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Telecommunications Regulation Handbook

Edited by
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The logo for infoDev, featuring the word "infoDev" in a lowercase, serif font. Above the "i" in "info" are five small dots arranged in a slight arc.

Telecommunications Regulation Handbook

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McCarthy Tétrault

Telecommunications Lawyers and Consultants

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Foreword

It is a pleasure for us to present this Telecommunications Regulation Handbook.

The preparation of this book was partially funded by a grant from the *infoDev* Program of The World Bank Group. In funding the book, we recognized the fundamental importance of an appropriate regulatory environment to accelerate connectivity and access to information services. The objective of *infoDev* in supporting this project was to provide regulators and others involved in the regulatory process with a practical reference source on the methods used to regulate the telecommunications sector around the world, focussing on best practices.

The authors have succeeded in providing a clear and straightforward description of major regulatory practices used in the telecommunications sector around the world. The focus is on practices that promote the efficient supply of telecommunications services in a competitive marketplace.

The practice of telecommunications regulation is constantly evolving and there will undoubtedly be different views on which approach to use in a given market at any point in time. While the advice and opinions expressed in this book do not necessarily reflect the views of *infoDev* or The World Bank Group, we believe that the book will make a valuable contribution to the understanding of telecommunications regulation around the globe.

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We are pleased to provide this foreword for the Telecommunications Regulation Handbook.

Staff of the International Telecommunication Union have collaborated in the preparation of this handbook, and we recommend its reading for regulators and others involved in the telecommunications sector around the world.

The book provides a useful compilation, in a single volume, of descriptions and analyses of regulatory practices and approaches applied in a wide range of countries.

This type of information will be particularly important to members and staff of the new separate regulatory authorities that have been established in more than 90 countries around the world in the last decade. However, it will also be of interest to the policymaking community and to those in the private sector involved with the regulatory and policy aspects of the telecommunications sector.

The book was prepared with input and assistance from the ITU Telecommunication Development Bureau and the ITU Strategies and Policy Unit. However, the views expressed in the book are those of the authors and do not necessarily reflect the opinions of ITU or its members.

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Preface and Acknowledgements

It is not an easy task for busy professionals to write a book on their area of practice. The task has both challenges and rewards. While this book was being written, our practice group advised on the privatization of a major telecommunications company in one country, the resolution of interconnection disputes in three countries, the licensing, establishment or financing of new telecommunications operators in half a dozen countries, and other telecommunications projects on five continents.

The challenge was finding the time to write the book. The reward was the constant cross-fertilization of ideas and experience between our telecommunications practice and our work on the book. We frequently incorporated ideas from our practice in the book, and vice versa. Therefore, our first acknowledgement must go to our clients: telecommunications companies, investors, regulators, governments and international financial institutions, among others. We learned from them all.

The principal authors of this book were Jeremy Oliver, Edgardo Sepúlveda and myself. However, we received a lot of help from other members of the McCarthy Tétrault telecommunications practice group across Canada and in Europe. Some wrote sections of the book, others provided invaluable comments, information and advice. Grant Buchanan, Julio Montero and Steve Rawson made major contributions. Other members of our group who provided comments and support include Tim Ellam, Peter Grant, Tony Keenleyside, Monique Lafontaine, Charles Morgan, Michel Racicot, Georges Racine, Lorne Salzman, and Elspeth Williams. Finally, the book would not have been completed without the extraordinary efforts of Mary Riccobene.

We gratefully acknowledge the support of the *infoDev* Program of The World Bank which provided funding for the production of the book. Special thanks to Peter L. Smith, who acted as project task manager and Carlos Braga, who leads the *infoDev* Program.

We also wish to acknowledge the support and assistance from representatives of the ITU's Telecommunication Development Bureau and Strategies and Planning Unit, particularly Doreen Bogdan-Martin, Don Maclean, Ben Petrazzini and Susan Schorr. Their comments, as well as access to ITU reports, data and contacts, greatly facilitated the task of writing the book.

Our thanks to all of the members of the handbook editorial committee. They included some of the leading players in telecommunications regulation and sector reform around the world. We are grateful to the committee members who sent us missives through cyberspace, with constructively critical comments, information and text revisions that significantly improved the quality of the book. Members of the editorial committee are listed on the previous page.

Finally, I must acknowledge some of the book's shortcomings. Given our time and budget, we did not set out to produce a comprehensive text on all aspects of telecommunications regulation. Some significant areas of regulation, particularly spectrum regulation and numbering, have been largely omitted. We could not cover approaches to regulation in all countries and regions. Instead, we attempted to focus on "best practices". We undoubtedly got it wrong in some cases. In addition, factual and other errors and dated references will have crept into the text. For this I apologize, and, as editor, accept personal responsibility. Any corrections or comments would be appreciated.

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MODULE 1

Overview of Telecommunications Regulation

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MODULE 1

OVERVIEW OF TELECOMMUNICATIONS REGULATION

1.1 Regulatory Objectives

1.1.1 Why Regulate Telecommunications?

The last decade of the 20th Century saw unprecedented changes in the global telecommunications industry. Numerous state-owned telecommunications operators were privatized, and a wave of pro-competitive and deregulatory telecommunications policies swept the world. New market-based approaches to the supply of telecommunications services were introduced in scores of countries.

This liberalization of telecommunications markets was motivated by various factors, including:

- Increasing evidence that more liberalized telecommunications markets were growing and innovating faster and serving customers better
- The need to attract private sector capital to expand and upgrade telecommunications networks, and to introduce new services
- Growth of the Internet, which caused data traffic to overtake voice traffic in many countries, and led to the introduction of many new service providers
- Growth of mobile and other wireless services, which provided alternatives to fixed networks

and introduced new service providers to telecommunications markets

- Development of international trade in telecommunications services, which are increasingly provided by transnational and global service providers

As market-based approaches were adopted during the 1990s, the number of national telecommunications regulatory authorities increased from 12 to over 90 around the world. To some this appears ironic. Shouldn't the market-based supply of telecommunications be accompanied by less regulatory intervention, rather than more?

The consensus answer around the world is yes – in the long run, but no in the short run. The successful transformation of monopolistic telecommunications markets into competitive ones requires regulatory intervention. Without it, viable competition is not likely to emerge. In fact, the times when privatization and the introduction of significant competition occur can be the busiest periods in the life cycle of a regulatory organization.

Regulatory intervention is required for a variety of reasons. Typically, regulators must authorize or license new operators. They must often remove barriers to market entry by new operators. They must oversee interconnection of new entrants with incumbent operators. Regulatory intervention may

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also be required to ensure competitive markets do not fail to serve high cost areas or low income subscribers.

The objectives of telecommunications regulation vary from country to country. Governments in most countries continue to see telecommunications as an essential public service. Even after telecommunications networks are no longer run by them, governments normally retain a regulatory role to ensure that telecommunications services are supplied in a manner consistent with national perceptions of the public interest.

With the widespread adoption of market-based approaches to the supply of telecommunications services, there is a growing consensus that regulators should not be involved in detailed "management" of the sector. Instead, the regulators' role is seen to involve maintenance of a regulatory environment conducive to the efficient supply of

telecommunications services to the public. The service suppliers will generally be private sector operators.

The trend today is toward deregulation. Some traditional forms of telecommunications regulation are now viewed as having been more damaging than beneficial to the development of national telecommunications infrastructure and services. Today, when regulatory measures are proposed or reviewed, governments and regulators must generally ensure that (1) there is a demonstrated need to regulate, and (2) the most efficient measure is selected to meet the specific regulatory objective.

While regulatory measures vary from country to country, the main objectives of telecommunications regulation are often similar. Box 1-1 lists some regulatory objectives that are widely accepted around the world today.

Box 1-1: Widely Accepted Regulatory Objectives

- > Promote universal access to basic telecommunications services
- > Foster competitive markets to promote:
 - > efficient supply of telecommunications services
 - > good quality of service
 - > advanced services, and
 - > efficient prices
- > Where competitive markets do not exist or fail, prevent abuses of market power such as excessive pricing and anti-competitive behaviour by dominant firms
- > Create a favourable climate to promote investment to expand telecommunications networks
- > Promote public confidence in telecommunications markets through transparent regulatory and licensing processes
- > Protect consumer rights, including privacy rights
- > Promote increased telecommunications connectivity for all users through efficient interconnection arrangements
- > Optimize use of scarce resources, such as the radio spectrum, numbers and rights of way

1.1.2 Expansion of Telecommunications Regulation

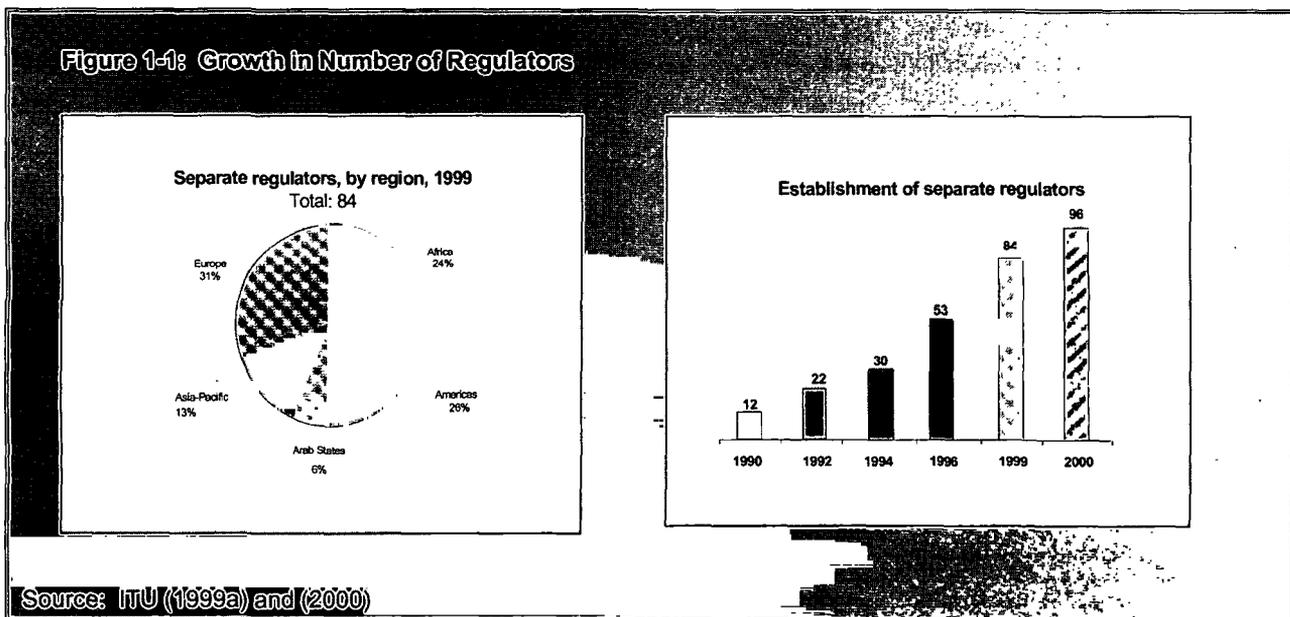
Government regulation of private sector telecommunications operators began in the US and Canada in the late 19th Century. However, in most of the world, telecommunications networks were operated by government administrations for most of the 20th Century. In most countries, governments ran telecommunications operations in the same way as government postal, rail or highway transportation services. This situation changed dramatically over the past ten years, as dozens of countries privatized their telecommunications operations.

The number of telecommunications regulators has increased rapidly over the past few years. Several factors precipitated this growth in regulation. The major factor is the implementation of telecommunications reforms that led to the separation of the policy, regulatory and operational functions of telecommunications.

Regulatory agencies were established at the same time that many government telecommunications

administrations were privatized. The overall objective of these new regulators was to ensure that public policy objectives for the sector continued to be met. While government monopolies are not perceived to require regulation, private monopolies generally are. Introduction of competitors in many newly privatized markets also increased the need for new regulators, to act as referees between the new entrants and incumbent operators.

ITU data indicate that in 1990, 12 countries had telecommunications regulatory agencies that functioned separately from telecommunications operators. The term "separate regulators" generally refers to agencies that operate separately from government ministries or PTTs that are also responsible for the provision of telecommunications services. By August 1999, that number had increased to 84. Nine new regulators were established between mid-1998 and mid-1999. In late 2000, the number was around 96 and increasing. The growth in the establishment of separate regulators is illustrated graphically in Figure 1-1.



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While the growth of regulatory authorities is remarkable, it should be kept in perspective. In many cases, new regulators replace existing PTT or Ministry functions. Therefore, in some countries, the establishment of separate regulators may not result in an increase in the number of government officials with regulatory functions. Also, while there is likely to be an increase in regulatory activity around the time of privatization and the introduction of competition, the level of regulatory intervention can be expected to drop significantly once competitive markets are established.

1.1.3 Implementing Telecommunications Sector Reform

While government policy officials usually introduce telecommunications sector reforms, regulators must implement many of these reforms. Good regulation is required to ensure the success of sectoral reforms. Table 1-1 summarizes major reforms that have been introduced, and are continuing to be introduced around the world. The table also lists major objectives for the introduction of these reforms.

Table 1-1: Major Global Telecommunications Sector Reforms and Associated Objectives

Reforms	Major Objectives
Privatization of PTTs	<ul style="list-style-type: none"> ➤ Attract financing to expand telecommunications infrastructure ➤ Increase sector efficiency, introduce new services ➤ Generate government revenues from privatization proceeds
Licensing of Competitive Operators	<ul style="list-style-type: none"> ➤ Expand range of services; serve unserved markets ➤ Increase sector efficiency through competition ➤ Decrease prices, improve range and supply of services ➤ Stimulate innovation and introduce advanced services ➤ Generate government licensing revenues
Introduction of Transparent Regulatory Processes	<ul style="list-style-type: none"> ➤ Increase success of licensing processes & government credibility ➤ Increase government revenues from licensing new services ➤ Increase market confidence, attract more investment
Mandatory Interconnection and Unbundling of PSTN	<ul style="list-style-type: none"> ➤ Remove barriers to competition ➤ Promote competition in advanced services (e.g. broadband Internet)
Price Cap Regulation	<ul style="list-style-type: none"> ➤ Better incentives for efficient service supply by dominant firms ➤ Simpler method than ROR regulation to prevent excessive pricing ➤ Reduce regulatory lag; ensure timely price adjustments
Targeted Universal Access Funds	<ul style="list-style-type: none"> ➤ Increase efficiency and effectiveness of universality policies ➤ Replace less transparent and potentially anti-competitive cross-subsidies
Removal of Barriers to International Trade in Telecommunications	<ul style="list-style-type: none"> ➤ Increase investment in telecommunications sector ➤ Improve competition in telecommunications markets ➤ Improve global communications

While a number of these reforms were perceived as radical when they were first proposed 10 or 20 years ago, many have become the generally accepted standards today. As these reforms were introduced in an increasing number of countries, some have become incorporated into trade agreements and international trade policies. Most significantly, the *WTO Agreement on Basic Telecommunications (ABT)* and its Regulation Reference Paper incorporate a number of these reforms. The ABT is discussed in several Modules of this Handbook and the Reference Paper is reproduced in Appendix A.

1.2 Regulatory Organizations

1.2.1 The Role of National Government Authorities

Until recently, in many countries, a single Ministry or other government administrative unit performed the roles of telecommunications policy maker as well as owner and operator of the national telecommunications network. No need was perceived for a regulator in this environment. The same government officials were often involved in policy decisions, policy implementation and operation of the telephone service.

Privatization and market liberalization has led to a re-organization of the government institutions involved in the telecommunications sector. The most common institutional model used in developed market economies around the world today, is illustrated in Table 1-2.

The structure set out in Table 1-2 is compatible with the market-based supply of telecommunications services, rather than government-based supply. It

also facilitates compliance with the *WTO Regulation Reference Paper*, in that it provides for a regulator that is separate from the telecommunications operator, and that can resolve interconnection disputes. This structure has the following features:

- Government officials can set policies in the national interest, without conflicting concerns based on their role as owners, managers or employees of telecommunications operators. In particular, governments are more inclined to introduce significant competition in telecommunications markets if they do not also run the main operator.
- Separate regulatory authorities can implement government policy in an objective and impartial manner. Separation from state-owned telecommunications operators increases the ability of regulators to act impartially toward all market participants, for example in matters involving competition policy or interconnection.
- Market confidence in the impartiality of regulatory decisions generally increases with the degree of independence of regulators from both operators and governments. Such market confidence promotes increased foreign and domestic investment in both incumbent operators and new entrants in the sector.
- Privately owned operators can make rational economic decisions about the supply of telecommunications services, without conflicting concerns arising from government ownership.

Table 1-2: Standard Institutional Structure in Developed Market Economies

Function	Responsible Organization
Policy Development	Government Ministry or Executive Branch
Regulation	Separate Regulatory Authority
Network Operations/Service Provision	PTOs (privately or commercially operated)

➤ For example, some PTTs traditionally maintained excessively large work forces for political or other non-economic reasons. This resulted in inefficiency and added costs for consumers. In most cases, privatization of telecommunications operations has increased the supply of telecommunications services and reduced costs. "Commercialization" of state-owned operators can also increase immunity from government interference, relative to traditional PTTs. However, the degree of immunity depends on the degree of independence granted to the "commercialized" state operators.

While there continue to be different views about the best institutional structure for the telecommunications sector in different countries, the model described above has clearly become the standard one. Other models are often seen as transitional, with recognition that the "standard" model will ultimately be adopted.

In some countries, other government ministries or agencies may play key roles in the telecommunications sector. For instance, a competition authority may be an important component of the institutional structure (the respective roles of a general competition authority and a sector-specific telecommunications regulator are discussed in detail in Module 5). Other organizations that may play a significant role in determining the overall economic environment of the telecommunications sector include ministries of finance and ministries of planning, as well as privatization and tax authorities. All of these institutions can play particularly important roles at the time of privatization. However, once privatization is completed, they often take on a more secondary role to the three entities described in the "standard mode".

1.2.2 The National Regulatory Authority

An increasing number of governments have developed an institutional structure of the type illustrated in Table 1-2, which includes a separate national regulatory authority. A variety of approaches have been developed to establish and operate such regulatory authorities. In the following sections we consider five major issues that frequently arise:

- Independence of the Regulator
- Funding of the Regulatory Process
- Single Regulators and Collegial Commissions
- Multi-Sector Regulators
- Organization of Regulatory Staff

1.2.2.1 Independence of the Regulator

As illustrated in Table 1-2, the standard institutional structure for the telecommunications sector around the world today includes a separate regulator. What is most important in this regard is separation of the regulator from the telecommunications operator(s) in the market. Such separation inspires market confidence and promotes compliance with international trade obligations.

Of equal importance in the eyes of many experienced telecommunications experts is independence of the regulator from governments. In practice the degree of such independence varies considerably from country to country. It depends on the legal, political and institutional structure of each country. Regulators in few, if any, countries enjoy complete independence from governments. At a minimum, most regulators are appointed and paid by governments, and have budgets established or controlled by them.

There are good reasons for increasing the degree of independence of regulators from governments. Such independence increases perceived neutrality and insulation from political or operational pressures. This perception of independence is particularly important where a government retains ownership of the PTO.

Telecommunications operators and investors will generally have greater confidence that an independent organization will regulate a market objectively and transparently. This can lead to increased investment in the sector and to related benefits for the economy. Such confidence will, however, depend on the credibility of the regulator. It must have a demonstrated capability to regulate in a professional and impartial manner.

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In some countries, separation of regulators from the general government administration also provides an opportunity to pay higher salaries to regulatory officials. This can be important in developing and transitional economies where extremely low government pay scales can make it difficult to attract and retain highly qualified and non-corruptible staff. The best staff of regulators in such countries can easily be lost to the private sector if the regulators' pay scale is not competitive.

Finally, it must be clear that "independence" of the regulator does not mean independence from the laws and policies of a country. The mandate of an independent regulator should be clearly spelled out in national laws. Regulators should be accountable to legislatures or other government bodies. Such accountability should include mechanisms, such as annual reports or legislative hearings, in which the regulator must demonstrate in a transparent manner that it has properly exercised its mandate.

1.2.2.2 Funding the Regulatory Process

It is essential to provide adequate funding for the regulatory process. Funding is required to hire good calibre professional staff and consultants that can implement regulatory objectives. Without adequate funding, regulation will not usually be effective. Regulatory objectives related to the opening of competitive markets and the establishment of a level playing field are not likely to be achieved.

Separate regulators can be funded in a number of ways. Traditionally, regulatory functions were funded out of general government budget appropriations, particularly when the functions were carried out within Ministries of Communications or PTT Administrations. Budget appropriations are also used for many separate regulators. However, licence fees and spectrum fees paid by operators provide an increasingly common means to fund the regulatory function.

A typical approach to levying licence fees is to distribute the costs of running the regulatory functions among all licensed telecommunications operators in proportion to their gross telecommunications revenues. Thus, in the early years, the incumbent operator (e.g. the former PTT) may pay 90% of the regulator's costs because it earns 90% of

telecommunications revenues in the sector. Over time, however, the licence fees payable by the incumbent will decrease, as other operators gain market share.

There are advantages to funding a regulator through licence and spectrum fees rather than government appropriation. Licence fees provide a way of recovering the costs of government services on a "user pay" basis. Telecommunications sector licence fees can generate a sufficiently large source of revenues to ensure the regulatory function is carried out in a professional manner, something that cannot always be assured by cash-strapped governments in developing economies. Other segments of society and the economy are not burdened with the regulatory costs. There is some accountability and greater transparency to determine when regulatory budgets are being spent well, and when they are not. The issue of licence fees is discussed further in Module 2.

1.2.2.3 Single Regulators and Collegial Commissions

Telecommunications regulators first emerged in the US and Canada at the end of the 19th Century. These regulators were structured as quasi-judicial boards or commissions. While these regulators were led by a chairperson, they were essentially collegial organizations. Decisions were typically made by consensus or, in case of controversy, by a majority vote. As the complexity of regulation increased, these regulators eliminated some of their judicial trappings, and hired an increasing number of technical, professional and support staff.

When new telecommunications regulators were established around the world in the 1990s, many were headed by a single director general, or other official. This structure was similar to other government organizational models used in some of the countries where the new regulators were established. An early example was Oftel, the UK regulator, which was established in 1984, when British Telecommunications was privatized. As with the commission model, regulators headed by a single official are usually assisted by various technical, professional and support staff, as well as outside consultants.

In the latter part of the 1990s, the commission approach became more popular again. The 1999 ITU Trends Report indicates that six of the nine new regulators established between July 1998 and August 1999 were collegial bodies, composed of between five and eleven members. New regulators established in Albania, Bulgaria, Egypt, Greece, Kenya, Malawi and Malaysia are all collegial bodies.

There are advantages and disadvantages to both the hierarchical and collegial approaches. Neither can be said to be superior in all cases. However, several observations can be made:

- Single regulators can act more quickly and decisively than collegial bodies.
- Collegial bodies provide checks, balances and collegial support for the decision-makers. Decisions can therefore be more thoroughly debated and considered.
- Large collegial bodies can lead to less cohesion and consistency than small ones or single regulators.
- Some countries with large collegial bodies have reduced them in size to increase decision-making efficiency (e.g. the US).
- Some collegial bodies, especially large ones, have part-time members. Such members usually find it more difficult to keep abreast of developments in rapidly changing telecommunications markets.
- Collegial bodies are somewhat less susceptible to "capture" by regulated companies. However, financially insecure regulators of both types may be motivated by future career prospects in the industry. Government tenure or other forms of security can mitigate this concern.

In practice, both single regulators and collegial commissions often rely heavily on professional staff and consultants for fact gathering, analysis, and recommendations. In some cases, regulatory staff are empowered to make some types of regulatory decisions. This is the case, for example, for staff

Bureau Chiefs of the FCC in the US. Thus, while the final decision on important regulatory matters and directions will rest with the single regulator or commission, depending on the model, much of the staff work and more routine decision-making can be very similar under both models.

1.2.2.4 Multi-Sector Regulators

Telecommunications regulators usually have sector-specific regulatory functions. In most cases, they are responsible for regulating only telecommunications markets. In some cases, they also have regulatory functions in adjacent markets. Examples include broadcasting (e.g. Canada and the US) and information services generally (e.g. Singapore and Malaysia). South Africa has established a merged telecommunications and broadcasting regulator (ICASA) on 1 July 2000.

A different approach that is well worth considering involves the establishment of a multi-sector regulator. Such an agency typically regulates telecommunications as well as other industry sectors with similar economic and legal characteristics. Examples of such sectors include electrical power generation and distribution, oil and gas pipelines, postal services, transportation and water utilities.

Multi-sector regulators, often referred to as public service commissions, existed for many years in Canadian provinces and states of the US. They have also been established in some developing economies, such as Bolivia, El Salvador, Jamaica and Panama. The multi-sector approach was also seriously considered, but recently rejected in the UK. Box 1-2 sets out some of the advantages and disadvantages of the multi-sector regulatory approach.

Other considerations are relevant in deciding whether a multi-sector regulatory approach works in any particular country. In most countries, reform occurs at different times in different industry sectors, such as telecommunications, energy, and water. It may be impractical to establish multi-sector regulatory agencies, for example, where the telecommunications industry has been privatized, but energy and water services continue to be supplied by government administrations.

Box 1-2: Advantages and Disadvantages of Multi-Sector Regulators

Key Advantages

- Reduce risk of “industry capture” because the creation of a regulator with responsibility for more than one sector can help avoid the rule-making process being captured by industry-specific interest groups
- Reduce risk of “political capture” because a regulator with responsibility for more than one sector will necessarily be more independent of the relevant line Ministries. The broader range of entities regulated by such a regulator will be more likely to resist political interference in a decision on, say, price regulation in one sector since that could set a precedent for other sectors
- Create more precedents, and therefore less uncertainty, for investors because a decision by an MSR in relation to one sector on a regulatory issue common to other sectors (e.g. the application of price cap regulation or cost accounting rules) will set a precedent that is valuable to potential investors in those other sectors
- Economies of scale in the use of one set of high-calibre professionals (e.g. economists, lawyers, financial analysts). Such economies are particularly important during the early stages of liberalization and privatization in a TDC when there is likely to be a scarcity of regulatory experience

Other Advantages

- Economies of scale in administrative and support services (e.g. computers, office space, support staff), particularly important where the costs of regulation can have a real impact on the affordability of basic services
- Flexibility in dealing with “peak load” periods, such as periodic price reviews, where intensive regulatory expertise is needed which may be spread across sectors if a multi-sectoral approach is adopted
- Economies of scale in the development and implementation of the regulatory agency whereby, for example, uniform rules on licence award or dispute settlement procedures can extend to more than one sector and, therefore, avoid the need to “re-invent the wheel” for each sector

Key Disadvantages

- Increase risk of “industry capture” by a dominant industry player not only of the single sector regulator but of the entire MSR body
- Increase risk of “political capture” by a dominant ministry of not only the single sector regulator but of the entire MSR body
- Increase risk that a precedent set in relation to one sector could be applied inappropriately in another sector (although this can also be mitigated by creating strong sector-specific departments underneath a central cross-sectoral decision-making body)
- Dilution of sector-specific technical expertise required where, for example, the skills of a tariff expert for one sector are not transferable to similar tariffing issues in another sector, or, for example, of a frequency engineer

Other Disadvantages

- Failure by the regulator cascades to other sectors
- Difficulty in achieving acceptance by relevant line Ministries of the concept of having an MSR
- Subsequent difficulty in achieving consensus from the relevant line Ministries on the type of MSR to be established
- Greater complexity in establishing the legal framework for the MSR, including the level of independence and allocation of functions as between the Minister and the regulator
- Potential delays in the reform process due to the disadvantages mentioned above

Box 1-2: Advantages and Disadvantages of Multi-Sector Regulators (cont'd)

- Transfer of regulatory know-how between regulators responsible for different sectors; again, this is particularly important when a country has limited experience in regulation
- Effective means of dealing with converging sectors (e.g. telecommunications and broadcasting where it is increasingly difficult to decide what is a telecommunications and what is a broadcasting service, for example video-on-demand, or telecommunications and posts, for example email and fax re-mailing)
- Effective means of dealing with the bundled provision of services (e.g. provision of both telecommunications and electricity by the same company) and with co-ordination requirements between sectors (e.g. where companies from a number of different sectors all need to dig up the same roads to construct their networks)
- Avoidance of market distortions due to the application of different rules to competing sectors (e.g. electricity and gas, or road and rail)
- Merging existing agencies may be problematic

Source: Schwartz, T. and Satola, D. (2000)

Finally, many variations are possible on the theme of multi-sector regulation. The choice is not simply between one single multi-sector regulator and a series of single-sector ones. As indicated above, Canada's CRTC regulates two similar and converging sectors, telecommunications and broadcasting, but no others. The CRTC's predecessor, the Canadian Transportation Commission, regulated a variety of industries, including telecommunications (but not broadcasting), air and rail transportation. However, at that time, gas pipelines, electrical power and other infrastructure industries fell under the authority of different regulators. Other combinations are possible.

1.2.2.5 Organization of Regulatory Staff

There are many ways to organize the decision-makers, management, staff and other advisors of a regulatory agency. No one approach is ideal. Much will depend on the institutional structure and the

workplace culture of a country. The structure of the regulator will also play a role. For example, the staff of collegial commissions may be, but is not always, structured differently from that of an organization reporting to a single director general. Multi-sector regulators will have different structures from single-sector regulators, since professional staff such as economists, lawyers and accountants will deal with telecommunications issues one day, and electrical power regulation the next.

The main factors determining organizational differences are the functions and objectives of different regulatory agencies. Some telecommunications regulators are responsible for spectrum management, licensing of new operators and regulation of broadcasting and other content services. Others are not. Some must actively regulate prices. Others are merely responsible for verifying compliance with a price cap regime prescribed in a long term licence, or adjusting the X-factor in a price cap regime every

few years. Different functions and objectives require different types and levels of professional assistance.

For these reasons, it would not be useful to prescribe an ideal model for a regulatory organization. However, some general observations can be made:

- Regulatory decision-making requires multidisciplinary skills. Specific types of regulatory decisions require qualified economists, engineers, lawyers, accountants and financial analysts. However, many other decisions benefit from having a range of different professional skills and perspectives brought to bear. Where high-calibre professional skills are not immediately available within the public service, outside experts should be brought in. Experts with hands-on experience with established regulators can be particularly valuable. Outside experts can be replaced as good permanent staff are hired and trained.
- The telecommunications environment is changing rapidly. Accordingly, regulatory organizations should not establish rigid hierarchies; they should be flexible and adaptable. Many effective regulatory organizations employ a “task force” or “working group” approach to staffing teams to advise on important regulatory decisions. These task forces are often selected from different branches of the regulatory organization. They are frequently brought together solely for a specific project.
- Consideration should be made to contracting out specific regulatory functions, rather than building large permanent staff organizations. This approach is recommended by the authors of the regulatory strategies checklist for developing economies (Table 1-4). They provide the following examples. Audit firms can monitor compliance with operating licence conditions. In Argentina, a private contractor monitors compliance with radio spectrum rules. External experts can also resolve operator disputes, leaving final decisions to the regulators. Many other examples exist.

1.2.3 International Agencies

The following sections describe the organization and functions of various international organizations that play an important role in telecommunications regulation.

1.2.3.1 International Telecommunications Union (ITU)

Overview of the ITU

The ITU was founded in Paris in 1865 as the International Telegraph Union. It changed its name to the International Telecommunication Union in 1934, and became a specialized agency of the United Nations in 1947.

The ITU is a global organization which includes public and private sector participation on telecommunications matters. The ITU’s mission covers the following areas or “domains”:

- **technical domain:** to promote the development and efficient operation of telecommunications facilities, in order to improve the efficiency of telecommunications services, their usefulness, and their general availability to the public;
- **development domain:** to promote and offer technical assistance to developing countries in the field of telecommunications; to promote the mobilization of the human and financial resources needed to develop telecommunications; and to promote the extension of the benefits of new telecommunications technologies to people everywhere;
- **policy domain:** to promote, at the international level, the adoption of a broader approach to the issues of telecommunications in the global information economy and society.

As of 1 July 2000, the ITU comprised 189 Member States and over 600 Sector Members. The latter include scientific and industrial companies, public and private operators, broadcasters and regional/international organizations.

Structure of the ITU

Under its constitution, the ITU's organizational structure comprises the following elements:

- The **Plenipotentiary Conference**, which is the supreme authority of the Union. It meets every four years to:
 - (a) adopt the strategic plan and fundamental policies of the organization;
 - (b) amend the Constitution and Convention as required; and
 - (c) adopt a financial plan for the next four-year period.
- The **Council**, which is composed of 46 ITU Member States (representing 25% of the Union's membership). The Council acts on behalf of the Plenipotentiary Conference and meets annually to consider broad telecommunications policy issues in order to ensure that the Union's policies and strategies respond to the constantly changing telecommunications environment. The Council is also responsible for ensuring the efficient co-ordination of the work of the Union and the approval of its budgets.
- **World Conferences** on International Telecommunications, which are convened periodically to review and revise the *International Telecommunication Regulations*. The Regulations are an international treaty governing the provision and operation of public telecommunications services, as well as the underlying transport mechanisms used to provide them. The Regulations provide a broad, basic framework for telecommunications administrations and operators in the provision of international telecommunications services.
- The **Radiocommunication Sector** (ITU-R) is charged with establishing technical characteristics and operational procedures for wireless services. The Sector also plays a key role in the management of the radio frequency spectrum. In its role as global spectrum co-ordinator, the Radiocommunication Sector develops the *Radio Regulations*, a binding set of international rules

that govern the use of the radio spectrum by some 40 different radiocommunications services around the world. The Sector also acts, through its Bureau, as a central registrar of international frequency use. It records and maintains the Master International Frequency Register which currently includes around 1,265,000 terrestrial frequency assignments, 325,000 assignments servicing 1,400 satellite networks, and another 4,265 assignments related to satellite earth stations.

In addition, the ITU-R is responsible for co-ordinating efforts to ensure that communications, broadcasting and meteorological satellites can co-exist without causing harmful interference to one another's services. In this role, the ITU facilitates agreements between operators and governments, and provides practical tools and services to help frequency spectrum managers carry out their day-to-day work.

The legislative and policy functions of the Radiocommunication Sector are performed by world radiocommunications conferences, which adopt and revise the *Radio Regulations*, by regional radiocommunications conferences, and by radiocommunications assemblies supported by study groups.

- The **Telecommunication Standardization Sector** (ITU-T) co-ordinates the international telecommunications standards-setting activities which result in the ITU-T Recommendations. The Standardization Sector carries on the standardization efforts of the ITU which span more than 130 years. Today, these efforts include development of standards for Internet Protocol (IP) networks, and IP-based systems.

The majority of the membership of the ITU-T comes from the private sector. Given the rapid pace of technical and market developments, the Telecommunication Standardization Sector's main challenge is in speeding up time-to-market progress of its Recommendations. The legislative and policy functions of the Standardization Sector are carried out through World Telecommunication Standardization Assemblies, supported by study groups.

- The **Telecommunication Development Sector** (ITU-D) discharges the ITU's responsibilities as a United Nations specialized agency and as an executing agency for implementing projects under the United Nations development system or other funding arrangements.

The ITU calculates that a lack of reliable access to basic telecommunications services affects around two-thirds of its 189 member countries. It is the task of the ITU-D to help redress this imbalance by promoting investment and the implementation of telecommunications infrastructure in developing nations throughout the world.

The ITU-D maintains a regional presence via 11 offices located in Africa, the Arab States, Asia, the Caribbean and Latin America. The Telecommunication Development Sector's two Study Groups discuss key telecommunications development issues and policies. They also establish best business practices for the deployment, management and maintenance of networks and services. Special attention is paid to the needs and concerns of the UN-designated Least Developed Countries.

Sector activities range from policy and regulatory advice, advice on the financing of telecommunications and on low-cost technology options, assistance in human resource management, as well as well as the development of initiatives targeting rural development and universal access. The ITU-D emphasizes partnerships with the private sector.

ITU-D also produces a range of information resources which provide analysis of trends in the global telecommunications sector backed by official statistics from the world's leading source of telecommunications information. Examples include the *World Telecommunication Development Report* (WTDR), which provides a comprehensive overview of transition in the telecommunications industry and the annual *Trends in Telecommunication Reform* (Trends). Trends is based largely upon the annual *Telecommunication Regulatory Survey* conducted by the Telecommunication Development Bureau. The Bureau monitors world telecommunications reform and maintains a regulatory database for governments reforming their telecommunications sectors.

The policy functions of the Development Sector are fulfilled by World and Regional Telecommunication Development Conferences supported by study groups.

- **The General Secretariat:** Manages the administrative and financial aspects of the ITU's activities, including the provision of conference services, the management of the IT infrastructure and applications, long range strategic planning, and corporate functions (communications, legal advice, finance, personnel and common services).

The General Secretariat is also responsible for organization of the world and regional TELECOM Exhibitions and Forums.

1.2.3.2 Other International Organizations

Organizations Interested in Telecommunications Regulation

A large number of international organizations play a role in telecommunications regulation and regulatory reform. For some, telecommunications regulation is a major part of their mandate. Others deal with it as an ancillary matter. An example of the latter is the WTO, which has dealt with telecommunications regulation as a means of promoting its core objective of facilitating international trade.

The focus of the organizations listed below varies considerably. Some have regional or global mandates to improve regulation, or to carry out specific regulatory functions. Some promote regulatory reform. Others provide technical assistance and fund consulting resources, studies, workshops and other activities to increase regulatory know-how. Still others act as focal points for the exchange of information between regulators and other stakeholders in the telecommunications regulatory process.

International organizations with a major role in telecommunications regulation are listed in Table 1-3.

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Table 1-3: Selected International Organizations Interested in Telecommunications Regulation

Organization	Activities
<p>African Development Bank (AFDB) http://www.afdb.org</p>	<p>Like its Asian and Inter-American counterparts, the African Development Bank provides financial and technical assistance for the establishment, expansion, improvement and integration of public telecommunications systems in Africa. Its programs are aimed at infrastructure development, increasing access to telecommunications services and improving the contribution of the telecommunications sector to its members' economic growth. It also aims to improve the competitiveness of Africa's telecommunications industry, and provide the conditions for its participation in the information economy. Among the main activities of the bank is the provision of support for privatization and strengthening of institutional frameworks.</p>
<p>African Telecommunications Union (ATU)</p>	<p>ATU co-ordinates the development of an African telecommunications networks. It promotes telecommunications development in Africa by serving as a regional discussion forum. (Formerly known as Pan-African Telecommunications Union.)</p>
<p>Caribbean Telecommunication Union (CTU) http://www.ctu.org</p>	<p>CTU promotes telecommunications development and regulatory reform by serving as a regional discussion forum. It also promotes co-ordination of the international policies of its 13 English-speaking Caribbean member states.</p>
<p>Common Market for Eastern and Southern Africa (COMESA) http://www.comesa.org</p>	<p>COMESA serves the English-speaking sub-regions of Eastern and Southern Africa. In collaboration with the ITU, COMESA's Transport and Communications Division provides technical assistance in several areas, including network connectivity and tariffs.</p>
<p>European Bank for Reconstruction and Development (EBRD) http://www.ebrd.org</p>	<p>The EBRD is an international financial institution established along somewhat similar lines as The World Bank Group, and particularly one of its members, the International Finance Corporation (see description of The World Bank below this table). The EBRD supports telecommunications privatization in Central and Eastern Europe and in the former Soviet Union (FSU) through the provision of equity or long-term debt financing to newly privatized companies and by providing pre-privatization finance. The EBRD provides support for new network operators in local, domestic and international long distance, and mobile telephone services. It also supports regulatory reform through its Technical Co-operation Programme, which has provided assistance to national authorities in establishing and improving the telecommunications legal and regulatory framework.</p>
<p>European Conference of Post and Telecommunications Administrations (CEPT) http://www.cept.org</p>	<p>CEPT's Telecommunications Committee (ECTRA) promotes co-operation between member administrations and bodies responsible for telecommunications policy and regulation. Its activities include harmonization of licensing conditions, spectrum management and numbering.</p>

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Table 1-3: Selected International Organizations Interested in Telecommunications Regulation (cont'd)

<p>European Commission – DGIS http://www.europa.eu.int</p>	<p>The EU shapes telecommunications law and policy in Europe through legally binding instruments. Its directives on different aspects of telecommunications liberalization aim at developing a common market for telecommunications service and equipment throughout Europe. The Directorate-General for the Information Society (DGIS) implements the European Commission's policies in the area and elaborates the economic, political and social analyses on which such policies are based. The DGIS supports telecommunications sector reform through programs and initiatives, which include monitoring activities and assistance in the establishment of regulatory frameworks consistent with the Commission's policies. The European Union provides additional support for economic reform in Central and Eastern Europe through development programs such as PHARE and TACIS.</p>
<p>European Telecommunications Office (ETO) http://www.eto.dk</p>	<p>ETO supports the establishment of new regulatory regimes for liberalized telecommunication markets and promotes the harmonization of existing regulations. It promotes the establishment of common procedures for licensing and numbering. ETO also provides a forum for discussion and analysis of national situations and undertakes studies on issues of topical concern. Recent ETO studies cover the areas of licensing, pricing, numbering and mobile number portability.</p>
<p>Gulf Co-operation Council (GCC)</p>	<p>The Telecommunications Department of the GCC has assisted Persian Gulf member states to co-ordinate telecommunications services tariffs, adopt the GSM mobile telephony standard and harmonize the curriculum taught at academic institutions and training centres in GCC member states. It also works with the ITU to promote harmonization and standardization processes.</p>
<p>Inter-American Development Bank (IADB) http://www.iadb.org</p>	<p>The IADB provides financial assistance for the establishment, expansion, improvement and integration of public telecommunications systems. It also provides technical assistance at all stages of the projects it finances and supports its member countries in the rationalization of telecommunications activities, with special emphasis on institutional reform and strengthening of regulatory capabilities. Its areas of involvement include local networks and rural telephony.</p>
<p>Inter-American Telecommunications Commission (CITEL) http://www.citel.oas.org</p>	<p>As the principal advisory body to the Organization of American States (OAS) on matters related to telecommunications, CITEL's main objectives are to facilitate and promote the development of telecommunications in the Americas, in order to contribute to the overall development of the region.</p>
<p>International Finance Corporation (IFC) http://www.ifc.org</p>	<p>A member of The World Bank Group (see separate description below this table). Together with the World Bank, IFC works through the new Global Information and Communications Technology Group (GICT) to promote the development of the telecommunication sector in emerging economies, particularly through private participation. The IFC has financed a large number of telecommunications projects throughout the developing world in areas such as basic wireline services, cellular telephony, equity funds for telecommunications service providers and equipment manufacturers, as well as satellite, wireless local loop and cable television operations.</p>

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Table 1-3: Selected International Organizations Interested in Telecommunications Regulation (cont'd)

<p>International Institute of Communications (IIC) http://www.iicom.org</p>	<p>The IIC is a multidisciplinary organization that brings together policy makers, regulators, academics and industry players. It provides a forum for the exchange of ideas on topics related to telecommunications and their commercial, cultural, political and social implications. It maintains an active publication program, hosts an annual conference and organizes international fora on a regular basis.</p>
<p>International Telecommunication Union (ITU) http://www.itu.int</p>	<p>See separate description of ITU above this table.</p>
<p>Latin American Forum of Telecommunications Regulators (REGULATEL) http://www.regulateel.org</p>	<p>REGULATEL encourages co-operation and co-ordination of efforts among 16 Latin American telecommunications regulatory agencies and promotes the development of telecommunications in the region. It provides a forum for discussion and for the exchange of information and experience in telecommunications policy and regulation.</p>
<p>Mercosur (Southern Common Market) http://www.mercosur.org.uy</p>	<p>Mercosur supports telecommunications liberalization among its members (Argentina, Brazil, Paraguay and Uruguay). Through its Public Telecommunications Services Commission, Mercosur promotes regional telecommunications development, harmonization of spectrum management and equipment certification and homologation as well as the exchange of information on telecommunications topics.</p>
<p>Organization for Economic Co-operation and Development (OECD) http://www.oecd.org</p>	<p>The OECD publishes data and studies on telecommunications markets. It promotes telecommunications reform as a means to achieve sustainable growth and employment that contributes to economic and social welfare, as well as to the expansion of world trade.</p>
<p>Pacific Telecommunications Council (PTC) http://www.ptc.org</p>	<p>PTC membership includes individuals, businesses and non-profit entities. It provides a forum for discussion and exchange of information on telecommunications in the Pacific area. It promotes regulatory reform and general awareness of the telecommunications sector in the area. PTC organizes conferences and seminars and interacts with national, regional and international organizations responsible for telecommunications policy and regulation.</p>
<p>Regional African Satellite Communications Organization (RASCOM) http://www.rascom.org</p>	<p>Among RASCOM's main objectives is the improvement of inter-urban communications in its member states through the establishment of direct satellite links between African countries. It also promotes the provision of telecommunications service to rural and remote areas.</p>
<p>Regional Commonwealth in the Field of Communications (RCC)</p>	<p>RCC co-ordinates network development, technical standards and spectrum management activities in CIS countries. It also co-operates with its members in the development of principles governing tariff policy as well as network interconnection and interoperability. In addition, the RCC is involved in joint research and development programs, and the training of communications specialists.</p>

Table 1-3: Selected International Organizations Interested in Telecommunications Regulation (cont'd)

<p>Telecommunication Regulators Association of Southern Africa (TRASA) http://www.trasa.org</p>	<p>TRASA's main goal is to increase communications and co-ordination between regulatory authorities in the Southern Africa region. TRASA seeks to encourage investment in the telecommunications sector by supporting the creation of a common enabling environment. The member states of the Southern African Development Community (SADC) are committed to undertaking initiatives to improve the economic and social well-being of their populations through telecommunications sector reform.</p>
<p>West African Telecommunications Regulators Association (WATRA)</p>	<p>WATRA was formed in September 2000 by West African telecommunications regulators, as a regional organization similar to TRASA (see above).</p>
<p>The World Bank Group http://www.worldbank.org</p>	<p>See separate description below this table. Members of The World Bank Group provide loans, equity and guarantees to developing countries. They also provide information, advice and assistance on telecommunications sector reform and national information infrastructure strategies.</p>
<p>World Trade Organization (WTO) http://www.wto.org</p>	<p>The WTO is the international body responsible for the administration of the <i>General Agreement on Trade in Services (GATS)</i>, which includes an Annex on Telecommunications and a Protocol regarding basic telecommunications services. This Protocol, officially known as the <i>Fourth Protocol to the GATS Agreement</i>, is referred to throughout this Handbook as the <i>WTO Agreement on Basic Telecommunications</i> (see Appendix A and Appendix C: Glossary). The WTO provides a global forum for trade negotiations and dispute resolution. The WTO also monitors national trade policies and provides technical assistance and training for developing countries concerning the implementation of their WTO commitments, including required regulatory reforms.</p>

Multilateral and Bilateral Development Organizations

A number of multilateral and bilateral development organizations have an interest in telecommunications regulation. These organizations focus on countries with developing and transitional economies. The goal of such development organizations is generally to assist in establishing a regulatory framework that will promote telecommunications sector development – and with it, general economic development.

These organizations generally provide technical assistance to governments and regulators to promote the development of a sound regulatory structure. Such technical assistance may include advice from expert staff resources, payment for independent telecommunications advisors (economists, lawyers

and other consultants), training programs, seminars, workshops and staff exchanges.

Some major multilateral development organizations active in promoting telecommunications sector restructuring and regulatory reform are listed in Table 1-3. These organizations include:

- The World Bank Group, including:
 - International Bank for Reconstruction and Development (IBRD);
 - International Development Association (IDA);
 - International Finance Corporation (IFC); and

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- Multilateral Investment Guarantee Association (MIGA).
- European Bank for Reconstruction and Development (EBRD);
- Asian Development Bank;
- African Development Bank;
- Inter-American Development Bank; and
- Andean Development Corporation.

Many bilateral development organizations also play a role in promoting regulatory development. These include national development organizations such as US AID, Denmark's DANIDA, and Canada's CIDA. They also include regional programs aimed at promoting telecommunications development, such as the European Commission's PHARE program.

A comprehensive review of the role of multilateral and bilateral development organizations in telecommunications sector regulation is outside the scope of this Handbook. We will describe one key institution, The World Bank, in greater detail. The World Bank has been active in the telecommunications field for many years, and a description of its changing role illustrates a trend common to some other major development organizations.

The World Bank

The World Bank Group has played an important role in telecommunications sector reform, including regulatory reform, in developing and transitional economies.

In the past, the Bank provided a significant source of direct financing for the expansion of telecommunications infrastructure by PTTs. Since the mid-1990s, Bank lending to state-owned enterprises has been contingent on a firm commitment from its client governments to sector reform. Such commitments have included a clear exit strategy for government's involvement in the ownership and management of telecommunications operators. Alternatively, commitments have included specific progress in reform aimed at commercializing, privatizing, facili-

tating entry into the sector and making the sector more efficient.

The Bank has been a catalyst in promoting privatization and market-based solutions to the development of the telecommunications sector. The Bank's goal has been to create a sustainable environment to attract private investment required to accelerate and sustain telecommunications sector development. Accordingly, Bank policy advocates using scarce official funds mainly to support sector reforms, including regulatory reform, that are likely to mobilize private capital and management to develop the sector.

In terms of a regulatory framework, the Bank advocates separating the government's policy and regulatory functions from telecommunications operations. It supports (a) strengthening the government's capacity to formulate and oversee policy, and (b) creating a regulatory regime and institutions that emphasize competition while keeping regulatory intervention to a minimum.

Consistent with its poverty-reduction goals, the Bank encourages governments to develop strategies to extend telecommunications services throughout the population, including the least privileged groups.

Today, the Bank is leading the way in supporting solutions to alleviate the effects of the digital divide. The Bank's aim is to encourage investments as well as policy and regulatory reforms to create a liberalized environment which will foster the development of communications infrastructure. Such an environment should also promote access to and use of the emerging knowledge-based global economy in the fight against poverty.

The Bank is also active in the development and dissemination of information resources to promote regulatory reform and to strengthen regulatory capabilities. For example, *infoDev*, a multi-donor grant facility administered by the Bank, provides funding for innovative projects that use information and communications technologies to facilitate economic and social development at the local, national, regional and global levels.

infoDev, through its networking with governments, multilateral and bilateral donors, the private sector

and not-for-profit organizations, provides links to technical, informational and communications expertise available throughout the world. The program has provided funding to support the ITU Regulatory Colloquia and other initiatives to expand regulatory knowledge and experience, including the preparation of this Telecommunications Regulation Handbook.

1.3 The Regulatory Process

Regulators employ a variety of regulatory procedures. Depending on the legal framework, they may issue different types of “regulatory instruments”, such as regulations, decisions, orders, decrees, rules, policies, notices, resolutions. In general, the effect of these instruments is to make “decisions” that implement regulatory policies, resolve disputes, or deal with other matters within the regulators’ mandate. In this section, we focus on the general process used in making regulatory decisions. The discussion in this section disregards the country-specific legal form that such decisions may take.

Regulatory decision-making can be difficult. Interested parties may vigorously promote and lobby in support of different outcomes for many regulatory decisions. In most cases, some parties will be happy with a regulatory decision, and others will not. Decisive regulators necessarily create winners and losers in some situations. Indecisive regulators may try to avoid offending anyone by delaying decisions, or creating unworkable compromises. Such indecision and compromises can damage development of the sector and ultimately help no one.

The principles of good regulatory decision-making are well known. They include:

- Transparency;
- Objectivity;
- Professionalism;
- Efficiency; and
- Independence

The laws and jurisprudence of most countries provide guidance and constraints on the regulatory decision-making process. Procedural rules vary from country to country and legal system to legal system. However, there are common trends.

Two “fundamental rules” of procedural fairness in common law countries are worth noting. While they are not legally binding on regulators in many other countries, they are widely respected. Adherence to them will often alleviate political and public relations problems as well as legal challenges. These rules are:

(1) Provide all interested parties with an opportunity to comment or otherwise make their case, before making a decision that affects them. This rule is sometimes expressed by means of the Latin maxim *audi alteram partem* or “hear the other side”. Breach of this procedural rule will lead the courts to quash regulatory decisions in some common law jurisdictions. In other jurisdictions, this rule is part of the unwritten code of basic procedural fairness applied by regulators. The rule has a pragmatic basis, as well as a legal one. Unless perspectives of all interested parties are taken into account, regulators risk making decisions that ignore important factors. Taking those factors into account can lead to different and better decisions. Application of this rule promotes transparent decision-making.

(2) “Don’t be a judge in your own cause”. This rule is based on another Latin legal maxim: *nemo iudex in sua causa debet esse*. The rule has been interpreted to mean that regulators should avoid bias as well as the perception of bias. They should not make decisions on matters in which they have a personal interest. Nor should they make decisions on matters where a reasonable person, knowledgeable of all the facts, would perceive a real likelihood of bias. In the words of the jurisprudence: “justice must not only be done, it must be seen to be done”. Perceptions of regulatory bias can stem from any number of factors, from a relative’s financial interest in a matter, to a former position as part of the management of a PTO that is the beneficiary of a regulatory decision. Application

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of this rule promotes objectivity and credibility of the regulatory process.

While these common law rules are not mandatory and do not cover all the bases of good decision making, they will promote credible and impartial good decision-making. Various other rules and principles for good regulatory decision-making have been promulgated by different regulators. A good example of such principles was developed by the Australian regulator. These principles are summarized in Box 1-3.

A variety of procedures are available to assist regulators to make better regulatory decisions. The choice of procedures will vary with the objectives of the decision-making process. Depending on the circumstances, the following approaches should help regulators achieve the hallmarks of good decision-making, namely: transparency, objectivity, professionalism, efficiency and independence:

> Use public processes, wherever time permits. Issue public notices inviting comments on proposed rules or approaches to regulating the industry and other major decisions. Publish ads in newspapers or other media to let the public know about such opportunities.

> Design public processes that will improve the quality of public input. Provide background information and options for the decision to be made, in notices or consultation documents. This approach helps to focus industry comments and to provide more useful input on the issues to be determined by the regulator. This approach has been used successfully in a wide range of countries, such as Jordan, South Africa, the US, the UK and Colombia.

> Publish all significant regulatory developments on a regulatory web site. The web site can also be used to invite the industry and other members of the public to comment on pending regulatory decisions. Publish decisions, rules, procedures, notices, and consultation papers on web sites. Provide links to other useful sites for parties wishing to participate in the regulatory process. Require major operators to provide useful public information, such as rates, service options and complaint procedures, on their web sites.

> Provide written information requests to major operators on complex matters. Have them provide the regulator with technical, financial

Box 1-3: Principles of Proper Decision Making

1. Decisions must be within legal authority of regulator
2. The regulator must consider all relevant matters and disregard irrelevant ones
3. Decisions must be made in good faith and for proper purposes
4. Factual underpinnings of decisions must be based on evidence
5. Decisions must be reasonable
6. Those affected by a decision must be accorded procedural fairness (including the right to respond to prejudicial arguments and evidence that may be taken into account)
7. Government policy must be properly applied
8. Independent regulators must not act on the direction of other persons

Note: These principles were adapted from those developed by the Australian Communications Authority

and economic information necessary to make informed decisions. Ask them to provide detailed arguments and evidence on actions that the regulator is considering.

- Encourage electronic filing of applications, comments and all other material filed by interested parties. If necessary to protect sensitive confidential information, provide for secure electronic filing. In other cases, encourage public filings that are accessible and transparent to the industry and other interested parties.
- Use alternative dispute resolution techniques to resolve complex issues. These include mediation and arbitration. Consider hiring independent experts as mediators and arbitrators. They can report to the regulator for guidance or a final decision, where necessary.
- Follow the basic steps to informed decision-making. Decide what type of information would be relevant in making a decision. Determine the best means to gather appropriate information (e.g. staff research, consultants studies, information requests to operators, etc.). Provide an opportunity for comment on the evidence by interested parties and the public; and make a decision based on the public record, wherever possible.
- Streamline decision-making where possible. Establish and publish schedules for decision-making processes – and stick to them.

1.4 Principles for Effective Regulation

Although telecommunications markets around the world are in transition, the basic direction of change is similar in most countries. It is therefore not surprising that the principles of effective regulation around the world are converging. However, application of these principles will vary considerably, depending on the structure and state of evolution of a particular telecommunications market, the resources of the country, its legal framework and regulatory capabilities.

In the following sections, we review basic principles for effective regulation that can be applied in different circumstances.

1.4.1 Minimize Regulatory Intervention After Competition is Established

Regulation should be kept to a minimum, particularly in competitive markets. The evidence from around the world indicates that freely competitive markets are better able to meet the demands of consumers than government controlled ones. The advantages of privatization and liberalization can be lost, or severely limited by burdensome regulatory measures.

The extent of regulation should be geared to the state of development in a market, and particularly the level of competition. As competition increases, regulation should decrease.

However, there must often be decisive regulatory intervention in the early stages of market liberalization, in order to ensure effective competition has a chance to emerge. Clear decisions to remove barriers to competition early in the process will stimulate competition and permit greater deregulation down the line. While markets are being opened to competition, regulation should normally be focussed on the incumbent operators, whose networks must be open to interconnection and unbundled to permit new entrants to be viable.

There is a tendency among new regulators to try to be “even-handed” and to treat incumbent operators and new entrants the same. This approach can actually increase regulatory intervention over the longer term. It can impose unnecessary burdens on new entrants, and prevent implementation of “asymmetrical” regulatory initiatives that will open the PSTN to competition.

This lesson has taken some time to learn. Initially, for example, many regulators have declined to intervene decisively in interconnection disputes, suggesting that competitive entrants and incumbent operators should “freely negotiate” the terms of interconnection with the PSTN. It took years for some regulators to realize that most incumbent PSTN operators had few incentives to negotiate favourable interconnection agreements with their would-be

competitors. Rather than minimizing regulation, this hands-off approach can lead to repeated regulatory intervention on interconnection issues over a protracted period of time.

Over the years, more and more regulators have realized that decisive regulatory intervention is required to implement interconnection arrangements that will substantially increase competition. Such intervention includes proactive regulation, that is advance guidelines, as well as dispute resolution. Regulatory thinking is evolving on this subject.

Regulation of interconnection represents one of a small number of exceptions to the general rule. In most cases, regulation can and should be minimized. Interventionist measures should always be assessed against their objectives. Are the objectives valid? If so, are the measures the least intrusive means of achieving the objectives?

A recent European case provides an example where these questions were asked, and a less interventionist regulatory approach was adopted. For many years governments in various countries have administered testing and certification programs for terminal equipment attached to telecommunications networks. This approach was reviewed by the EU in an effort to reduce unnecessary regulation. As a result, the EU recently decided to abandon its previous approach to regulation of terminal equipment in favour of industry self-reporting. The 1999 EU *Directive on Radio and Telecommunication Terminal Equipment*, requires only manufacturers' declarations of conformity with essential requirements. This type of regime should permit new technologies to be introduced more quickly, with fewer regulatory delays or other barriers.

This European example may not be applicable in some developing countries, where, for example there is no effective frequency spectrum monitoring. However, in all countries, new regulatory measures should be assessed carefully to ensure they provide the most efficient means of achieving valid objectives.

1.4.2 Harmonize with Regional and Global Regulatory Standards

The basic technologies and economics of the telecommunications industry are the same around the world. Today, a small group of manufacturers is responsible for producing the majority of switching, transmission, terminal, software and related network facilities used almost everywhere. Even where there are variations in technology or local applications, the same basic network architectures are employed. The trend to harmonization of telecommunications technology is increasing.

The basic economics of telecommunications service markets is also the same in most countries. Businesses and consumers all demand telecommunications services, with increasingly advanced features, at the lowest possible price. Other things being equal, suppliers that meet that demand best will succeed. Those that fail to compete successfully will be bypassed by consumers and their competitors. While the ability of businesses and consumers to pay for services varies greatly, this variation does not account for the large differences in approaches to regulation around the world. Equally rich countries have often taken very different regulatory approaches, as have equally poor ones.

Regulatory differences are often ascribed to differences in the legal, institutional, political or cultural framework of different countries. These differences are important, but generally do not justify substantial differences in technical or economic aspects of regulation.

Telecommunications markets are increasingly becoming regional and global markets. While successful telecommunications service providers will always be close to their customers, they must think globally in terms of their business and competitive strategies. Regulators should do the same.

Regulators that impose uniquely local regulatory burdens, or more costly requirements than other countries, can handicap players in their national markets. Similarly, regulators that protect national operators from regulatory disciplines that apply in other countries are doing them no favours. Such regulators will retard competition, service innovation and possibly economic growth by failing to

implement the same pro-competitive regimes as neighbouring countries.

Over time, global regulatory standards or “best practices” are emerging. Some of those are evident from the list of major global telecommunications sector reforms in Table 1-1. Others are discussed throughout this Handbook. Examples of such standards are price cap regulation and targeted universal service funds (as opposed to inter-service cross-subsidy by incumbent PSTN operators). Other regulatory practices are newer, such as the various approaches to requiring unbundling of the local loop.

Some regulatory standards or practices are being adopted in trade agreements and other international accords. Prime examples are the regulatory disciplines included in the *WTO Regulation Reference Paper* (see Appendix A).

In this context, it is interesting to note that in late July 2000, the US announced that it would request WTO consultations with Mexico regarding that country's alleged failure to implement its commitments under the *Agreement on Basic Telecommunications*. This is the first time a country has taken a dispute on barriers to competition in a telecommunications market to the WTO. The three issues put forward by the US for the consultations are: 1) lack of effective disciplines over the former monopoly, Telmex, which is able to use its dominant position in the market to thwart competition; 2) failure to ensure timely, cost-oriented interconnection that would permit competing carriers to connect to Telmex customers in order to provide local, long-distance, and international service; 3) failure to permit alternatives to an outmoded system of charging U.S. carriers above-cost rates for completing international calls into Mexico.

Regulators that are concerned about maintaining the competitiveness of their domestic telecommunications markets should monitor international regulatory trends and become early adopters of trends that will increase efficiency and competition in their markets. Telecommunications regulation can be complex without re-inventing the wheel in each market. In most cases, economic and technical regulatory techniques that have proven themselves in some markets will work in other similar markets. Increased communication between regulators and regulatory

organizations to harmonize regulatory approaches can certainly improve regulation.

1.4.3 Introduce Competition

It is widely recognized that the benefits of competition in the supply of telecommunications services and facilities far outweigh any disadvantages. Today, telecommunications markets have been opened to varying degrees of competition in most countries around the world.

Over the last decade, the most dramatic progress in liberalizing telecommunications markets occurred in Europe and other OECD countries. Most telecommunications services in Europe were provided on a monopoly basis at the beginning of the decade. By the end of the decade, over 96 per cent of the OECD market, measured by total telecommunications revenues, was open to competition.

Significant liberalization has also occurred in telecommunications markets in other economies throughout the Americas, Eastern Europe and the FSU, Africa and the Asia-Pacific region. Based on ITU data for 1999, the most open telecommunications markets globally were in cellular services (67 per cent) and Internet services (72 per cent). Basic telecommunications services markets remained fairly closed. About 73 per cent of global basic telecommunications markets continued to have monopolies at the beginning of 1999. However, there is no doubt about the trend. Basic telecommunications markets are being opened to competition in all regions. It is in this area that regulators will face the greatest challenges.

Regulatory involvement is generally required to ensure the establishment of viable competition. This is not the case in all industries. However, the structure of the telecommunications industry and the nature of telecommunications networks are such that regulation is required. Regulatory intervention is required to meet a number of objectives related to the introduction of competition. Key objectives discussed in detail later in the Handbook are:

- To license new competitors and existing operators on terms and conditions that will provide a

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clear and certain basis for both to attract investment (see Module 2).

- To ensure interconnection of networks and services, and to resolve interconnection disputes (see Module 3).
- To prevent incumbent operators from abusing their dominant position to drive new competitors out of telecommunications markets (see Module 5).
- To prevent dominant operators from charging excessive prices for services over which they have market power, and using the proceeds to cross-subsidize their services in competitive markets (see Module 4).
- To ensure universality objectives are achieved in a competitive environment (see Module 6).

Without regulatory intervention to achieve such objectives, there is a good prospect that competition will fail to produce the benefits that have been achieved in the world's more competitive markets.

1.4.4 Regulate by Principle

Regulators are prone to regulate "after the fact". Sometimes, they wish to avoid regulatory intervention. In other cases, they are unsure of the right approach to take on a disputed regulatory issue. In some cases they do not have the resources and professional advice necessary to rule confidently on complex issues.

Delays in deciding major regulatory issues can retard development in the sector. Interconnection issues provide prime examples. If regulators do not provide clear advance guidance on interconnection principles, parties may negotiate for months or years, and service introduction will be delayed.

Regulators will understandably want to be careful to avoid decisions on complex issues without careful consideration. However, in many cases they can establish principles to be applied by the industry, without spending an undue amount of time on the details of implementation. Those details can often be left to the industry. Announcement of the principles in advance can often expedite industry discussions.

Good international practices are emerging on the principles for dealing with many types of regulatory issues. An example is the pricing of unbundled interconnection facilities. The calculation of telecommunications costs can be very complex and time consuming for a regulator. However, making a decision in principle that interconnection facilities should be priced at a level equal to estimated LRIC (Long Run Incremental Costs) plus a mark-up for forward looking common costs, is not that difficult. General principles and practices for such costing and pricing decisions have been adopted in many countries. Best practices are often clearly established and it is not that risky to adopt them.

Regulatory decisions, even ones to adopt general principles, should always be made in a transparent manner. Providing opportunities for public comment on whether a regulatory principle should be adopted will generally improve the quality of the decision as well as the credibility of the regulatory process.

1.4.5 Establish Operational Efficiencies

Sharing experiences with other regulators can often lead to operating efficiencies. Regulatory operations can clearly be more efficient today than ever before. The Internet, electronic filing of regulatory applications and electronic publication of regulatory decisions have vastly improved the efficiency and transparency of regulation. The costs of establishing a regulatory web site and arranging for electronic

Box 1.4: Highlights of 1999 Plan to Overhaul the FCC

- Receive 70% of filings electronically within two years, and by 100% within five years
- Reduce backlogs of pending items for action by 60% in two years, and by 100% in five years
- Reduce staff by authorizing buyouts of surplus FCC employees
- Authorize use of nonagency experts and consultants

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filing of reports, applications and other regulatory communications has declined to a level where every regulator can use such approaches to increase regulatory efficiency.

Regulators have adopted many different approaches to improve operational efficiency. An example of one regulator's approach is set out in Box 1-4, which includes highlights of the FCC's plan to expedite its internal processes in the US.

1.4.6 Strategies for Effective Regulation in Developing Economies

While the principles of effective regulation are similar in most countries, some may be applied differently in developing economies. There are significant differences in resource and other constraints in developing economies from those of OECD economies. This obviously has implications for regulation. Regulators in developing and transitional economies have a greater need for practical and straightforward approaches.

Table 1-4: Regulatory Strategy Checklist: Primary (•) and Secondary (✓) Benefits

Measure	Reduce Need for Agency Decisions	Enhance Regulatory Credibility	Use Resources Effectively
Accelerate competition	•	✓	✓
Prepackage regulatory rules	•	✓	✓
Establish rules for interconnection	•		✓
Keep operators' obligations reasonable	•		✓
Focus licensing on the main operators	•		✓
Rebalance prices early	•		✓
Reduce regulation as competition develops	•		
Adopt transparent process		•	
Harness public support		•	
Lock in principles through international commitments		•	
Outsource regulatory functions			•
Adopt alternative dispute resolution	✓	✓	•
Put the operators to work		✓	•
Consider multisectoral agencies			•
Create regional capacity			•

Source: Smith, P. and Wellenius, B (1999)

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The principles listed above can generally be adapted to the needs of developing and transitional economies. However, telecommunications experts with experience in telecommunications regulation in such economies have developed additional

strategies, which have proven to be effective there. A good paper on such strategies was published by the senior telecommunications experts of The World Bank in 1999. The regulatory strategies checklist from this paper is reproduced in Table 1-4.

MODULE 2

Licensing Telecommunications Services

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MODULE 2

LICENSING TELECOMMUNICATIONS SERVICES

2.1 Introduction

2.1.1 Telecommunications Licences

A telecommunications licence authorizes an entity to provide telecommunications services or operate telecommunications facilities. Licences also generally define the terms and conditions of such authorization, and describe the major rights and obligations of a telecommunications operator.

Licences for new entrants in telecommunications markets are frequently granted by means of a competitive licensing process, which involves the selection of one or more operators from a group of applicants. In other cases, general authorizations are issued. These authorize any entity that complies with the basic terms and conditions of the authorization to provide a telecommunications service, without the need for an individual licence.

Licensing is a relatively recent development in many telecommunications markets. Historically, state-owned incumbent operators provided telecommunications services on a monopoly basis in most markets. Telecommunications operations were treated as a branch of the public administration, along with postal services, road transportation and other government services, and licences were not considered necessary.

In many cases, licences for incumbent operators were prepared as part of their privatization process. By specifying the rights and obligations of such operators, investors were provided with some certainty as to the business in which they are investing. The licence provides all stakeholders, including consumers, competitors and the government with a clear understanding of what the operator is and is not permitted or required to do.

Licences are particularly significant in the context of emerging and transitional economies. Licences provide certainty for investors and lenders, and with it the confidence that is required to invest the millions or billions of dollars required to install or upgrade telecommunications infrastructure in such economies.

Licences do not have the same importance in all countries. In a few countries where monopoly telecommunications operators have long been privately owned, notably the US and Canada, there have traditionally not been telecommunications licences. Instead, regulatory terms and conditions were imposed through decisions, orders or tariff-approval processes of a government regulatory authority. In some other countries, including Latin American countries, privately-operated telecommunications carriers were traditionally granted concessions or franchises.

While the terms “licence”, “concession” and “franchise” may be defined differently in the laws of different countries, these terms generally refer to the same basic concept. In the context of telecommunications regulation, they all refer to a legal document granted or approved by a regulator or other government authority that defines the rights and obligations of a telecommunications service provider. For the sake of simplicity, we will use the term “licence” only in this Module. In most cases, however, what is said about licences applies equally to concessions and franchises.

The process of licensing incumbents and new entrants is sometimes handled by independent telecommunications regulators and sometimes directly by governments or Ministers. In this Module, for ease of reference, we will generally refer to the licensing authority as the “regulator”. This term is intended to include other licensing authorities, such as Ministers.

No matter which government authority is responsible, the licensing process is generally one of the most important “regulatory” processes undertaken in the course of reforming the telecommunications sector. The licensing process is integrally tied to the structure of telecommunications markets, the number and types of operators, the degree of competition between them, the revenues earned by governments in opening markets, and, ultimately, the efficiency of the supply of telecommunications services to the public.

2.1.2 Licensing Objectives

Governments and regulators normally have several different objectives for licensing telecommunications operators. Common licensing objectives are set out below:

- (i) **Regulating Provision of an Essential Public Service** – Basic telecommunications is viewed as an essential public service in most countries. While there has been an irreversible trend toward privatization and reliance on market forces, most governments continue to impose some controls to ensure basic telecommunications services are provided in the public interest. Licences

are an important tool for exercising such control in most countries.

- (ii) **Expansion of Networks and Services and Other Universal Service Objectives** – This is a major reason for licensing new telecommunications operators in most countries. Network roll-out and service coverage obligations are often included in licences. This is particularly the case where a state-owned incumbent operator (a PTT) is privatized, or some degree of exclusivity is granted (e.g. a duopoly cellular licence, with a right to use scarce spectrum). Licences are an important tool for expanding infrastructure investment and promoting universal service and universal access objectives in developing countries. (Universal service objectives are discussed in detail in Module 6).
- (iii) **Privatization or Commercialization** – A licence is necessary where a state-owned incumbent (a PTT) is privatized. The licence specifies the rights and obligations of the operator. It is a key document in the privatization process. It specifies what the investor is buying and what the government expects from the operator and the investor.
- (iv) **Regulating Market Structure** – A key aspect of regulation is the determination of the market structure of the telecommunications sector, and in particular, the number of operators licensed to provide telecommunications services. In many countries a prime reason for licensing new telecommunications operators is to increase competition. Licensing of new operators has made competition the dominant mode of supply in some telecommunications markets (e.g. cellular, ISP), but not yet in others, including basic services. Figure 2-1 illustrates the different levels of competition in various telecommunications markets around the world. A major objective of the licensing process in many markets is to ensure the viability and benefits of new competitive entry. On the other hand, while licensing initiatives can increase competition, licensing requirements can also provide a

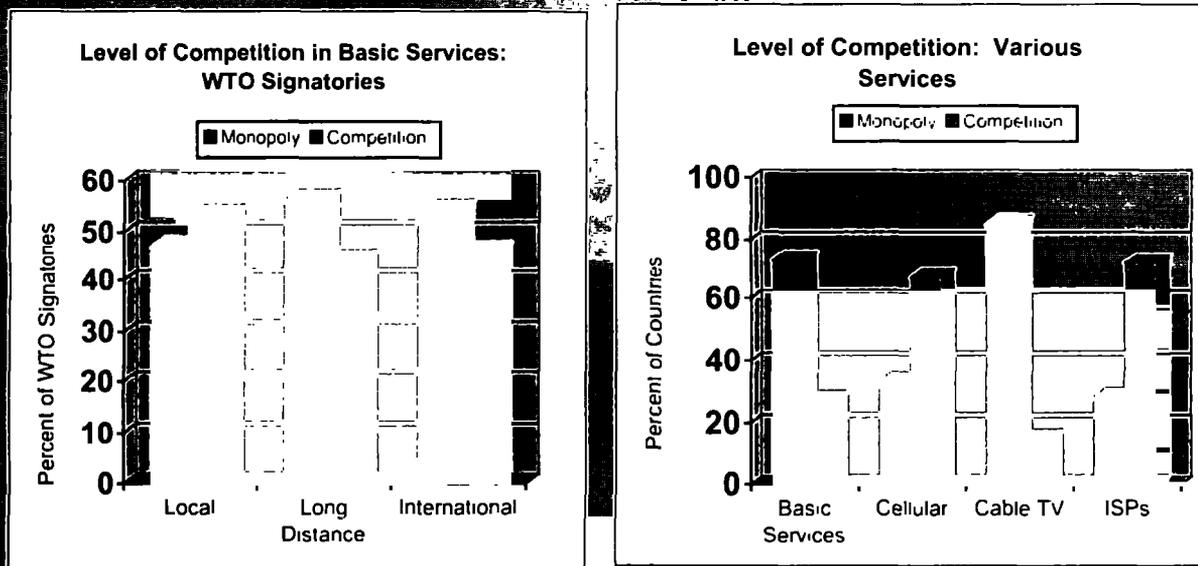
means to limit market access. This is the objective of licensing authorities in some countries, where licences have granted or retained monopoly, duopoly or other exclusive rights. Such rights are often retained for political or financial reasons. For example, governments in many countries have increased privatization proceeds to government coffers by granting monopoly rights to the newly privatized operator for a fixed term. While maintenance of monopolies generally reduces efficiency in telecommunications markets, many governments have accepted this as a “transitional” problem, in order to generate cash for purposes like debt reduction. In these cases, liberalization generally proceeds in stages.

- (v) **Establishing a Competition Framework** – Licences frequently include conditions to establish a “level playing field” for competi-

tion, and to limit the prospects that incumbent operators will abuse their dominant position in telecommunications markets. Such conditions are generally referred to in licences as “anti-competitive safeguards” or “fair trading conditions”. (Examples of such conditions are discussed in greater detail in Modules 3, 4 and 5).

- (vi) **Allocation of Scarce Resources** – Finite resources required in the operation of a telecommunications service (such as radio spectrum, numbers and rights of way) should be allocated between operators fairly, efficiently and in the public interest. This allocation often requires a balancing of competing interests and priorities. Spectrum, for instance, may be auctioned to the highest bidder or allocated at low cost to reduce prices or to encourage the rollout of new services. Access to rights of way can

Figure 2-1: Licensing Competitive Operators



Source: ITU (1999)

be a source of revenue to government authorities or public utilities, but economic or other restrictions on access can delay the rollout of services and lead to higher consumer prices.

- (vii) **Generating Government Revenues** – Licensing of telecommunications operators and of radio spectrum can provide significant revenues to governments. An auction for new licences can generate one-time revenues. In addition, annual licence fees often provide a continuing source of revenue to fund the operations of the regulator, or for other purposes. In addition, licensing of new operators can increase the overall size of telecommunications markets and thus generate higher tax revenues for governments.
- (viii) **Consumer Protection** – Conditions relating to consumer protection are often included in telecommunications licences. Such conditions may relate to matters such as price regulation, billing practices, consumer complaint mechanisms, dispute resolution, limitations of liability for service defaults, and mandatory services to consumers (e.g. directory services, operator assistance and emergency services).
- (ix) **Regulatory Certainty** – By clearly defining the rights and obligations of the operator and the regulator, a licence can significantly increase confidence in the regulatory regime. Regulatory certainty is a critical element of the licensing processes where the aim is to attract new operators and investment. This is particularly true in the case when foreign investment is sought in riskier developing or transitional economies.

2.1.3 Licences and Other Regulatory Instruments

In most countries, licences comprise only one element of the regulatory framework. Other rules that govern operators are included in telecommunications laws, sector policies, regulations, decrees, orders, decisions, guidelines, directions and other documents of general application.

Whether an operator's rights and obligations are set out in a licence or by some other means is generally determined by two factors:

- requirements of local law, and
- the level of development of the local regulatory framework.

Matters that are dealt with in licences in some countries are dealt with in other regulatory instruments in different countries. For example, in Mexico, the quality of service standards and targets for Telmex were included in the licence (concession) prepared for Telmex prior to its privatization. In Canada, quality of service standards and targets are set out in decisions and orders of the regulator, the CRTC.

Privatization and liberalization first occurred in Europe in the United Kingdom in the early 1980s. At that time, the concept of telecommunications regulation was new to the UK. There was no existing regulatory framework. Therefore, the licence issued to British Telecom was prepared as a largely self-contained regulatory code. It governed most aspects of the operations of BT and granted a variety of exclusivity rights, such as a limited monopoly for basic voice services and limitations on simple resale. Similarly, the licence for Mercury, the first fixed-link competitor in the UK, contained a fairly comprehensive regulatory code for that operator.

A similar model was adopted in a number of other countries in Europe and elsewhere as incumbent operators were privatized and new operators were licensed.

As indicated above, some countries, particularly in North America, have no tradition of issuing comprehensive licences that spell out detailed regulatory regimes. In the United States and Canada, detailed regulatory rules are typically contained in regulations, decisions, orders or tariffs made or approved by the regulator. Accordingly, when Canada implemented a licensing regime for certain telecommunications operators for the first time in 1998, the regulator issued very short (2 page) licences for international service operators. The balance of the rules governing these operators is set out in other regulatory instruments.

Module 2 – Licensing Telecommunications Services

Countries that do not have a clear regulatory framework and that intend to license new operators, or attract investment in incumbents, will need to develop fairly comprehensive licences. Some countries that have initiated privatization and liberalization without clear and detailed licences or other regulatory instruments have experienced serious problems due to regulatory uncertainty.

In other countries, without a clear regulatory framework, certainty has been achieved at an early stage through the use of comprehensive licences. Examples include Hungary, Uganda, Morocco and Jordan. The more detailed licences have contributed to the success of privatization and new competitive entry. Table 2-5 provides an example of the fairly comprehensive contents of a PSTN licence in a developing country without a clear regulatory framework.

With increasing competition in telecommunications markets, it should be possible to reduce the detail of the regulatory framework included either in licences or in other regulatory documents. This trend is recognized in the 1997 European Union Directive on Licensing, and the subsequent July 2000 licensing proposals, which favour minimal licence conditions and the eventual elimination of the licensing requirement.

However, the situation remains different in less developed telecommunications markets, and especially in those with perceived high country risk, economic and governance problems. Most of these markets do not have clear or consistent regulatory policies or frameworks. In such markets, it will be important to develop clear and detailed licences as part of privatization and liberalization initiatives. There should be two key goals in preparing such licences:

- **Regulatory Certainty** – Where privatization and licensing transactions are implemented before a clear regulatory framework has been developed, the rights and obligations of operators should be clearly defined in licences. Regulatory certainty on key issues (such as interconnection, price regulation and competitive safeguards) will promote success of privatization and initiatives to promote new market entry. Uncertainty will reduce investor interest. It will also reduce

proceeds to governments from privatization sales or licensing fees.

- **Defining Exclusivity Rights** – Sector policy may call for the licensing of multiple operators, or it may grant exclusive monopoly (or duopoly) rights for specified periods of time. The granting of exclusivity rights generally increases government revenues from privatization and licensing transactions. However, as noted in Modules 1, 4 and 6, maintaining monopolies can limit sector growth and reduce operator efficiency to the detriment of consumers. Whatever policy is adopted on exclusivity, it should be clearly reflected in the licences of new operators in order to provide certainty to them, their investors and lenders.

2.1.4 Multilateral Trade Rules

The *General Agreement on Trade in Services* (GATS) and the 1997 *WTO Agreement on Basic Telecommunications* (ABT) of the World Trade Organization (WTO) include trade rules applicable to telecommunications regulation and licensing. Signatories to the ABT, as well as countries wishing to join the WTO, must bring their regulatory and licensing practices into compliance with WTO trade rules.

The trade rules relevant to the licensing process are summarized below. Further detail is provided in other Modules (e.g. trade rules affecting interconnection, fair competition and universal service). The central themes of all of these rules are evolution towards open competitive markets and transparent licensing processes.

(i) General GATS Requirements

All WTO member states are bound by the “general obligations and disciplines” of the GATS. Three of these are directly relevant to the licensing process:

- (a) Most Favoured Nation (MFN) Treatment (GATS Article II)– A licensing regime must grant market access to operators from a WTO member country on terms “no less favourable” than the terms applicable to operators from “any other country”.

(b) Transparency (GATS Article III) – All laws and rules affecting trade in services must be published. The Telecommunications Annex to the GATS specifically requires publication of, among other things, all notification, registration or licensing requirements, if any as well as any other forms of recognition and approval (e.g. type approval of terminal equipment) needed before foreign service suppliers can do business lawfully in a member country.

(c) Barriers to Trade (GATS Article VI) – Licensing requirements must not “constitute unnecessary barriers to trade”.

(ii) Specific ABT Commitments

The schedules to the GATS contain additional trade commitments by individual member countries concerning specific services, including basic telecommunications services. Further, national commitments made as part of the *WTO Agreement on Basic Telecommunications* require many countries to provide greater telecommunications market access. In many cases, implementation of these commitments is phased in over a period of several years.

The *WTO Regulation Reference Paper*, which was annexed to many countries' ABT commitments, binds them to adopt certain regulatory practices applicable to basic telecommunications services. Two of these commitments, which are set out in Box 2-1, are directly relevant to licensing.

The complete text of the *WTO Regulation Reference Paper* is set out in Appendix A.

2.1.5 The EU Licensing Directive

The 1997 EU Licensing Directive provides a detailed framework for telecommunications licensing in Europe. This framework is consistent with the WTO commitments of the EU. While it is only binding within the EU, the Directive provides a good approach for other countries to consider in developing their own licensing regimes.

The EU has recently published a proposal for new licensing Directive (*Proposal for a Directive on the authorization of electronic communications networks and services*, 12 July 2000). However, as discussed below, this new proposal largely represents a renewed effort to implement the harmonized and

Box 2-1: Licensing Rules in *WTO Regulation Reference Paper*

WTO Regulation Reference Paper – Commitments on Licensing Process

4 Public Availability of Licensing Criteria

Where a licence is required, the following shall be made publicly available:

- (a) All the licensing criteria and the period of time normally required to reach a decision concerning an application for a licence, and
- (b) the terms and conditions of individual licences.

The reasons for the denial of a licence will be made known to the applicant upon request.

6. Allocation and Use of Scarce Resources

Any procedures for the allocation and use of scarce resources, including frequencies, numbers and rights of way, will be carried out in an objective, timely, transparent and non-discriminatory manner. The current state of allocated frequency bands will be made publicly available, but detailed identification of frequencies allocated for specific government uses is not required.

deregulatory approach set out in the 1997 Directive. Therefore, we will focus on the 1997 Directive below.

The objectives of the EU in adopting the Directive are set out in Box 2-2.

The Directive encourages the use of general authorizations, which the British refer to as class licences. The proposed use for individual licences is restricted to public voice telephony and services using scarce resources. Conditions of general authorizations should be limited to those relating to “essential requirements”. The contents of this type of condition are described in Box 2-3. The licence conditions and eligibility criteria for general authorizations are to be published by the licensing authority. Any person who meets the criteria will be authorized to provide service without any further selection process, regulatory decision or individual licensing requirement.

Under the 1997 Licensing Directive, restrictions are also placed on the types of conditions that may be applied to individual licences. These conditions are described in Box 2-4. Specific provisions of the Directive relating to the form and content of licences are discussed in more detail later in this Module.

In its July 2000 proposal for a new Licensing Directive, the European Commission renewed its efforts to harmonize and reduce European licensing requirements. Although the 1997 Licensing Directive gives priority to general authorizations, the EC determined that it still leaves too wide a margin for Member States to use individual licences. In fact, the EC found that individual licences have become the rule rather than the exception in most European national licensing regimes. In order to further promote market entry, the EC’s July 2000 proposal would cover all services and networks under a general authorization scheme, and would limit the use of individual licences to the assignment of radio frequencies and numbers only. The proposed directive would also further limit the number of conditions that may be imposed on service providers. It requires strict separation between conditions established under general law (applicable to all operators), conditions under the general authorization and conditions attached to individual licences.

Box 2-2: EU Licensing Objectives

Objectives of the 1997 EU Licensing Directive

To extend competition in telecommunications markets by means of a licensing regime which:

- Eliminates all barriers to entry except for objective, transparent, non-discriminatory and proportionate restrictions relating to the availability of scarce resources, such as numbers, spectrum and rights of way,
- Simplifies and harmonizes licensing processes across the EU, and
- Establishes licence conditions that are transparent and constitute “the lightest possible regulation, compatible with the fulfillment of applicable requirements”.

The EC’s July 2000 proposal aims to ensure that no information is required as a prior condition for market entry. It also places limits on subsequent verification of compliance with conditions. In addition, the proposed Directive would reduce administration charges considerably, and would require regulators to publish annual overviews of costs and charges. If charges collected by regulators exceeded their administrative costs, the regulators would be required to adjust the level of charges the following year.

2.2 Types of Licensing Regimes

In general, there are three approaches to authorizing telecommunications operators and services:

1. individual operator licences;
2. general authorizations; and
3. no licensing requirements (i.e. open entry).

These 3 categories are reflected in the regulatory framework of a number of countries. The categories are used in the EU’s 1997 Licensing Directive. While the existing legal framework in all countries does not

Box 2-3: EU Rules on Conditions for General Authorizations

1. Any conditions which are attached to authorizations must be subject to the principle of proportionality and consistent with the EU's competition rules.
2. Conditions which may be attached to all authorizations:
 - 2.1 Conditions aimed at ensuring compliance with relevant essential requirements,
 - 2.2 The provision of information reasonably required for the verification of compliance with applicable conditions and for statistical purposes,
 - 2.3 Conditions intended to prevent anti-competitive behaviour in telecommunications markets, including measures to ensure that tariffs are non-discriminatory and do not distort competition,
 - 2.4 Conditions relating to the effective and efficient use of numbering capacity.
3. Specific conditions which may be attached to general authorizations for the provision of publicly available Telecommunications services and networks:
 - 3.1 Conditions related to the protection of users and consumers, in particular, in relation to:
 - The prior approval by the national regulatory authority of the standard subscriber contract,
 - The provision of detailed and accurate billing,
 - The provision of a procedure for the settlement of disputes,
 - Publication and adequate notice of any change in access conditions, including tariffs, quality and the availability of services.
 - 3.2 Financial contributions to the provision of universal service, in accordance with Community law.
 - 3.3 Communication of customer database information necessary for the provision of universal directory information.
 - 3.4 Provision of emergency services.
 - 3.5 Special arrangements for disabled people.
 - 3.6 Conditions relating to the interconnection of networks and the interoperability of services, in accordance with the EU's Interconnection Directive and obligations under Community law.

Source: CEC (1997)

reflect this categorization, it is a useful approach for considering licensing requirement. (Once again, the North American situation is different. There have generally been no licensing requirements for telecommunications operators or services, except for spectrum licences, FCC Section 214 facilities certifications, CRTC international service licences, and, historically, public convenience and necessity certificates in some states and provinces.)

The main features of each of the three approaches to licensing are outlined in Table 2-1.

The form of a licence depends on the legal regime of each country. Matters of form are largely irrelevant to good licensing practice. What is more important is that the licence conditions are clear, proportionate and enforceable.

In many countries the grant of a telecommunications licence is a unilateral act of the regulatory authority. The licence is granted to one or more licensees subject to the terms and conditions specified in the licence. The grant of the licence is a purely administrative act.

Box 2-4: EU Rules on Conditions for Individual Licences

Specific conditions which may be attached to individual licences, include:

- Specific conditions linked to the allocation of numbering rights (compliance with national numbering schemes).
- Specific conditions linked to the effective use and efficient management of radio frequencies.
- Specific environmental and specific town and country planning requirements, including conditions linked to the granting of access to public or private land and conditions linked to collocation and facility sharing.
- Maximum duration, which shall not be unreasonably short, in particular in order to ensure the efficient use of radio frequencies or numbers or to grant access to public or private land, without prejudice to other provisions concerning the withdrawal or the suspension of licences.
- Universal service obligations.
- Conditions applied to operators having significant market power, intended to guarantee interconnection or the control of such significant market power.
- Conditions concerning ownership which comply with European Community law and the Community's commitment vis-à-vis third countries.
- Requirements relating to the quality, availability and permanence of a service or network.
- Specific conditions relating to the provision of leased lines.

Source: CEC (1997)

In other countries, a licence is a contract between the regulator and the operator. This approach is used where licences are granted by way of traditional "concessions". Licences in this form generally set out rights and obligations of both the regulator and the operator in some detail and are signed by both parties. This "contractual" form of licence is most common and useful in countries where the legal and regulatory framework is less developed.

Over time the need for individual licences will diminish in many liberalized markets. In a highly competitive market the main justification for individual licences will be the need to fairly allocate scarce resources such as spectrum. This is one reason to separate the licensing of spectrum from the other aspects of licensing.

Whatever the legal form and process of licensing, good licensing regimes have common features. These include clarity, transparency and the avoidance of unnecessarily burdensome conditions. These features are discussed further in Section 2.4 of this Module.

2.3 The Licensing Process

The last section considered different types of licensing regimes. In this section, we consider the different processes by which licences are issued. The process will depend on the sector policies, laws and market structure in a particular country. Five common types of licensing process are discussed below.

2.3.1 Licensing Incumbent Operators

The telecommunications reform process in most countries includes privatization of PTTs and the granting of competitive licences in various market segments. Many countries have completed this process; others are in the midst of implementing it, and a few have not started.

A major step in the privatization and liberalization process in many countries is the issuance of a licence to incumbent operators. This step generally

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Table 2-1: Types of Licensing Regimes

Type of Licensing Requirement	Main Features	Examples
Individual Licences (Operator Specific Licences)	<ul style="list-style-type: none"> ➤ usually a customized and detailed licence document ➤ frequently granted through some form of competitive selection process ➤ useful where: <ul style="list-style-type: none"> (i) a scarce resource or right is to be licensed (e.g. spectrum) and/or (ii) the regulator has a significant interest in ensuring that the service is provided in particular manner (e.g. where the operator has significant market power) 	<ul style="list-style-type: none"> ➤ basic PSTN services in a monopoly market ➤ mobile and fixed wireless services ➤ any service requiring spectrum
General Authorizations (Class Licences)	<ul style="list-style-type: none"> ➤ useful where individual licences are not justified, but where there are significant regulatory objectives which can be achieved by establishing general conditions ➤ normally contain provisions relating to consumer protection and other essential requirements ➤ generally issued without competitive selection process; all qualified entities are authorized to provide service or operate facilities 	<ul style="list-style-type: none"> ➤ data transmission services ➤ resale services ➤ private networks
Services which may be provided without a licence (fully liberalized services)	<ul style="list-style-type: none"> ➤ no licensing process or qualification requirements ➤ useful where an activity is technically caught within the definition of activities subject to regulation (e.g. offering a telecommunications service to the public) but where there is no justification for imposing licence requirements ➤ general requirements (e.g. registration with the regulator) can be imposed through a general regulation or order 	<ul style="list-style-type: none"> ➤ Internet service providers (ISPs) ➤ Value-added services

does not involve competitive selection or other formal public process. New telecommunications laws or amendments often authorize the licensing of the incumbent operator. The licensing process involves the detailed identification of existing and new rights and obligations of the operator. In some cases, incumbent operators may be granted general

authorizations. Others, including the PTT, generally receive individual licences. While the EC licensing proposals advocate a move away from individual licences in mature competitive markets, there are still good reasons for individual licences for incumbents in less competitive markets with less well-defined regulatory frameworks.

Table 2-2: EU Licensing Directive: Types of Regulation of Competitive PSTN Operator

Type of Regulation	Form of Regulation
> Allocation of spectrum	> individual spectrum licence issued through competitive selection
> essential requirements	> general operating authorization or class licence available to all qualified operators
> anti-competitive practices and universal service	> general laws and regulations applicable to all operators in the sector

Licensing

The rights and obligations incorporated in new licences for incumbents must generally be adapted to a new sector policy and regulatory regime. In particular, they must often be adapted to the realities of a market based economy, especially where the operator is to be privatized and to face competition for the first time in some markets. It is generally advisable to obtain good market input before settling the terms of such licences. This can be achieved through a public process, although it is more common to do so by retaining good professional advisors with experience in privatization and liberalization in other markets.

In practice, the licensing of incumbents often involves a process of negotiation between the Public Telecommunications Operator (PTO) and the regulator. Additional input generally comes from professional advisors, including investment bankers and lawyers hired by the PTO, government or regulator. It is important for the regulator (or other licensing authority) to obtain a good balance of views on the contents of the licence. In this regard there are often competing agendas between the PTO, which may want to retain as much exclusivity and market power as possible, and those promoting a competitive telecommunications policy. Ministries of Finance and investment bankers for PTOs often focus on granting exclusivity and market advantages as means of increasing privatization proceeds. Ministries of Communications and regulators are often more focussed on promoting competition as a means of increasing efficiency of telecommunications markets and delivering better services to the public.

Parallel Licences for PTO and New Entrants

In some countries, established PTOs are granted licences for new services (e.g. cellular, data communications, ISP, value added services) while licences for those services are also granted to new entrants. The PTOs generally receive the licence outside the competitive selection process that may be used to select new entrants, such as new mobile operators. This has been the case for cellular mobile licences in both developed and less developed countries.

Issues of competitive fairness arise in this process. Often the new entrant pays a significant amount for the licence under a competitive selection process but the incumbent does not. This issue has sometimes been addressed by requiring incumbent operators to pay a fee equal to the amount of the winning bid or a fixed percentage of that amount. This occurred recently when Jordan licensed a second GSM operator. When Colombia licensed second cellular operators in each of three regional markets, the existing operators were required to pay 95% of the amount of the winning bid in the applicable region.

In other countries the incumbent operator has not been required to pay licence fees, even though new entrants do pay. Some argue that the incumbent was awarded a licence in accordance with past practice and law, and that it would be unfair to retroactively tax it. Others have pointed out that the incumbent may have taken risks and incurred expense in developing the market. From this

perspective the retroactive imposition of a substantial licence fee may be considered inappropriate. While there is not always a right answer in these situations, care must be taken to provide a level playing field. If preferential treatment is granted to an incumbent, there should be clear benefits to the public for doing so. These may include maintenance of network rollout obligations or other specific universal service objectives.

2.3.2 Licensing New Entrants - Individual Licences

The issuance of individual licences to new operators requires some form of selection process. Where no existing operator holds a licence, it is best to implement a competitive and transparent licensing process in accordance with the practices discussed in detail later in this Module (especially in Section 2.4).

2.3.3 General Authorizations

Issuance of general authorizations (class licences) involves the definition of licence eligibility criteria and licence conditions. Ideally, both processes should involve prior public consultation. This improves the transparency of the licensing process and ensures all relevant information is taken into account. No selection process is required for general authorizations, since all eligible operators or service providers will be licensed.

Implementation of a general authorization regime can be more complicated where existing individual licences authorize the same services as those covered by the general authorization. For example, general authorizations are frequently used to establish conditions for the provision of value added services. However, many PTO operators are also authorized to offer value added services under their individual licences.

To ensure fair competition, regulators should ensure that any differences between general authorizations and individual licence conditions are competitively neutral. A good solution is to indicate that individual licences do not authorize the offering of any service that can be offered under a general authorization. In this way, regulators can ensure that all providers of

the same service are subject to the same licence conditions.

2.3.4 Spectrum Licences

Many telecommunications services require an authorization to use radio frequencies. Spectrum licences that are required to provide a service are often granted as part of an individual licensing process. It is necessary, for instance, to authorize cellular operators to use the required spectrum as well as authorizing them to operate the cellular networks.

Authorizations to operate a telecommunications service and to use the required radio spectrum should be granted at the same time. There should be no delays or risks of inconsistent regulatory requirements as between the two types of authorizations. If two separate licences are issued, they should be issued simultaneously. A good approach is to attach a draft spectrum licence as well as a draft operator's licence to a call for applications for licences. This approach is discussed later in this Module.

One reason for retaining two separate licences is administrative convenience in management of the spectrum. In most countries spectrum management is delegated to a different administrative group from the group that regulates other aspects of telecommunications operations, such as price regulation or anti-competitive conduct. By having a separate, consistent form of spectrum licence, technical, reporting and compliance requirements can be standardized across all users of the radio spectrum.

2.3.5 Spectrum Auctions, Lotteries and Comparative Evaluation Processes

The radio spectrum is universally acknowledged to be a valuable, limited public resource and thus subject to government regulation. Technological developments have expanded the usable portions of the spectrum and enabled the transmission of more and more information in the same amount of bandwidth. Despite these developments, an increasing number of telecommunications services and applications rely on spectrum, and thus demand for spectrum often exceeds availability. Hence there is a need to develop policies and approaches to assign

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spectrum. These approaches have similarities with other licensing processes, but there are also differences.

In the era of public telecommunications monopolies, PTTs were often responsible for spectrum assignment, and they assigned spectrum for their own use as the need arose. Many countries have since developed new approaches to spectrum assignment to replace those used in the era of public monopolies. The development of new approaches was spurred on by the *WTO Regulation Reference Paper*. Section 6 of the paper requires that procedures for the allocation and use of scarce resources, including frequencies, be carried out in an objective, timely, transparent and non-discriminatory manner.

Different approaches have been adopted to assign spectrum where demand exceeds availability. No consensus exists as to which approach is best in which cases.

Traditionally, governments often allocated spectrum to particular applications and then assigned parts of the spectrum to entities to use for specific purposes on a “first come, first served” basis. This approach is fast, practical and inexpensive, but not appropriate in today’s competitive environment. The increase in the number of competitors and demands for spectrum have led to the development of competitive approaches for its assignment. These approaches include lotteries, comparative evaluation approaches and auctions. Various combinations of these approaches have also been used. For example, applicants may be short-listed using a “comparative evaluation” approach and then participate in an auction or lottery for the final assignment of spectrum.

Lotteries

Lotteries provide a fast, inexpensive and transparent approach for selecting from substantially similar or equally qualified applicants. Lotteries should generally be preceded by a formal qualification process to select lottery participants. Otherwise, their use may hinder sector development. In the US, for example, experience demonstrates that some past lottery participants had no intention of operating telecommunications services, but simply planned to resell their spectrum licences for a profit. Other lottery

winners proved to be financially incapable of starting up service.

Comparative Evaluation Processes

Under a comparative evaluation approach, the regulator (or another government agency) decides to whom the relevant spectrum is to be assigned. Comparative evaluation provides an approach for choosing among multiple applications that are substantially equal. It also allows regulators to match specific sectoral objectives with the operators in charge of achieving them.

There are many forms of comparative evaluation schemes. In some cases, spectrum licences are awarded to applicants expected to make the best use of spectrum to serve the public. Comparative evaluation processes may involve the application of a variety of qualification and selection criteria. In most cases, these criteria will be published in advance, and applicants will strive to demonstrate how their applications meet the criteria better than other applications.

Minimum qualification requirements generally include evidence of financial resources, technical capability and commercial feasibility of the relevant spectrum application. Selection criteria may include proposed tariffs, coverage (geographical and in terms of users), network rollout targets, quality and range of service commitments, and efficient use of frequencies. Some of the above criteria are applied in some cases as qualification criteria and in others as selection criteria, depending on the country and even on categories of services within a country.

There have been many criticisms of the comparative evaluation approach. Criticism generally focuses on lack of transparency. No matter how stringent the evaluation criteria, there is a subjective element to most comparative evaluation processes. Hence they are sometimes referred to as “beauty contests”. Because of the subjective element, it is often suspected that regulators or other decision-makers may not exercise their judgement impartially. In some cases these suspicions have led to litigation. In others, the suspicions are not acted upon, but they nevertheless undermine the credibility of the licensing process and the government or regulator.

Other criticisms of the comparative evaluation process focus on its speed. The process is often slow. Careful evaluations of financial capability, technical plans, etc. can take time. Finally, comparative evaluation processes are sometimes criticized as involving inappropriate or questionable regulatory intervention in the selection of winners and losers. It is often said that auctions provide a better alternative to comparative evaluations, in that they rely on market forces rather than regulatory fiat to determine competitive outcomes.

Auctions

Auctions are increasingly used by regulators to grant spectrum licences to the highest bidders. In the case of auctions, the market ultimately determines who will hold the spectrum licences. However, in many auction schemes, bidders are pre-qualified using criteria similar to those used in comparative evaluation processes. As a result, participation in some auctions is limited to bidders with proven financial and technical capabilities.

Experience with spectrum auctions in the US illustrates the importance of using rigorous technical, financial and commercial criteria to pre-qualify bidders. In that country, some successful bidders later proved to be incapable of financing their aggressive bids. It appeared that others had neither the technical capability nor the intention of operating telecommunications services utilizing the frequencies they had successfully bid on.

There are different types of spectrum auctions. The most common are:

- One round or simple auctions (open or closed); and
- Multiple-round auctions (sequential or simultaneous).

Initially developed in the US in the mid 1990s, the simultaneous, multiple-round auction has become the most widely used auction approach. While there are variations from country to country, the approach generally involves a simultaneous auction for different spectrum licences. There are "rounds" of bidding, that is series of consecutive bids, for each licence. The bids continue to increase during these

rounds until a high bidder is determined for each licence:

At the beginning of each round, every bidder receives information about its eligibility to bid and about the standing high bid on each licence. New bids must normally be higher than the standing high bid by at least a minimum pre-set amount. In some cases, bidders may have the opportunity to withdraw bids made in earlier rounds, although this action is usually subject to penalties. Sometimes an "activity rule" penalizes bidders who are inactive by reducing their "bidder eligibility points". The rounds continue until there are no new bids on any licence.

The bidding process in simultaneous multiple round auctions is usually computerized, so that bids and other auction information can be posted and calculations made quickly. Bids are typically encrypted for security and submitted electronically.

Some key features of simultaneous multiple round auctions are illustrated in Box 2-5, which describes the Canadian auction process.

There are many arguments in favour of spectrum auctions. Auctions provide an efficient, transparent and objective means of awarding spectrum licences to the bidders who value them most highly. A proper pre-qualification process can ensure that successful bidders have the technical and financial capabilities to implement services quickly and efficiently. The high investments required to win an auction can be viewed as incentives for rapid roll-out of infrastructure and services, since that is the only way the successful bidder can recoup its investment in the licence fee. Another argument in favour of spectrum auctions is that they provide the means to provide the public with the highest "rents" for the use of a public resource. Governments can use the proceeds of auctions for deficit reduction and other public priorities.

There are also arguments against spectrum auctions. First, it is argued that the high costs paid by successful bidders are usually passed on to customers. The result can be excessive rates for consumers of wireless services, and reduced penetration, particularly among lower income consumers. Some argue that capital used to pay high auction fees will not be available to invest in network

Box 2-5: Features of Multiple Round Auctions: The Canadian Example

1. **Bidder Eligibility Points:** Each licence in an auction is assigned a number of points proportionate to the bandwidth and population covered by that licence. Each bidder must indicate which licences, and the number of “points-worth” of licences, it may wish to bid on.
2. **Activity Rule:** A bidder is considered active on a particular licence if it has the current high bid from the previous round or if it submits an acceptable bid in that current round. In each stage of bidding, a bidder must be active on licences whose corresponding points add up to a certain percentage of the bidder’s eligibility point level.
3. **Bid Withdrawals/Penalties:** If a bidder makes a bid and later wishes to change it, it may do so subject to paying a penalty which corresponds to the potential loss of revenue caused by the withdrawn bid.
4. **Bid Increments:** Bid increments are used to expedite the auction. They are set in percentage and/or absolute dollar terms and are changed during the course of the auction.
5. **Waivers:** Waivers protect bidders against mistakes they may make or in the case of technical or communication problems. They prevent a bidder from losing bidder eligibility points when it does not satisfy the activity requirements in a given stage.
6. **Stopping rule:** The auction generally stops when a round finishes with no acceptable bids or waivers having been submitted on any licences.
7. **Forfeiture:** A bidder who submits the high bid on a licence but fails to pay will forfeit its right to the licence and must pay a penalty

Source: Department of Industry Canada (1998)

infrastructure. While it is arguable that a well-financed applicant should be able to pay for both, it is not possible to prevent strategic bidding to obtain spectrum. Banks, rating agencies and financial advisors have been critical of recent record-high auction fees paid for UMTS mobile spectrum in several European countries. Share prices and debt ratings of some successful bidders have dropped due to widely-held perceptions that too much was paid by them in the auctions. Finally, high auction fees may discourage smaller participants from entering a telecommunications market. The result may be increased market concentration, and ultimately also higher consumer prices.

Simultaneous multiple round auctions have recently been used to license wireless service providers in Australia, Canada, Spain, the Netherlands, the United Kingdom and Germany. The recent UMTS (3G Cellular) licensing process provides some interesting case studies in different spectrum licensing approaches. Box 2-6 describes the quite different UMTS licensing processes utilized in a variety of European countries.

2.4 Licensing Practices

While telecommunications licensing approaches vary considerably from country to country, there are common features, particularly among better licensing practices. The following sections review good practices that will help ensure the success of a licensing process.

2.4.1 Transparency

Procedural transparency is one of the fundamental requirements of a successful licensing process. The importance of transparency in the licensing process is evidenced by its inclusion in the *WTO Regulation Reference Paper* (see Box 2-1).

Transparency requires that a licensing process be conducted openly and that licensing decisions be made based on criteria published in advance. These requirements apply to all licensing decisions, including ones to award or revoke a licence. The licensing processes described later in this Module

Box 2-6: Auctions and Comparative Evaluations – UMTS Case Studies

Germany – In August 2000, Germany auctioned off 12 blocks of UMTS spectrum. The German regulator (RegTP) published the rules applicable to the award of the UMTS licences on 18 February 2000. The rules provided that eligibility to take part in the auction would be governed by the basic eligibility requirements of the Telecommunications Act. Bidders were required to bid successfully for at least two blocks of spectrum to qualify for a licence. Minimum bid increments were set at 10 percent. Additional rules were established to prevent bidders from influencing the outcome or controlling the pace of the auction. While the auction took place, for example, small groups of representatives of each bidder were isolated from 8 a.m. to 6 p.m. each day, with two observers from RegTP present with each group at all times. Bidders were not able to see what rivals were bidding. Only the highest bids for each block were made known to bidders.

Germany's UMTS spectrum auction lasted for 14 days and 173 rounds of bids. At the end, six operators each obtained two blocks of spectrum and 20-year licences. The licences require operators to provide coverage of at least 50 percent of the German population by the end of 2002. This auction concluded with record bids for UMTS licences: a combined total of over USD 46 billion. As a result of the enormous amounts paid, concerns were expressed that some operators may well end up spending more on acquiring the licences than on building their networks.

United Kingdom, Spain and Netherlands – The UMTS spectrum auction held in the United Kingdom in April 2000 raised USD 32.58 billion. That process continued for more than 100 rounds over a period of more than four weeks. The Netherlands auctioned off five licenses for USD 2.3 billion in July 2000. Spain, on the other hand, raised only USD 425 million from its sale of four UMTS licences in March 2000.

Norway – In Norway, a comparative evaluation process was used instead of an auction to grant UMTS spectrum licences. Applicants were required to meet minimum eligibility requirements, such as a commitment to meet specific coverage and roll out obligations, and proof of financial strength/capability. The two main selection criteria were coverage (geographical and in terms of population) and roll out. Financial aspects, quality of service, environmental impact and previous experience were secondary criteria.

Norway's emphasis was not on raising as much money as possible from the licensing of spectrum for 3G mobile systems. Rather the goal was to encourage rapid network development and to increase the country's overall competitiveness. In Norway, wireless operators are required to pay moderate administrative and frequency management fees. Operators awarded 3G spectrum licences were required to pay a special annual fee of approximately USD 2 million. In addition, subject to parliamentary approval, 3G licensees were required to pay a one-time lump sum of approximately USD 11 million. These sums are very small compared with the results of the spectrum auctions in the United Kingdom and Germany.

Sweden – In Sweden, spectrum licences for 3G mobile communications systems will also be awarded using a comparative evaluation process. Swedish law provides that spectrum licences must be awarded based on specific criteria. As in Norway, the main selection criteria for the award of 3G spectrum licences in Sweden are coverage and roll out. Modest fees will be charged for the spectrum licences. This approach is considered beneficial in that it will enable operators to invest in network development. High spectrum fees paid by operators will not be passed on to customers.

reflects the principles of transparency. Key features of such processes include:

- advance publication of a call for applications, with application process (tender) rules, qualification and selection criteria;

➤ separation of qualification and selection processes;

- return of unopened financial offers (bids) to applicants who do not meet the published qualification criteria; and

- public opening of sealed financial offers from qualified applicants.

A transparent process can be different in the case of electronic applications or auctions. These are discussed above under the heading Auctions.

Transparency is best measured from the point of view of the participants in the licensing process. It is good practice for a regulator to take all reasonable steps to ensure that participants in the licensing processes, including applicants, existing licensees, and competitors as well as the general public, perceive the process to be fair.

Conducting a transparent licensing process is sometimes perceived to be more time consuming and difficult than less transparent alternatives. The process, for instance, of publishing procedural rules and selection criteria in advance can be difficult for a newly formed regulator in a country where procedural transparency is not entrenched in government practice.

However, the absence of transparency undermines investor confidence in the fairness of the entire regulatory process and in the telecommunications market itself. Lack of transparency can significantly slow the process of liberalization and reduce the benefits of privatization.

2.4.2 Public Consultation

It is good practice to engage in public consultation before and during a licensing process. To start, it is often useful for a regulator to invite public comment on the approach to be taken in a proposed licensing process before it starts. Consultation with stakeholders reinforces the perception of a transparent process. Consultation allows the regulator to receive directly the views of consumers, existing operators and prospective applicants on a proposed licensing initiative. This allows licence terms and conditions and licensing procedures to be fine-tuned to maximize the prospects for a successful licensing process.

Consultation is particularly important where a general authorization is to be issued. Advance publication of proposed conditions of general authorizations provides the main opportunity for

public comment. By contrast, in a competitive licensing process there are usually other ways for stakeholders to make their views known, such as pre-bid conferences and written exchanges of questions and answers.

Consultation can be formal or informal. In the context of any major licensing initiative, it is generally advisable for the regulator to establish a formal and transparent consultation process. A good approach is for the regulator to publish a notice stating its intention to launch a licensing process, and inviting comments on the proposed approach. The notice should set forth in some detail the proposed approach and any specific issues on which comments are sought. Where the regulator is unsure of the best approach, comments can be invited on different options.

Notices of this kind should be sent to all interested parties, including prospective applicants, existing licensees, consumer and industry interest groups. In some cases, a public meeting is held to allow a public exchange of views by interested parties. Copies of written comments can also be published.

A pre-licensing consultation process increases the likelihood that the regulator's approach to licensing will be based on a good understanding of all relevant considerations. Consultation also helps to ensure that even those who may disagree with the regulator's approach will believe that their views have been considered.

2.4.3 Licence Fees

In the telecommunications industry, the term "licence fee" is used to describe different things. It may include one or more of the following:

- a fee paid as a premium or "rent" to a government or licensing authority for the right to operate a network, provide a service or use a limited resource, such as radio spectrum or numbers;
- administrative charges to compensate a regulator for its costs in managing and supervising use of the radio spectrum; and

- administrative charges to compensate a regulator for costs incurred in performing other regulatory functions, such as licensing operators, ensuring compliance with licence terms, resolving interconnection disputes, establishment and supervision of other aspects of the regulatory framework, etc.

It is good practice to differentiate the above-noted types of fees. This improves transparency and makes it easier to determine that the administrative charges related to cost recovery are indeed cost-based. Separating administrative licence fees related to spectrum management from other administrative fees improves transparency and accountability. Spectrum management is usually handled by a separate branch, and sometimes a wholly separate ministry or agency from the telecommunications regulator.

It is generally accepted that administrative fees should not impose unnecessary costs on the telecommunications sector. The most transparent manner by which to achieve this objective is an explicit cost-recovery scheme. Cost recovery schemes involve establishment of licence fees based on the projected or actual costs of the regulator. Once that overall level of cost-recovery has been set, it is necessary to allocate the costs among licensees or market participants. This allocation can be based on different factors, including telecommunications revenues, licensed coverage areas or types of services. The most common allocation factor is revenues.

The July 2000 EC proposal to replace the 1997 Licensing Directive criticized the “lack of transparency and high fees” of its European Member States. It provides the following proposal:

“(15) Administrative charges may be imposed on providers of electronic communications services in order to finance the activities of the national regulatory authority in managing the authorization system and for the granting of rights of use. Such charges should be limited to cover the actual administrative costs for those activities. For this purpose transparency should be created in the income and expenditure of national regulatory authorities by means of annual reporting about the total sum of charges collected and the

administrative costs incurred. This will allow undertakings to verify that administrative costs and charges are in balance. Administrative charges should not act as a barrier to market entry. Such charges should therefore be distributed in proportion to the turnover on the relevant services of the undertaking concerned as calculated over the accounting year preceding the year of the administrative charge. Small and medium sized undertakings should not be required to pay administrative charges.

(16) In addition to administrative charges, usage fees may be levied for the use of radio frequencies and numbers as an instrument to ensure the optimal use of such resources. Such fees should not hinder the development of innovative services and competition in the market.”

2.4.4 Balancing Certainty and Flexibility

Telecommunications licences should balance regulatory certainty with the flexibility necessary to address future changes in technology, market structure and government policy.

In many countries, a balance between regulatory certainty and flexibility is achieved by using regulatory instruments other than licences as main elements of the regulatory framework. However, where a country's regulatory regime is not well developed, it is often necessary to include a reasonably comprehensive codification of the basic regulatory regime in a licence. This is necessary to provide the certainty required to attract new entrants and substantial investment to the sector.

Licence conditions should be sufficiently flexible to allow their integration into the general regulatory framework for the sector as it develops. Licensing an operator should not preclude future regulatory reform.

There are several approaches to providing such flexibility, including:

- permitting unilateral licence amendment by the regulator;
- establishing short licence terms;

- permitting licence amendments with the mutual consent of the licensee and regulator; and
- permitting unilateral amendments by the regulator only of specific licence conditions that should constitute part of the country's general regulatory regime, provided such amendments are made in a procedurally fair and competitively neutral manner.

The first two approaches are not consistent with regulatory certainty. They will generally make it difficult, if not impossible, to attract the investment and financing required for a major licence, such as a fixed line or cellular licence.

The fourth approach is more attractive in this regard. To implement it, a distinction can be made between licence conditions that are of a regulatory nature and those which can only be amended with the agreement of the licensee. For example, licence conditions on industry-wide universal service mechanisms or general terms of interconnection may be subject to amendment by the regulator. Other conditions of a purely contractual nature or which are fundamental to the economic value of the licence may be subject to modification only on consent of the operator. These would normally include conditions such as the term of the licence and the licence acquisition fee payable.

Where the regulator has the right to amend the general regulatory conditions of a licence, such amendments should be made in a transparent and competitively neutral manner. Any amendments should be preceded by consultation with the licensee and other affected parties. In some cases, a right of appeal or review may be warranted.

2.4.5 Distinguishing Licensing from Procurement

The process of licensing a telecommunications operator should be distinguished from the government procurement process. In many countries there has been confusion between the two types of processes, sometimes with adverse consequences for the licensing process.

In licensing a telecommunications operator, a regulator is not buying goods or services using public money. In essence, licensing involves offering a business opportunity to qualified investors who agree to comply with the licence conditions. The regulator is more a seller than a buyer.

This observation leads to two important recommendations for licensing processes:

- The regulator must offer to licence applicants an opportunity that is financially attractive to experienced and competent telecommunications operators. While some licensing opportunities sell themselves, others, particularly those in emerging and transitional markets, must be carefully structured and marketed to attract qualified applicants. Experience shows that almost any call for applications for telecommunications licences will attract some bidders. However, many are not financially or technically capable of meeting the regulator's objectives to expand and improve services.
- Government procurement procedures are generally not suitable for a telecommunications licensing process. Many countries have bureaucratic centralized procurement administrations. Detailed government procurement procedures are often developed for good reason - to reduce corruption. However application of these procedures can cause legal and administrative headaches, and delay and confusion about the real goals of the licensing process. For example, government procurement officials generally want to see detailed specifications for every aspect of the goods and services being purchased and a careful inspection and monitoring of installation and performance after selection and delivery. This kind of micro-management is inappropriate in a telecommunications licensing process. As discussed below, clear qualification requirements should be established. However, the regulator is generally concerned only with results. What matters is whether - not how - licence conditions are complied with. From this perspective, such issues as technology choices, management structures and marketing strategies should not be the subject of licence conditions or selection criteria.

Other problems are experienced in trying to apply standard government procurement procedures to a telecommunications licensing process. It is generally best to avoid such procedures, and to use a simple and transparent competitive licensing process, based on internationally accepted telecommunications licensing procedures.

2.4.6 Concessions, BOTs and Similar Arrangements

A licence is a grant by a public authority of a right to operate a service, subject to the terms and conditions specified in the licence or in other regulatory instruments. The issuance and enforcement of a licence is therefore always, to some extent, a matter of public or administrative law. As indicated above, licences, concessions and other types of government permits to operate telecommunications facilities and services have more in common than not.

However, in some cases, private sector investors have entered into business arrangements with governments or state-owned operators that are more in the nature of joint ventures with government entities than independent rights to operate telecommunications facilities or provide services.

Before describing these arrangements, the term "concession" should be discussed. In most countries, this term is used to refer to a document that establishes a commercial agreement between a government and the private builder, owner or operator of an element of public infrastructure (such as a toll road, power plant or telecommunications network) or a business located on public property. Contractual remedies, such as money damages, are available for breach of a concession through civil courts or arbitration. Governments can fine tune concession terms to establish the protections and incentives necessary to attract investors and to guarantee performance by the concession holder.

Some licences have both regulatory and concession features. It is important to distinguish between the two. A good approach is to deal with the concession features in a concession contract between the host government (not the regulator) and the investor. In project finance terms, such an agreement would be called a government support agreement.

It should be noted that the term concession has different meanings in different countries. For example, in some Latin American countries, such as Mexico, the term concession is used to refer to a document (e.g. the Telmex Concession) that is essentially a licence, not a commercial agreement, although it is signed by the government and the concession holder.

Some countries, particularly in Asia, have granted concessions that are in the nature of joint venture agreements rather than granting full licences to operate telecommunications networks independent of the government.

Many variations are possible on the theme of "joint ventures" between private sector investors on the one hand and governments or PTTs on the other. These include Build-Operate-Transfer (BOT), Build-Transfer-Operate (BTO), Build-Operate-Own (BOO), and an alphabet soup full of alternatives limited only by the imagination of project finance lawyers and bankers. Some examples of countries where such arrangements have been implemented are listed below:

- BTO: Thailand, Philippines
- BOT: Lebanon, India, Indonesia (Joint Operating Schemes or KSOs)
- BOO: Malaysia, Solomon Islands

In general, these are all project finance structures aimed at attracting investment and management expertise required to develop telecommunications infrastructure. A variation on such structures involves contracts where an investor does not build or own any facilities, but shares in revenues from a state-owned operator in return for providing financing, management or both. Financing contracts of this type have been entered into in China and Indonesia. An example of a management contract with revenue sharing is the Vietnamese "Business Cooperation Contract".

Most of the types of structures discussed in this Section have experienced initial success in promoting network expansion. In part this was because they were not characterized as licences to private operators but rather as contracts under which

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private contractors would build and operate telecommunications services “owned” by the government or by a state-owned operator. This arrangement allowed for private sector participation in telecommunications operators without breaching laws or policies that prevented private sector ownership of operators.

However, experience in Lebanon, Indonesia and elsewhere suggests that these models are not viable in the long term. Investors in BOT projects lack the long-term security and equity interests of a licensee. They are therefore motivated to maximize short-term profitability at the expense of long term network or service development. A BOT must either terminate, with the resulting withdrawal of the private investor, or it must be converted into a true licence. If the investor withdraws, the operator may or may not be able to continue to expand and manage the service on its own. If the concession is converted to a licence, serious questions may arise regarding the fairness and transparency of the licensing process.

2.4.7 Service Areas

The definition of geographic service areas to be covered by a new licence presents unique challenges. Different approaches have been taken in different countries. In some cases, national licences are issued, while in others, a distinction is made between regions or between rural and urban areas. In some cases, national licences are offered in parallel with competing regional licences for the same service.

There is no one right approach to designating service areas. However, some approaches are likely to be less successful than others. One approach that has experienced limited success in a number of countries is to preserve the profitable urban markets for a state-owned PTT, and to invite private sector operators to serve only financially less viable rural areas. In some cases, the failure of the private sector operators to perform well in such areas has been used as evidence to argue against further sector liberalization.

The following points are relevant in selecting licensed service areas:

- Financial viability must be a key factor. If financially non-viable rural or high cost areas are licensed, a universality fund, or similar mechanism should be established. A preferred approach in such cases is to select a licensee from among competing applicants, based on the lowest requested subsidy. Universality funding mechanisms and approaches for measuring financial viability are discussed in Module 6.
- Experience shows that regional licensees often merge with, or are acquired by, other regional licensees to serve larger regions or form national operators. Examples range from the Colombian cellular operators to the U.S. Regional Bell Operating Companies. These moves are often driven by economies of scale. Regulators may want to keep this trend in mind, and license several competing national operators at the outset, rather than numerous financially weaker regional operators. The result will be lower transaction costs for the sector, and less disruption due to integration of different operating systems.
- Licensing operators to serve larger areas will permit them to cross subsidize from more profitable areas to less profitable ones. This approach can be used to extend service to less profitable areas. However, it can lead to anti-competitive conduct where an incumbent operator retains the right to serve profitable urban markets as well as less profitable rural ones, while new entrants can serve only the rural markets. Problems of anti-competitive cross-subsidy are discussed in detail in Module 5.
- National licences and large service areas are consistent with the consumer interests in obtaining seamless “one stop shopping” service from a single service provider. This is particularly true where technical or other barriers to efficient interconnection or roaming are present.

2.4.8 Qualification Criteria

It is important to distinguish between criteria relating to the qualification of an applicant to participate in a licensing process and criteria for the selection of a

successful licensee from among the qualified applicants.

In the case of a general authorization, only the qualification criteria are relevant because there is no selection to be made. In the case of a selection process for an individual licence, both qualification and selection criteria are normally developed. It is generally advisable to conduct a licensing process in at least two phases. The qualification phase is completed first. Only qualified applicants participate in the second phase – the licensee selection process.

Qualification criteria are minimum requirements for the right to participate in the selection process. Generally, qualification criteria are limited to ensuring applicants have the financial and technical resources and experience to successfully operate the licensed service.

Some countries impose foreign ownership restrictions that establish minimum levels of local ownership for licensed operators. Foreign ownership restrictions are generally contrary to the spirit, if not the letter of foreign trade agreements, including the GATS. However, various WTO signatory countries have registered exceptions permitting them to continue to apply foreign ownership restrictions. Over time, such restrictions are likely to be phased out in most countries.

The importance of establishing clear and rigorous qualification criteria is related to the level of competition in the applicable service. In the case of individual licensees that will enjoy monopoly or other exclusive rights, it is of critical importance to ensure that the licensed operator is financially and technically able to meet its licence obligations. Otherwise, the licensee may fail to meet important licence conditions, such as those related to network rollout, service coverage and quality. The process of enforcing licence compliance or revoking and re-tendering a licence in the case of default is time consuming, costly and disruptive for consumers.

In the case of competitive services, competition will generally discipline the market. If a market is sufficiently competitive, consumers will switch from an operator that fails to provide adequate service to

another operator that does provide it. A qualification process is therefore less important.

Recent experience in spectrum auctions demonstrates, however, that even in relatively competitive markets, such as mobile services in Brazil and the US, it is important to establish some minimum qualification requirements. These requirements will ensure that valuable spectrum and other scarce resources are awarded to applicants who are financially and technically capable of providing the public with service using such resources.

Some licensing processes involve more than one qualification phase. In issuing a large individual licence, a pre-qualification requirement is often established. This limits the eligibility of applicants who can participate in the final qualification process. It is justified, for example, where there are high costs incurred by the regulator (and applicants) in conducting a detailed qualification process or where confidential access to information or facilities is granted to applicants.

In those circumstances it makes sense to discourage participation in the process by applicants who are unlikely to meet the qualification criteria or to submit a competitive application. Various pre-qualification options exist. These include:

- payment of a substantial registration fee;
- a substantial document purchase fee; and
- use of a proxy indicator of experience and resources (e.g. minimum number of customers or lines in service for similar services in other markets).

It is important to specify whether qualification criteria are in any way relevant to selection. Transparency requires that applicants be told whether minimum compliance with qualification criteria is sufficient. There has been litigation against regulators in some countries where certain qualification criteria were specified, and then some qualified applicants were rejected on the basis that they were less qualified than others.

Table 2-3 sets out possible qualification criteria for a variety of different services.

2.4.9 Selection Criteria

There are two basic types of selection processes:

- Competitive selection based on a single quantitative criterion. Examples include:
 - an auction where the highest bidder wins; and
 - a subsidized rural service competition, where the operator that bids the lowest subsidy wins.
- Comparative evaluation where based on a more subjective evaluation of one or more quantitative or qualitative criteria.

Advantages and disadvantages of both approaches are discussed above under the heading Spectrum Auctions, Lotteries and Comparative Evaluation Processes. The single criterion approach is clearly the most transparent and simplest to use. It is the most consistent with international trade agreements, and the most frequently recommended approach of international financial institutions and international development organizations that promote telecommunications sector reform. However, it may not always result in the selection of the best qualified applicant, and, in the case of an auction, it may result in the imposition of excessive costs on the sector.

There are many variations on these two basic approaches. For example, in some cases, there is more than one quantitative criterion, with a weighting scheme for the various criteria that will result in a single “score”. In other cases, numerical scores are given for essentially subjective measures, such as the experience record of an applicant, or the quality of its management

Several observations can be made about the choice of selection criteria:

- Qualified applicants are motivated to devote financial and other resources to those aspects of their applications that will form the basis of the selection decision. Licensing selection is a zero-sum game. Each applicant has a finite amount of cash and other resources to devote to the

proposed service. Resources which are allocated to one aspect of an application on which selection is based (i.e. the financial offer or accelerated roll-out commitments) are not available to fund other aspects of the operation which are not related to selection criteria (i.e. universal service, lower prices, introduction of enhanced services).

- Transparency is increased by use of simple quantitative selection criteria. A competitive selection process that is based on subjective or qualitative criteria will be less transparent. The same is true of multiple criteria that cannot easily be compared. A lack of transparency undermines the credibility of the process and of the regulator. It also opens the door for complaints of bias, corruption or incompetence. To maximize transparency, a single financial or other quantitative selection criterion should be used. This can be derived by use of a formula which combines a number of selection criteria into a single numeric factor if desired.

Use of a single financial criterion does not mean other service factors or licensing objectives are irrelevant. Important factors and objectives not used as selection criteria can be indirectly included in the qualification process. For example, coverage, rollout and universal service commitments can be specifically incorporated as licence conditions that any successful applicant will have to comply with. All applicants will then incorporate these minimum requirements into the calculation of their financial bid.

Table 2-4 describes possible types of selection criteria and summarizes their advantages and disadvantages.

2.5 Contents of Licences

The contents of licence documents vary considerably depending on the country, the service and the operator. As indicated above, much depends on the state of development of the regulatory regime in a country. Where it is well developed, licences tend to be shorter. Where it is not well developed, licences must often include considerably more detail, in order to provide a comprehensive regulatory framework for the operator or service being licensed. For

Table 2-3: Possible Qualification Criteria

Licence Type	Possible Qualification Criteria	Rationale
First new competitive fixed network (local or international service)	<ul style="list-style-type: none"> ➤ Applicant not currently licensed to offer a competitive service; not associated with the incumbent ➤ Applicant has a minimum number of fixed lines in service in other countries/markets (an international PTO as partner) ➤ Relevant experience in similar markets (direct or by contract) ➤ Financial comfort letter from recognized bank ➤ Business plan, including pro forma financial statements and a marketing plan ➤ Technical plan, including details of network planning and roll out and technology selections 	<ul style="list-style-type: none"> ➤ Effective competition will not develop between related entities ➤ Only experienced operators can meet the significant challenges facing a start up fixed line competitor ➤ Experience and contacts in local market increases prospects of successful start-up ➤ Evidence of access to required financing ➤ Evidence of financial viability and likelihood of success of the project; disadvantage in that it is costly to prepare plan ➤ Business plan and technical plan can demonstrate detailed and viable service plans and knowledge of local economic and other conditions
Competitive cellular service (first new entrant in an emerging market)	<ul style="list-style-type: none"> ➤ Similar to, but less onerous than, above 	<ul style="list-style-type: none"> ➤ Presence of competition reduces (but does not eliminate) public costs of failure ➤ Significant economic and sector development objectives will be achieved by successful launch ➤ Valuable and scarce spectrum will be allocated to the selected operator on an exclusive basis
Data transmission service in highly competitive market	<ul style="list-style-type: none"> ➤ None 	<ul style="list-style-type: none"> ➤ General authorization is best approach ➤ No scarce resources involved ➤ Existing competition makes success or failure of this operator relatively unimportant
Broadband wireless services in highly competitive market	<ul style="list-style-type: none"> ➤ Financial comfort letter ➤ Evidence of experience in successful operation of similar businesses in any market 	<ul style="list-style-type: none"> ➤ Spectrum is a scarce and valuable resource. Regulator has a important role to play in ensuring efficient use and avoiding warehousing

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example, if a price regulation regime already exists in a country, it will not be necessary to spell it out in a licence. However, where no rules on price regulation exist, it is essential that they be spelled out in

the licence document (even to say that prices will be unregulated). Certainty is the key theme in good licensing practice.

Table 2-4: Possible Selection Criteria

Selection Criteria	Advantages	Disadvantages
Comparative Evaluation – based on subjective assessment and comparison by the regulator of applications based on a list of qualitative and/or quantitative criteria	<ul style="list-style-type: none"> > Maximum flexibility and discretion to select the most attractive application > Allows applicants to focus on factors they believe are important and to convince regulator accordingly 	<ul style="list-style-type: none"> > Non-transparent > Subject to accusations of bias or corruption from losing bidders which are hard to refute and damage regulatory credibility > Risk of confusion among bidders who may not clearly understand regulatory priorities
Pure Auction – selection from among qualified bidders based on the highest financial bid	<ul style="list-style-type: none"> > Maximum transparency > Market efficiency – licence awarded to the bidder which values it most > High bidder will have strong incentive to roll out service quickly to recover its bid > Suited to licensing in competitive markets 	<ul style="list-style-type: none"> > Payment of fee can divert financial resources from service provision to auction fees (government revenue) > Encourages applicants to minimize resources devoted to other important priorities (i.e. rollout, coverage etc.)
Pure Auction – selection based on quantitative criteria, other than cash, relating to the service (i.e. time required to meet roll-out target, commitments on maximum prices for consumers)	<ul style="list-style-type: none"> > As above > Regulator can focus bidder resources on service development or other priorities as opposed to government revenues 	<ul style="list-style-type: none"> > Encourages applicants to minimize resources devoted to priorities which are not selection criteria, unless they make business sense
Combined auction/comparative selection via weighted formula	<ul style="list-style-type: none"> > A compromise which has many of the benefits of both auction and comparative selection > Applicants are awarded points based on selection criteria 	<ul style="list-style-type: none"> > Difficult to develop a sound formula that compares “apples to apples” > Compromise has disadvantages of both comparative selection and auctions > Less transparent than pure auctions

Licensing

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Table 2-5 provides an example of the contents of a fairly comprehensive licence. It is based on the contents of a PSTN operator's licence in an emerging economy without a well-developed regulatory framework. This type of licence has been chosen as an example since it is fairly comprehensive. It also covers many of the areas often dealt with in licences for other services, such as mobile services – except that licences for such other services can usually be much less comprehensive. Some additional and different conditions will be required in licences for particular services.

Not all of the matters included in Table 2-5 will be necessary in all licences for PSTN services. In many countries some of the matters included in the table will already be covered in general laws, regulations or policies. Examples include general regulations on universal service or licence fees, a competition law or general rules of practice and procedure governing licensee information reporting or licence termination and renewal. It generally does not matter which type of legal document is used to deal with these issues, provided the provisions are stated clearly and are enforceable under local law.

Table 2-5: Contents of a PSTN Operator's Licence (Example for Emerging Economy)

Contents	Notes
Part 1 – Background and Identification of Parties	
Recitals	<ul style="list-style-type: none"> > Provides background, governing law, licensing circumstances, etc. > Important for posterity, and for courts and governments interpreting the licence
Naming of parties	<ul style="list-style-type: none"> > Ensure licensed entity has legal and financial substance
Definitions	<ul style="list-style-type: none"> > Key to clarity of licence conditions > Should repeat relevant definitions from laws, regulations, etc., since these may change
Part 2 – Grant of Licence	
Describe scope of licence: services, facilities and spectrum licenses	<ul style="list-style-type: none"> > Approaches may differ (e.g. licensing of facilities or services) > Spectrum often licensed separately – refer to separate licence > Sometimes useful to define exceptions – i.e. what licensee is not entitled to do > Specify services licensee may not offer (e.g. to implement competition policy)
Exclusivity rights	<ul style="list-style-type: none"> > Define precisely, including time limits, possible extensions and any pre-conditions for extensions
Term of licence	<ul style="list-style-type: none"> > Duration of licence and renewal terms, if applicable > Include effective date of licence
Part 3 – Licence Fees	
Licence acquisition fee	<ul style="list-style-type: none"> > Usually based on competitive bid or fixed in advance > One time fee > May be payable in installments, with revocation penalty

Table 2-5: Contents of a PSTN Operator's Licence (Example for Emerging Economy) (cont'd)

Operating licence fees	<ul style="list-style-type: none"> ➤ Periodic fee (usually annual) ➤ Often intended to recover administrative costs of regulation ➤ Fees should not exceed demonstrable administrative costs ➤ Should be impartial assessment of fees across industry
Spectrum fees	<ul style="list-style-type: none"> ➤ Usually provided for in spectrum licence ➤ Cost recovery for spectrum management ➤ Sometimes higher fees (if no licence acquisition fee)
Part 4 – General Conditions of Licence	
Application	<ul style="list-style-type: none"> ➤ Include essential requirements and public interest matters applicable to all or most licences for telecommunications services
Eligibility	<ul style="list-style-type: none"> ➤ Cite requirements to retain eligibility to hold licence (if any)
Ownership and control rules	<ul style="list-style-type: none"> ➤ Cite any restrictions on ownership and control of licensee (e.g. cross-ownership with major competitors, foreign ownership restrictions)
Facilities and equipment	<ul style="list-style-type: none"> ➤ Rules on equipment that may be used (e.g. type approval rules)
Books, records and reports	<ul style="list-style-type: none"> ➤ Any applicable rules (e.g. to verify price or revenue cap regulation) ➤ Specify reporting requirements and rules on provision of information to the regulator
Co-operation with regulator	<ul style="list-style-type: none"> ➤ Specific obligations to provide access by regulator to information or premises, and to co-operate with regulator for specific regulatory purposes
Co-operation with other governmental authorities	<ul style="list-style-type: none"> ➤ Specify obligations to co-operate with other authorities (e.g. police and national security forces regarding interception of communications, environmental protection, health and safety rules if not covered by law of general application)
Access to rights of way and other public property	<ul style="list-style-type: none"> ➤ Rights of operator to access streets, sidewalks, road allowances and other public property and rights of way for the purpose of constructing, operating and maintaining facilities ➤ Cite legal authority for any such rights ➤ Include rules for access, if not stated elsewhere (e.g. payment, if any, public safety and convenience, aesthetics, compliance with applicable law)
Access to private property	<ul style="list-style-type: none"> ➤ Any rights of operator to access private property (e.g. rights of way for cable or microwave routes) including expropriation rights, if applicable ➤ Cite legal authority for any such rights

Table 2-5: Contents of a PSTN Operator's Licence (Example for Emerging Economy) (cont'd)

Part 5 – Specific Conditions of Licence	
Use of radio spectrum	<ul style="list-style-type: none"> ➤ Often dealt with in separate spectrum licence ➤ Include rules on efficient spectrum use
Numbering	<ul style="list-style-type: none"> ➤ Assignment of numbers, if applicable ➤ Refer to national numbering plan, if applicable ➤ Rights and obligations regarding implementation of number portability arrangements
Directory and Emergency Services	<ul style="list-style-type: none"> ➤ Obligations to provide such services, and co-operate with other operators in providing them jointly
Universal Access and/or Universal Service Obligations	<ul style="list-style-type: none"> ➤ See Module 6 – Universal Service
Network roll-out and service coverage obligations	<ul style="list-style-type: none"> ➤ Specific obligations (usually set out in Appendix, including maps, number of access lines, etc.) ➤ See Module 6
Quality of service	<ul style="list-style-type: none"> ➤ Specific obligations (usually set out in Appendix, including specific indicators, standards to be met by specified dates, reporting procedures, etc.) ➤ May be covered or supplemented in other regulatory documents
Security for Performance of Licence Obligations	<ul style="list-style-type: none"> ➤ Reference details of performance bond or other method used to secure performance of licence obligations ➤ Bond or security document(s) may be annexed to licence
Part 6 – Relations with Customers	
Terms and conditions of service	<ul style="list-style-type: none"> ➤ Terms and conditions usually set out in regulatory documents ➤ May include mandatory contents of customer contracts ➤ May include consumer “code of rights”
Customer complaints	<ul style="list-style-type: none"> ➤ Rules on handling and recording complaints ➤ May be set out in regulatory documents
Consumer protection	<ul style="list-style-type: none"> ➤ Provisions may be in regulatory documents or approved customer contracts (to provide notice to customers) ➤ Include protection of privacy ➤ Rules often published in telephone directories
Price regulation	<ul style="list-style-type: none"> ➤ Price regulation (tariff) regime usually specified (e.g. price caps) ➤ Specify services to which price regulation regime applies ➤ Review period and rules for review often specified ➤ Key to financial viability of licence ➤ Details in appendices or referenced regulatory documents

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Table 2-5: Contents of a PSTN Operator's Licence (Example for Emerging Economy) (cont'd)

	<ul style="list-style-type: none"> ➤ See Module 4 – Price Regulation
Dispute resolution	<ul style="list-style-type: none"> ➤ Method to resolve disputes over application of licence
Part 7 – Relations with Other Operators	
Interconnection	<ul style="list-style-type: none"> ➤ See Module 3 ➤ Include rights and obligations to interconnect
Anti-competitive practices	<ul style="list-style-type: none"> ➤ See Module 5 ➤ Include remedies and sanctions, if not specified elsewhere
Access to shared facilities (poles and conduits)	<ul style="list-style-type: none"> ➤ Rights and obligations regarding collocation and access to poles, towers, conduit, etc. ➤ See Module 3
Resale	<ul style="list-style-type: none"> ➤ Rights and obligations regarding resale by licensee and by other service providers (e.g. for payphones, Internet services, value added and simple resale)
Dispute resolution	<ul style="list-style-type: none"> ➤ Method to resolve disputes with other licensees, e.g. regarding interconnection (see Module 3)
Part 8 – Amendment, Renewal and Termination	
Amendment by regulator	<ul style="list-style-type: none"> ➤ See Section 2.4.4 ➤ Unilateral modifications should only apply to certain regulatory matters, not key commercial terms of licence ➤ Procedural safeguards ➤ Competitive neutrality should be maintained
Amendment by mutual agreement	<ul style="list-style-type: none"> ➤ Provides certainty, where needed ➤ Key commercial terms usually only subject to amendment by agreement between licensee and regulator ➤ Competitive neutrality should be maintained
Compliance	<ul style="list-style-type: none"> ➤ Specify sanctions and penalties for failure to comply with various terms of licence (e.g. fines, forfeiture of performance bonds, revocation)
Renewal	<ul style="list-style-type: none"> ➤ Include renewal rights (e.g. if certain performance targets met)
Termination for cause	<ul style="list-style-type: none"> ➤ Termination, revocation and/or suspension may be included ➤ Grounds (usually certain major, unresolved breaches only) ➤ Procedure (include due process) ➤ Include lesser penalties (e.g. fines) which will not disrupt service
Termination if no renewal	<ul style="list-style-type: none"> ➤ Clarify surviving rights of licensee, property rights, treatment of assets, and other effects of non-renewal

Table 2.5: Contents of a PSTN Operator's Licence (Example for Emerging Economy) (cont'd)

Part 9 – General	
Force Majeure	➤ Excuses performance in case of specified types of events beyond control of licensee
Assignment	<ul style="list-style-type: none"> ➤ Often no assignment (at least without consent) ➤ Rules and restrictions on assignment of licence
Transitional provisions	➤ Rules and timetable for coming into full compliance with licence (important in licensing of PTT or other incumbent operator)

MODULE 3

Interconnection

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MODULE 3

INTERCONNECTION

3.1 *Interconnection Principles*

3.1.1 *The Importance of Interconnection*

Interconnection of telecommunications networks has been important for a century, but never more so than today. Originally, operators, such as PTTs and the North American Bell companies, interconnected with neighbouring operators. However, these operators retained monopolies over all networks and equipment in their geographic serving areas. For decades, few other types of interconnection occurred.

Beginning in the 1970s, customers began to interconnect a growing range of terminal equipment and private network facilities to the incumbent operator's facilities. With the liberalization of telecommunications markets over the last few decades, effective interconnection arrangements have become key to the operations of an increasingly wide range of services. These services include local, long distance and international fixed, mobile and satellite services, providing everything from basic voice telephony to high speed Internet connectivity to Internet multimedia services.

Competition is the key to the growth and innovation of today's telecommunications markets. Interconnection is a critical factor for the viability of

competition. For most of the history of telecommunications, operators and government administrations negotiated with each other to set the terms of interconnection without regulatory intervention. The emergence of competition has changed this. Incumbent operators have little incentive to make things easy for their new competitors, and most of the bargaining power in negotiations lies with the incumbents.

Strategic anti-competitive behaviour on interconnection matters by incumbents has retarded or prevented competition in many telecommunications markets around the world. Incumbents can engage in a wide range of behaviour to frustrate effective competition. For example, they can charge excessive rates for interconnection, refuse to build or make available adequate interconnection capacity, and refuse to unbundle network elements or services necessary for efficient interconnection. New entrants in telecommunications markets have little to offer in negotiations to remove these barriers to competition. Today, there is a consensus among telecommunications experts and policy makers that decisive and informed guidance by regulators is required to pave the way for effective interconnection arrangements.

Interconnection is an important consumer issue. Telecommunications users cannot communicate

with each other or connect with services they demand unless necessary interconnection arrangements are in place. Interconnection of a multitude of different types of networks has brought tremendous benefits to consumers and businesses around the world in the last decade. Without efficient interconnection arrangements, services such as direct international dialing, all Internet-delivered services, automated teller machines and e-commerce would not be possible.

Increasing network interconnection will continue to improve the convenience and utility of telecommunications service for users around the world in the next decade. Inadequate interconnection arrangements not only impose unnecessary costs and technical problems on operators - they also result in delays, inconvenience and additional costs for businesses, consumers and, ultimately, for national economies.

According to ITU' surveys, Interconnection-related issues are ranked by many countries as the single most important problem in the development of a competitive marketplace for telecommunications services, interconnection has been a highly contentious issue in Europe. Almost half of all countries in the Asia-Pacific region indicated that interconnection issues were a top regulatory priority. While fewer countries in the Arab states (20%) and the Americas (30%) pointed to interconnection as a regulatory priority, the general level of network competition was still low in those regions. That is changing. The importance of interconnection issues will increase in all regions as network competition develops.

This Module examines the arrangements that must be put in place between operators, and the steps that can be taken by regulators, to facilitate effective interconnection.

3.1.2 Scope of Interconnection Issues

Interconnection is defined in different ways in the different regulatory and policy regimes that deal with it. A good recent definition is included in the 12 July 2000 proposed European Commission Directive on access and interconnection:

“interconnection” means the physical and logical linking of public electronic communications networks used by the same or a different undertaking in order to allow the users of one undertaking to communicate with the users of the same or another undertaking, or to access services provided by another undertaking. Services may be provided by the parties involved or other parties who have access to the network. (Article 2 – CEC(2000d))

This definition differs from others in that it includes interconnection of networks used by the same undertaking and not just networks of different operators. The proposed Directive also differs from some other regulatory interconnection regimes in that it includes a separate concept of “access”, defined differently from interconnection:

“access” means the making available of facilities and/or services, to another undertaking, under defined conditions, on either an exclusive or non-exclusive basis, for the purpose of providing electronic communications services. It covers inter alia:

- access to network elements and associated facilities and services, which may involve the connection of equipment by wire or wireless means;
- access to physical infrastructure including buildings, ducts and masts;
- access to software systems, including operational support systems;
- access to number translation or systems offering equivalent functionality;
- access to mobile networks, in particular for roaming; and
- access to conditional access systems for digital television services.

Interconnection is a specific type of access implemented between public network operators. Access in this Directive does not refer to access by end-users.

The last sentence of the definition is important. It distinguishes the Commission's use of the term "access" from its normal meaning, which relates to end-user access, for example in the terms "access lines" or "network access service". Despite this potential confusion, the types of inter-operator "access" listed in the Commission's definition are very important in the context of interconnection.

The types of "inter-operator access" listed in the Commission's definition are treated as an integral part of "full" or "efficient" interconnection in other jurisdictions. They may also be considered as "supplemental" or "ancillary" forms of interconnection. These types of access arrangements are typically addressed in interconnection agreements entered into between experienced operators.

Whatever the regional or local definition of interconnection, the matters included in the Commission's proposed definition of "access" must be dealt with as part of a comprehensive approach to interconnection. In this Handbook, therefore, we will deal with this type of "inter-operator access" in detail, as an integral part of full interconnection.

3.1.3 Interconnection Issues

Commercial, technical and operational arrangements must be made to facilitate interconnection between network operators. A number of issues must be agreed upon by the operators, or determined by the regulator, in order to finalize these arrangements.

The major commercial issues of concern to new entrants are generally related to the cost of interconnection. In North America and Europe, for example, up to 50% or more of the total costs of some long-distance operators have been paid out in interconnection charges to local operators. Such interconnection charges are particularly significant for operators that rely heavily on resale or that must pay a subsidy or contribution component as part of interconnection charges. The practice of combining subsidies and cost-based charges is widely discouraged, for the reasons set out in Section 3.3.5.4. Even without a subsidy component, the level of interconnection charges is often an important factor in determining the financial viability of a new telecommunications service provider.

Interconnection costs are certainly not the only major issue. Various technical and operational issues are also critical to both incumbent and new operators. Box 3-1 lists some of the most important interconnection issues encountered in many countries.

3.1.4 Regional Interconnection Rules

In recent years, the development of regional trading areas and the implementation of multilateral trade agreements has accelerated the liberalization of interconnection policies.

A leading example is the 1997 European *Interconnection Directive* (97/33/EC). It contains rules specifically aimed at liberalizing national interconnection regimes. The Directive requires interconnection arrangements to be public and non-discriminatory. It also requires interconnection charges to be cost-based. Related EU Directives supplement and amend the European interconnection regulatory framework. These Directives include obligations on special access (98/10/EC) and provision of leased transmission capacity (92/44/EC).

The provisions of the European Directives related to interconnection are fairly general in nature. This approach permits adaptation to the EU's different national legal regimes and regulatory frameworks. The European Commission has taken additional steps, beyond the Directives, to improve interconnection arrangements. One such step is the publication of "best current practice" interconnection rates. These interconnection rates are significantly lower than those of some member countries, suggesting that these countries should take action to meet international cost benchmarks. Another major step was the recent adoption of rules and a proposed regulation to require unbundling of the local loop. These rules are discussed later in this Module.

The European Commission has also reviewed its interconnection-related Directives. As previously indicated, on 12 July 2000, the Commission published a proposed new Directive on access to, and interconnection of, electronic communications networks and associated facilities (COM(2000) 384). The proposed new Directive seeks to respond to the

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convergence phenomenon by covering a broader range of electronic communications networks and services. It also contains some new and different principles. However, under the proposed new Directive, the key provisions of the three previous (above-noted) Directives will continue to be legally binding on European Union Member States, pending further reviews.

Other multilateral organizations have also developed interconnection guidelines. For example, the Asia-Pacific Economic Co-ordination (APEC) Telecommunications Working Group has developed a *Framework for Interconnection*. Unlike the EU

Box 3-1: Some Key Interconnection Issues

Framework and Procedural Issues

- Adequacy of regulatory guidance for interconnection negotiations
- Availability of interconnection with incumbent operators for various types of services
- Access to standard interconnection terms with incumbent operator
- Independent and timely dispute resolution
- Non-discriminatory access to interconnection facilities and services
- Access to PSTN network specifications (including planned network changes)
- Treatment of Universal Service, Universal Access or Access Deficit Charges

Commercial Issues

- Level and structure of interconnection charges; basis for calculation (i.e. type of costs used to calculate charges, revenue sharing, bill and keep, etc.)
- Unbundling of interconnection charges for different network components and related services
- Resale of network facilities and services
- Payment for network modifications to facilitate interconnection
- Confidential treatment of competitive and customer information

Technical and Operational Issues

- Open network standards and technical compatibility
- Location of Points of Interconnection (POI)
- Access to signaling systems, advanced digital features, billing system, operations support systems (OSS), call-related databases and other software to provide advanced services
- Access to unbundled network components, including local loops
- Equal ease of customer access to competitive networks (e.g. customer dialing parity)
- Access to numbers and implementation of number portability
- Collocation and sharing of infrastructure (e.g. buildings, poles, conduits, ducts, towers)
- Quality of interconnection, including availability of sufficient interconnection capacity to avoid congestion, and to ensure the timely provisioning of interconnection services and facilities

approach, this framework is not binding on APEC members. The APEC framework is intended to provide principles, examples of interconnection approaches in APEC economies, and other useful information to assist in the development of national interconnection policies. Similarly non-binding approaches have been taken in interconnection principles published by other regional organizations, such as CITEL in Latin America.

3.1.5 Multilateral Interconnection Rules

The 1997 *WTO Agreement on Basic Telecommunications* (formally known as the *Fourth Protocol of the General Agreement on Trade in Services* or *GATS*) was the first widely accepted multilateral trade agreement to include binding interconnection rules. These rules were included in the so-called *Reference Paper*, an informal text containing regulatory principles negotiated among WTO Members. The *Reference Paper* became legally binding on WTO Members that attached it as part of their "additional commitments" in their GATS Schedule of Commitments on telecommunications market access. The *Reference Paper* was attached in whole or with minor modifications by 57 of the 69 signatories to the *Fourth Protocol*. Six additional signatories elected to list some of the principles in their Schedules, but not the entire document.

All WTO Members have the option of undertaking the obligations of the *Reference Paper* in their GATS Schedules on interconnection or other matters, whether or not they participated in the *Fourth Protocol*. As of late 1999, a total of 64 WTO Member governments had committed to the interconnection obligations of the *Reference Paper*. This increase from 57 was due to the submission of commitments by seven more countries since the *Fourth Protocol*. Of these, four WTO Members attached the *Reference Paper* to telecommunications commitments they made after the Protocol negotiations ended and three countries attached it to the GATS Schedules they filed upon accession to the WTO. Most of the nearly 30 additional countries seeking accession to WTO are expected to also commit to the *Reference Paper* and its interconnection obligations.

The most important interconnection-related rules set out in the *WTO Regulation Reference Paper* are

summarized in Box 3-2. The full text of the *Reference Paper* provides more detail than the box.

The paper's central principles are non-discrimination, transparency, and the availability of reasonable interconnection terms, including cost-oriented rates and unbundled access, from "major suppliers". The concept of "major suppliers" in the *Reference Paper* can generally be assumed to refer to operators with a dominant position vis-à-vis essential infrastructure or market share. Thus, at present, the Paper's interconnection disciplines would most commonly apply to monopoly or former monopoly fixed-line operators.

The *Reference Paper* was designed as a set of general rules or principles to be observed, rather than as detailed prescriptive guidelines on how the principles are to be implemented. This approach makes the paper adaptable as telecommunications markets evolve, and provides flexibility for application to different legal systems and regulatory interconnection frameworks.

Interconnection

Box 3-2: Interconnection Rules of WTO Regulation Reference Paper

- Interconnection With "Major Suppliers" must be assured
 - > At any technically feasible point in the networks
 - > In a timely fashion
 - > On non-discriminatory and transparent terms (including quality and rates)
 - > Sufficiently unbundled to avoid charges for unnecessary components
 - > At non-traditional interconnection points if requestor pays charges
- Procedures
 - > Procedures for interconnection to major suppliers must be made public
- Transparency
 - > Agreements or model interconnection offer of major supplier must be made public

As a practical matter, therefore, more detailed guidance is essential to turn the general *Reference Paper* principles into workable interconnection arrangements, agreements, national regulations or regulatory directives. The experience of other countries can provide valuable precedents in this regard.

When the *GATS Agreement on Basic Telecommunications* came into effect on 15 February 1998, many signatory countries did not yet have detailed interconnection rules in place. Some still do not. Given the general nature of the *Reference Paper* principles, it will be a challenge for many countries to develop sufficiently detailed interconnection regimes to put “flesh on the bones” of their GATS obligations.

Before examining the details of interconnection arrangements, the following sections of this Module will review the basic principles underlying most interconnection rules.

3.1.6 Interconnection Principles

3.1.6.1 Providing Advance Regulatory Guidelines

There continues to be a regulatory debate about the relative advantages of providing *ex ante* or advance interconnection guidelines versus *ex post* regulation. Proponents of the *ex post* approach generally favour negotiation of interconnection agreements between operators, with recourse to regulatory dispute resolution or competition law remedies, if negotiations fail.

Several years ago, there were more advocates of the *ex post* approach, particularly outside of North America, than there are today. This approach was based on the belief that regulation should be minimized in competitive markets. Many regulators recognized that the financial, technical and operational details of interconnection arrangements could be complex. They considered that incumbent operators and new entrants would generally have a much better understanding of these arrangements than regulators. They were also concerned that inappropriate regulatory intervention in interconnection matters could impose high costs on the sector.

For these reasons, a large number of regulators and telecommunications experts promoted industry negotiation as the main approach for developing interconnection arrangements. *Ex ante* regulatory intervention was discouraged. The focus of regulatory attention was on dispute resolution, in the event industry negotiations broke down.

In recent years, there have been increasing doubts about the effectiveness of the *ex post* approach. There appears to be a growing consensus that advance regulatory guidelines, or even specific interconnection rules, are necessary to facilitate successful negotiations. This view has been expressed recently by the European Commission, in its 12 July 2000 proposed Directive on access and interconnection. The Commission stated:

“...there is a consensus that ex-ante sector specific rules will continue to be needed alongside competition rules to regulate access and interconnection, until such time as there is full and effective competition in all segments of the market.” (CEC (2000c))

This view has long been held by regulators and policy-makers on the other side of the Atlantic. During the 1980s and 1990s, US and Canadian regulators issued a series of detailed guidelines and decisions on most aspects of interconnection with dominant operators, including interconnection rates and technical terms and conditions. The more interventionist approach of the North American regulators appears to have led to more unbundling of network services, more competition, and arguably more service innovation and growth.

The issues of negotiating interconnection arrangements and approaches to regulatory intervention are discussed in detail in Section 3.2.2 of this Module.

3.1.6.2 Focus Interconnection Obligations on the Incumbent Operator

One generally accepted means of minimizing regulatory intervention is to limit imposition of interconnection obligations to dominant incumbents. In practice, this is the most effective and efficient means of utilizing limited regulatory resources.

This approach is sometimes subject to criticism by incumbent operators. They argue that this approach amounts to regulatory “handicapping” and construction of “non-level playing fields”. Others suggest that universal imposition of interconnection obligations would provide more interconnection opportunities for all operators.

However, this is a minority view. The consensus view is that universal imposition of interconnection obligations on all operators, large and small, generally amounts to over-regulation. In principle, only firms with a dominant market position have the ability to establish interconnection terms independently of competition. Non-dominant competitors would find it difficult to independently maintain excessive interconnection rates, or discriminatory conditions. Other service providers wishing to interconnect could avoid such unfavourable interconnection arrangements by interconnecting with a competitor, including the dominant supplier. Over time, as markets become increasingly competitive, it may be possible to deregulate more interconnection arrangements, including those of once-dominant operators. However, in the transition period to full competition, a degree of asymmetric regulation is required in order to level a playing field that is tilted in favour of incumbents.

For these reasons, the regulatory approach to interconnection in this Module focuses on interconnection arrangements with dominant incumbent operators.

This approach is consistent with the *Reference Paper* of the *WTO Agreement on Basic Telecommunications*, which only imposes interconnection obligations on dominant operators (i.e. “major suppliers”). It is also consistent with the European Commission’s 12 July 2000 proposed Directive on access and interconnection. The proposed Directive aims to expand the scope of its interconnection framework to a wider range of electronic communications networks. However, only dominant operators will be subject to the *ex ante* regulatory obligations proposed by the Commission, such as mandatory interconnection, resale, collocation, etc.

3.1.6.3 Transparency

Transparency is a major policy objective of multilateral trade agreements as well as the national telecommunications policies of many countries. While there is a lot to be said for protecting the confidentiality of business agreements in a competitive marketplace, interconnection with dominant incumbents is generally considered an exception.

Confidential treatment of interconnection arrangements would provide incumbents with an opportunity to act strategically to thwart competitors. For example, such operators could enter into confidential interconnection agreements that provide unfavourable interconnection arrangements with competitors, and more favourable ones with affiliates. Dominant operators could also limit the functionality of the types of interconnection offered, levy excessively high charges, and otherwise act strategically to limit competition.

Transparency of interconnection arrangements is an effective means of discouraging anti-competitive strategic behaviour by dominant operators. It is easier for regulators to detect and remedy such behaviour if interconnection arrangements are made public. Publication of agreements also makes it easier for regulators and all industry participants to compare interconnection rates, terms and conditions. Transparency also assists in developing industry standards and benchmarks, as well as best practices on operational and administrative issues.

Many countries require publication of reference interconnection offers or model interconnection agreements. To further promote transparency, some regulators maintain public registries of interconnection agreements, or require publication of agreements by operators. In some cases, interconnection agreements are available over the Internet.

Where interconnection agreements are made public, various mechanisms can be used to protect confidential commercial information. For example, Indian legislation requires the regulator to maintain a registry of interconnection agreements. However, at the request of parties, the regulator may direct that parts of an agreement be placed in a confidential portion of the registry. In such cases, a summary of

the confidential parts must be made publicly available.

3.1.6.4 Non-Discrimination

Avoidance of discrimination is a central objective of most interconnection policies. Discrimination in interconnection arrangements can take several forms. One form involves discrimination by a dominant operator in interconnection arrangements entered into with several different new competitors. For example, new entrant B may obtain better arrangements than new entrant C. Such discrimination is relatively easy to detect if interconnection agreements are public.

It should be noted that interconnection arrangements may vary from one competitor to another without being “unduly” or “unjustly” discriminatory. The two competitors may have voluntarily agreed to different arrangements, for example, to suit their different operating conditions. The real test, therefore, should not be “discrimination” in the sense of “differences” in interconnection arrangements. The test should be “unjust”, “undue” or “unfair” discrimination, in the sense that an interconnecting competitor is placed at a significant disadvantage as a result of less favourable interconnection arrangements.

The other major form of discrimination is often harder to identify. It involves the provision of more favourable interconnection arrangements by a dominant firm to its own operations or its affiliates than to competitors. Disputes or complaints about this form of discrimination are often difficult for regulators to resolve. For example, it is sometimes impossible to grant a competitor exactly the same type of interconnection arrangements as it is possible to provide to an internal operation.

Various approaches have been developed to identify and resolve cases of discrimination of the second type. Since interconnection arrangements need not be identical, the objective of preventing undue discrimination has been described as one of developing “comparably efficient” interconnection arrangements.

Some incumbents discriminate against competitors by treating them as “customers” rather than “peers”

or “co-carriers”. This approach often leads to higher prices and inferior interconnection arrangements. Regulators should generally insist that interconnecting carriers should be treated on an equal and reciprocal basis, as peers and not customers.

One type of discrimination can be fatal to the prospects of competition. It involves providing insufficient network capacity to interconnecting operators, as compared to an incumbent’s own services. Network congestion can be a deadly anti-competitive barrier. Regulators must sometimes intervene to ensure non-discriminatory rationing of network access and transport facilities. They must often also ensure that established PSTN operators construct sufficient capacity to handle growing demand that can be expected in a competitive telecommunications market.

One regulatory approach to reduce, or at least assist in the identification of, discrimination between a dominant firm and its competitors involves the establishment of structural or accounting separations or divestiture. Under structural separation approaches, a dominant firm is required to move its competitive operations into a separate affiliated company, with separate management, accounting records, etc. Divestiture involves selling all or part of the separate affiliate to other persons. Accounting separations involve setting up separate accounting records only, and not actually requiring the establishment of a separate legal entity for the competitive business. These approaches are discussed in Section 5.3.3 of Module 5 – Competition Policy.

Another less interventionist approach that is commonly used by regulators and competition authorities to prevent undue price discrimination by a dominant firm is an “imputation approach”. Such an approach is applied to vertically integrated suppliers. Such suppliers include operators that provide a retail service, like local telephone access service, on a competitive basis, and also provide a wholesale service, like international telephone service, on a monopoly basis to itself and other competitors.

Under an imputation test, a vertically integrated supplier would be required to include the same amount it charges to its competitors for international service in its own retail rates, and to add an amount

sufficient to cover its additional costs of providing local services. Imputation tests are discussed under the heading Vertical Price Squeezing in Section 5.3.4. of Module 5.

3.1.6.5 Cost Orientation

Interconnection principles, such as those set out in the *Reference Paper* for the WTO's *Agreement on Basic Telecommunications* and the European Union's *Interconnection Directive*, require interconnection charges to be "cost-oriented".

There are various reasons for specifying that interconnection charges should approximate costs. Without a cost-based standard for setting interconnection charges, an established monopolist or dominant operator would have an incentive to demand a high price for terminating calls that originate on a new competitor's network. Similarly, a dominant operator would have an incentive to pay little or nothing to the competitor to terminate calls

originating on the dominant operator's network. In the absence of regulatory intervention, some new competitors might have little choice but to accept such a deal or remain unable to interconnect.

Serious problems can result from a dominant firm charging competitors interconnection prices that are significantly above cost. First, it deters market entry and the development of competition. Second, customers of the competitors will ultimately have to pay for these excessive charges. Third, the excessive prices can provide a pool of revenues that the dominant firm can use to subsidize losses, for example losses incurred as a result of predatory pricing action taken by the dominant firm to drive competitors out of a market.

The approaches used by telecommunications economists and regulators to calculate interconnection costs, and telecommunications costs generally, are discussed in Section 3.3 of this Module, in Module 4 and in Appendix B of the Handbook.

Box 3-3: Summary of Widely Accepted Interconnection Principles

- Terms of interconnection should not discriminate unduly between operators or between a dominant firm's own operations and those of interconnecting competitors
- Interconnection should be permitted at any technically feasible point, but the requesting operator should pay any additional costs of non-standard interconnection
- Interconnection charges should generally be cost-based (i.e. the evolving best practice specifies that the cost standard should be forward-looking long-run incremental costs; there is normally a mark-up to cover forward-looking joint and common costs)
- Cost inefficiencies of incumbent operators should not be passed on through charges to interconnecting operators
- Where reciprocal interconnection and costs can be expected to be reasonably balanced, bill and keep arrangements are an efficient alternative to cost-based interconnection
- Regulatory guidelines and procedures should be prescribed in advance, to facilitate interconnection negotiations between operators
- Standard terms and procedures should be published for interconnection to dominant operators
- Interconnection procedures and arrangements should be transparent
- Interconnection arrangements should encourage efficient and sustainable competition
- Network elements should be unbundled, and charged separately
- Charges related to universal service obligations should be identified separately, and not bundled with interconnection charges
- An independent regulator (or other third party) should resolve interconnection disputes quickly and fairly

3.1.6.6 Other Interconnection Principles

A number of other interconnection principles have been proposed and adopted by regulators, policy makers and trade organizations. In many cases, these are variations on the same themes. Box 3-3 summarizes widely accepted interconnection principles.

3.1.7 Contents of Interconnection Agreements

The contents of interconnection agreements vary considerably. Much depends on the regulatory

framework. If the existing regulatory framework provides sufficient detail on the terms and conditions of interconnection, then interconnection agreements can be shorter. The same is true if an incumbent operator, or an industry group, has published detailed interconnection tariffs, technical standards, procedures, etc. which can be incorporated into an agreement. In other cases, interconnection agreements must be more comprehensive.

Bearing these variations in mind, Table 3-1 provides a list of the possible contents of a “typical” interconnection agreement.

Table 3-1: Contents of a Typical Interconnection Agreement

Contents	Detail and Comments
Interpretation	
Recitals	<ul style="list-style-type: none"> ➤ “Whereas” clauses add historical and legal context to assist understanding by future readers of agreements
Definition of Key Terms	<ul style="list-style-type: none"> ➤ Terminology varies significantly among different countries and operators ➤ It is important to ensure compatibility of terminology to the local environment when adapting interconnection agreements from other countries ➤ Definitions in other documents may be referenced, e.g. definitions in laws or regulations, regulatory guidelines, ITU definitions
Scope of Interconnection	
Description of Scope and Purpose of Interconnection	<ul style="list-style-type: none"> ➤ Different types of interconnection agreements have different purposes (e.g. two local networks, local to long distance/international, fixed-to-mobile, mobile-to-mobile, local ISP to ISP backbone) ➤ The purpose of some interconnection agreements is to provide termination <i>services</i> or transit services; others involve provision of unbundled <i>facilities</i>, etc. ➤ Interconnection architecture (annotated diagrams)
Points of Interconnection and Interconnection Facilities	
Points of Interconnection (POI) and Related Facility Specifications	<ul style="list-style-type: none"> ➤ POI locations (e.g. exchanges, meet points) usually listed in an appendix; may be modified from time to time. Typically includes exchange types and street addresses ➤ Specific POI facility locations (e.g. digital distribution frame; manhole splice box)

Table 3-1: Contents of a Typical Interconnection Agreement (cont'd)

	<ul style="list-style-type: none"> ➤ Description of network facilities to be interconnected (e.g. OC-3 fibre optic terminals with interconnecting single-mode optical fibres) ➤ Specify capacity and/or traffic volume requirements ➤ Indicate which party is to provide which facilities (include diagram of POIs and interconnected facilities) ➤ Technical specifications, for example: <ul style="list-style-type: none"> ➤ Calling Line Identification (CLI) specs ➤ Other advanced digital feature specs, e.g. call forwarding, caller name ID, etc. ➤ Basic and ISDN call control interface specs ➤ Local Number Portability (LNP) query-response network specs
<p>Signaling Interconnection</p>	<ul style="list-style-type: none"> ➤ Specify type of signaling networks/standards (e.g. CCS7) ➤ Signaling POIs locations to be specified (i.e. Signal Transfer Points or STPs) ➤ Point Codes to be specified ➤ Technical interface specifications (e.g. signaling links to be dedicated E-1 or DS-1 transmission facilities; operating at 56 kbps) ➤ Diagram of signaling interconnection architecture
<p>Network and Facility Changes</p>	
<p>Planning and Forecasts</p>	<ul style="list-style-type: none"> ➤ Requirement for mutual notification of network changes and capacity forecasts, for example: <ul style="list-style-type: none"> ➤ traffic forecasts for each POI ➤ local number and portability requirements ➤ area code saturation and changes to increased digit phone numbers ➤ default and redundant routing arrangements ➤ Periodic network planning reports may be specified
<p>Facility Ordering Procedures</p>	<ul style="list-style-type: none"> ➤ Specify rights and obligations of each party with respect to ordering and provisioning of interconnection facilities (including unbundled network elements – see below). ➤ Confidentiality requirements and procedures to ensure same ➤ Ensure no anti-competitive use of order information (e.g. no contacts with end users; competitive service divisions of operator receiving orders) ➤ Specify points of contact (e.g. Interconnection Service Groups; E-mail addresses, etc.) ➤ Specify order format and procedures (e.g. standard order forms may be utilized in paper or electronic (EDI) format)

Table 3-1: Contents of a Typical Interconnection Agreement (cont'd)

	<ul style="list-style-type: none"> ➤ Procedures to expedite specific orders ➤ Co-ordination process for migration of customers between operators (e.g. coordination of cut-overs to prevent or minimize service interruptions to end users) ➤ Procedures for ordering operator to arrange for all equipment installations and changes at end-user premises ➤ Order confirmation and order rejection procedures, timely notification, notification of additional charges, etc. ➤ Order completion notification and reporting requirements
Traffic Measurement and Routing	
<p>Traffic Measurement Responsibilities and Procedures</p>	<ul style="list-style-type: none"> ➤ Describe party responsible; measurement and reporting procedures (see billing procedures below): ➤ Rules for routing of different types of traffic, if any (e.g. Bill and Keep local traffic that is to be terminated reciprocally without charge may be carried on "Bill and Keep" trunks; traffic to which termination charges apply may be carried on other trunks, e.g. transit trunks, national traffic trunks, etc.)
Infrastructure Sharing and Collocation	
<p>Sharing of Infrastructure, Procedures and Costs</p>	<ul style="list-style-type: none"> ➤ Availability of poles, conduits, towers, rights of way, etc. ➤ Procedures, if any, for determining available capacity; procedures for allocating capacity among requesting operators (e.g. first come/first served) ➤ Prices and/or costing method ➤ Provision and pricing of supplementary services (electrical power, security systems, maintenance and repairs, etc.) ➤ Sub-licences on property of third parties (e.g. right of way owners, municipal and other public and private property owners, where infrastructure is located), insurance and indemnification for damages
<p>Collocation</p>	<ul style="list-style-type: none"> ➤ Availability of actual or virtual collocation (e.g. for transmission facilities on exchange premises); list of addresses where collocation is available; procedures for determining available space; reservation of expansion space ➤ Prices and/or costing method for collocated space ➤ Provision and pricing of supplementary services (e.g. electrical power and emergency backup power, lighting, heating and air conditioning, security and alarm systems, maintenance and janitorial services, etc.) ➤ Procedures for ensuring access to and security of collocated facilities (notification; supervised repair and provisioning work and/or separated premises, etc.)

Table 3-1: Contents of a Typical Interconnection Agreement (cont'd)

	<ul style="list-style-type: none"> ➤ Negotiation of other lease and/or licence arrangements, including issues of sub-licences on property of third parties (e.g. building owners, right of way owners, municipal and other public property owners), insurance and indemnification for damages
Billing	
Scope of Billing Arrangements and Responsibilities	<ul style="list-style-type: none"> ➤ May include different arrangements, for example: <ul style="list-style-type: none"> ➤ Operators billing each other for interconnection services (e.g. termination) and facilities (e.g. unbundled loops and other network elements) ➤ Performance of billing functions by some operators for others (e.g. local operators billing end-users for long distance or international operators, ISPs, etc.)
Billing Procedures	<ul style="list-style-type: none"> ➤ Interconnection billing media – discs, tapes, paper and/or electronic (EDI) transfers; format and software specifications ➤ Guidelines for production of interconnection billing outputs, including: <ul style="list-style-type: none"> ➤ Applicable industry standards (e.g. CABS, BOS, SECABS, used with or without modifications) ➤ Billing data format and data elements ➤ Standardized codes and phrases ➤ Billing schedule ➤ Customer Service Record (CSR) provision, including: <ul style="list-style-type: none"> ➤ details to be supplied by provisioning local operator (e.g. record of interconnection elements used, including circuit and other (e.g. DSLAM) equipment identification numbers) ➤ media (e.g. tape, paper, etc.) and schedule for delivery ➤ other requirements to facilitate efficient verification and billing of end-user by non-provisioning operator ➤ Retention periods for billing data
Payment Terms and Conditions	<ul style="list-style-type: none"> ➤ Billing fees and related charges. ➤ Payment terms and conditions, including late payment penalties; service disruption credits, etc.
Billing Disputes and Reconciliation Procedures	<ul style="list-style-type: none"> ➤ Contact details for reconciliation and billing queries ➤ Responsibilities to provide back-up records ➤ Notification of billing disputes ➤ Initial resolution procedures (e.g. escalation to more senior management) ➤ Final resolution (referral to arbitration, regulator or courts)

Interconnection

Table 3-1: Contents of a Typical Interconnection Agreement (cont'd)

Quality of Service/Performance and Trouble Reports	
Quality of Service	<ul style="list-style-type: none"> ➤ Service performance standards may be specified in appendix, for example: <ul style="list-style-type: none"> ➤ Average time for provisioning interconnection circuits ➤ Percentage of interconnection cut-overs made on scheduled dates ➤ Comparative provisioning performance for competitors and self (or affiliates) ➤ Switching and transmission quality measures on interconnected circuits (e.g. probability of blockage at peak hours, transmission delay and loss – consider referencing ITU-T recommendations)
Testing and Maintenance	<ul style="list-style-type: none"> ➤ Right to make reasonable tests, and to schedule service interruptions; procedures to minimize disruption
Trouble Reports	<ul style="list-style-type: none"> ➤ Procedure for trouble reports; notice periods; response time standards ➤ Duty to investigate own network before reporting faults to interconnecting operator ➤ Responsibility for costs incurred to second operator in investigating faults subsequently found to exist in first operator's network. Calculation of charges (labour, etc.) for investigating trouble reports
System Protection and Safety Measures	<ul style="list-style-type: none"> ➤ Responsibilities of parties to take necessary precautions to prevent interference with, or interruptions of, other parties' networks or customers
Interchange and Treatment Information	
Data Interchange Format	<ul style="list-style-type: none"> ➤ Method and format of data interchange between carriers, including data interfaces, software, forms, etc.
Data to be Exchanged	<ul style="list-style-type: none"> ➤ Specify all data types and systems for which data is to be interchanged, for example: <ul style="list-style-type: none"> ➤ New facilities and service orders, network changes and forecasts, billing, etc. (see above) ➤ Number allocations and other data required for call routing and local number portability (where applicable, e.g. where LNP system is operated by incumbent operator rather than an independent party) ➤ Customer listings in directories and databases ➤ Access to network databases, for provision of advanced services

Table 3-1: Contents of a Typical Interconnection Agreement (cont'd)

<p>Access to and use of Customer Information</p>	<ul style="list-style-type: none"> ➤ Confidentiality procedures for customer information, including: <ul style="list-style-type: none"> ➤ Establishment of separate interconnection services group with secure data (password protection for electronic files; locks for data rooms and filing cabinets, etc.) ➤ Confidentiality forms to be completed by all relevant employees (penalties and bonding optional) ➤ Procedures to ensure protection of customer privacy
<p>Access to and use of Operator Information</p>	<ul style="list-style-type: none"> ➤ Confidentiality procedures (see customer information procedures – above) ➤ Intellectual property rights
<p>Equal Access and Customer Transfer</p>	
<p>Equal Access Procedures</p>	<ul style="list-style-type: none"> ➤ Procedures depend on equal access approach, e.g. carrier pre-selection; casual selection. Detailed procedures normally incumbent for carrier pre-selection, including: <ul style="list-style-type: none"> ➤ Customer authorization requirements (signature on prescribed form, clear choice requirements) ➤ Authentication and measures to prevent unauthorized customer transfers (slamming) ➤ Penalties for unauthorized customer transfers ➤ Methods of reporting customer transfers (contact points and data to be provided) ➤ Order confirmation procedure (format, medium, etc.) ➤ Schedule to implement transfers ➤ Procedures to implement transfers ➤ Dispute resolution process (e.g. escalation through senior management, arbitrator and regulator); information to be provided in dispute resolution process ➤ Procedures for dealing with disputed customers (which operator may contact customer, information to be provided to and/or obtained from disputed customers)
<p>Ancillary Services</p>	
<p>Operator Assistance</p>	<ul style="list-style-type: none"> ➤ Types of operator assistance services to be provided, including directory assistance, translation services, fault report routing, etc. ➤ Call handling and operations procedures ➤ Fees and billing procedures

Table 3-1: Contents of a Typical Interconnection Agreement (cont'd)

Other Ancillary Services	<ul style="list-style-type: none"> ➤ Subscriber listings in telephone directories ➤ Information and billing inserts ➤ Repair and maintenance services ➤ Other services provided by one or other operators to increase mutual operating efficiencies
Termination	
Grounds for Termination and Restrictions	<ul style="list-style-type: none"> ➤ Termination may only be permitted subject to certain restrictions (e.g. regulatory approval for termination of interconnection by incumbent operator) ➤ Grounds for termination by incumbent may include: <ul style="list-style-type: none"> ➤ Regulatory or court orders ➤ Bankruptcy, insolvency, receivership, etc. ➤ Cessation of business ➤ Fewer, if any, termination restrictions in competitive markets, and by non-dominant operators
Termination Procedures	<ul style="list-style-type: none"> ➤ Advanced notice requirements ➤ Payment of non-recoverable interconnection costs incurred by disconnected operator ➤ Computation and payment schedule for disconnection costs ➤ Dealings with end-users, communications restrictions, etc. ➤ Disconnection cutover procedures.
Other Provisions	
<i>Force Majeure</i>	<ul style="list-style-type: none"> ➤ List of conditions for which non-performance of interconnection agreement obligations will be excused
Assignment	<ul style="list-style-type: none"> ➤ Rights of assignment and restrictions on same (e.g. consent or regulatory approval requirements)
Applicable Laws	<ul style="list-style-type: none"> ➤ Agreement to be governed by, and interpreted in accordance with, the laws of relevant jurisdiction
Regulatory Approvals	<ul style="list-style-type: none"> ➤ Specify regulatory approvals required for effectiveness and/or renewal, amendment, termination, etc. of agreement
Breach of Agreement	<ul style="list-style-type: none"> ➤ Remedies and penalties ➤ Liabilities, indemnification and limitation of liabilities
Legal Interpretation	<ul style="list-style-type: none"> ➤ Standard provisions for legal interpretation and enforcement of agreement (e.g. entire agreement clause, effect of unenforceable terms, cumulative rights and remedies, etc.)

Table 3-1: Contents of a Typical Interconnection Agreement (cont'd)

Dispute Resolution	<ul style="list-style-type: none"> > Procedures for resolution of disputes under agreement that are not specifically dealt with elsewhere. For example: <ul style="list-style-type: none"> > Good faith negotiations, time schedule for same, escalation through management levels > Referral to regulator, arbitrator or court (e.g. of different types of issues) > Selection of, and procedures for, arbitration
Term	<ul style="list-style-type: none"> > Duration of term > Renewal rights and procedures
Amendment	<ul style="list-style-type: none"> > Review and re-negotiation procedures > Impact of regulatory changes

3.2 Interconnection Procedures

3.2.1 Establishing Interconnection Arrangements

A variety of different approaches have been used to establish interconnection arrangements. The main approaches are listed below. Combinations of these approaches have been used in different countries at different times.

- > Regulatory prescription (*ex ante*) of interconnection arrangements.
- > Negotiation between operators.
- > Establishment of general regulatory guidelines for operators to negotiate.
- > Regulatory mediation to facilitate operator-negotiated agreements.
- > Regulatory prescription (*ex ante*) of default interconnection arrangements, for example, based on other jurisdictions, that will apply if negotiations fail.
- > Regulatory decisions to resolve interconnection disputes.

- > Independent arbitration or mediation of interconnection disputes.
- > Regulatory review, variation and approval of negotiated arrangements.

Active industry participation is necessary to develop practical interconnection arrangements. However, there has also been a growing consensus that it is necessary to have regulatory involvement to provide advance guidelines for operator negotiations and to resolve disputes. Different approaches to balancing industry participation and regulatory intervention are discussed in the following sections.

3.2.2 Negotiation of Interconnection Arrangements

In many countries, industry negotiation has been the main approach to establishing interconnection arrangements. As previously discussed, there are good reasons for this. Operators understand their networks and operational requirements better than regulators, and they have the technical information required to implement effective interconnection arrangements.

However, without regulatory intervention and direction, interconnection negotiations do not usually proceed successfully. Incumbent operators are

generally suspicious that interconnecting operators will seek subsidized access to their extensive existing networks. Indeed, interconnection at almost any price is less expensive for a new entrant than duplicating major parts of the PSTN. However, the purposes of interconnection include minimization of total network costs, and speedy introduction of competition and rollout of new services, such as broadband access services. Interconnection obligations must often be imposed on incumbents, whether or not they agree with them, in order to promote sector development.

Some incumbents may also act strategically during the course of negotiations to implement arrangements that can effectively prevent or hinder competitive entry. Consequently, regulators must find ways to overcome incumbents' reluctance to interconnect their network to new competitors' networks on efficient, cost-based terms and conditions.

Despite encouragement from governments and regulators, the reality is that dominant incumbents have little incentive to enter into agreements that expedite competitive entry by interconnecting operators. Incumbent operators hold all the bargaining power in negotiations. New entrants have little to offer in exchange for favourable interconnection terms. They can promise market expansion, which should benefit all operators. However, most incumbents see this benefit as being outweighed by the loss of existing markets to new entrants.

Delays and failure have characterized many interconnection negotiations. In some of these situations, regulators subsequently realized that delays and disputes could have been resolved by appropriate regulatory intervention. For example, regulators could have applied benchmarks or best practices from other countries. In other cases, while negotiations did produce interconnection agreements, these were sometimes one-sided, costly and inefficient. Sometimes, new entrants accepted one-sided agreements as the only means available to start up business and avoid bankruptcy.

As a result of this experience, many regulators and interconnection experts have concluded that it is generally impractical to direct dominant incumbents to negotiate interconnection agreements with new

entrants, without adequate regulatory guidance. *Ex ante* regulatory direction and ongoing supervision or mediation are generally required for operators to negotiate reasonable interconnection agreements on a timely basis.

3.2.3 *The Regulator's Role in Interconnection Negotiations*

Once it is decided that regulators should play a role in promoting the successful conclusion of interconnection negotiations, the next question is: how can the regulator intervene most effectively? Regulators have a variety of tools available to expedite negotiations and to assist in the successful completion of interconnection agreements. Some proven regulatory approaches are described below. Variations and combinations of these approaches can be used in some cases:

- **Establishing guidelines in advance of negotiations** – As indicated in Section 3.1.6.1, there is a consensus that *ex ante* interconnection guidelines are a necessary and effective means to promoting good interconnection agreements. The task of developing such guidelines has been made easier for newer regulators due to the growing number of published interconnection principles and guidelines established by other regulators. The increasing availability of precedent interconnection agreements and the development of “best practices” and benchmark interconnection charges in other countries also make it easier for regulators to establish such guidelines. The remaining sections of this Handbook also discuss approaches that can be used in establishing *ex ante* guidelines.
- **Setting default interconnection arrangements in advance of negotiations** – Regulatory interconnection guidelines are usually fairly general. As a result, there are often disputes among operators about how best to apply guidelines. This can cause delays and impasses, and the need for further regulatory intervention. One approach to deal with this issue, is for the regulator to publish default interconnection arrangements together with guidelines. If the negotiations

fail, the default arrangements will apply. Such an approach was adopted for some interconnection issues by the US regulator in its landmark 1996 interconnection order.

In the case of a first interconnection agreement with an incumbent, it may be difficult for a regulator to establish appropriate default arrangements. The regulator may need to review the issues in depth, obtain information and submissions from the operators, etc. before it is in a position to establish default arrangements. However, default arrangements will usually be easier to establish for subsequent agreements.

As with guidelines, published interconnection agreements and the development of “best practices” and “benchmark” interconnection charges in other countries is making it easier for regulators to establish default arrangements. Benchmarking has been used extensively by the European Commission, and at the international level, such as in the US-Japan bilateral telecommunications negotiations.

Finally, if there is a concern about the appropriateness of the default arrangements, the regulator can provide a “sunset” clause for their applicability. In other words, the regulator can indicate that the default arrangements will cease to have effect after, for example, one year. That will provide time for a more detailed review between the time negotiations fail and the sunset of the default arrangements.

- **Establish deadlines for various stages of the negotiations** – Deadlines should be set at the outset of negotiations for completion of various steps or deliverables. For example, the incumbent might be asked to produce a proposed interconnection agreement in 30 days. Alternatively, deadlines can be proposed as soon as it appears delays will occur. Consequences of the failure to meet the deadlines can include regulatory intervention to impose an agreement and independent mediation or arbitration.

Another option that is sometimes proposed is final offer arbitration. In final offer arbitration, an independent arbitrator must select one of the final offers put forward by two disputing parties. In theory, this provides an incentive for the parties to make reasonable offers. In practice, this approach is generally inappropriate for interconnection negotiations, due to the number of issues involved, their complexity, and to the regulatory goal of developing efficient and non-discriminatory arrangements. The regulatory goal is not simply to establish an interconnection arrangement, but to establish a good one.

- **Establish Industry Technical Committees** – Bilateral or multilateral industry committees are often the best forum for establishing the details of interconnection arrangements. If negotiations are proceeding smoothly, incumbents and new entrants may take the initiative to delegate the details of technical interconnection arrangements to working groups or committees. However, in some cases, it may be necessary for the regulator to take the initiative to ensure appropriate technical committees are established. In either case, it is usually good practice to set deadlines for reports by such committees.

Depending on the degree of co-operation between operators, representatives of the regulator may also be able to play a useful role on the committees. They can often facilitate agreement on interconnection arrangements, suggest alternative approaches when there is an impasse, and otherwise mediate the discussions. In some cases, it will be necessary or useful for the regulator to retain expert consultants to assist in this role, and particularly in assessing the merits of conflicting positions of operators.

Sometimes industry technical committee work can drag on for months or years. In such cases, the committees actually slow down the process of reaching interconnection agreements. Delays can result from the establishment of committees with rigid work schedules, lack of familiarity with intercon-

nection technologies on the part of the regulatory participants, unnecessary process concerns, and other factors. The regulator should be flexible and willing to adopt alternative approaches to ensure that the industry technical committee process produces results on a timely basis. Alternatively, in some cases, the process should be abandoned, and other approaches adopted.

The industry technical committees established under regulatory supervision in Canada have generally been considered very successful. The Canadian Interconnection Steering Committee (CISC) and its sub-committees included participation from interested industry firms, as well as representatives of the regulator. CISC was established after a regulatory decision that provided *ex ante* guidance on the terms and conditions of interconnection. However much detail remained to be determined by CISC. It took about 2 years to reach agreement on major issues, and regulatory intervention was required from time to time. However, CISC managed to achieve consensus on many important interconnection issues. The CISC committees continue to deal with ongoing issues that arise, for example, in connection with new types of interconnection.

- **Incentives to complete interconnection arrangements** – A carrot can be more effective than a stick. Various incentives can often be provided to conclude interconnection agreements. Incumbents depend on regulators for approvals or actions that can sometimes be linked to the successful conclusion of interconnection arrangements.

An example of this approach can be found in Canada. In 1984, the incumbent operators (the “wireline operators”) were licensed to provide new cellular telephone services. At the same time, licences were issued to a new entrant cellular operator. As an incentive, the incumbents were prohibited from starting up their cellular services until they had completed interconnection agreements

with the new entrant. The arrangements that applied to the new entrant would also apply to the incumbents’ own cellular operations. This “no head start” rule proved to be effective. Mutually acceptable agreements were quickly concluded. The incumbent operators did not want to delay the introduction of their own cellular services.

In developing positive incentives for incumbents to complete interconnection agreements, regulators must take care to ensure that they do not create incentives for new entrants to stall or frustrate the negotiations. In the Canadian example discussed above, for instance, if the new entrants had not been ready to start up service, they might have delayed start up by the incumbents by stalling completion of agreements. Regulators must provide incentives for both sides to complete negotiations.

Finally, the prospect of receiving compensatory interconnection charges can provide an incentive for incumbents to conclude interconnection agreements. Most incumbents focus on short-term loss of market share to competitors. However, those that take the longer view, and build appropriate network facilities, can earn significant interconnection revenues as a result of the new traffic stimulated by their competitors.

- **Appoint mediators or arbitrators** – Where negotiations fail, or where they are likely to fail, success can often be achieved by appointment of a mediator or arbitrator. The two are different in that arbitrators are empowered to make binding decisions where an agreement cannot be reached. Mediators can provide additional information, develop compromises, propose alternatives, and persuade. However, they cannot impose their own decision on the negotiations.

It is possible for regulators or regulatory staff to act as mediators and arbitrators. However, this is not always the best approach, particularly in the case of inexperienced regulators and staff. Interconnection is a

complex area, and the costs of delays and improper regulatory intervention can be high. There is a growing body of international interconnection "know-how". Experienced independent interconnection experts can often add valuable experience. They can recognize issues from other countries, suggest options for unresolved issues, and otherwise save time. In addition, the use of outside experts maintains the independence and credibility of the regulators. The regulators can act as a final decision-maker in the event the mediation process fails. They can also review the final decision of an arbitrator, if necessary.

One or more of the foregoing regulatory approaches is usually required to promote the successful conclusion of interconnection negotiations. Whatever the approach, it is important for regulators to be proactive in establishing interconnection procedures and guidelines that will promote the negotiation of effective interconnection agreements. Further, where negotiations fail, regulators must be prepared to take steps to bring them to a successful conclusion.

3.2.4 Dispute Resolution

In most countries, it is the regulator's role to resolve interconnection disputes. The *WTO Regulation Reference Paper* requires signatories to the *Agreement on Basic Telecommunications* to establish an independent dispute resolution mechanism. The Paper requires recourse to an independent domestic body to resolve interconnection disputes within a reasonable time. This may be the regulator or another independent body.

In practice, regulatory dispute resolution can be a difficult task. Most regulators will normally be less informed than the operators on the details of interconnection. The risk of making an unsatisfactory decision deters many regulators from wading into interconnection disputes.

However, regulators must resolve disputes in a decisive and timely manner, or competition and sector development will be retarded. If information on local costs is insufficient, international bench-

marks can be applied. Other practices applied in foreign jurisdictions can provide useful precedents. Discussions with other regulators and assistance from expert advisors can facilitate the regulators' task.

If interconnection negotiations fail, an operator, usually the new entrant, may apply to the regulator to resolve the interconnection dispute. There is no single best approach to resolving a complex interconnection dispute, but some approaches are better than others. Table 3-2 suggests some approaches regulators may use in resolving interconnection disputes.

The *WTO Regulation Reference Paper* defines an independent regulator as follows:

"Independent Regulator" - The regulatory body is separate from, and not accountable to, any supplier of basic telecommunications services. The decisions of and the procedures used by regulators shall be impartial with respect to all market participants.

As discussed in Module 1, the degree of independence of regulators varies in different countries. In some countries, the regulator is a government ministry, or a government agency that also has responsibility for the operations of a state-owned incumbent. Many observers would not consider such a regulator independent for the purpose of resolving interconnection disputes. While such a regulator may technically be in a separate organization from the incumbent, it has similar interests. Both are part of the government telecommunications bureaucracy. Both may consider the financial and operating interests of the incumbent as their prime concern.

In such cases, other independent dispute resolution bodies should be considered, possibly using some of the approaches set out in Table 3-3. These might include an independent arbitrator or mediator acceptable to both parties. One option is to have an independent dispute resolution body established by a senior branch of government (the executive or legislature). This body need not be set up as a costly, permanent bureaucracy. It can be staffed on a temporary basis with independent domestic and international telecommunications experts. Another option is to request an international agency with re-

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sponsibility in the telecommunications sector, such as the ITU or The World Bank, to appoint or recommend an independent dispute resolution expert or panel to assist in the domestic dispute resolution process.

3.2.5 Ex Ante Regulatory Guidance

In some countries, regulators have prescribed detailed interconnection conditions before interconnection arrangements are made. Examples are the 1996 US and the 1997 Canadian interconnection orders for competitive local operators. In these

countries, lengthy regulatory interconnection proceedings were held before the rulings were made. Input was obtained from incumbents, new entrants and other interested members of the public. In the end, detailed decisions were issued, specifying many of the approaches and specific rates, terms and conditions on which interconnection should occur.

This experience produced a wealth of information, analyses and insights into interconnection issues. However, the work effort required to produce a detailed set of interconnection rules should not be

Table 3-2: Approaches to Resolving Interconnection Disputes

Improving the information base for decision-making	<ul style="list-style-type: none"> ➤ Require parties to clearly define areas of agreement and dispute ➤ Send written information requests to operators to clarify disputed issues and provide information for interconnection decisions ➤ Require written argument (with supporting facts and research, if necessary) to assist in clarifying the issues in dispute ➤ To increase transparency, consider making the arguments (but not confidential business data) available for comment by other interested parties and the public ➤ Consider inviting other interested parties (e.g. other interconnecting operators, service providers, or user groups) to comment on the issues
Obtaining expert assistance	<ul style="list-style-type: none"> ➤ Hire an experienced interconnection expert to assist in clarifying the issues, formulating information requests, and providing general advice to the decision-makers ➤ Consider appointing a mediator (or, if the parties agree, an arbitrator) ➤ Use outside parties for informal mediation, arbitration, information gathering or other participation in the negotiations. This approach is particularly useful in countries where direct regulatory involvement would "taint" the legality or politically prevent it from making an unbiased final decision.
Improving accuracy and credibility	<ul style="list-style-type: none"> ➤ Consult with other regulators on their experience in similar cases ➤ Review decisions and interconnection agreements approved by other regulators ➤ Consider circulating a draft of the decision to resolve the dispute to the disputing operators and other interested parties. Their comments should be made public. Comments and corrections can improve the accuracy of the final decision.

underestimated. Moreover, these lengthy interconnection proceedings did not produce the “final word” on interconnection arrangements. In both Canada and the US, there have been lengthy follow-up proceedings before the regulators and in the courts. In Canada, much of the detail of interconnection arrangements was left to a number of industry technical committees led by regulatory staff. This CISC process (which is referred to above) produced very useful results, but it took about 2 years to resolve most of the issues.

It should be recognized that interconnection is a dynamic issue. The types of telecommunications infrastructure and services are constantly changing. As a result, interconnection requirements continue to change as well. Where regulators prescribe interconnection arrangements, they should be viewed as flexible rules that should evolve with telecommunications networks and markets.

3.3 Financial Terms of Interconnection

3.3.1 Interconnection Charges

Interconnection charges often account for a very significant part of the costs of new telecommunications operators. This is particularly the case with new entrants that do not own end-to-end networks. The level and structure of interconnection charges

are, therefore, major determinants of the viability of operators in a competitive telecommunications market.

Over the years, a variety of approaches have been used to calculate interconnection charges and generally to determine the financial terms of interconnection. In this Section, we first consider the general approaches that have been used to determine interconnection charges. Later in the Section, we review specific types of interconnection-related costs that are often treated in specific ways. Examples are start-up costs, costs of interconnection links and collocation and infrastructure sharing costs.

3.3.2 Approaches to Setting Interconnection Charges

This Section reviews the general approaches that have been used to determine interconnection charges. While there is no single correct approach, there is a consensus among telecommunications and trade experts that the best approaches are cost-based. However, other approaches have their merits in some circumstances. Table 3-3 provides an overview of the main approaches used to determine interconnection charges. Readers interested in more detail on the costing concepts and economic theories underlying them should refer to Appendix B of the Handbook.

Table 3-3: Main Approaches to Interconnection Charges

Approach	Description and Examples	Comments
Forward Looking Incremental Costs	<ul style="list-style-type: none"> ➤ Charges based on forward-looking costs of facilities and services provided to interconnecting operator (usually estimated over the long run, i.e. Long Run Incremental Costs or “LRIC”) ➤ Examples: Australia, Canada, the Hong Kong SAR of China, Chile, and US local operators ➤ Variations of LRIC include LRAIC, TSLRIC and TELRIC. These approaches include different elements of fixed and common costs (e.g. 	<ul style="list-style-type: none"> ➤ Generally accepted as best practice ➤ Approach sends most efficient price signals based on current technology rather than existing book assets ➤ Closest approximation of costs in a fully competitive market ➤ Requires study and some cost and demand estimates ➤ Usually leads to lower interconnection rates; this stimulates competition but provides lower revenues to incumbent

Table 3-3: Main Approaches to Interconnection Charges (cont'd)

	<p>overheads, and fixed-service costs).that are excluded from traditional LRIC analyses. These variations are growing in acceptance as "best practices". They are described in Appendix B of the Handbook</p>	<p>operator</p> <ul style="list-style-type: none"> ➤ May be substantially out of line with actual book costs of inefficient incumbents <p>Can be inappropriate if end-user prices are seriously unbalanced (e.g. set well below costs and below interconnection charges)</p>
Historical Accounting Costs	<ul style="list-style-type: none"> ➤ Charges based on the accounting records of the operator supplying the interconnection facilities or services ➤ Generally includes an assignment of direct costs and an allocation of common costs booked in the accounting records ➤ Examples: UK, 1995 Japanese system, and Sweden 	<ul style="list-style-type: none"> ➤ Common practice; less favoured by regulators and experts today ➤ Less efficient since historical costs were often incurred less efficiently than those based on current technology and operational circumstances (e.g. privatization) ➤ Accounting records often misstate real value of assets: based on subjective accounting policies and political decisions regarding investments ➤ Usually requires study to assign/allocate booked cost to interconnection facilities and services
Sender Keep All (SKA) (Bill and Keep)	<ul style="list-style-type: none"> ➤ No charges payable between interconnecting operators for termination of each other's traffic ➤ Typically, each operator pays for its own facilities up to the point of interconnection, plus charges for any unusual costs incurred by the other operators to accommodate its traffic ➤ Examples: Indian, US and Canadian local operators, and Indonesian regional operators 	<ul style="list-style-type: none"> ➤ Works best where the two operators are similarly situated and exchange approximately the same amount of traffic (e.g. for interconnecting local operators) ➤ Charges can apply to compensate for traffic imbalances ➤ Without such charges, SKA can retard financing and development of rural or other services, where there is an imbalance of traffic (i.e. more incoming) ➤ Was the main model for interconnection of ISPs in many markets. However, this is changing as larger ISPs, with substantial backbone facilities and reach, increasingly treat smaller ISPs as customers rather than peers
Revenue Sharing	<ul style="list-style-type: none"> ➤ Typically, new entrants pay the incumbent operator a share of their revenues from interconnected services (or all services) ➤ In some revenue-sharing arrangements, no additional charges are 	<ul style="list-style-type: none"> ➤ This approach is simple – no need for cost studies to determine interconnection charges ➤ Generally considered non-transparent ➤ Potentially inefficient and anti-

Table 3-3: Main Approaches to Interconnection Charges (cont'd)

	<p>payable between interconnecting operators for termination of each other's traffic; in others, additional charges do apply for direct interconnection costs (e.g. transmission links, interconnection interfaces)</p> <ul style="list-style-type: none"> ➤ Examples: Thailand, Indonesia, and China 	<p>competitive (i.e. when excessive revenue shares are paid)</p> <ul style="list-style-type: none"> ➤ Sometimes prescribed by governments or PTTs as the only basis on which interconnection will be permitted in an otherwise closed market; sometimes treated as a "tax" for doing business in a country. May be a transitional step to a more efficient approach
Interconnect Charges based on Retail Prices	<ul style="list-style-type: none"> ➤ Interconnection charges based on prices to end users ➤ A discount is sometimes applied for inter-operator charges. This can be estimated based on the avoided costs of the supplying operator (e.g. retail billing and marketing costs). ➤ Examples: US local resale prices, pre-1995 Japanese approach 	<ul style="list-style-type: none"> ➤ Difficult to estimate appropriate discount – may lead to inefficiency (i.e. high discount discourages construction of competitive facilities; low discount undermines financial viability of competition) ➤ Specifically rejected in some jurisdictions (e.g. Hong Kong, China which differentiate "carrier-to-carrier" charges from retail rates)
Other Negotiated Interconnect Charges	<ul style="list-style-type: none"> ➤ Interconnection charges have been negotiated between operators based on a wide range of other approaches; some principled, many arbitrary ➤ Example: International accounting rates, and some reseller agreements 	<ul style="list-style-type: none"> ➤ Efficiency of charges depends on how closely they approximate efficient costs; many negotiated charges include implicit subsidies between operators and customers ➤ Level of negotiated charges often depends on the bargaining power of the operators

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3.3.3 Comments on Different Approaches

Internationally accepted interconnection principles generally require interconnection charges to be cost-based or "cost-oriented". This is the case with the interconnection principles of the WTO's *Agreement on Basic Telecommunications* and the European Union's *Interconnection Directive*. Cost-based pricing of interconnection services is consistent with best practices adopted by regulators in most countries. This issue is discussed further in Section 3.1.6.5.

Forward-Looking Costing Approaches

There remains a fair amount of debate in regulatory circles about the best approaches to use to calculate

interconnection costs in different circumstances. However, today most regulators and experts generally agree that the ideal approach for calculating the level of interconnection charges would be one based on forward-looking costs of supplying the relevant facilities and services. This ideal is usually implemented by means of some variant on the long-run incremental cost (LRIC) approach. This approach has been entrenched in the regulations of some countries (e.g. India) and the laws of others (e.g. the US).

The major variations of the LRIC approach that have been most widely accepted by regulators and experts are:

Long Run Average Incremental Costs (LRAIC) - A long-run costing approach that defines the increment as the total service. It differs from traditional marginal and incremental cost measures by including allowance for the fixed costs specific to the service concerned: "service-specific fixed costs". The European Commission has adopted this approach.

Total Service Long Run Incremental Costs (TSLRIC) - This approach, developed by the Federal Communications Commission (FCC) in the USA, measures the difference in cost between producing a service and not producing it. TSLRIC is LRIC in which the increment is the total service.

Total Element Long Run Incremental Costs (TELRIC) - This approach, also developed by the FCC, includes the incremental cost resulting from adding or subtracting a specific network element in the long run, plus an allocated portion of joint and common costs.

Other variations - There are other variations on the LRIC approach. In Canada, for example, the regulator uses an incremental cost approach (Phase II Costing) and adds a mark-up to approximate forward-looking fixed and common costs. Other regulators have developed different approaches.

A well-designed LRIC-type approach provides an estimate of the costs of an operator to provide interconnection in a fully competitive market. An LRIC-type calculation generally starts by estimating the direct costs incurred by an operator in providing the interconnection services in question. These costs are calculated over the "long run", usually at least ten years, in order to average out the inherently "lumpy" nature of the investment costs of interconnection facilities in the year they are introduced.

In addition to the directly attributable costs, LRIC-type calculations generally include a capital cost component. This component is intended to reimburse the operators for the costs of financing the interconnection facilities, since these costs are necessarily incurred by the operator providing the facilities.

As can be seen from the preceding descriptions, the most widely accepted LRIC-type approaches generally include a reasonable allocation of joint and common costs. Such costs can also be calculated on a forward-looking basis, to approximate the costs of an efficient operator. Joint and common costs are, by definition, not directly caused by the interconnection services, but are nevertheless incurred by an operator in connection with its interconnection facilities and services. Common examples of such costs are the salaries of the president, managing director or legal counsel of the operator. By including capital, joint and common costs, a LRIC approach can approximate costs in a competitive market, while providing reasonably full compensation to the operator supplying the interconnection – assuming it operates efficiently.

Further descriptions of the methods used to calculate long-run incremental costs, including LRAIC, TELRIC and TSLRIC are included in Appendix B and in Module 4.

While variations on the LRIC approach are considered the best practices by most experts, there are practical limitations on their applicability. Some of these are listed in Table 3-3. Some of these limitations are particularly significant in countries with less developed telecommunications sectors. For example, if local retail telecommunications rates are set well below costs, setting interconnection prices at LRIC may not permit a new, local services entrant to run a viable business. The new entrant's interconnection costs may exceed its retail prices. While rate rebalancing is the long-term solution to this problem, in the short term interconnection rates may need to be discounted in order to permit competition to emerge. There are other practical problems with the application of LRIC-type approaches in some environments.

Other Approaches

The applicability of the non-LRIC-type approaches listed in Table 3-3 depends on the circumstances of different countries. The comments in the Table describe strengths, weaknesses and other considerations. Several other comments follow.

Modifications are often made to the various approaches to attempt to compensate each operator

more closely for costs resulting from its interconnection. An example is the Sender Keep All (Bill and Keep) approach. As indicated in Table 3-3, this approach is appropriate where the two operators are similarly situated and exchange approximately the same amount of traffic. Thus, it is often used for interconnection of local operators in the same city or neighbouring regional operators.

The Sender Keep All approach may be modified to add charges to compensate for traffic imbalances. For example, operator no. 1 may receive and terminate more traffic from operator no. 2 than it sends to that operator. Operator no. 1 will then usually incur higher costs as a result of the interconnection than operator no. 2. To compensate for this imbalance, operator no. 2 may pay a cost-based interconnection charge to operator no. 1 for every minute of traffic it sends that exceeds the traffic it receives.

A word or two about revenue sharing approaches. An element of revenue sharing may be appropriate in some cases to distribute surplus revenues after payment of cost-based interconnection charges. However, in some cases, revenue shares paid to incumbents have included a wide range of components, ranging from interconnection costs to a "licence fee" for operating in a jurisdiction or "compensation" to an incumbent for loss of business to new entrants, or fulfilment of universal service obligations.

The latter three components are typically not cost based. They are usually not transparent and are not recommended in any jurisdiction where the regulator wishes to improve efficiency in the telecommunications sector. These approaches can be subject to abuse. For example, excessively high revenue-sharing arrangements have been imposed in some jurisdictions in a short-sighted attempt to earn additional operator or government revenues. The effect is to prevent efficient competition.

If revenue-sharing schemes must be used, then regulators should consider identifying each component of the revenue share separately. This includes, for example, shares to pay for cost-based interconnection charges, for concession or licence fees, etc. This approach adds transparency and allows for the gradual elimination of revenue-sharing components that are not cost-based. Universal service charges

should be dealt with by means of a separate charge, not a revenue-sharing formula. Issues related to universal service and universal access charges are discussed in detail in Module 6.

Table 3-3 does not provide an exhaustive list of the approaches to calculating interconnection charges. Other approaches exist. One example is the Efficient Component Pricing Rule (ECPR), which bases interconnection charges on the net incremental costs of interconnection, plus the "opportunity costs" or margin lost by the incumbent as a result of traffic "taken" by the new entrant. This approach has been discussed among academics and consultants, but has generally not been accepted by regulators as a reasonable option.

Finally, interconnection charges are sometimes indexed or "price capped" to determine future increases (e.g. for a five or ten year period). Such approaches provide certainty to interconnecting parties regarding their level of future costs or revenues.

3.3.4 Specific Interconnection Costs

3.3.4.1 Start-up Costs

The network infrastructure of most incumbent operators was designed to function on a monopoly basis. In the transition to a competitive telecommunications market, some modifications are usually required to the operator's switching and transmission facilities and related software to permit efficient interconnection among multiple operators. For example, switches must be programmed to recognize and route traffic to telephone numbers on the network of interconnection operators. Additional numbers must often be allocated and equipment modified to deal with them. These modifications are often referred to as "start-up costs", since they are required at the outset to permit interconnection.

Regulators in different countries have treated start-up costs in different ways. Some take the view that new operators are the beneficiaries of interconnection, so they should pay all start-up costs. In the extreme, this approach is applied not only to interconnecting transmission circuits, but to all modifications and upgrades to an incumbent's network required to facilitate interconnection. Some

new operators accept this approach as the only one that will provide them with interconnection, particularly in countries with state-owned PTTs. However, this approach has disadvantages. It can impose a heavy financial burden on a new entrant, shift costs of network upgrades from incumbents to competitors, and ultimately lessen the chances of viable competitive entry.

A different approach that is more pro-competitive in nature has been adopted by a number of countries such as Canada. The approach is based on the assumption that competition is introduced to benefit all telecommunications users and the economy in general. Interconnection start-up costs are seen as a direct result of the policy decision to open a market to competition. It is also recognized that the costs incurred by all operators will, market conditions permitting, generally be borne by telecommunications users.

Therefore, some basis is developed to apportion costs among established and new operators on the assumption that they will generally pass these on through user rates. A specific surcharge may be considered, but may not be adopted for political reasons. One method of apportioning costs is on the basis of the projected use of telecommunications services (including interconnected services) in the future. A formula can be established to adjust compensation between operators in case actual use differs from projected use of telecommunications or interconnected services.

Under this approach, the incumbent will generally bear a large share of start-up costs. Some regulators regard this approach as necessary or appropriate to facilitate competition. Understandably, this approach is generally opposed by incumbents.

3.3.4.2 Interconnection Links

Different approaches have been adopted to apportion the costs of the physical links between interconnecting operators. Such links include transmission lines or radio links that carry the interconnecting circuits. They also include the ducts, towers, manholes and other support infrastructure, as well as the modifications that are required to the transmission-related facilities (e.g. cross-connects

and distribution frames) in order to accommodate the interconnected circuits.

One approach is to require the new operator to pay the entire cost of the transmission links and related facilities. This approach is based on the theory that transmission facilities are being added and the modifications made solely for the benefit of the new operator and its customers. If this approach is adopted, incumbents should not be able to recover any more than the actual costs of the transmission links and related facilities. Sophisticated costing approaches are not required. Normally, these costs are easily tracked through expense invoices, related labour costs and overhead. As a general principle, the costs should not exceed fair market costs for installing the links. Incumbents may have an incentive to inflate charges for such links, and regulatory oversight may be required to ensure charges are based on market costs.

One method of ensuring charges for interconnection links are not inflated is to give the new operator the option of installing the links itself, including work on the premises of the incumbent. Specifications for such work can be subject to discussion at a joint technical committee with a dispute resolution mechanism. Work on its premises can be monitored by the incumbent to avoid arguments about improper work or sabotage.

As with start-up costs (see discussion in previous Section), interconnection links are a necessary prerequisite for the development of a competitive market. Taking this view, regulators may consider it appropriate to apportion the costs of such links between incumbents and new entrants, based on the assumption that end users of all operators will ultimately benefit.

The simplest, and probably most common method of apportioning costs of interconnection links is to have each operator pay the costs of its interconnection links up to the Point of Interconnection (POI). Since POIs are often located in or near the exchange of the incumbent, this method can impose significant costs on a new operator. However, under this approach, the new operator can decide how to configure its network to limit its costs.

3.3.5 Structure of Interconnection Charges

The structure of charges for interconnection often varies from country to country. These variations reflect a number of factors, including differences in the telecommunications infrastructure, policy differences and varying levels of effort on developing cost and price structures. Price structures need not be complex to be efficient and fair. In many cases, simplicity is best. However, with some effort, a price structure can be developed that levels the playing field for all operators and facilitates more efficient interconnection.

Box 3-4 sets out some basic principles for an efficient interconnection price structure.

Operators, regulators and telecommunications experts have long discussed how best to refine telecommunications pricing structures to improve efficiency. Many of the principles applicable to other telecommunications prices also apply to the struc-

ture of interconnection charges. Several examples are given below.

3.3.5.1 Fixed and Variable Charges

As a general principle, interconnection charges should reflect the difference between fixed and variable costs of interconnection. For example, the fixed costs of providing a dedicated network access line (loop) are best recovered through a fixed charge. On the other hand, where the costs of network components, such as telecommunications switches, are traffic sensitive, they are best recovered through usage charges. Usage charges are usually based on time (minutes). In the case of interconnection of Internet backbone operators and Internet Service Providers, charges are often based on capacity (bits of traffic).

While it is not always practical to implement this principle, doing so is consistent with efficient pricing theory. Distinguishing between fixed and variable costs in the charges for interconnection components

Box 3-4: Principles for Efficient Interconnection Price Structures

- Interconnection charges should be cost-based (ideally based on long-run average incremental costs, including cost of capital, plus a reasonable markup to cover forward-looking joint and common costs)
- Where information is available, costs should be based on the current replacement costs of assets (discounted to their remaining service life); in the absence of such costs, depreciated book value of assets is sometimes used
- Interconnection charges should be sufficiently unbundled so that an operator seeking interconnection need only pay for the components or services it actually requests
- Where the costs of a particular component vary significantly in different locations, the interconnection charges should be disaggregated (e.g. costs of access lines may be higher in rural areas (where they are typically longer) than in cities)
- Charges should not include hidden cross-subsidies, particularly of an anti-competitive nature (e.g. charges for monopoly-supplied network components should not be inflated to a level well above costs in order to fund below-cost provision of competitive components). This principle is adopted in the *WTO Regulation Reference Paper*.
- The structure of interconnection charges should reflect underlying costs. Thus, fixed costs should be covered by fixed charges, variable costs by variable charges. Peak and off-peak charges should be set where there is a significant difference in costs.

will send the right price signals. For example, there will be less incentive to overuse usage-sensitive network components if they are priced based on usage, rather than on a flat monthly charge. Establishing a price structure that reflects underlying fixed and variable costs should lead to a more efficient use of those components.

3.3.5.2 Peak and Off-Peak Charges

Peak and off-peak pricing differentials have been used for retail pricing of telecommunications services for many decades. Charging higher rates for usage in peak hours provides users with an incentive to call in off-peak hours. Advantages of a peak/off peak pricing structure include:

- reduced peak-hour congestion;
- reduced demand to build new infrastructure to meet peak traffic loads;
- increased overall network utilization; and
- improved quality of service.

The same principles of peak and off-peak pricing are often incorporated in interconnection charges. If they are not, then interconnecting operators will have no incentive to charge higher rates to their end-users during peak hours. The result can be a migration of peak-hour traffic to new entrants, who will then impose higher costs on incumbent's that must build the infrastructure to support the higher peak-hour loads.

Good regulatory policies, such as those adopted in Hong Kong, China specifically provide that the structure of interconnection charges must reflect the behaviour of underlying costs. Thus, the "carrier-to-carrier" charging principles in Hong Kong encourage interconnection charges to reflect both fixed/variable and peak/off peak cost differences.

3.3.5.3 Unbundled Charges

In an increasing number of countries, telecommunications policies require incumbent operators to provide competitors with access to unbundled network components. This approach is supported by the *WTO Regulation Reference Paper*, which states

that major suppliers must provide interconnection on a basis that is sufficiently unbundled so that a supplier need not pay for network components or facilities that it does not require for the service to be provided.

In keeping with their WTO commitments, or generally because it is good policy, many regulators have issued directives requiring unbundled charges. For example, in India, a regulation was issued in 1999 by the Telecommunications Regulatory Authority of India (TRAI) that states that "No service provider shall be charged for any interconnection facility it does not seek or require". (TRAI (1998a))

3.3.5.4 Universal Service and ADC Charges

In many countries, incumbent operators incur deficits in carrying out uneconomic universal service obligations (USO) or universal access obligations. Beneficiaries of these social obligations generally include high-cost service areas, such as remote villages or low-income customers. In some countries, however, deficits are not incurred by the incumbents to perform specific universality. Rather, the deficits are incurred as part of a policy of maintaining low access charges for all customers. These are usually referred to as Access Deficit Contributions (ADCs) to distinguish them from Universal Services Obligation (USO) payments that generate revenues for more targeted social purposes.

In a monopoly environment, ADCs are often paid from services priced above costs (e.g. international rates or business services) to access costs that are priced below cost. In the case of the incumbent, ADCs may be explicit, or implicit in unbalanced rates. Traditional telecommunications policies often prevent "rebalancing" of the prices to more closely reflect their costs. New interconnecting operators often do not have similar universal service obligations or access deficits. Accordingly, they are often asked to contribute to USO payments or ADCs of the incumbent.

There are a number of ways of dealing with this issue. These are discussed in detail in Module 6. As indicated in that Module, the best practice for regulators is to levy any USO or ADC charges separately from interconnection charges. As demonstrated in

this Module, the underlying concepts and calculations for interconnection charges are very different from those underlying USO and ADC charges.

If USO or ADC charges are established, it is clearly a good practice to identify them as separate from interconnection charges. Blending the two charges removes transparency from the interconnection process. Separate charges permit regulators to comply with the requirement of the *WTO Regulation Reference Paper* that USO charges be administered in a transparent, non-discriminatory and competitively neutral manner. Please see Module 6 for a more comprehensive discussion of USO and ADC issues.

3.3.6 Internet Interconnection Charges

Over the past decade, the Internet has changed from a co-operative to a commercial communications medium. It has also changed from a relatively small education and research-based data network to a network that accounts for more traffic than voice telephony in several countries today. This transformation of the Internet has changed the basis for interconnection charges among ISPs and between ISPs and the operators of the large capacity backbone telecommunications networks that carry Internet traffic.

Originally, many ISPs regarded themselves as equals or "peers". They generally entered into Bill and Keep interconnection arrangements. Under these 'peering' arrangements Internet networks exchanged traffic without levying charges or paying fees to each other. The underlying premise for peering arrangements was that Internet networks of substantially similar size and traffic volumes benefited more-or-less equally from interconnection, and incurred generally similar costs.

Over time, some Internet Protocol (IP) networks expanded their coverage to national and global levels. Some network operators developed into specialized IP backbone operators, carrying large volumes of Internet traffic for long distances between ISPs and Internet hosting services. These backbone network operators generally provide 'transit' services. Transit services involve the transmission of Internet traffic between two or more ISPs and Internet hosts. Providers of Internet transit

services may or may not provide any Internet content or access services themselves. Some ISPs with larger networks also provide transit services, in addition to standard Internet interconnection arrangements.

ISPs generally interconnect with each other and with Internet backbone providers at Internet Exchange Points (IXPs). These are sometimes referred to as Network Access Points (NAPs), although that term is becoming less common. IXPs have switching equipment and routers that permit interconnection of the various Internet networks using the IXP. As with the Internet generally, IXPs are evolving into increasingly multifunctional, and commercial operations, that charge fees for an increasingly wide range of services, rather than just facilitating 'free' interconnection of ISPs. Many IXPs now provide collocation services, providing space as well as equipment for Internet routing, transmission, web-hosting and other services. Separate, market-based charges are usually levied for such services. As with most Internet-related services, these charges are generally unregulated, except where they are provided by a dominant incumbent operator.

The transition of the Internet to a more commercial medium, with large disparities between the sizes and functions of Internet networks, has changed the structure of Internet interconnection charges. In some cases, interconnecting ISPs still exchange traffic with each other as 'peers' on a Bill and Keep basis. Under this arrangement, each ISP typically pays its own costs of transmission, routing and other equipment, or shares the costs on a negotiated basis.

However, such peering arrangements are becoming less common, particularly where different types or sizes of Internet operators interconnect. There, asymmetrical charges have become the norm. The backbone network operator, or the larger ISP, usually charges the smaller ISP or local access provider for interconnection and transit services. The basis for such interconnection charges is often similar to those found in other parts of the telecommunications industry. Charges are typically based on one or more of the following variables:

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- traffic flow or usage, based on the increasing capacity of Internet routers and other equipment to measure traffic;
- imbalance of traffic flows between ISPs;
- distance or geographical coverage;
- number of points of interconnection; and
- other cost-based interconnection charges.

All of these charging variables are related to costs incurred by the ISP providing the service, or at least proxies for such costs. This trend toward cost-based interconnection charges is consistent with developments in other telecommunications services.

One anomaly in the trend toward cost-based Internet charges has been related to the traditionally heavy reliance on US-based ISPs and Internet backbone providers by ISPs in other countries. Due to the early lead of the US-based Internet industry, and the heavy concentration of attractive Internet web sites in the US, many ISPs in other countries have paid US ISPs for transportation to and from the US to their home country. There have often been no reciprocal charges paid by US ISPs for traffic to the interconnecting ISPs in other countries. This imbalance has become a hot policy issue within the ITU and other international organizations. Within APEC, for example, Australia and various Asian countries have complained that current costs of interconnecting with North America are too high and that it is inequitable that Asian networks are not compensated for their costs in carrying traffic generated by North Americans.

In April 2000, ITU Study Group 3 adopted Recommendation D.iii on International Internet Interconnections:

"Noting the rapid growth of Internet and Internet protocol-based international services: It is recommended that administrations involved in the provision of international Internet connection negotiate and agree bilateral commercial arrangements applying to direct international Internet connections where each administration will be compensated for the cost that it incurs in

carrying traffic that is generated by the other administration."

The US and Canada have opposed this recommendation. They argue that the North American bias of Internet routing will decrease over time, as competition and market developments reduce costs and increase Internet facilities in other regions. The US, in particular, has long argued that the Internet should remain unregulated in most respects. The proposed resolution was considered at the ITU's World Telecommunications Standardization Assembly in Montreal in October 2000. After much discussion, the Assembly adopted a recommendation that calls for arrangements to be negotiated and agreed upon on a commercial basis when direct Internet links are established internationally. The new recommendation does not prescribe any particular costing approach; thus operators are free to determine the approach to be used in implementing it. This recommendation has been referred to as a framework for future discussions. The US and Greece stated that they would not apply this recommendation in their international charging arrangements.

Local interconnection charges are also important to the viability of ISPs. Local Internet access providers will be principal beneficiaries of the move to unbundling of local loops, which is discussed in Section 3.4.6 of this Module. Unbundled local loops can be used by ISPs to provide DSL-based high speed Internet services on more favourable terms than those currently available in most markets.

In a number of countries, cable television networks provide an efficient and highly successful form of high-speed local Internet access. These 'cable modem' services have generally been provided only by the serving cable TV operator. This has given the cable operator a strong position in ISP markets compared to other ISPs without high-speed capabilities. Several countries have considered whether to require cable operators to interconnect with other ISPs to provide them access to high-speed cable networks.

In Canada, the CRTC has ordered major cable operators to grant other ISPs access to their high speed networks at a discount from retail ISP rates. In the US, the FCC has not, to date, taken similar

action. Some US cable operators have entered into agreements with ISPs to access their high-speed networks on an exclusive basis, thus making access unavailable to competitors. This appropriateness of such exclusive arrangements is under consideration by the FCC.

3.3.7 Interconnection with Mobile Networks

As indicated in various places in this Module, mobile operators must obtain interconnection with incumbent operators of the PSTN in order to ensure the viability of their services. In general the interconnection principles and practices described in this Module apply to interconnection by mobile operators to the PSTN. However, certain differences apply to interconnection with mobile operators.

Historically, regulators devoted much less attention to mobile services than fixed services. Mobile service was priced at a substantial premium to wire-line service. As a result, mobile service was viewed as a discretionary or even a luxury service where consumers did not need much in the way of regulatory protection. As well, mobile service was offered competitively in many countries, with the expectation that market forces rather than regulators would be the prime force in setting prices. Mobile operators were not perceived as possessing market power in the same way as fixed operators.

However, the role of mobile services has changed in recent years, leading to increased regulatory interest and attention:

- The consumer rates for mobile service have declined in both developed and developing countries. The combination of rate decreases, the fact that consumers like the flexibility of mobile service, and improvements in mobile technology (such as longer battery life) have contributed to an enormous increase in the number of mobile users. Indeed, in some countries, the number of mobile users now exceeds the number of fixed users. Thus, for many, mobile service is no longer a luxury – it is the prime way in which they access the PSTN.
- Some less developed countries have begun to devote much more attention to fostering the growth of mobile service, as they realize that

implementing mobile infrastructure can be quicker and less capital intensive than building the type of ubiquitous wireline networks that are found in most developed countries.

- All countries have come to appreciate the revenues that can be realized by auctioning mobile wireless spectrum. Bidders will take the design of the regulatory environment into account as they assess how much to bid.

When mobile service was first introduced, most countries adopted Calling Party Pays (CPP) arrangements. Under CPP, the person that originates a call is the one that pays for it, whether it originates on a mobile or fixed-line telephone. A person who makes a mobile-to-fixed call pays the mobile operator at the retail rate. The mobile operator, in turn, pays the fixed operator an interconnection charge that is relatively small when compared to the retail rate. Usually, the interconnection charge is invisible to the mobile caller. However, the situation is quite different for a fixed-to-mobile call. Because the interconnection charge paid by the fixed operator to the mobile operator is relatively large, the fixed operator will want to recover it from the caller who makes the call. Accordingly, the fixed operator will charge a substantial surcharge for fixed-to-mobile calls, with the surcharge (less an administrative charge) being passed on to the mobile operator. The mobile operator does not charge its customers for calls received from the PSTN.

CPP has not been adopted in countries such as the US and Canada, where most local calls on the PSTN are not metered, but charged at a flat monthly rate. These are referred to as Receiving Party Pays (RPP) or Mobile Party Pays (MPP) environments. In a RPP country, the mobile customer pays both for mobile-to-fixed calls and for fixed-to-mobile calls. However, the customer on the fixed network pays the same amount to call someone whether on the fixed network or on a mobile network. Interconnection between the fixed and mobile operators is generally on a reciprocal basis, either bill-and-keep (also referred to as sender-keep-all) or mutual compensation at the same interconnection rates that are found in fixed-fixed interconnection arrangements.

A number of countries that do not have CPP are considering a switch to it, or have done so. For example, Mexico introduced CPP in April 1999. This move is partly motivated by evidence of higher mobile subscriber growth rates in CPP countries. Sri Lanka has announced its intention to change to CPP. The transition to CPP affects subscribers of all networks in a market, including PSTN subscribers. Their bills will be increased since they will be charged for calls to mobile subscribers. Accordingly, the transition normally involves regulatory supervision to ensure, among other things, that PSTN subscribers are adequately notified of increased charges that will appear on their bills.

Because fixed-to-mobile calls are so much more expensive than fixed-to-fixed calls in a CPP country, many countries have distinct dialling prefixes for fixed-to-mobile calls. In that way, consumers understand that they will be charged a premium for fixed-to-mobile calls, and it is obvious when such charging takes place.

In recent years, some observers have expressed concern about the level of CPP charges for fixed-to-mobile calls. The ITU's Trends 2000 Report, which focuses on interconnection, points out that in Europe, where CPP arrangements prevail, the average fixed-to-mobile interconnection rate was USD 0.21 per minute for a three minute call. This contrasts with mobile-to-fixed interconnection rates of USD 0.01 per minute for local interconnection, 0.014 for single transit interconnection and 0.02 for double transit interconnection. The ratios of fixed-to-mobile and local mobile-to-fixed rates range from a low of 8.7 in Norway to a high of 34 in France. The report suggests that asymmetrical regulation of fixed-line and mobile operators may have resulted in inflated mobile termination charges under CPP.

Some observers believe that the high level of CPP charges for fixed-to-mobile calls is due to a combination of two factors, market failure and regulatory inattention:

- The market failure arises because there is little competition in fixed-to-mobile rates. Mobile operators often compete vigorously on subscription and mobile-to-fixed rates, service levels and coverage, but they rarely compete on fixed-to-mobile rates. Such competition does

sometimes arise, for example in Finland, where mobile operators have reduced fixed-to-mobile rates in line with mobile-to-fixed rates. In countries where there is a monopoly fixed operator, the fixed operator has little incentive to reduce fixed-to-mobile rates. Even in countries with competing fixed operators, there seems to be little evidence of competition to reduce fixed-to-mobile rates.

- The regulatory inattention arises because, as explained earlier, mobile service was historically viewed as a discretionary or even a luxury service that appealed to a narrow segment of users. In many countries, mobile service was offered competitively, and rates were set by market forces. Unlike the fixed networks, regulators did not have good cost data for mobile networks. Without cost data, the regulators were not in a position to determine if fixed-to-mobile rates might be higher than necessary.

The result of these two factors is that fixed-to-mobile rates in some countries have remained at high levels even as mobile-to-fixed rates have declined substantially due to reduced costs and vigorous competition.

An examination of the fixed-to-mobile rates that are charged to the customers of a fixed operator leads to an examination of the interconnection charges levied by the mobile operator to the fixed operator for the termination of a call on the mobile network. Few countries have examined the costs of mobile termination and applied these costs in setting interconnection charges. One country that has recently made such an attempt is the United Kingdom. In a 1998 report, the Competition Commission determined that fixed-to-mobile termination rates were substantially above cost. In 1999, OFTEL ordered that rates be substantially reduced to a ceiling of 11.7 pence per minute, and that the ceiling be further reduced by 9% per year (after inflation) for two years thereafter. OFTEL will be considering if further pricing action is needed following this period.

High mobile interconnection rates may be reduced by competition over time. However, as mobile services catch up with and overtake fixed networks, there is likely to be more regulatory scrutiny of high mobile termination rates, particularly where they are

thought to be set at levels that are significantly above cost.

3.4 Technical and Operational Conditions

While financial arrangements are important to the development of interconnection arrangements, the technical and operational conditions determine how efficient and “seamless” interconnection is from the users’ perspective. These conditions can also determine whether competition in a particular market will succeed or fail.

The most important technical and operational conditions are neither complex nor difficult to understand. At a minimum, regulators should develop an overview of the key technical and operational conditions in order to resolve disputes that may arise in interconnection negotiations.

3.4.1 Provision of Information by Incumbents

3.4.1.1 Availability of Agreements or Offers

The advantages of transparent interconnection arrangements are discussed in Section 3.1.5.4. The simplest way to encourage transparency is to require publication of interconnection agreements or offers of incumbents. In this regard, the *WTO Regulation Reference Paper* requires signatories to ensure that a major supplier will make publicly available either its interconnection agreements or a reference interconnection offer.

The advantages of publication of interconnection agreements or standard offers include:

- Publication facilitates interconnection by existing and potential new entrants. It allows them to obtain basic interconnection terms and conditions without lengthy negotiations or regulatory orders;
- It discourages undue discrimination by a dominant operator (or by both parties to an agreement) that may not be readily detectable by regulators if filed in confidence;

- It facilitates comparisons of interconnection rates, terms and conditions among major operators; and
- It assists in developing industry standards, benchmarks and best practices.

The disadvantage of mandatory publication of interconnection agreements is that it breaches the normal confidentiality of commercial agreements. However, this disadvantage can be mitigated in several ways. One is to permit deletion of commercially sensitive information from filed agreements. This can include proprietary network or service information and related costs. In such cases, a confidential filing with the regulator is normally required. Another approach is to require only the filing of standard agreements or offers (“reference offers”), rather than all executed agreements.

For the reasons discussed in Section 3.1.5.2, the filing of interconnection agreements between non-dominant operators is not generally required. The *WTO Regulation Reference Paper* requires publication of agreements with major suppliers, or a reference interconnection offer with them. A number of countries with well-developed regulatory regimes, for example Denmark and the UK, only require the publication of interconnection agreements of incumbents.

There is often no telecommunications regulatory requirement for publication of interconnection agreements between smaller operators. However, these are increasingly being made public to comply with the securities laws of some countries. In these countries, securities regulators require companies that issue shares to the public to disclose their material contracts. Examples of such agreements can be found on the EDGAR Web Site in the US. Agreements between new entrants can provide insight into interconnection arrangements in less regulated markets.

3.4.1.2 Network Specifications

Interconnected networks must be technically compatible. A new entrant must, therefore, have access to technical specifications of the network of the incumbent with which it will interconnect. Similarly, the incumbent requires information on the

technical characteristics of an interconnecting operator's network. For example, it will be important for both operators to know the types of switching, routing and transmission equipment used by the other, signalling protocols, number of circuits and the projected volume of traffic to be exchanged.

Sufficient information is required to permit the interconnecting operators to design their own networks to provide efficient connectivity between each other's customers. Regulators should ensure that incumbents and new entrants do not withhold information necessary to ensure efficient interconnection arrangements for both sides.

Operators should not be permitted, for example, to withhold necessary information on the grounds that their standards and specifications are proprietary. If necessary, some technical information could be exchanged under non-disclosure agreements. In practice, however, this is impractical and can frustrate interconnection of future networks. The telecommunications sector is evolving towards more open standards, and this is a trend that regulators should encourage. Open standards are often developed through industry committees with regulatory observers or mediators. In keeping with this practice, regulators should encourage interconnection operators to establish technical committees to develop specifications, protocols, and procedures for the interconnection of their networks.

In many cases, incumbent operator networks have not been designed to anticipate interconnection with other operators. Accordingly, some network modifications are often required to permit interconnection. Treatment of such network modifications or "start-up costs" is discussed in Section 3.3.4.1.

3.4.1.3 Network Changes

Telecommunications networks are dynamic. In most countries, networks are constantly changing as new switching and transmission facilities are added, new software and features are installed, and new protocols adopted. The most obvious example is the current transition from circuit-switched to packet-switched networks, such as Internet Protocol networks, to carry both data and voice traffic. However, the network plans of operators change

regularly in response to technological development, market and budget considerations.

Over time, as the networks are modified, it is good practice for regulators to require that networks of dominant incumbents evolve into more open networks.

3.4.2 Treatment of Competitor Information

Monopoly or dominant providers of local telephone services, and certain other monopoly services, are in a position to collect competitively valuable information on their interconnecting competitors. A typical situation might involve a local monopoly operator that receives orders from a long distance competitor to install leased local lines to interconnect with the competitor's POP. The monopolist would know that the competitor had located a relatively heavy long distance user (probably a business or government user) that had sufficient traffic to require a leased local line. In the absence of competitive restrictions, the monopoly could send a salesperson from its own long distance division to offer a discount or other incentive to the customer to persuade it not to use its competitor's services.

Abuse of such competitive information is subject to regulatory restrictions in many countries. The Reference Paper on Regulation that forms part of the *WTO's Agreement on Basic Telecommunications* attempts to prohibit such activities. The Reference Paper requires signatories to maintain "appropriate measures" for the purpose of preventing major suppliers from engaging in anti-competitive practices. One of the practices identified is using information obtained from competitors with anti-competitive results.

A national example of a prohibition against competitive misuse of information can be found in the General Licence issued by the Irish regulator. Condition 20 of that licence deals with misuse of data in the following terms:

"The Licensee shall not make use of network or traffic data, traffic profiles or any other data of any nature, and which are not otherwise publicly available and which become available to the Licensee directly or indirectly either as a result of entering into interconnection arrangements or

otherwise as a result of carrying telecommunications messages, in such a way which, in the reasonable opinion of the Director, would unduly prefer the interests of any business carried on by the Licensee or an Affiliate or place persons competing with that business at an unfair disadvantage.” (OTDR (1998))

A good approach to preventing abuse of competitive information is the establishment of an Interconnection Services Group (ISG). This is sometimes called a Carrier Services Group. The idea is to establish a separate organization within the incumbent operator, whose role it is to handle interconnection-related dealings between that operator and interconnecting operators. For example, all orders by interconnecting carriers for interconnection links, additional capacity and customer access lines would be submitted to the ISG. The ISG will process the orders.

Safeguards will be put in place to ensure that information obtained by the ISG is not used for improper purposes. For example, where a new entrant orders an access line from the incumbent operator to serve a new customer, the ISG should not pass that information on to the marketing department of the operator to try to “snare” or “win-back” the customer before the access line is installed. Confidentiality safeguards should include codes of conduct with mandatory suspension or termination of employees who “leak information”. Separate office space, locked filing cabinets, audits and other measures can help ensure confidentiality of ISG information.

3.4.3 Treatment of Customer Information

Monopoly providers of local telephone services are in a position to collect information on their customers. Such information may include names, addresses and telephone numbers, as well as information on monthly billing levels, calling patterns, percentage of calls unanswered, etc. Customer information of this type can be very valuable in marketing new services. For example, customers with very long calls may be heavy Internet users to whom Internet services can be successfully marketed. Users with many missed calls make good customers for voice-messaging services. Customers with high international calling would be good targets to tie up

in long-term contracts if a competitive international service operator is about to be licensed.

In some countries, including the US and Canada, regulatory restrictions are imposed on the use of customer information. Some of these rules are aimed at protecting the privacy of customers. For example, customers typically do not want the world to know what phone numbers they call.

Another example of a regulatory restriction is found in the European Union data protection directives and in related laws of EU Member States. These laws impose specific obligations on telecommunications service providers regarding the use that can be made of billing and other customer data, including a prohibition against using such information to market telecommunications services to customers unless the customer has consented to that use of its data. Other countries have implemented, or are considering similar consumer protection rules.

Other restrictions are aimed at preventing anti-competitive use of customer information gathered by monopoly operators that have competitive operations or affiliates. Such rules may require a monopoly local operator, for example, to share any customer information that it provides to its competitive operations or affiliates with interconnecting operators or other direct competitors in the same business line. For example, if a local monopoly operator’s long distance services division collects information to identify heavy Internet users to help its Internet division sell services, it would be required to provide the same information to competitive Internet Service Providers.

These restrictions are based on the assumption that the local monopoly service provider is in a position to collect the information solely due to its monopoly position. Distribution of this type of information can be handled through an Interconnection Service Group (see Section 3.4.2).

3.4.4 Points of Interconnection

The interconnection policies of many countries require incumbent operators to permit interconnection with their networks at any technically feasible point. This policy is reinforced by the *WTO Regulation Reference Paper*, which requires

signatory countries to ensure interconnection at any technically feasible point with their major suppliers.

Interconnection agreements and regulatory orders have established different interconnection points in different countries. Box 3-5 provides examples of technically feasible interconnection points that have been prescribed by regulators or established in interconnection agreements.

The definition of technically feasible interconnection points is not static. Telecommunications networks continue to evolve. As new technologies, such as those based on the Internet Protocol and digital subscriber loops, are rolled out, it is becoming technically feasible to interconnect networks at different points. Therefore, interconnection agreements and regulatory directives should not prescribe limitations on the points of interconnection that will be permitted. It should be open to interconnecting operators to propose interconnection at different points as networks evolve.

The costs of interconnection incurred by both operators will vary depending on the points of interconnection. Incumbents will sometimes propose standard points of interconnection of their networks with other operators. These standard points of interconnection may be set out in the “reference

interconnection offers” major suppliers are required to make available pursuant to the *WTO Regulation Reference Paper*.

In some cases, new entrants may wish to interconnect at points other than the standard points. In such cases, the Reference Paper provides that such interconnection should be made available upon request. However, the requesting party may be required to pay charges that reflect the cost of construction of necessary additional facilities.

A variation on the theme of interconnection at non-standard points can be found in a recent regulatory decision in the United Kingdom on Third Generation cellular services. The UK regulators have recently ruled that new Third Generation cellular networks should have access to earlier generation cellular networks at points around the country, by means of a compulsory roaming arrangement. This example is set out at Box 3-6.

3.4.5 Access to Unbundled Network Components

In an increasing number of countries, telecommunications policies require incumbent operators to provide competitors with access to unbundled

Box 3-5: Examples of Technically Feasible Interconnection Points

- The trunk interconnection points of local and national tandem exchanges (most common point of interconnection or POI)
- The national or international circuit interconnection points of international gateway exchanges
- The trunk side of local exchanges
- The line side of local exchanges (e.g. at the main distribution frame (MDF) or Digital Distribution Frame (DDF))
- Cross-connect points of any exchange
- “Meet points” at which operators agree to interconnect
- Signaling transfer points (STF) and other points outside of the communications channel or band, where interconnection is required for CCS7 or other signaling to exchange traffic efficiently and to access call-related databases (e.g. a Local Number Portability (LNP) database).
- Access points for unbundled network components
- Cable landing stations

network components. Unbundling generally refers to the provision of network components on a stand-alone basis. Unbundling permits interconnecting operators to access a single unbundled component without an obligation to buy other components as part of an “interconnection service”.

There are many possible types of unbundled network components. The policies of some countries require provision of certain features, functions and services on an unbundled basis – as well as certain physical facilities. These features, functions and services may be associated with transmission or switching facilities. They may also be associated with software facilities, such as databases that

support the efficient provision of telecommunications services. Examples include access to directory information databases, operator services and subscriber listings in telephone directories.

In this Module, we will use the term “network components” to refer to both physical network facilities and these “non-physical” features, functions and services. Box 3-7 lists examples of unbundled network components.

Unbundling of the local loop is a special case of unbundling that is currently being addressed by regulators in many countries. It is dealt with in more detail in the next Section.

Box 3-6: Compulsory National Roaming in the UK

Background:

As part of the process leading to the licensing of “Third Generation” cellular wireless networks in the UK, Oftel and the Department of Trade and Industry (“DTI”) dealt with the issue of compulsory roaming. The regulators determined that any existing wireless network operator which participated in the auction to obtain spectrum for Third Generation network services would be required to accept a licence modification obligating the operator to negotiate an interconnection agreement to provide national roaming access to new entrants. The aim was to prevent incumbent operators from using their existing wireless networks to an unfair competitive advantage while new entrants built up their networks and territorial coverage. In effect, DTI and Oftel determined that access to earlier generation networks was an essential facility to be made available to new entrant competitors. (The concept of essential facilities is discussed in the next Section.)

The Nature of Roaming:

Roaming is typically an arrangement between wireless network operators or services providers to allow access by one service provider's customers to the network or services of another service provider located outside the service area of the first service provider. Roaming arrangements require the implementation of subscriber authorization and billing systems. They also require appropriate technical and spectrum capacity arrangements to be at all points of access by customers of roaming operators.

The Requirements of National Roaming:

DTI and Oftel intend to make what was previously a system of negotiated interconnection among non-competing wireless operators a compulsory arrangement between incumbents and a new entrant. National roaming is to be made available on a non-discriminatory basis. Oftel will deem the incumbent to have costs of roaming services equal to the rates for roaming services charged to competitors. Oftel will then include such deemed costs in determining whether the service charges of incumbents are sufficient to cover costs and make an adequate return. National roaming services will not be available to a competitor before the competitor has achieved network roll-out covering at least 20% of the UK population, and may expire any time after 31 December 2009. Roaming charges are to be determined on a “retail minus” rather than “cost plus” basis (meaning that roaming charges will be derived from end user charges, less a discount reflecting elements of cost not incurred in providing the roaming service rather than an end user service).

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Decisions as to what components to unbundle and how to unbundle them are sometimes left to negotiations between operators. According to the Japanese interconnection policy, for example, unbundling should be promoted as much as possible through a process which takes into consideration the opinions of carriers other than the incumbent. However, the Japanese policy also indicates that the regulator should be involved if negotiations fail. In practice, for the reasons discussed below, negotiated unbundling arrangements are generally unsatisfactory in the long run. The incumbent has little incentive to unbundle its network sufficiently to permit competitors to operate very effectively.

Rationale for Unbundling

The purpose of unbundling policies is to lower economic and technical barriers to competitive entry. The large capital costs of building duplicate networks raise a significant barrier to entry. Competitors may not be willing or able to finance the construction of complete networks. However, they may be willing to build parts of such networks. For example, they may build certain switches, inter-exchange transmission facilities, and access lines in a limited number of locations. If the regulatory

framework permits, competitors can then obtain other network components, such as switching capability and access lines in other locations, from the incumbent. This permits new entrants to mix their self-built network components with those of the incumbent in an efficient manner.

The ability to mix self-built network components and those of the incumbent will increase the viability of the business case for competitive entry in many countries. Thus, competition will emerge where it otherwise would not. The use of the incumbent operator's network components by competitors will often be transitional. Over time, the competitor will build more of its own facilities and become a full-fledged facilities-based operator.

Many incumbents are unwilling to provide competitors with access to unbundled network components unless they are required to do so by regulation. While the issue is still controversial in some countries, and among some experts, mandatory network unbundling is becoming more common.

Unbundling Policies

The trend to unbundling was given a strong impetus in the *WTO Regulation Reference Paper*. The

Box 3-7: Some Possible Unbundled Network Components and Services

- > Network access lines (local loops and related functions)
- > Local switching functions
- > Tandem switching functions
- > Inter-exchange transmission (e.g. between local and tandem switches)
- > Access to signaling links and signal transfer points (STPs)
- > Access to call-related databases (e.g. line information, toll-free calling and number portability databases)
- > Central office codes (NNXs)
- > Subscriber listings (in telephone directories and directory databases)
- > Operator services
- > Directory assistance functions
- > Operations support systems (OSS) functions

Reference Paper states that major suppliers must provide interconnection on a basis that is sufficiently unbundled so that a supplier need not pay for network components or facilities that it does not require for the service to be provided. While this statement is supportive of unbundling policies, it is quite general. It provides little guidance for the development of national unbundling policies. Unbundling policies are still in the early stages of development in many countries.

Unbundling policies have developed in the US, Canada, Australia, Singapore, Hong Kong and other countries, including, more recently, the EU. The new regulatory framework for electronic communications services proposed by the European Commission on 12 July 2000 provides a strong new impetus for implementation of national unbundling policies. Particularly significant in this regard, is the EU's new regulation on local loop unbundling, which will come into force on 31 December 2000.

Unbundling has also been required in other EU regulatory documents. Article 7(4) of the EU Interconnection Directive provides that interconnection charges must be sufficiently unbundled so that an applicant for interconnection is not required to

pay for anything that is not strictly related to the service requested. Similarly, Article 7(4) of the *Revised Voice Telephony Directive* (Directive 98/10/EC) states that:

"Tariffs for facilities additional to the provision of connection to the fixed public telephone network and fixed public telephone services shall, in accordance with Community law, be sufficiently unbundled so that the user is not required to pay for facilities which are not necessary for the service requested."

Advantages and Disadvantages of Unbundling

There are some disadvantages to a full-scale mandatory unbundling policy. In particular, it can act as a disincentive to the construction of competitive network components, and the development of true facilities-based competition. However, the disadvantages appear to be outweighed by the advantages. Moreover, the potential disadvantages can generally be avoided if the pricing and other terms of the unbundling guidelines are properly set. The main advantages and disadvantages of a mandatory unbundling policy are summarized in Table 3-4.

interconnection

Table 3-4: Advantages and Disadvantages of Unbundling

Advantages	Disadvantages
<ul style="list-style-type: none"> ➤ Reduces economic barriers to entry, by allowing new entrants to construct some components of their networks and obtain other components from the incumbent operator ➤ Encourages innovation, since new entrants can combine new technologies (e.g. ADSL and IP data/voice switches) with components of existing networks (e.g. access lines) ➤ Avoids unnecessary duplication of components (e.g. access lines in remote areas, transmission tower space) ➤ Facilitates access to rights of way, towers, etc. by new entrants (in many countries it can be very time consuming and expensive to obtain such rights) 	<ul style="list-style-type: none"> ➤ Reduces incentive for construction of competitive network facilities (depending on the availability and price of unbundled components) ➤ Can enrich the new entrant at the expense of the incumbent operator (if unbundled component prices are set below costs) ➤ Requires detailed regulatory intervention and technical co-ordination

Regulatory Approaches to Unbundling

Given the potential disadvantages of a mandatory unbundling policy, some regulators have adopted modified approaches to such a policy. These approaches are intended to achieve some advantages and avoid some disadvantages of policies that require unbundling of all network components. Some of these approaches may be summarized as follows.

- > **Transitional Unbundling Requirements** - Access to certain types of unbundled components may be required for a limited period of time. This approach can apply, for example, to access lines (loops) in urban areas. Unbundling of access lines might be required for the first five years after a market opening. Thus, competitors can use the incumbent's access lines to "jumpstart" competition. However, they will have to construct their own access lines by year five, in order to maintain network connections with their customers. In theory, this approach will encourage the development of competition in the short term. At the same time it should promote development of complete facilities-based competition over the mid to longer term. Local loop unbundling is described further in the following Section of this Module.
- > **Selective Unbundling Requirements** - Some unbundling policies distinguish between network components. They require unbundling of some and not others. Unbundled access may be required only for certain types of components. For example, unbundled access may be required for network components in cases where construction of duplicate components would cause environmental damage or public inconvenience. Thus, incumbents might be required to provide access to towers, poles, conduits, ducts, aerial access lines and inside wiring, where a proliferation of such facilities would degrade the environment, disrupt public roads, and/or otherwise inconvenience the public. The same may be true of access lines or switching facilities in architecturally or culturally important areas. Such access might be required over the long term as well as the short term.

Many countries are still developing policies on network unbundling. Unbundling policies vary from country to country, depending on the conditions of local telecommunications markets. It is arguable that mandatory unbundling is less desirable in countries with very limited telecommunications network infrastructure and large pent-up demand. In such less developed countries, mandatory unbundling may reduce the incentive to build much-needed new infrastructure. On the other hand, in some less developed countries, the business case for new entry may not be viable without mandatory unbundling. Each telecommunications market should be carefully assessed to determine the role unbundling policies should play in sector development.

3.4.6 Local Loop Unbundling

Mandatory unbundling of local loops is increasingly being used as a regulatory tool to accelerate competition in local access markets. Around the world, telecommunications network competition has developed most rapidly in the long-distance and international markets. Local access markets are generally less competitive. Wireless services currently provide an alternative means of local narrowband access in many markets, and broadband competition is starting. However, wireline services still provide the main means of local access around the world. There, high entry costs and low margins have discouraged competition.

Competition in local access is increasingly seen as an important policy objective. One reason is the perceived need to provide more competition in high-speed access markets in order to accelerate the roll out of Internet, e-commerce and video services. Many regulators and policy makers see such competition as necessary to maintain or increase the competitiveness of their national economies.

Regulators have now mandated unbundled access to local loops in a range of different economies. At one end of the income spectrum, these countries include the US, Australia, Canada, Singapore and the EU members. Unbundled loop access has also been mandated in a number of middle income countries, such as Mexico and the Slovak Republic, as well as in lower income countries, such as Albania, Guatemala, Kyrgistan and Pakistan.

Types of Local Loop Unbundling

Local loop unbundling regimes typically require incumbent operators to provide access to their local loops to competitors. Other third parties, such as customers, may sometimes also obtain unbundled access. Access to local loops is provided at a point of interconnection somewhere between the network termination point on the customer premises and the line-side of the access network operator's local switch. From this point of interconnection, the competitor will obtain dedicated or shared access to the local loop. The competitor will thus be able to use the loop as a direct transmission medium between its network and the customer's premises.

Various technical options are available for local loop unbundling. In its proceedings on unbundled access to the local loop in early 2000, the European Commission's DGIS focussed on three main options for access to local loops:

- Full unbundling of the local loop (unbundled access to the copper pair for competitive provision of advanced services by third parties);
- Shared use of the copper line (unbundled access to the high frequency spectrum of the

local loop for the competitive provision of Digital Subscriber Loop (DSL) systems and services by third parties); and

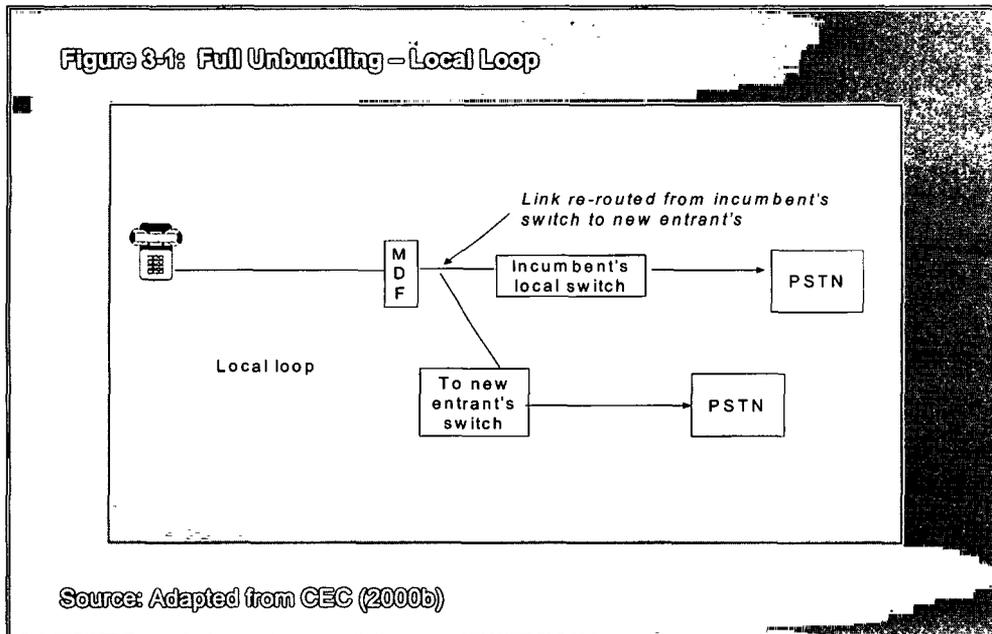
- High speed bit stream access (provision of xDSL services by the incumbent).

Although different approaches are possible, these three are the main ones in use today. Each of them is described in greater detail below.

Full Unbundling (Copper Loop Rental)

Full unbundling can provide new entrants with access to raw copper local loops (copper terminating at the local switch) and sub-loops (copper terminating at the remote concentrator or equivalent facility). In the case of unbundling at the local switch, the link between the main distribution frame (MDF) and the local switching equipment on the incumbent's premises is re-routed and connected to the new entrant's switch. The new entrant takes over the operation of the local loop.

Figure 3-1 illustrates this type of full unbundling of a local loop. The illustrated case assumes that the



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customer has decided to change telecommunications service suppliers. The local loop that previously connected the customer to the incumbent's switch has been re-routed to connect it to the new entrant's switch. The new entrant will then use the unbundled local loop to provide an alternative local access service to that previously provided by the incumbent.

Figure 3-2 illustrates full unbundling in a case where there are two local loops to a customer's premises. One loop is unbundled by the incumbent and re-configured to connect the customer to the new entrant's network. The other loop continues to connect the customer to the incumbent's network. A similar approach would apply where there are three or more loops to a customer's premises. In each case, the customer could decide how many loops it wanted connected to different operators. The approach illustrated in Figure 3-2 would be used where a customer wants to retain its basic telephone service with the incumbent. It can do so and, for example, at the same time have a dedicated connection to a new entrant's xDSL services to access high-speed data services (e.g. Internet or video services).

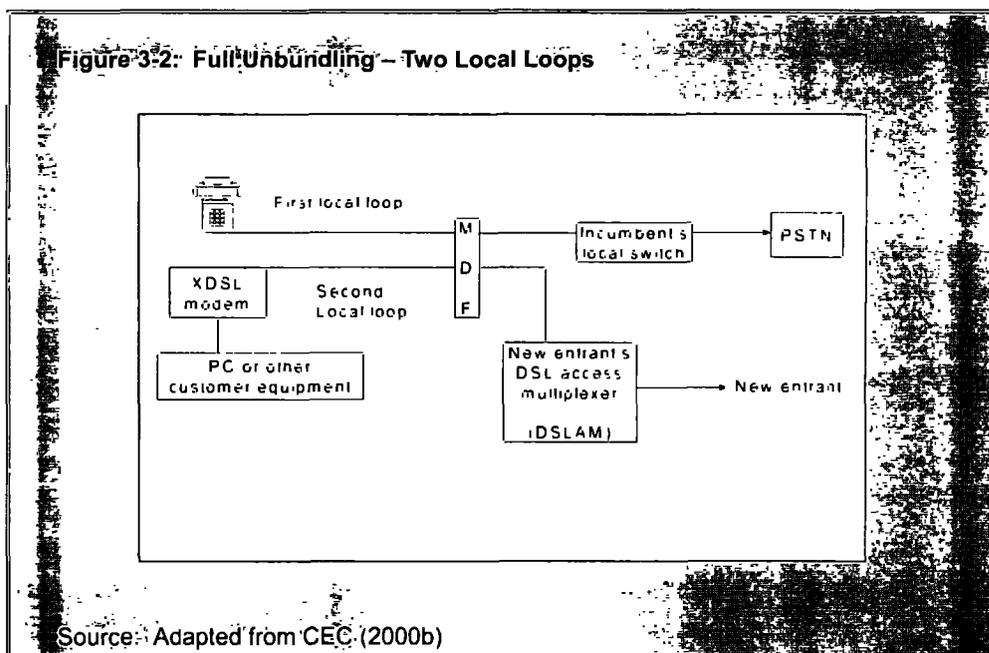
Full unbundling of the type illustrated in Figure 3-1 and Figure 3-2 essentially involves rental of a dedicated copper loop by the incumbent to a new entrant. Such copper loop rental provides the new entrant with direct access to and use of the copper loop. This allows new entrants to operate their own end-to-end transmission systems. Such operational control can be important to ensure the integrity and quality of high-speed services.

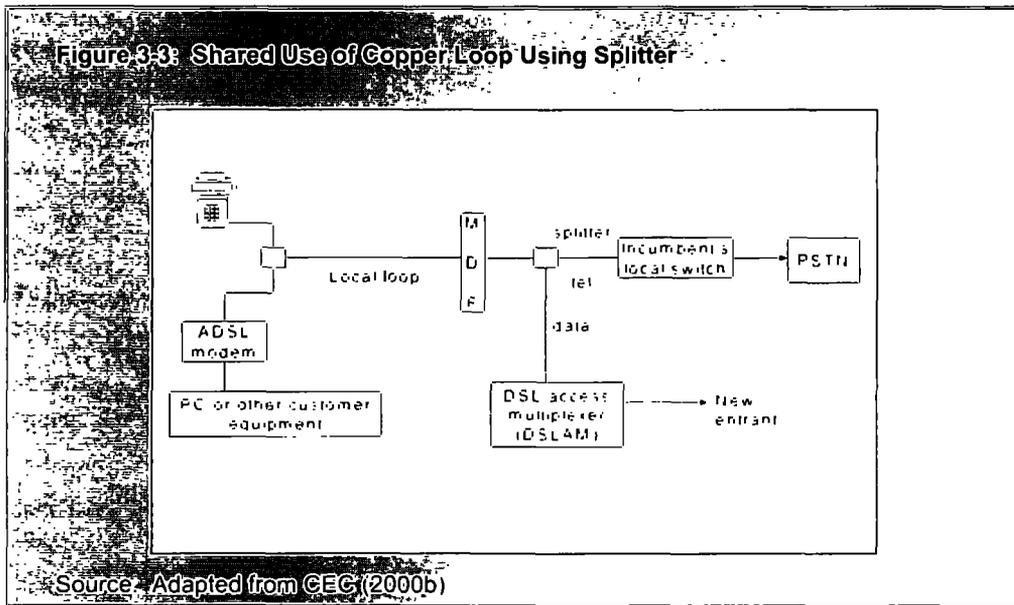
Although Figure 3-1 and Figure 3-2 indicate that the point of interconnection is at the distribution frame where the copper loop terminates, it is also possible to locate the point of interconnection at a remote concentrator unit (remote line unit).

Shared Use of the Copper Loop

An alternative means of providing access to the local loop involves shared access rather than exclusive access by a new entrant. In this form of unbundling, the incumbent and the new entrant provide services over the same loop.

Figure 3-3 illustrates one form of sharing the local loop. In this case, the customer will continue to





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receive basic PSTN services from the incumbent, and at the same time, receive DSL access services from a new entrant. As illustrated, a splitter is located between the MDF and the incumbent's local switch. The splitter is connected to both the incumbent's switch and to a DSL access multiplexer (DSLAM) connected to the new entrant's high-speed network.

As indicated, the splitter separates telephone and data traffic. Thus, the voice frequencies of the loop continue to be used by the incumbent. The non-voice frequencies are made available to the new entrant to provide high-speed services. In effect, this arrangement provides unbundled access to the high frequency spectrum of the local loop for the competitive provision of Digital Subscriber Loop (DSL) services by new entrants.

Shared use of copper line can provide a cost-effective solution for some customers. For example, it permits a customer to retain the incumbent as its telephone service provider, and at the same time, select a new entrant to provide high-speed Internet service over the same loop.

High-speed Bit Stream Access

A third approach to providing access to the local loop involves provision by an incumbent of a high-

speed bit stream to new entrants. To do this, the incumbent would install a high-speed access link to the customers' premises and then make it available to other operators to enable them to provide high-speed services. Provision of bit stream access services requires provision of both the transmission medium (e.g. copper cables, coaxial cables and optical fibre cables) and the transmission system (e.g. synchronous digital hierarchy transmission on optical fibres and xDSL transmission on copper cables).

In the case of high-speed bit stream access, the point of interconnection will usually be at the incumbent's local switch, but circuits could be back-hauled to points of interconnection further up the switching hierarchy. Technically, bit stream access can be provided to any transmission system, since it only requires reservation of a specified bandwidth, rather than dedicated use of a physical loop. This access arrangement does not entail any unbundling of a copper pair. Rather it uses the higher frequencies of the copper local loop, as in the case of shared use of the copper line.

Providing high-speed bit stream service can be attractive for incumbent operators as it does not involve physical access to copper pairs. As a result, for example, it would not hinder the progressive

modernization of the local access network by replacing copper with fibre.

Figure 3-4 illustrates the provision of high-speed bit stream access by an incumbent. In this example, two customers obtain high-speed data services from two different service providers, the incumbent and a new entrant. At the same time, the incumbent continues to provide basic PSTN services to both customers.

The three means of access to the local loop referred to above are not necessarily mutually exclusive. Where regulators mandate local loop access, they may require or permit incumbent operators to provide one or more alternative forms of access.

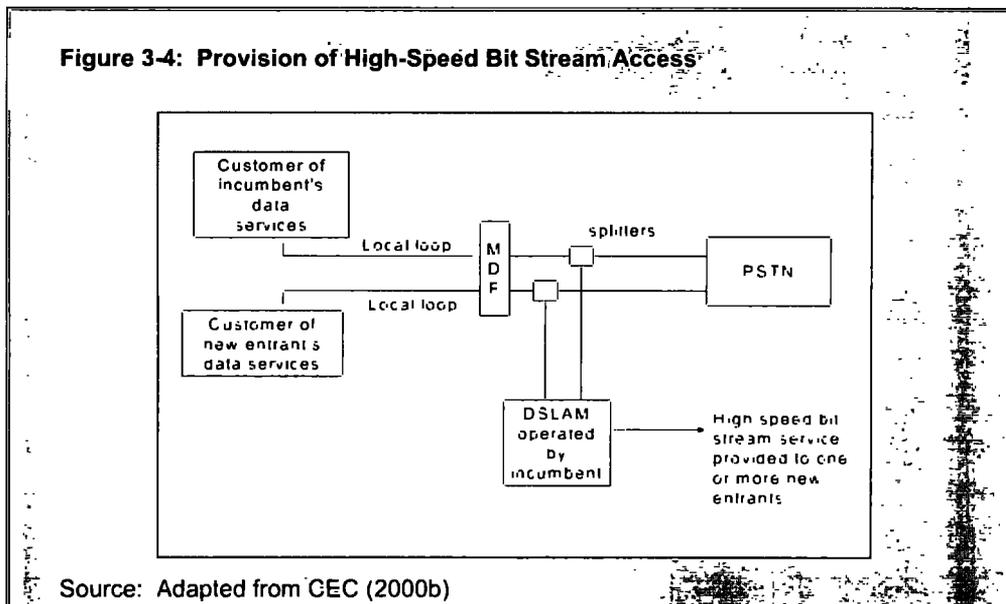
Advantages and Disadvantages of Unbundling the Local Loop

The main reason regulators have required incumbents to unbundle their local loops is to promote competition and innovation in access and advanced high-speed services. However, there continues to be an active debate on the merits of mandatory loop unbundling. There remain arguments against it, as well as for it. Table 3-5 summarizes the pros and cons of mandatory loop unbundling.

Implementation of Local Loop Unbundling

Different approaches may be used in mandating and regulating local loop unbundling. The appropriate approach will often depend on the state of competition in the relevant market for local access. Possible approaches include:

- Mandatory loop access without specification of the type of access arrangement. In this case, it is likely many incumbents will choose to offer bit stream access, which enables them to retain greater management control and possibly obtain higher access charges from competitors. The disadvantage of this approach is that competition may be delayed. Incumbent operators will have little incentive to accelerate implementation of bit stream access arrangements, at least until they are positioned to provide competitive services.
- Requiring bit stream access only (see previous point – same considerations apply).
- Requiring all three forms of access described above, except where the incumbent can



demonstrate significant problems with dedicated loop rentals.

- Requiring all three forms of access in some or all national markets.

Various other regulatory approaches to unbundling may be developed.

Local loop unbundling may be a transitional phenomenon in some areas. Unbundling of loops may be required, for example, to facilitate competition in the short term. This will enable new entrants to roll out service rapidly, while they are constructing alternative access networks in the areas where there is sufficient demand.

Implementation of local loop unbundling continues to be a novel issue for regulators in many countries. A major source of experience to date is the United

States. In the US, the 1996 *Telecommunications Act* requires incumbents to offer access to unbundled network elements and to making retail services available at wholesale prices. The US regulator has stated that “[p]reventing access to unbundled local loops would either discourage a potential competitor from entering the market in that area, thereby denying those consumers the benefits of competition, or cause the competitor to construct unnecessarily duplicative facilities, thereby misallocating societal resources” (FCC, *First Report and Order in the Matter of the Implementation of the Local Competition Provisions in the Telecommunications Act of 1996*). The FCC and US state regulators have subsequently taken further steps to facilitate loop unbundling.

As of June 1999, approximately 685,000 loops had been provided to competitors in the US as unbundled network elements. This represented an

Table 3-5: Arguments For and Against Local Loop Unbundling

Pros	Cons
<ul style="list-style-type: none"> ➤ Accelerates introduction of local access competition, including xDSL access 	<ul style="list-style-type: none"> ➤ Reduces incentive to build alternative access networks and more sustainable facilities-based competition
<ul style="list-style-type: none"> ➤ Accelerates competition, service innovation and roll out for high speed services, including: <ul style="list-style-type: none"> ➤ Internet services ➤ Video services (including interactive ones) ➤ E-commerce ➤ other data services 	<ul style="list-style-type: none"> ➤ May undermine investment in alternative access networks (wireline and wireless) ➤ May complicate modernization of incumbent operators' networks (e.g. if some access loops are dedicated to competitors use) ➤ Requires prolonged and detailed regulatory intervention compared to facilities-based access competition
<ul style="list-style-type: none"> ➤ Avoids duplication of access networks, and increases network operating efficiencies 	<ul style="list-style-type: none"> ➤ Requires more technical co-ordination between operators compared to facilities-based access competition
<ul style="list-style-type: none"> ➤ Provides new revenue streams to incumbent (which may or may not exceed existing revenues from loops, depending on tariffs) 	
<ul style="list-style-type: none"> ➤ Reduces disruption of streets and environment due to construction of new access networks 	

increase of 180 percent over the previous year. In addition, competitors had collocation arrangements in exchanges covering 60 percent of all lines in the US (compared with 32 percent of all lines the previous year). By the end of 1999, competitors had provided 117,000 xDSL lines, up from 1,500 lines in 1997, while incumbents provided 386,000 DSL lines, up from 32,000 at the end of 1998. Competitors had installed over 1,400 data switches, a fivefold increase over 1997. Recent estimates suggest that about 60% of the US population had access to DSL at the beginning of 2000, with 25% located in cities with four or more DSL providers.

In July 2000, the European Union adopted a *Regulation on Unbundled Access to the Local Loop*. The regulation will be binding on dominant operators in EU Member States, as of 31 December 2000. Issuance of the regulation is based on the assumption that providing access to the local loop to all new entrants will increase the level of competition and technological innovation in the local access network, and in turn stimulate the competitive provision of a full range of telecommunications services from simple voice telephony to broadband services. The regulation is aimed, in part, at ensuring that the EU does not fall further behind the US in the deployment of high speed access and the advanced services it enables.

The European regulation requires dominant operators to provide physical access to third parties at any technically feasible point of the copper local loop or sub-loop. The third party can locate and connect its own network equipment and facilities at such points (i.e. at the local switch, concentrator or equivalent facility) in order to deliver services to its customers. Dominant operators are required to make unbundled loop access available to third parties under transparent, fair and non-discriminatory conditions. In addition, the regulation provides that the dominant operators must provide competitors with the same facilities as they provide to themselves or their associated companies, and with the same conditions and times. Regulators are given authority to intervene in pricing issues and resolve disputes in connection with the regulation.

Experience in other jurisdictions suggests that regulatory guidance is required in determining the pricing (and costing) of unbundled local loops.

Operator negotiations, or unilateral price setting by incumbents can result in anti-competitive pricing. Where advance regulatory guidelines are not established, *ex post* regulatory intervention will often be required. A recent Australian case illustrates the point. In early August 2000, the Australian regulator, the ACCC, found that prices imposed by the dominant operator (Telstra) on competitors for local loop access were too high.

3.4.7 Sharing of Infrastructure and Collocation

Extensive infrastructure is required to build telecommunications networks. Key supporting infrastructure includes poles, ducts, conduits, trenches, manholes, street pedestals, and towers. Sharing of such infrastructure can significantly increase the efficiency of telecommunications supply in an economy. The same is true in the case of sharing building space in exchanges to permit two or more operators to "co-locate" their cable and radio transmission facilities and related equipment. Collocation permits direct (or near-direct) access to exchange switches and local access lines.

Availability of infrastructure sharing and collocation can significantly decrease barriers to competitive entry. The acquisition of rights of way and other permits required to build pole lines or towers, dig trenches or install ducts and conduits can be very time consuming and expensive. In some countries, only government entities, such as the incumbent operator, have clear legal authority to obtain rights of way, occupy public property or expropriate private property. Sharing of infrastructure and collocation can reduce costs for the new entrant, and at the same, time provide additional revenues to incumbents.

An added benefit is reduced environmental impact and public inconvenience. Competitive entry into telecommunications markets has led to a proliferation of cellular and microwave towers, aerial pole lines and road trenches in many countries. This result has become an increasing concern for many municipalities and other local administrations.

Some regulators require incumbents to permit infrastructure sharing and collocation of a new operator's transmission facilities in their exchanges. Other

operators, including new entrants, are frequently required to cooperate as well, at least in the sharing of infrastructure that is seen to be environmentally degrading, such as towers. In some countries, third parties that own support infrastructure, such as electrical power utilities, are also encouraged to participate in sharing arrangements.

In some jurisdictions, sharing of infrastructure occurs without regulatory intervention. Both sharing parties can benefit from the arrangements. In these jurisdictions, sharing of infrastructure is often seen as a matter to be freely negotiated between operators. However, as with other interconnection issues, there is often an asymmetrical market situation. In some cases, incumbents resist sharing their infrastructure. In these markets, regulatory intervention will be required to implement efficient sharing and collocation arrangements.

Table 3-6 lists steps regulators can take to promote sharing of infrastructure and collocation.

Once there is clear regulatory direction that infrastructure sharing and collocation must be permitted, operators are sometimes able to negotiate mutually acceptable sharing arrangements. In many other cases, however, regulatory direction or dispute resolution has been required to finalize sharing arrangements. Regulators seeking to expedite sharing arrangements may want to provide advance guidelines on such arrangements, after taking into account the views of incumbents and new entrants.

Some of the main issues that have arisen in relation to infrastructure sharing and collocation are:

- Rationing of space between incumbents' future requirements and current and future requirements of various new entrants; reservation of future expansion space for each operator.
- Pricing of facilities, and costing basis for the same.
- Access and security arrangements for various operators' equipment. Collocation premises of different operators are usually separated physically (e.g. by wire mesh) and locked.

- Appointment and supervision process for mutual cut-overs and work affecting more than one operator's facilities. Payment and rates for the same.
- Provision and pricing of ancillary services such as electrical power and back-up power, lighting, heating and air conditioning, security and alarm systems, maintenance and janitorial services, etc.
- Negotiation of other lease and/or licence arrangements, including issues of sub-licences on property of third parties (e.g. building owners, right of way owners, municipal and other public property owners), insurance and indemnification for damages.

3.4.8 Equal Access

On a level competitive playing field, telecommunications users should be able to access the services of new entrants as easily as those of incumbent operators. Without equal ease of access, new entrants will find it difficult to attract customers. While access need not be exactly equal, accessing a competitor should not be significantly more difficult.

In the early days of long-distance competition in Canada and the US, for example, customers were often required to dial up to 20 or more extra digits to route calls to new entrants' networks. This significant difference in access was due to the historical design of the PSTN. The operators' switches had been programmed for a monopoly environment. The additional digits were required to permit the operators' switching software to identify the new entrant to which the call should be routed as well as to provide billing details for the customer. It is not surprising that the new entrants initially found it difficult to encourage customers to switch services from the incumbents.

Over time, many incumbents and telecommunications equipment manufacturers redesigned their switches and related software. These facilities are now far more adaptable to the requirements of a multi-operator environment. Dialling parity is easy to achieve with the right software package. This has made it much easier to implement equal access.

However, changes in incumbent procedures and the regulatory environment are also required to facilitate equal access in a previously monopoly environment.

Table 3-6: Steps to Promote Infrastructure Sharing and Collocation

<p>Develop Regulatory Policy</p>	<ul style="list-style-type: none"> ➤ Publish a regulatory policy encouraging infrastructure sharing and collocation ➤ Encourage local authorities, such as municipal governments to support and facilitate infrastructure sharing ➤ Encourage reciprocity of infrastructure sharing (i.e. new entrants should be required to size and build their facilities to permit sharing with incumbents and other operators) ➤ Require incumbent operator to publish a standard offer and price list for access to key infrastructure components: poles, ducts, conduits, tower space, etc. ➤ Incumbents should be required to provide information on the location of infrastructure, and capacity available for sharing (e.g. excess capacity in ducts, towers, etc.) ➤ A joint committee of operators should be established to plan infrastructure capacity, co-ordinate permits from local authorities and improve the mutual efficiency of the infrastructure provisioning process ➤ Operators should be able to reserve capacity in advance on reasonable terms
<p>Price of Shared and Infrastructure Collocation</p>	<p>Regulators should encourage development of clear pricing guidelines (the following guidelines are illustrative only)</p> <ul style="list-style-type: none"> ➤ Normally, incumbents and other operators should be able to recover at least their direct incremental costs of sharing, plus reasonable overheads ➤ Additional price components may be subject to negotiation and regulatory dispute resolution ➤ Prices for collocation and infrastructure sharing should generally be unbundled so that the operator requesting access is only required to pay for the services it uses ➤ Cost of new infrastructure should be shared among 2 or more operators in proportion to their use of the infrastructure (e.g. number of antennae located on a microwave tower) ➤ Costs of increased capacity and re-location of infrastructure should be shared among those that benefit from such works. Where an incumbent operator receives no benefit from works required to accommodate a new entrant, it should normally not pay, unless and until it benefits from such works. An alternative approach is to allocate the costs among sharing operators based on use, with a surcharge for the operator that requests the work. ➤ Future sharers of infrastructure should reimburse early entrants for expenditures that benefit them
<p>Regulatory Safeguards</p>	<ul style="list-style-type: none"> ➤ Shared infrastructures should be made available to all operators on a non-discriminatory basis. This includes the owner of the infrastructure. Capacity should normally be provided on a first come, first served basis. The regulator should approve rationing schemes for scarce capacity.

Table 3-6: Steps to Promote Infrastructure Sharing and Collocation (cont'd)

	<ul style="list-style-type: none"> ➤ New entrants (or other operators) that do not use ordered infrastructure capacity within a set time period should be required to return it. A penalty for excessive orders may also be appropriate. ➤ Operators that provide shared infrastructure should record and have available for regulatory review, provisioning times for their own operations and competitors. ➤ Physical separation of infrastructure, (e.g. by walls or fences) may be warranted where necessary to prevent sabotage, but operators should be encouraged to share in the most efficient manner.
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There are basically two approaches to providing equal access:

- **Call-by-call customer selection** – Customers select the operator of their choice for each call. They usually do this by dialing a short code or prefix for their selected operator. For example, in Colombia, customers dial 09 to route national calls through TELCOM's network, 05 to route them through Orbital's network, and 07 for ETB's network. The main requirements to provide this type of equal access on an efficient basis are:
 - Trunk-side interconnection by new entrants to incumbent switches.
 - A numbering plan that allocates equivalent numbers to the incumbent operators and new entrants (For example similar access codes for long distance and international competitors; and equivalent blocks of access numbers for local and mobile operators).
 - Provision of basic signalling services by incumbents to new entrants including Calling Line Identification (CLI); answer and disconnect supervision.
 - Appropriate billing and audit arrangements to permit direct billing by each operator or billing by one and remission to the others. For example, the local operator might do all billing and remit long distance charges to the other operators.

- **Operator pre-selection** – Under this approach, customers select an operator for some or all of their calling. For example, an operator other than the incumbent might be selected for all long distance and international calling. After the selection is made, all calls from these customers will be routed to the operator of choice until their selection is changed. The main requirements for this type of equal access are:
 - Trunk-side interconnection by new entrants to incumbent switches.
 - Switch software features to identify customer selections and to route and bill calls appropriately to the selected operator.
 - Appropriate billing and audit arrangements to permit direct billing by each operator or billing by one and remission to the others. As with the call-by-call approach, the local operator might do all billing and remit long distance charges to the other operators.

The implementation of equal access has been uneven around the world to date. It is available, for example in Argentina, Australia, Canada, Chile, Hong Kong, and the US, but unavailable to date in many other countries. Equal access is more common for international and local services but less so for long distance services. In some countries, equal access is unavailable due to limitations in installed switching and software facilities. In others, it is due to delays in implementing a numbering plan that allocates equivalent numbers to competitors. In

some, regulators have simply not seen equal access as a priority.

Market experience in more open markets has demonstrated that there is considerable inertia among telecommunications customers. Regulators that wish to expedite the development of fully competitive markets will, therefore, want to consider equal access as a useful approach.

3.4.9 Quality of Service to Interconnecting Operators

It is good regulatory policy to require incumbent operators to provide a reasonable quality of interconnection services and facilities. Without such a policy, it would be possible for an incumbent to frustrate a competitor's ability to provide competitively attractive services. For example, if an incumbent connected its own new customers' circuits within days, but delayed connection of a competitor's customers' circuits for months, customers in a hurry would likely choose the incumbent's services.

The *WTO Regulation Reference Paper* deals with quality of interconnection with major suppliers in signatory countries. It requires interconnection to be ensured under terms and conditions that are no less favourable than those provided for their own similar services. Interconnection must also be no less favourable than that provided to a major supplier's subsidiaries, its other affiliates or to non-affiliated service suppliers.

Similar types of policies in many countries require "non-discriminatory" interconnection by an incumbent. In practice, it is very difficult to ensure the implementation of such policies. Many interconnection complaints of new entrants deal with unequal quality of interconnection as between the incumbent's services and their own.

The practical tools available to a regulator to promote high quality interconnection are:

- Establishing interconnection quality of service monitoring requirements;

- Monitoring complaints seriously, and establishing significant penalties for clearly unequal service quality; and
- Establishing an independent Interconnection Services Group within the incumbent's organization.

Quality of interconnection services can be monitored by an Interconnection Services Group (ISG) (see Section 3.4.2). The ISG should measure quality of service to interconnecting operators, and compare it to the incumbent's self-provisioning. For example, it should ensure that new circuits ordered by interconnecting operators are provisioned, on average, within the same number of days as internal orders.

Table 3-7 provides examples of interconnection quality of service measures. Where interconnection service problems are serious enough to warrant regulatory supervision, regulators can monitor these measures. Regulators may also establish a monitoring regime in advance, to prevent problems. A monitoring regime may require reports from incumbents on two types of quality of service performance:

1. Absolute performance based on established standards or international benchmarks, and
2. Relative performance by the incumbent in providing interconnection facilities to itself and to interconnecting operators.

Interconnection policy in some countries may require an incumbent to provide superior interconnection services to interconnecting operators under some circumstances. For example, it may be useful to require an incumbent to provide interconnecting operators with higher quality service than it normally provides for its own services – if the interconnecting operator is willing to pay for the difference. Such an approach has applications in industrialized countries seeking to promote the provision of advanced telecommunications services.

Table 3-7: Some Key Interconnection Quality of Service Measures

Provisioning Measures	<ul style="list-style-type: none"> > Average time for provisioning interconnection circuits and other interconnection facilities and services (including unbundled components) > Percentage of installation appointments met for competitors' service installations > Average time for processing changes in customers from incumbent operator to competitor (in an equal access regime) > Percentage of repair appointments met for competitors > Comparative provisioning performance for (1) competitors, (2) affiliates, and (3) self-provisioning (including measures such as those set out in the previous points)
Switching and Transmission Quality Measures	<ul style="list-style-type: none"> > Probability of blockage in peak hour on interconnecting circuits > Transmission delay (ref: ITU-T recommendation G114) > Transmission loss (loudness – ref: ITU-T recommendation P76) > Noise and distortion (ref: ITU-T recommendations, including Q551-554, G123, G232, G712, P11) > Other transmission quality standards (e.g. for digital services ref: ITU-T recommendations G821 re: bit errors and timing, and G113 re voice coding problems, and for both analogue and digital services ref: ITU-T recommendations G122 re: echo and loss of stability; and P16 et. al re crosstalk).

This type of policy can also be useful in less developed countries. In many less developed countries, the quality of service provided by an incumbent is below international standards. This low quality of service is often due to financial constraints on the incumbent. In such cases, regulators should be willing to promote improvement of the quality of service provided to a new entrant, provided the new entrants pays for it. For example, a new entrant may be willing to pay for new trunk circuits between the point of interconnection at a congested customer service exchange and a tandem exchange.

Such payments can be a win-win situation for the incumbent and new entrants. Arrangements of this type are best negotiated between incumbents and interconnecting operators. However, some regulatory supervision may be required to ensure new entrants do not have to pay excessive charges. Similarly, the regulator may need to ensure that the

incumbent does not require payments from new entrants to construct facilities to improve the incumbent's competitive advantage, as a condition of providing an adequate quality of service.

3.4.10 Quality of Interconnected Services

The previous Section discussed the provision of services by incumbents to interconnecting operators. Regulators in most countries are also concerned with the broader issue of the quality of service to the public. Many regulators established quality of service reporting systems during the time services were provided in their countries on a monopoly basis.

To deal with the emergence of competition, some countries have apportioned responsibility for providing a prescribed quality of service among interconnecting operators. For example, in the UK,

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the regulator prescribed maximum delays for interconnecting operators. The purpose of these maximum delay standards was to ensure calls between operators met national transmission speed standards. Customer PBX equipment at each end of a call was allocated 5 milliseconds (ms); originating and terminating local network operators 3 ms each; and the long distance network operator 7 ms, for a total maximum delay of 23 ms.

Other countries have taken a more deregulatory approach. They have not imposed quality of service reporting requirements on new entrants. This

approach is based on the assumption that new entrants will not be able to attract and retain customers if their quality of service does not match or exceed that of the incumbent operator. Based on the same approach, it should be possible to remove regulatory quality of service requirements from incumbents once competition is well established and they lose their market power.

As competition develops, it should be possible for more and more regulators to take the latter approach. Regulation of service quality can then be left to the market, rather than to regulators.

MODULE 4

Price Regulation

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MODULE 4

PRICE REGULATION

4.1 Introduction

This Module discusses price regulation in the telecommunications sector. Before reading the Module, readers may want to review the section on the economic rationale for price regulation in the telecommunications sector that is found in Appendix B of the Handbook. As indicated in Section 1.1 of Appendix B, price regulation is normally justified when telecommunications markets fail to produce competitive prices.

In this Module, we look more closely at the specific objectives of price regulation and at the regulatory approaches used to achieve those objectives. The basic approaches to price regulation have evolved with the transformation of the telecommunications sector from monopoly to competition. As regulators have increasingly recognized the benefits of competition, they have adapted price regulation to take advantage of those benefits.

Today, price cap regulation is the most widely accepted form of price regulation in the sector. Because of its pre-eminence, a substantial part of this Module is devoted to price cap regulation. Before dealing with it, however, we discuss the objectives of price regulation and review other approaches to price regulation, particularly Rate of Return (ROR) regulation and its variations.

4.1.1 Objectives of Price Regulation

Good price regulation mimics the results of efficient competition. However, price regulation may have additional objectives. The objectives of price regulation may be grouped into three broad categories:

- Financing objectives;
- Efficiency objectives; and
- Equity objectives.

Financing Objectives

An important objective of price regulation is to ensure that regulated operators are permitted to earn sufficient revenue to finance on-going operations and future investments. The minimum amount of revenue associated with the financial objective is often referred to as the operator's "revenue requirement". To mimic the effect of a competitive market, the revenue requirement should ideally match the amount required by an efficient operator to finance its operations and investments. This aspect of the financial objective may be considered as setting a revenue "floor" for efficient operators.

Some traditional forms of price regulation, including Rate of Return regulation, do not allow operators to earn revenues in excess of their revenue requirements. This aspect of the financial objective is associated with preventing excessive revenues associated with monopoly or dominant market positions. It is discussed in greater detail in Sections 1.1 and 1.2 of Appendix B of the Handbook. This aspect of the financing objective, which may be considered a revenue “ceiling”, has been relaxed under some specific conditions in other forms of price regulation, particularly price cap regulation.

Efficiency Objectives

It is generally accepted that price regulation should promote efficiency in the supply of telecommunications services. However, efficiency can be measured in different ways. Three main aspects of efficiency are discussed below.

Allocative efficiency is achieved when the prices of services reflect their relative scarcity. In an efficient market, prices will equal the marginal cost of producing each service. In the telecommunications sector, prices of international and long-distance services have traditionally been set significantly above their costs while local calls are priced below theirs. This is viewed as an example of allocative inefficiency. The above-cost pricing of international services discourages consumption of such services. On the other hand, pricing local calls below cost encourages consumption beyond the level at which local calls can be economically provided. A more detailed discussion of allocative efficiency is presented in Section 1.2 of Appendix B of the Handbook.

Productive efficiency has two related aspects. One aspect relates to the most efficient mix of inputs (capital, labour, etc.) for a given level of output. Some forms of price regulation can reduce productive efficiency. Rate of Return (ROR) regulation, for example, is generally viewed as encouraging operators to use an inefficiently high level of capital for its level of output. A second aspect of productive efficiency requires that the services be produced as efficiently as possible, that is by minimizing all inputs. The related concept of x-efficiency describes a situation in which an operator's costs are not

minimized because the actual output from the given inputs is less than what could be achieved.

Dynamic efficiency is achieved when resources move over time to their highest value uses. Such uses include efficient investment, improved productivity, research and development, and the diffusion of new ideas and technologies. Dynamic efficiency involves the movement from one type of efficient use of resources to another type of efficient use of resources.

Equity Objectives

Equity objectives motivate many regulatory decisions on telecommunications prices. Equity objectives generally relate to the fair distribution of welfare benefits among members of society. Telecommunications regulators are primarily concerned with two different aspects of equity in the regulation of prices:

Operator-consumer equity relates to the distribution of benefits between consumers and the regulated operator. For instance, many people would not consider it equitable that monopoly operators be allowed to earn high profits for an extended period of time without improving or extending service. In this regard, the aim of many regulators is to ensure that the savings that result from improved technological innovations are shared equitably between the operator and consumers. Price cap regulation includes a mechanism for consumers to share in these productivity gains.

Consumer-consumer equity relates to the distribution of benefits between different classes of telecommunications consumers. For example, in Colombia, consumers in lower socio-economic brackets pay less for the same local telephone subscription services than consumers in higher brackets. This approach implements a government policy aimed at improving consumer-consumer equity.

Balancing the Objectives of Price Regulation

The main challenges of price regulation involve the design and implementation of low-cost and effective regulatory approaches that induce the regulated

operator to achieve the socially desirable objectives discussed above. Regulation imposes a burden on the economy in the form of direct costs to telecommunications operators for enforcement and compliance. It may also place indirect burdens on consumers in the form of loss of choice of operators and/or services. A practical objective in the design of price regulation approaches should be to impose the least burden necessary to achieve their purposes. At a minimum, benefits of price regulation should justify its costs.

In practice, there is often disagreement over telecommunications price regulation because the three broad regulatory objectives, financial, efficiency and equity, can conflict with one another. Some people will place more importance on one objective than others. This means that the regulator will often have to make trade-offs between these objectives in the course of implementing price regulation.

4.1.2 Rate Rebalancing

This Section contains a brief discussion of price rebalancing, or rate rebalancing, as it is more frequently called. This important topic is dealt with in greater detail in Appendix 4-1 of this Module.

The term “rebalancing” refers to moving the prices for different telecommunications services more closely in line with the costs of providing each service. Currently, telecommunications price structures in many countries are highly unbalanced, with some services priced well above costs and others below costs. Telecommunications costing is discussed in detail in Section 1.4 of Appendix B of the Handbook

Prices of telephone connections, monthly subscriptions, and local calls have traditionally been set below costs in many countries. Resulting deficits have been subsidized by higher-than-cost long distance and international calling prices. Some of the historical reasons for these traditional pricing structures are discussed in Section 4.2.2.

Unbalanced price structures are not sustainable in a competitive environment. New competitors will generally enter those market segments where profit margins are highest, such as long distance and international calling. Incumbent operators will

therefore be under pressure to reduce subsidies or risk losing customers in the more profitable market segments. Traditional unbalanced price structures are also inefficient in that higher-than-cost prices encourage uneconomic entry by high-cost operators. Lower-than-cost prices discourage economic entry, even by low-cost operators.

Costs of different telecommunications services have been decreasing at different rates as a result of technological developments. This has further unbalanced telecommunications prices. Where telecommunication markets are open to competition, prices of different services will tend to move towards their costs. However, in monopoly or non-competitive environments they may not, and the regulator may be required to take steps to ensure that prices are more closely aligned with costs. Efficient monopoly pricing, and related matters, such as Ramsey Pricing, are discussed in Sections 1.1 and 1.2 of Appendix B of the Handbook.

A significant amount of rate rebalancing has occurred in many industrialized countries in recent years. Comprehensive price comparisons have been conducted by the OECD for its 29 member countries since 1990. The effects of rebalancing calls in member countries is presented in Figure 4-1. As this figure illustrates, since 1990, the average price of local calls in OECD countries has risen by more than 30%. In contrast, the average price of long distance calls (110 km and 490 km calls) has decreased by about 30% over the same period.

Figure 4-2 shows the effect of rebalancing on prices for business services. Over the 1990-1998 period, fixed charges (connection and subscription) increased by over 20% and usage charges decreased by over 20%, for an overall weighted reduction of about 12%. Note that overall teledensity in the OECD countries has increased steadily, despite rebalancing. The relationship between rebalancing and consumer welfare is discussed further in Module 6.

These two figures and those contained in Appendix 4-1 indicate that rate rebalancing has produced lower overall prices for most consumers in a majority of the countries surveyed. However, this is not the only benefit of rebalancing. Rate rebalancing will also increase social welfare by moving prices closer

Figure 4-1: Index of OECD Tariff Rebalancing by Distance, Including Local Calling

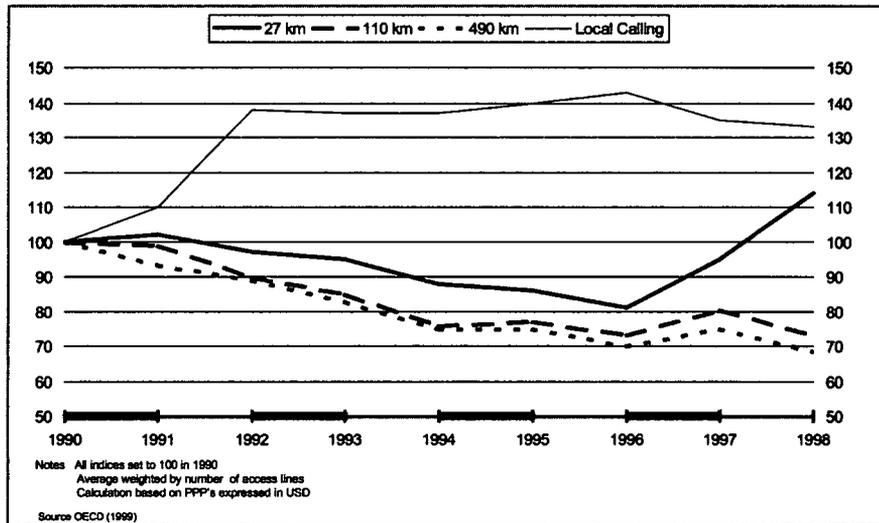
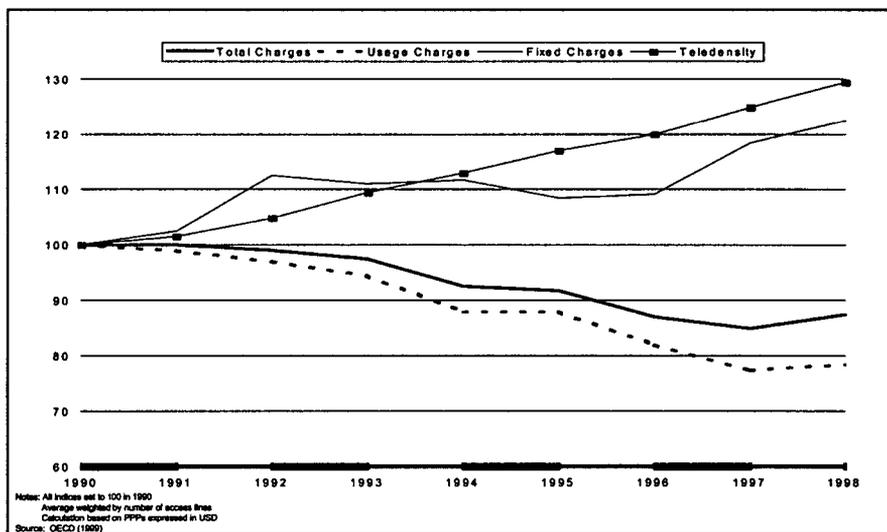


Figure 4-2: Index of OECD Business Charges and Teledensity



to costs. This is illustrated in more detail in Appendix 4-1, and in other studies that have examined rebalancing in different countries. Rate rebalancing will provide benefits to the economy in addition to producing lower overall prices. Therefore, there is a strong case to be made for rate rebalancing, with or without the introduction of competition.

4.2 Approaches to Price Regulation

4.2.1 Introduction

Different approaches have been developed over the years to regulate telecommunications prices. Some, involving rules-based approaches, are designed to provide stability and certainty, as well as achieving regulatory objectives. Others have been more *ad hoc* and discretionary.

This Section begins with a discussion of two common pricing approaches: traditional discretionary price setting and Rate of Return regulation. This Section is followed by a discussion on incentive regulation. In our analysis we consider how well the three approaches achieve the broad objectives of price regulation: namely the financing, efficiency, and equity objectives.

4.2.2 Discretionary Price Setting

Traditionally, in many countries, price regulation was focussed heavily on social objectives as well as financial or economic ones. This was particularly true where the government operated the telecommunications network. Under such circumstances, prices were usually set to promote consumer-to-consumer equity objectives. In many countries, there was little or no analysis of the economic impacts of such policies.

Where discretionary price regulation existed, or continues to exist, it is usually characterized by below-cost prices for connection, subscription and local calls. The shortfall is made up by higher-than-cost international call prices, and sometimes also high long-distance prices.

The frequently-stated objective of this type of pricing is to promote affordability of basic telephone services. This type of pricing may also incorporate the value of service principle. Simply stated, this

principle assumes that a prospective buyer will pay a price that is related to the value derived from the service and that telephone services are more valuable to some classes of customers than to others. Accordingly, businesses are often charged more than residential customers for the same connection and subscription services. It is assumed that businesses are major users of international and long-distance services, and that they value such services highly. Accordingly, higher rates are charged for such services.

Discretionary price regulation approaches in many countries were interventionist. Often the government or the Minister in charge would micro-manage the PTT's pricing structure, severely reducing its ability to function as a normal business enterprise. In some cases, telephone prices were increased to make up government budget deficits, without extensive consideration of the economic or social impacts of such increases.

In some countries, traditional discretionary price regulation failed to generate enough revenue to pay the operating costs of the incumbent operator or to support network upgrades and expansion. As a result, the operator's revenue requirement and the financial objective of regulation were sometimes not met.

In some jurisdictions, telephone revenues of state-owned operators were treated as part of general government revenues. Expenditures of the state-owned operator, including those for investments, are included in the general government budget. Poor government fiscal management made it impossible to meet a PTT's revenue requirement. Such an arrangement deprives the operator of the capital required to upgrade its network. It can also reduce the incentive for the operator to innovate and reduce costs, which hurts the dynamic efficiency objective. In practice, such operators often have poor performance and over-staffing, which means that the productive efficiency objective is not met either.

Long-term capital investments should make up a large part of the costs of a telecommunications operator. However, cash-strapped governments sometimes extract cash from state-owned operators to finance other government priorities. This has been more common where there was no explicit rules-

based regulatory regime that requires prices to be set to meet a revenue requirement calculated to include long-term capital investments. Enough cash may be left for the operator to meet its day-to-day operating requirements, but not enough to upgrade or expand the network.

Where this has happened, the result has been an undersupply of telecommunications services and waiting lists for service. In some countries, telecommunications prices have been increased solely to meet general government revenue requirements, without regard to the specific revenue requirement of the telecommunications operator. Instead of improving telecommunications service, the proceeds of telephone rate increases have sometimes been used to meet a wide range of other government priorities, from subsidizing postal services to paying the armed forces.

In some cases, it is said that local telephone rates are kept at low levels to maintain affordability of services for low-income subscribers (i.e. to meet consumer-consumer equity objectives). In reality, however, the initial telephone users in most emerging economies are not the poor. With low prices, the relatively privileged group of telephone users end up paying much less than it can afford. At the same time, the operator cannot expand the network to provide service to other users. This undermines the operator-consumer equity and consumer-consumer equity objectives. As a result, most of the poor households, especially in rural areas, receive no subsidy at all because they have no access. In summary, experience has shown that discretionary price setting approaches have seldom achieved their social or economic goals, at least on a long-term basis.

Traditional discretionary price setting approaches have usually resulted in inefficient price structures. Table 4-1 summarizes the main differences between prices that typically result from discretionary price setting and the types of cost-oriented prices that would result from competition.

A detailed discussion of telecommunications costs is provided in Section 1.4 of Appendix B.

4.2.3 Rate-of-Return Regulation

Rate of Return (ROR) regulation is a rules-based form of price regulation. Unlike discretionary price setting, ROR regulation provides an operator with relative certainty that it can meet its revenue requirement on an ongoing basis. The essence of ROR regulation is simple. First, the regulated operator's revenue requirement is calculated. Then the operator's individual service prices are adjusted so that its aggregate service revenues cover its revenue requirement.

In calculating the revenue requirement, the regulator first reviews the operating costs and financing (e.g. debt service) costs. Typically there is some regulatory scrutiny to ensure that the costs were necessarily and prudently incurred in order to provide the regulated services. If not, they may be disallowed from the "rate base". The operator will not be entitled to increase its prices or rates to recover such disallowed costs.

The next step in calculating an operator's revenue requirement is to determine its rate of return. In order to allow the operator to remain financially viable, and to attract new capital for its operations, ROR regulation permits the operator to recover not only its direct operation and financing costs, but also a fair return on its rate base. The regulator determines an appropriate rate of return on capital for a given time period (typically one to three years). This return is generally based on a review of financial market conditions, plus any additional operator or industry-specific issues (industry or operator risk, operator specific taxation issues, etc.).

Based on the approved rate of return, a revenue requirement is calculated (i.e. total revenues that may be generated in a given period). The revenue requirement is to be recovered from the sum of all services provided. If an operator earns more than its allowable rate of return, the regulator will require price reductions to bring the operator's rate of return down to the allowable level. Conversely, if the operator does not meet its allowable rate of return, it will request price increases to raise its revenues.

Table 4-1: Typical Result of Discretionary Price Setting

Service	Discretionary Price Setting	Efficient Cost-oriented Pricing
Connection	Very low price, typically below \$50. Waiting list used to ration demand.	Related to the incremental costs of providing the line
Subscription	Relatively low price, typically below \$3/month. Network congestion used to ration demand.	Related to the incremental costs of local service, including the local exchange switch and the "local loop" portion of the network. Local service costs vary significantly across different service areas, based on density and other factors. Higher charges levied on businesses due to their higher demands for maintenance and service quality.
Local Calling	Very low, unmetered or non-existent local call charges.	Calls charged per minute and in some cases with additional call set-up surcharge. Discounts for off-peak calling and special promotions.
Domestic Long-distance Calling	High charges with multiple call zones. Longest distance typically charged at a multiple of 20 or more times local call rate.	Calls charged per minute with possible reductions for duration of call. Discounting during off-peak periods. Ratio between longest-distance call and local call in range of five to one or less. Tendency to distance-insensitive or "postalized" prices
International Calling	Generally very high, especially to distant countries. Accounting rates kept high and number of outgoing circuits kept low to generate net settlement payments.	Calls charged per minute with possible reductions for duration of call. Discounting during off-peak periods. Ratio between international and national calls typically in excess of 3 to 1, but coming down due to accounting rate reform.

Source: Adapted from ITU (1998a)

ROR regulation is designed to equate an operator's total revenues with its total costs. It is generally not designed to equate revenue for any particular service to the cost of that service. As a result, it does not specifically address the structure of prices. In practice, where ROR regulation is applied, the structure of prices generally tends to fall somewhere between cost-oriented prices and the prices that result from discretionary price setting.

Weaknesses of ROR Regulation

The weaknesses of ROR regulation are summarized in Box 4-1. The main weakness is that it does not provide operators with a strong incentive to operate efficiently by reducing their operating costs. They can usually recover most if not all of their costs through rate increases, and they are not permitted to retain additional profits earned by reducing their costs. As a result, ROR regulation does not promote

the efficiency objectives of price regulation as well as other forms of regulation.

The perceived inefficiencies of ROR regulation must be put into perspective. The reality is that operators in some industrialized countries performed relatively well under ROR regulation for nearly a century, taking advantage of gains in technology and sharing the benefits with their customers in the form of lower prices. Nevertheless, because of the identified weaknesses, many regulators in industrialized countries have been introducing forms of incentive regulation instead of ROR regulation.

Concerns about the inefficiencies of ROR regulation arose in industrialized countries after extensive networks had been constructed. The most important objective in many developing countries is to build network infrastructure to meet unsatisfied demand.

Box 4-1: Weaknesses of Rate of Return Regulation

Lack of Incentive to Minimize Costs

- In ROR regulation, the operator's prices are set at a level sufficient to cover its costs. This is why ROR regulation is often referred to as "cost plus regulation". From a dynamic perspective, therefore, the operator has little incentive to reduce its rate base or its operating costs. In competitive markets, where the market determines price levels, an increase in costs will reduce profits. Therefore cost containment is a major objective of operators in a competitive market.

Lack of Innovation/Productivity Improvement

- Over time, ROR regulation of a monopoly operator will lead to a lower rate of productivity improvement than would occur under effective competition. ROR regulation does not provide the operator with a strong incentive to increase its productivity.

Capital Bias – The Aversch-Johnson Effect

- ROR regulation provides incentives to increase the amount of capital that the operator invests. The higher the capital expenditure, the higher the rate base, and the greater the total return the operator can earn. It therefore encourages the operator to use an inefficient input mix. The operator will have an incentive to use an inefficiently high capital/labour ratio for its level of output. This result is often referred to as the Aversch-Johnson effect, named after two economists who described it. The effect is an indication that productive efficiency is not being maximized.

Cost of Regulation

- ROR regulation requires the operator and the regulator to spend significant amounts of time and money. The rate base must be repeatedly calculated by the operator and reviewed by the regulator, the cost of capital must be recalculated, and so on. Rate reviews or hearings must be held on a regular basis, incurring costs to the regulator, the operator, and other participants in the process.

Interventionist Nature of ROR Regulation

- The regulator is required to review many aspects of the operation and management of the firm in a detailed manner. This includes scrutiny to prevent rate base "padding". Over time, this type of detailed regulation may place a regulatory burden on the firm that impedes its ability to function as a normal business enterprise.

Inadequacy for Transition to Competition

- ROR regulation operates relatively slowly, and generally does not allow operators the pricing flexibility they need to respond to competitors' actions.
- The introduction of competition in some parts of the telecommunications sector, combined with continuing ROR regulation in monopoly segments, means that vertically-integrated operators have an incentive to engage in anti-competitive practices (e.g. anti-competitive cross-subsidization).

This will typically require a very large capital investment. As a result, the concern about ROR regulation emphasizing capital investment is not as significant a concern in developing countries. The political and economic environment in many developing countries

minimizes the differences between ROR and incentive regulation. In fact, any economically sustainable form of rules-based price regulation would be preferable to the *ad hoc* forms of discretionary price

setting currently practised in some developing countries.

4.2.4 ROR-Incentive Regulation

The term ROR-incentive regulation is generally used to describe variations on ROR regulation that were developed in different US states to respond to perceived weaknesses in traditional ROR regulation. ROR-incentive regulation has enjoyed limited popularity in other parts of the world.

Incentive regulation provides inducements and penalties that encourage an operator to meet regulatory goals.

The different types of incentive regulation generally share the following elements:

- The operator often participates in setting goals or performance targets.
- The operator is given more flexibility than under traditional ROR regulation. The regulator typically does not prescribe specific management actions. For example, the operator may be rewarded for reducing its operating costs but not told exactly how to reduce these costs.
- The regulator restricts some activities of the operator.
- Rewards and penalties established by the regulator motivate the operator to perform efficiently.

4.2.5 Types of ROR-Incentive Regulation

In this Section, we summarize some of the incentive-based regulatory schemes that have been implemented in the US telecommunications industry. These forms of regulation typically replace traditional ROR regulation.

Banded Rate-of-Return

Under this form of incentive regulation, regulators establish a range (or band) of authorized earnings. Prices are set to generate earnings that fall within the authorized range. When only a narrow band of earnings is permitted, the operator's incentives are

similar to those created by traditional ROR regulation. A broad band of earnings can create stronger incentives for the operator to reduce operating costs and improve operations. For instance, rather than set the rate of return at 12%, the operator might be allowed a return of between 10% and 14%.

Rate Case Moratoria

Rate case moratoria can be implemented by agreements between a regulator and an operator to suspend regulatory scrutiny of the operator's earnings for a fixed period. This form of incentive regulation is often used at the beginning of a transition to price cap regulation. It gives the regulated operator an incentive to lower operating costs, since it may retain higher earnings during the transition period.

Earnings-Sharing

Under an earnings-sharing plan, the operator may retain higher earnings. However, earnings in a specified range are shared with consumers. Typically, these plans are set up with different sharing ranges based on a prescribed ROR. These sharing ranges can differ substantially from plan to plan. In one example of this type of plan, the regulated operator keeps 100% of the earnings up to 10%, the operator and consumers split earnings between 10% and 14%. The operator's earnings are capped at 14%.

4.3 Price Cap Regulation

4.3.1 Overview

This Section provides an overview of price cap regulation, which is the preferred form of rules-based price regulation around the world today.

Price cap regulation uses a formula to determine the maximum allowable price increases for a regulated operator's services for a specified number of years. The formula is designed to permit an operator to recover its unavoidable cost increases (e.g. inflation, tax increases, etc.) through price increases. However, unlike ROR regulation, the formula does not permit the operator to increase rates to recover all costs. The formula also requires the operator to lower its prices regularly to reflect productivity

increases that an efficient operator would be expected to experience.

Price cap regulation has several advantages over ROR regulation:

- It provides incentives for greater efficiency;
- It streamlines the regulatory process;
- It provides greater pricing flexibility;
- It reduces the possibility of regulatory intervention and micro-management;
- It allows consumers and operators to share in expected productivity gains;
- It protects consumers and competitors by limiting price increases; and
- It limits the opportunity for cross-subsidization.

For these advantages to materialize, price cap regulation must be implemented in an effective and internally consistent manner. We discuss some of these implementation challenges in the Sections below.

Price cap regulation is meant to provide incentives that are similar to competitive market forces. Competitive forces require operators to improve productivity and, after accounting for unavoidable increases in their input costs, pass these gains on to their customers in the form of lower prices. The price cap formula has a similar effect.

Price cap regulation is a means to regulate prices over time. The price cap formula determines the rate of change in prices from an initial level. The initial level of prices may be set by the regulator (see Section 4.1.2). Alternatively, the regulator may establish a transition period at the end of which the regulated operator must reach target price levels or ranges (see Section 4.4.5). Future financial performance for a price cap regulated operator formulae is highly dependent on the initial price levels. Therefore, it is critical for the regulator to ensure that the initial level of prices are consistent with the operator's revenue requirement.

4.3.2 The Basic Price Cap Formula

There are a number of ways to express the price cap formula. In its simplest form, a price cap formula allows an operator to increase its rates annually by an amount equal to an inflation measure, less an amount equal to the assumed rate of productivity increase. A simplified very basic price cap formula is set out in Box 4-2.

It can be seen from this simple example that operators may increase their prices to include the effects of inflation, but no more. Inflationary cost increases of 5% may be passed on because it is assumed that the operator cannot control them. However, the example also assumes that telecommunications industry productivity will increase by 3%. Such productivity increases result from technological improvements, lower switching and transmission costs, and many other factors. Therefore, in the above example, the operator must pass on a productivity benefit to its customers by lowering its year 2001 prices by 3%.

In this example, the operator may reap the benefits of any measures it takes to reduce its costs below 3%. If the operator has been very efficient, it may

Box 4-2: Simplified Basic Price Cap Formula

Allowable price increase for a year = Starting Price + I - X

Notes:

- (1) I = Inflation Factor for the year
- (2) X = Productivity Factor
- (3) These factors are discussed in greater detail in later Sections of this Module

Example:

In year 2000, the price is 100

I = 5

X = 3

Therefore, the allowable price increase for 2001 equals $100 + 5 - 3 = 102$

have reduced its actual costs by 10%. In such a case, the operator may retain the benefits of lowering its costs from the assumed 3% productivity factor to 10%. The additional earnings which result from such efficient operations may be retained as profits to shareholders or used for other purposes, such as new investment. The earnings could also be used to reduce prices further, for example to meet competition. However, such additional reductions will not be required by the regulator. The price cap formula determines the maximum required price decreases.

4.3.2.1 Price Indices and Weights

The sample price cap formula in Box 4-2 is highly simplified. In practice, telecommunications operators do not offer a single service at a single price. They offer a range of different services at different prices. A typical price cap formula will, therefore, generally use an index of the prices charged by an operator and not a single price. In such cases, the operator will be required to keep its actual prices below a Price Cap Index (PCI).

In developing indices for a price cap formula, prices of different services are weighted so that the prices for major services receive a proportionately greater weight. Consider a simple example, where an operator provides only two services, local service and international service. An index of the operator's actual prices (Actual Price Index or API) can be developed for this operator using service revenues as weights. For example, assume that local service accounts for 75% of the operator's revenues, and international service accounts for 25%. The same proportions ("weights") will be used to determine whether the operator's API exceeded the price cap, or PCI.

Let us use the same price increase assumptions as described in Box 4-2. In the year 2001, prices will be allowed to increase from 100 to 102. Therefore, let us assume that 102 is the PCI. To determine whether the operator's actual prices in 2001 exceed the PCI of 102, we must compare that PCI to the API. Box 4-3 contains examples comparing the operator's API for 2001 to its PCI of 102.

These simple examples illustrate the following basic features of price cap formulae that are based on indices:

- The actual prices of the operator (as measured by the API) may not exceed the price cap for the year (as measured by the PCI).
- The operator has pricing flexibility; some prices may be increased above the weighted average of the change in prices, as long as others are not.
- Prices for services with heavier weightings in an index will affect the index more. Therefore, prices for major services (measured by revenues) may not be increased as much as prices for less significant services.

4.3.2.2 Basic Indexed Price Cap Formula

Box 4-4 restates the basic price cap formula using the concept of price indices described above. The formula assumes that prices will be calculated for each year. The symbol "t" is used in the formula to represent the appropriate time period (e.g. a year). In practice, different time periods can be used instead of years.

The factors I and X which are used in the formula set out in Box 4-4 are discussed in greater detail in later Sections of this Module.

4.3.2.3 Service Baskets

Under price cap regulation, services are usually grouped into one or more service baskets. Different service baskets may be subject to different price cap indices.

For example, a residential service basket might be developed to limit price increases affecting residential consumers. This basket might include local residential connection charges, monthly subscription fees, and local and international usage charges. A separate basket might include services used by typical business customers.

Box 4-4: Basic Price Cap Formula Using Indices

Price cap regulation requires:

$$API^t \leq PCI^t \text{ for all } t$$

That is, the API for a particular time period must always be less than or equal to the PCI for that period. From year to year, the PCI is adjusted according to the following formula:

$$PCI^t = PCI^{t-1} \times (1 + I^t - X)$$

i.e. the PCI for a given year (t) will be equal to the PCI for the previous year ($t-1$) multiplied by 1 plus the Inflation Factor for year t (I^t) minus the Productivity Factor (X).

Notes:

- (1) API^t means the Actual Price Index at year t . The API is a weighted average of the change in prices actually charged by the operator.
- (2) PCI^t means the price cap index at year t . The PCI is a weighted average of the change in the maximum allowable prices of the operator.
- (3) I^t is the inflation factor at time t .
- (4) X is the productivity factor.
- (5) It is common to express I^t and X in percentage terms especially when referring to them outside the context of actual price cap calculations. Note, however, that in the price cap formulae these variables are expressed in decimal, not percentage terms.

Example

Using the same PCI assumptions as described in Box 4-2 and Box 4-3, in a period where the inflation factor is 5% and the productivity factor is 3%, the maximum amount that the weighted average of the change in prices would be permitted to increase would be by 2%.

i.e. The formula $PCI^t = PCI^{t-1} \times (1 + I^t - X)$ produces the following result: $102 = 100 \times (1 + .05 - .03)$

There may also be restrictions on the absolute or relative movement of prices for services subject to price cap regulation. Operators may change prices for individual services within the baskets as long as the API for the services in the basket complies with the price cap formula, and as long as no individual service pricing restrictions are breached.

An example of an individual service pricing restriction is a rule that no price for an individual service may increase by more than 10% per year. Such restrictions may be applied, for example, to limit the impact on residential consumers of rate rebalancing. The concepts of service baskets and individual restrictions are discussed further in Sections 4.3.7 and 4.3.8 of this Module. Service baskets may also be used to restrict or prevent the cross-subsidization

of service open to competition (e.g. domestic and international long distance) by monopoly services (e.g. access and local calling).

4.3.3 Calculating Price Cap Variables: Looking Ahead or Back

The basic price cap formula contains a number of variables that must be calculated. To mimic the workings of competitive markets, the price cap formula should ideally be forward-looking. Variables such as the inflation (I) and productivity (X) factors, and the weights used to calculate the indices should ideally be determined based on expected future values.

In practice, however, the majority of regulators only set the productivity factor based on future values. The inflation factor and index weights are determined based on the most recent available historical data.

There are a number of practical reasons for setting the inflation factor and index weights based on historical data:

- In many economies, past inflation performance is a good predictor of future inflation.
- The process of forecasting inflation and the demand and revenue variables needed to forecast weights is complex, time consuming, and subject to controversy and possibly manipulation.
- A forecasting approach may necessitate corrections to offset the effect of forecasting errors, thus adding complexity and regulatory uncertainty.

Basing the inflation factor and weights on historical data also has disadvantages. For instance, future inflation may vary significantly from past inflation. This disadvantage may be mitigated by increasing the frequency of adjustments to the inflation factor, or by establishing trigger mechanisms as discussed below.

In principle, index weights may be based on costs or revenues. Cost weights are generally considered to be the more theoretically correct choice, but reliable forward-looking costing data is often not available. In practice, therefore, most regulators have chosen revenue weights to calculate the aggregate indices in the price cap formula. Regulators should be especially vigilant in the choice of weights when prices are not balanced and heavy cross-subsidization exists. In this type of scenario there may be significant differences in the cost and revenue weights and use of the latter may bias the calculation of the API.

Another approach is to set fixed weights that do not vary from period to period. This approach is administratively simpler and limits any possibility for the operator to manipulate the price cap formula by setting prices strategically. Setting weights based on forward-looking cost benchmarks is one possible alternative under this approach.

4.3.4 The Inflation Factor

The price cap formula includes an inflation factor to account for changes in input costs of the operator. For example, holding all the other variables constant, a 5% inflation factor would allow a regulated operator to increase its average prices by 5%.

4.3.4.1 Selection Criteria

In most economies, a number of different indices are used to measure inflation. For example, a consumer price index or retail price index (CPI or RPI) measures changes in the prices of goods and services purchased by typical consumers (e.g. food, passenger transportation, residential electrical power, etc.). A Producer Price Index (PPI) measures changes in the prices of goods and services purchased by different types of production industries (e.g. prices for labour, freight transport, industrial electrical power, etc.).

In developing a price cap formula, regulators must select an appropriate inflation factor (I). A choice may be made from among existing inflation indices, or a new inflation factor may be calculated. Regulators that have implemented price cap regulation have identified a number of criteria for selecting an inflation index to be used as the inflation factor. Frequently used criteria are set out in Box 4-5.

Particular national circumstances may dictate that other criteria should be considered. It is unlikely that any one potential inflation measure will rank highest in all of the selection criteria. Ultimately, the selection must be based on the informed judgment of the regulator.

Box 4-5: Selection Criteria for an Inflation Factor

Reflective of changes in the operator's costs

- > For the inflation factor to be a useful variable, it must reflect changes in the operator's input costs. This is particularly critical in situations of economic instability, when the inflation factor will have to capture sudden and large changes in the country's exchange rate. This is particularly important for operators that typically purchase a large proportion of their equipment in foreign currency.

Availability from a credible, published, independent source

- > This is important if price cap regulation is to have credibility with all parties involved. Private sector participants as well as international investors in the sector must be able to trust the source of the data.

Availability on a timely basis

- > In order for the price cap formula to respond quickly to any changes in input costs, the inflation factor should ideally be available with a lag of less than 6 months and preferably 2 to 4 months.

Understandability

- > There is significant benefit in including an inflation factor that is easily understood not only by all the players in the telecommunications sector, but by the public at large.

Stability

- > The values of some statistical indices are subject to revision after their initial release. For example, in March 2001, the January 2001 CPI may be announced at 123.47; however, that value may be revised to 123.58 in June 2001. If possible, an inflation factor should be chosen that is not subject to large frequent revisions.

Consistency with total factor productivity of the economy

- > The choice of price index will have a direct impact on the manner of calculating the productivity factor (X) because efficiency gains in the rest of the economy affect the operator through this index. As we discuss below, the inclusion of specific variables in the price cap formula will depend on whether an economy-wide price index or a price index for the operator's principal inputs is used. This aspect is discussed in greater detail in Section 4.3.5.

4.3.4.2 Potentially Useful Inflation Indices

With these selection criteria in mind, the next step is to examine existing inflation measures available in the country. A number of indices are normally published by or available from the government statistical office (if one exists), and/or the country's central bank. In some countries, these statistics are produced by government ministries, such as the Ministries of Finance, Statistics, Planning or Economic Development.

Potentially useful inflation measures may be classified as either economy-wide indices or non-economy wide price indices. Some inflation measures are designed to reflect national or domestic output price changes. For example, the Gross Domestic Product (GDP) price index measures the cost of a fixed basket of goods and services that make up the GDP in a particular base year. This is updated at periodic intervals. Similarly, the price index for the Gross National Product (GNP) gives economy-wide coverage.

A related index is the GDP or GNP deflator. Traditionally, the deflator is determined by dividing the cost of the basket of goods and services that make up the GDP (or GNP) at current prices by the cost of the same basket at constant prices. Hence, the deflator reflects not only pure price changes, but also changes, if any, in the weights attached to the GDP (or GNP) components.

The GDP (and GNP) indices and deflators are broadly based. They reflect changes in the prices affecting a large basket of goods and services. Many regulators in the U.S. and Canada have chosen one of these economy-wide indices as the inflation factor to be included in their price cap formula.

Other indices are narrower in scope. For example, the Consumer Price Index (CPI) or the Retail Price Index (RPI) measures the changes in prices paid by consumers. They typically measure the cost of a fixed basket of goods and services that are bought by consumers in a particular base year, and update it at periodic intervals. This narrow scope is their greatest disadvantage because telecommunications operators incur only a portion of their costs in retail consumer markets. Hence, the CPI or RPI may be relatively poor indicators of inflation affecting the operator's cost structure.

Another set of inflation measures that is narrower in scope are the producer, industrial or wholesale price indices. Generally, they measure changes in prices paid by companies economy-wide, or in particular sectors of the economy.

A number of regulators in the United Kingdom and Europe have selected retail price indices as the inflation factor to be included in their price cap formula. In fact, price cap regulation is sometimes referred to as "RPI-X" regulation, referring to the initiative of the United Kingdom in first implementing this type of regulation in the early 1980s, when British Telecom was privatized.

4.3.4.3 Other Inflation Factors

Based on the general criteria set out above and on a survey of existing indices, the regulator should con-

sider the advantages and disadvantages of each available index as a potential inflation factor. It is possible that the regulator will decide that none of the existing national indices is appropriate. Box 4-6 presents some possible alternative inflation factors.

4.3.4.4 Period of Adjustment

The regulator must decide how often changes in the chosen inflation index will be used to adjust the price cap formula, and how often the operator will be allowed to adjust its rates. This is referred to as the periodicity of adjustment to the price cap formula. In industrialized countries, the period of adjustment is usually once a year. This is a feasible option because inflation rates tend to be relatively low and stable in such countries.

Many developing countries, however, are subject to greater economic instability. Hence, the ideal periodicity may be less than a year, say 3 or 6 months. A relatively short period between updates lessens the impact that an acceleration or deceleration of inflation can have on the operator's expenses. The regulator should weigh the benefits of frequent adjustment against the administrative costs of changing and publishing new prices on a regular, short-term basis.

4.3.4.5 I-Factor Adjustment Mechanism

One approach developed to deal with economic instability is to include a trigger mechanism in the adjustment of the price cap formula. Under this approach, the regulator may select a standard national inflation index as its inflation factor with a relatively long period of adjustment. However, as a "fall back", an immediate adjustment may be made to the inflation factor in the event of certain large and unexpected economic developments.

As an example, an adjustment might take place when the selected national inflation index increases or decreases by a significant amount. In countries with a history of relatively low and stable inflation, this amount could be in the order of 10% to 20%.

Box 4-6: Alternative Inflation Factors

- One option is to use an inflation index from another country (or inflation measures produced by United Nations organizations and/or international financial institutions, regional development banks, The World Bank, the IMF, etc.).
 - In Argentina, for instance, some regulated utilities use the producer price index for the United States. This is then converted into the national currency. This choice was designed to reassure foreign investors by relating their revenues to a hard currency.
- Another option is to construct a new measure of inflation that more accurately reflects the cost structure of the operators. This new “composite” index may be a weighted combination of several existing indices.
 - In Colombia, for instance, the interconnection access rates paid by wireless and long distance operators to local telephone operators is indexed on a monthly basis to a composite index made up of the following:
 - An index of the US/Colombia exchange rate and the average customs duty; weight: 0.38
 - An index of the minimum industrial wage in Colombia; weight: 0.29
 - The Producer Price Index of Colombia; weight: 0.33
 - Similarly, in Chile, the access rates paid by mobile operators to terminate calls on the networks of PSTN operators is indexed on a monthly basis to a weighted aggregate index made up of the following:
 - An index of the imported goods and services component of the Chilean wholesale price index; weight 0.263
 - The Chilean wholesale price index; weight: 0.542
 - The Chilean consumer price index; weight: 0.195

Source for Argentina example: Green and Pardina (1999)

Price Regulation

An I-Factor adjustment mechanism can also be tied to other key changes that would seriously impact on the cost of operating a telecommunications system. In many countries, the most serious potential change is a devaluation of the national currency. While this may reduce labour costs, it can significantly increase the costs of equipment, foreign consulting services, financing charges, etc. An adjustment mechanism to deal with this type of change is presented in Box 4-7.

4.3.5 The Productivity Factor

The price cap formula includes a productivity factor, which is based on an estimate of the operator’s expected productivity increases over the relevant period. This variable, commonly referred to as the “X-factor” or the “productivity offset”, ensures that

consumers receive partly or fully the benefits of the operator’s expected productivity gains in the form of lower prices. For example, if all other variables are held constant, a 3% X-factor will result in annual reductions of 3% in average consumer prices.

The proper choice of an X-factor is critical for the long-term viability of any price cap plan. Selecting the X-factor is often the most contentious aspect of implementing price cap regulation. The X-factor should be set so that it poses a challenge to the operator. It should promise consumers higher gains relative to alternative regulatory regimes. If the X-factor is set too low, the operator will earn excessive profits and the regulatory regime could fall into disrepute. If too large an X-factor is selected, the operator may not be permitted to meet its revenue requirement.

Box 4-7: Inflation Factor for Foreign Exchange Rate Changes

A mechanism to adjust the inflation factor in a price cap formula can be triggered by large foreign exchange (FX) rate changes. It is possible that national inflation measures will not adjust rapidly enough to reflect the real impact of large FX changes. For example, this occurred in Indonesia in 1997, when the Asian economic crises caused the Indonesian rupiah to drop rapidly from approximately 2400 rupiah per US dollar to 14,000 per dollar. In comparison, the Indonesian inflation indices remained relatively stable. Since telecommunications operators paid for equipment purchase, financing charges, etc. in foreign currencies, the drop in the rupiah translated into a massive increase in operating costs, which was not reflected in the national inflation indices.

To account for such large FX changes, a pre-established mechanism could provide for an adjustment to the inflation factor – for example, if the percentage change in the average monthly exchange rate is higher than the corresponding percentage change in the inflation factor by a specified amount (perhaps 20 to 30%) within any specified period.

By way of illustration, let us assume a 25% threshold. If the Indonesian rupiah depreciated by 35% during the relevant period (hence, increasing by 35% the number of rupiah required to purchase a US dollar), but the national inflation measure increased by 30%, the trigger mechanism would not apply. However, if the inflation measure only increased by 5%, an adjustment would be triggered.

4.3.5.1 X-Factor Determination

The X-factor may be divided into the “basic offset” and adjustment factors. The basic offset should reflect the regulated operator’s historical achievement of productivity growth. If the operator has had a history of lower input price inflation than other firms in the economy, that should be reflected in the basic offset. Adjustment factors are included to take into account changes in the operating environment of the regulated operator. For example, an adjustment factor might reflect the introduction of price cap regulation, the introduction of competition or the privatization of the operator.

There are two major approaches to determination of the X-factor. One approach, which we will refer to as the historical productivity method, relies on historic information about the productivity performance of the regulated firm to set the basic offset. Once the basic offset is calculated, certain adjustment factors may be added or subtracted to take into account changes in the operating environment of the operator. These adjustment factors are based on regulatory benchmarking or other predictive methodologies. This approach is based on the understanding that past productivity, with adjustments, is a good indicator of future productiv-

ity. The implementation of this approach is subject to the availability of specific data. The calculation may be very data-intensive and requires reliable and consistent data of a very specific nature at an adequate level of detail for an adequate period of time.

The other approach, which we will refer to as the regulatory benchmarking method, recognizes that in some instances, past productivity performance may not be a good indicator of future expected performance. This may be the case where the sector was previously regulated by discretionary price setting (or not regulated at all). It may also be the case where the sector has been inefficiently operated under public ownership or is subject to very significant structural change, for instance, divestiture. In these cases, the adjustment factors may be much more significant than the calculated basic offset. A benchmarked productivity factor is likely the only practical alternative in many developing countries. There the regulator is not likely have access to reliable and consistent historical productivity data to determine the historical productivity factor.

4.3.5.2 Historical Productivity Method

A number of empirical methods can be used to help the regulator set the X-factor. Most of these methods were developed in the countries that first implemented price cap regulation (United Kingdom, United States, Canada, etc.). The preferred method to determine an X-factor is to carry out a total factor productivity (TFP) study using historical data on the regulated operator and/or on the sector. Box 4-8

provides an overview of TFP and how it may be applied to the telecommunications sector.

Historical Productivity - Basic Offset

Price cap regulation is intended to replicate the discipline of competitive market forces. These forces require operators to improve productivity and pass their gains on to their customers in the form of lower prices, after accounting for increases in input prices. If all sectors in the economy were fully competitive,

Box 4-8: Total Factor Productivity

Productivity is the measure of how effectively an entity employs inputs to produce outputs. It is a measure of operational efficiency. A typical, although partial, measure of productivity in the telecommunications industry is lines (one output) per employee (one input). Lines per employee is obviously only a partial measure, given that one could increase the number of lines by increasing capital investment or materials. Simultaneously, a telecommunications operator produces many more outputs than just the number of lines.

TFP (also known as multi-factor productivity) measures how effectively an operator, an industry or an economy employs all inputs to produce all outputs. TFP can be said to have increased if the operator produces more outputs with the same amount of inputs, or if it produces the same outputs with fewer inputs. TFP is equal to the ratio of output volume to input volume. Algebraically the TFP index may be expressed as:

$$TFP = Q/Z$$

Where Q is an index of aggregate output volume and Z is an index of aggregate input volume. Note that for price cap regulation we are primarily interested in the changes in the TFP index, rather than its level. If we refer to changes by the symbol Δ , the change in the TFP index may be expressed in the following manner:

$$\Delta TFP = \Delta Q/\Delta Z$$

Example:

If the output volume index has increased by 5% (i.e. $\Delta Q=1.05$) and the input volume index has increased by 2% (i.e. $\Delta Z= 1.02$), the change in the TFP index is 2.94%:

$$\Delta TFP = 1.05/1.02 = 1.0294$$

Note that for the sake of simplification regulators and analysts often approximate the multiplicative relationship between TFP, Q and Z by an additive relationship. In this instance, if output has increased by 5% and inputs by 2%, it can be said that TFP has approximately increased by 3%:

Approximation:

$$\begin{aligned} \Delta TFP &\approx \Delta Q - \Delta Z \\ &\approx 5\% - 2\% \\ &\approx 3\% \end{aligned}$$

It should be stressed that while this type of approximation is fairly common, it is not always accurate. While in the example above the approximation (2.94%) was quite close to the actual number (3.00%), this will not always be the case. Generally, the larger the change in TFP the larger the inaccuracy of the approximation.

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output prices in the economy would grow at a rate equal to the difference between the growth rate of input prices and the rate of productivity growth.

As described in Bernstein and Sappington (1998), if regulated telecommunications operators were like a typical company, the telecommunications regulator could replicate market discipline by restricting increases in the operator's prices to the economy-wide rate of price inflation. This restriction would require the regulated operator to achieve the same productivity gains as that of the typical company, and to pass these gains on to its customers, after adjusting for the typical input price inflation rate. If the regulated operator faces the same input price inflation rate as other companies in the economy, the X-factor should be set at zero.

Generally, therefore, the X-factor should reflect the extent to which:

- the regulated operator is capable of increasing its productivity more rapidly than other companies in the economy; and
- the prices of inputs used by the regulated operator grow more slowly than the input prices faced by other companies in the economy (this is often referred to as the input price differential or IPD).

Telecommunications operators should normally enjoy faster productivity growth than other companies due to the more rapid rate of technological change in the telecommunications industry. Telecommunications operators may also have lower input price inflation due to the decreasing unit costs of processing, switching and transmission.

If the regulated operator can achieve faster productivity growth or enjoy lower input price inflation than other companies in the economy, then the regulated operator should be required to pass the associated benefits on to customers in the form of lower prices.

For example, assume the expected annual rate of productivity growth of the regulated operator is 3%. The corresponding growth rate elsewhere in the economy is 1%. Input prices in the regulated

industry are expected to increase 0.5% annually, and the corresponding growth rate of input prices elsewhere in the economy is 2.5%. In this setting, the X-factor should be set at approximately 4% ($= [3 - 1] + [2.5 - 0.5]$). Note that for simplicity we have approximated the X-factor by adding and subtracting the different variables. As pointed out in Box 4-8, for small numbers this is generally a fair approximation to the mathematically-correct multiplicative calculation.

Table 4-2 presents the results of some studies of TFP for the US communications industry and corresponding TFP performance of the US economy as a whole. Based on Table 4-2 and other studies (including those of the Canadian telecommunications industry), it appears that in the long-term productivity growth of the communications industry in North America has been about 2% to 2.5% higher than productivity growth of the respective economies. Some of these studies are dated and the productivity differential may have changed recently.

The choice of the inflation factor will have an impact on the choice of variables to calculate the basic offset. If a general inflation index is selected for the I-factor (e.g. GDP-PI or CPI or RPI, etc.), the basic productivity offset should be calculated as in the example presented two paragraphs above. This is referred to as the *differential* approach. Based on this approach, the figures in Table 4-2 suggest a basic offset between 2.0% and 2.5%. If a sector or operator-specific index is constructed, however, the appropriate basic offset is simply the telecommunications TFP estimate. This is referred to as the *direct* approach. Based on his approach, the figures in Table 4-2 suggest a basic offset between 3.0% and 3.5%.

Historical Productivity Adjustments

Many regulators have adjusted the basic offset by other factors to take into account significant changes in the operating environment of the regulated operator. We review some of the key adjustment factors below. These adjustment factors are often determined based on benchmarking or predictive methods, such as time-series, cross-sectional econometric studies.

Table 4-2: Selected Estimates of TFP for the US.

Study	Period	COM	US	DIFF
Nadiri-Schankerman	1947-76	4.1	2.0	2.1
Jorgenson	1948-79	2.9	0.8	2.1
Christensen	1947-79	3.2	1.9	1.4
AT&T	1948-79	3.8	1.8	2.0
A.P.C.	1948-87	4.0	1.7	2.3
Christensen	1951-87	3.2	1.2	1.9
Crandall	1960-87	3.4	1.3	2.1
DRI	1963-91	3.0	0.2	2.8
Christensen	1984-93	2.4	0.3	2.1

Note: US Communications Industry (COM); US Economy and Differential (DIFF %)

Source: Taylor (1997)

Incentive Regulation Factor

After price cap regulation replaces ROR regulation or, more likely, when it becomes the first form of rules-based price regulation adopted, operators in the industry can be expected to achieve a higher productivity growth rate than they have in the past.

In such circumstances, some regulators have supplemented the basic offset with what is sometimes called a *customer productivity dividend* (CPD). A number of econometric studies have examined the impact of incentive regulation plans on productivity of telecommunications operators. On the whole, these studies have concluded that incentive regulation has a positive impact on productivity growth.

In principle, the CPD should reflect the best estimate of the increase in the productivity growth rate in the regulated sector that will be brought about by the improved incentives inherent in the new regulatory regime. This variable, also referred to as the *stretch factor*, could be allowed to vary over the life of the price cap plan. For example, the variable may be higher at the beginning of the plan and reduced near its end. CPDs adopted in the US and Canada have generally been below 1% per year.

Competition Adjustment

The rise of strong competition is another structural change that can affect the value of the X-factor under price cap regulation. The effect of increased competition, however, is unclear.

On the one hand, increased competition, like a change in regulatory regime, can force the regulated operator to operate more efficiently, and thereby achieve a higher productivity growth rate. This would seem to favour a higher X-factor, particularly if a CPD has not been imposed.

On the other hand, increased competitive forces can shift market share from incumbent operators to new entrants. The result can be an unavoidable reduction in the growth rate of the incumbent's outputs. Particularly in the short run, this lowering of the growth rate of the incumbent's outputs can be higher than any associated lowering of the growth rate of its inputs. This leads to a lower productivity growth rate for the incumbent, arguing for a lower X-factor. The empirical evidence on the effect of competition on productivity growth is mixed. A number of recent time-series, cross-sectional econometric studies have found no relationship between competition and

productivity growth, after taking into account other factors.

Privatization Factor

The theoretical literature suggests that privatization should increase productivity growth. The theory is substantiated by recent econometric studies that have found privatization to increase productivity by at least 0.5% to 1.0% per year.

4.3.5.3 Regulatory Benchmarking Method

In some instances, past productivity performance may not be a good indicator of future expected performance. This may be the case where the sector was not price regulated, was not operated efficiently or is the subject to very significant structural change.

In these circumstances, or when the operator and/or its operating environment are undergoing drastic change, the X-factor may have to be developed based on the informed judgement of the regulator and its advisors. International experience with price cap regulation can provide a useful benchmark in such cases. This is why we refer to this method as regulatory benchmarking.

Furthermore, this approach may be the only practical alternative in many developing countries because of lack of the very specific detailed historical data over an adequate period of time to calculate TFP. More generally, the historical method may be less applicable to developing economies for the following reasons:

- Low teledensity levels, and privatization of former government telecommunications operators, can be expected to lead to significant productivity improvements;
- Significant political and economic instability, and the lack of a clear legal and regulatory framework may affect productivity levels, and;
- Recent evidence suggests that technological catch-up and the possibilities for greater sector growth in developing countries mean that productivity growth should be higher than in industrialized economies. This would suggest

that the X-factor should be set at relatively high levels. On the other hand, there are some very efficient telecommunications sectors in the developing world that may not be subject to such “catch-up” phenomenon.

Countries that have had a number of price cap plans have generally increased the X-factor over time. One example is that of British Telecom (BT) in the United Kingdom (UK), where the X-factor has been increased from 3% in the 1984-1989 period to much higher factors in recent years (see Table 4-3). This regulatory “tightening” has been a result of better-than-expected performance by the regulated operator. The major increases in the X-factor from a modest initial figure also reflects a degree of regulatory caution, with an initial bias towards ensuring the regulated operator's revenue requirement is met.

No price cap plan, no matter how carefully designed, will be perfect or permanent. It is in the nature of good regulation to evolve with market and policy developments. The evolving nature of price cap regulation is perhaps best illustrated by the changes in the various price cap plans that have been applied to British Telecom. BT was the first telecommunications operator subject to price cap regulation. It remains subject to this form of regulation, but as illustrated in Table 4-3, there have been significant changes over the years. Regulators that are considering introducing price cap regulation should take comfort from the British experience. The most significant decision at the time of the privatization of BT was to adopt price cap regulation – not to specify its particular X-factor, and other details. The actual form of regulation was not cast in stone. As in other countries where price cap regulation has since been adopted, adjustments continue to be made as the regulator's experience with this form of regulation increases, particularly with respect to the determination of the X-factor.

Table 4-4 and Table 4-5 provide examples of current X-factors adopted by regulators around the world. Although there is some variation in the actual X-factors set by regulators, based on this selected sample, when a majority of the operator's services are included in price cap regulation, many regulators have selected an X-factor in the range of 3.5% to 4.5% as the initial X-factor. This range is generally

Table 4-3: A Summary of British Telecom's Price Cap Plans

Duration	X	Services Subject to Price Caps	Other Main Pricing Constraints	Main Services Not Subject to Price Caps
1984-89	3.0	Subscription; local and national calling	Residential subscription (RPI+2)	Rental, international calls, operator services, connection charges, public telephone calls
1989-91	4.5	Subscription; local and national calling	Subscription (RPI+2); connections (RPI+2); private circuits (RPI+0).	Rental; international calls and public phone calls.
1991-93	6.25	Subscription; local and national call charges; international calls; volume discounts.	Residential and single line subscription (RPI+2); multi-line subs. (RPI+5); connection (RPI+2); private circuits (RPI); median res.bill (RPI)	Telephone rental; public telephone calling.
1993-97	7.5	Subscription; local and national calling; international calls; connection charges.	All subscriptions (RPI+2); all individual prices in basket limited to RPI including connection charges; private circuit basket (RPI).	Public telephone calling.
1998-2001	4.5	Retail charges: residential connection subscription; local, national and international calls. Based on expenditure patterns of lowest spending 80% of residential customers.	Business assurance package, including subscription (RPI), analogue private circuits (RPI).	Public telephone calling.
	8.0	Network charges: non-competitive access services (call origination and termination, single transit, local conveyance) and interconnection specific service.	Services divided into three baskets, each basket subject to RPI-8 cap.	

Source: Adapted from OECD (1995) and Ofel (2000a)

consistent with the differential approach to calculating the X-factor. The more detailed guidelines

discussed below may assist in regulatory judgements to set the X-factor.

Table 4-4: X-Factors of Selected National Price Cap Regulation Plans

Country	X-Factor
Argentina	5.5
Australia	7.5
Canada	4.5
Chile	1.1
Colombia	2.0
Denmark	4.0
France	4.5
Ireland	6.0
Mexico	3.0
Portugal	4.0
UK	4.5
US	6.5

Table 4-5: X-Factors of Selected State Price Cap Regulation Plans in US

State	X-Factor
Connecticut	5.0
Delaware	3.0
Georgia	3.0
Illinois	4.3
Maine	4.5
Massachusetts	4.1
Michigan	1.0
New York	4.0
North Carolina	2.0
Ohio	3.0
Rhode Island	4.0
Wisconsin	3.0

Regulatory Benchmarking

➤ **Differential Approach**

The long-term historical productivity differential between the telecommunications sector and the economy is generally accepted to be 2% to 2.5% or higher. We discussed this range in the previous section. This benchmark can be higher where the telecommunications sector is expected to grow at a rate significantly higher than that of the economy.

The long-term historical input price differential (IPD) between the telecommunications sector and the economy is generally accepted to be positive, but smaller than 1%. The IPD could be lowered if, for example, a telecommunications worker's wages grew faster than that of the average worker. Conversely, the IPD should be raised if the rate of productivity-improving technological development in the telecommunications industry increases.

➤ **Direct Approach**

The long-term historical productivity performance of the telecommunications sector is generally accepted to be 3% to 3.5% or higher. We discussed this range in the previous section. This benchmark could be higher where productivity in the telecommunications sector is expected to grow at a rate significantly higher than that of the economy.

Regulatory Benchmarking – Adjustments

Adjustments can be made for the effects of the introduction of incentive price regulation, competition, and privatization, where these conditions apply. These factors and their effects are discussed above. Table 4-6 provides a numerical summary of the benchmark estimates discussed in this Section. These are of a general nature. It is recommended that each country carry out an appropriate TFP or benchmarking study based on specific national conditions.

Table 4-6: Summary of Benchmark Estimates for Setting X-Factor (%)

	Differential Approach	Direct Approach
Basic Offset	2.0 to 2.5	3.0 to 3.5
Adjustment Factors		
Incentive Regulation	0.5 to 1.0	
Competition	0.0*	
Privatization	0.5 to 1.0	

Note: * Could be increased to up to 0.5 if competition is combined with privatization.

Source: Based on McCarthy Tétraut review of the literature and experience with price cap regulation in industrialized countries. Estimates may be less applicable to developing countries. These estimates are of a general nature. It is recommended that each country carry out an appropriate TFP or benchmarking study based on specific national conditions.

4.3.6 Capped and Non-Capped Services

A basic decisions to be taken in price cap regulation is the selection of which services to regulate. In general, regulators apply price cap regulation to services that are provided on a monopoly or dominant provider basis. The rationale for price regulation is discussed in Appendix B of the Handbook.

In many markets, the distinction is made between “basic services” which are price-capped, and other services which are not. Services provided in fully competitive markets are normally excluded from price cap plans. There is sometimes a grey line between the categories, and regulators have treated the same types of services differently. Table 4-7 and Table 4-8 describe the types of services covered by price cap plans in the same jurisdictions as in Table 4-4 and Table 4-5 around the world.

Services are sometimes included in price cap baskets to promote competition and to protect consumers. An example is the case of interconnection charges. Interconnection access charges can be included under a global price cap that could incorporate consumer “retail” and access “wholesale” services. This would make it possible for expected productivity gains in the provision of access services to be passed on to competitors and be

ultimately reflected in retail prices. Access services can also be placed in a separate basket from retail services to prevent the dominant supplier from “price squeezing” its competitors through its control of both retail and wholesale pricing.

4.3.7 Service Baskets

Having selected the services to be included in price cap regulation, the structure of the price cap plan should be determined. One of the features of price cap regulation is that the regulated operator maintains some pricing flexibility. This flexibility is particularly important when significant rate rebalancing is required within the price cap plan. It is also important when the operator is facing competition and must respond quickly to competitive price challenges. Nevertheless, there are a number of reasons for the regulator to restrict pricing flexibility.

One reason is to restrict the operator’s ability to engage in inappropriate cross-subsidization. Such a restriction can be implemented through the creation of groups of services, or service baskets, within the price cap plan. An example of how service baskets constrain flexibility is provided in Box 4-9.

It is common practice to place capped services in more than one basket. For example, Figure 4-3 and

Table 4-7: Service Coverage of Selected National Price Cap Regulation Plans

Country	Service Coverage
Argentina	Basic services
Australia	Basic and mobile services
Canada	Basic local services
Chile	Local and access services
Colombia	Local services
Denmark	Basic and ISDN services
France	Basic services
Ireland	Basic and ISDN Services
Mexico	Basic services
Portugal	Basic and leased line services
UK	Basic residential services
US	Interstate access services

Table 4-8: Service Coverage of Selected Price Cap Regulation Schemes in US

State	Service Coverage
Connecticut	Basic and non-competitive services
Delaware	Basic services
Georgia	Basic and other services
Illinois	Non-competitive services*
Maine	All services
Massachusetts	Non-competitive services*
Michigan	Non-competitive services
New York	Basic services
North Carolina	Basic services
Ohio	Basic Services*
Rhode Island	Basic services
Wisconsin	Basic and other services

Note: * excludes basic residential services

Figure 4-4 illustrate the service baskets for the Telecom Australia price cap plan. Different types of services are grouped in different baskets, and services with common characteristics are grouped within a single basket.

Many regulators have established different “sub-caps” on different baskets. In effect, these basket-pricing restrictions are used by regulators to further constrain the pricing flexibility of the operator. For instance, in Figure 4-4, subscription services would be subject to the CPI-2% sub-cap of its service basket and also to the overall price cap of CPI-5.5%.

The assignment to baskets is intended to replicate the effects of competition. The following are general criteria for assigning capped services into service baskets:

- degree of competition in each service basket;
- homogeneity of services (including similarity in demand price elasticities); and

- degree of substitutability of each service.

4.3.8 Individual Service Pricing Restrictions

Restrictions can be placed on the relative and/or absolute movement of prices of individual services, as well as on service baskets. This may be done, for example, if the regulator is concerned that the residential subscription rate may rise too quickly as a result of rate rebalancing.

The maximum allowable price increase for individual services will be inversely proportional to the weight of the individual service within the services basket. As a result, the price for services with relatively small weights could increase significantly if the allowed increase were channelled towards one of these services and there were smaller compensating decreases in charges for services with relatively larger weights. Conversely, a service with a relatively heavy weight within the proposed services basket would be subject to only moderate price increases if the allowed increase were channelled to

this service, even though compensating decreases were made in services with relatively smaller weights.

There are two alternatives to individual restrictions, each of which may be applied to restrict the decreases and/or increases in prices.

One of these methods, commonly referred to as “banding”, limits the price movement of specific services relative to another variable, usually the inflation factor. For instance, if the regulator is concerned about increases in the residential subscription price, an upper restriction could provide that the price could not increase at a rate greater than the inflation factor plus 5% (CPI + 5). If the X-factor has been set at 4% and the corresponding I-factor was 7%, the weighted average of prices could increase by approximately 3% (7% - 4%). The residential subscription price, however, could increase up to a maximum of approximately 12% (7% + 5%). This is an example of a relative restriction. In the case of Telecom Australia provided in Figure 4-3, the residential subscription and local calls are subject to an individual restriction of CPI.

The other type of restriction is absolute. For example, if the regulator is concerned that national long-distance rates may decline too quickly, a downwards restriction could provide that the average price of these calls should not decrease by more than 20% per year.

It is generally considered that relative restrictions are preferable to absolute ones because they provide the regulator with greater certainty as to the movement of the real (inflation-adjusted) prices of the services.

Restrictions may be upwards or downwards, but do not necessarily have to be symmetrical. For example, if access prices are included in the price cap, they could be subject to relative restrictions with upward and downward bounds (e.g. inflation factor $\pm 5\%$).

Restrictions on the regulated operator’s pricing flexibility have been implemented by most regulators. Care must be taken to design restrictions that are internally consistent and do not unduly constrain the operator. Judgment is required to set restrictions that

provide sufficient flexibility to permit necessary rate rebalancing, while protecting consumers from excessive rate increases and competitors from anti-competitive subsidization. Too many restrictions on prices will eliminate pricing flexibility, one of the main benefits of price cap regulations.

4.3.9 Duration and Review of Price Cap Plans

The longer the term of a price cap plan, the stronger the incentive for the operator to improve its performance. In theory, the duration of a price cap plan should be indefinite, so that the regulator would not intervene in the setting of future prices.

In practice, however, this type of price cap regime is neither feasible nor desirable. A regulator cannot estimate future productivity growth with certainty; nor can it set the X-factor at the right level for an indefinite period. With the X-factor set imperfectly,

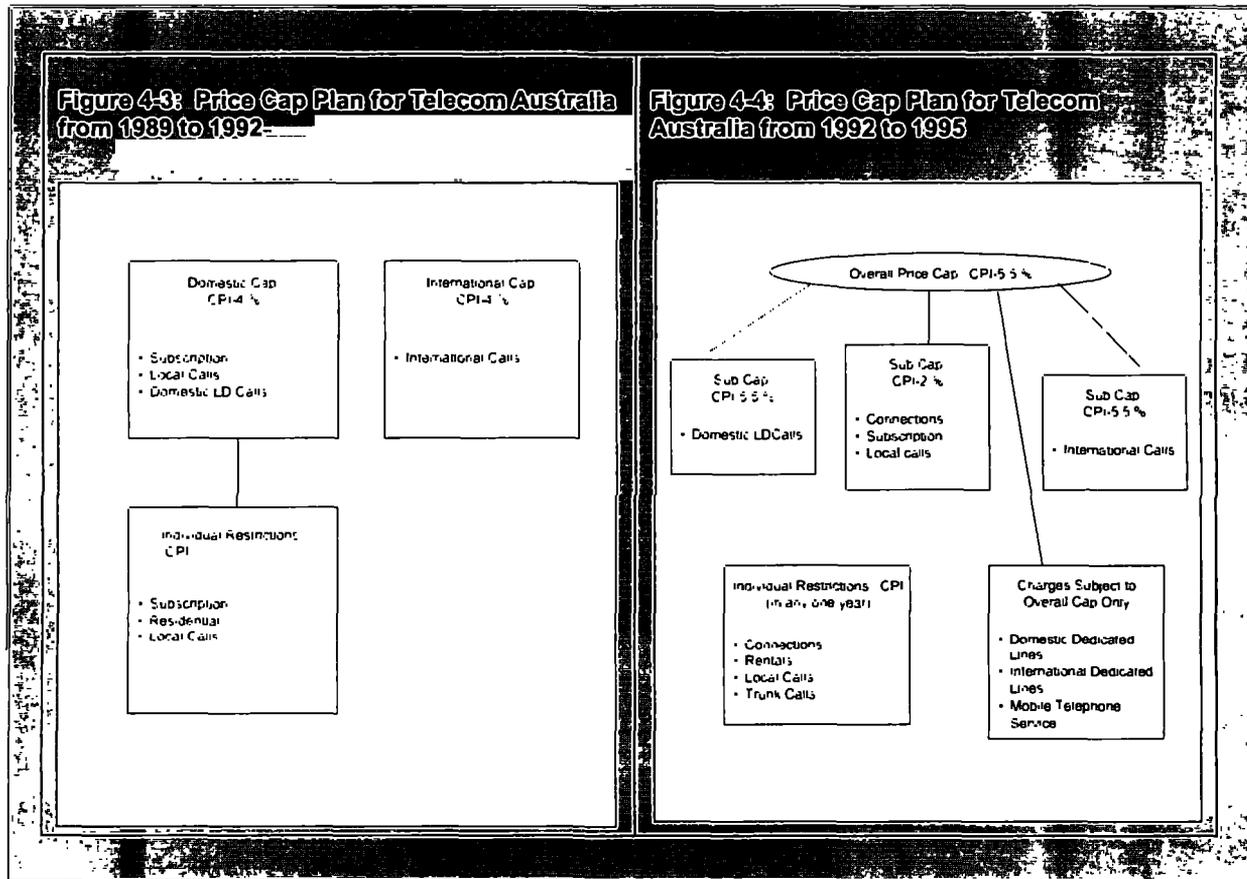
Box 4-9: How Service Baskets Constrain Price Flexibility - Example

Assume a one-basket price cap plan. It includes international services and residential subscription services. Assume both have the same weight in the price cap index. Holding all other prices constant, a decrease in domestic long distance prices (say 30%) can be offset by a significant increase (also 30%, assuming the same revenue weights) in the residential subscription rates

To constrain this type of offsetting rate rebalancing, residential subscription services and international services can be placed in separate baskets. If this were done, price decreases in one service cannot be offset by equivalent increases in the price of other services.

In practice, of course, regulators should not constrain operators from implementing necessary rate rebalancing. Individual price constraints or bands can be used to limit price increases to particularly sensitive services, with less impact on the overall pricing flexibility of operators.

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the operator would either earn insufficient revenues or unacceptably high profits. Both outcomes are inefficient and unsustainable. As a result, in a real-world price cap plan, the regulator generally sets a minimum period during which the X-factor will not be revised. At the end of the duration period, a review is undertaken. Regulators have typically chosen periods of three to five years.

The duration of the plan should be sufficiently long to allow efficiency incentives to be acted on. However, it should not be so long that market developments undermine the regime. In the Regulatory Benchmarking Section, above, it was suggested that a prudent approach would be to set an initial X-factor conservatively. In such as case, the plan should be reviewed reasonably soon, to minimize the negative impact of miscalculations or errors of judgement in setting the X-factor.

The price cap plan review process should be carefully designed. The key variable that will have to be reviewed, and perhaps reset, is the X-factor. This will be a primary focus of the review. It involves some complex incentive issues for the regulator to grapple with.

If productivity improvements achieved by the operator exceed the X-factor by a substantial amount, the operator will make significant profits. There may be pressure on the regulator to adjust the value of the X-factor upwards. Rate of return or other profit indicators are generally used to reset the X-factor. This review mechanism will reduce the regulated operator's incentive to continue to increase its productivity. The incentives for further efficiency improvements will tend to fall as the review approaches, particularly if the operator knows that any additional cost savings will result in a higher X-factor resulting from the review process. In this

instance, price cap regulation will approximate ROR regulation during the review period. The optimal selection of incentives/disincentives will ultimately be based on regulatory judgement.

The approach to resetting the X-factor will depend on how the regulator evaluates the need for the operator to earn higher profits to increase its ability to attract investment, compared to the consumer benefits of lower prices (operator-consumer equity objective). It will also depend on the relative importance placed on productive and dynamic efficiency. The higher the weight placed on consumer benefits relative to profits in the short term, the more the regulator will tend to reduce future profits by setting a higher X-factor at the time of the review.

4.4 Price Cap Variations

4.4.1 Introduction

This Section considers some of the variations that have been applied to the basic price cap formula. Depending on national telecommunications market conditions, regulators may include some of these variations in their price cap plan.

4.4.2 The Exogenous Factor

As discussed above, the inflation factor is a proxy for the changes in the regulated operator's input prices. There may be instances, however, when the operator faces a significant change in input prices that are outside its control and not captured by the inflation factor. An example is provided in Box 4-10. Regulators must decide whether to include in the price cap formula a cost pass-through variable (also referred to as an "exogenous" variable or "Z-factor") to address this possibility.

The inclusion of a Z-Factor in a price cap formula is not always warranted. Many US state regulators have not included a Z-factor in their price cap plans. They may consider that there are very few truly exogenous events that are not captured in the

Box 4-10: Examples of Unexpected Input Price Change Outside Control of Regulated Operator

An increase in customs duty from 20% to 40% is imposed on imported capital equipment, including telecommunications equipment. The telecommunications operator faces a significant input price increase. Assuming new equipment purchases account for 20% of the annual costs of the operator, the customs increase could increase total costs by 4%. This change may not be fully reflected in the inflation factor. Assuming that new foreign equipment purchases account for 5% of economy-wide costs, an economy-wide inflation index would increase by only 1%. As a result, the operator would have to absorb the remaining 3% increase in its costs.

inflation factor. Most developing country price cap plans do not include a Z-factor. However, the situation may be quite different in emerging markets where significant exogenous events are more common.

If the regulator decides to include a Z-factor adjustment, the amended price cap formula would be as follows:

$$PCI^t = PCI^{t-1} \times (1 + I^t - X \pm Z^t)$$

It should be recognized that the practical application of a Z-factor adjustment could be administratively challenging and a source of controversy. Some of the uncertainty can be eliminated by carefully defining the types of cost changes covered by the Z-factor.

Based on the considerations outlined in Box 4-11, the regulator should define the exogenous factor to promote certainty in price regulation of the sector. In preparing this definition, the criteria should be general enough to capture the impact of certain events without diminishing the operator's incentive to control its costs.

Box 4-11: What are Exogenous Cost Changes?

The following considerations are relevant in determining which cost increases may be covered by a Z-factor:

- Generally, *legislative, judicial or administrative actions that have a significant impact* on the regulated operator should be considered. Such actions are usually beyond the control of the operator. With respect to "significant", there may be an advantage to setting a threshold below which adjustments would not be considered. A threshold in the range of 1% to 2% of revenues may be reasonable.
- Regulators should only consider *events that do not represent normal business risk*. In assessing whether costs should be included in a Z-factor, the regulator should consider whether the operator can take reasonable measures to mitigate the consequences of the cost-producing events.
- The Z-factor costs should not otherwise be reflected in the price cap formula and must be such that they have specific or disproportionate impact on the operator. The burden of proof should be on the operator to show that the proposed event is not already accounted for in the inflation factor and would be reflected in prices charged by operators operating in competitive markets.
- Events, such as an economic downturn, that affect the whole economy would generally not be considered to produce exogenous cost increases eligible for Z-factor treatment. While such events may have a negative impact on the demand for the operator's services, and decrease its ability to recover costs, the purpose of the Z-factor is not to guarantee a rate of return for the operator. Such a guarantee would not be consistent with the objective of using price cap regulation as a proxy for competitive market conditions.
- *Z-factor costs should be quantifiable and known*. The operator must be able to estimate the specific costs in monetary terms.

In theory, the impact of the exogenous event should be allocated across capped and uncapped services, with only the impact allocated to capped services being included in the price cap formula. In practice, the regulator could use revenue shares or other weights to allocate the impact to capped services only.

Generally, the regulator will design the exogenous factor so that the regulated operator must request the inclusion of exogenous cost changes in the price cap formula. The onus is placed on the operator to take action in the matter. The regulator only has to decide on the issue if and when there is an application before it.

An exogenous event may increase or decrease the costs of the operator. It will be in the interest of the

operator to request the consideration of an event that has increased its costs. Where an event has decreased the operator's costs, however, the operator has no incentive to request consideration. If a Z-factor exists, the regulator will likely have to ensure that savings are passed on to consumers.

4.4.3 Quality of Service

Like other services, telecommunications services have a quality component and a price component. In theory, a telecommunications operator subject to price cap regulation could increase profit by lowering the quality of its service. This prospect is of most concern when the operator is a monopolist, or is dominant so that its service levels are not subject to effective competitive pressure from other operators.

Table 4-9: Q-Factor Example –Rhode Island Scheme

The price regulation plan for the incumbent operator in Rhode Island, NYNEX, includes a Service Quality Adjustment Factor "SQAF". It was added to the basic price cap formula in the following manner

$$PCI^t = PCI^{t-1} \times (1 + I^t - X \pm SQAF^t)$$

Each month, NYNEX provides reports to the regulator on QoS performance. As illustrated in the table below, the maximum value for the Service Quality Index (SQI) is 42. The regulator has determined that a passing monthly score is 25. The price cap formula is adjusted once a year. At that time, for each of the 12 most recently measured months that NYNEX has not achieved a passing score in the SQI, the SQAF will be increased by .0417%. Hence, if NYNEX does not receive a passing score in 6 months, the SQAF will take the value of 0.25%, and prices must be decreased by that amount in the next period to compensate for poor QoS performance.

	Nynex Performance	Points
New Installations orders not completed within 5 working days (%)	<12	2
	12.0-13.99	1
	≥14.0	0
Installation appointments missed (%)	< 2.5	2
	2.5 – 3.49	1
	≥3.5	0
Line out of service > 24 hours (%)	< 40	4
	40 – 44.99	2
	≥45	0
Repeat repair reports (%)	< 11	2
	11.0 – 13.99	1
	≥14	0
Repair service answer time (sec.)	< 14.0	4
	14.0 – 16.99	2
	≥17	0
Directory assistance answer time (sec.)	< 4.0	2
	4.0 – 5.99	1
	≥6.0	0
Average duration time – special access 1.5 Mbps Circuits (hours)	< 2.5	2
	2.5 – 4.49	1
	≥4.49	0
Sub-total (maximum available)		22
Customer trouble reports per 100 lines per central office (CO)	< 4.0	2
	4.0 – 4.99	1
	≥5	0
Sub-total (maximum available assuming 10 CO's reviewed)		20
TOTAL POSSIBLE POINTS/MONTH		42

Price Regulation

Telecommunications Quality of Service (QoS) has many aspects. It has traditionally been measured by a number of QoS indicators, such as:

- > Call Completion Rate
- > Dial Tone Delay
- > Delivery Precision
- > Call Failure Rate
- > Fault Clearance
- > Complaints
- > Billing Accuracy.

If a regulator decides to regulate QoS of an operator subject to price cap regulation, it can adopt several approaches. The traditional approach is to set a series of QoS targets or standards for each indicator. Sub-standard performance can be dealt with on a case-by-case basis, or by pre-set sanctions (e.g. monetary fines or penalties payable by the operator).

An innovative approach is to integrate a QoS variable, often referred to as a Q-factor, in the price cap formula. This is a relatively new approach. It is being implemented in a few states of the US. Table 4-9 provides a summary of such an approach in the US State of Rhode Island. A similar approach has also been recently adopted in Colombia at the national level. This approach is consistent with the objectives of incentive regulation. In addition, it has the advantage of directly linking QoS with the price mechanism, thus mimicking the quality/price trade-off in competitive markets. The following formula illustrates how a Q-factor fits into the basic price cap formula:

$$PCI^t = PCI^{t-1} \times (1 + I^t - X \pm Q^t)$$

The objective of including a Q-factor is that a reduction in quality should result in lower prices for consumers. Conversely, increased quality may lead to higher prices. If there is concern that quality may drop to unacceptable levels, the regulator may set

minimum quality standards similar to minimum price floors. It should be recognized that the incorporation of a Q-factor can be complex and administratively challenging. Few regulators have integrated QoS and price cap regulation in this manner.

4.4.4 New Services

A key objective of telecommunications sector reform is to promote innovation, particularly in the introduction of new services. The regulator must determine whether or not to subject new services to price regulation. If the decision is affirmative, price cap regulation is sufficiently flexible to accommodate most new services.

In markets that are subject to competition, many regulators have concluded that it is not in the public interest to regulate most new services. Such decisions provide an additional incentive for operators to introduce innovative services; mobile services are a common example.

Where such a decision is taken, it is important for the regulator to ensure that a regulated operator's "new" service is truly new. Operators will have an incentive to try to repackage existing services as "new" services in order to avoid price regulation. To avoid confusion in the industry, the regulator may want to consider publishing a definition of a new service based on the criteria, such as the following:

- > Does the new service include a new technology or functional capability?
- > Does the new service replace an existing service and consequently not expand the range of services available?

4.4.5 Rate Rebalancing and Price Caps

Rate or price rebalancing is discussed in Section 4.1.2 and in Appendix 4.2. It refers to the adjustment of price levels for different services to more closely reflect the costs of providing each service. Rebalancing can be achieved under most forms of price regulation.

A regulator that implements a price cap plan should consider including a transitional period for rate rebalancing, either before the plan comes into effect or as part of the plan. The transition period should be kept as short as possible and, depending on the level of price-cost imbalances, should not last more than 5 to 7 years. This will ensure that prices at the beginning of a price cap plan are more in line with costs than they would be without a transition period. In a number of countries, regulators have allowed the regulated operators a period of several years to

achieve limited rebalancing. This decision is based on the conviction that the benefits of price cap regulation are greater when prices are balanced. Rebalanced prices are clearly closer to those found in a competitive market.

A new regulator will likely be confronted with the necessity to rebalance prices and to introduce a form of price regulation for the first time. Given the benefits of rebalancing and price cap regulation, neither should be delayed. Hence, there may be no opportunity to attain any significant rebalancing prior to the implementation of price cap regulation. It will have to be done as part of a price cap plan. The regulator may prescribe the specific targets or target ranges for some or all prices for regulated services. Some regulators have only specified end-of-period targets while others have also specified intermediate targets. In this manner the regulator may be sure that over the transition period the operator will move prices in the desired direction. If this is done, the operator should be given sufficient pricing flexibility to achieve rebalancing.

Establishing a transition period for rebalancing before a price cap plan is implemented is only a practical option when there is another form of price regulation in place. In Canada, the incumbent operators were subject to ROR regulation during the transition period. Clearly, where the operator is a privately-owned monopoly or dominant operator, some form of price regulation is preferable to none at all. In countries where price cap regulation is the first form of price regulation to be introduced, the more desirable option will be to undertake rate rebalancing within a price regulation regime.

4.4.6 International Accounting Rates

Technological developments and the liberalization of telecommunications markets have put downward pressure on international accounting rates. Accounting rates are the charges payable to inter-connecting international operators under traditional settlement arrangements for mutual termination of traffic between their networks. In most countries, during the last few decades of the 20th Century, the level of accounting rates was well above the cost of providing international service termination.

Profits from high accounting rates provided a significant source of cross-subsidies, particularly to developing countries. It also led to a major imbalance in payment of accounting rates from countries that originated more calls than they terminated. There has been strong pressure from the US and other countries with outbound accounting rate imbalances to reduce accounting rates. This pressure, the ITU response, international service competition and technological developments have all led to significant decreases in accounting rates.

One recent technological development that undermines the accounting rate regime is Internet telephony, also referred to as "Voice over the Internet", or "voice over IP" (VoIP) technology. Internet telephony generally bypasses the accounting rate regime, and hence allows VoIP providers to price their services below those of operators of conventional PSTN networks.

The downward trend in international accounting rates can be seen as an international form of rate rebalancing - between international and national service. Operators in a large number of countries will need to increase revenues from national services to offset potential losses from international settlements.

The demand for international calling is generally considered to be price elastic, especially at higher prices. Reductions in international rates will therefore usually lead to increases in international calling. Local access and calling, on the other hand, are generally less price elastic. The result of this rebalancing could therefore be higher overall revenues for operators providing both services.

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The need to rebalance international and national rates has important implications for price cap regulation. For many countries, a significant amount of rate rebalancing may be both desirable and necessary. Accordingly, pricing restrictions should not deprive the operator of sufficient pricing flexibility to

implement rebalancing. The potential volatility of international prices and uncertainty of customer response, may make it beneficial for the regulator to implement a fixed-weights scheme for the price cap formula, at least until the majority of the rebalancing has occurred.

Appendix 4-1: OECD Rate Rebalancing

This appendix provides an overview of the OECD tariff comparison methodology and recent analysis of rate rebalancing trends in the OECD member countries.

Figure 4-5 and Figure 4-6 show the most recent Business and Residential Tariff basket comparisons for OECD member countries. Note that these baskets are based on standard listed prices rather than the myriad of discount schemes generally available in competitive markets.

In its 1999 publication, *Communications Outlook*, the OECD noted significant rate rebalancing in its 29 member countries. For instance, it noted a major trend towards postalized rates at the national level. Postalization is the term given for the trend towards flat rates for long distance services regardless of the distance. In other words, long distance service is heading for a world where, like postal services, it is usually priced the same irrespective of distance. This has been referred to in the industry as “the death of distance.”

For instance, Figure 4-7 shows the difference between the cost of long distance calls and a local call (3 km) between 1990 and 1998. In 1990, the average price of a call at 490 km was 20 times

greater than a local call at 3 km. In 1998, the margin was reduced to about seven times.

There are a number of reasons for postalized rates. Incumbent operators typically tend to reduce the number of long-distance bands in response to competitive entry. Another reason is the prevalence of discount plans that require consumers to sign up to a specific operator, often having to pay a fee. In return, loyal consumers receive significant savings over standard listed prices. Figure 4-1 in the main text of this Module indicates that rate rebalancing is also evident in the price trends of calls at different distances.

Rebalancing has been slower for the residential basket, as shown in Figure 4-8, than the business basket, which is illustrated in Figure 4-2 in the main text of this Module. When rate rebalancing occurred in 1994, however, significant cost savings for both residential and business consumers were realized. Fixed charges are now slightly lower than in 1990. Combined with usage charge reductions in the order of 25%, the overall price of the basket has been reduced by nearly 15%. Note that overall teledensity in the OECD countries has increased steadily, despite rebalancing.

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Box 4-12: OECD Tariff Comparison Methodology

In 1990, the OECD established a harmonized methodology that enables international comparisons of national telecommunications prices, using a basket of the different elements for a particular service. This comparison can be made across countries and across time.

In recognition of the calling patterns and different prices faced by residential and business consumers, the OECD constructed a Residential basket and a Business basket. Each basket is made up of two elements, a fixed charge and a usage charge. The fixed charge covers a one year's subscription with the installation charge discounted over 5 years.

Once the fixed charge is calculated, the usage charge is based on OECD averages for the overall allocation of fixed charges to usage charges. Based on telephone usage patterns, the usage charge can be allocated to national calls. These calls are then priced out for each of the countries to arrive at the monetary amount, which is either expressed in US dollars at prevailing exchange rates or based on purchasing power parity (PPP).

Figure 4-5: OECD Business Tariff Basket

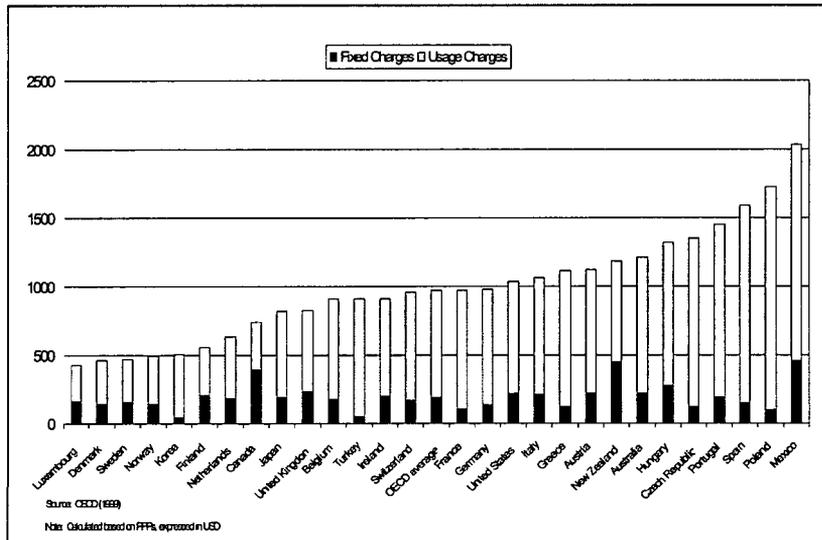
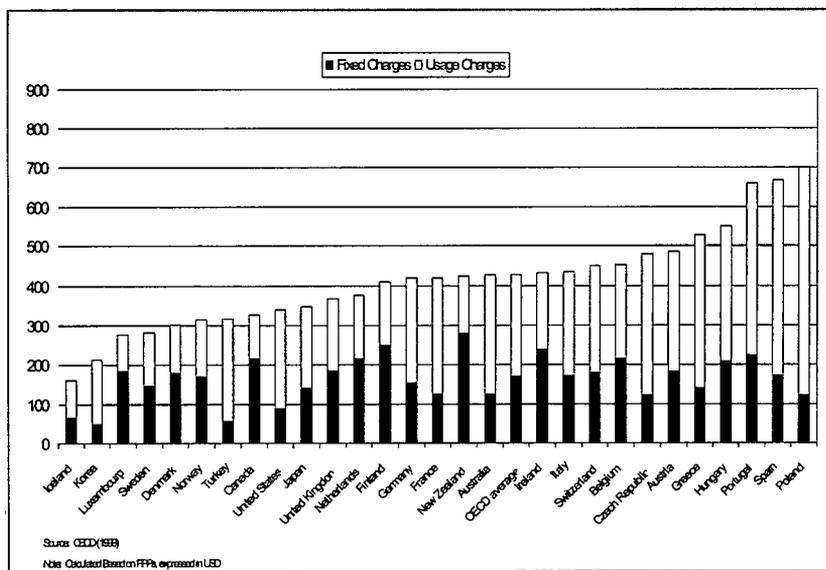
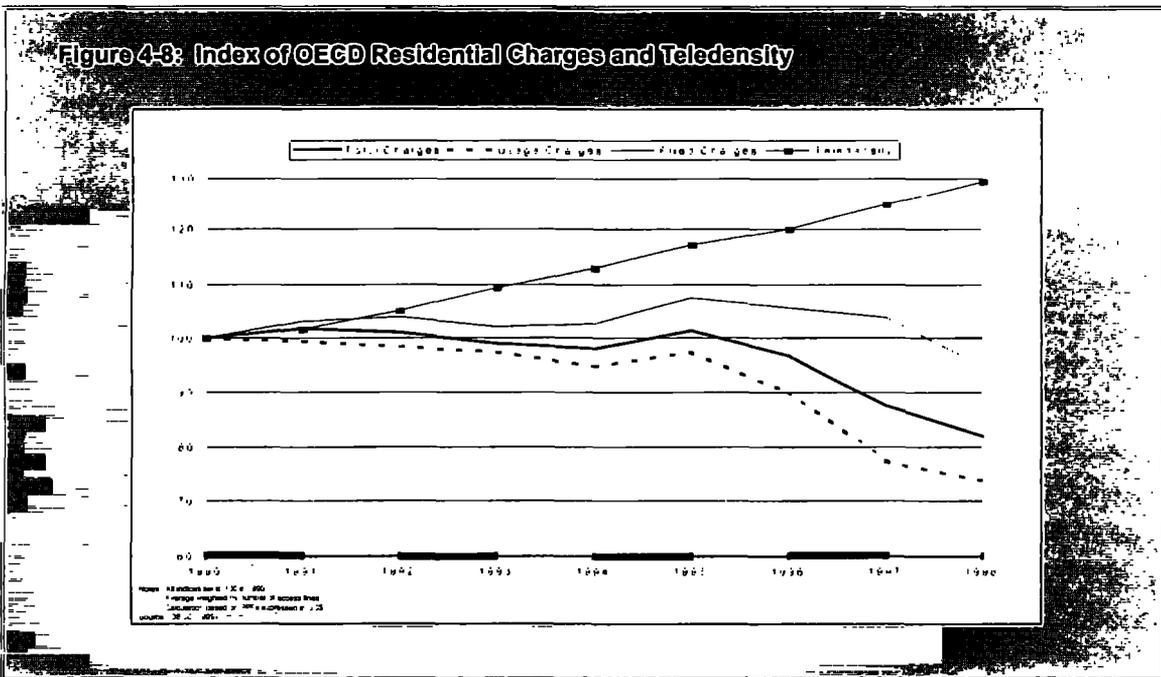
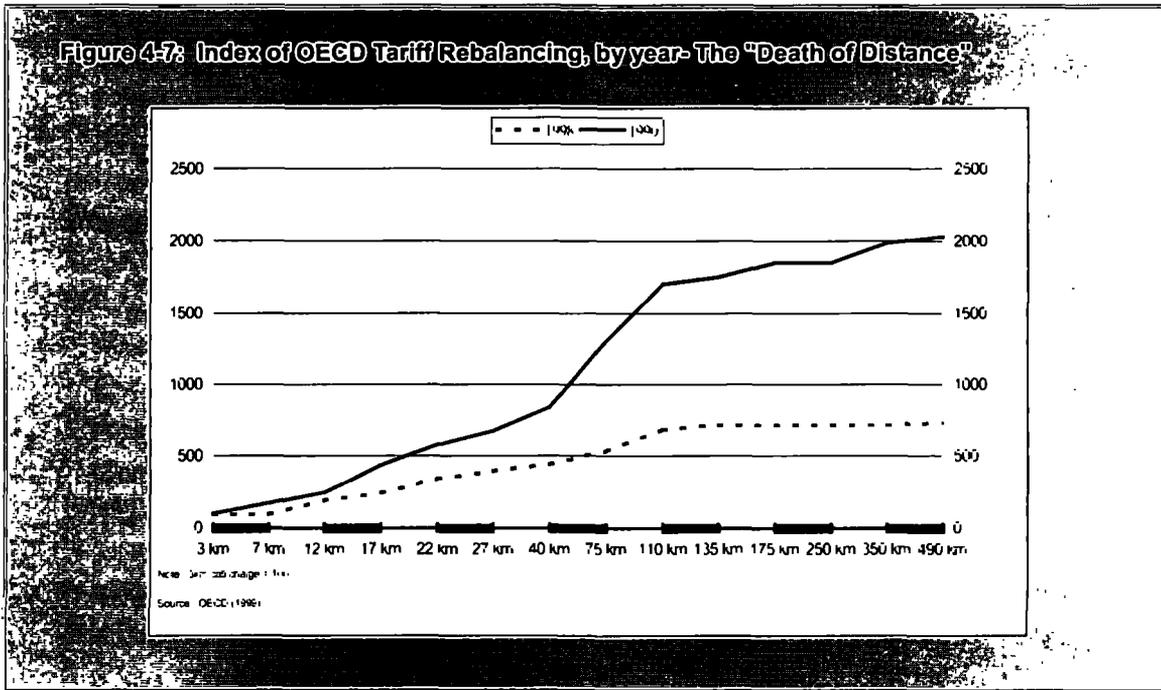


Figure 4-6: OECD Residential Tariff Basket





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Appendix 4-2: Welfare Benefits of Rate Rebalancing

This Appendix provides an overview of the potential benefits to public welfare that may be expected from rate rebalancing.

The OECD study of telecommunications price trends (Appendix 4-1) indicates that rate rebalancing provided most consumers with lower prices in a majority of the countries surveyed. This is not the only benefit of rebalancing. Rate rebalancing will also increase social welfare by moving prices closer to costs. This will provide benefits to the economy in addition to those that result in lower overall prices. Rate rebalancing, therefore, should be undertaken whether competition is being considered or not.

Regulators may be requested to justify rate rebalancing. The recent modelling of rate rebalancing that carried out in Australia may be useful in this regard. The model was prepared for Australia's incumbent operator, Telstra, to estimate the potential efficiency gains from different rebalancing scenarios. Similar analyses have been carried out in other countries. This example uses a number of concepts, including long run incremental costs (LRIC), demand elasticities, revenue requirement, and Ramsey Pricing, which are discussed in Appendix B of the Handbook.

Table 4-10 provides a summary of the main estimates used in the model. By way of explanation, the unit of measurement for access is connections. For local calling, it is number of calls, for long distance and international calling, it is minutes. Net revenue is the difference between price and cost (LRIC) times the quantity. For instance, the net revenue loss for residential access of \$614 million is equal to the difference between price \$139.80 and LRIC \$235.00, times 6.45 million connections. Note that the sum of the net revenue is \$2,909 million, which we later assume to be its net revenue requirement.

The price elasticity of demand was based on a review of available estimates that were considered appropriate for national conditions. With the exception of local calling elasticity, the estimates are within the intervals discussed in the Appendix B of the Handbook.

The concept of efficiency loss requires some explanation. It is based on the theory that marginal cost pricing is optimal, that is, it maximizes the sum of consumer and producer surplus. (This concept is discussed in Appendix B of the Handbook.) When prices do not equal marginal costs, there are efficiency losses because either consumer or producer

Table 4-10: Estimates Used in the Telstra Rate Rebalancing Model - Base Scenario

Markets	Price (\$ per unit)	LRIC (\$ per unit)	Quantity	Net Revenue (\$m)	Efficiency Loss (\$m)	Price Elasticity of Demand
Res. Access	139.80	235.00	6.45m	-614	8	-0.04
Bus. Access	240.00	235.00	2.76m	14	0	-0.00
Local calls	0.232	0.099	11.20b	1492	26	-0.006
Dom. LD calls	0.311	0.124	9.51b	1782	322	-0.60
Intnl. Calls	1.129	0.759	638.00m	236	746	-1.20
Total				2909	402	

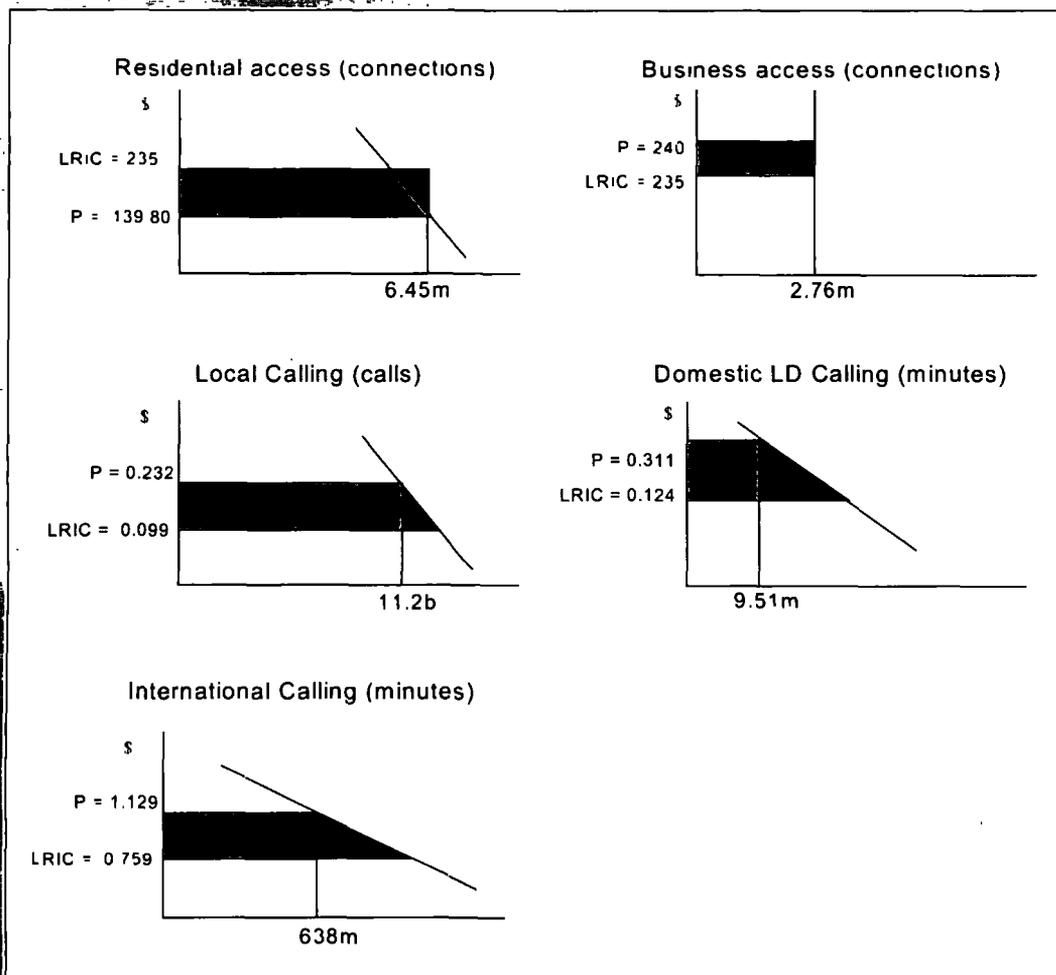
Source: Australia Productivity Centre (1997)

surplus are reduced. Figure 4-9 provides a graphical presentation of the main estimates used in the analysis. The black shaded areas are the efficiency losses associated with each instance of non-marginal cost pricing. Note that efficiency losses increase when the price-cost disparity is greater and when demand is more elastic. (Note the light shaded areas represent net revenues for each service).

\$402 million, or nearly 15% of total operator revenues. Note, however, that while marginal cost pricing will eliminate this loss in economic efficiency, it will not meet Telstra's net revenue requirement, which is assumed to be equal to \$2,909 million. As discussed in Appendix B of the Handbook, the solution to this dilemma is to calculate the corresponding Ramsey prices, that is, the set of prices that minimize efficiency losses and meet the revenue requirement.

The price-cost gap at initial conditions (the base scenario) imposes a loss in economic efficiency of

Figure 4-9: Rate/Rebalancing - Base Scenario



Note: Figures are not to scale.

Source: Australia Productivity Centre (1997).

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Table 4-11 presents the results of five rebalancing scenarios, with the corresponding net revenue contribution and efficiency losses, and contrasts these to the base scenario.

Scenario #1, which totally eliminates the efficiency loss, would appear to be an extreme case. Ramsey prices call for the highest price over cost mark-up for the least price-sensitive service. In this instance, business access price is raised to \$1,287 and contributes the entire net revenue of \$2,909 million because it has an estimated zero price elasticity.

Scenario #2 holds the business access price to \$350 and calculates the constrained Ramsey prices. Scenarios #3, #4, and #5 are other permutations that put further constraints on prices. Note that the more constraints that are placed on Ramsey prices, the smaller the efficiency gains. Note also, however, that even modest price movements towards LRIC can result in significant efficiency gains. These gains are likely to be greater in developing countries because of the generally greater disparity between prices and costs.

Table 4-11: Results of Rate Rebalancing Scenarios

	Variable	Residential Access	Business Access	Local Calls	Domestic LD Calls	International Calls	Total
Scenarios	LRIC \$	235.00	235.00	0.099	0.124	0.759	
Base Scenario	Price (\$)	139.80	240.00	0.232	0.311	1.129	
	Net. rev (\$m)	-614	14	1492	1782	236	2909
	Eff. Loss (\$m)	8	0	26	322	46	402
Scenario 1: Unconstrained Ramsey Pricing	Price (\$)	235.00	1287.00	0.099	0.124	0.759	
	Net. rev (\$m)	0	2909	0	0	0	2909
	Eff. Loss (\$m)	0	0	0	0	0	0
Scenario 2: Constrained Ramsey Prices	Price (\$)	354.00	350.00	0.235	0.148	0.804	
	Net. rev (\$m)	723	318	1529	301	38	2909
	Eff. Loss (\$m)	13	0	27	5	0	45
Scenario 3: Constrained Ramsey Prices	Price (\$)	235.00	350.00	0.291	0.158	0.822	
	Net. rev (\$m)	0	318	2120	418	53	2909
	Eff. Loss (\$m)	0	0	54	10	1	65
Scenario 4: Constrained Ramsey Prices	Price (\$)	235.00	350.00	0.232	0.209	0.919	
	Net. rev (\$m)	0	318	1492	975	124	2909
	Eff. Loss (\$m)	0	0	26	67	8	101
Scenario 5: Constrained Ramsey prices	Price (\$)	140.00	350.00	0.232	0.272	1.036	
	Net. rev (\$m)	-614	318	1492	1520	194	2909
	Eff. Loss (\$m)	8	0	26	203	25	262

Source: Australian Productivity Centre (1997)

MODULE 5

Competition Policy

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MODULE 5

COMPETITION POLICY

5.1 General Principles

5.1.1 The Rationale for Competition Policy

When competition exists in market-based economies, two or more different suppliers contend with each other to sell their goods or services to customers. Competitive suppliers may offer lower prices, more or better quantities, and packages or qualities of service to attract customers. Competition serves the public interest by inducing suppliers to become more efficient and to offer a greater choice of products and services at lower prices.

In a competitive market, individual suppliers lack “market power”. They cannot dictate market terms, but must respond to the rivalry of their competitors in order to stay in business. Market power is generally defined as the power to unilaterally set and maintain prices or other key terms and conditions of sales; that is without reference to the market or to the actions of competitors.

Imperfect Competition

In a perfectly competitive market, there would be little or no reason for government intervention to implement competition policy. Such a market would ideally consist of a large number of suppliers of products or services, as well as a large number of consumers. Consumers would have complete information and freedom to deal with any chosen

supplier. There would be no negative external factors associated with supplier or consumer behaviour. No single supplier would be able to distort the efficient operation of the market, or the setting of prices or supply conditions.

However, no markets are perfectly competitive. Many markets are not truly competitive, but are dominated by a small number of large or well-established firms. Producers or suppliers in such markets often have market power that can be exercised to the detriment of consumer welfare and overall industry performance.

Imperfect competition gives rise to an inefficient allocation of resources. Imperfect competition is an important source of “market failure”. Market failure occurs when resources are misallocated or allocated inefficiently. The result is waste or lost value.

Monopoly

Monopoly can be the result of market failure. A monopolistic market is often associated with excessively high product prices, reduced supply levels or other behaviour that reduces consumer welfare. Collusive agreements among suppliers are another example of market failure. Supplier collusion can be directed to increasing prices or restricting output, behaviour that is similar to the exercise of monopoly power.

Telecommunications has, in most jurisdictions, developed in a monopoly environment. As competition is introduced into telecommunications markets, there are typically concerns about the continuing exercise of market power by the incumbent operator. This exercise of market power constitutes a special form of market failure that must be addressed by regulators and competition authorities in many countries.

5.1.2 Government Intervention to Implement Competition Policy

Objectives

Governments intervene in the operation of a market-based economy for a variety of different reasons. In the case of competition law and policy, the main objectives of government intervention are to respond to market failures, to limit abuses of market power and to improve economic efficiency. This Module will focus on competition laws and policies that are aimed at achieving those objectives.

Public intervention can have other objectives. For example, a government may adopt rules and policies that limit the participation of foreign capital or companies in order to create or cultivate a domestic industry. Such intervention may deliberately limit competition and compromise economic efficiency in favour of other public interests.

There is a long history of government intervention to preserve and stimulate the operations of competitive markets. Many useful precedents for competition policy have developed in the US, where the term "antitrust policy" is used to refer to what is often called "competition policy" in other countries. This term "antitrust" comes from an old form of anti-competitive conduct once engaged in by the owners of different companies that had the power to jointly dominate a market (e.g. steel or rail transport). These owners delivered the majority of their shares to a central body, which would hold the shares "in trust" for the owners. The trust's control of the shares was then used to direct the actions of the different companies. The objectives of such joint direction included raising prices across the industry, restricting supply and otherwise acting to reduce competition.

Types of Government Intervention

Competition policy is generally applied through two different types of government intervention.

The first type is behavioural. In this type of intervention, a public authority attempts to modify the behaviour of a particular firm or group of firms through regulation of their behaviour. Price regulation is an example of behavioural intervention. Other examples are orders prohibiting collusive practices or agreements, and orders requiring interconnection of competitors' networks.

A second form of intervention is structural. Such intervention affects the market structure of the industry. For example, governments may intervene to prevent a merger of the two major telecom network operators in a market. Similarly, a dominant supplier might be required to separate its operations into distinct corporate entities, or to divest itself of lines of business entirely. The 1984 AT&T divestiture in the United States provides a well-known example of the latter.

Flexibility

Government intervention in markets generally requires flexibility and an ability to tailor rules and principles to specific circumstances. In some instances, competition rules can be formulated as outright prohibitions (for example, against price fixing agreements). In many situations, however, pro-competitive rules are formulated so that there is discretion in their application. For example, price discrimination is not always inappropriate; only anti-competitive or otherwise harmful forms of price discrimination are generally prohibited.

Competition policy is applied to curb abuses of market power and to prevent a powerful firm from forcing competitors out of the market. However, there is a tension between the objective of protecting competition and the more problematic practice of protecting individual competitors. This tension is particularly evident in the regulation of the telecommunications industry during the transition period from the introduction of competition to the time competition becomes self-sustaining.

Competition policies generally have no iron-clad rules that must be rigorously applied in all circumstances. The policies must be applied flexibly to suit the circumstances of different markets.

5.1.3 The Interplay of Competition and Telecommunications Policies

Some countries have both a general competition authority and a sector-specific telecommunications regulator. Where two or more authorities exist, it is important that they not subject an industry to duplicative or inconsistent intervention.

Not all countries have separate telecommunications regulators and competition authorities. For example, New Zealand has long had economy-wide competition law, but no sector-specific regulator. While New Zealand is an anomaly in this regard, other countries have telecommunications sector regulators, but no economy-wide competition law or authority. Some countries have neither. In any case, it is important for those involved in the regulation or supervision of the telecommunications sector to understand and have access to the basic tools provided by competition law and policy.

Sector-Specific Regulators and Competition Authorities

The roles of a sector-specific telecommunications regulator and a general competition law authority can be compared and contrasted in several ways.

Sector-specific regulation typically involves both prospective and retrospective activities. A telecommunications regulator, for example, will often render decisions that establish conditions for firms participating in telecommunications service markets, such as the approval of prices or the terms and conditions for interconnection between operators. Such conditions have forward-looking application. Telecommunications regulators are also typically authorized to respond to particular complaints, or to remedy existing or past behaviour which contravenes telecommunications policies or laws. Competition authorities, by contrast, tend to exercise their powers on a retrospective basis and with a view to correcting problems which result from actions by particular firms that harm competition.

The types of policies typically adopted by sector-specific regulators can also be contrasted with those of competition authorities. Sector-specific regulation is often unrelated to (and even inconsistent with) the key competition policy goals of facilitating competition and improving economic efficiency. Competition policy is typically directed at preventing market participants from interfering with the operation of competitive markets. Traditional telecommunications regulation, on the other hand, often manipulated competitive market circumstances to achieve other public goals.

An example is the prices approved by telecommunications regulators. Most regulators traditionally supported price structures that were very different from prices that would prevail in a competitive market. Telecommunications regulators often supported such price structures in an effort to increase availability of basic telecommunications services. Examples include various types of cross-subsidization: local service by long distance services, residential subscribers by business subscribers and rural subscribers by urban subscribers. These price structures were typically developed in a period of public monopoly supply. These structures are not sustainable in a competitive market. They require adjustment as competition develops. (See Module 4 for a further discussion of telecommunications pricing.) Table 5-1 sets out the typical difference between a competition authority and sector-specific regulator.

Rationale for a Telecommunications Sector Regulator

An industry-wide competition authority may play a useful role in overseeing the telecommunications industry. However, there are good reasons to establish and retain telecommunications sector-specific regulation, at least until the relevant markets are reasonably competitive. These reasons include:

- > the need for sector-specific technical expertise to deal with some key issues in the transition from monopoly to competition (e.g. network interconnection, anti-competitive cross-subsidization);
- > the need for advance rules to clearly define an environment conducive to the emergence of competition, and not just retrospectively apply

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- remedies to "punish" anti-competitive behaviour or restructure the industry;
- the need to apply policies, other than competition-related policies, that are perceived important by national governments (e.g. universal service policies, national security and control policies); and
- the need for ongoing supervision and decisions on issues such as interconnection, quality of service, and the establishment and enforcement of licence conditions, particularly for dominant operators.

These factors, among others, suggest that, even where an economy-wide competition authority exists, a telecommunications regulator can play an important role.

- As a separate matter, it may be efficient to combine, in a single entity, the regulation of the telecommunications sector and other sectors, such as pipelines, electrical power, commercial water supply, etc. The advantages and disadvantages of such a multi-sectoral regulator are discussed in Module 1.

Implementation of Competition Policy by Telecommunications Regulators

Telecommunications sector regulators often apply competition law or policy in carrying out their mandates. Four examples from the UK, Malaysia, Canada and Australia are set out below.

Table 5-1: Typical Differences Between a Competition Authority and a Sector-Specific Regulator

Feature	Competition Authority	Sector-Specific Regulation
Timing/Process	<ul style="list-style-type: none"> ➤ Typically applies remedies retrospectively (i.e. after the fact) ➤ Specific complaint or investigation driven ➤ Formal investigative, other procedures ➤ Narrow scope for public intervention 	<ul style="list-style-type: none"> ➤ Prospective as well as retrospective ➤ Decisions or other processes of general application, as well as specific issue proceedings ➤ Mix of formal and less formal procedures ➤ Typically broader scope for public intervention
Policy Focus	<ul style="list-style-type: none"> ➤ Objective to reduce conduct which impedes competition ➤ Focus on allocative efficiency/preventing abuse of market power or other misconduct 	<ul style="list-style-type: none"> ➤ Typically applies multiple policy objectives ➤ Traditional (monopoly) regulation likely to pursue social objectives other than allocative efficiency (universal service for example) ➤ Transitional regulation may focus on preventing anti-competitive behaviour as market becomes competitive; (ultimately, forbearing from regulation may be a policy objective as competition becomes sufficient to protect public)
Scope	<ul style="list-style-type: none"> ➤ Economy wide, multiple industries ➤ Powers of intervention and remedies tend to be narrowly defined. 	<ul style="list-style-type: none"> ➤ Usually industry-specific (usually develops greater sectoral expertise) ➤ Powers tend to be more broadly defined (correspond to breadth of policy objectives and procedures).

United Kingdom

In the UK, Ofcom has concurrent authority to deal with matters arising under the *Competition Act*. Ofcom must co-ordinate its efforts with the Director General of Fair Trading, who is primarily responsible for enforcing the *Competition Act*. Ofcom has also been responsible for enforcing the Fair Trading Conditions of U.K. telecommunications licensees, including BT.

Ofcom has published *Guidelines on the Application of the Competition Act in the Telecommunications Sector*. The guidelines address subjects such as market definition, measures of market power and the assessment of individual agreements and conduct. The guidelines reference conventional approaches to competition rules from a number of sources and jurisdictions, and anticipate how these standard tools will be applied in the telecommunications sector.

Malaysia

The Malaysian Communications and Multimedia Commission has prepared similar guidelines. These indicate how the Commission will apply competition law concepts such as “substantial lessening of competition” and “dominant position” in exercising its authority under the *Malaysian Communications and Multimedia Act 1998*. The guidelines identify the concepts and analytical processes that the Commission will use in evaluating certain conduct. The guidelines borrow conventional tools and concepts from competition theory and indicate how they will be applied in the context of the domestic telecommunications industry.

Box 5-1 sets out the Malaysian Commission’s proposed analytical process for evaluating whether particular conduct constitutes a substantial lessening of competition.

Canada

Canadian law provides for changes in the extent of sector-specific telecommunications regulation depending on the level of competition in specific telecommunications markets.

Under the Canadian *Telecommunications Act*, the sector-specific regulator, the CRTC, has a duty to forbear (refrain) from regulation where telecommunications services are subject to sufficient competition to protect the interests of users. Forbearance is also permissible in certain other circumstances. A forbearance order may not be made by the CRTC where such an order would likely impair the establishment or continuance of a competitive market for a service. The Canadian approach to forbearance is described in Box 5-2.

Australia

A more general example of the interplay of competition policy and telecommunications sector regulation can be found in Australia. In July, 1997, the Australian government implemented a package of statutory reforms to both its competition and telecommunications laws. These reforms changed the *Trade Practices Act 1974* (the primary competition law) and introduced a new *Telecommunications Act*.

As a result of these reforms, the Australian Competition and Consumer Commission (ACCC) was given a significantly expanded role in telecommunications regulation. It became responsible for both (1) implementation of competition rules and policies in the telecommunications sector; and (2) economic regulation of telecommunications operators, including the incumbent operator, Telstra.

Box 5-3 provides details on the scope and performance of the telecommunications regulatory responsibilities of the ACCC.

These four examples from the experience of different countries illustrate the overlap of telecommunications and competition policy. The examples indicate how some telecommunications regulators apply standard competition policy and analysis, and how competition authorities must understand sector-specific telecommunications regulation. The competition policy concepts used in these examples are discussed in greater detail below (in Section 5.2).

Box 5-1: Substantial Lessening of Competition: Proposed Malaysia Approach

	Define the Context	Define the Market	Assessment of Conduct
Objective	Ensure that the Commission has appropriate powers to act.	Define the boundaries of the relevant market	Determine whether there is (or may be) a substantial lessening of competition within the relevant market.
Process	<p>Consider which section of the Act the assessment is being made under.</p> <p>Identify the circumstances which initiated the assessment.</p> <p>Identify the key stakeholders in the process.</p>	<p>Identify all demand substitutes for the service.</p> <p>Identify all supply substitutes for the service.</p> <p>Determine the relevant product market.</p> <p>Determine the relevant geographical market.</p> <p>Determine the relevant temporal market.</p>	<p>Assess the likely changes in the degree of competitive rivalry in the absence of Commission intervention in the light of test criteria.</p> <p>Assess the likely changes in the degree of competitive rivalry in the case of Commission intervention in the light of test criteria.</p> <p>Assess the difference in the level of rivalry between the two cases.</p> <p>Assess whether the difference is substantial in the light of the objects of the Act and national policy objectives.</p>

The Regulated Conduct Defence

A final point to consider in the interplay of telecommunications sector regulators and industry-wide competition authorities is the regulated conduct defence. A number of jurisdictions recognize such a defence. The defence can shield regulated firms from the application of competition laws in certain circumstances.

The essence of the defence is that activities that are authorized under a valid scheme of regulation are

deemed to be in the public interest. Where the defence applies, a telecommunications operator that carries on activities authorized by a telecommunications regulator will generally not attract liability under competition laws for those activities. Questions can arise, however, as to whether particular anti-competitive activities were subject to active regulation. For example, competition laws that are generally inapplicable to the activities of regulated telecommunications operators may become applicable where a regulator decides to forbear from regulation.

Box 5-2: Case Study: Canadian (CRTC) Forbearance Analysis

The CRTC may withdraw (“forbear”) from regulation of telecommunications markets or services when there is sufficient competition. In Telecom Decision CRTC 94-19, the CRTC set out the criteria for decisions to forbear from regulation pursuant to Section 34. The criteria for forbearance reflect standard competition policy concepts and principles. They can be summarized as follows:

- The CRTC should forbear from regulation when a market becomes “workably competitive”.
- A market cannot be workably competitive if a dominant firm possesses substantial market power.
- Market power is assessed in terms of three factors:
 - (i) the market share held by the dominant firm;
 - (ii) demand conditions affecting responses by customers to a change in price of the product or service in question; and
 - (iii) supply conditions affecting the ability of other firms in the market to respond to a change in the price of the product or service.
- High market share is a necessary but not a sufficient condition for market power. Other factors must be present to enable a dominant firm to act anti-competitively.

The CRTC’s method of assessing market competitiveness begins with a definition of the “relevant market”. The CRTC defines the relevant market as “the smallest group of products and geographic area in which a firm with market power can profitably impose a sustainable price increase”

The CRTC then proceeds to an assessment of the market share held by the largest and other firms in the relevant market. In addition to an assessment of market share, the CRTC assesses other aspects of market power, including the availability of substitutes, whether a particular product or service is an essential input or bottleneck and the extent of barriers to entry. Among the other indicators of competition highlighted by the CRTC is evidence of rivalrous behaviour (price competition and effective marketing activities for example).

The CRTC decided in Decision 94-19 to refrain from regulating the sale, lease and maintenance of certain forms of customer premises equipment. The CRTC subsequently applied Section 34 to forbear from the regulation of a number of other services, including wireless services, services provided by non-dominant long distance operators and certain of the long distance services provided by the incumbent telephone companies. The CRTC has also forbore from the regulation of other services, including retail services provided by competitive local exchange operators and the supply of retail Internet services.

5.1.4 The Transition from Monopoly to Competition in Telecommunications

An effective competition policy must take into account the specific characteristics of the market to which it is applied. Telecommunications network service markets raise unique challenges for the application of competition policy. These challenges arise from the specific manner in which some incumbent network operators are able to continue to dominate their markets after the introduction of competition.

It is generally desirable to minimize government intervention in competitive markets. However, there is a general consensus that regulatory intervention is required to implement a successful transition from monopoly to competitive telecommunications markets. The introduction of effective competition into telecommunications markets around the world has generally been more difficult and intrusive than in the case of most other markets.

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Box 5-3: Case Study: The Telecommunications Mandate of the Australian Competition and Consumer Commission

The ACCC's telecommunications mandate is performed by the Telecommunications Group, which is considered a part of both the ACCC's Regulatory Affairs Division (for economic regulation) and the Compliance Division (for competition enforcement).

The revised Trade Practices Act 1974 (TPA) includes two parts which address telecommunications matters specifically. Part XIB gives the ACCC authority to issue competition notices in cases of anti-competitive conduct. Competition notices are enforceable in the Federal Court. Part XIB also governs tariff filing and record keeping requirements (the latter reinforce the ACCC's implementation of accounting separation in appropriate cases).

Part XIC of the TPA establishes a framework for access to the networks of competing operators. The ACCC has power to declare a body to be a recognized "telecommunications access forum" or "TAF" (a facilitator of access arrangements); to approve any "access code" prepared by the TAF; to approve "access undertakings" or model terms and conditions submitted by individual operators; and to arbitrate access disputes.

The ACCC has complementary authority under the *Telecommunications Act*, the *Radiocommunication Act 1992* and the *Telstra Act 1991*. Specifically, the ACCC has regulatory authority:

- to oversee the conduct of international telecommunications operators;
- to issue directions on technical issues such as the implementation of number portability and interconnection;
- to arbitrate a range of operator disputes (i.e., in addition to interconnection disputes);
- to administer price regulation, such as price caps, for those services of Telstra which remain subject to price regulation; and
- to assess the acquisition of radio-frequency spectrum by incumbent operators to determine whether such acquisition is likely to have anti-competitive effects.

The ACCC also has authority to monitor telecommunications markets and activity in order to determine whether the general provisions of the TPA should be applied to promote competition and fair trading

Advantages of Incumbent Operators

The nature of telecommunications networks provides strong advantages to well-established network operators. These advantages often call for pro-competitive measures that are relatively unique to the telecommunications sector. Such measures are discussed throughout this Module and in Module 3 – Interconnection. Without such measures, new entrants may never overcome the "incumbency advantages" of established operators. Incumbents in other types of markets (e.g. steel, chemicals, and food products) generally do not enjoy similar advantages and, therefore, those types of markets typically require less detailed sector-specific regulation.

Some major advantages of incumbent operators are listed below. Technical terms used in this list are discussed in greater detail in the following sections of this Module.

Control of Essential Facilities – Incumbent operators often own "essential facilities" that were built and paid for under a regime of government ownership or guaranteed rate-of-return regulation. The concept of essential facilities is discussed in detail in Section 5.2.4 below. In telecommunications network markets, essential facilities may include public rights-of-ways, support structures such as poles and conduits, local loops, telephone numbers and frequency spectrum. New entrants typically require access to these facilities in order for competition to be feasible. Duplication of these

facilities may be either technically difficult, or more often, economically inefficient.

Control of essential facilities can give an incumbent numerous advantages over new entrants, particularly in the absence of strong pro-competitive regulation. For example, an incumbent can use its control over essential facilities to increase a competitor's costs, and make its services less attractive to customers. The competitors' costs can be increased by increased prices of essential facilities. The incumbent may be able to shield its own customers from the impacts of such higher essential facility prices, either by not "charging itself" those price increases, or offsetting them with cross-subsidies from its monopoly or less-competitive services.

An incumbent can also discriminate in the provision of essential facilities to make its competitors' services less attractive to end-customers. In the extreme case, it can simply refuse to supply essential facilities to competitors. It can also discriminate by providing inferior quality essential facilities to competitors, as compared to itself. For example, it can provision local loops to its own customers within a week, but delay provisioning of local loops to customers of competitors for months. Anti-competitive discrimination in the provisioning of essential facilities can take many forms, some of which are difficult to detect.

Economies of Established National Networks – As a related matter, incumbent network operators might enjoy "economies of scale and scope" that cannot be matched by new entrants for many years (or decades). For some network elements (e.g. a national local access (loop) network), the cost of duplicating an incumbent's facility may be prohibitively high. At the same time, the facility may have a large enough capacity that one or more competitors may be able to share use of the facility with the incumbent without imposing any congestion costs.

In addition, many established telecommunications operators have a long history of providing local access service at subsidized rates. This provides the incumbent with advantages in terms of economies of density, scale and scope. In competing for a new customer, an incumbent can often set a relatively low price, which reflects a lower long-run "total-

service" incremental cost than new entrants, and spreads its "joint and common costs" across a large established customer base. A new entrant must often cover a much higher long-run total-service incremental cost, since this must be recovered from a smaller customer base.

Vertical Economies – Many incumbents have "vertically integrated" upstream and downstream production facilities. For example, they may operate local access networks, national long-distance networks and international networks. These incumbents would usually enjoy vertical economies. For example, it is less expensive to co-ordinate local, long distance and international telecommunications within a single firm than through arm's-length negotiations and transactions with different (often competing) operators. Incumbents may also enjoy vertical economies related to integrated network planning, construction, operations (e.g. traffic aggregation) and maintenance.

Control Over Network Standards and Development – An incumbent usually has a significant advantage in that its existing technologies and network architecture have become de facto network standards to which all competitors must adapt their networks. Unless competitors are notified well in advance, the incumbent may obtain a substantial head-start in the deployment of new network services or features that rely on switching, transmission or software upgrades installed by the incumbents.

Cross-subsidies – Incumbent operators are often able to cross-subsidize some services from others. Many different forms of cross-subsidy are possible. In most countries, local access services have traditionally been cross-subsidized by international services. Profits from the latter were used to maintain below-cost tariffs in the former. New entrants typically do not have a similar range of services to cross-subsidize. Some incumbents have engaged in anti-competitive practices by which competitive services (e.g. mobile telephone services or Internet access services) are priced below costs and effectively subsidized by monopoly or less-competitive services, such as international services.

Customer Inertia – Telecommunications network markets are often characterized by a high degree of

customer inertia. New entrants may find it very difficult to persuade customers to switch from an incumbent that has served them for many years. This is particularly true for lower-volume users (e.g. residential customers) when marketing costs and customer-switching costs and inconveniences can be high (e.g. dialing extra digits to reach a new entrant's network, dealing with two telephone bills, changing telephone numbers, etc.). In some cases, incumbents may intentionally take actions to "lock in" their customers, and to make switching to competitors more difficult and costly.

The "natural" advantages of incumbent operators (e.g. economies of scale and scope and customer inertia) can be augmented by anti-competitive conduct on the part of such operators. This is where telecommunications regulators (and competition authorities) often face difficult challenges. Their goal is to promote competition without unfairly "handicapping" incumbents.

Before dealing with specific types of anti-competitive conduct, we will describe some of the basic concepts that are widely used in competition law and policy.

5.2 Basic Concepts of Competition Policy

5.2.1 Market Definition

The definition of a market is a key issue in competition policy and analysis. It is necessary to define a "relevant market" in order to establish whether a firm has a dominant position in that market. Similarly, in analyzing whether a restrictive agreement among firms has an appreciable effect on reducing competition in a market, it is necessary to define the relevant market and then to evaluate the impact of the agreement in that market. Market definition is an initial step in competition analysis. It provides the context in which to evaluate the level of competition and the impact of anti-competitive conduct.

There are two aspects to the definition of a market – the product, including a service, and the geographic area in which the product is sold. In defining the product, close substitutes are normally included. The analysis of substitutability is generally conducted

from the demand side, that is from the perspective of buyers of the product.

For example, the definition of the market for international telephone service in a country could include IP Telephony services that are available through the PSTN, by dialing a specific access number or code. However, the definition would generally exclude "computer-to-computer" IP Telephony services that require special software, computers at both ends of a call, and pre-arranged calling times, etc. to the average buyer of international telephone services, such "computer to computer" services would not be a close substitute for international telephone service.

The Product Market

A widely accepted approach to market definition begins with the assumption that there is a monopolist in the relevant product market. The question is then asked: could the hypothetical monopolist raise the price of the product by a small but significant amount and for a non-transitory period? If a sufficient number of buyers would switch to other products so as to make the price increase unprofitable for the monopolist, those substitutes would be included in a new definition of the market. This analysis will be repeated until the boundaries are set so that substitution does not make the price increase an unprofitable strategy.

The Geographic Market

The second dimension is the definition of the geographic scope of the market. In defining the geographic boundaries of a product market, the aim is to identify the extent to which the proximity of rival suppliers can impose competitive constraints on the hypothetical monopolist or actual market participant. Again, the definition of the geographic scope of the market is based on an assessment of substitutability in response to product price changes.

Geographic areas are more important in defining some telecommunications markets than others. For example, the market for local access in Mumbai is not affected by the degree of competition in the Johannesburg local access market. These are clearly separate markets. However, geography is increasingly less important in defining the level of competition in markets for Internet Service Providers

(ISPs), E-mail providers or even international long distance services. The markets for these products are rapidly becoming global markets. Consider the substitution test described earlier in this Section. It would be difficult, if not impossible, for an E-mail service provider in Mumbai to raise the price of its E-mail service if customers in Mumbai have local access to substitute E-mail service providers (e.g. Hotmail) that are based in other geographic areas.

Having said that, the definition of product and geographic markets remains very relevant for the services that remain most subject to market dominance, particularly local and national long-distance services.

5.2.2 Barriers to Entry

The evaluation of competitive markets and market behaviour often focuses on the extent to which one or more firms can introduce and sustain price increases. If it is easy for a new supplier to enter a market and provide a substitute product, then established suppliers will be reluctant to implement significant long-term price increases. Such price increases would invite market entry, which will increase competition.

The existence of barriers to market entry will limit this competitive response. There are many types of barriers to entry in different markets. Among the most commonly recognized barriers are:

- government restrictions such as monopoly franchises or restrictive licensing practices;
- economies of scale (i.e., where per unit production costs fall as output increases, a large established supplier can produce at a lower per unit cost than new entrants);
- high fixed/capital costs; and
- intellectual property rights such as copyright and patent protection (which may affect the availability to a competing supplier of key inputs or outputs).

Multiple barriers to entry may exist in a single telecommunications market. For example, local networks are typically regarded as being

characterized by economies of scale. The establishment of a local facilities-based network also requires a large investment in fixed costs. Local telecommunications operators often require government licences, which may be granted on an exclusive or otherwise restrictive basis. Entry into wireless local networks is also restricted by spectrum scarcity. Certain local telecommunications services may operate on network platforms which have patent or copyright protection (complicating or preventing the launch of a competing service).

In addition to these barriers to entry, it is also possible for a dominant firm to engage in conduct that establishes additional barriers to entry. Refusal to supply essential facilities and refusal to interconnect networks are two classic examples of anti-competitive conduct that an incumbent operator may engage in to discourage or prevent new entry. These and other examples of anti-competitive conduct are discussed in Section 5.3.

5.2.3 Market Power and Dominance

As a practical matter, most of the concern of competition authorities (and telecommunications regulators promoting competitive markets) is focussed on established telecommunications operators that have market power. Firms without market power are simply not able to cause serious problems in the economy or in the sector. If they raise their prices above market levels, for example, they will simply lose customers and profits.

This Section discusses the related concepts of market power, significant market power and market dominance.

Market Power Defined

In general, market power is defined as the ability of a firm to independently raise prices above market levels for a non-transitory period without losing sales to such a degree as to make this behaviour unprofitable.

Factors frequently considered in determining whether a firm has market power include:

- market share;

- barriers to market entry;
- pricing behaviour;
- profitability; and
- vertical integration.

Market share can be measured in several ways, including monetary value, units of sales, units of production and production capacity. Market share alone can be an inaccurate measure of market power. However, it is unlikely that a firm without significant market share will have sufficient market power to behave anti-competitively on its own. Therefore, market share is usually a starting point in determining market power.

Assessment of barriers to entry is also important. The extent to which established suppliers are constrained by the prospect of new market entry is a key factor in whether the established suppliers have market power.

Pricing and profitability are other factors relevant to a determination of market power. The existence of true price rivalry is inconsistent with a finding of market power. Price competition, which consists of “follow the leader” behaviour is consistent with the exercise of market power by the price leader.

The profitability of existing suppliers in a market can also be indicative of the extent of true price competition. Excessive profitability typically indicates insufficient price competition and the exercise of market power in setting prices.

Finally, vertical integration is relevant to an assessment of whether a firm which enjoys market power in one market is able to extend its power into upstream or downstream markets. In telecommunications, incumbent operators that are vertically integrated (e.g. that provide local access as well as long distance or international services) can often use their market power in the local access market to competitive advantage in the long distance and international markets. They may abuse their market power, for example, by inflating local access prices (including interconnection prices) and using the surplus revenues to subsidize rate cuts to their competitive long distance or international services.

Significant Market Power

A related concept is that of “Significant Market Power” (or SMP). This is a relatively arbitrary measure of market power utilized in European Commission competition analysis. A number of the European Commission’s Open Network Provision (ONP) directives permit the imposition of additional obligations on operators that have SMP. In its July 2000 package of proposed policy reforms, the Commission proposed to change its approach, and to focus more on traditional measures of market dominance. Nevertheless, since the SMP approach is frequently referred to, we will discuss it here.

Article 4 of the European Commission’s *Interconnection Directive* states that “an organization shall be presumed to have significant market power when it has a share of more than 25% of a particular telecommunications market”. The article imposes an obligation on organizations with SMP to “meet all reasonable requests for access to the network including access at points other than the network termination points offered to the majority of end-users”.

The 25% SMP threshold is not fixed in stone. The Directive permits national regulatory authorities to determine that organizations with less than 25% market share have significant market power; and to determine that organizations with market share greater than 25% do not have significant market power. In making such determinations, regulators are directed to take into account factors such as:

- the organization’s ability to influence market conditions;
- turnover relative to the size of the market;
- control of means of access to end-users;
- access to financial resources; and
- experience in providing products and services in the market.

Characterization of an organization as having SMP does not necessarily lead to a finding of market power or dominance on the part of that organization. The SMP designation is simply a trigger for the ap-

plication of additional obligations under the various ONP Directives.

Market Dominance

Market dominance is a more extreme form of market power. The definition of market dominance varies significantly in the laws and jurisprudence of different countries. In general, however, two factors are key in the determination of market dominance. First there must usually be a relatively high market share (usually no less than 35%, often 50% or more). Second, there must normally be significant barriers to entry into the relevant markets occupied by the dominant firm.

Some definitions are more qualitative than quantitative. Consider Box 5-4, which sets out the definition established in European Commission jurisprudence.

Other definitions exist. The U.K. Office of Fair Trading has said that describing an operator as dominant raises the implication that it possesses more market power than any of its competitors. The European Court of Justice has found that there is a presumption of market dominance, in the absence of evidence to the contrary, if a firm has a market share consistently above 50%. As is the case for market power generally, market dominance is not a matter of market share alone. However, some commentators have suggested that a market share in excess of 65% is likely to support a finding of dominance.

5.2.4 Essential Facilities

The concept of essential facilities is important to the application of competition law in the telecommunications sector. In the sector, an essential facility is generally defined as one which has the following characteristics:

- it is supplied on a monopoly basis or is subject to some degree of monopoly control;
- it is required by competitors (e.g. interconnecting operators) in order to compete; and
- it cannot be practically duplicated by competitors for technical or economic reasons.

Box 5-4: Market Dominance: A European Commission Definition

"A position of economic strength enjoyed by an undertaking, which enables it to prevent effective competition being maintained in the relevant market by affording it the power to behave to an appreciable extent, independently of its competitors, customers and ultimately consumers."

(United Brands v. Commission, ECR 207).

Definitions of essential facilities have been developed by a number of national regulations and multilateral agencies. Box 5-5 includes a benchmark definition of essential facilities was included in the *WTO Regulation Reference Paper*.

The complete *WTO Regulation Reference Paper* is reproduced in Appendix A. The Reference Paper indicates when and how signatory countries must ensure essential facilities are provided to competitors.

The phrase "bottleneck facility" is sometimes used as a synonym for "essential facility". However, the term "bottleneck" puts the emphasis on the facility being a necessary part of a communications link, the supply of which is restricted, rather than on the ability of competitors to replicate the facility.

Box 5-5: Essential Facilities - WTO Definition

Essential facilities mean facilities of a public telecommunications transport network or service that

- (a) are exclusively or predominantly provided by a single or limited number of suppliers, and
- (b) cannot feasibly be economically or technically substituted in order to provide a service

Common examples of essential facilities are network access lines (local loops) and local exchange switching. Local loops are the circuits between a customer's premises and the first "node" or exchange which connects the customer with the PSTN. It can be seen that in many countries, local loops fall within the definition of essential facilities because they are:

- (1) required by competitors in order to compete for the business of end customers;
- (2) predominantly supplied by the incumbent, and
- (3) technically or economically difficult to substitute, at least on a widespread basis.

Accordingly, regulators in the US, Canada, Europe and elsewhere have required incumbents to facilitate competition by providing local loops to competitors. If alternative sources of fixed and wireless local loops become available, they may no longer be designated as essential facilities.

More examples of essential facilities, and a more detailed discussion of the concept are set out in Section 3.4.5 of Module 3 under the heading "Access to Unbundled Network Components".

A telecommunications operator that controls an essential facility often has both the incentive and the means to limit access to the facility by competitors. It becomes a matter of public interest to ensure that essential facilities are available to competitors on reasonable terms. Without such access, competition will suffer, and the sector will operate less efficiently than it could.

Consider, for example, how much more efficient it is to have a variety of different ISPs, international operators and other telecommunications service providers use the same network access lines and local switches to reach subscribers in a locality. This is far more efficient than having each operator construct network access lines to serve the same locality.

The determination of which telecommunications network resources constitute essential facilities has great practical importance. Too narrow a definition can impede competition by preventing competitors

from being able to obtain necessary network components on appropriate terms. Too broad a definition can stimulate uneconomic entry or provide insufficient incentives for competitors to invest in and develop alternative network infrastructure.

Various approaches to defining essential facilities are discussed in Section 3.4.5 of Module 3. That Section considers which facilities an incumbent operator should be required to unbundle and provide to competitors. The balance of this Module 5 illustrates the use of the concept of essential facilities in competition policy as it applies to the telecommunications sector.

5.3 Remedies for Anti-Competitive Conduct

5.3.1 Abuse of Dominance

The concept of abuse of dominance includes a broad range of anti-competitive conduct recognized in the laws and policies of many countries. It is similar to, but broader than the concept of "monopolization" that is found in some laws.

While there are different definitions of abuse of dominance, there are common themes in the definitions. The essential characteristics of abuse of dominance include:

- (i) A firm has a dominant market position in the relevant market; and
- (ii) The firm uses that position to engage in "abusive" conduct which is or is likely to be harmful to competition.

The concept of abuse of dominance covers many specific types of conduct. New forms of abusive conduct are being recognized today. Recent examples can be found in the Microsoft litigation in the US, or in other areas of intellectual property licensing. Other actions that were once considered abusive are considered acceptable today, depending on the circumstances. This Section and subsequent sections describe some specific types of conduct that have been considered abuses of dominance in the telecommunications industry. These descriptions should not be considered exhaustive.

Before discussing different types of abusive conduct, we will review the concept of market dominance.

When Does a Firm Dominate a Market?

The concepts of market power and dominance are discussed earlier in this Module. The first step in evaluating whether a firm dominates a market involves the definition of the relevant market in which the possible abuse occurs. As discussed earlier, once the relevant product and geographic market must be considered. Then the degree of dominance exercised by the firm in the relevant market can be evaluated.

A narrow definition of the relevant market will generally suggest a higher market share for a particular firm, and an appearance of greater dominance. Conversely, a broad definition of the market will suggest lower market shares and less dominance. The definition of the relevant market will, therefore, often be critical to an assessment of market dominance.

Once the relevant market has been defined, the evaluation of whether a firm occupies a dominant position will typically depend on two main factors: (i) the market share of the particular firm; and (ii) the extent of barriers to market.

A finding of dominance must be based on the context and circumstances of the relevant market. It is difficult to provide general guidelines to determine the particular measure of market share which will support a finding of dominance. Many commentators suggest that a market share of less than 35% is unlikely to be associated with a dominant position; while a market share of greater than 65% is likely to be. It is widely observed that even a very large market share may not result in market dominance. This is particularly the case when barriers to entry are so low that price increases or output decreases by a firm with a large market share will stimulate new entry and additional competition.

When is a Firm Abusing its Dominant Position?

If it is determined that a firm has a dominant position in a relevant market, the next question is: Is the firm abusing this position? In telecommunications markets, abuse of dominance can occur in many

ways. Box 5-6 sets out common examples of the types of behaviour that are seen as abusive, if carried out by a dominant telecommunications operator.

Different approaches are used to define conduct that amounts to an abuse of dominance. These approaches all focus on conduct that is harmful to competition in a market.

Abusive conduct is sometimes divided into “exploitative abuses” and “exclusionary abuses”. Conduct such as charging excessive prices or offering poor service to subscribers can be characterized as exploitative abuses. This type of conduct exploits the dominant position a firm enjoys in a market and reduces consumer welfare. Predatory pricing or refusal to supply essential facilities, on the other hand, can be characterized as exclusionary abuses. These forms of conduct are aimed at foreclosing market entry or forcing market exit. Other approaches to classifying abuses of dominance exist in various laws as well as in the legal and economic literature.

The main types of abuse of dominance encountered in the telecommunications industry are discussed in greater detail below. They include refusal to supply essential facilities, anti-competitive cross-subsidization, vertical price squeezing, predatory pricing, tied sales and bundling.

Legal Prohibitions Against Abuse of Dominance

National and international laws and treaties include prohibitions against abuse of dominance. Some prohibitions are broad and general; others more specific.

A good example of a broad prohibition against abuse of dominance is found in Article 82 of the EC Treaty (formerly Article 86). It provides a general prohibition at the level of European Union law. Article 82 states that:

“Any abuse by one or more undertakings of a dominant position within the common market or any substantial part of it shall be prohibited as incompatible with the common market insofar as it may affect trade between member states.”

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The broad prohibitions of the EC Treaty have been incorporated into the laws of member countries of the European Union. In addition to being bound by the requirements of the EC Treaty, public telecommunications operators in EC member countries are generally subject to additional and more specific national legal prohibitions against abuse of dominance.

Abuse of Dominance – Remedies

Different approaches are taken to prevent, correct or punish abuse of dominance. To properly investigate and remedy abuse of dominance complaints, a regulator or competition authority must have sufficient powers to conduct a proper investigation. At a minimum, investigative powers typically include the ability to compel the dominant entity to disclose information and documents.

If an investigation indicates that abusive conduct has occurred, an effective legal framework generally provides powers to remedy the situation. Examples of the types of powers that are granted to remedy abuse of dominance are set out in Box 5-7. Some of these powers may be granted to a telecommunications regulator, some to a general competition authority, and some to the courts.

Box 5-6: Abuse of Dominance by a Telecommunications Operator: Common Examples

- Refusal or delay in providing essential facilities to competitors;
- Providing services or facilities to competitors at excessive prices or on discriminatory terms;
- Predatory pricing and/or cross-subsidization of competitive services with revenues obtained from services which are subject to less competition;
- Bundling of services designed to provide the dominant firm with exclusive advantages in subscriber markets or require a competitor to obtain services or facilities which it does not truly need.

Box 5-7: Some Powers to Remedy Abuse of Dominance

- Power to issue enforceable orders against the dominant entity,
 - (a) to cease abusive behaviour; or
 - (b) to prescribe specific changes in its behaviour to limit the abusive aspects
- Power to revoke the licence of the dominant entity (NB. In practice, this has limited applications since no regulator wants to deny service to the public)
- Power to fine the dominant entity and the individual persons responsible for the abusive conduct
- Power to order compensation (damages) to be paid to subscribers or competitors injured by the abusive conduct
- Power to restructure the dominant entity (such as the divestiture of some lines of business or structural separation of those lines into a separate but affiliated company)
- Power to facilitate and approve informal settlements in cases of abuse of dominance (e.g. to pay compensation, restructure, voluntarily cease or change conduct)

The question of establishing an effective regulatory framework, including investigative and remedial powers, is discussed in Module 1 – Overview of Telecommunications Regulation. Specific remedies for different types of abuse of dominance and other forms of anti-competitive conduct are set out in the following sections.

5.3.2 Refusal to Supply Essential Facilities

The concept of “essential facilities” is introduced in Section 5.2.4. above, and discussed in greater detail in Section 3.4.5. of Module 3. We will only deal with the matter briefly here.

The competition policies of a number of countries require dominant firms to provide competitors with access to essential facilities controlled by dominant firms. The so-called “essential facilities doctrine” is closely related to the concept of “refusing to deal” with competitors, which is an offence under competition law in some, but not all circumstances.

Some experts have discouraged telecommunications regulators and competition authorities from developing excessively broad principles requiring incumbent operators to provide network facilities to their competitors. They point out that such principles would discourage competitors from building their own competitive facilities.

However, most telecommunications experts agree that the introduction of competition can be greatly accelerated by requiring incumbents to provide access to a broadly defined range of essential facilities to new entrants. For the provision of telecommunications services to the general public, for example, interconnection to the incumbents’ PSTN and related switching, signaling, Operational Support Systems (OSS) and database systems can significantly speed up the introduction of competitive new services.

Most of the debate about essential facilities in the telecommunications context relates to interconnection facilities. The issues related to the supply and unbundling of essential facilities are discussed in more detail in Module 3 – Interconnection.

Abuse of Dominance and Essential Local Network Facilities – The EU Example

The European Commission’s 1998 “Access Notice” provides a good example of the treatment of essential network facilities in current competition and telecommunications law and policy (*Notice on the Application of the Competition Rules to Access Agreements in the Telecommunications Sector*).

The Access Notice illustrates how an established telecommunications network operator can abuse its dominant position in controlling network access facilities. The Notice sets out how competition rules are to be applied to telecommunications network access agreements in the context of: i) specific telecommunications market liberalization directives; and

ii) overlapping authority between national and EU institutions, and between competition and sector-specific regulatory authorities. The Access Notice builds on earlier Commission guidelines on the application of competition rules in the telecommunications sector.

The Notice adopts a conventional approach to market definition. It uses the concepts of demand substitutability and non-transitory price increases as the main tools for defining separate product markets. Based on its analysis, the Commission concludes that telecommunications network access constitutes a distinct market from the market for end user services.

Much of the Notice is directed toward an evaluation of market dominance and the application of principles of abuse of dominance to the network access market. The first principle is that a company controlling access to an essential network facility is in a dominant position within the meaning of EU law on abuse of dominance (specifically, Article 82 of the EC Treaty – formerly Article 86).

The Commission concludes that abuse of dominance can be made out where a network operator refuses access to its network, withdraws access or provides access subject to unjustifiable delays or excessive prices. The Commission identifies other conduct which may be abusive, including tying or bundling network elements without adequate justification, configuring a network so that access by competitors becomes more difficult, unjustly discriminating in the terms of access offered to competing operators or pricing access so as to “squeeze” competitors’ profit margins. These concepts are discussed later in this Module.

5.3.3 Cross-Subsidization

In some key telecommunications markets, there is a concern that incumbent telecommunications operators will abuse their dominant position by engaging in anti-competitive cross-subsidization. The concern is that an operator that dominates one market may increase or maintain its prices above costs in that market. It can then use its excess revenues from the dominant market to subsidize lower prices in other more competitive markets. As a result, a disproportionately large share of the costs of the operator’s

entire business can be recovered from the markets the operator dominates.

This results in a “cross-subsidy” between services and subscriber groups. The more competitive services are subsidized by the less competitive services. Such cross-subsidies can be significant barriers to competition.

Without the ability to cross-subsidize its own competitive services, a new entrant may not be able to match the incumbent’s low prices in competitive markets. This may prevent new entry into the incumbent’s less competitive markets. Alternatively, it may drive new entrants out of business or prevent them from raising enough capital to expand into the incumbent’s dominant markets.

Regulatory treatment of anti-competitive cross-subsidies in telecommunications markets is complicated due to the patterns of “social” cross-subsidies which characterized the monopoly era of telecommunications services in many jurisdictions.

In the monopoly era, governments typically authorized the cross-subsidization of local, residential and rural services by other services, such as international, long distance and business services. Whatever the benefits of social cross-subsidies in the monopoly era, there is now a widespread recognition that they should be abolished. These cross-subsidies are gradually being eliminated by the implementation of rate rebalancing policies. Rate rebalancing policies are aimed at aligning prices of different services more closely with their costs. Rebalanced rates are closer to the types of “efficient” pricing found in competitive markets.

That is not to say that social objectives, such as maintenance of affordable access for poor or remote subscribers, are being ignored today. However, most telecommunications policy-makers, regulators and sector experts agree that implicit cross-subsidies between services should be replaced by explicit subsidies aimed at meeting specific social objectives. The issues surrounding targeted subsidies to meet social objectives are discussed in greater detail in Module 6.

Prohibitions Against Cross-Subsidies

Prohibitions against anti-competitive cross-subsidy have been incorporated into the laws and regulatory framework of many countries. Many countries that did not do so before have established such prohibitions as part of their obligations under the 1998 *WTO Agreement on Basic Telecommunications*.

The WTO’s Regulation Reference Paper (see Appendix A) requires signatory countries to maintain appropriate measures to prevent major suppliers from engaging in or continuing anti-competitive practices. The list of anti-competitive practices specifically includes “engaging in anti-competitive cross-subsidization”.

National prohibitions against cross subsidies can be found at various levels, including laws, regulations, regulatory guidelines, rules, orders or licences.

Licence conditions are often used to prohibit cross-subsidy. One example of a licensing prohibition can be found in the *General Telecommunications Licence* granted by the Office of the Director of Telecommunications Regulation in Ireland. Condition 14 of the Licence permits the Director to enquire into complaints of cross-subsidization by the licensee, and to issue a binding direction requiring the licensee to cease such cross-subsidization. This condition is found in Part 3 of the Licence, which includes the conditions applicable to any licensee with Significant Market Power (see definition in Section 5.2.1). This licence also requires licensees to keep appropriate accounting records in order to permit the Director to evaluate whether conduct amounts to unfair cross-subsidization.

Another example of a broad prohibition can be found in the licence issued to the Jordan Telecommunications Corporation by the Telecommunications Regulatory Commission of Jordan. The prohibition reads as follows:

“The Licensee will not, alone or together with others, engage in or continue or knowingly acquiesce in any anti-competitive practices and, in particular, the Licensee shall: ... not engage in anti-competitive cross-subsidization;”

Such broad prohibitions are included in licences or in other regulatory conditions imposed on incumbent operators in many other countries. While these broad prohibitions send a strong signal to incumbents, they are not generally effective unless they are accompanied by more specific measures to identify and prevent anti-competitive cross-subsidies. We will now consider several specific measures: accounting separations, structural separations and imputation tests.

Accounting Separations

Accounting separations can be used to determine the existence of cross-subsidization. Regulators have developed accounting separations, or have required incumbents to do so, in a number of jurisdictions.

An example is provided by Article 8 of the EU's *Interconnection Directive*. It imposes an obligation on EU member states to ensure that public telecommunications network operators that have significant market power keep separate accounts for their interconnection-related activities and their other commercial activities. This obligation applies if such incumbents provide both end user services and interconnection services to new entrants. In addition, the record of interconnection-related activities must include both interconnection services provided internally and interconnection services provided to others. The new *Interconnection Directive* proposed by the European Commission in July 2000 provides that regulators should have the authority to impose accounting separations in relation to specified activities related to interconnection and/or network access (Article 11).

More detailed accounting separation approaches are required by several national regulators. In some cases, accounts must be separated for a range of different services. The most detailed approaches have been developed in Canada and the United States.

The goal of accounting separations is to divide the costs of an operator between the different services it offers in order to determine the costs of providing each service. The costs of each service are then compared to the revenues generated by that service to determine whether the service recovers its costs

or loses money. Services that do not cover their costs are considered to be subsidized by other services with revenues that exceed their costs.

In effect, accounting separations require an operator to account for different services as if they were stand-alone operations. Since telecommunications operators provide a wide range of services, many accounting separations undertaken for regulatory purposes do not attempt to separate the costs of each individual service. Rather, they separate the costs of broad categories of service.

The focus of regulators is usually on separating the costs of the categories of services in which an operator is dominant, from the costs of providing the more competitive services. Such a separation permits the regulator to determine whether the monopoly (or less competitive) services are generating excess revenues – and whether these costs are being used to subsidize the more competitive services. Accounting separations can add transparency to the costing and pricing process of the incumbent operator.

Accounting Separations – Cost & Revenue Categories

Determination of which accounting categories should be established will depend on the state of competition in a national telecommunications market. In general, the more competitive the market, the more difficult the accounting separation process.

Once all segments of a market become workably competitive, it will no longer be necessary to establish accounting separations, or worry about cross-subsidies. At that point, no firm would retain a dominant position in any market segment. Accordingly, it could not raise prices above competitive levels and use the excess profits to cross-subsidize more competitive areas.

The following are simplified illustrations of possible accounting separations that could be used in emerging markets that are subject to a limited degree of competition. Three simplified scenarios are considered in Table 5-2, Table 5-3 and Table 5-4.

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Several observations can be made about these simplified scenarios. In Scenario A, the operator appears to be cross-subsidizing its entry into competitive services with revenues from its monopoly services. Several factors are relevant in determining the extent of this cross-subsidy. Any firm will incur start up costs in the early years of

introducing a new service, and if the deficit for Category 2 competitive services is short lived, there may not be a serious anti-competitive problem. However, if the cross-subsidy persists, or increases, that would make it very difficult for new entrants in the cellular and value-added services markets to compete. They may be driven out of business.

Table 5-2: Scenario A: No competition in basic telephone services; competition in cellular and value-added services (e.g. Internet access, e-commerce services)

Accounting Category 1 – Monopoly Services		Accounting Category 2 – Competitive Services	
Revenues	5000	Revenues	100
Costs		Costs	
Local Access Network Services	2500	Cellular Telecommunications Services	300
Long Distance Network Services	1000	Value-added Services (including Internet Access, e-commerce)	200
International Network Services	400		
Total Costs	3900	Total Costs	500
Surplus	1100	Deficit	(400)

Table 5-3: Scenario B: No competition in local access services; competition in long distance, international cellular and value-added services (e.g. Internet access, e-commerce services)

Accounting Category 1 – Monopoly Services		Accounting Category 2 – Competitive Services	
Revenues	2500	Revenues	2600
Costs		Costs	
Local Access Network Services	2500	Cellular Telecommunications Services	300
		Value-added Services (including Internet Access, e-commerce)	200
		Long Distance Network Services	1000
		International Network Services	400
Total Costs	2500	Total Costs	1900
Surplus/Deficit	0	Surplus	700

Table 5-4: Scenario C: (same assumptions as Scenario B) No competition in local access services; competition in long distance, international cellular and value-added services (e.g. Internet access and e-commerce)

Accounting Category 1 – Monopoly Services		Accounting Category 2 – Competitive Services	
Revenues from End Users	1700	Revenues	2600
Local Access Revenues from Competitors	800		
Total Revenues	2500		
Costs		Costs	
Local Access Network Services	2400	Cellular Telecommunications Services	300
Cost of Providing Local Access Services to Competitors	100	Value-added Services (including Internet Access, e-commerce)	200
		Long Distance Network Services	1000
		International Network Services	400
Total Costs	2500	Total Costs	1900
Surplus/Deficit	0	Surplus	700

Scenario B illustrates a hypothetical accounting separation for an incumbent operator that has rebalanced its local access prices. Its local access prices are sufficient to cover associated local access costs – and no more. Based on these data, the firm cannot be said to be cross-subsidizing its competitive services from its monopoly services.

However, a further degree of accounting separation may illustrate a form of anti-competitive cross-subsidization that is potentially damaging to competition. This is illustrated in Scenario C.

The total costs and revenues illustrated in Scenario C are the same as in Scenario B. However, Scenario C separates out the costs and revenues of the incumbent in providing local access services (e.g. call termination) to competitors. In so doing, Scenario C illustrates what appear to be anti-competitive cross-subsidization practices on the part of the operator.

It appears that the operator is charging competitors 8 times as much as it costs to provide them with local access services (local access revenues from

competitors are 800, costs are 100). This could increase the costs of competitors to a level where they would find it very difficult to compete with the incumbent. The more detailed level of accounting separation provided in Scenario C illustrates what seems to be a large cross-subsidy from one category of monopoly services, i.e. local access services provided to competitors, to other monopoly services.

Scenario C indicates other potential problems that merit further investigation. For example, it is possible that the incumbent is implicitly charging its own competitive services at lower prices for local access services than it is to competitors. This problem is discussed later in this Section.

A comparison of Scenarios A, B and C indicates that it is important to design accounting separation categories to meet different market circumstances, and to take into account the type of cross-subsidy that is being investigated or monitored.

Accounting Separations - Cost Allocation Issues

In practice, it is sometimes difficult to separate the costs to telecommunications operators. Cost accounting approaches are well developed in some highly competitive industries, where business managers carefully monitor the financial performance of different services or “profit centres”. However, the same has not generally been true of incumbent telecommunications operators.

Identifying the costs of different services was simply not required in the monopoly era. Telecommunications managers and regulators typically focussed on the overall profitability of the firm, not on the profitability of individual services. If some services lost money, these losses were covered by profits in other services. Detailed cost separation approaches were never required or developed.

Some difficult issues of cost separation are rooted in the nature of telecommunications costs. Many of the costs of operating a multi-service telecommunications operator can be characterized as joint or common costs. These concepts are defined and discussed in detail in Appendix B.

As discussed in Appendix B, it is difficult to assign joint and common costs directly to a service. Accordingly, such costs are often “allocated” or “distributed” among the different services. Various approaches can be used for such cost allocations. Most involve some degree of judgment.

Given the arbitrary nature of some cost allocations, incumbent operators will often have the opportunity to allocate more costs to their less competitive service offerings. This “shifting” of costs will make the more competitive services appear less costly and more profitable. For example, an incumbent might allocate 95% of its head office expenses to its basic telephone services, because those services account for 95% of its revenues. However, in reality, over 30% of the time of head office staff may be devoted to competition with new entrants in value-added, Internet and e-commerce services, which accounts for only 5% of its revenues. By shifting its headquarters’ costs away from the more competitive services, the incumbent could justify charging a very low price for these services. The incumbent might thus be able to convince the regulator that it was not

pricing the competitive services below cost, and subsidizing them from excess basic service revenues.

There is no simple solution to the accounting separation problems identified above. If there are serious concerns about anti-competitive cross-subsidies, the regulator will have to “roll up its sleeves”, and work to understand the cost structure of the incumbent. The help of experienced telecommunications accounting or economic consultants will be useful, if not essential, in most cases.

International benchmarks can assist in some cases. For example, consider two services: (1) local termination services provided by an incumbent to interconnecting competitors, and (2) cellular telephone services provided to end users in competition with the same competitor. A benchmarking study may show that the incumbent charges twice as much for service (1) in comparable countries, and only half as much for service (2). In such a case, the regulator will want to take a closer look at the costs and pricing of the incumbent to ensure it is not engaging in anti-competitive cross-subsidization.

In conclusion, accounting separations can be challenging for both the regulator and regulated operators. However, some simplifying assumptions and benchmarking can assist in providing “order of magnitude” indications of possible cross-subsidies. Whatever techniques are used, accounting separations remain a valuable tool for regulators.

The accounting separations approach does have drawbacks. These include the discretionary nature of some cost allocations and the large amount of resources required for detailed cost separations. For example, the Canadian regulator spent the better part of a decade to develop its “Phase III” category-wide cost separations process. These drawbacks suggest that detailed accounting separations should not be relied on exclusively as a tool to identify and prevent anti-competitive cross-subsidies. In countries with limited resources, it may be more efficient to use a combination of benchmarking and very high level cost separations.

Structural Separation and Divestiture

Two other approaches, namely structural separation and divestiture, have been used by competition authorities and telecommunications regulators in cases of serious anti-competitive cross-subsidization. Both approaches tend to be used only where there is evidence of significant anti-competitive conduct. This usually involves not only cross-subsidization, but related conduct such as predatory pricing, anti-competitive use of information and discriminatory practices.

Structural separation generally refers to the separation of different lines of business of a telecommunications operator into separate corporate entities.

As an example, a cellular business can be operated by a separate company from a wireline telephone business. Both may be owned by the same shareholders. However, existence of a separate cellular company makes it easier to ensure that the incumbent operator with which it is affiliated does not discriminate unfairly against cellular competitors as compared to its own cellular operations. Rules can be established to ensure that both cellular companies are treated the same, for example, with respect to interconnection charges. Other examples of telecommunications lines of business that are frequently separated include ISPs and various types of mobile operators.

When structural separation is mandated by regulation, the different companies must typically be run on an “arm’s length” basis. In that case, the companies must deal with each other on the same terms and conditions as they deal with third parties, such as competitors. The separate companies must normally not only have separate accounting records, but also separate management, offices, facilities, etc.

Regulatory conditions normally determine the degree of separation required in the companies’ operations. Development of these conditions can pose challenges. Regulators must balance two competing objectives. One is to create sufficient separation to minimize the potential for cross-subsidization, collusion or other anti-competitive actions between the separated companies. The other is to minimize the inefficiencies that will almost inevitably be created by structural separation.

For example, there may be efficiencies (economies of scale and scope) inherent in providing common administrative services to both companies. On the other hand, the sharing of administrative services, such as accounting services, provides potential for anti-competitive conduct and for developing covert cross-subsidies. Similarly, sharing head office space can lead to efficiencies. On the other hand, it provides opportunities for collusive conduct between managers of the two companies. If structural separation is to be required, there should be a real separation of the two lines of business, including their management, premises, customer data bases, accounts and operations. Otherwise, the structural separation may be a sham.

The initial question, however, is not whether there should be structural separation between the companies, but whether the advantages of separation outweigh the disadvantages given the realities of a particular market. Other disadvantages of structural separation include high transaction costs (the costs of creating the separate companies) and the distraction for employees and customers as they work through the separation. Despite those disadvantages, structural separation may be the only way to ensure a level playing field for competition in some markets.

Structurally separate companies can often continue to operate under common ownership. Divestiture refers to a situation where a company, such as an incumbent, not only runs a particular line of business through a separate company, but divests (i.e. sells) some or all of the ownership of that separate company to independent parties.

Some competition advocates argue that only divestiture of ownership can ensure that a separate company is run in the interests of its separate shareholders, rather than merely as an operating arm of its parent company (e.g. the incumbent). Without divestiture, it is argued, a great deal of regulatory effort will be expended to detect anti-competitive dealings between affiliated companies. Once there are separate shareholders, the management of the separate companies must act in the interests of those shareholders. It will be safer to assume that the companies are actually run on an arms-length basis.

Structural Separation – The EU Cable Directive

An example of a structural separation directive can be found in the EU's *1999 Cable Ownership Directive*. This Directive requires dominant telecommunications operators to place their cable television operations in a structurally separate company. The Directive builds on the EU's ONP Directives and other efforts to implement a competitive framework for telecommunications. It is intended to address specific problems which the EU Commission has concluded result from the joint operation of cable television networks and conventional telecommunication networks.

The *Cable Ownership Directive* makes it clear that the Commission views structural separation as the minimum corrective measure required at this time, and that it may impose further measures, including divestiture of cable interests to third parties, in specific cases. The Commission also appears to be adopting a practice of requiring dominant companies to divest their cable interests as a precondition to securing Commission approval for new mergers among telephone companies. (See, for example, the discussion of the Commission's approval of the merger of Telia AB of Sweden and Telenor AS of Norway in Section 5.4.2 below.)

Divestiture – The AT&T Model

The most famous example of a telecommunications divestiture involved the separation of AT&T from the Regional Bell Operating Companies (RBOCs) in the United States in 1984. Not only were the local operations of AT&T structurally separated from its long distance and international operations, but ownership of the two groups of companies was separated by means of a share swap. The divestiture was, by most accounts, a great success.

With their ownership separate from AT&T, the RBOCs no longer had an incentive to favour AT&T over its long distance competitors, such as MCI and Sprint. Therefore, all long distance competitors obtained access to local telecommunications services from the RBOCs on similar, non-discriminatory terms. More relevant to this Section, the divestiture eliminated concerns about anti-competitive cross-subsidies between AT&T's local and long distance operations.

Divestiture is generally viewed as an extreme remedy that is only appropriate in cases of overwhelming dominance by very large operators in large economies such as the US. Policy-makers in other countries have been reluctant to consider dismembering incumbents, which are often seen as "national champions".

However, this view may be changing. The *EU Cable Ownership Directive* indicates a willingness by the EU to consider divestiture of at least some types of business lines. Consideration of the divestiture option may increase as more incumbents around the world become fully privatized. The changing market, economics and financing of the telecommunications sector suggest that there are advantages as well as disadvantages in divesting some lines of telecommunications business from others. For example, it is often easier to finance an e-commerce or GSM cellular business on a stand-alone basis than as part of a large multi-service operator. Finally, in countries with limited competition, divestiture may provide the means to create other strong players with the critical mass to become successful telecommunications service providers.

5.3.4 Vertical Price Squeezing

Vertical price squeezing is a particular type of anti-competitive conduct that may be engaged in by incumbent operators. This form of conduct can occur if the incumbent provides services in two or more "vertical" markets. Vertical markets are sometimes labelled "upstream" and "downstream" markets. For example, the oil production market is upstream of the oil refining market, which in turn is upstream of the gasoline sales market. Instead of upstream and downstream, the terms "wholesale" and "retail" are often used.

Vertical price squeezing can occur when an operator with market power controls certain services that are key inputs for competitors in downstream markets, and where those same key inputs are used by the operator or its affiliates to compete in the same downstream market.

To take an example, in telecommunications markets, incumbents often control local access and switching services. Consider one such service – the provision of dedicated local circuits from customer

premises to local exchanges. Dedicated local circuits can be viewed as “upstream” services. These services are used as an input by the incumbents in providing “downstream” services, such as dedicated Internet access services. Dedicated local circuits are also a key input for competitors who provide dedicated Internet access services. In other words, both the incumbent and other suppliers compete in the downstream market for dedicated Internet access services.

If the incumbent decided to engage in vertical price squeezing, it could increase the price to competitors for the upstream input (i.e. dedicated local circuit rates) – while leaving its downstream prices the same (i.e. prices for its dedicated Internet access services). The effect would be to reduce or eliminate the profits (or “margins”) of competitors. Their margins would be “squeezed”. To increase the squeezing effect, the incumbent could also reduce its downstream prices for Internet access. This would be a “two-way” or margin squeeze.

Put another way, an incumbent can often squeeze the margins of competitors by raising wholesale prices paid by competitors, while at the same time lowering retail prices on competitive services.

A simplified numerical example of a vertical price squeeze is included in Box 5-8.

Box 5-8: Example of Vertical Price Squeeze by Incumbent Operator	
Cost to incumbent of upstream facility (e.g. dedicated loop)	\$ 90
Price charged by incumbent to competitor for loop	\$ 120
Cost of providing retail services to end users (e.g. dedicated Internet access service) in addition to loop cost (e.g. marketing, billing)	\$ 20
Price charged by incumbent to end users for dedicated Internet access services	\$ 130

In this example, it is evident that there is no margin available for the competitor. The competitor must buy the upstream service, a dedicated loop, from the incumbent at \$120. Assume that it will incur \$20 in additional costs before it can provide retail services. Thus, it must spend \$140 to provide the retail service to end-users. Since the incumbent provides the same retail service for \$130, it is unlikely that the competitor could attract any customers away from the incumbent.

Wholesale Cost Imputation Requirement

To prevent vertical price squeezing, a telecommunications regulator may impose a wholesale cost imputation requirement, along the lines set out in Box 5-9.

Box 5-9: Basic Elements of Wholesale Cost Imputation Requirement

Conditions for Application:

1. Applies to a monopoly or dominant provider of “wholesale services”
2. Where the dominant provider also competes in market for “retail services” that require the wholesale services as inputs.

Basic Rules:

Dominant provider must provide evidence to the regulator that its retail prices are no lower than the sum of the following:

- A. The price it is charging competitors for the wholesale services that form part of the retail service (this price is said to be “imputed” in the cost of the dominant provider whether it actually incurs this cost or not); plus
- B. The actual incremental costs (above the imputed wholesale costs) that are incurred by the dominant supplier in providing the retail service. For example, marketing, billing, etc. costs.

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Variations on this type of imputation approach have been used by various regulators and competition authorities. It is relatively simple to use (compared to detailed accounting separations or cost allocations). To return to the margin squeezing example in Box 5-8, it does not matter whether the actual cost of the wholesale service is \$90, \$120 or some other number. What the imputation requirement assures is that the same cost for essential wholesale services is imputed to the dominant operator's retail services as is passed on to its competitors.

Imputation – A Canadian Example

A form of the wholesale cost imputation requirement has been applied by the Canadian regulator in response to complaints of targeted retail price discounting by incumbent operators. The CRTC's approach was tailored to the rather unique circumstances of the Canadian market. In that market, the CRTC established a universal service program in the form of a subsidy for the access deficit incurred by operators in higher-cost areas.

All long distance operators, including new entrants, are required to make "contribution" payments to subsidize the deficit described above. However, as noted in our detailed discussion of the Canadian example in Module 6, incumbent local operators continue to receive the vast majority of contribution payments. Initially, the CRTC did not specifically require the incumbent operators to account for their own use of the local access network in providing competitive services. That is, it did not require incumbents to make contribution payments to themselves. This led to the potential for vertical price squeezing by incumbents. The CRTC's response to this situation is described in Box 5-10 below.

This imputation test is similar to the one described in Box 5-9. The main difference is that the CRTC imputes "contribution" subsidies, as well as wholesale facilities costs, as costs that must be covered in the incumbents' retail prices. The CRTC took the position that so long as a service recovers these imputed costs, plus the direct causal costs of the retail service, targeted pricing would not be anti-competitive.

Box 5-10: Case Study - The CRTC Imputation Test

In 1994 (Decision 94-13), the CRTC described the targeted price cutting responses of incumbent operators to new entrants as follows:

"Under a scenario of unrestrained targeted pricing by the telephone companies, competitors could be faced with the situation in which they must compete against telephone company prices that embody a contribution amount that is lower than the competitor contribution cost in that market segment...The Commission considers that, due to their previous status as monopoly toll providers, the telephone companies have an established and generally predominant share in all market segments. As a result, their traffic mix, the presence of barriers to entry and the existence of customer inertia would permit them, on a sustained basis, to recover contribution from the most highly contested market segments at a level below the contribution amount [payable by competitors]."

As a result of these concerns, the CRTC implemented an "imputation test" to ensure that incumbents' prices in competitive networks were subject to similar cost recovery requirements as competitors. This imputation test, as modified in a later CRTC decision (Telecom Decision CRTC 94-19), has the following requirements:

Revenues for each service offered by an incumbent must equal or exceed the sum of--

- (a) the costs for "bottleneck services" used by the company in the provision of the services in question, using tariffed rates for those bottleneck services (the "Operator Access Tariff");
- (b) the causal costs specifically attributed to the services, which are additional to the costs covered in (a) above; and
- (c) any applicable contribution payments.

5.3.5 **Predatory Pricing**

Predatory pricing is the practice of providing services at prices that are low enough to drive competitors out of a market, so as to monopolize the market. There is considerable debate about what prices and what conduct constitute predatory pricing. While the competition laws of various countries differ, it is generally agreed that a number of elements must exist to constitute predatory pricing. Typical elements for the definition of predatory pricing are set out in Box 5-11.

Predatory pricing is often prohibited under national competition laws. It may also be prohibited under the laws or policies applied by a telecommunications regulator. Either way, it will be necessary for the regulator to have the means to investigate and stop instances of predatory pricing and to implement suitable penalties or remedies.

Remedies vary. Predators may be penalized, competitors which have been the victims of predatory pricing may be compensated, or both. Another regulatory approach is to anticipate predatory pricing by implementing price regulation to

deter predatory behaviour. Wholesale cost imputation requirements, which are discussed in the previous Section, provide an example of this approach.

Predatory pricing is a particularly difficult type of conduct to prove in the telecommunications industry. As previously discussed, the industry is characterized by substantial joint and common costs which are difficult to assign to particular services. The economic cost tests used to determine predatory pricing, such as Average Variable Costs and Long Run Incremental Costs are difficult to apply to many types of telecommunications prices. Again, these tests and related costing issues are discussed in Appendix B.

Predatory Pricing – Example of a Complaint

The case study provided in Box 5-12 summarizes Oftel's investigation into certain of BT's Internet services after a competitor raised predatory pricing concerns. It illustrates some of the problems of establishing that low pricing amounts to predatory pricing.

Box 5-11: What is Predatory Pricing?

Generally, the following elements must exist to constitute predatory pricing:

- > The predator must have market power (power to unilaterally increase its prices, etc.)
- > The predator must charge prices that fall below a predatory price standard. This standard varies somewhat between countries. Generally, in competition law, prices in this sector must be below Average Total Costs, and near or below Average Variable Costs. In the telecommunications sector, prices must usually be below Long Run Incremental Costs (LRIC) or Total Service Long-Run Incremental Costs (TSLRIC). (See Appendix B for a discussion of these cost standards)
- > There must be evidence of a clear policy of selling at predatory prices, not just sporadic or reactive price cutting.
- > Normally, there must be a reasonable expectation that the predator will be able to recoup its losses after its predation ends (e.g. after competitors are driven out of the market).

Box 5-12: Case Study - OfTel Investigation of BT's Internet Services

The complaint:

A competing Internet service provider complained to OfTel that BT was engaging in predatory pricing. The complaint was that BT was offering its BTNet services at a price 9 times less than other comparable BT services (X.25 packet services). Other elements of the complaint were that BTNet was not recovering an appropriate measure of costs and that BT was offering a free initial period of subscription.

The analysis:

OfTel observed that barriers to entry were low in the Internet services market, and so predatory behaviour was not feasible (BT would not be able to raise prices and recoup early losses in the longer run). OfTel also noted that the BTNet service was distinguishable from the X.25 packet service, which the complainant relied on to demonstrate unreasonably low pricing. OfTel looked at the business plan for BTNet and performance against plan, and concluded that early losses were consistent with being a start up business and that projected results indicated a move into profitability. Finally, OfTel observed that free subscription periods were common in the industry and that BTNet had limited these offers to its initial launch.

The conclusion:

OfTel concluded that BT was not engaged in predatory pricing in its BTNet offers. OfTel did state its intention to continue to monitor the situation closely (given BT's potential influence over the market).

5.3.6 Misuse of Information

Dominant providers of local telephone services and certain other monopoly services are in a position to collect competitively valuable information on their interconnecting competitors. For example, a competitor might require a local access circuit from an incumbent operator in order to provide a dedicated Internet service to a business customer. The competitor would order the circuit from the incumbent.

An incumbent should not be able to misuse the information obtained in its capacity as a supplier of essential facilities to the competitor. For example, the incumbent should not be permitted to approach the competitor's prospective customer to induce the customer to switch to (or remain with) the incumbent's own dedicated Internet services.

Most of the information received by an incumbent which is subject to competitive misuse, is received in the course of interconnection arrangements. Therefore, the types of potential anti-competitive abuse, and the remedies for such abuse are discussed in Module 3, Sections 3.4.2 and 3.4.3.

5.3.7 "Locking-in" Customers

Telecommunications network operators may attempt to "capture" particular subscribers through agreements that make it difficult or impossible for a customer to move to another network operator or service provider. Examples include long term contracts and discounts for exclusive dealing, as well as agreements which tie a customer to a particular technology or hardware platform.

Not all agreements that lock-in customers are anti-competitive. Most do not warrant regulatory interference. However, there are cases, particularly where a dominant competitor locks in customers in advance of the introduction of competition, that merit regulatory review. Dominant firms certainly can injure the prospects for competition in a market by locking customers into exclusive arrangements. These arrangements can amount to an abuse of dominance.

One clear form of abuse involves a requirement by a monopoly operator that a customer enter into a long-term exclusive contract in advance of the introduction of competition, as a condition of receiving continued service. Regulators should prohibit such

practices. Clearly, monopoly services should not be discontinued if customers refuse to enter into long-term contracts that would undermine the introduction of competition. Such a practice clearly involves an abuse of dominance. This is a form of anti-competitive tied sale, as well as a form of locking-in customers.

Other cases of locking-in customers are less clear. Much will depend on the degree of competition in the market and the effect of the locking-in arrangements on competition in the market. The more dominant a telecommunications operator, and the more injurious to competition the locking-in arrangement is, the stronger the case for intervention by the regulator or competition authority. Some regulators and competition authorities will be more vigilant than others regarding the potential harm through locking-in arrangements.

A practical example of the approach taken by a competition authority to a case of locking-in telecommunications customers can be found in the EU's "SIM Lock" case. The approach taken by the EU's Director-General for Competition (DG IV) in this case is illustrated in Box 5-13.

5.3.8 Tied Sales and Bundling

A tied sale is the sale of one product or service on condition that the buyer purchases another product or service. Bundling is the practice of assembling multiple products or services (or multiple product / service elements) together in an integrated offer.

Tied or bundled sales are not necessarily abusive or anti-competitive. The sale of one product or service may be tied to another for reasons of consumer safety or technical interdependence. Bundled sales may also be provided to respond to consumer preference or convenience.

Box 5-13: Case Study – DG IV Intervention in "SIM Locking"

The following approach was taken by the Director-General for Competition (DG IV) of the European Commission in the case of the "SIM Lock" feature on mobile phone handsets. This feature was, at one time, common on European handsets.

The SIM Lock feature had at least two characteristics:

- (i) It could be used as a theft deterrent (since the "subscriber identification module" – or "SIM" – integrated circuit card was uniquely associated with a particular handset); and
- (ii) It effectively locked a particular handset and subscriber to a single mobile telephone service operator. The SIM card authorized a particular handset and subscriber to use a particular service provider's network. Locking the SIM card and preventing its replacement in the handset prevented subscribers from changing their service provider. The SIM Lock feature could be "unlocked". However, service providers tended to impose significant charges for overriding the SIM Lock feature.

On 30 May 1996, DG IV wrote a letter to the manufacturers of the handsets and to network operators notifying them that it considered the SIM Lock feature as having anti-competitive effects. Further consultations and correspondence ensued. As a result, manufacturers agreed to modify their handsets and include the ability for subscribers to unlock the SIM Lock feature.

DG IV also set out a number of additional restrictions on the use of the SIM Lock feature. These included full disclosure to consumers that they could unlock the handsets. Where service providers had subsidized handset prices, the amount of the subsidy and specific commercial terms for recovering that subsidy had to be disclosed. Providers also had to disclose any effect that this subsidy might have on the subscriber's ability to unlock the feature. DG IV permitted service providers to keep the handsets locked until such time as the subsidy had been recovered.

Anti-competitive Aspects

Tied sales can be abusive when they have significant adverse effects on consumers or competitors. An example of an abusive form of tied sales is tying a product or service offered in a highly competitive market to another product in a monopolistic or less competitive market. The first product would typically have low prices and profit margins; the latter, higher prices and profit margins. Another example is tying a requirement to buy a maintenance service contract with the sale of the product itself, where the service market is highly competitive but the product market is not.

Bundling has become a popular marketing approach in the telecommunications industry. Many incumbent operators and competitors are offering bundled packages of services. A popular bundle in Canada, for example, includes wireless telephone service, Internet access service and cable TV service, sold together for a price which is 10% lower than the combined price of the individual services. Like tied sales, bundling can be convenient to customers. Among other things, it cuts down on the number of bills to pay. However, regulators have been asked to deal with anti-competitive aspects of bundling in various countries.

Regulatory Intervention

Regulatory intervention is usually focussed on a few types of bundling activity. One type occurs where an incumbent offers bundles of products or services on terms which cannot possibly be met by competitors. This concern is particularly serious where the operator includes a service in the bundle, such as basic local telephone service, of which it is the monopoly or dominant supplier.

Another area where regulatory intervention may be required occurs where a dominant operator supplies services to a competitor which the competitor needs as an input to its own services in order to compete with the incumbent. In other words, the dominant operator provides both the upstream and downstream services, but the competitor only provides downstream services. Some concerns about this

situation are discussed above under the title Vertical Price Squeezing.

A related concern arises where the dominant operator chooses to provide the upstream service to competitors on a bundled basis. In other words, the dominant operator may require competitors to acquire not only the minimum upstream service elements they require, but also other services. Such bundling would impair the competitors' efficiency. It would also inflate revenue flows from competitors to the dominant operators.

The issues related to the bundling of services provided by incumbents to their competitors are discussed in detail in Section 3.4.5 of Module 3, under the title Access to Unbundled Network Components.

Unbundling Conditions

Dealing more generally with the issue of bundling of retail packages by incumbents, a number of regulatory approaches are possible to prevent anti-competitive conduct. Outright prohibition should generally be seen as a last resort. Other approaches can often be used.

Steps can often be taken to level the playing field between dominant operators and new entrants, even when monopoly services are part of a bundle. Where this is the case, regulators can impose resale requirements on the dominant operator. In other words, the dominant operator may be permitted to sell monopoly services as part of a service bundle, but only if it makes the monopoly services available to competitors on reasonable terms to resell as part of their own competing bundles.

Box 5-14 provides an example of conditions imposed by one regulator on dominant operators that want to provide bundles of services that include monopoly service elements. The conditions established in this example include a resale requirement, a cost imputation test and a general requirement that competitors must be able to offer similar bundles in competition with the dominant operators.

Box 5-14: Case Study - CRTC Bundled Service Conditions

In 1994, when local services were offered on a monopoly basis in the Canadian market, the CRTC established the following bundling conditions (in Telecom Decision CRTC 94-19). These conditions applied to dominant operators that proposed to offer a bundled service, including monopoly service elements and competitive service elements:

- The bundled service must cover all applicable costs including:
 - (a) Tariffed rates for bottleneck network components;
 - (b) Bundled service start-up costs; and
 - (c) Contribution payments (access deficit subsidies similar to those paid by competitors);
- Competitors must be able to offer their own service bundles by combining network or service elements acquired from the dominant operator at tariffed rates and the competitor's own network or service elements; and

The dominant operator must permit resale of the bundled service by its competitors.

Regulatory conditions of this type can be incorporated into the regulatory framework to permit provision of bundled services, while safeguarding against anti-competitive conduct. Such conditions can be included in licences or specific guidelines, decisions or directions of regulators.

5.3.9 Other Abuses of Dominance

When the concept was introduced in Section 5.3, it was indicated that abuse of dominance involved two factors: (1) existence of market dominance, and (2) conduct by the dominant firm that is harmful to competition. The most common types of abuse of dominance in the telecommunications industry have already been reviewed.

However, various other abuses of dominance are possible. If conduct by a dominant firm exploits consumers, excludes competitors, or otherwise harms competition, it should be reviewed by telecommunications regulators or competition authorities. Box 5-15 lists some other types of abuses of dominance that are found in telecommunications and other industries.

5.3.10 Restrictive Agreements

Types of Restrictive Agreements

Most telecommunications regulators and virtually all competition authorities are called upon, from time to time, to review potentially anti-competitive agreements involving telecommunications operators. Some types of regulatory review are ex ante, such as where laws or licence conditions require prior approval of some types of agreements entered into by regulated operators. Other reviews are ex post, such as in cases where a competitor complains about the anti-competitive effect of an existing contract.

Some types of telecommunications agreements, such as interconnection agreements, are routinely reviewed by regulators. Interconnection agreements are discussed in Module 3. The following discussion focuses on other types of agreements between telecommunications operators.

Two categories of agreements may raise concerns of anti-competitive conduct. "**Horizontal agreements**" are agreements among competitors. They will cause concern to the extent that they restrict the competitors' ability to compete independently.

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Box 5-15: Some Other Forms of Abuse of Dominant Position

The following list includes common types of abuses not discussed in detail elsewhere in this Module. This list is not exhaustive.

- **Excessive Prices** – This is perhaps the most common form of “exploitative” abuse of a dominant or monopoly position in the telecommunications sector. It is not an anti-competitive abuse but an exploitation of consumers. (It is discussed in Module 4 and Appendix B.)
- **Restriction of Supply** - A monopolist or dominant firm may refuse to invest in network infrastructure and supply new customers, preferring to serve a limited range of customers. This limited range of customers may provide a secure stream of profits, and requires less additional capital.
- **Refusal to Deal** – Refusal by a telecommunications operator to deal with a competitor is not always anti-competitive. Refusal by a dominant operator to do so may be anti-competitive, where the effect is injurious to competition. The most common example involves refusal by an incumbent operator to provide essential facilities, such as local loops required by competitors to compete (see discussion in this Module and in Module 3). However, other forms of anti-competitive refusal to deal occur in telecommunications markets.
- **Unjust Discrimination** – A dominant firm may discriminate unjustly or unfairly between customers, or between competitors (including itself). Discrimination may involve prices or other conditions of service. Regulators have traditionally prohibited such discrimination where it is exploitative, exclusionary of competition or otherwise harms competition or consumer welfare. Regulators generally do not prohibit all forms of discrimination, particularly those that have no harmful effects. Rules on which forms of discrimination are “unjust” vary from country to country.
- **Abuses Involving Intellectual Property** – Anti-competitive abuses of dominance may occur, for example in exclusionary IP licensing arrangements, and in attempts to monopolize adjacent markets.

“**Vertical agreements**” are agreements between upstream and downstream participants in the same or related markets. These agreements can exclude or restrict competition or harm consumer welfare. Problematic vertical agreements include some agreements that fix retail prices or grant exclusive distribution rights in a given geographic market.

Only horizontal or vertical agreements that have anti-competitive effects should be prohibited. There are many useful forms of horizontal agreements. These include some agreements to adopt common standards, or other product specifications or design features. Such industry standardization may result in greater production efficiency. It can also promote competitive entry by establishing an “open” market with increased product interoperability.

Certain vertical agreements can also benefit the public, such as exclusive marketing agreements that induce a distributor to invest in the development of a

difficult new market. Exclusive arrangements can also be used to maintain high levels of customer support.

Box 5-16 deals with three types of problematic agreements found in telecommunications and other industries: price-fixing, bid-rigging and market allocation agreements. The first two are generally horizontal agreements. Market allocation agreements can be horizontal or vertical.

Other types of agreements can have anti-competitive effects, depending on the circumstances. Some are subject to legal prohibitions and remedies in different countries. Remedies and sanctions for restrictive agreements are generally similar to those for abuse of dominance. They can include fines, awards of damages or other compensation, orders rescinding agreements and other corrective orders.

Box 5-16: Examples of Restrictive Agreements

- **Price Fixing** price fixing agreements among competitors are designed to manipulate pricing. The simplest example is an agreement on the prices to be charged to consumers. Variations include agreements to jointly implement price increases, resist price decreases, establish a formula to generate uniform prices, or remove lower price products from the market in order to shift demand to higher price products.
- **Bid-rigging** - is collusion among bidders in order to determine who will win or what the winning price or conditions will be. Various forms of bid-rigging can occur. Some bidders may agree not to submit a bid in response to a particular tender. They may agree to submit tenders at higher prices or incorporate conditions that are deliberately inferior. Another variation involves competitors agreeing to take turns as to which of them is to succeed in a particular tender, a practice often referred to as "bid rotation". This can inflate prices for all bidders.
- **Market Allocation** – can be implemented by horizontal or vertical agreements. Market allocation reduces competitive entry. In horizontal agreements, competitors allocate geographic or product markets amongst themselves. They will agree not to compete in each other's markets. Such agreements are anti-competitive, and should almost always be prohibited. In vertical market allocation agreements, it may be acceptable to support a period of territorial exclusivity. This may be required to induce investment to develop a market properly. Competition from suppliers of substitute products or services may also reduce the anti-competitive impact of such agreements.

Evidence of Anti-competitive Effect

Legal and regulatory approaches to restrictive agreements vary. In some countries, some forms of restrictive agreements are prohibited outright. In other jurisdictions, prohibitions incorporate a reasonableness test.

In the US, for example, collusive arrangements among competitors, such as price-fixing and market allocation, are illegal regardless of whether the agreed restrictions are considered reasonable or not. Participants to a restrictive agreement can be punished if it is proven that: (1) such an agreement exists, and (2) it could have anti-competitive consequences.

Similarly, Article 81 (formerly Article 85) of the EC Treaty prohibits all agreements between undertakings "which may affect trade between Member States and which have as their object or effect the prevention, restriction or distortion of competition within the common market". Article 81 specifically prohibits price-fixing and production allocation agreements which prevent, restrict or distort competition.

A different approach is taken in Canada. There, only agreements among competitors that lessen competition "unduly" are prohibited. Accordingly, in Canada, it is necessary to prove: (1) the existence of a prohibited agreement; and (2) that the agreement lessens competition unduly. This additional requirement is a major reason why there have been few successful prosecutions in Canada for agreements that would be recognized as anti-competitive in other jurisdictions.

5.4 Mergers, Acquisitions and Other Corporate Combinations

5.4.1 Concerns About Mergers

The review and approval of mergers, acquisitions and other corporate combinations (all referred to as "mergers" for convenience here) is normally entrusted to competition authorities or other branches of government rather than to telecommunications regulators. However, there has been a high level of merger and acquisition activity in the global telecommunications industry in recent years. Consequently, the analysis of mergers and acquisitions can be expected to become a more

important part of competition policy in the telecommunications sector.

Many mergers will have little or no negative impact on competition. Some mergers may be pro-competitive, for example, by enhancing production efficiencies resulting from economies of scale or scope. Mergers may also create new synergies, lead to innovation by combining talents of different firms, and provide additional resources to develop new products and services.

Concerns about mergers, acquisitions and other corporate combinations are generally based on the same concerns about anti-competitive behaviour as discussed earlier in this Module. The main concern is that a larger merged firm may increase its market power. To the extent a merged firm becomes more dominant in a market, there is a greater potential to abuse this dominance. Merger controls aim to prevent the accumulation and exercise of market power to the detriment of competitors and consumers.

The basic rationale for merger control is that it is better to prevent firms from gaining excessive market power than to attempt to regulate abuses of their market power once such power exists. In practice, merger reviews and the exercise of related powers by competition authorities are usually based on an evaluation of the impact of a specific merger on competition in the relevant markets.

Types of Mergers and Acquisitions

Mergers can be characterized according to three categories: **horizontal mergers**, which take place between firms that are actual or potential competitors occupying similar positions in the chain of production; **vertical mergers**, which take place between firms at different levels in the chain of production (such as between manufacturers and retailers); and **other mergers**, such as those which take place between unrelated businesses or conglomerates with different types of businesses.

Merger reviews typically focus on horizontal mergers since, by definition, they reduce the number of competitors in the relevant markets. Also of concern are mergers between a firm which is active in a

particular market and another which is a potential competitor.

In the telecommunications industry, vertical mergers can also be of concern. The merger of a firm that provides essential inputs to other firms can be problematic if the supply of those inputs to other firms is threatened. For example, the merger of a dominant local access provider with a major Internet Service Provider can raise concerns about whether other ISPs will obtain local access services on fair and non-discriminatory terms. Such a merger might be reviewed in order to ensure that adequate safeguards are in place to protect competing ISPs.

5.4.2 Merger Analysis

Large mergers, acquisitions and some other corporate combinations require prior review and approval in some jurisdictions. As part of their review, competition authorities may prohibit mergers or approve them subject to conditions. Mergers are usually only prohibited or subjected to conditions if the authority concludes that the merger will substantially harm competition. Given the discretion inherent in the interpretation of this threshold, various competition authorities have published merger guidelines. These are intended to assist firms and their advisers to anticipate the procedures and criteria which will be applied in assessing a merger.

An example of such guidelines is contained in the Horizontal Merger Guidelines published in 1997 by the US Department of Justice and the Federal Trade Commission. The Guidelines set out a five-stage analysis of the following subject areas:

- market definition;
- identification of firms participating in the relevant market and their market shares;
- identification of potential adverse effects of the merger;
- analysis of barriers to market entry; and
- evaluation of any efficiencies arising from the merger.

The importance of market definition was discussed in Section 5.2.1. In the context of a merger review, market definition is often the key factor in determining whether a merger is anti-competitive. If a market is defined broadly, the merging firms may be considered to be competitors. A more narrow market definition may result in a determination that the firms operate in different markets. On the other hand, a broad market definition could lead to a conclusion that the merged entity will face sufficient competition from other firms in the market. A narrower definition could lead to a conclusion that the merged entity would have excessive market power in a smaller market.

The second stage of the analysis is the identification of firms competing in the relevant market and their market shares. The determination of market share will have a direct bearing on an assessment of market power and the potential for abuse of market power by the merged entity. The evaluation of market participants includes not only firms which actually participate in the relevant market, but also firms which could be expected to enter it.

In assessing the potential adverse effects of a proposed merger, attention will typically focus on the establishment or increase of the dominant position by the merged entity. There may also be concerns that the merger, by reducing the number of firms participating in a market, will create conditions which make anti-competitive agreements among them more likely.

The evaluation of barriers to entry is an important aspect of merger review. A finding that there are low barriers to entry can help justify a merger.

Finally, the five-stage analysis concludes with an assessment of any efficiencies to be realized as a result of the merger. In this stage, the objective is to assess efficiency or other welfare gains which can be projected to result from the merger. These will be balanced against any anti-competitive effects which have been identified in the earlier stages of the review.

Theoretically, substantial efficiency gains or other public welfare gains could support approval of a merger even where anti-competitive risks are identified. In practice, it is difficult for a competition author-

ity to quantify the positive and negative aspects of the transaction and arrive at any verifiable net effect. It may also prove difficult to determine how any efficiency or other welfare gains will be distributed between the producing firm and its customers. Similarly difficult is the development of any means to ensure redistribution of efficiency gains to broader public advantage.

In exceptional circumstances, a merger which would have anti-competitive effects may be permitted where one of the merging entities is in severe financial distress. The competition authority may be persuaded that the public interest is better served by a merger than by the failure of one of the merging entities. However, transactions of this sort should be carefully evaluated. Sometimes the merger is not the best solution. For instance, it may be that another firm could expand productive capacity using the assets of the failing firm and that public welfare would be better served by this alternative solution. Bankruptcy is painful for shareholders, but does not always have a long-term negative effect on the economy.

Information in Merger Reviews

As part of the merger review process, the merging firms must normally provide information to the reviewing authority. It is standard practice in jurisdictions which impose merger review to require parties to the merger to submit advance notice of the proposed transaction. The information disclosed in the pre-merger notification will normally be used by a competition authority in the first stage of merger review (i.e., to determine if any anti-competitive concerns are present and whether to proceed with a more detailed review of the proposed transaction).

The contents of pre-merger notifications are generally defined by law or regulation. Required information typically includes:

- the identity of the firms involved in the proposed transaction;
- a description of the nature and commercial terms of the transaction;
- the timing of the transaction;

- financial information on the firms involved (including revenue, assets and copies of annual or other financial reports);
- identification of related ownership interests and the organizational structure of the firms involved, and
- a description of the relevant product and service markets in which the firms operate.

The initial information filing typically triggers a waiting period, during which the reviewing authority will be entitled to request further information. This process concludes with a determination by the reviewing authority whether to proceed with a more detailed investigation.

If the competition authority decides to proceed with a further investigation, it will obtain more information from the merger participants. Additional information is usually gathered from third parties such as competitors and customers. Commercially sensitive information is also generally protected from public disclosure.

During a more detailed review, a competition authority will normally seek information about matters such as the following:

- products, customers, suppliers, market shares, financial performance;
- activity of competitors and competitors' market shares;
- availability of substitute products;
- influence of potential competition (including foreign competition);
- pace of technological or other change in the relevant markets, and its impact on competition; and
- nature and degree of regulation in the relevant markets.

The quality of a merger review will depend heavily on the quality and range of information available to the reviewing authority.

5.4.3 Merger Remedies

The goal of merger control laws is to prevent or remove anti-competitive effects of mergers. Three types of remedies are typically used to achieve this goal:

- **Prohibition or Dissolution** - The first remedy involves preventing the merger in its entirety, or if the merger has been previously consummated, requiring dissolution of the merged entity.
- **Partial Divestiture** – A second remedy is partial divestiture. The merged firm might be required to divest assets or operations sufficient to eliminate identified anti-competitive effects, with permission to proceed with the merger in other respects.
- **Regulation/Conditional Approval** - A third remedy is regulation or modification of the behaviour of the merged firm in order to prevent or reduce anti-competitive effects. This can be achieved through a variety of one-time conditions and on-going requirements.

The first two remedies are structural, and the third remedy is behavioural. Behavioural remedies require ongoing regulatory oversight and intervention. Structural remedies are often more likely to be effective in the long run and require less ongoing government intervention.

Partial divestiture or behavioural constraints are less intrusive in the operation of markets than preventing a merger from proceeding or requiring dissolution of a previously completed merger. Partial divestiture can reduce or eliminate anti-competitive effects while preserving some of the commercial advantages of a merger. Partial divestiture is emerging as a preferred remedy in many jurisdictions. Although it has since been abandoned, the proposed Telia/Telenor merger, which is described in Box 5-17 provides a good illustration of the use of this remedy.

Box 5-17: Case Study - The Telia / Telenor Merger

On 13 October 1999, the European Commission approved the merger of Swedish telecommunications operator, Telia AB and Norwegian operator, Telenor AS into a new company to be jointly controlled by the Swedish and the Norwegian governments.

On its initial review, the Commission identified a number of concerns due to the breadth of operations and market presence of Telia and Telenor, in their respective domestic markets. In addition, the Commission expressed concern with certain overlapping interests, such as the interest of each operator in competing mobile companies in Ireland. In addition, a significant concern was raised about Telia and Telenor's ownership of cable TV networks in each of their domestic markets.

To secure Commission approval of the proposed merger, Telia and Telenor volunteered the following commitments:

- each of Telia and Telenor would divest its cable television operations;
- each company would divest overlapping operations in the Swedish and Norwegian markets;
- one of Telia or Telenor would divest its Irish mobile telephone interests; and
- each of Telia and Telenor would implement local loop unbundling in its domestic market to facilitate the development of local competition.

The divestiture of cable assets is consistent with the Commission's *Cable Ownership Directive*. The commitments made to secure Commission approval for the merger represent a mix of structural and behavioural remedies to address identified anti-competitive effects. The commitments to divest operations are structural remedies. The commitment to implement local loop unbundling is a behavioural remedy requiring ongoing regulatory oversight.

Note: Although the merger was conditionally approved, it was later abandoned due to inability to agree on certain implementation matters.

We will now move to behavioural remedies. Some proposed mergers raise concerns about the potential for ongoing anti-competitive behaviour by the merged firm. Remedial orders issued in response to these concerns are generally similar to the remedies for abuse of dominance discussed earlier in this Module. Box 5-18 describes the US FCC's decisions in recent Bell Operating Company mergers in the US. It illustrates the types of behavioural remedies that may be imposed in telecommunications industry mergers. These orders are likely to focus on the supply of products or services to competitors and

the prevention of anti-competitive pricing practices by the merged entity.

A merger may impact existing regulatory treatment of one or more of the merged firms in a number of ways. For example, if a merger significantly increases a firm's market share or market power, the regulator may review earlier decisions to forbear from regulation. Similarly, it may review an earlier determination that an entity involved in the merger was not dominant in its market, and was thus entitled to a lighter degree of regulation.

Box 5-18: Case Study - FCC Review of Bell Atlantic/Nynex and SBC/Ameritech Mergers

The Bell Atlantic/Nynex Merger

On 14 August 1997, the FCC approved the merger of Nynex Corporation into Bell Atlantic Corporation. The FCC's review was conducted pursuant to sections of the *Communications Act of 1934*, which requires FCC approval for transfers of operating licences and other authorizations. These sections required a demonstration that the merger is in the public interest. Accordingly, the parties to a proposed merger have the onus of proving that the transaction will enhance competition or that it will otherwise be in the public interest. The merger was also subject to approval of the US Department of Justice (DOJ).

In this and other merger reviews, the FCC applied the 1997 DOJ/FTC Horizontal Merger Guidelines. The FCC also evaluated the proposed merger on the assumption that the market opening initiatives introduced by the *Telecommunications Act of 1996* had been implemented. Applying this framework, the FCC concluded that the merger would have significant anti-competitive effects.

The first concern was that the merger would remove Bell Atlantic as a potential Nynex competitor in the New York market. The second concern was that continuing Bell Operating Company consolidation increased the likelihood of co-ordinated action among the remaining market participants.

The FCC reviewed claims of merger-related efficiencies put forward by the parties (including cost savings, accelerated broadband deployment and service quality improvements), and concluded that these fell far short of overcoming anti-competitive effects and of demonstrating a net public benefit. The FCC concluded that substantial barriers to entry would remain and that, without the benefit of additional measures, market entry could not be relied upon to constrain the exercise of market power.

Ultimately, the FCC decided to approve the proposed merger based on the following market opening commitments volunteered by Bell Atlantic. These commitments were to be made enforceable conditions for approval of the merger:

- the provision of detailed performance monitoring reports to competitors and regulators regarding performance of Bell Atlantic's networks and operational support systems (OSS);
- negotiated performance standards and enforcement mechanisms covering all major aspects of OSS operation and network performance;
- development and implementation of uniform OSS interfaces for the combined Bell Atlantic / Nynex region;
- operator-to-operator OSS testing in response to competitor requests, with a further obligation of providing evidence to the FCC that OSS functions could meet demand for resold services and unbundled network elements;
- offering interconnection, unbundled network elements and transport and termination services at rates based on forward-looking economic cost;
- offering unbundled switching and shared transport services priced on a per minute of use basis, routed in the same manner as Bell Atlantic's phone traffic and without the imposition of access charges; and
- optional payment plans permitting new entrants to pay recurring charges for what would otherwise be non-recurring charges, an installment payment plan for co-location and other large non-recurring charges and alternative payment mechanisms for common construction costs and competitor-specific construction and equipment costs (with cost apportionment consistent with earlier FCC orders).

These conditions were subject to a sunset limitation. They were due to expire 48 months following the release of the merger approval order.

Box 5-18: Case Study - FCC Review of Bell Atlantic/Nynex and SBC/Ameritech Mergers (cont'd)

The SBC / Ameritech Merger

On 6 October 1999, the FCC approved the merger of Ameritech Corp. into SBC Communications Inc. FCC approval was required and proceeded under the same statutory framework as the Nynex / Bell Atlantic merger. As a result of the merger, SBC will control three of the original seven Regional Bell Operating Companies (Southwestern Bell Telephone, Pacific Telesis and Ameritech). Perhaps because of this greater degree of consolidation, the FCC appears to have required a more onerous set of conditions in order to approve the merger.

In its review, the FCC was primarily concerned about the effects of the merger in removing a significant potential competitor from each of the participating firms' local markets. Concerns were also expressed about impeding the implementation of the market-opening requirements of the *Telecommunications Act of 1996*. Again, the FCC concluded that claimed efficiencies and other merger benefits were insufficient to overcome the identified anti-competitive effects.

Both the DOJ and FCC reviews of the SBC / Ameritech merger concluded that the merged entity would have to divest itself of cellular telephone licences in identified service markets (14 in all). This would eliminate overlapping operations by the two merged firms in those markets. The FCC concluded that the transfer of Ameritech's international authorizations to SBC would be approved subject to the SBC subsidiaries being classified as dominant international operators on US-South Africa and US-Denmark routes.

The most striking aspect of the FCC Decision is the range of conditions to be imposed on the merged entity. The conditions (30 in all) include:

- establishing a separate affiliate for the deployment of advanced services (which must obtain facilities and services from SBC companies on the same terms as competitors and be subject to a "comprehensive" annual audit);
- enhanced OSS loop information and loop conditioning to facilitate competition in advance services;
- enhanced OSS and performance measurement data to improve and monitor interconnection and other competitor provisioning (with identified "incentive payments" to be made by SBC if performance measures are not met);
- interconnection agreements to be made available on a multiple state and "most-favoured-nation" basis;
- identified operator-to-operator "promotions", including a loop discount of 25% off the otherwise lowest monthly loop charge (subject to "state-specific quantity limits");
- a commitment to enter at least 30 out of territory, major markets as a facilities-based competitive local service provider (to business and residential customers) within 30 months of the merger closing (and subject to an "incentive payment" of up to \$1.2 billion U.S if the entry requirements are not met in all 30 markets); and
- a number of residential service enhancements, including "life line plans" for low-income subscribers and additional quality of service and network reliability reporting requirements.

These conditions are of limited duration. SBC undertook that each of the conditions would remain in effect for a period of 36 months from first implementation.

5.4.4 Joint Ventures

In some cases, telecommunications competitors may enter into joint ventures. The competition analysis of joint ventures generally raises similar issues to those discussed under the title Restrictive Agreements earlier in this Module. The process and information requirements for review of a joint venture will resemble those discussed earlier under the title Merger Analysis and Remedies.

Questions will be raised about whether a joint venture will bring about a significant reduction in

competition or result in the exercise of market power to the detriment of competitors or consumers. Joint ventures can become vehicles for anti-competitive collusion between firms that would otherwise be competitors. Such ventures can also result in the creation or reinforcement of a dominant position.

Box 5-19 illustrates some of the considerations taken into account in a large-scale telecommunications joint venture recently reviewed by the European Commission.

Box 5-19: Case Study - The BT/AT&T Joint Venture

On 30 March 1999, the European Commission approved the creation of a joint venture between British Telecommunications plc and AT&T Corp. to create a global telecommunications services company. The final decision marked the conclusion of an in-depth inquiry commenced in December 1998. This inquiry was prompted by concerns that:

- The joint venture would create or reinforce a dominant position in the supply of international telecommunications services to large corporations and other telecommunications operators;
- the joint venture would create or reinforce a dominant position for certain telecommunications services in the U.K.; and
- the joint venture would result in anti-competitive co-ordination in the U.K. market given AT&T's ownership interests in competitors to BT (ACC and Telewest).

The joint venture was assessed with a view to determine whether it would create or strengthen a dominant position and significantly impede competition contrary to Article 2 of the European Community Merger Regulation and Article 85 (now 81) of the EC Treaty.

The Commission concluded that the presence of substantial competition in the international services markets, as well as "plentiful additional capacity" supported the conclusion that the joint venture did not create or strengthen a dominant position. Although the Commission found that AT&T and BT had about half the traffic volume on the U.K./US route, it also found that the parties controlled only about 20% of capacity with planned additional capacity and falling prices for new capacity supporting competitive entry.

However, the Commission expressed a number of "co-ordination concerns" regarding U.K. markets. These included concerns about AT&T's interests in BT competitors ACC and Telewest (the former a competitive long distance telephone services provider, the latter a major operator of telephony enabled cable TV systems). The Commission was also concerned about the distribution of AT&T /Unisource international telecommunications services in the U.K. To overcome these concerns, AT&T volunteered undertakings to:

- divest its interests in ACC U.K.,
- reinforce the structural separation between AT&T and its Telewest holdings, and
- facilitate the appointment of another Unisource services distributor in the U.K. (since the existing U.K. distributor, AT&T U.K., would be wound up).

The Commission granted approval for the joint venture subject to compliance with these undertakings.

MODULE 6

Universal Service

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MODULE 6

UNIVERSAL SERVICE

6.1 *Universal Service and Universal Access*

6.1.1 *Introduction*

This Module deals with the concepts of universal service (US) and universal access (UA) in the telecommunications sector. These concepts can be described as follows:

Universal Service policies generally focus on promoting or maintaining “universal” availability of connections by individual households to public telecommunications networks. The objective of connecting all, or most, households to public telecommunications networks is generally referred to as the “Universal Service Obligation” (USO). US is a practical policy objective in many industrialized countries. However it is not economically feasible in most developing countries, where universal access is a more practical objective.

Universal Access generally refers to a situation where every person has a reasonable means of access to a publicly available telephone. UA may be provided through pay telephones, community telephone centres, teleboutiques, community Internet access terminals and similar means.

While US and UA policies can be quite different, the concepts are closely related. In some cases, the terms US, USO and UA are used interchangeably. In this Module, we use the term **universality** to refer to both US and UA.

The overriding objectives of universality policies are to expand and maintain availability of affordable telecommunications services to the public. In particular, US and UA policies are aimed at providing or maintaining service to those who would not normally be served. This population includes those in high cost service areas, such as rural and remote regions, as well as lower income groups.

This Module reviews the key issues in the development and implementation of universality policies and programs.

Section 6.1 provides background information on telecommunications universality. It lists the main objectives for introducing universality programs, and describes the economics of universality.

Section 6.2 deals with the definition of US, UA and the USO. The definitions vary among countries. The underlying economics of universality suggest that richer industrialized countries will focus on providing a range of increasingly sophisticated services to

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every household, while developing countries will focus on providing public access.

Innovative programs in countries such as South Africa, Chile and Peru demonstrate that it is possible to make advanced telecommunications services, including Internet access, available to the public at a reasonably low cost. Good universality policies can go a long way to bridging the "digital divide" between "online" and unserved populations in developing as well as industrialized countries.

Section 6.3 addresses the question: How to fund universality programs? That section reviews the main approaches used in different countries. These approaches include:

- **Market-Based Reforms:** especially privatization, competition and cost-based pricing;
- **Mandatory Service Obligations:** imposed by licence conditions or other regulatory measures;
- **Cross-subsidies:** between or within services provided by incumbent operators;
- **Access Deficit Charges (ADCs):** paid by telecommunications operators to subsidize the access deficit of incumbents; and
- **Universality Funds:** independently administered funds that collect revenue from various sources and provide targeted subsidies to implement universality programs.

These approaches are not mutually exclusive. Most countries use more than one approach.

Industrialized countries have gradually introduced market-based reforms, such as privatization, competition and cost-based pricing over the last two decades. Despite concerns to the contrary, the evidence suggests that teledensity levels increased, and did not decrease, after these reforms were implemented. Many other countries around the world, with historically lower telecommunications penetration levels, have also introduced similar reforms in recent years. In these countries, well-designed sector reforms have led to large gains in telecommunications service penetration levels.

Traditionally, most countries have relied to some extent on the second and third approaches listed above: that is, mandatory service obligations and cross subsidies. These mechanisms were intended to subsidize unserved or high cost subscribers from revenues earned from other subscribers or services. Such transfers are often implicit rather than explicit. International and long distance services, for example, have traditionally been priced well above cost. Surplus revenues from these high-priced services were intended to be used to subsidize higher cost or lower margin services, particularly residential local access lines.

Today, cross-subsidies between services are increasingly viewed as impractical and anti-competitive. With the onset of competition in international and long distance services, rates have fallen. This has left smaller subsidies available to support the universality objective.

Economists and other telecommunications experts have long criticized inter-service cross-subsidies. Cross subsidies can promote inefficiency and depress demand for services (e.g. Internet services) that must pay artificially high international rates. They also constitute a form of hidden taxation, which may be regressive. For example, a cross-subsidy regime may require poor migrant workers, who will never be able to afford a personal telephone, to pay high long distance rates to subsidize individual line services to their wealthier fellow citizens.

Finally, large cross-subsidies have fallen out of favour with telecommunications experts today because they simply have not been effective as a tool to promote universality. Some of the countries with the highest international, business and long distance service rates in the world have retained some of the lowest telephone penetration or teledensity rates. Other countries with similar or lower levels of GDP have often increased their teledensity levels significantly after implementing alternative approaches to promoting universality.

Access Deficit Charges are used to promote universality in some countries. An ADC regime is like a traditional cross-subsidy regime, but modified to fit a competitive market. In an ADC regime, other operators pay subsidies to finance the total local access deficit incurred by the incumbent in providing

local services that are priced below cost. Like cross-subsidies that are internal to the incumbent, ADCs have been criticized for their reliance on inefficient and potentially anti-competitive subsidies. A number of regulators, including those in Australia and Canada, have reformed their ADC regimes by targeting subsidies to finance only the access deficit incurred in providing service to high-cost areas and/or low-income subscribers. Others, such as the UK's OfTel, have abolished ADCs altogether.

The final approach discussed in this Module is the universality fund. This approach is seen as the best option in an increasing number of industrialized and developing countries. The approach has many variations. These are sometimes called USO funds, US funds or UA funds.

Universality funds collect revenues from a variety of sources. These include government revenues, charges on interconnecting services and levies on all telecommunications service operators. The revenues collected in these funds are then used in a variety of ways to promote universality objectives. In contrast to ADCs, universality funds are generally used to finance specific and targeted high cost areas and/or low income subscribers. In practice, the most efficient funds provide relatively small subsidies to incent private sector telecommunications operators to expand their networks to serve specifically targeted service areas. These are typically areas where service would otherwise be uneconomic (i.e. where costs cannot be recovered from available subscriber revenues).

Section 6.4 addresses the main issues involved in designing an effective universality fund.

The last half of this Module is devoted to case studies of universality policies and programs in a range of different countries. The case studies are referred to throughout the Module to illustrate various approaches and issues.

6.1.2 Objectives of Universality Policies

Governments and regulators pursue universality policies for different reasons. In many countries there is strong political support for extending US or at least UA to unserved members of the public.

The following are some of the major objectives for implementing universality policies:

- *To permit full participation in 21st Century society.* Access to telecommunications is increasingly being viewed by policy makers as a basic right of all citizens, essential to full membership in the community. The objective of ensuring access is gaining momentum due to the increased reliance on the Internet and related new media by all sectors of society. It is widely recognized today that telecommunications services are necessary for far more than personal and business communications. Today, telecommunications delivers all types of information, goods and services to the public; including essential government, social, educational and medical services, and a wide range of e-commerce services. Those without access to telecommunications services risk becoming increasingly marginalized members of 21st Century society.
- *To promote national political, economic and cultural cohesion.* These nation-building considerations call for the widespread availability of telecommunications throughout a country's territory. Creating a single market, and even a single nation-state, requires effective telecommunications.
- *To promote economic development.* While the relationship between economic and telecommunications development is a complex one, an increasing amount of research suggests that telecommunications leads to economic growth. With the increasing ubiquity of the Internet and e-commerce, countries or regions without adequate telecommunications infrastructure will not be able to reap the benefits of the "new economy".
- *To encourage more balanced distribution of the population.* Telecommunications can encourage development outside congested metropolitan areas. This objective is often cited in industrialized countries, where "telecommuting" can ease traffic and pollution in urban areas.
- *To eliminate disparity between rural and urban areas.* This objective is particularly apt in lower

income countries. Figure 6-1 illustrates the disparity between urban and rural access to telecommunications in various regions. Only in high-income countries is the ratio of urban to rural teledensity close to being balanced. The ratios of urban to rural teledensities in developing regions is considerably higher, ranging from a high of about 7:1 in South Asia, to a low of the about 2.5:1 in Eastern Europe, Central Asia, Latin America and the Caribbean.

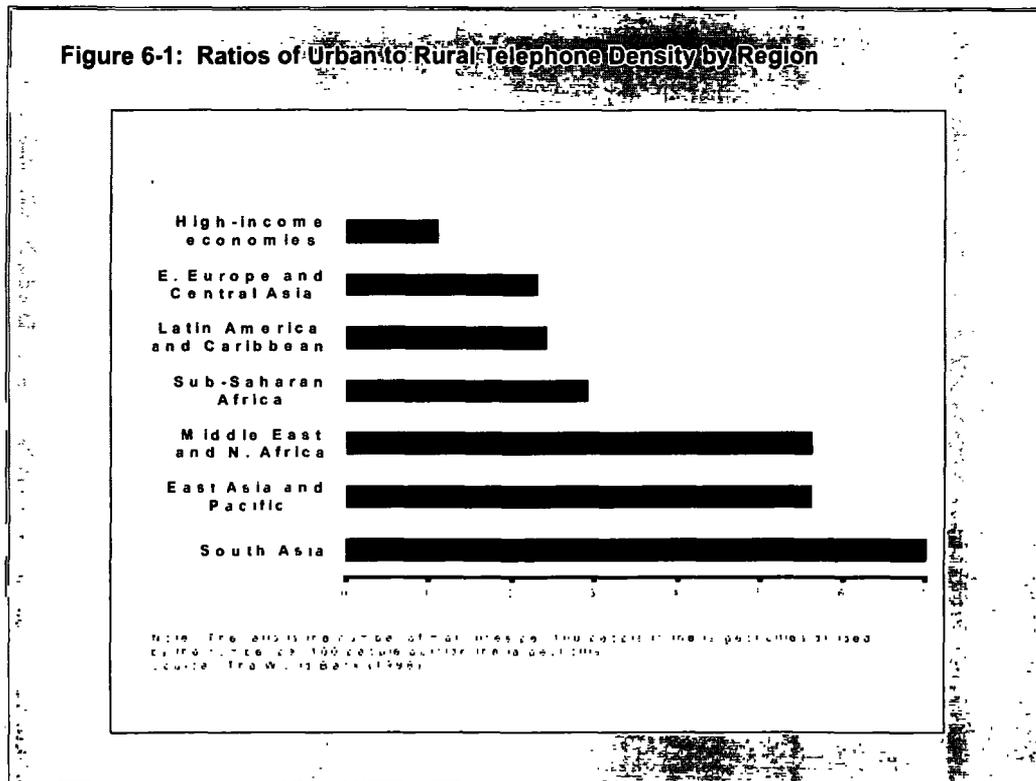
6.1.3 The Economics of Universality

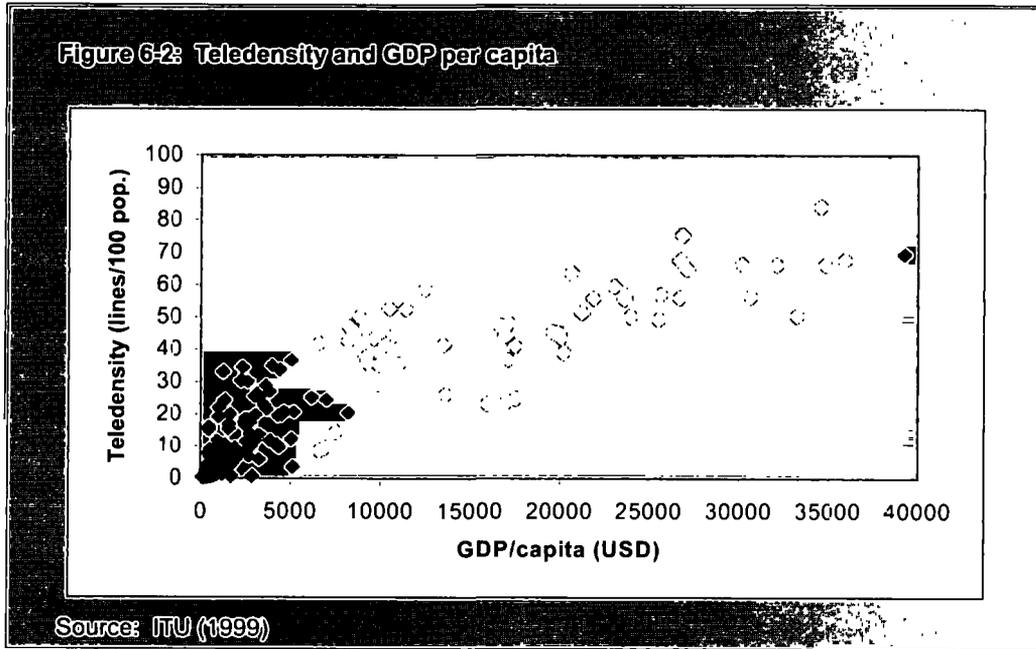
Universality and Economic Development

- The most important determinant of telecommunications universality is economic development. There is a strong relationship

between the national telephone penetration rate, and a nation's per capita Gross Domestic Product (GDP). Figure 6-2 illustrates the relationship between teledensity and per capita GDP.

- The strong relationship between teledensity and GDP per capita provides explanations for major differences in teledensity in different countries. It is not surprising that countries such as the USA, Canada, Japan, France and Germany rank high in teledensity levels, compared to most countries in Africa, for example. A sample of teledensity levels reported by the ITU is included in Table 6-1.





In general the maximum amount of revenue available to fund telecommunications networks and services depends on per capita income levels within a country. It is clear, from Table 6-1, however, that per capita income levels do not absolutely determine teledensity levels. Table 6-1 illustrates that there are many variations in the relationship between GDP per capita and teledensity. For instance, the distribution of income within a country will determine the number of households that can actually afford to have access to telecommunications services. The table also makes it clear that penetration of public telephone lines and cell phones varies considerably across the range of countries illustrated.

In some of the least developed countries, aid from foreign governments and multilateral institutions, such as The World Bank, has provided supplementary resources to expand teledensity levels. Cross-subsidies from international telephone accounting rates, and other external sources have also

increased teledensity levels in some countries. However, such sources of external revenues are declining. This decline is due, in part, to the widespread perception that scarce public development funds should be devoted to other purposes since private capital is generally available to fund telecommunications network development.

Expenditures on Telecommunications

Although national per capita income levels impose a constraint on universality, there are significant differences in the percentage of income that is spent on telecommunications in different countries. For example, in some countries with a relatively low GDP per capita, less than 1% of GDP is spent on telecommunications. In other countries with similar GDP per capita, as much as 4% or 5% of GDP is spent on telecommunications. These differences and the general trend in telecommunications spending are illustrated in Figure 6-3.

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Table 6-1: Teledensity in Selected Countries

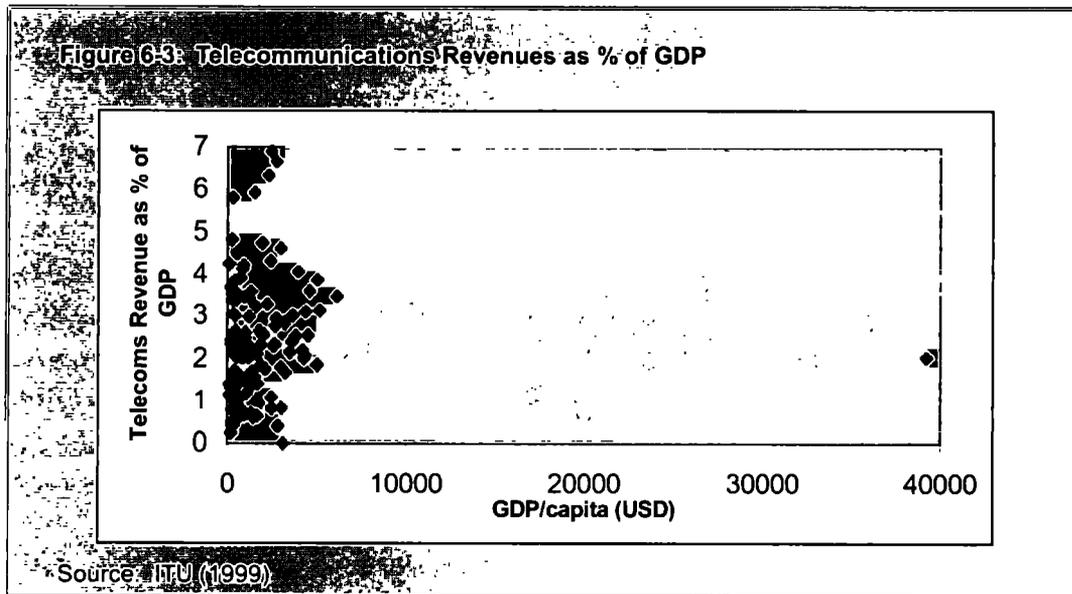
Country	GDP per capita (in 1997 USD)	Teledensity (Telephone lines per 100 people 1998)	Public teledensity (Public telephone lines per 1000 people 1998)	Mobile cellular phones (per 100 people 1998)
Angola	1,684	1.0	0.0	0.1
Argentina	8,214	20.0	2.7	7.9
Bangladesh	262	0.3	0.0	0.1
Cameroon	617	0.5	0.0	0.0
Canada	20,608	63.4	6.1	17.6
Colombia	2,424	17.3	1.4	5.0
Czech Republic	5,052	36.4	3.6	9.4
Egypt	1,195	6.0	0.1	0.1
Germany	25,625	56.7	1.9	17.0
Haiti	447	1.0	-	-
India	451	2.0	0.4	0.1
Indonesia	1,068	3.0	1.1	0.5
Japan	33,231	50.3	6.2	37.4
Mexico	4,216	10.4	3.3	3.5
Morocco	1,218	5.4	1.1	0.4
Nepal	220	0.9	0.0	-
Peru	2,676	6.7	2.0	3.0
Russia	3,030	20.0	1.3	1.0
South Africa	2,979	11.5	3.5	5.6
Thailand	2,478	8.4	2.0	3.3
Ukraine	974	19.1	1.1	0.3
USA	30,173	66.1	6.5	25.6

"-" means zero or a quantity less than half the unit shown.

Source: ITU (1999)

The international experience provides a good rule of thumb for testing the effectiveness of universality policies. There are differences in national telecommunications expenditures. However, on average,

around the world, people spend about 2% to 3% of their incomes on telecommunications. This relation generally holds true for whole countries, regions, cities, and on average to households.



This rule of thumb that an average of about 2.5% of per capita income is spent on telecommunications worldwide is useful in a number of ways. For example:

- Where the costs of providing telecommunications access is greater than 2.5% of local incomes, external subsidies may be required to promote UA. Funding mechanisms, such as a universal access fund, can be designed with this rule of thumb in mind. Local residents will generally be willing and able to pay about 2.5% of their incomes on telecommunications services, and the fund may be required to subsidize the rest of the costs.
- Where it would cost less than about 2.5% of local income to provide telecommunications services, but no service is available in an area, there is often a sector policy problem. In many cases, one or more of the following problems exists:
 - Poor telecommunications sector governance
 - No priority given to telecommunications development
 - No reliance on private sector funding to expand networks

- No competition in relevant telecommunications markets
- No effective universality policies

In many countries, lack of supply and not lack of demand is the principal reason for low teledensity. Problems, such as those listed above, have resulted in long waiting lists for telephone service in many developing countries. As illustrated in Figure 6-3, consumers around the world are willing to spend a reasonable percentage of their income on telecommunications, if service is provided to them.

A review of international experience makes it clear that the actions of governments and regulators determine the level of universality that is achieved in a specific country. While national incomes place constraints on the upper level of universality, it is clear that some countries have been far more successful than others in providing their citizens with access to telecommunications.

Specific examples of experience with universality policies are found in the case studies in the Appendix to this Module. The case studies of countries such as Peru and Chile demonstrate that good universal access policies can significantly expand service without large government expenditures, even in remote areas with low income levels.

It is clear that low teledensity levels in many developing countries have two distinct causes: (1) under-supply of telecommunications services due to inadequate sector policies, and (2) low demand due to low incomes. The first cause should be addressed first. The most effective and lowest-cost means to increase teledensity in countries that have not already done so, is to implement telecommunications sector reforms such as competition, privatization and pricing reform (e.g. price rebalancing). Evidence around the world demonstrates that reforms of this type will remove many supply constraints on the sector.

However, such sector reforms will generally not be sufficient to address the second cause of universality problems – insufficient local incomes to support the rollout of telecommunications networks. Most of this Module is devoted to regulatory approaches that address that second cause of universality problems. The main approaches are mandatory service obligations, cross-subsidies, ADCs and universality funds.

Before reviewing these approaches, however, we will consider the definitions of US, UA and the USO.

6.2 Defining Universality: What to Fund?

6.2.1 Different Countries: Different Approaches

Reasons to Define US and UA

Countries have defined universal service (“US”) and/or universal access (“UA”) for a number of reasons. In some cases, universality definitions have been established as a part of national telecommunications development plans. Such definitions sometimes include specific target dates and service levels.

In some countries, state planners or policymakers prescribed certain levels of universality. Such prescribed levels were often included in telecommunications policies or national plans. This was particularly true in some centrally planned economies with state-owned operators, or econo-

mies with former state-owned operators that are in transition to market economies. Such definitions of universality were sometimes unrealistic, and many universality targets have been missed in developing or transitional economies. “Planned” levels of universality will only be effective where they are linked to realistic implementation measures, including funding mechanisms.

More care should be taken in defining US or UA when specific universality implementation measures are introduced. Such definitions are generally developed to define the mandatory service obligations of an operator that is designated as a “Universal Service Provider”. A definition may be included in the licence conditions of the US provider at the time of its privatization. Definitions are also required as part of specific USO funding mechanisms, such as ADCs and universality funds.

Matching Universality Definitions to Local Conditions

The definitions of telecommunications universality are very different, for example, in Switzerland than in Pakistan. Realistic universality definitions reflect local economic and sector conditions. The level and distribution of national income are important factors. Another key factor is the distribution of a country’s population. The resources required to provide telecommunications services to the same number of people will vary depending on whether the majority of the population is concentrated in metropolitan areas, or is widely dispersed in rural areas. National geography, topology and security matters may also be important factors.

Two distinct aspects can be noted in the definition of universality in all countries:

Types of access – At the most general level, the difference between US and UA is that the former generally refers to individual or private (exclusive) access, while the latter refers to community or public (shared) access. Universality definitions sometimes include requirements for a certain level of both private and public access.

Types of services - Basic access is typically defined to include voice-grade fixed access to the PSTN. However, many universality definitions amplify this requirement. Some countries include enhanced or value-added services, including Internet access, within the scope of their universality regimes.

As a general rule, developing and transitional countries place greater emphasis on basic public access. Industrialized countries can afford to define universal service more broadly to include advanced features. Details of different types of universality definitions are included in the following sections.

6.2.2 Universal Service in Industrialized Economies

Table 6-2 provides a summary of the types of service contained in the definitions of universal service in selected OECD member countries. The table provides a good sense of the scope of universality as currently defined in those countries. It should be kept in mind that the definitions are not static. They are evolving with market conditions and public demand.

A review of the definitions in Table 6-2 makes it clear that most of the listed OECD countries have defined universal service to include much more than basic public access to voice telephony. In most cases, the prescribed level of universal service must be provided to individual subscribers on demand at regulated rates. In some cases, these regulated rates are fixed below cost and subsidized through cross-subsidies, ADCs or universality funds. Details of funding approaches are provided in Section 6.3 and in the case studies in the Appendix.

6.2.3 Universal Access in Developing and Transitional Economies

Many different universality definitions and objectives are used in developing and transitional economies.

Table 6-3 provides a selected list of universal access policies and operator obligations established by various developing and transitional economies.

In all but the richest of the developing and transitional economies, it is unrealistic to set a universal service objective of providing fixed telecommunications service to each household, at least in the near term. In such economies, the regulatory focus tends to be expansion of access services. Effective universality policies in these countries generally concentrate on:

- > Expansion of new access services, rather than support of existing services
- > Expansion of services to remote or high cost areas and low income subscriber groups, where it is currently uneconomic to provide service
- > Priority on public access services, rather than private household access

Table 6-3 provides examples of some “disconnects” between the definition of universal access and the mechanism to implement such access. For example, in a number of countries where the UA definition calls for a phone in every village, no obligations are imposed on the incumbent operator to supply such phones. More significantly, in many countries, no funding mechanism is defined to implement the universality objectives.

Modelling the Viability of Universality Programs

A number of analytical tools are available to regulators and policy makers to develop realistic universality definitions and implementation policies. Financial models have been developed to determine the cost and feasibility of expanding service to unserved areas. In general, these models calculate the difference between the cost of providing service in specific regions and the projected telecommunications revenues available in those regions.

Table 6-2: Universality in Selected Industrialized Countries

Summary of Definitions of Universal Service in Selected OECD Countries	
Australia	Standard telephone services, including voice telephony and, if voice telephony is not practicable due to a disability, another form of communication equivalent to voice telephony (e.g. a teletypewriter); payphones; prescribed carriage services.
Canada	Individual line local service with touch-tone dialing, provided by a digital switch with capability to connect via low speed data transmission to the Internet at local rates; enhanced calling features, including access to emergency services, Voice Message Relay service, and privacy protection features; access to operator and directory assistance services; access to the long distance network; a copy of a current local telephone directory.
USA	Voice-grade access to the PSTN, with the ability to place and receive calls; Dual Tone Multi-frequency (touch-tone) signaling or its functional equivalent; single party service; access to emergency services; access to operator services; access to directory services; access to long distance services.
Austria	Access to the PSTN via a fixed network connection, through which a fax machine also can be operated, including the transfer of data at rates compatible with transmission paths for voice communication; free access to emergency services; access to directories of subscribers, as well as directory enquiry services; public pay telephones.
Denmark	A telephony network and an associated telephony service; an ISDN network and the associated ISDN services; leased lines (excluding broadband lines); special services and tariffs for disabled subscribers; public radio-based maritime distress and safety services; directory enquiry services.
Italy	Voice telephony (also capable of providing fax G3 and data transmission); provision of directory for local area users; provision of customer information service; payphones; special services for the disabled; connection to emergency services.
Norway	Public voice telephony; operator assistance; emergency and directory inquiry services; public payphones.
Spain	Basic telephone service including local, national and international access; free directory services; public phones; special services for disabled people.
Switzerland	Real time voice transmission or voice band and digital data transmission, keypad tone dialing and main entry in telephone directory; additional services such as call forwarding, privacy protection, itemized billing and outgoing call barring; emergency services; directory services; public telephones; text service; operator assistance.
United Kingdom	Connection to the fixed network able to support voice telephony and with speed data and fax transmission (and the option of a more restricted service package at a lower cost); public telephones; free access to emergency services; itemized billing; selective call barring; access to operator assistance and directory assistance.

Source: Adapted from OECD (1999)

Table 6-3: Universality in Selected Developing and Transitional Economies

Summary of Universality Access Definitions and Obligations		
Country	Universal Access policy	Operator Obligations
Bhutan	A phone booth in every village.	No obligations.
Comoros	A phone in every locality.	No obligations.
Costa Rica	Within 1 km of both public and private access.	No obligations.
Cuba	Access to all villages and to communities of more than 500 inhabitants.	Licence conditions stipulate by the end of the first 8-year programme all villages of more than 500 inhabitants must have access.
Ethiopia	A phone booth in every town.	Obligations under preparation.
Guinea	A telephone box for every locality; a telephone exchange for every administration.	Service and interconnection expected; no specified obligations.
Iran	Telephone facilities to all villages of more than 100 people.	Expansion, service quality, interconnection and service to the elderly as part of licence conditions.
Kenya	A phone within walking distance.	A performance contract entails obligations on service quality and expansion.
Kyrgyzstan	A phone booth in every town; a phone in every home.	Expansion, service quality and interconnection contracted with the government.
Lesotho	A public telephone within 10 km of any community.	Voluntary objective to be achieved by 2002.
Madagascar	A public phone in every village.	No obligations.
Maldives	At least one telephone booth per 500 inhabitants; a phone on every island.	Operator's licence condition is to provide access to basic telecommunications services to the whole country by the year 2000.
Mozambique	A public telephone within distance of less than 5 km. At least one public telephone in each of the 144 district centres.	Expansion, service quality and interconnection contracted with the government.
Pakistan	A phone in every village.	No obligations.
Togo	A telephone within a 5 km radius by 2010; a telephone in every administrative and economic centre of importance	Contract with the state to determine the objectives for development and plurality of service.
Zambia	Telephone booths in public places (schools, clinics, etc) countrywide.	No obligations.

Source: Adapted from ITU (1998a)

Cost projections may be based on specific network construction studies, or on local or international benchmark costs for building new lines. Revenue projections can be developed in different ways. One approach is to start with per capita income estimates for residents of the target region, and then to multiply those estimates by the number of inhabitants in an area. The results can then be used to determine whether the provision of new telecommunications services is financially viable.

For example, we know that, on average, people are willing and able to spend about 2.5% of their income on telecommunications services (see Figure 6-3). A very rough estimate of the viability of providing a specified level of service (e.g. one payphone per village) can be made by determining whether it will cost more to provide that level of service than about 2.5% of the village's estimated income (per-capita income multiplied by the number of inhabitants). The same type of study can be conducted for clusters of villages or regions.

If it is determined that a specified level of universal access is not financially viable, the same type of model can be used to estimate the shortfall between the projected costs and revenues of providing new access lines. This type of approach is used in the successful Chilean and Peruvian universality funds (See Appendix.) It can then be determined whether a source of revenues will be available to subsidize the shortfall between costs and revenues. The financial model can project the amount of subsidies required to make the service financially viable.

Similar types of models have been used to project the number of rural pay phones that can be financially viable in different countries. An example of the results of such a model is presented in Table 6-4. If a country's universal service policy requires a greater number of payphones than the market can support, a subsidy mechanism must generally be developed to implement the policy successfully.

6.3 *Implementing Universality: How to Fund It?*

6.3.1 *Criteria for Selecting Universality Mechanisms*

This section considers the five main mechanisms in use around the world today to implement universality policies. These mechanisms are:

- **Market-Based Reforms:** especially privatization, competition and cost-based pricing.
- **Mandatory Service Obligations:** imposed by licence conditions or other regulatory measures.
- **Cross Subsidies:** between or within services provided by incumbent operators.
- **Access Deficit Charges (ADCs):** paid by telecommunications operators to subsidize the access deficit of incumbents; and
- **Universality Funds:** independently administered funds that collect revenue from various sources and provide targeted subsidies to implement universality programs.

This list is not exhaustive and the mechanisms are not mutually exclusive. One (or more) of these mechanisms constitutes the main regulatory tool to promote US and UA in most countries. There are many variations on the five mechanisms. Specific examples of the application of these mechanisms are included in the case studies in the Appendix to this Module.

The following sections of this Module describe the five mechanisms. The strengths and weaknesses of each are reviewed. In considering the different approaches, a number of criteria should be kept in mind. The following are particularly relevant:

Table 6-4: Modelling of Financial Viability of Rural Payphones

Rural Population Required to Support One Rural Public Phone in Different Countries			
Country	Rural GDP/Capita (USD)	Investment/Line (USD)	Rural Population to Support One Public Phone
Argentina	2,327	3,000	28
Bangladesh	171	1,000	187
Bolivia	299	9,000	535
Botswana	1,315	7,000	97
Brazil	843	9,000	190
Colombia	321	8,000	449
Ecuador	446	6,000	251
India	220	2,000	219
Indonesia	444	5,000	216
Kenya	140	5,000	687
Malaysia	1,152	2,000	42
Mexico	1,108	10,000	159
Nepal	139	7,000	574
Pakistan	275	2,000	175
Paraguay	812	7,000	158
Peru	295	10,000	597
Philippines	386	3,000	166
Thailand	1,212	4,000	66
Uganda	134	8,000	1,077
Zimbabwe	236	6,000	474

Source: Dymond and Kayami (1997)

Note: GDP/capita and cost numbers are based on data from mid-1990's

➤ **Compliance with International Trade Rules:** The *WTO Regulation Reference Paper* which forms part of the *WTO Agreement on Basic Telecommunications* deals with universality and subsidy issues. The Reference Paper is reproduced in the Appendix A of the Handbook

and contains the following provision regarding US:

Universal Service - Any Member has the right to define the kind of universal service obligation it wishes to maintain. Such obliga-

tions will not be regarded as anti-competitive per se, provided they are administered in a transparent, non-discriminatory and competitively neutral manner and are not more burdensome than necessary for the kind of universal service defined by the Member.

In addition to this specific section on US, the Reference Paper has a number of other provisions that could impact upon the choice of universality mechanism, and particularly a mechanism that uses cross-subsidies. For example, the Paper provides that:

Appropriate measures shall be maintained for the purpose of preventing suppliers who, alone or together, are a major supplier from engaging in or continuing anti-competitive practices [including...] engaging in anti-competitive cross-subsidization.

If a country that has committed to the regulatory rules in the *WTO Agreement on Basic Telecommunications* maintains a universal service mechanism that infringes the Agreement, it will be open to a trade complaint to the WTO from other signatory countries.

- **Economic Efficiency:** Some universal service mechanisms are more efficient than others. The degree of economic efficiency will depend, among other things, on which services receive and provide the subsidies, and on the size of the subsidy. Among the least efficient mechanisms are implicit cross subsidies between services of an incumbent that are neither quantified nor targeted. Such cross-subsidies are maintained in many countries, particularly those that retain state-owned incumbents. It is generally assumed in such countries that high international and long distance rates are being used to subsidize low local access rates and to promote universality objectives.

In reality, such implicit cross subsidies are often misdirected and wasteful of resources. For example, under such an approach, low-income international callers subsidize low access rates for high income local service subscribers. Many of the local access subscribers who benefit from

such cross-subsidies would continue to pay for local access even if their rates were rebalanced to cover underlying costs.

Such cross-subsidies also depress demand for higher cost services that provide the subsidies (e.g. international, long distance, Internet and value-added services). This effect not only reduces operator revenues but can reduce overall economic activity. Similar inefficiencies are associated with other universality mechanisms that distort prices. This applies, for example, to ADCs which inflate long distance rates to provide subsidy to the access services of the incumbent.

In contrast, the most efficient mechanisms are those that provide small targeted subsidies to promote specific universal service initiatives. On the revenue side, the more efficient mechanisms will collect revenues from government sources or from a widely-based range of telecommunications services, rather than only from specific "high margin" services, like international or long distance services. Broadly based collection mechanisms with uniform charges will also reduce the inefficiencies associated with operators "gaming" the system by by-passing highly-taxed services or attempting to have their services classified as low-taxed or untaxed.

- **Political Considerations:** These are undoubtedly important to any regulator that is appointed by, or accountable to, government or a legislature. Public relations and political considerations are often cited as reasons not to introduce market-based reforms, such as rebalancing rates, elimination of cross-subsidies, and, in some countries, privatization. Political considerations can also be used to argue against increased taxes or levies on telecommunications revenues to finance a universality fund.

In many cases, hindsight proves that the political risks of introducing telecommunications sector reforms are exaggerated. For example, when cost-based rate rebalancing was first proposed in countries in North America a decade or more ago, there were dire predictions of decreased teledensity levels or network "drop off". Looking

back, it is clear that teledensity levels actually increased in most countries as local access rates went up. (See Table 6-5.) The same is true in many countries where privatization was introduced. Initially, political and labour reaction was often strong. In retrospect, most telecommunications privatizations in the last decade are now seen as successful initiatives to expand network infrastructure while maintaining reasonable rate levels.

Many proactive regulators realize that they can play an important role in shaping political and public opinion about telecommunications sector reforms. Some political opposition to sectoral reform is based on ignorance or blatant self-interest by established players. Regulators can often play an essential role in analyzing and publishing the real costs and benefits of different universality options for politicians and the public.

6.3.2 Promoting Universality: Comparing the Options

Table 6-5 lists the main options for promoting universality dealt with in this Module. Major advantages and disadvantages are noted for each option. These advantages and disadvantages are dealt with in more detail in the following sections. Note that in our detailed discussion of universality funds in section 6.4 we provide a set of criteria for the selection of the most appropriate revenue collection mechanism for that specific universality approach. Some of those criteria may also be applicable to the revenue collection aspects of some of the other universality approaches discussed below.

6.3.3 Sector Reform and Universality

In many countries, particularly those with developing and transitional economies, outdated sector policies are a principal cause of universality problems.

Many of these countries have low income levels, and undoubtedly have many poor people who could benefit from domestic or international programs to promote universal access. However, in many cases, these countries also have large unserved populations that are willing and able to pay for personal or community telecommunications access. These include businesses that could increase economic

activity if they had the telecommunications services to do so.

Experience in a growing number of countries around the world indicates that the introduction of market-based reforms can significantly increase the supply of telecommunications services. This experience is supported by an increasing body of statistical evidence, including multiple regression studies. In many countries, a few key telecommunications sector reforms would eliminate most supply constraints. Three key reforms will be considered here:

- Privatization
- Competition
- Cost-based pricing

Privatization

There is a growing amount of data available to demonstrate that privatization increases the supply of telecommunications services. Privatization has significantly increased teledensity and public telephone penetration in a variety of different types of countries.

Privatization promotes universality for a number of reasons. First, network expansion targets are often included in contracts or licences that form part of the privatization process. However, that is only one reason. Privatized operators have surpassed many mandatory network expansion targets. Investors in the privatized operators have demonstrated their willingness to meet or exceed rollout targets, not simply to comply with legal obligations, but as a profit-maximizing strategy. There are other reasons why privatization promotes universality. These include:

- Availability of private capital to fund network expansion;
- Commercial incentives to supply service to meet demand;
- Improved management; and
- Reduced political and bureaucratic constraints on extending service.

Table 6-5: Options for Promoting Universality

Main Options for Increasing Universality – Advantages and Disadvantages		
Option	Advantages	Disadvantages
<p>1. Market-Based Reforms: (Privatization, Competition & Cost-Based Pricing)</p>	<ul style="list-style-type: none"> ➤ Proven effectiveness in expanding service in economies with state-run telephone monopolies ➤ Privatization tied to specific network roll-out obligations (sometimes including non-economic areas) ➤ Combination of 3 reforms should provide incentives for continuous service to all areas that are economic to serve ➤ Reforms are consistent with sector development in all areas (i.e. not just uneconomic areas) 	<ul style="list-style-type: none"> ➤ Privatization, competition and cost-based pricing will not expand service to uneconomic areas (however these reforms can be supplemented by targeted subsidies to achieve universality objectives in uneconomic areas) ➤ Some conflict between these 3 reforms. Direct competition and rebalancing may be limited immediately after privatization to maximize network rollout obligations. Exclusivity periods are often granted in order to maximize privatization proceeds to the government
<p>2. Mandatory Service Obligations: (imposed by licence conditions or other regulatory measures)</p>	<ul style="list-style-type: none"> ➤ Can be effective, if realistic and not anti-competitive ➤ Most effective for newly licensed or newly privatized operators 	<ul style="list-style-type: none"> ➤ Places burden of financing universality on specific operators; with potentially anti-competitive effects (if USO burden outweighs benefits) ➤ Sometimes used as a rationale to limit other sector reforms: rebalancing & competition
<p>3. Cross Subsidies: (between or within services provided by incumbent operators)</p>	<ul style="list-style-type: none"> ➤ Traditional approach in place in many countries; often combined with mandatory service obligations 	<ul style="list-style-type: none"> ➤ Promotes inefficiency; demand is depressed for higher cost services that provide subsidies, and entry is foreclosed in subsidized markets ➤ In most cases, only existing users receive the subsidy. ➤ Anti-competitive effects are difficult to detect and prevent
<p>4. ADCs: (Access Deficit Charges paid by telecommunications operators to subsidize the access deficit of incumbent operator)</p>	<ul style="list-style-type: none"> ➤ Spreads burden of financing uneconomic access services across all operators (including competitors) 	<ul style="list-style-type: none"> ➤ Difficult to calculate access costs; difficult to implement and administer in a transparent and efficient manner ➤ Inefficient (as with cross-subsidies)

Table 6-5 Options for Promoting Universality (cont'd)

		<ul style="list-style-type: none"> ➤ Difficult to calculate benefits of USO provider; can lead to excessive access charges to competitors.
<p>5. Universality Funds: (e.g. USO, US or UA funds that collect revenue from various sources and provide targeted subsidies to promote universality programs)</p>	<ul style="list-style-type: none"> ➤ Most effective means of providing targeted subsidies to expand or support uneconomic service ➤ Potentially most efficient ➤ Most transparent ➤ Work best in expansion of service to new areas if combined with competitive bids for private operators 	<ul style="list-style-type: none"> ➤ Some administrative complexity and transaction expenses in establishing fund; some potential for bad governance; difficult to forecast associated costs and revenues

Competition

Competition generally has positive universality effects. These include increased teledensity and public payphone penetration and reduced waiting lists. Competition has also resulted in significantly increased penetration of wireless service, which is becoming a substitute for wireline services in many countries. The relationship between competition and teledensity has been demonstrated in studies of both developing and industrialized country markets.

Cost Based Pricing

As discussed in other Modules, “rate rebalancing” refers to initiatives to align prices for individual telecommunications services more closely with costs. In most countries, this means increasing local subscription and usage rates and decreasing international, long distance and Internet access rates. When rate rebalancing was first proposed in most countries, some predicted that higher local access rates would lead to lower teledensity levels.

Ten years later, the evidence indicates that such concerns were exaggerated. Penetration levels actually increased after rate rebalancing, at least in OECD countries, where most research has been done.

This result is not surprising since, in most OECD countries, the evidence indicates that rate rebalancing resulted in lower overall prices of telecommunications service for most consumers. Other reforms, such as privatization and introduction of competition, also stimulated price decreases in these countries.

In addition, the evidence indicates that the price elasticity of access services is very low. In other words, relatively few people will give up telephone access due to an increase in access rates. The research is consistent with the conclusion that local access services and telephone calling services are complementary. Therefore a decrease in the price of usage will result in an increase in demand for access services. In other words, demand for access service is influenced at least as much by the level of usage rates as by the access charge.

Figure 6-4 and Figure 6-5 demonstrate that there has been significant price rebalancing over the last decade in business and residential telecommunications markets in OECD countries. While fixed charges, such as those for local access, have increased significantly, prices have declined overall. During this period, teledensity increased every year despite the increase in fixed charges. As Figure 6-4 demonstrates, this trend continued even in 1991 and 1996, when fixed business charges increased around 10% each year.

Figure 6-4: Index of OECD Business Charges and Teledensity

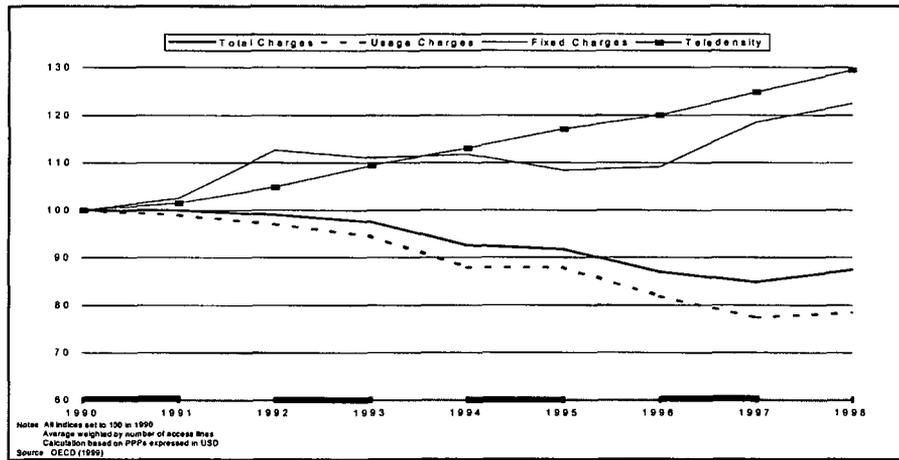
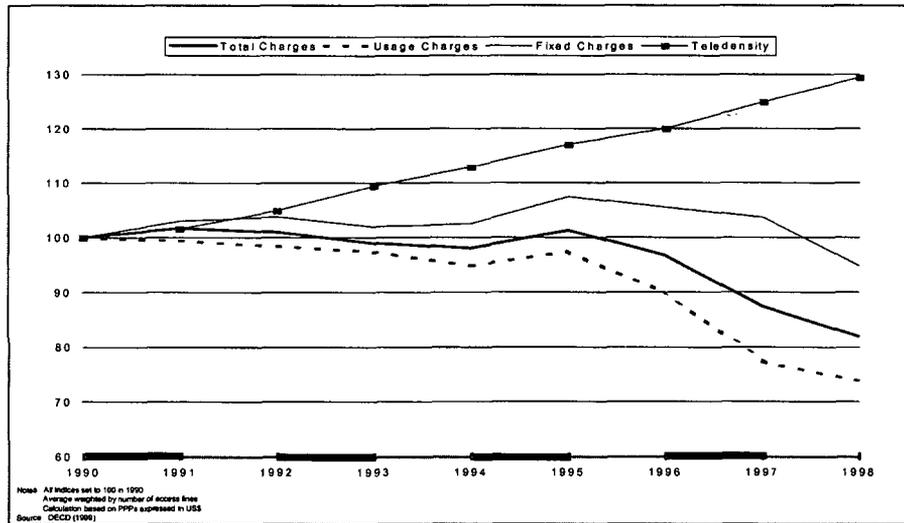


Figure 6-5: Index of OECD Residential Charges and Teledensity



The positive relationship between rebalancing and teledensity also seems to apply to developing countries. For instance, as Ros and Banerjee (2000) have shown, higher subscription prices result in higher telephone penetration rates and in reduced waiting lists. While this relationship seems counter-intuitive, there are good explanations. The main reason is that residential subscription rates tend to be set below economic costs. As operators are permitted to raise these rates, they are able to reduce their access deficits. It becomes profitable, rather than unprofitable, to construct more network access lines. Thus, higher prices lead to increased supply.

The experience with rate rebalancing in OECD countries is discussed further in Appendix 4-1 of Module 4.

6.3.4 Mandatory Service Obligations

Perhaps the most commonly used mechanism for promoting universality is the mandatory service obligation. In some countries, this obligation is described as a “duty to serve” all customers willing to pay the prescribed rates.

Geographic limits are sometimes prescribed for areas where service is mandatory. For example, such areas include urban areas but not remote rural areas where no telecommunications infrastructure is installed. In most cases, new services must be installed within a prescribed time after an application for service is received. Compliance is monitored through quality of service indicators.

The operator with a general obligation to serve all customers is usually referred to as the universal service provider. In most cases, it is the incumbent operator.

In some countries, governments and regulators have imposed mandatory service obligations on newly licensed or newly privatized operators. These may include obligations to provide service throughout certain areas (especially for wireless operators) or to install a specific number of lines within a certain period (coverage and rollout obligations).

Such mandatory service obligations are currently the most common mechanisms used to expand tele-

communications networks in developing economies. They are used in the case of most privatizations and new licence grants. A major benefit of implementing such mandatory service obligations is that the funding is generally provided by the private sector.

There are disadvantages to imposing excessively high roll-out obligations. A privatized operator normally has a commercial incentive to roll out service to previously unserved customers that are able to pay for its service. If privatized operators are subjected to uneconomic service obligations they will have to finance such obligations through monopoly profits, cross-subsidies or future considerations. In other cases, an operator may simply fail to meet its roll-out obligations.

Table 6-6 presents a sample of recent licence obligations in developing and transitional economies.

6.3.5 Cross-Subsidies

For decades, in most countries, internal cross-subsidization by the incumbent operator has been the main mechanism used to promote universality in the telecommunications sector. Such cross-subsidization involves the use of surplus revenues earned from profitable services to cover losses from providing non-profitable services. In the context of universality, we are primarily concerned with the use of such cross-subsidies to maintain low access rates, particularly in high cost areas.

Theodore Vail, the driving force behind the early success of AT&T in the USA at the turn of the last century, promoted universal service through cross-subsidization. This was a means of expanding the reach of the telephone, and thus the value of AT&T's service to the public. While the public interest was undoubtedly a concern, this policy was also very valuable to the company, which soon became one of the largest business corporations in the world.

Incumbents have often been encouraged by regulators to maintain a policy of internal cross-subsidization in order to extend telephone access services, and to maintain low access rates. Similar policies were adopted by both state-owned and privately-owned operators during the monopoly era of telephony which lasted for most of the 20th Century.

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Several types of internal cross-subsidies were commonly used by incumbents:

- **Inter-service cross-subsidization.** Connection and access services are usually priced below cost and long distance and international calling are priced above cost. In this instance, the subsidy flows from long-distance and international calling to access and local calling. Other services may also provide or receive subsidies.
- **Intra-service cross-subsidization.** A common example is geographic tariff averaging, where access prices in rural or other higher-cost areas are set at the same level as in urban and other lower-cost areas. Another example involves the pricing of business access services, which were often set much higher than residential access services.

A number of countries maintain more complex targeted cross-subsidy regimes. One example is Colombia, where residential households in low-

income "strata" pay lower access rates than households in high income "strata".

While internal cross-subsidization has been the most commonly used mechanism to promote universality; it is being phased out in many countries. The cross-subsidy approach has a number of weaknesses that make it undesirable and probably unsustainable in the long run. These weaknesses include:

Competitive unsustainability: Cross subsidies are increasingly unsustainable in a competitive environment. New entrants typically target profitable market segments or classes of service (i.e. the services or areas that provide subsidies, rather than those that receive it.) This reduces or eliminates subsidies.

International accounting rate reform: International accounting rates are being significantly reduced in the near to mid-term, hence reducing or eliminating a major source of funding for cross-subsidization in many countries.

Table 6-6: Selected Licence Network Expansion Obligations

Country	Company	Obligation
Ghana	Ghana Telecom	225,000 new telephone lines within 5 years, starting in 1996.
Mexico	Telmex	Starting in 1990, average annual line growth of 12% p.a. to 1994. Public payphone density of 2 per 1,000 inhabitants by 1994 and 5 per 1,000 inhabitants by 1998.
Panama	Cable and Wireless	From 1997, increase teledensity to 25% by 2002. Install 600 rural payphones within 2 years.
Peru	CPT and Entel	Starting in 1994, add 978,000 telephone lines by 1998. Install 19,000 public telephones by 1998.
Venezuela	CANTV	Increase telephone lines by 355,000 p.a. from 1992 to 2000.
South Africa	Telkom	Starting in 1997, install 2.69 million new lines by 2002. Install 120,000 new public pay phones by 2002.
Philippines	9 International Licensees	Each install 300,000 new access lines within 3 years of obtaining licences.
	5 Cellular Licensees	Each install 400,000 access lines within 5 years of obtaining licences.

Sources: Various, including ITU (1998a)

- **Inefficiency of untargeted subsidies:** All existing access users generally receive the subsidy, whether they can afford to pay the full economic price or not.
- **Subsidies promote inefficient consumption:** Demand is depressed for higher cost services that provide subsidies, and entry is foreclosed in subsidized markets (competitors cannot match low prices).
- **Anti-competitive use of subsidies:** Subsidies from profitable services are intended to support universality. However, in many cases the cross-subsidy regimes are not quantified or carefully monitored by regulators. As a result, the incumbent may engage in anti-competitive subsidization as well. For example, surplus revenues from monopoly international or long distance services may be used to provide below-cost Internet access services, thereby driving competitive ISPs out of the market.
- **In most cases, only existing users receive the subsidy.** While access rates may be low in many urban areas, those without telephone service, in rural areas or on waiting lists, do not benefit from the subsidy.

These problems have initiated an international trend away from reliance on internal cross-subsidies. While such cross-subsidies remain important in many countries, including most industrialized nations, they are increasingly being phased out or supplemented by more efficient targeted mechanisms to promote universality.

An exception to the trend away from cross subsidies involves services to physically handicapped and other disadvantaged subscribers. A number of countries maintain subsidized services to the hearing impaired and the blind, among others.

6.3.6 Access Deficit Charges

Access Deficit Charges (ADCs) are a variation on traditional cross-subsidy mechanisms. Traditional cross-subsidies are internal to the incumbent. That is, the incumbent uses subsidies from some of its own services to subsidize below-cost prices, usually for local access services.

With the onset of competition, regulators in some markets, including the USA, Canada, and Australia, initially established ADC systems to replace or supplement internal cross-subsidies. The difference is that in an ADC regime, all providers of subsidizing services (e.g. long distance services) must contribute payments to subsidize access services. In other words, in the example above, the subsidy “tax” is expanded beyond the incumbent and spread across all competitors in the long distance market.

Like cross-subsidies that are internal to the incumbent, ADCs have been criticized as being inefficient and anti-competitive. Some regulators, notably including those in the UK, Australia and Canada, have recently rejected or reformed ADC regimes. Other regulators, including those in the USA are reviewing their ADC regimes. ADCs are referred to as “supplementary charges” in some countries. A detailed description of the approach to ADCs is included in the USA case study in the Appendix.

ADCs are imposed on designated operators as a means of financing the local access deficit that results from local services of the incumbent being generally priced below cost. More specifically, ADCs may be used to subsidize either broad service categories (for instance, all access services) or narrower categories (such as only residential access services).

ADCs are often collected in a similar manner to interconnection charges. In most cases, this means they are collected on a per-minute basis. In other cases they are collected on a per trunk basis, or on some other basis. They may also be collected by means of a levy on telecommunications service revenues earned by contributing operators. In the latter case, they resemble a tax.

Whatever means is used to collect ADCs, they should not be bundled or confused with standard interconnection charges. International trade law and best practice require ADCs and other payments that promote universality to be collected in a transparent, non-discriminatory and competitively neutral manner. Interconnection charges should be separate from ADCs, and should be cost-based and unbundled. (See discussion of *WTO Agreement on Basic Telecommunications* in Section 6.3.1 above, and in Module 4, Price Regulation).

ADCs were traditionally collected and administered by the universal service provider in many countries. However, regulatory reform, and the impetus of the *WTO Agreement on Basic Telecommunications*, has caused most regulators to establish an independent administrator to collect and disburse ADCs.

If an ADC regime is to be maintained, ADCs should be calculated based on detailed estimates of the access deficits (i.e. access revenues minus costs of the universal service provider). Such calculations form the basis of the ADC regimes in several countries, including the USA. In other countries, such calculations have led to the conclusion that ADCs should be abolished (as in Australia and the UK), or that there is no need for an ADC regime (as in some European countries). The European Commission has established criteria to be applied by its member states in determining whether an ADC regime or similar USO charges should be established. These and other examples are described in the case studies in the Appendix.

The move by several industrialized countries to eliminate or replace ADCs is based on a growing perception that ADCs are a problematic and inefficient mechanism for promoting universality. Perceived problems with ADCs include:

- ADCs inflate the prices of the subsidizing services and, therefore, reduce the demand for them. (e.g. long distance or international services). ADCs are an economically inefficient means to collect the required subsidy. The demand for long distance calling, for example, is relatively price elastic compared to other telecommunications services, such as access service. Therefore, ADCs can reduce demand for these services in a disproportionate manner, hence contributing to economic inefficiency.
- ADCs encourage bypass of the PSTN. In countries where ADCs are charged for interconnected services (e.g. the USA), competitors have a strong incentive to terminate services to customers by means other than the PSTN. Such bypass may be uneconomic, in the sense that the competitors could terminate calls more cheaply on the PSTN if they did not have to pay the ADCs for PSTN termination. Therefore, ADCs can promote inefficient duplication of

network facilities and deprive the incumbents of interconnection revenues they would earn, except for the bypass.

- Technological and market developments are starting to reduce the distinction between local minutes of traffic and minutes of traffic that pay ADCs (e.g. international or long distance). IP Telephony and “refiling” of long distance traffic by CLECs are two developments that undermine the viability of ADC regimes. These developments make it difficult to detect and measure minutes of traffic that should contribute to ADCs. As a result, the collection of ADCs will become increasingly problematic.
- Finally, many of the problems with ADCs are the same as those of traditional cross-subsidies that are internal to the incumbent. These problems are listed in the previous Section 6.3.5.

6.3.7 Universality Funds

Universality funds, sometimes called US funds, USO funds or UA funds, are generally seen as the best option for promoting universality objectives. This view is shared in an increasing number of countries, including those with industrialized, transitional or developing economies.

Universality funds collect revenues from various sources and disburse them in a fairly targeted manner to achieve specific universality objectives. Depending on the country, the source of revenues may include government budgets, charges on interconnecting services, levies on subscribers (e.g. on access lines) or levies on all telecommunications service operators.

In contrast to ADCs, universality funds are generally used to finance specific and targeted high cost areas and/or low income subscribers. The most efficient funds provide relatively small subsidies to incent private sector telecommunications operators to serve targeted service areas. These are typically areas where service would otherwise be uneconomic (i.e. where costs cannot be covered by available subscriber revenues). Good examples of the universality funds are included in the case studies of Chile and Peru, set out in the Appendix.

The design and operation of universality funds is considered in detail in the next Section of this Module.

6.4 *Universality Funds*

6.4.1 *Introduction*

International experience is demonstrating the benefits of universality funds. These funds are designed to meet universality goals by subsidizing specific initiatives to extend or maintain service or access. Such funds have most of the benefits and few of the disadvantages of the other universality funding mechanisms discussed in this Module.

Universality funds (USO, US or UA funds) are special-purpose mechanisms designed to achieve universality objectives. These funds are generally administered independently from the incumbent operator. Subsidies from universality funds are typically used to provide financial support to fund specific programs. Examples include network expansion projects and installation of public payphones or calling centres. While they come in different forms, good funds have a number of features in common. Some of these features are summarized in Box 6-1.

As noted above, two of the most successful universality funds in the world today have been established in Chile and Peru. There are many possible variations on such funds. Some of the main considerations in designing funds are discussed in the remaining sections of this Module.

Universality funds can be used to subsidize existing levels of universal service, or to provide new universal access or service through new network rollouts. Both purposes are discussed below. However, it is clear that universality funds are an ideal mechanism for subsidizing new network rollouts to expand universal access to uneconomic areas. Much of the discussion below relates to funds used for that purpose.

6.4.2 *Sources of Fund Revenues*

Unlike cross-subsidies and mandatory service obligations, universality funds involve the collection

Box 6-1: Features of a Good Universality Fund

- > Independent administration – not related to telecommunications operators
- > Transparent financing
- > Market-neutral – does not favour incumbent operators or new entrants
- > Funding targeted to specific beneficiaries (e.g. high cost regions, unserved rural areas, low income populations, educational & health sectors)
- > Subsidies should be relatively small; should only subsidize the uneconomic portion of service; private sector operators should finance the rest
- > Competitive bidding process for implementation of universality projects: i.e. lowest bidder should be awarded subsidy and right to build and operate networks to expand service

and disbursement of funds by an independent organization. There are various possible sources of such funds. These “collection mechanisms” include:

- > Direct funding from general government revenues (e.g. Chile);
- > Contributions from telecommunications operators (e.g. in proportion to their revenues from specified services);
- > Proceeds from telecommunications privatizations, spectrum auctions and/or licence/concession payments;
- > A subscriber levy (e.g. on a per access line basis) collected by telecommunications operators; and
- > Funding from international development agencies.

If funds are collected from telecommunications operators, or through them from subscribers, the rules of the *WTO Agreement on Basic Telecommunications* should be kept in mind (see Section 6.3.1 above). Specifically, the collection and administration of such funds should be transparent, non-discriminatory, competitively neutral and not more burdensome than necessary for the kind of universal service defined by the country's laws or policies. Below we discuss some of the principal criteria used by regulators for selecting amongst these collection mechanisms. Most regulators have selected contributions from telecommunications operators (i.e. a proportion of operational revenues for universality funding.)

Criteria for Collection Mechanisms

Regulators have established different criteria to determine the best way to collect revenues for universality funds. These criteria include:

- **Economic Efficiency:** All collection mechanisms result in some degree of economic inefficiency. The goal, therefore, should be to collect universality fund revenues in a manner that minimizes economic efficiency losses. For instance, as discussed in Appendix B of the Handbook, Ramsey pricing principles suggest that services with relatively inelastic demand should pay higher universality charges than those with more elastic demand. In practice, for administrative and equity considerations, most regulators have opted for widely-based uniform universality charges rather than Ramsey-based charges. As discussed in section 6.3.1, a uniform widely-based charge will reduce the inefficiencies associated with operators trying to avoid or by-pass highly-taxed services in favour of low-tax or untaxed services. Other analysts have suggested that collecting universality fund revenues from the government budget is the most efficient option. This conclusion is based on the observation that only the government has an overall economic vision and mandate to tax all sectors of the economy, and can, therefore, choose the optimal level and mix of taxation. However, many governments are in the process of implementing fiscal reforms and hence direct government funding is often not a feasible or reliable option.
- **Administrative Efficiency:** Universality revenues should be collected in an efficient and transparent manner. It may be that the existing government revenue collection process is the most administratively efficient because the infrastructure to collect taxes and other revenues already exists. On the other hand, experience suggests that the administrative costs of setting up a universality fund to collect revenues are reasonably low. The collection mechanism should be designed so that the calculation of the amount that each operator is required to pay is relatively simple and not subject to interpretation and controversy. This consideration supports relatively simple and broad collection mechanisms, such as on applied to all telecommunications revenues (basic and non-basic services).
- **Sustainability:** Collection mechanisms must be designed so as to access a relatively stable revenue base. Collection mechanisms based on a specific service or based on minutes may not be sustainable in the long term. Universality funding based on one-off events such as spectrum auctions, may also not be sustainable. The advent of distance-insensitive long-distance calling and the significant growth of mobile wireless telephony is blurring the distinction between local and long-distance calling. Developments in digital and IP technology are also leading to doubts about whether minutes will continue to be the basic unit of measurement for telecommunications. Rather, it may be the bit or the IP packet. Therefore, it may be prudent to select a constant measure, such as revenues, rather than a technology or service specific measure, such as minutes of long distance traffic.
- **Equity:** The collection mechanism should be fair. Many regulators have rejected the economically-efficient option of collecting universality revenues through a levy on access charges due to equity considerations. Such levies would increase local access rates for all, including low-income subscribers. Many observers have argued that telecommunications universality objectives are an aspect of government social policy and that they should, therefore, be funded from the government

budget rather than exclusively from the telecommunications sector. However, as a practical matter, few governments have made funding available for universality funds.

6.4.3 Determining the Amount of Subsidy

Funds can be used to finance various types of universality objectives. However, they are ideal vehicles for financing the expansion of service to specific high-cost areas or populations. The funds in Chile and Peru were used for this purpose, and each country's fund has succeeded in extending new telecommunications access to thousands of rural localities.

Where a subsidy is used to fund specific network extension targets, such as in Chile and Peru, some estimate should be made of the amount of financing that will be required to reach that target. The fund should not pay too much for a network extension project.

There are generally two ways to determine the subsidy required for a network expansion project. They are complementary, and both should generally be used. The first is to estimate the cost of the subsidy using a financial model along the lines discussed in the next section. The second approach is to let the market determine the final amount of the required subsidy, through a competitive bidding process.

It is recommended that the competitive bidding approach should always be used. However, the financial study can be useful for a number of purposes. It can assist in fund budgeting, and assist the fund administrator in determining the maximum subsidies that will be available for the projects. It can also act as a safeguard against possible bid rigging or other attempts to undermine the competitive bidding process.

Cost Models for New Universal Access

A financial model can be used to determine the subsidy required to expand new service to rural and other high cost areas. In general, these financial models calculate the difference between the capital and operating costs of providing service in specific regions and the projected telecommunications reve-

nues available in those regions. Cost projections may be based on network construction estimates or on national or international benchmark costs for new access lines. Revenue projections can be developed in different ways.

The fund should only pay for the uneconomic part of the project. For example, it may cost USD 10 million to provide one or two public telephones per village to 500 very remote villages. However, the financial model may indicate that telecommunications service revenues from those villages can be expected to finance USD 6 million of the cost of the network expansion, plus cover ongoing operating revenues. In this case, the required subsidy from the fund should be no greater than USD 4 million. It may be less once ancillary benefits to the operator are taken into account.

Cost Models for Maintaining Universal Service

Estimating subsidies required to maintain existing levels of universal service is somewhat more difficult and controversial than estimating subsidies required for new network extension projects. This difficulty is due, among other things, to the larger and more diverse scope of the services to be costed and due to the embedded nature of the costs of existing services.

Universality funds in industrialized countries have generally focussed on providing subsidies to existing services or to maintaining below-cost rates for subscribers already on the network. Under these circumstances, a detailed cost model incorporating installation and ongoing costs appears to be the only practical option for estimating the required subsidy. International best practice suggests that the calculation of the net costs of providing the required level of universal service should be based on the long run incremental costing (LRIC) method.

At best, an LRIC cost model only provides a general estimate of the subsidy costs, not a precise calculation. Models incorporate a series of choices about how to assign costs in the network. These choices are made using expert judgement; the choices are not black and white. Disagreements may arise about what geographic areas should be used as net cost areas, how to assess which technologies could have been used to deliver the designated services most

efficiently, whether and how to account for depreciation, how to calculate the cost of capital, how to account for the benefits to the operator of being the universal service provider (see discussion below) and how to judge which network and access costs are truly avoidable, as opposed to costs that would have been incurred in any event.

As a result, there have been significant controversies about regulatory decisions on the level of funding to maintain existing levels of universal services in industrialized countries. In the end, the level of funding is based, in large part, on regulatory judgement. The same controversies will generally exist whether universality initiatives are funded through ADCs administered by an incumbent or through an independent universality fund.

A number of regulators have found innovative solutions to address universal service costing. For instance, the FCC in the USA has made publicly available its Hybrid Proxy Cost Model. As part of a regulatory proceeding, the FCC developed this model based on three other cost models that different parties had submitted. The FCC selected its preferred modules from each of the models and created its own hybrid version.

The FCC model is referred to as a "proxy" because it does not model the network of any specific operator. Rather it may be used with the particular costs of different operators to estimate or "proxy" its TELRIC. The FCC has made the model publicly available (free on the FCC's website and at a nominal cost on CD-ROM) for interested parties. Parties are able to input their own data to run the model and to carry out sensitivity analyses.

Competitive Bidding to Implement Universality Projects

Even the best regulators or universality fund administrators will generally have less information than telecommunications operators about the real costs and benefits of implementing universality initiatives. Therefore, a competitive bidding process is a better approach than cost modelling to determine the final subsidy amount, if any, required to implement a universality initiative.

Competitive bidding is more practical and is administratively simpler in cases where new universal access is to be provided, for example, in an unserved rural area. As previously discussed, the process is more difficult where an incumbent is already providing the designated universal services. Most of the discussion in this section relates to subsidies for new services and not existing ones. However, in principle, competitive bidding processes could be equally effective in determining the amount of subsidy required to maintain existing services.

For example, an auction could be held to determine the amount of subsidy required to maintain or upgrade service in a region where an incumbent currently operates network facilities at a loss. A universality fund administrator might require the incumbent to submit to a competitive tender process as a condition of receiving a continued subsidy for the region. If another financially and technically qualified operator makes a firm bid to operate the network in that region for a lower subsidy, then the incumbent's subsidy might be limited to the lower amount. If dissatisfied, the incumbent could negotiate with the alternative operator to have it take over network operations. Alternatively the incumbent could sell the network facilities to the other operator, which would then be required to upgrade them to meet the required universality objectives. A variety of management contracts, joint ventures, build-operate-transfer arrangements, and asset purchase contracts could be used to implement the transfer of network operations to the lower cost bidder.

The case studies for Chile and Peru provide good descriptions of competitive bidding processes for licences to serve rural areas. In these countries, licences were granted to the bidders that offered to provide the designated services at the lowest subsidy. As a result of the competitive bidding process in those countries, many licences were granted with a zero-subsidy, meaning that there was no need to subsidize the winning bidder at all.

Use of competitive bidding processes means that the fund administrators need not determine the actual net cost of fulfilling the universal access requirements, but rather only the subsidy that the fund must provide to UA providers. It does not absolutely require the use of economic or financial costing models by regulators, although such models are

useful to determine the maximum subsidy amount that may be required. Bidders will use their own models and projections to determine their proposed subsidy bid. It is clear from the results in Chile and Peru that competitive bidding has the advantage of reducing the total funding required to meet universality objectives.

The Peruvian case study illustrates another advantage of the competitive bidding process. There may often be synergies in providing service to different localities or across various regions. An operator's willingness to serve a market at a given subsidy will depend on whether the operator can also serve other areas. When tendering more than one designated service area, fund administrators can capture scale economies by allowing applicants to bid to serve different combinations of areas at different subsidy amounts. The methods and effectiveness of such a multiple bidding approach are discussed in the Peruvian case study.

Intangible Benefits

Another advantage of a competitive bidding process is that it can transfer the value of the intangible benefits of being a US or UA provider from the operator to the universality fund. In this sense, intangible benefits refer to financial or other benefits accruing to US or UA providers that are not taken into account in traditional costing or revenue models. The United Kingdom case study in the Appendix describes some of the benefits of being a universal service provider.

In theory, a bidder that wants to become a US or UA provider would include intangible benefits in its calculation of the subsidy required to serve a new

area. The larger the benefits, the lower the subsidy a bidder would require. Until recently, there were no real-world examples to test this theory. However, the competitive bidding processes in Chile and Peru provide such evidence. As described in the case studies for those countries, the actual winning bid amounts were generally well below the maximum subsidy that was calculated to be required to provide economic service in the tendered regions. In some cases, the proposed subsidy was zero, although the subsidy estimated by the fund was much higher.

In Chile, over the 1995-1999 period, the average winning subsidy was about 50% of the maximum subsidy offered. Similarly, in Peru, in the last two years, the average winning subsidy has been about 25% of the maximum subsidy offered. These market-based results suggest that operators are prepared to become a UA provider for a compensation which is significantly less than the net financial cost of the activity. The evidence suggests that the difference between the net financial cost and the compensation must be equal to the intangible benefit that the UA provider expects to receive.

In the absence of a competitive auction, subsidy valuations should include a value for such intangible benefits. A degree of judgement will be required to estimate such values. However, it should be possible to establish benchmark estimates for certain categories of benefits. Perhaps the best practical example of the valuation of intangible benefits is the UK. As described in the UK case study, in 1997, Oftel determined that such benefits offset any net costs involved in the provision of universal service by British Telecom. As a result of this determination, BT does not receive any funding from other operators or the government to subsidize its USO.

APPENDIX: UNIVERSALITY CASE STUDIES

1 CHILE

The Chilean model of extending public telecommunications service to low income and rural areas was one of the first to utilize market-based mechanisms to implement a successful universal access policy.

1.1 Universal Access Policy

The Chilean telecommunications sector was the first in Latin America to be privatized and opened to competition. The introduction of market-opening policies succeeded in reducing telecommunications prices and increasing teledensity. Despite this success, however, many low income and rural localities continued to be unserved. This lack of access to telecommunications services was identified as a market failure.

The Chilean government developed an effective and economically efficient approach to address this market failure. The approach relies on public funding in the form of targeted financial subsidies to provide public telephone access to low income and rural localities.

The Chilean program focuses on providing community access (i.e. universal access) rather than individual access (i.e. universal service). The program provides one-time subsidies for the installation of public telephones. It does not provide ongoing funding.

1.2 Legislation

In March 1994, the General Telecommunications Law was revised to establish the Telecommunications Development Fund. The fund is referred to as the "FDT" (*Fondo de Desarrollo de las Telecomunicaciones*). The FDT provides government funds to private operators to subsidize the installation of public telephones in unserved, low income and rural areas. The private operators who receive the subsidies are selected by means of a competitive bidding process.

The FDT is administered by a special Ministerial Council presided over by the Minister responsible for Telecommunications. The FDT's Executive Secretary is the head of the telecommunications regulator, SubTel (*Subsecretaría de Telecomunicaciones*).

The FDT is financed from the Chilean national government budget. Each year, a specific allocation is approved for FDT purposes. This type of funding was selected for several reasons. First, it avoided the economic inefficiencies that result from cross-subsidies between telecommunications services. Providing tax-based funding was also consistent with the government's view that universal access is a social policy issue. As such, subsidizing universal access is primarily seen as a government responsibility, and not that of telecommunications operators or telecommunications subscribers.

1.3 FDT Project Selection Process

A Regulation to implement the FDT was approved in December 1994. The Regulation established the rules for the operation and administration of the FDT.

The process for the selection of projects eligible for FDT subsidies is detailed in the Regulation. The main features of the process are:

- **Focus on Public Telephone Services:** In general, only public telephone services are financed by the FDT. These services may be provided by individual public telephones or telecentres.
- **Publicity:** SubTel has undertaken publicity campaigns to raise awareness of the FDT and to promote participation from unserved localities around the country.
- **Application Process:** Any person, community or municipal organization may submit a public telephone application to SubTel by 30 September of each year. After the annual

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closing date, SubTel compiles a list of localities requiring public telephony service. (In 1998, 1,963 rural applications were received, and a total of 1,951 localities were accepted.)

- **Development of FDT Projects:** With the assistance of external consultants, SubTel undertakes a technical analysis of the applications. SubTel then develops specific rural public telephony projects. Each project is designed to cover a number of adjacent localities. (In 1998, 80 projects were designed to incorporate all 1,951 eligible applications.)
- **Financial Evaluation:** SubTel evaluates each of the projects based on general government-approved methods of cost-benefit analysis. For each project, two measures of net present value (NPV) are calculated: private and social. Projects that have a positive private NPV are excluded from the list. Projects with a positive private NPV are those capable of being financed solely from project revenues, without a government subsidy. SubTel then ranks the remaining projects (those with a negative private NPV) based on the relationship between social and private NPV, among other factors. This formulation aims to maximize the social returns per dollar of private investment. For these subsidizable projects, the maximum subsidy is calculated as the private NPV (always negative). The NPV's are calculated based on the tariff regime established for rural public telephones. The tariff regime in Chile is based on maximum rates that are adjusted on an annual basis with reference to an aggregate price index and productivity offset. Operators are allowed to set their rates lower than the designated maximum. The maximum rates for local calls from rural public telephones are approximately USD \$0.07/minute based on a 5-minute local call. In comparison, local calls from urban public telephones are priced at approximately USD \$0.05/minute, also based on a 5-minute call. Higher rates are allowed for shorter calls from rural public telephones. Interconnection access charges for all telecommunications services, including rural public telephones, are set by SubTel.
- **Selection of Projects:** A list of projects that are eligible for subsidies is then developed by SubTel. The projects are ranked based on the financial evaluation. The list is submitted to the FDT Ministerial Council, which selects the projects that will be opened to competitive bidding, based on the available FDT budget. In 1998, 80 projects were eligible for subsidy, and 31 were selected. These 31 projects covered 1,023 localities.
- **Competitive Bidding Process:** Once the Ministerial Council selects projects eligible for subsidy, SubTel prepares tender documents for a competitive bidding process. These are published in the country's Official Digest. Tender documents for each project include the following information:
 - the localities to be served by the project;
 - the minimum quality of service to be provided;
 - the applicable tariff regime (see further discussion above);
 - the time period allowed for the installation of the public phones;
 - the maximum subsidy available for the project;
 - available spectrum frequency bands; and
 - any other conditions.
- **Selection of Successful Bidders:** For each project, the bidder that proposes the lowest subsidy is declared the winner by SubTel. In 1998, firms bid for 27 of the 31 eligible projects. In total, the successful bidders proposed subsidies of USD 5.5 million, well below the maximum subsidy of USD 8.9 million available for the 27 projects. In some cases, no (zero) subsidy was required by the successful bidder.
- **Concessions:** The winning bidders must apply for a public telephone concession. Concessions are issued by the Ministry responsible for Telecommunications, based on the recommendation

of SubTel. The concessions are non-exclusive. The decree granting the concession includes the following information:

- name and details of the holder of the concession (the "concessionaire");
 - type of service to be offered;
 - duration of the concession;
 - geographic zone covered by the concession;
 - technical specifications of the infrastructure to be installed;
 - deadlines for commencement and termination of installation;
 - technical specifications of radio stations, if any;
 - amount of subsidy awarded, if any; and
 - other conditions.
- **Implementation:** Concessionaires must generally install the required public telephones within about 20 months. These public telephones must be capable of sending and receiving calls from other subscribers, including local and long distance calls from both fixed and mobile terminals. Once the infrastructure has been installed

and verified by SubTel, the concessionaire receives the subsidy it is eligible for.

1.4 Results of the Bidding Process

Table 6-7 summarizes the results of the FDT bidding process to 1999. At the start of the FTD program, around 6,000 localities were identified as unserved. Between 1995 to 1999, a total of 183 projects were approved under the program. These projects covered 5,916 localities with a served population of over two million people. Therefore, it is evident that the original target of providing telephone service to unserved areas was met over a five-year period.

Table 6-7 demonstrates that competition between bidders significantly reduced the actual subsidies paid, as compared with the maximum subsidies that had been projected to be required to provide service. Over the five-year period, only about 50% of the estimated maximum subsidies were actually paid. In 1996, only 21% of the estimated maximum was paid. In 1999, 80% of the maximum was paid.

In practice, some delays have been experienced in the installation of public telephones under the FDT program. For instance, at the end of 1998 about 1159 or just over 50% of committed telephones had been delivered. As a result of these delays, SubTel has issued warnings and imposed fines in accordance with the terms of the concessions. The fines are calculated separately for different localities.

Table 6-7: Summary of FDT Results

Year	Projects	Localities	Inhabitants in Localities (000)	Maximum Subsidy (USD m)	Subsidy Granted (USD m)
1995	34	726	240	3.1	2.1
1996	18	1632	762	4.2	0.9
1997	70	2146	772	20.4	8.1
1998	27	858	229	8.9	5.5
1999	34	554	154	6.5	4.4
Total	183	5916	2157	42.1	21.0

Fines increase for longer delays. By the end of 1999, an additional 3,264 public telephones were installed under the programme, for a cumulative total of 4,424 to that date.

1.5 Regional Funding Differences

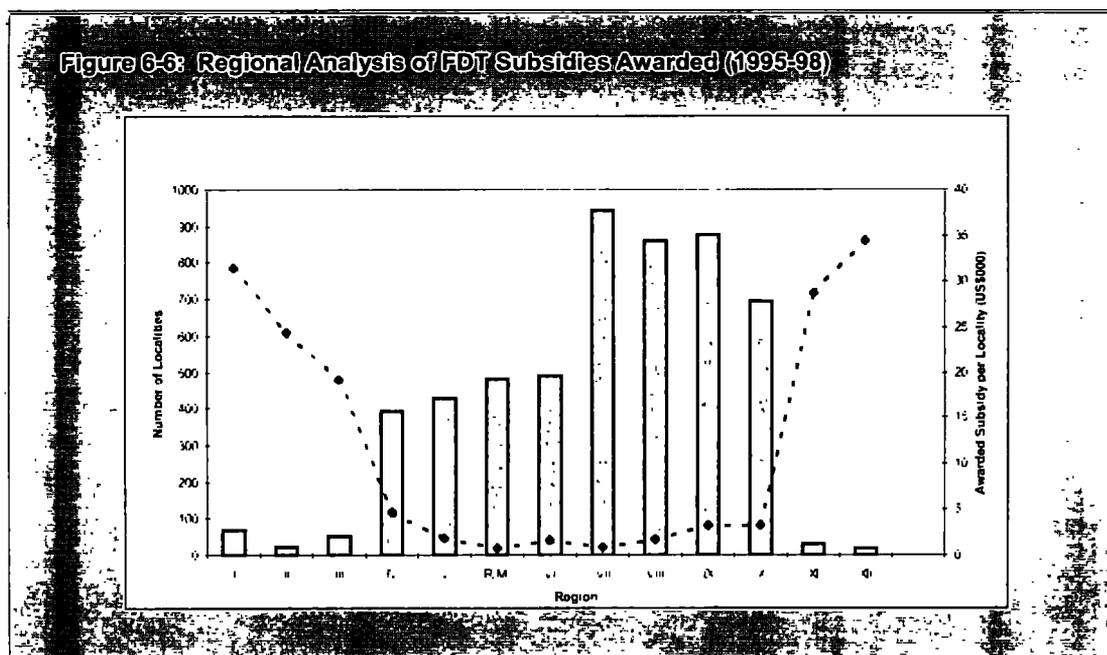
Chile is divided into 12 regions plus a capital region (R.M.). The Regions range from Region I at the northern end of Chile to Region XII at the southern end. The central Regions IV to X are the most densely populated areas. Figure 6-6 provides a regional analysis of the 1995-98 results.

Figure 6-6 indicates that most localities that received subsidies were located in the densely populated central areas of the country. Not surprisingly, the figure also indicates that the average subsidy per locality is significantly higher in outlying regions as compared to the central regions. It clearly cost more

to provide service in more remote regions. For instance, the subsidy was 33 times greater per locality in Region I than in Region VII. Therefore, while the more remote Regions I, II, XI and XII, accounted for 25% of the total amount of subsidies for the country as a whole, they represent only about 2% of the newly served population.

1.6 Access to the Internet

The original FDT target of providing public telephone service to approximately six thousand unserved localities was met over the 5 years between 1995-1999. Having met this target, the President of Chile proposed revisions to the FDT in November of 1999. Under these changes, FDT funds may be used to finance community Telecentres with access to the Internet and to other new information and communications technologies.



2 PERU

Peru's experience with universality programs bears similarities to that of Chile's. Peru's policy, like Chile's, promotes universal access by means of a rural telecommunications fund. However, the Peruvian program is more recent, and includes some notable differences and innovations.

2.1 Universal Access Policy

In the mid 1990s, Peru's government joined a growing number of others in deciding that the traditional policy of financing universal access by internal cross-subsidies was no longer feasible or desirable. This decision was consistent with its policy to rebalance rates and to eliminate all inter-service cross-subsidies over a five-year period after the privatization of its monopoly operator.

The Peruvian government distinguished between the universal service emphasis of maintaining access in industrialized countries, and the emphasis in developing countries on extending basic access in the first place. Peru clearly fit into the latter situation, particularly in rural areas. Accordingly, the Peruvian government established a universal access fund with targeted subsidies to finance new public access telephones in rural areas.

2.2 Legislation

A new regulatory framework for the Peruvian telecommunications sector was introduced by revisions to Peru's telecommunications laws in 1993 and 1994. The revisions promoted private sector participation in telecommunications, and among other things, authorized the privatization of the main wireline operators.

The legislative changes also created OSIPTEL as the new sector regulator. In addition, they established the universal access telecommunications fund, FITELE, which is administered by OSIPTEL. Under the law, OSIPTEL collects 1% of gross revenues from the telecommunications sector to finance FITELE. Collection started in mid-1994. By mid-1998, when FITELE undertook its first pilot project, over USD 30 million had been collected.

2.3 Sector Policy

The Peruvian *Full Competition Guidelines*, published in August 1998, opened the sector to competition. These Guidelines placed renewed emphasis on rural telecommunications. Although the privatized incumbent operator had met the rollout obligations imposed as part of its privatization, many rural localities in Peru remained without telecommunications service.

In the 1998 guidelines, the government set a target of extending service to five thousand unserved localities by the year 2003. The government defined universal access as access to a set of essential services provided by public operators and available to the majority of users. Specifically, these services included voice telephony, low-speed fax and data, and free emergency calls.

2.4 Regulation

To implement its universal access policy, the government issued the *FITELE Regulation* in September 1998. The regulation establishes administrative and technical terms for FITELE's operations.

The *FITELE Regulation* establishes criteria to select the localities that will receive funding for service expansion. Such localities include:

- rural towns (with a population of more than 400 inhabitants and less than 3,000 inhabitants);
- district capitals; and
- towns in high social interest areas (as defined by the Government).

FITELE will not finance past or future network expansion or coverage obligations imposed by the Government on telecommunications operators. Therefore, the incumbent operator is excluded from accessing FITELE funds to finance its rollout obligations. The Regulation also stipulates that FITELE will not provide direct subsidies to subscribers or provide funding for localities that already have access to telecommunications services.

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FITEL refines the list of possible projects by determining which projects have the highest social benefit for FITEL's investment, among other things. According to the regulation, FITEL must establish a list of projects eligible for subsidy, and forward it for approval by the Ministry responsible for Telecommunications. Once the list has been approved by the Ministry, OSIPTEL prepares tender documents for a public bidding process to select operators to implement the projects.

The competition is public and international. Notice of the tender is published in the country's Official Digest, and in at least one newspaper with national circulation. The tender may also be published in international media.

The bidder with the minimum subsidy bid is selected as the winning bidder. The winner is eligible to receive the concession to provide the designated services. The winner is required to enter into a fi-

nancing contract that stipulates the conditions under which FITEL will provide the subsidy.

The maximum subsidy is set at the "private NPV" of each project. Tariffs for rural public telecommunications services are regulated by OSIPTEL, based on a maximum rate regime. Operators are allowed to set lower rates if they wish. The maximum rate for local calls from rural public telephones is approximately USD \$0.057/minute. In comparison, the price for local calls from urban public telephones is about USD \$0.048/minute (based on a three-minute call), with each additional minute at about USD \$0.029. Domestic long distance charges are set at the same regulated rate as that of the dominant long distance provider.

Interconnection charges are negotiated by the operators. If there is no agreement, the general interconnection regime established by OSIPTEL applies. This regime includes provisions for default cost-based rates.

Box 6-2: Key Information in Fitel Tender Documents

FITEL tender documents include the following information for each project:

- the localities to be served;
- technical description of the service to be offered;
- timetable for the project, including expected installation dates;
- the maximum subsidy offered by FITEL;
- the applicable tariff regime (see below for further discussion);
- a technical, financial and economic profile of the project (i.e. business plan);
- a description of the socio-economic situation of the area to be served;
- information relating to a guarantee bond;
- information relating to a performance bond for the proper operation of the infrastructure;
- timetable and procedures for the tender process;
- the evaluation process for the offers;
- draft financing contract;
- draft concession contract (for 20 years, non-exclusive); and
- other conditions and requirements.

2.5 Project Results

FITEL's program began with the Northern Frontier pilot project, which was awarded in May 1998. This project was a test case used to verify the design of the program. The project included 213 localities in 4 departments, with a total of about 59,000 inhabitants. The project required the installation of one new public telephone per locality.

The maximum FITEL subsidy for the pilot project was calculated at USD 4 million. The public bidding process was won by a subsidy bid of USD 1.66 million to serve the designated communities. This sum was equal to 41% of the maximum available subsidy.

The winning bidder completed installation of all required public telephones in December 1999. We understand that in this instance the winning bidder used VSAT technology to implement the project. The public telephones in the project can send and receive calls to and from other subscribers, including local and long distance calls from fixed and mobile terminals.

After the pilot project, a number of changes were made to the program. These changes applied to projects awarded in December 1999. One change required the winning operator to install and maintain a public Internet telecentre in all district capitals in the areas covered by the three projects. The three projects tendered in December 1999 included a requirement to install 1,937 public telephones and 236 public Internet telecentres.

2.6 Bidding Procedure

Another innovation introduced after the pilot project encouraged bidders to bid simultaneously on more than one project. OSIPTEL's objective was to provide the lowest total subsidy for all three projects. Therefore, OSIPTEL adopted bidding procedures designed to capture possible economies of scale (i.e. to pay a lower subsidy if a single operator could serve two or three projects at a lower total cost than one project).

OSIPTEL designed a bidding process that permitted bidders to bid on any combination of the three projects. Table 6-8 and Box 6-3 use a specific example to illustrate this process. This example assumes there are three projects (1, 2 and 3) and three bidders (A, B and C).

In the example in Table 6-8 and Box 6-3, the combination of bids that minimizes the total subsidy is (iv) with a total of 170. Hence the winners would be Bidder A for Project 3 with a bid of 50 and Bidder B for projects 1 and 2 together (1&2) with a bid of 120.

In fact, for the bidding process undertaken by FITEL in December 1999, the winning firm made a combined bid for all three projects for a total of USD 10.99 million. This bid was well below the maximum available subsidy of USD 50 million. Details are provided Table 6-9. Projects to be tendered in 2000 and afterwards will include the requirement to install community Internet telecentres and will incorporate the multiple project bidding process described above.

Table 6-8: Example of Multiple Project Procedure

	Project 1	Project 2	Project 3	Projects 1 & 2	Projects 1 & 3	Projects 2 & 3	Projects 1, 2 & 3
Bidder A's bids:	100		50		130		
Bidder B's bids:	80	50	60	120	130	100	180
Bidder C's bids:	90	45		130			

Telecommunications Regulation Handbook

In September 2000 OSIPTEL modified the FITEC Regulation to among other things, formally introduce the possibility of funding access to the Internet and other advanced services. The new Regulation also expanded the geographic and operational coverage of the Fund. Indeed, FITEC can now provide funding

for areas that, while having limited telecommunications access, are not expected to fully benefit from competition in the near future. In addition, FITEC is now permitted to provide funding for the operation and maintenance of the designated services, rather than just installation as was previously the case.

Box 6-3: Evaluation Process for Bids

Example of Evaluation Process (Multiple Bids):

Step 1: Determine the minimum subsidy amounts requested for each project or combination of projects:

Min(Project 1) = 80;

Min(Project 2) = 45;

Min(Project 3) = 50;

Min(Projects 1&2) = 120;

Min(Projects 1&3) = 130;

Min(Projects 2&3) = 100;

Min(Projects 1&2&3) = 180

Step 2: Compare the minimum amounts requested, this time for all three projects based on the following possible combinations:

(i) Sum (Min(Project 1) + Min(Project 2) + Min(Project 3)) = 175

(ii) Sum (Min(Project 1) + Min(Projects 2&3)) = 180

(iii) Sum (Min(Project 2) + Min(Projects 1&3)) = 175

(iv) Sum (Min(Project 3) + Min(Projects 1&2)) = 170

(v) Sum (Projects 1&2&3) = 180

Table 6-9: Projects Tendered in December 1999

Project	Localities	Inhabitants in Localities (k)	Maximum Subsidy (USD m)	Subsidy Granted (USD m)
South	534	136	14.0	
Centre South	1029	303	27.0	
Jungle North	374	141	9.0	
Total	1937	580	50.0	10.99

3 EUROPEAN COMMISSION

In developing new policies for the telecommunications sector, the European Commission issued a Communication in November 1993 on developing universal service in a competitive environment. This Communication initiated a process that established a consensus within the European Union on key issues related to universality. These issues include the scope of universal service, the choice of costing methods to determine the actual costs of universal service (if any), and possible universal service funding mechanisms. Each of these issues is discussed below.

The European Commission has declared that its member states are free to select their approach to universal service from three options. The decision on the appropriate national option must be based on the costing method stipulated by the Commission. The options are:

- Universal service financing is not required (i.e. universal service obligations do not represent an unfair burden to the designated operators providing universal service);
- Universal service obligations do represent an unfair burden on the designated operators; however the State chooses to finance it directly or indirectly; or
- Universal service is considered to be an unfair burden on the designated operators and a specific universal service financing mechanism scheme is required. In this case the national scheme must comply with European Community Law.

3.1 *Scope of Universal Service*

The European Commission has defined universal service in its *Interconnection Directive*. Universal service is defined as a minimum set of services of specified quality which is available to all users independent of their geographical location and, in light of specific national conditions, at an affordable price.

In the most recent version of the *ONP Voice Directive*, the Commission defined universal service to include:

- voice telephony service via a fixed connection which will also allow a fax and a modem to operate;
- operator assistance;
- emergency and directory inquiry services (including the provision of subscriber directories); and
- the provision of public payphones.

The European Commission has recognized that the concept of universal service may evolve as technology develops, and as the needs and expectations of citizens in its member states change. Accordingly, the scope of universal service may need to be redefined in the future. (See further discussion below.)

3.2 *Costing Method*

The *Interconnection Directive* states that universal service regimes must be based on the net cost of universal service obligations. The net cost must be audited by the NRA of the member state. The calculation of the net cost and the structure of the mechanism adopted by the NRA must be based on objective, transparent, non-discriminatory and proportionate criteria and objectives.

According to the directive, the costs of universal service should, in principle, be calculated based on a long-run average incremental cost (LRAIC) methodology. Universal service funding mechanisms are only justified when the net cost of the USO is considered to represent an unfair burden on the operator(s) subject to the obligation by the NRA.

The European Commission considers that the assessment of the net costs of universal service must be rigorous. The calculation of net costs should take into account all of the benefits derived by an operator from the provision of universal service.

3.3 USO Funding Mechanisms

The *Interconnection Directive* stipulates that national universal service regimes may take the form of:

- a universal service fund established at a national level,
- a system of supplementary charges collected directly by the operators who have the responsibility of providing the service, or
- a combination of elements of both mechanisms.

Universal Service Fund: Such a fund pools contributions from operators and service providers required to contribute. The funds are then transferred to operators that are entitled to receive universal service payments. The fund must be administered by a body that is independent of the parties who contribute to and benefit from the fund. The NRA is responsible for verifying the net cost of the USO.

Supplementary Charges: A supplementary universal service charge may be added to interconnection charges to recover the net cost of the USO. Such charges must be distinct from interconnection charges. The NRA must ensure that such contributions:

- are made in a transparent, non-discriminatory and proportionate manner, and
- that there is no conflict of interest between an operator's commercial activities, and its role in collecting such supplementary charges from competitors.

The *Interconnection Directive* states that only organizations providing public telecommunications networks and/or public voice telephony services may be required to contribute to a Universal Service Fund or to pay Supplementary Charges. This determination was based on a number of factors. First, contributions should be apportioned amongst market players according to their activity in the relevant market. In addition, the collection mechanism must be designed to prevent double contributions. Note that the European Commission considered the use of Supplementary Charges only

as a transitional measure and required them to be phased out.

Only service obligations that flow from the Commission's definition of universal service may be financed by universal service schemes. European Union member states may impose other obligations on telecommunications companies and finance such obligations in accordance with Commission law (including fair competition principles). However, member states may not require other market players to contribute to the resulting costs.

In November 1996, the Commission issued a Communication on the assessment criteria for universal service schemes. This document provides more detailed guidance on various aspects of universal service, including some of the matters discussed in this section.

3.4 Current Status of USO in the European Union

In February 1998, the European Commission completed its *First Monitoring Report on Universal Service in Telecommunications in the European Union*. The report concluded, among other things, that it would be premature to propose an expansion of the scope of universal service obligations at this stage. In the most recent European Commission communication pertaining to universal service, the Commission reports that the provision of universal service does not appear to be creating an undue burden on the designated operators in the member states.

In practice, the vast majority of European Union member states have not established specific USO mechanisms. Some have decided that any burden associated with universal service is so low that it does not constitute an unfair burden for the designated operator. Others have determined that any USO burden does not justify the administrative overheads of a specific mechanism.

4 UNITED KINGDOM

The United Kingdom (UK) provides an interesting specific case study of the European Union's general approach to USO issues. Oftel, the UK telecommunications regulator, has determined that specific universal service financing is not required for the designated universal service provider, British Telecom (BT). This determination was based on the conclusion that its USO does not represent an unfair burden on BT.

4.1 Background

In December 1994, Oftel published a consultative paper which examined the evolution of the telecommunications regulatory framework in the United Kingdom. The paper examined the interconnection regime and the Access Deficit Contributions (ADCs) which provided universal service funding in the UK at that time. ADCs were made by interconnecting operators to pay for the deficit incurred by BT in providing access services. The consultative paper set out a number of options to address concerns about ADCs. The options included elimination of ADCs and their replacement, if necessary, with other universal service funding mechanism(s).

In July 1995, Oftel decided to eliminate ADCs from 1997 onwards. In coming to this decision, Oftel identified what it considered to be critical problems of ADCs in the UK. First, the net costs of universal service in the UK were calculated based on fully-allocated, historical costs and not the preferred LRIC method. In addition, the ADC regime was complex and difficult to administer. Oftel also concluded that ADCs provided a major source of uncertainty for potential market entrants, since the calculation of ADCs was in the hands of the incumbent, BT. Finally, Oftel expressed concerns that maintenance of ADCs would institutionalize a significant distortion of the market.

4.2 Benefits of Providing Universal Service

Once Oftel decided that ADCs were to be eliminated by 1997, it had to determine whether BT's USO

constituted an unfair burden. If so, based on EC practice, such a burden could justify the establishment of a specific funding mechanism.

In February 1997, Oftel reached a preliminary conclusion that, taking into account the benefits to BT of providing universal service, there was no proven net cost of the USO. Accordingly, Oftel decided that there was no justification for setting up a USO funding mechanism, at least in the short term. Oftel confirmed this preliminary conclusion in July 1997.

Early in its process of determining the cost of universal service, Oftel identified some of the benefits to operators of being a universal service provider. These benefits are summarized in Box 6-4.

4.3 Calculation of Net Cost of USO

Table 6-10 below presents two estimates developed by Oftel of the net cost and benefits of being the USO provider. The net cost estimates were based on standard costing and revenue calculation methodologies, consistent with European Commission guidelines. Of the various possible types of benefits, Oftel estimated the value of the following: life cycle effects; ubiquity; corporate reputation (brand enhancement); marketing from Public Call Boxes.

The original estimates were released by Oftel in February 1997. In this instance, the total intangible benefits (£102m to £151m) were estimated to exceed the total net cost (£45m – £65m). These estimates are presented in Table 6-10.

In July 1999, Oftel released a consultative paper to review universal service issues. The paper included revised estimates of net cost and benefits of the USO. The revised estimates are also presented in Table 6-10. Oftel noted that the balance between the costs and the benefits is closer than previously estimated. However, Oftel maintained its view that the case has not been made for the establishment of a universal service fund to share the USO costs with other operators. In September 2000 Oftel again stated its belief that the USO is not an unfair burden on BT. Oftel expects to be able to issue a definite statement on the issue in Spring 2001.

Box 6-4: Benefits of Being a Universal Service Provider

- Enhanced corporate reputation;
- Marketing and brand recognition;
- Access to customers' telephone usage and demand data;
- Benefits associated with customer life cycle. The life cycle effect refers to the effect of basing a decision on the net present value (NPV) of the business proposition in question, instead of on the current difference between costs and revenues;
- Ubiquity provides a marketing benefit to an operator within its traditional serving territory. All customers know they can order telephone services from that operator no matter where they are in the serving territory;
- Avoidance of loss of business through poor image and loss of trust due to disconnecting or discouraging subscribers;
- Avoidance of disconnection costs; and
- Reduced planning costs.

Table 6-10: Annual Net Cost and Benefits of Universal Service Provision

	Original Estimates (February 1997) (£m)	Revised Estimates (July 1999) (£m)
Benefits		
Life cycle	1 – 10	0
Ubiquity	40 – 80	0
Corporate Reputation	50	50
Call Boxes	11	11
Total Benefits	102-151	61
Total Net Cost (conventional)	45-65	53-73

5 SPAIN

Spain is one of the member states of the European Union that has introduced legal provisions relating to the creation of a universal service funding mechanism. However, as most other member states, Spain has not yet put the mechanism into operation.

5.1 Legislation

Spain's General Telecommunications Law/1998 (the "Law") implemented a comprehensive revision of the legal framework for the telecommunications sector in Spain. The main objective of these revisions was to facilitate full liberalization of the sector. It also transposed several European Commission directives into Spanish law. *Title III* of the Law created the legal framework for the regulation and financing of universal service in Spain.

Title III states that operators that provide telecommunications services to the public and operators of telecommunications networks whose operation requires an individual licence are subject to public service obligations. Three categories of public service obligations are established: Universal Telecommunications Services (UTS); obligatory telecommunications services; and other public service obligations. Obligatory telecommunications services include telex, leased lines, and advanced services. The Law provides for the possibility of external financing only for UTS.

Universal Telecommunications Services ("UTS") are defined as a set of telecommunications services of a determined quality that should be accessible to all users independent of their geographic location at an affordable price. This definition is similar to the European Commission's definition. The Law provides that the services included in the UTS concept may be enlarged or revised to take into account technological developments.

Initially, UTS should include the following elements:

- the right of all citizens to be connected to the public fixed network and have access to fixed public telephone service available to the public;

- the right of telephone subscribers to receive, free of charge, a printed and updated telephone directory;
- supply of sufficient public telephones; and
- rights of subscribers who are handicapped, or have special social needs, to have access to fixed telephone service available to the public under equivalent conditions as other subscribers.

The Law provides that any dominant operator in a determined geographic zone may be designated to provide any of the services included in the definition of UTS. The telecommunications regulator, the CMT, is empowered to determine whether the USO for designated operators results in a competitive disadvantage. If the CMT so determines, a universal service funding mechanism (the National Universal Service Fund) will be established to distribute among telecommunications operators the net cost of universal service provision. The Fund will be administered and managed by the CMT.

The Law establishes a method for the calculation of the net cost of universal service. The Law's approach is in line with the European Commission's guidelines. If implemented, the specific contribution scheme will be determined by the CMT. As previously indicated, only operators providing telecommunications services available to the public and operators of public telecommunications networks would be liable to contribute to the universal service funding mechanism. However, the Law allows the CMT to exempt certain operators from the contribution requirement, to promote the introduction of new technologies or the development of effective competition.

5.2 Regulation

In July 1998 a regulation was approved to implement *Title III* of the Law. The regulation defines in more detail the initial set of services to be included in UTS. It also sets out UTS quality and technical specifications and establishes the framework for determining UTS affordability.

The regulation authorizes the Ministry responsible for telecommunications to undertake a public

consultation process to determine whether there are operators interested in providing some or all of the services included in UTS in determined geographic areas. This process should be carried out at least once a year before the finalization of the term established to provide universal service. Under this provision, the Ministry could open a competitive tender process to determine the US provider for that zone. The universal service licence will be given to the operator that offers service under the most advantageous conditions, including its offer with respect of the net cost of providing universal service.

The regulation establishes a detailed method for calculating the net cost of universal service provision. Procedures are to be established by the CMT to quantify the non-monetary benefits expected to accrue to the designated operator of being of the universal service provider. The regulation also sets out detailed provisions for the financing of universal

service including the distribution of any contribution payments and the administration of the Fund.

On 3 June 1999, the CMT issued a resolution designating dominant operators in three national markets (fixed telephony, leased lines, and mobile telephony). In the first two markets, CMT designated Telefonica as dominant (having over 95% market share in both markets). For the third market, the CMT designated Telefonica Movil and Airtel as dominant operators.

Since its designation as dominant in relevant UTS markets, Telefonica may now calculate its net USO costs and petition the CMT to rule that its USO places the company at a competitive disadvantage. This move could lead to the establishment of a detailed universal service regime in accordance with the Law.

6 CEE AND CIS COUNTRIES

This Section provides a high-level overview of universality policies in the countries of CEE (Central and Eastern Europe) and the CIS (Confederation of Independent States).

In summary, in these countries, USO and universal access concepts are not currently defined in a manner that would allow the specific implementation of universality funding mechanisms. There are plans to implement universal service funds in some countries in the region. However, the most common universality funding mechanisms in the regions are:

- inter-service cross-subsidies by the USO operator; and
- (in countries that have recently privatized their incumbent operators) service performance and rollout obligations.

6.1 Introduction

There are significant variations in the level of economic and telecommunications development among countries in this region. Until the last decade, all countries in the region had state-owned monopolies. Since then, some have privatized, using different models, and others have not. Some have relatively open telecommunications markets. Other markets remain closed, particularly in the key wireline markets.

The policies and practices of the European Union are increasingly becoming the model for telecommunications policy development in the region. The process of accession to the European Union requires countries to adopt European Commission directives on policy, regulations and legislation, including directives on universal service. The following sections review universal service policies in various CEE and CIS sub-regions.

6.2 CEE Countries - EU Accession Tier 1 Countries

The five Tier 1 countries, the Czech Republic, Hungary, Estonia, Poland and Slovenia have signed

EU Accession Partnership Documents. The European Commission considers these countries as the most similar to itself in terms of economic and policy development. This group of countries will, therefore, be the first in the region to join the EU.

The telecommunications sector is relatively well developed in these countries. National telecommunications and sector policies generally promote competition and private sector participation. These countries have generally relied on internal operator cross-subsidies to promote universality objectives. Countries that have privatized their incumbent operators have imposed rollout obligations to promote universality.

New universal service schemes in these countries, when established, should be consistent with those of the European Commission. In Poland, for example, the government currently plans to replace the existing posts and telecommunications law with separate laws for each industry. The two new laws will come into force by the end of 2000. The new *Telecommunications Law* will establish a new universal service regime. The regime will implement a universal service fund called the *Fundusz Usług Powszechnych*. The goal of the universal service fund will be to increase access to universal telecommunications services in less developed areas of Poland, especially rural areas.

Similarly, in the Czech Republic, the current legislation does not specifically deal with the concept of universal service. The concept will be defined in a new Telecommunications Act, which is currently in preparation. A new universal service regime is also being prepared in Hungary.

6.3 CEE Countries – EU Accession Tier 2 Countries

The Tier 2 Accession countries are Bulgaria, Latvia, Lithuania, Romania, and the Slovak Republic. These five countries have also signed EU Accession Partnership Documents and are likely to become members of the European Union some time after the Tier 1 countries. The European Commission considers that more preparation is required to align the policies and regulatory framework of the Tier 2 countries with those of the EU.

Like those countries in Tier 1, Tier 2 countries have generally relied on inter-service cross-subsidies by incumbent operators to promote universality. Countries that have privatized have also imposed service rollout obligations. For example, network rollout obligations were imposed on Lattellecom, the main operator in Latvia when it was privatized.

Some of the Tier 2 countries have started to define more specific universal service regimes. In Bulgaria, for instance, the telecommunications sector policy incorporates universal service principles that are consistent with those of the European Union. Specific universal service policies are currently under preparation, and the interim Bulgarian universal service definition is similar to the EU definition. At present, the USO is imposed on the main telecommunications operator, the Bulgarian Telecommunications Company.

6.4 CEE Countries – Non EU Accession Countries

Other CEE countries, such as Albania, Bosnia, Croatia, Macedonia, and Turkey have not yet signed EU Accession Partnership Documents, but plan to do so. Turkey has made a commitment under the

WTO Agreement on Basic Telecommunications and is preparing for the privatization of its established national operator. The other countries in this group have been affected by war and civil unrest which has destroyed significant parts of their telecommunications infrastructure. Generally, countries in this group do not have specific definitions of universal service. They generally require their incumbent operators to cross-subsidize from higher margin services, such as international services, to maintain affordable service.

6.5 CIS Countries

The CIS countries are Armenia, Azerbaijan, Belarus, Kazakhstan, Kyrgyz Republic, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine and Uzbekistan. In general, these countries do not yet have detailed policies on universal service or universal access. Universal service is generally not specifically defined, or is not defined in a manner that implements a specific funding mechanism for universal service or universal access. The traditional model of inter-service cross-subsidization by the incumbent operator is typically still used in CIS countries. Where privatization has occurred, some network rollout obligations have been imposed on the privatized operator.

7 CANADA

Canada's main universal service program was introduced in 1992. It was established by the federal telecommunications regulator, the CRTC, as part of its decision to authorize infrastructure-based long-distance competition.

Under Canada's original universal service regime, long distance operators paid "contribution charges" to support the USO of the incumbent operators. The net cost of the USO is the access deficit incurred by the USO operators as a result of charging the prescribed "affordable" rates for local service in higher-cost areas. In other words, regulatory constraints require USO operators to maintain rate levels in high cost areas below associated costs.

Contribution payments are based on the "contribution-eligible" minutes of long distance traffic of each operator. All long distance providers, incumbents as well as entrants, are required to contribute. The flow of contribution funds is administered by an independent Central Funds Administrator (CFA).

The current contribution payments regime is under review by the CRTC. As part of this review, the CRTC is considering whether to replace contribution charges with a revenue-based contribution regime. Another option under consideration is a levy on subscribers, similar to the subscriber line charge in the USA. (See discussion of the SLC in USA case study below.)

7.1 Background

The CRTC established contribution charges in 1992 in order to provide a subsidy to support local access services. Despite rebalancing initiatives in the 1990s, Canadian local access services are still priced below their associated costs in a number of higher-cost areas. The CRTC policy is intended to promote and retain Canada's high teledensity levels.

The rationale for the 1992 CRTC policy was partly based on the assumption that new entrants in long distance markets would reduce long distance revenues of the vertically-integrated incumbents. Thus, it was assumed that the new entrants would reduce

the total amount of subsidy available to fund those operators' access services.

In 1998, the CRTC authorized competition in local access markets. At that time, it modified the contribution regime. For instance, it decided to make the contribution regime portable. Therefore, Local Exchange Carriers (LECs), whether incumbents or new entrants, are entitled to use contribution revenues to subsidize residential access services in designated higher-cost areas. Note that to date, given the relatively slow entry of competitors in those areas, incumbents continue to receive the vast majority of contribution payments.

The CRTC also modified the contribution charge regime to establish an independent administrator to collect contribution charges from long distance operators. These funds are disbursed to LECs based on the number of residential customers they serve. Since competitive LECs (CLECs) have made few inroads into residential markets in Canada, the vast majority of contribution funds are still presently paid to incumbent LECs (ILECs).

7.2 Rate Rebalancing

Since 1992, the CRTC has implemented a program of tariff rebalancing to raise access rates to a level closer to costs. This rebalancing program was completed prior to the introduction of a price cap tariff regime in 1998. The rate rebalancing resulted in a reduction of contribution charges from a range of about CD 0.05 to CD 0.08 per minute per end to the current range of about CD 0.006 to CD 0.023 per minute per end for average (includes peak and off-peak) rates. This has resulted in the elimination of the access deficit in lower-cost areas; however, a significant access deficit is still incurred in higher-cost areas by the ILECs.

As in many countries, social and political concerns have prevailed in Canada to prevent the completion of full rate rebalancing in higher-cost areas. New entrants in long distance markets have been vociferous opponents of the contribution regime, arguing, among other things, that the regime does not take into account the significant benefits that accrue to incumbents in providing universal service. Early in 2000, the Canadian government requested a Senate Committee to study a variety of issues

related to the regulatory framework for the telecommunications sector, including the contribution regime.

The CRTC has frozen the current level of contribution charges until the end of 2002. This move has eliminated the requirement for annual regulatory proceedings to set contribution rates. It has also provided more certainty to competitive suppliers regarding the cost of the contribution regime.

7.3 Cost Classification

As in other countries, the territories of the major Canadian ILECs are subdivided into exchanges (the geographic areas served by a switching centre or cluster of switches). In order to better identify higher-cost areas, the CRTC has classified exchanges into several bands, largely based on the cost to provide telephone service in the exchanges. Only certain higher-cost bands are eligible for subsidy. LECs receive a subsidy based on the number of residential lines they serve in those bands. Bands in higher cost areas generally receive higher subsidies per subscriber line.

The CRTC has recently initiated a regulatory proceeding to revise the banding classification. The overall objective of banding is to de-average the costs to provide services across the territory of the designated operator. The costs of providing service

will be significantly lower in the urban core of a city than in isolated rural areas. Universal service programmes should incorporate these cost differences, where practical. The aim of the CRTC in the current proceeding is to have the greatest amount of intra-band exchange cost homogeneity while maintaining an administratively practical programme.

In a recent decision, the CRTC decided that in the future, only residential services in high-cost areas would be eligible for subsidies. This means that rates in all but the defined high-cost areas will have to increase in order to eliminate any remaining access deficit. This decision was based on several considerations. A major consideration was the fact that despite concerns to the contrary, telephone penetration had increased through the period during which rate rebalancing was implemented. The CRTC also considered that contribution subsidies should be better targeted to reduce the overall subsidy and the resulting economic efficiency losses.

The CRTC has defined a high-cost area as:

A clearly defined geographical area where the incumbent local exchange carrier's monthly costs to provide basic service are greater than the associated revenues generated by an approved affordable rate. Costs are estimated using long-run, incremental costs plus an appropriate mark-up.

Box 6-5: CRTC Basic Service Objective

This objective defines the level of service which should be extended to as many Canadians as feasible in all regions of the country. This level of service includes;

- individual local service with touch-tone dialing, provided by a digital switch with capability to connect via low speed data transmission to the Internet at local rates;
- enhanced calling features, including access to emergency services, Voice Message Relay service (for the hearing impaired) and privacy protection features;
- access to operator and directory assistance services;
- access to the long distance network (the capability to make and receive long distance calls); and
- a copy of a current local telephone directory.

The basic service objective is independent of the technology used to provide service, and may change over time as service expectations evolve.

The CRTC-approved mark-up is intended to cover some of the joint and common costs of the ILECs' operations which are not captured under the LRIC approach.

7.4 Basic Service Objective

The CRTC has recently defined a "basic service objective", which is similar in concept to the definitions of universal service adopted in the European Union and elsewhere. The CRTC's basic service objective is described in Box 6-5.

8 UNITED STATES

8.1 Introduction

The administration of universal service policies is relatively complex in the USA. This complexity is partly the result of the two-tier state and federal regulatory system in that country. In summary, the USA *Telecommunications Act* of 1996, confirmed that the authority for implementation of universal service support programs was shared between the federal government (through the federal regulator, the FCC) and the states. The state regulatory agencies have authority to impose universal support programmes consistent with FCC principles. The implementation of the universal service reform provisions of the 1996 Act were delayed and have been the subject of various regulatory and judicial appeals.

At the federal level, the USA has two distinct funding schemes. One is aimed at the financing of access deficits (i.e. the difference between access costs and access revenues). The objective of the second is the promotion of universal service in higher cost areas.

8.2 Access Deficit Charges

A portion of the access deficit of incumbent local exchange carriers (ILECs) has been allocated to the federal (interstate) jurisdiction. This portion has traditionally been about 25%. This amount is collected through a combination of access charges on interstate carriers and direct subscriber charges. This regime was introduced in 1984 at the time of the AT&T divestiture. The access charge regime has been modified extensively since. Historically, the main access charges have been:

- > the Subscriber Line Charge (SLC) which is levied monthly by LECs directly on subscribers;
- > the Common Carrier Line Charge (CCLC) which is a per minute charge on interstate long distance calls levied by LECs on interstate long-distance providers; and
- > the Pre-subscribed Interexchange Carrier Charge (PICC) which is levied by the LEC on

the long distance provider which has prescribed to each access line.

As part of the most recent access charge reform package that went into effect in July 2000 the FCC combined the PICC and the SLC into a new SLC. For the first year the new single charge will be lower than the existing two charges combined. By July 2003, however, the cap for the new SLC is expected to increase significantly, to USD \$6.50 per month per residential and single-line business lines. Consequently, the CCLC is expected to decrease to below USD \$0.005 per minute of interstate long distance traffic (from about USD \$0.06 per minute in 1996). Another component of the reform package was to remove about USD \$650m in implicit universal service support from access charges, and replace that amount with an equivalent amount to be collected through the existing federal high-cost service fund.

8.3 Universal Service Support - Federal

As in the case of the access deficit, about 25% of the cost of subsidizing high-cost areas is currently collected at the federal level. A central high-cost service fund has been established towards which all carriers contribute in proportion to their share of interstate revenues. The contributions are paid into the Universal Service Administration Company (USAC), an independent fund administrator.

This fund supports three principal Federal programs: High-Cost Support, Local Switching Support and Long Term Support.

- > **High-Cost Support** provides funds to rural carriers in high-cost areas to finance their access deficit.
- > **Local Switching Support** provides additional support to LECs with fewer than 50,000 lines for traffic sensitive switching costs.
- > **Long Term Support** allows high cost providers to have the same CCLC rate level as other carriers.

As part of the July 2000 reform package discussed above, an additional and separate program for high-cost rural support was created. The new program support is provided on a portable, per-line basis. The central high cost service fund also finances FCC low-income support programs for eligible subscribers. Under a different and separate funding mechanism, schools, libraries, and health care providers are eligible for discounted telecommunications services.

All telecommunications carriers that provide interstate telecommunications services must contribute to the cost of universal service. This includes carriers that provide service on a non-common carrier basis, as well as payphone aggregators. However, the FCC has determined that carriers that provide only international telecommunications services are not required to contribute to universal service. This decision was made, in part, so that foreigners would not be required to cross-subsidize the national USA network and its universal service regime.

Contributions for high-cost and low-cost income support mechanisms are assessed against interstate and end-user revenues. Recently, the contribution rate has been approximately 3% of designated revenues.

To date, the FCC has calculated access costs for the purpose of its universal service charges based on historic, embedded costs. As part of the reforms initiated by the 1996 *Telecommunications Act*, the FCC announced that it would introduce a forward-

looking cost model to be used from 2001. After this date, federal payments are to be shifted gradually to 25% of the difference between forward-looking costs of high-cost facilities and a benchmark level of designated telecommunications revenues. This new approach is intended to replace the existing programs described above.

8.4 Universal Service Support – States

The remaining 75% of universal service subsidies is collected at the state level. Collection of these subsidies falls under the jurisdiction of state regulators. Each state may allow carriers to use a different mechanism. Historically, most states have relied on inter-service cross-subsidies by the ILECs to promote their universal service plans. Many state regulators are now moving to replace internal cross-subsidies with a central high-cost fund at the state level. These funds will collect contributions from carriers operating in each state in proportion to each carrier's share of revenues.

For example, the State of Arizona has implemented the Arizona Universal Service Fund (AUSF). The AUSF receives its funding equally from long distance customers (based on the total intrastate long distance revenue for a particular carrier) and local customers (based on the number of access lines and interconnecting trunks) of telecommunications carriers operating in the state that are connected to the PSTN.

9 SOUTH AFRICA

South Africa provides an interesting case study because of the high profile that country has given to the development of the telecommunications sector in general and to universality objectives in particular. Telecommunications is high on the Government's economic and social policy agenda.

9.1 Background

In South Africa, universal service is considered a long-term goal, and universal access a short-term goal. A 1995 consultative document (the Green Paper) and the subsequent 1996 White Paper on Telecommunications Policy placed considerable emphasis on these issues. *The Telecommunications Act of 1996* also emphasized universality objectives.

More recently, the newly created Universal Service Agency (see discussion below) undertook a consultation process in 1998 to establish specific universality definitions, mechanisms and targets.

Telkom, South Africa's incumbent operator was partially privatized in 1997 (30% of its equity was sold to a foreign strategic partner). As part of the reform package, Telkom was granted five years of exclusivity for PSTN services, ending in 2002. During this period of exclusivity, Telkom has the primary role in universal service/universal access provision in South Africa. The company is expected to use its monopoly revenues to cross subsidize its network rollout. At the same time, government policy provides that Telkom must rebalance its rates by the end of the exclusivity period.

9.2 Network Rollout Obligations

According to its licence, Telkom must also install 2.69 million new lines by 2002. Of these lines, 1.67 million must be installed in under-served areas. Telkom must also convert 1.25 million existing analogue lines to digital, as well as installing 120,000 payphones in the same time period.

Other telecommunications providers also have obligations related to universal service and universal access. Cellular network operators, for example, have rollout obligations imposed as conditions of

their licences. The two cellular operators licensed in 1993, MTN and Vodacom, were required to install 7,500 and 22,000 cellular payphones (community service telephones) in under-served areas over a period of five years.

9.3 Universal Service Fund

Telecommunications licensees must pay an annual contribution to the Universal Service Fund (USF), which was created by the *Telecommunications Act of 1996*. The USF was allocated R3,000,000 as start-up funding when it was established in 1997. The USF may be used for:

- providing direct subsidies to targeted priority (needy) persons to defray the higher cost of telecommunications services due to rate rebalancing; and
- subsidizing the cost of network rollout to under-served areas by operators, including Telkom, whose licences impose such rollout obligations (until such time as Telkom has completed rebalancing its rates).

The USF is administered jointly by SATRA, the national telecommunications regulator, and the Universal Services Agency (USA). SATRA monitors compliance with network rollout and service quality targets and pricing. It also establishes the basis for USF contributions. The USA defines, investigates and recommends ways to achieve universal service and universal access.

The establishment of telecentres has been a priority for USF financing. Generally, the USA is responsible for establishing telecentres in partnership with communities and donor agencies. NGO's, individual entrepreneurs, women and disabled people in rural areas and townships are particularly encouraged to apply to run community telecentres. Telecentres typically contain a number of telephones, fax and photocopy machines, PCs and access to the Internet.

Over the last three years, 150 telecentres have been established or are in the process of being established. In the 1997/98 financial year, six standard telecentres were established. In 1998/99 an additional 12 standard telecentres were set up. In

1999/2000 ten mini-telecentres, 10 standard telecentres and 90 larger multipurpose community telecentres (MCT) will be established. Thirty of the MCT's will be specifically targeted to disabled people.

All telecommunications licensees are required to pay annual contributions to the USF. In the most recent financial year, operators licensed to provide public switched services (including access, local and long distance services) and mobile cellular services were required to contribute 0.16% of their annual revenue from the provision of the corresponding telecommunications services. Value-added network services licensees were required to contribute R1500 annually to the USF, while private network licensees were required to contribute R1000 annually.

9.4 Human Resources Fund

The *Telecommunications Act of 1996* also created a Human Resources Fund (HRF) which is adminis-

tered by the Ministry of Posts, Telecommunications and Broadcasting, in consultation with SATRA. The HRF is utilized to promote the provision of adequately skilled human resources at all levels of the telecommunications sector. The HRF will finance training and educational programs at the artisan/technician, undergraduate, and post-graduate levels. It includes support for science and technology education at schools.

All licensees are required to pay annual contributions to the HRF. In the most recent financial year, operators licensed to provide public switched services (including access, local and long distance services) and mobile cellular services were required to contribute 0.08% of their annual revenues from the provision of the telecommunications services. Value-added network services licensees were required to contribute R750 annually to the HRF, while private network licensees were required to contribute R500 annually.

10 AUSTRALIA

10.1 Background and Legislation

The universal service regime in Australia is set out in Part 2 of the *Telecommunications Act of 1999*. The Act establishes a USO, which is the obligation placed on the universal service provider(s). Such providers must ensure that standard telephone services and payphone services are reasonably accessible to all people in Australia on an equitable basis, wherever they reside or carry on business.

The rates of standard telephone services are regulated. As a result, in high-cost areas, the universal service provider cannot always recover the full cost of its service from the customer. Losses from the provision of such USO services are shared among all telecommunications operators. All operators, including Telstra (the incumbent and USO provider) are required to contribute to the costs of providing the USO in proportion to their overall share of the telecommunications market. Contribution shares are calculated using an eligible revenue formula (discussed below).

10.2 Net Cost of USO

“Net cost areas” are determined by the Australian regulator, the ACA. These are geographic areas for which universal service providers may claim compensation for their losses. They are primarily rural areas. Within 90 days after the end of the financial year, each universal service provider may file a claim to the ACA for a credit, based on its claimed net universal service cost for the financial year.

The net universal service cost is calculated as “avoidable cost” minus “revenue forgone”. In essence, avoidable cost is the cost incurred by a universal service provider that it would not have incurred if it had not supplied services to net cost areas. Revenue forgone is the revenue a universal service provider would not have earned if it had not supplied service to net cost areas.

10.3 Eligible Revenue

Within 90 days after the end of a financial year, all participating carriers (including universal service providers) may file returns with the ACA setting out their designated “eligible revenue” for that financial year.

Eligible revenue is calculated as follows. First, the carrier’s gross telecommunications revenue is determined, based on all sales revenue earned from telecommunications industry activities. The carrier may then make certain deductions to calculate its net telecommunications revenue. Deductions include revenue earned entirely in overseas markets, sale of customer equipment, USO levy credit receipts, supply of content services and terrestrial radiocommunications broadcasting activities.

Eligible revenue is then calculated as net telecommunications revenue minus “input payments” to other carriers. Input payments are payments to other carriers for services required to provide the first carrier’s telecommunications services (e.g. interconnection charges). The carrier’s share of the total eligible revenue of all participating carriers is its contribution factor. This factor can be seen as a proxy for its market share in the markets from which a contribution is required.

10.4 Payment Mechanism

The ACA may choose either to accept the net cost claims and the eligible revenue returns as correct, or make further inquiries. After any such inquiries, the ACA publishes a written assessment for the financial year. The ACA assessment sets out a “levy debit” for each participating carrier, which is its contribution factor multiplied by the total net universal service cost.

Each participating carrier must pay its levy debit to the Commonwealth’s Universal Service Reserve within one month after receiving the ACA assessment. The total of a participating carrier’s levy debit is equal to total net universal service cost. Each participating carrier that is a universal service provider also has a levy credit, which is equal to its net universal service cost. When all carriers who

owe money to the Reserve have paid into the Reserve, universal service providers are paid any net amount to which they are entitled.

10.5 Recent Developments

For the 1996/97 fiscal year, the net universal service cost levied on the industry was agreed between carriers to be USD 153.4 million. For 1997/98, Telstra claimed a net cost of USD 1,115.1 million, a substantial increase over the previous year. ACA's preliminary review of the Telstra claim suggested it would be substantially decreased (to around USD 580M).

The Australian government recognized the potential for Telstra's large universal service claims to generate uncertainty in the industry and serve as a

disincentive to investment. Accordingly, the government enacted legislation that capped the 1997/98 net universal service cost at USD154.5 m and at USD154.5 m plus CPI for 1998/99 and 1999/2000. This cap is an interim measure only. These capped amounts represent approximately 1.4% of gross carrier revenue.

The scale of the Telstra claim and the potential uncertainty it generated has called into question the current USO funding arrangements. It has prompted the Australian government to undertake a public consultation process to review the USO funding arrangements, including the desirability and practicality of direct government funding.

11 ASIA

11.1 Introduction

This section provides a very high-level overview of the status of universal service and universal access policies in selected Asian countries. In general, universal service is not currently defined in Asian countries in a manner that would allow for the implementation of a targeted funding mechanism. The most common funding mechanism in the countries we reviewed remains inter-service cross-subsidy by the incumbents.

In a number of countries, network expansion obligations are used to supplement cross subsidies as a method of promoting universality. Such obligations may be imposed on existing state-owned incumbents, on newly privatized operators, on competitive new operators or on joint venture/consortia-type entities, for example, as part of BOT-type arrangements.

There are other variations on the continent. Hong Kong has implemented transparent per-minute charges to promote universal service in competitive conditions. Malaysia is considering the establishment of a Universal Service Fund. In the following sections, we highlight a few notable country examples and provide a summary of developments in other countries.

11.2 Highlights: Selected Countries

In Japan, the *NTT Corporation Law of 1997* reorganized the incumbent, NTT into two regional companies for eastern and western Japan, and one long-distance company. All three operating companies are owned by a single holding company. The 1997 Law specifies that NTT has the responsibility to contribute to securing appropriate, fair and stable provision of nation-wide telephone services. Although universal service is not specifically defined, universality objectives have been implemented by requiring uniform geographically-averaged rates for both access and local calling. In high-cost areas, these charges are cross-subsidized by access charges from more densely-populated, less costly areas, and by long-distance charges.

In New Zealand, the government maintained some restrictions on the incumbent, TCNZ, when it was privatized in 1990. These restrictions are enforced through the so-called Kiwi Share provisions in the TCNZ Articles of Association. For example, the Kiwi Share provisions oblige TCNZ to maintain rural customer access charges at rates no higher than the standard urban residential rate. New Zealand does not have a telecommunications regulator or specific regulations for the telecommunications sector. Recovery by TCNZ of the costs of serving high-cost areas is left to commercial negotiations and general competition policy. Accordingly, TCNZ seeks to recover costs through commercially negotiated interconnection prices. As of late 1999, interconnection negotiations resulted in an impasse which the New Zealand government has tried since to sort out.

Hong Kong has established a cost-based universal service regime funded through charges on external (i.e. international) traffic. The designated universal service provider (CWHKTC) has an obligation to provide PSTN access services in Hong Kong. The universal service provider may receive fair contributions from other licensees towards the net costs of serving customers and providing public telephones. Customers and payphones for which compensation is requested by the USP are referred to as “uneconomic”. The total net cost of CWHKTC (the universal service contribution or USC) was calculated at HKD 510.5 million for the 1997/98 financial year. Of this amount, HKD 398.2 million was incurred in serving uneconomic customers and HKD 112.3 million in serving uneconomic payphones. The USC for the 1997/98 year was equivalent to HKD 0.136 per minute external of traffic. The USC accounted for about one percent of total sector revenues. The USC regime has been maintained after the external market liberalization of January 1999. However, an independent intermediary was appointed to collect and administer the USC.

11.3 Other Asian Countries

Internal cross-subsidization is widely used in other Asian countries to promote universality. This approach is used, for example, in China, Bangladesh, Bhutan, Indonesia, Iran, South Korea, Sri Lanka, Mongolia, Nepal, Philippines and Thailand.

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Network expansion obligations are also widely used to promote universality. Some examples follow.

In India, new and existing telecommunications operators are required to install a certain number of lines in rural areas within specified periods. As an example, in category A concessions, in the most desirable areas, the tender conditions for India's basic service operators stipulated that at the end of 12 months, a minimum of 10% of installed lines must be in rural areas. A similar condition applied to the less desirable category B concession areas, but the timetable was extended to 24 months. For category C concession areas, the timetable was 36 months.

In the Philippines, all nine international service providers were required to install 300,000 local lines within 3 years of obtaining their licences. Cellular

mobile operators were required to install 400,000 local lines within a period of five years. In some cases, licences were awarded to companies for both cellular and international services, resulting in a requirement to put in 700,000 lines in 5 years.

Thailand and Indonesia have adopted joint-venture/consortia models with Build Operate Transfer (BOT) type arrangements. Under these arrangements, foreign strategic investors entered into agreements with local partners (often including the incumbent operators) to operate telecommunications networks in designated areas. In both Thailand and Indonesia, the licence and contractual arrangements included requirements to install a certain number of lines within specified period. In Indonesia, the new operators were also required to extend service to rural municipal districts in their serving territories within specified periods.

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APPENDIX A – WTO REGULATION REFERENCE PAPER

Annex to the Fourth Protocol to the GATS Agreement, the “Agreement on Basic Telecommunications” negotiated under the auspices of the World Trade Organization (WTO) in February 1997, which came into effect on 1 January 1998.

This Reference Paper forms part of the commitments of most of the original 69 signatories to the Agreement on Basic Telecommunications. Several signatories committed to somewhat different wording. Others have subsequently committed to implement the regulatory framework set out in the Reference Paper.

REFERENCE PAPER

Scope

The following are definitions and principles on the regulatory framework for the basic telecommunications services.

Definitions

Users mean service consumers and service suppliers.

Essential facilities mean facilities of a public telecommunications transport network or service that:

- (a) are exclusively or predominantly provided by a single or limited number of suppliers; and
- (b) cannot feasibly be economically or technically substituted in order to provide a service.

A major supplier is a supplier which has the ability to materially affect the terms of participation (having regard to price and supply) in the relevant market for basic telecommunications services as a result of:

- (a) control over essential facilities; or
- (b) user of its position in the market.

1. Competitive safeguards

1.1 Prevention of anti-competitive practices in telecommunications

Appropriate measures shall be maintained for the purpose of preventing suppliers who, alone or together, are a major supplier from engaging in or continuing anti-competitive practices.

1.2 Safeguards

The anti-competitive practices referred to above shall include in particular:

- (a) engaging in anti-competitive cross-subsidization;

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- (b) using information obtained from competitors with anti-competitive results; and
- (c) not making available to other services suppliers on a timely basis technical information about essential facilities and commercially relevant information which are necessary for them to provide services.

2 Interconnection

2.1 This section applies to linking with suppliers providing public telecommunications transport networks or services in order to allow the users of one supplier to communicate with users of another supplier and to access services provided by another supplier, where specific commitments are undertaken.

2.2 Interconnection to Be Ensured

Interconnection with a major supplier will be ensured at any technically feasible point in the network. Such interconnection is provided.

- (a) under non-discriminatory terms, conditions (including technical standards and specifications) and rates and of a quality no less favourable than that provided for its own like services or for like services of non-affiliated service suppliers or for its subsidiaries or other affiliates;
- (b) in a timely fashion on terms, conditions (including technical standards and specifications) and cost-oriented rates that are transparent, reasonable, having regard to economic feasibility, and sufficiently unbundled so that the supplier need not pay for network components or facilities that it does not require for the service to be provided; and
- (c) upon request, at points in addition to the network termination points offered to the majority of users, subject to charges that reflect the cost of construction of necessary additional facilities.

2.3 Public Availability of the Procedures for Interconnection Negotiations

The procedures applicable for interconnection to a major supplier will be made publicly available.

2.4 Transparency of Interconnection Arrangements

It is ensured that a major supplier will make publicly available either its interconnection agreements or a reference interconnection offer.

2.5 Interconnection: Dispute Settlement

A service supplier requesting interconnection with a major supplier will have recourse, either:

- (a) at any time or
- (b) after a reasonable period of time which has been made publicly known to an independent domestic body, which may be a regulatory body as referred to in paragraph 5 below, to resolve disputes regarding appropriate terms, conditions and

rates for Interconnection within a reasonable period of time, to the extent that these have not been established previously.

3 Universal Service

Any Member has the right to define the kind of universal service obligation it wishes to maintain. Such obligations will not be regarded as anti-competitive per se, provided they are administered in a transparent, non-discriminatory and competitively neutral manner and are not more burdensome than necessary for the kind of universal service defined by the Member.

4 Public Availability of Licensing Criteria

Where a licence is required, the following will be made publicly available:

- (a) all the licensing criteria and the period of time normally required to reach a decision concerning an application for a licence; and
- (b) the terms and conditions of individual licences.

The reasons for the denial of a licence will be made known to the applicant upon request.

5 Independent Regulators

The regulatory body is separate from, and not accountable to, any supplier of basic telecommunications services. The decisions of and the procedures used by regulators shall be impartial with respect to all market participants.

6 Allocation and Use of Scarce Resources

Any procedures for the allocation and use of scarce resources, including frequencies, numbers and rights of way, will be carried out in an objective, timely, transparent and non-discriminatory manner. The current state of allocated frequency bands will be made publicly available, but detailed identification of frequencies allocated for specific government uses is not required.

APPENDIX B – THE ECONOMICS OF TELECOMMUNICATIONS PRICES AND COST

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APPENDIX B – THE ECONOMICS OF TELECOMMUNICATIONS PRICES AND COSTS

This Appendix provides an overview of the economic theory and practice of price regulation (tariff setting) and costing in telecommunications. It contains background information relevant to several of the modules in this Handbook. It is particularly relevant to Module 4, which focuses on price regulation.

The concepts addressed in this Appendix are also relevant to other Modules. In particular, telecommunications costing and pricing concepts underlie many of the issues related to Interconnection (Module 3), Competition Policy (Module 5), and Universal Service (Module 6). Having said that, the world of economic theory and practice is not for everyone. We have concentrated a discussion of these concepts in this Appendix to be read by those with a particular interest in the subject.

We start this Appendix with a discussion of the benefits of competition and the alternatives available when markets fail to produce socially-optimal results. We then review the theoretical and practical applications of monopoly pricing, including Ramsey pricing. We provide a survey of telecommunications elasticity estimates. The last half of this Appendix is devoted to a survey of telecommunications costs, including different costing perspectives, terms and definitions. We discuss some of the costing methodologies adopted by regulators around the world, including the FCC's TELRIC and the European Commission's LRAIC. We conclude with a specific interconnection costing example.

This Appendix covers a range of topics, from general economic theory to very specific economic applications of the theory in the telecommunications sector. We have only provided a summary treatment of the principal topics, and we have simplified the discussion of certain issues. Readers interested in a more detailed and technically specific treatment are directed to the selected sources listed in Appendix D.

1.1 *The Economic Rationale for Price Regulation*

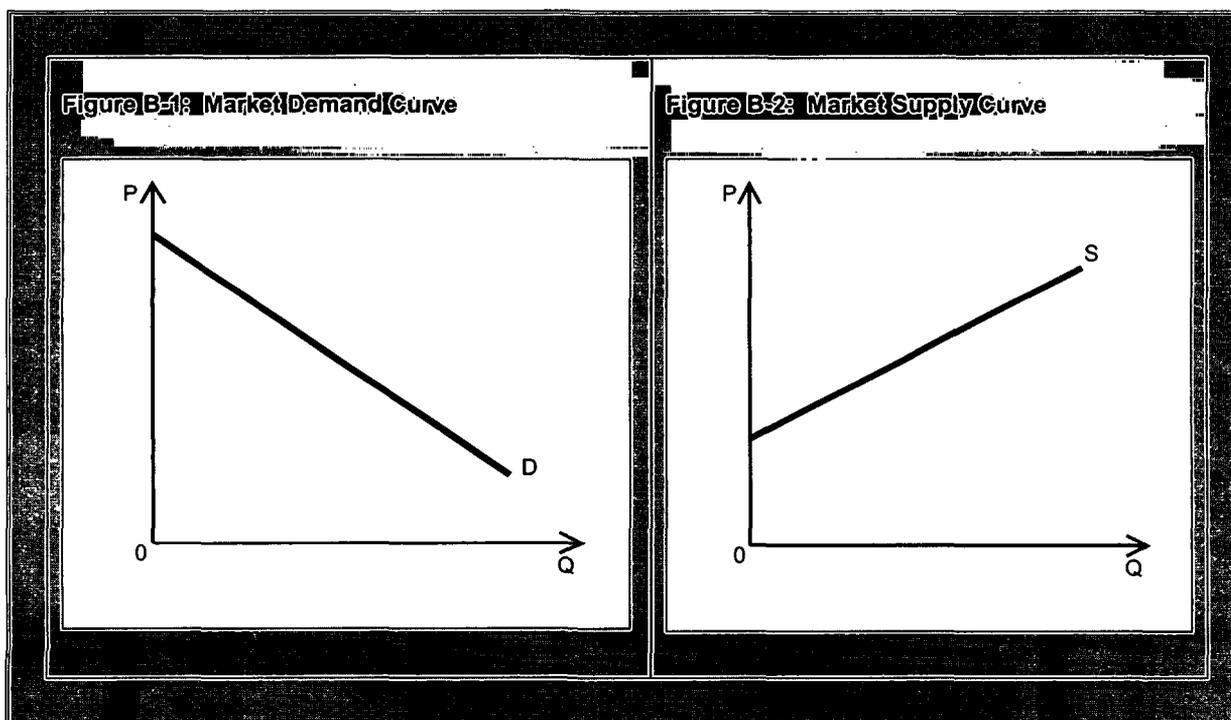
In the following Section, we review the economic theory relating to the benefits of competition. We also review the cost characteristics of telecommunications networks that constrain competition and that provide a rationale for continued price regulation of dominant operators in the telecommunications sector.

1.1.1 *Benefits of Competition*

According to economic theory, price regulation is justified when markets fail to produce competitive prices. If markets are competitive and function smoothly, theory predicts that they will lead to "efficient" prices that maximize society's welfare. Specifically, efficient prices will equate the amount of a service that sellers want to supply to the amount of a service that buyers demand. Efficient prices will equal the benefit that buyers get from the last unit consumed and the cost of producing the last unit supplied (the marginal cost).

The general economic theory of efficient competitive markets is illustrated below. Figure B-1 shows the market demand curve, *D*, for a particular service. The demand curve is plotted on a graph with the price of the service (the "own-price"), *P*, on the vertical axis (the "y-axis") and the quantity of the service, *Q*, on the horizontal axis (the "x-axis"). Because consumers will want more of the service when the price is lower, the demand curve is drawn sloping downwards from left to right, to show that market demand increases as price decreases, and vice-versa. Total market demand is determined by adding together the demand curves of individual consumers.

Figure B-2 shows the market supply curve, *S*, for the service. This curve slopes upward to the right, showing that more services will be provided by firms as the price of the service increases. In this example of a perfectly competitive firm, we assume constant or decreasing returns to scale (see discussion of these and other cost concepts below). Under this assumption, the supply curve of a perfectly



competitive firm is that portion of the marginal cost (MC) that lies above the average variable cost curve. Total market supply is determined by adding together the supply curves of individual firms.

Figure B-3 shows the market equilibrium when firms (suppliers) and consumers interact. At market equilibrium, the demand and supply curves intersect at the market price P^* and market output Q^* . In summary, competitive markets will lead to an efficient price P^* , at which the amount suppliers want to provide, Q^* , equals the amount buyers demand. Given that for each firm the supply curve is the marginal cost curve, at market equilibrium the firm will produce up to the point where the price is equal to marginal cost – that is, the level of output at which P^* equals marginal cost.

Figure B-4 shows that social welfare is maximized at the competitive equilibrium (price P^* , output Q^*). Assuming that the area under the demand curve represents consumers' total willingness-to-pay and the area under the supply curve represents suppliers' total cost, the difference between these two concepts is area ABC. This is often referred to as "social surplus" or "total surplus".

Total surplus may be divided into consumer surplus of AP^*B (the difference between total willingness to pay $0Q^*BA$ less what consumers must actually pay $0Q^*BP^*$), and producer surplus of P^*CB (the total difference (profit) between the revenues $0Q^*BP^*$ and the costs incurred $0Q^*BC$). It can be shown that no other combination of prices will result in as much total surplus. In short, equating price and marginal cost at output Q^* maximizes total surplus and, hence, social welfare. This is why economists refer to marginal-cost pricing as "efficient".

This, then, is the situation in this ideal competitive marketplace. For this efficient ideal to be realized, the market must meet a number of conditions. For instance, the market must have several sellers (suppliers) and buyers (consumers), with none so large that it can affect prices: no one can be dominant in the marketplace. In addition, there must be no significant externalities, loosely defined as spillover benefits or negative effects to/from other markets. There should also be free entry to and exit from the market. Finally, as mentioned above, this market should not be characterised by economies of scale.

Figure B-3: Market Supply and Demand

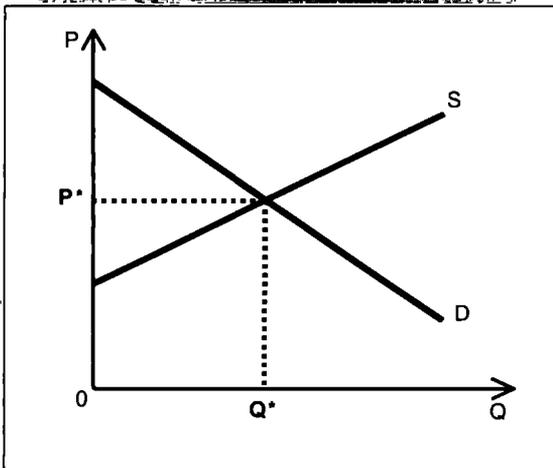
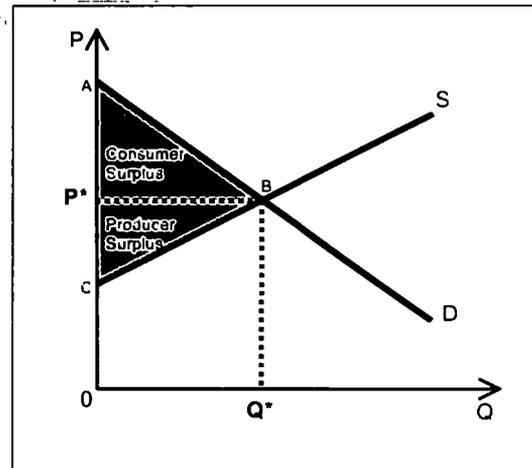


Figure B-4: Social Welfare of Marginal Cost Pricing



This conventional description of competitive markets generally will not be applicable to the telecommunications sector because of the specific cost characteristics of telecommunications networks. We discuss these cost issues in the sections below.

1.1.2 When Markets Fail

Where all the conditions mentioned above are not present, the market will not generally produce socially-optimal results. Economists call this "market failure". Market failure occurs when resources are misallocated, or allocated inefficiently. The result is waste or lost value. In such a situation, there is justification for government intervention to improve social welfare. Clearly, the impetus for regulation must be weighed against its economic and bureaucratic costs, in order to avoid or minimize "regulatory failure". Module 1 of this Handbook provides guidelines for effective and efficient regulation in the telecommunication sector.

In traditional economic theory, natural monopoly is cited as a prime example of market failure. Loosely defined, a natural monopoly exists when the costs of

production are such that it is less expensive for market demand to be supplied by one operator than by several. A natural monopoly arises from two sources: economies of scale and economies of scope. Economists use the concept of "subadditivity" to describe and test for natural monopoly.

1.1.2.1 Economies of Scale

Economies of scale exist when the average (total) cost of the firm decreases with the volume of production. Figure B-5 illustrates how a supplier's long-run average cost (AC) declines as a result of economies of scale. Economies of scale are also referred to as increasing returns to scale. Conversely, diseconomies of scale, or decreasing returns to scale, exist when average costs increase with the volume of production. Constant returns to scale exist when average costs are constant with the volume of output.

Economies of scale can arise from a number of technological and managerial factors. One common source of economies of scale, especially in the telecommunications sector, is fixed costs (i.e. costs that

are incurred regardless of how many units of output are produced). Fixed costs are significant in telecommunications and in other industries that require networks. When output expands, average fixed costs will decline. This phenomenon will exert a downward pressure on average cost that may result in economies of scale. Note that the existence of fixed costs does not necessarily mean that the firm will have economies of scale. As noted above, economies of scale can be due to factors other than fixed costs.

Economies of scale can exist over some ranges of outputs, but not others. For instance, at high levels of output, management might not be able to oversee closely all the operations of the firm, giving rise to inefficiencies that can dominate any technological cost advantages of large-scale operation.

The existence of economies of scale depends on whether average (total) cost increases or decreases in the long run. Average total cost is made up of two components: average fixed cost and average variable cost. As discussed above, average fixed cost decreases with output. However, average variable cost may increase more or less rapidly than output. Economies of scale depends on the

combined behaviour of these two components as output increases.

For a single service firm, a natural monopoly exists if economies of scale arise over the relevant range of output relative to actual and future demand. When the firm produces more than one service, average costs are not clearly defined. In this instance, economists have developed a number of criteria to represent and test for economies of scale. The general idea remains the same as in the single service example: a multi-service firm with economies of scale can increase all of its services in proportion with a less than proportional increase in its total costs.

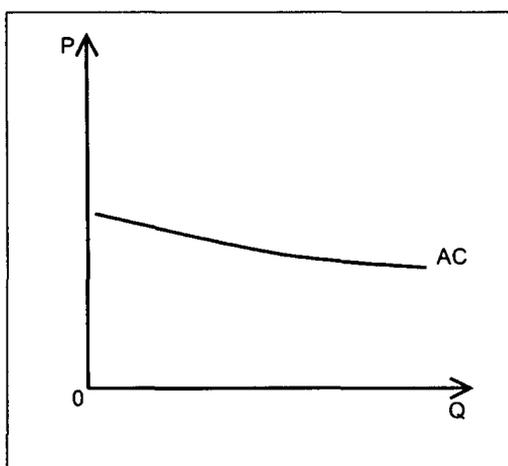
1.1.2.2 Economies of Scope

When more than one good is being produced, a natural monopoly can arise from economies of scope as well as from economies of scale. With several goods, there are sometimes shared equipment or common facilities that make producing them together less expensive than producing them separately. Economies of scope exist if a given quantity of each of two or more goods can be produced by one operator at a lower total cost than if each good were produced separately by different operators.

Economies of scope refers to the cost advantage of one operator supplying two or more products or services compared to different operators each providing one. A local PSTN operator, for example, already has a network for local subscribers. With appropriate interconnection to long distance facilities, the local network can also be used to provide long-distance service to customers. Using the local network for long distance service will provide the local operator with economies of scope that would be unavailable to a new operator that aimed to provide just long-distance services. The latter would have to replicate the local network to access subscribers.

A somewhat similar curve to that in Figure B-5 would represent the effect of economies of scope on aggregate average costs of an operator providing several products or services, recognizing that different curves would appear for each individual output.

Figure B-5: Average Cost under Economies of Scale



As with economies of scale, it is possible for economies of scope to exist at some levels of output and not at others. Economies of scope can exist with or without economies of scale.

1.1.3 The Monopoly Problem

The traditional view was that the entire telecommunications sector had natural monopoly characteristics. This implied that key telecommunications markets would fail to meet the competitive condition that there be many sellers in the market. In effect, the traditional industry structure was that of monopoly.

The problem is that the monopolist may exploit its position by charging excessive prices or restricting output. This leads to losses of social welfare (market failure) and sets the scene for government intervention to ensure that consumers and potential competitors are not exploited by the power of the monopolist.

1.1.4 Regulated Monopoly

Governments have addressed the monopoly problem in a number of ways. The main one is regulation. Government policy makers that believed the telecommunications industry to be a natural monopoly decided that citizens would best be served by a single monopolist that can exploit economies of scale and scope. However, traditional telecommunications policies imposed regulations to prevent the monopolists from exercising monopoly power and charging excessive prices. This compromise was aimed at capturing the benefits of productive efficiency without permitting an unrestrained monopolist to earn excessive profits or restrict supply of its services.

In some cases, this view that monopoly was the socially optimal market structure provided a rationale for creating regulatory or legislative barriers to entry in monopoly markets. This transforms a natural monopoly into a legal monopoly. In practice, the regulated monopoly model was implemented through privately owned operators in a number of countries, including the US and Canada.

1.1.5 Public Enterprise

The most common alternative model to regulated private monopoly is public ownership of the operator in a monopoly environment. This model is based on the belief that sector objectives are more likely to be achieved through direct public control and ownership of the enterprise actually providing the services. In such a model, therefore, regulation is often thought to be unnecessary. Until recently, monopoly public ownership was the prevalent sector model in many countries in Europe, Africa, Asia, Latin America and the Caribbean.

In practice, however, public enterprises are used for a variety of tasks of which handling the natural monopoly problem is just one. Given these conflicting tasks and historically poor performance, many governments have abandoned or are abandoning the unregulated public enterprise model. In some jurisdictions, there was a recognition that the rationale for economic regulation was strong whether the operating firm was private or public. State-owned operators were sometimes established as separate "commercialized" or "corporatized" entities, subject to regulation by a different government body.

1.2 Monopoly Pricing

1.2.1 Single Product Monopoly

There is a substantial body of economic theory and practice on the regulation of prices charged by a monopoly. A sample of this literature is included in the Selected Sources to this Appendix.

As seen in the foregoing discussion of the social welfare in an ideal competitive marketplace, economic theory states that "first-best" pricing sets prices equal to marginal cost. For a firm with economies of scale, such as a natural monopoly, however, this efficient pricing prescription is problematic. For such a firm, marginal cost is generally below average costs in the relevant range of output. This situation is illustrated in Figure B-6, where the demand curve and the marginal cost curve intersect below the average cost curve. In this instance, setting a regulated price equal to marginal cost, P^1 , will not allow the firm to recoup all of its costs. In such a case, the firm will lose money and

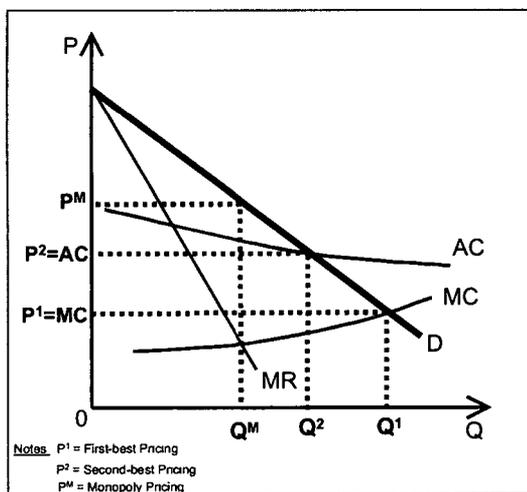
Telecommunications Regulation Handbook

go out of business. Accordingly, regulators must find viable solutions to avoid this result.

In practical terms, this means that price will have to be set above marginal cost. But at what level? To maximize social welfare, departures from marginal costs should be set to minimize total surplus losses while allowing the supplier to break even. This is referred to as the second-best price; in the case of a single-product monopoly, it is the average cost. This price, P^2 , is set at the intersection of the average cost curve and the demand curve in Figure B-6.

Notice that the quantity associated with second-best pricing, Q^2 , is less than that related to first-best pricing, Q^1 . This reduction in quantity is an indication of the welfare losses due to economies of scale. These welfare losses, however, are small compared to those that would result if the monopolist were not price regulated. An unregulated monopolist would equate its marginal cost with its marginal revenue (MR curve in Figure B-6 and set a monopoly price, P^M , higher than its average cost. This pricing would result in monopoly profits for the firm, a reduction in the quantity supplied, Q^M , and additional welfare losses.

Figure B-6: Firm Loses Money at "First Best" Pricing under Economies of Scale



Note that unlike the perfectly competitive firm that has a well-defined supply curve (the marginal cost curve that lies above the average variable cost curve), the natural monopolist has no supply curve that is independent of the demand curve. The amount that an unregulated monopoly produces depends on its marginal cost curve and on the shape of the demand curve.

1.2.2 Ramsey Pricing

Telecommunications operators produce more than one service. The problem that first-best pricing is not commercially viable also applies to a multi-service telecommunications monopoly. Marginal cost pricing will not cover all the monopoly operator's costs, so prices must be raised until the operator can break even. With more than one service, however, there are an infinite number of price combinations that will produce this result.

Economic theory provides a recommendation as to how to deal with this issue. Out of all these price combinations, the second-best prices (i.e. the ones that result in the smallest loss of social welfare compared to marginal-cost pricing) are those that equate the amount by which price exceeds marginal cost in inverse relation to the elasticity of demand for each service. In other words, prices are raised above marginal costs more for services with a lower elasticity of demand and less for services with higher elasticity.

These second-best prices are often referred to as Ramsey prices named after the British researcher who originally studied the issue. This is also referred to as the "inverse elasticity rule." Ramsey prices minimize the changes in quantity purchased compared to the quantities that would be bought at prices equal to marginal cost. The general principle is that the products with the least price-sensitive demand should have the highest prices relative to their marginal costs.

Figure B-7 shows a simplified example of the application of Ramsey pricing principles when the operator provides two services. Ramsey principles are general enough to account for differences in cost; however, for simplicity, our example shows that the two services have the same marginal cost (MC) and that these costs are constant. Under this

assumption, both services have the same “first best” prices, P_1 , set at their marginal cost. In order to raise additional revenue, for instance, to cover all of its costs or to pay for regulatory levies (such as universal service, etc.) prices have to be raised above marginal cost. The application of Ramsey principles would mean that the price of the service with the relatively inelastic price demand would be raised proportionately more than the price of the service with relatively elastic demand. The resultant second-best Ramsey prices, P_2 , are higher for the relatively inelastic than for the elastic service.

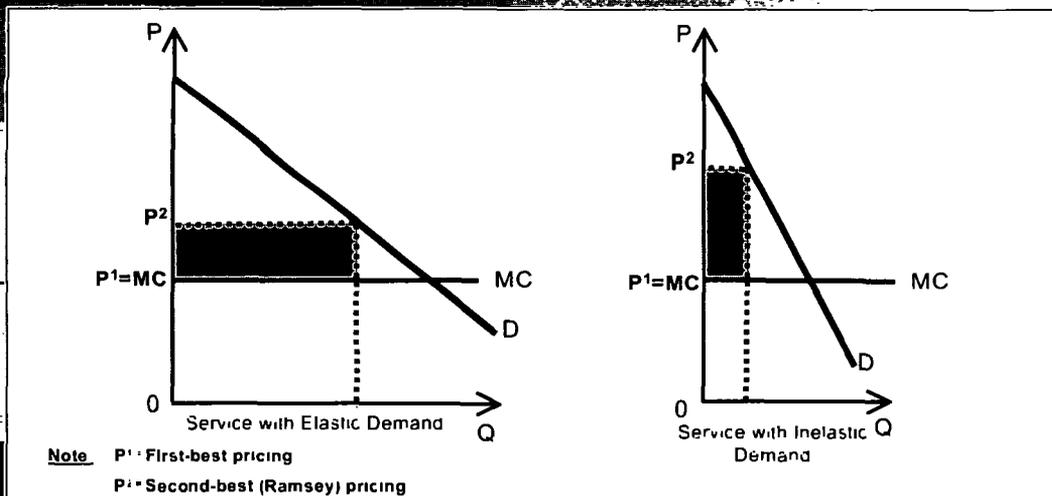
To apply Ramsey prices in an exact manner, regulators face two challenges. One is to determine the elasticity of demand for various telecommunications services. The other is to identify, as accurately as possible, the costs of providing these services. While the perfect application of Ramsey principles requires a great deal of information and hence presents implementation challenges, this does not mean that the basic Ramsey lesson (that relative demand elasticities of telecommunications services affect social welfare) should be ignored. Reasonable measures that approximate Ramsey principles will result in welfare improvements relative to alternate measures. A numerical example of these welfare

improvements is presented in the Appendix to Module 4.

The informational requirements to implement Ramsey pricing are less onerous for operators, who may be presumed to have a much better sense of the elasticities and costs involved than the regulator (another example of the “asymmetry of information” regulatory problem). Fortunately, recent research suggests that under certain conditions price caps regulation provides the operator with the correct incentives for it to set prices in a manner consistent with Ramsey prices. That is, an operator subject to price caps will tend to set economically efficient prices as a result of trying to maximize its profit – an example of incentive-compatible regulation.

Ramsey prices may also be referred to as Ramsey mark-ups. As explained in more detail in the next Section, a mark-up is a percentage or a fixed monetary amount that is used to take into account joint and common costs, to supplement certain incremental costing methodologies. Mark-ups may be uniform or non-uniform. While regulators have generally set uniform mark-ups to promote competition, the application of Ramsey principles suggests that a non-uniform mark-up may be more economically efficient.

Figure B-7: Example of Application of Ramsey Prices



1.2.3 Regulation under Increasing Competition

Policy-makers and regulators are quickly eliminating legal monopolies around the world. However, the end of legal monopoly does not mean the end of monopoly power or of natural monopoly. Hence, the end of legal monopoly does not mean the end of price regulation.

Economists now generally agree that many segments of the telecommunications sector are not characterised by natural monopoly. Infrastructure-based competition between multiple operators in long distance and mobile cellular service, for instance, has proven to be durable and sustainable. There is no economic consensus, however, on whether the access network remains a natural monopoly and, if so, to what extent.

The existence or not of natural monopoly characteristics in the access network may not matter

much. Given the historically poor performance of most legal monopolies, especially in developing countries, most policy-makers do not believe that the theoretical benefits of natural monopoly can be realized in a legal monopoly environment. Hence, there is a growing consensus that there is a favourable trade-off for the sector as a whole from the introduction of competition. There may be some loss of economies of scale, for instance, but these losses are more than offset by the gains in improved efficiency and responsiveness due to competition.

After the introduction of competition, many former monopoly (incumbent) operators will retain residual monopoly power (or "market power") for extended periods of time. This will especially be the case in certain market segments, for instance the access network. Market power exists when incumbent operators are still able to unilaterally (or in combination with other operators) influence market conditions, especially prices. Firms with market power are therefore generally price regulated in

Box B-1: Price and Income Elasticities of Demand

The effects of many demand factors are typically measured by elasticities:

- **Price elasticities** measure the percentage by which the quantity demanded for a telecommunication service changes in response to a small percentage change in price.
 - For example, if a 1% decrease in the price of national long distance service leads to a 0.5% increase in national long distance calling, the price elasticity is -0.50 .
 - Elasticities with a value between 0.0 and -1.0 reflect inelastic demand.
 - Elasticities with a value smaller than -1.0 reflect elastic demand.
 - Elasticities with a value of -1.0 are said to be of unitary elasticity.
 - One of the critical characteristics of elastic demand is that a reduction of prices will result in sufficient increased demand – stimulation – that revenues will in fact increase after the price decrease. On the other hand, revenues will decrease after a decrease in the price of an inelastic service.
 - The elasticity of demand may be deduced from the slope of the demand curve. Generally, the steeper the demand curve, the more inelastic the demand. At one extreme, a vertical demand curve shows zero elasticity. In this instance of totally inelastic demand, the quantity demanded does not vary by price at all. For example, research suggests that business demand for telecommunications access can be almost totally inelastic.
- **Income elasticities** measure the percentage by which the quantity demanded for a telecommunication service changes in response to a small percentage change in income.

order to constrain their ability to charge excessive prices. The subject of market power and its impact on pricing is discussed further in Module 5 - Competition Policy.

1.3 Elasticity of Demand

In this section, we discuss the responsiveness of demand for telecommunications services to changes in prices. This is referred to as the (own-price) elasticity of demand and is of critical importance in a number of applications, including in the determination of Ramsey prices and the calculation of the welfare benefits of rate rebalancing. Box B-1 provides an overview of demand elasticities.

As for most other products, the demand for telecommunications services depends on factors such as consumers' demographic characteristics, their incomes, the prices of the services, and the availability and price of other communications options.

In considering price elasticities, it should be noted that telecommunications demand generally has two interrelated parts — access and usage. Local, long distance and international calls depend on having access, and access is of value only if using the network (calling) has value. Whereas most economic goods are substitutes, access and usage are complements. That is, if the price of access increases, the demand for access and usage both decrease. If the price of usage increases, demand for calls and access decreases.

1.3.1 Survey of Elasticity Estimates

Most studies of telecommunications demand have concentrated on voice telephony services. They are divided into studies of residential and business demand for access, local, long distance and international calls.

Estimates of elasticities are usually based on historical consumption patterns and are calculated using complex statistical techniques. As a result, determining the magnitude of elasticities is an empirical matter. Most of the elasticity studies to date have been done in industrialized countries. A significant and consistent body of literature now exists to provide point and/or interval estimates of

most price and income elasticities for important classes of telecommunications services.

Table B-1 summarizes the subjective estimates from the classic 1980 study conducted by Lester Taylor. (The results from this study are used as benchmarks by many consulting economists in industrialized and developing countries.) A second edition of the Taylor study was published in 1994.

The elasticity studies show that there is a range of price elasticities among telecommunications services. Access service is very price inelastic. Demand for access is more inelastic at higher rates of penetration. Domestic long distance and international calls are the most elastic services.. Demand for calling is more elastic the longer the distance of the call. Demand for any given service is less elastic for business users than for residential users.

Box B-2: Application of Industrialized Country Elasticity Estimates to Less Developed Markets

Care must be taken in interpreting elasticity estimates for industrialized telecommunications markets in developing countries. One of the principal reasons for low penetration rates in such countries is not lack of demand, but rather under-supply, shown by the long and ever-present waiting lists.

A change in price in capacity-constrained telecommunications markets is not likely to affect demand as much as is suggested by the elasticity estimates presented in this section (which were calculated in environments where supply is not constrained). It could be, therefore, that consumers in many developing countries are not on the same demand curve as their counterparts in mature telecommunications markets.

Recent research has confirmed this hypothesis. For instance, in studying the recent rate rebalancing initiatives in many Latin American countries, Ros and Banerjee (2000) found that an increase in monthly subscription prices actually lead to increases in penetration rates — that is, the quantity demanded.

Table B-1: Point and Interval Estimates of Price and Income Elasticities of Demand for Selected Telephone Services

Type of Demand	Price Elasticity			Income Elasticity
	Connection	Subscription	Long Distance	
Access	-0.03 (±0.03)	-0.10 (±0.09)		0.50 (±0.10)
Local Calls		-0.20 (±0.05)		1.00 (±0.40)
Domestic LD Calls				
Shorter distance			-0.375 (±0.125)	1.15 (±0.25)
Medium distance			-0.65 (±0.15)	1.25 (±0.25)
Longer distance			-0.75 (±0.20)	1.50 (±0.40)
International Calls			-0.90 (±0.30)	1.70 (±0.40)

Notes:

In each cell, the first figure indicates the point estimate of the elasticity – that is the one best estimate of the variable. The second figure, preceded by ±, indicates the subjective interval estimate for the elasticity – that is, the possible range of the variable. For example, medium distance domestic LD calling the price elasticity is estimated at about -0.65 with a possible range of -0.50 to -0.80.

LD refers to long distance

Source: Adopted from Taylor (1980) and supplemented by Taylor (1994) and other elasticity studies.

1.4 Telecommunications Costs

Determining or verifying the costs for telecommunications services are among the most difficult challenges facing regulators. Nevertheless, cost analysis can be of crucial importance. In particular, regulators use cost analysis in setting or approving prices, including “retail” prices for consumers and “wholesale” prices for competitors (e.g. interconnection and unbundled network elements, etc.), and in enforcing competition policy.

The practice of determining costs in the telecommunications industry is often complex and controversial. Different cost approaches, concepts, definitions, interpretations and data sources lead to this complexity. Generally, the nature of the problem being addressed and the purpose of the costing exercise will determine which is the most appropriate approach to use.

1.4.1 Costing Perspectives

Most telecommunications cost analyses use one or more of the main perspectives outlined in Box B-3. Each is associated with the perspectives of a particular profession.

1.4.2 Costing Terms and Concepts

Box B-4 provides descriptions and some examples of the principal terms and concepts used in telecommunications cost analysis. These are the basic building blocks of cost analysis.

1.4.3 Costing Methods

In this section, we briefly review and compare some of the main costing methods used by telecommunications regulators over the years.

Most costing methods are based on the principle of cost “causality” (also referred to as cost causation). Simply stated, cost causality means that costs

Box B-3: Three Principal Costing Perspectives**Accounting Costs**

This perspective focuses on the recording of the actual incurred costs by the operator. The focus is on the historically recorded costs (i.e. it is backward-looking). Data sources include corporate financial accounting and more detailed management accounting measures. In the past, regulators relied almost exclusively on accounting data as their source of information for cost studies.

Engineering Costs

This perspective is primarily concerned with forward-looking management decisions. Engineering cost analyses assess different ways of meeting a specified objective, such as provisioning a certain amount of capacity. The goal of engineering cost analysis is generally to determine the optimal method of building telecommunications facilities.

Economic Costs

The objective of this costing perspective is to determine the structure of efficient prices, that is, prices that maximize consumer and producer surplus. Economic costing uses a forward-looking approach that emphasizes concepts of cost variability, incremental costs and opportunity costs. These concepts are discussed below.

should be recovered (e.g. through prices, etc.) from the source that caused the costs to be borne. While this principle is relatively easy to implement in many instances (variable or incremental costs), it is more complex to apply in the presence of fixed, joint and shared costs. We discuss this issue in more detail below in the section containing the interconnection pricing example.

One of the most important distinctions between costing methods is between methods that use historical data and ones that use a forward-looking approach. We adopt this distinction in our detailed discussion of costing methods in the following section. Generally, forward-looking costs are preferred because they better reflect the workings of competitive markets. In such markets, from the moment an investment is made, the asset's value to the operator depends more on what use can be made of it than what it cost. If a competitor is more efficient, the operator will need to respond by adjusting its prices, rather than to continue pricing on the basis of its historical costs. In other words, competitive operators are compelled to look forward to set prices, and hence be able to compete, rather than to look backward to prices based on their original investments.

Costing methods and models can be "top-down" or "bottom-up". Top-down approaches are generally associated with historic costs, while bottom-up models are generally associated with forward-looking costs.

One matter that we have not dealt with so far is the cost of capital. The required return on investment in the network and other related assets is the cost of capital. It should reflect the opportunity cost to investors, so that the return earned on network assets and other related assets would be broadly equal to the likely return on alternative comparable investments.

Because the telecommunications industry is capital-intensive, the cost of capital is a critical issue in determining telecommunications costs, regardless of the costing methodology used. The main point to recall is that the regulator has to incorporate the correct measure of the cost of capital in its costing methodology in order for the regulated operator to recover all of its efficient capital costs, including its equity and debt costs.

1.4.3.1 Costing Method Comparison

This introductory section provides a graphical comparison of the main costing methods that are discussed in greater detail in the following sections.

Much of the controversy associated with cost analysis relates to the allocation of indirect costs to different telecommunications elements or services. The allocation issue is highlighted in Figure B-8 which provides a simplified comparison between LRIC, TSLRIC/LRAIC, TELRIC, FDC/FAC and stand-alone cost for a specific telecommunications element or service.

Recall from Box B-4 that LRIC, TSLRIC/LRAIC and TELRIC are generally required to be supplemented by mark-ups to recover a portion of joint and shared costs. Hence, mark-ups are included in Figure C-15 for those cost methods. This is in contrast to FDC/FAC approaches that generally allocate all joint and common costs to the services, based on allocation formulae. In this instance, there is no requirement for mark-ups. Recall that if all joint and shared costs are included, the resultant cost concept is stand-alone cost. We discuss the allocation issue further in the section that contains the interconnection cost analysis example.

Box B-4: Principal Costing Terms and Concepts (in alphabetical order)

Allocated Cost - A joint or common cost that has been divided among services in accordance with a set formula or by judgement. This is also known as a distributed cost.

Average Cost - A specified cost divided by the quantity of output. [By default, usually refers to the average of total cost, which is total cost divided by the specified volume of output.]

Avoidable Cost - A cost that would not be incurred if output volume was reduced.

Common Cost - A cost incurred when a production process yields two or more services. This is also referred to as shared cost if it applies to all of the operations of the operator. For example, the cost of the building to house a telecommunications exchange may be described as a common cost of serving both business and residential customers. The salary of the operator's president may be considered a shared cost of all services (this type of cost is often also referred to as an "overhead" cost).

Direct Cost - A cost that can be attributed solely to the production of a specific item. A direct cost does not require a cost allocation (or distribution) to separate it from the costs incurred in the production of other items. An indirect cost, however, does require such an allocation. An operator that produces a single product sold in a single market incurs only direct costs. When an operator is engaged in producing multiple products or serving multiple markets, however, it will normally also incur indirect costs such as joint and/or common costs.

Fixed Cost - A cost that does not vary by volume of production. A specific type of fixed cost is sunk costs, costs that cannot be changed or avoided even by ceasing production entirely. For instance, head office space is a fixed cost, but the labour component of the installation of the copper wire in the local loop is a sunk cost. Neither fixed nor sunk costs enter into marginal-cost pricing decisions because neither varies with output.

Increment - A specific non-minimal increase or decrease in volume of production.

Incremental Cost - The change in total cost resulting from an increment. Incremental cost equals total cost assuming the increment is produced, minus total cost assuming the increment is not produced. Because a wide variety of different increments can be specified, incremental cost can conceptually range all the way from total cost per unit (entire output as the increment) to marginal cost (one unit as the increment). The size of the increment used in any specific cost analysis will be a matter of judgement. The most common practice is to use the entire service or element as the increment, in which case the service or element specific fixed costs of the service or element would be included in the increment

Box B-4: Principal Costing Terms and Concepts (in alphabetical order) (cont'd)

Joint Cost – A specific kind of common cost incurred when a production process yields two or more outputs in fixed proportion. Joint costs vary in proportion to the total output of the joint production process, not to the output of the individual joint products.

Long Run – A period over which all factors of production, including capital, are variable. In practice, a period of 10 to 15 years is sometimes selected by regulators for the purpose of LRIC analysis, for example.

Long Run Incremental Cost (LRIC) – The incremental costs that arise in the long run with a specific increment in volume of production. LRIC is generally calculated by estimating costs using current technology and best available performance standards. When a cost study is based on the “costs of an efficient firm”, it usually refers to LRIC-type methodology. In the presence of joint or common costs, the sum of the LRIC for all of the operator’s services will be less than the total costs of the operator. Hence, the operator will not be able to recoup all of its costs. Regulators will generally allow a mark-up to be added to LRIC or LRIC-type costs for the firm to help recover all of its costs.

Marginal Cost - The change in total cost resulting from a very small change in the volume of output produced. Due to a number of practical issues, including the lumpiness of capital increments (i.e. the inability of telecommunications plant to be divided into very small parts, or scaled to provide an exact fit with the actual requirements of the network), marginal cost is difficult to estimate. Accordingly, most estimates of marginal cost are based on incremental cost.

Mark-Up – A percentage or a fixed monetary amount that is used to take into account joint and common costs, for example, to supplement certain costing methodologies. Cost concepts that do not fully allocate (or distribute) all indirect costs generally require mark-ups. These cost concepts include incremental costing methodologies, including LRIC (and TSLRIC/LRAIC and TELRIC as discussed in detail in the cost methods section below). The mark-up may be uniform or non-uniform. While regulators have generally set uniform mark-ups to promote competition, the application of Ramsey principles suggests that a non-uniform mark-up may be economically efficient.

Stand-alone Cost – The total cost to provide a particular product or service in a separate production process (i.e. without benefit of scope economies).

Total Cost – The aggregate amount of all costs incurred in producing a specified volume of output. The sum of fixed and variable costs equals total cost.

Variable Cost - A cost that varies with increased volume of production.

Source: Adapted from Johnson (1999) and other sources.

1.4.3.2 Historical Cost Approaches

These approaches generally involve the compilation and analysis of accounting and other historical data. One of the advantages of these approaches is that they reflect the real-world workings of the actual telecommunications operator under study.

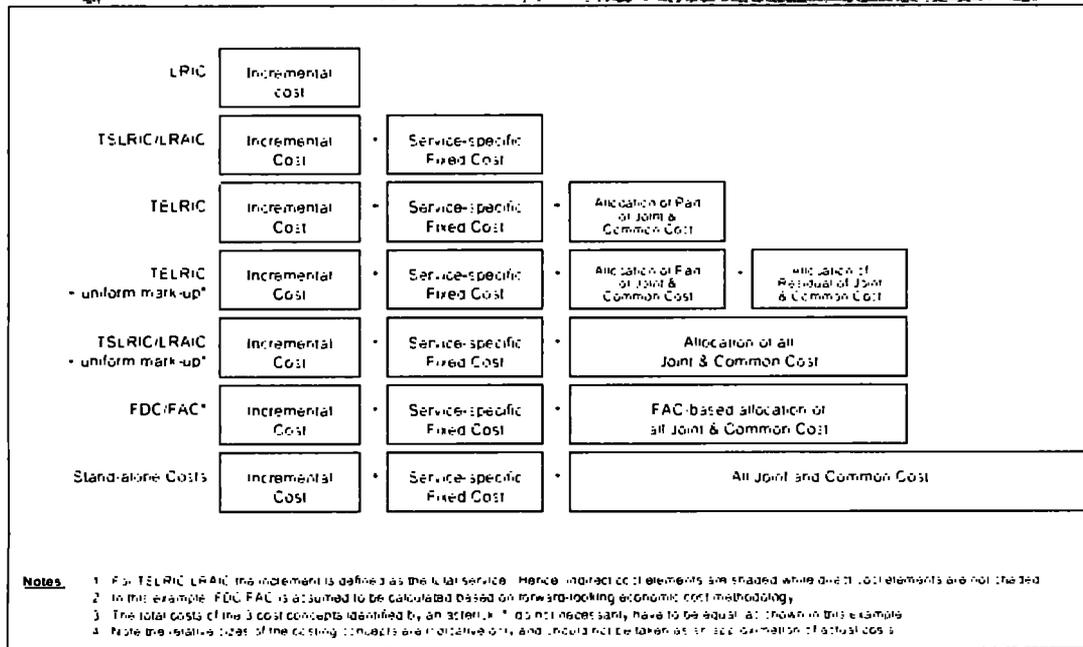
Fully Distributed Cost (FDC)

➤ This method, also referred to as fully allocated cost (FAC), is generally based on a historical accounting of costs. Typically, an FDC study

focuses on broad categories of service rather than on individual services. For instance, the study might show the cost of local exchange service, different lengths of long distance and miscellaneous services.

➤ The challenge (and inherent weakness) of this type of study is how to allocate joint and common costs to the specific classes of services. The joint and common costs are often allocated to the various categories of service using formulas that reflect relative usage or other factors.

Figure B-8: The Relationship Between Costs, Costing Methods and Allocations



Source: Adapted from ODTR (1999) and other sources.

- For instance, if network access lines in an exchange are used 70% for local calls, 20% for national long distance calls and 10% for international calls, an FDC study may allocate the joint costs of these lines based on the same percentages. These allocations are arbitrary.
- FDC/FAC methods do not require a mark-up to recover a portion of joint and common costs. The FDC/FAC allocation may or may not be the same as the one that would result from the use of a mark-up.
- Another criticism of this type of study is that the historic costs may reflect certain operational or technological inefficiencies of the incumbent operator. Using historic costs, for example to calculate interconnection costs, leads to concerns that incumbent operators are “passing on their inefficiencies” to the interconnecting operators. The reason for this is that the services in question could likely be provided at a

lower cost using current technology or efficient labour and/or management practices.

Embedded Direct Analysis (EDA)

- This is also a type of study based on historical accounting of costs, but it differs from FDC. An EDA study will only assign those costs that can be directly traced to a particular service category. Joint and common costs will be left unassigned, typically as one or more lump sum amounts.

1.4.3.3 Forward-Looking Cost Approaches

These approaches typically involve the development of engineering-economics models that are used to calculate the costs of network elements and, in turn, services provided using those elements. These models estimate the costs of rebuilding specific elements of the network using current technology. Generally, this modelling approach assumes

operating and capital costs will be incurred efficiently. The LRIC approach is discussed in Box B-4.

Total Service Long Run Incremental Cost (TSLRIC)

- TSLRIC measures the difference in cost between producing a service and not producing it. TSLRIC is LRIC in which the increment is the total service. Hence, mark-ups are required to recoup a portion of joint and common costs, which are not included in TSLRIC.
- The European Commission has adopted a TSLRIC-type approach, called, Long Run Average Incremental Cost (LRAIC) as its preferred costing methodology. The term “average” is intended to capture the policy decision that defines the increment as the total service. LRAIC, hence, includes the fixed costs specific to the service concerned: “service-specific fixed costs.”
- TSLRIC can be useful in public policy and pricing decisions. For example, TSLRIC estimates can highlight the presence or absence of subsidies for a service. Similarly, incremental costs can be useful in developing or examining the regulatory or pricing policies that apply to a particular service or group of customers.
- One of the weaknesses of this method, and of all forward-looking studies, is that the results are estimations that may or may not occur in practice.

Total Element Long-Run Incremental Cost (TELRIC)

- TELRIC is a term coined by the FCC to describe a specific approach to costing. TELRIC includes the incremental cost resulting from adding or subtracting a specific network element in the long run, plus an allocated portion of part of the joint and common costs. Hence, mark-ups may also be necessary to recoup a portion of the “residual” joint and common costs not already included in TELRIC.

- The FCC developed TELRIC to implement the 1996 Telecommunications Act. In the FCC’s words:

...prices for interconnection and unbundled elements...should be set at forward-looking long-run economic cost. In practice, this will mean that prices are based on the TSLRIC of the network element, which we will call ...TELRIC, and will include a reasonable allocation of forward-looking joint and common costs...

- In coming up with its own costing method, the FCC distinguished between its approach to costing network elements and TSLRIC.
- The FCC required that certain joint and common costs be included in TELRIC, even if they do not vary with the presence or absence of the element in question. This is not consistent with the standard definition of TSLRIC.

1.4.4 Interconnection Costing Example

This section provides a numerical example of a forward-looking costing analysis to determine an interconnection price. This example incorporates many of the concepts introduced in this Appendix. Note, however, that it deals only with the on-going costs of interconnection. It does not include the “start-up” costs associated with actually interconnecting the two operators (transmission links, etc.). These “start-up” costs, which can be relatively small compared to the “ongoing” or “recurrent” costs discussed in this example, are discussed in Module 4.

Figure B-9 provides a simplified graphical representation of the costs of an incumbent operator that provides access services and local calling services. The specific division between access and calling service costs varies depending on the purpose of the cost analysis. Generally, access service costs include costs of the local loop and some associated fixed costs. Calling service costs generally include those associated with the rest of the network, including switching and transmission. Note that “calling” services are referred to as conveyance in the UK and other countries.

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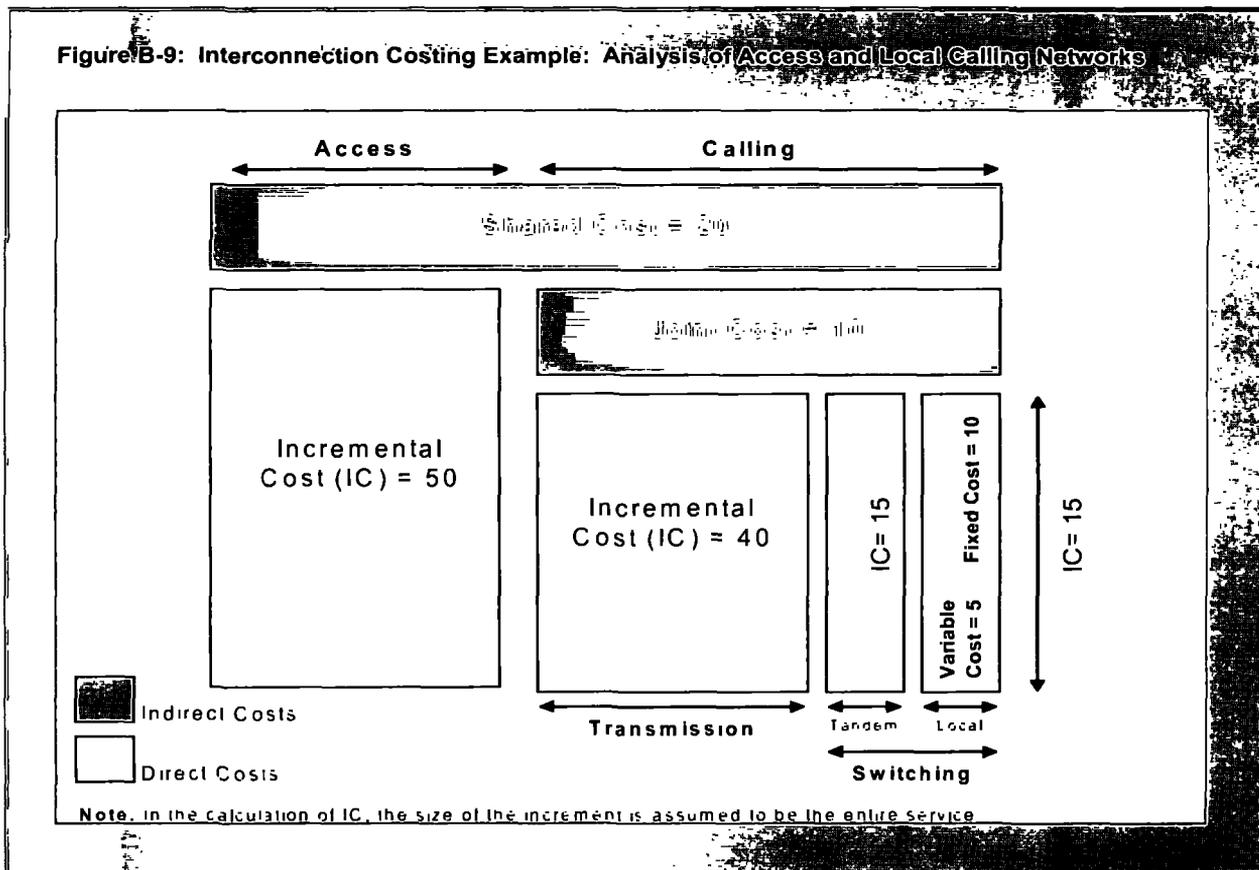
1.4.4.1 Determining the Size of the Increment

In this example, we generally assume that the size of the increment is the entire service. This assumption is consistent with the principle of cost causation as it has been interpreted by many regulators. This assumption means that the service-specific fixed costs of each service are included in calculation of the respective incremental costs. In practice, this assumption will mean that the entrant makes a contribution to the incumbent operator's service-specific fixed cost.

As shown in Figure B-9, the incremental costs for access, transmission, tandem switching and local switching are 50, 40, 15 and 15. Local switching may be further disaggregated into fixed costs of 10 and variable costs of 5.

Total incremental costs are 120. These costs constitute the incumbent operator's direct costs. The indirect costs total 30 and include joint cost of 10 (e.g. carrier services or network division, etc.) and shared cost of 20 (e.g. president's salary, etc.).

In this example, we assume that a long-distance operator requests interconnection with the incumbent (access and local) operator at the local switch. Let us assume that the parties do not agree on interconnection price, or that the regulator wishes to provide interconnection pricing guidelines in advance. What is the appropriate interconnection amount? This question is addressed in the following sections.



1.4.4.2 LRIC Approach

Based on a narrow application of the principle of cost causation, the entrant should pay the incumbent operator only for the additional costs that result from the entrant terminating and originating traffic on the latter's network. Based on the LRIC methodology, therefore, the entrant should pay the incumbent operator only a proportion of the variable cost of the local switch. That proportion may be based on market share or other criteria. For instance, the proportion could be the percentage of entrant minutes routed on the incumbent operator's network. For this example, we assume the entrant has a 10% market share. Using this methodology, the regulator would set an interconnection amount of 0.5. This amount is based on the proportion (10%) of the variable cost of local switching (5).

Based on this perspective, the entrant does not cause the incumbent operators to bear any other additional costs, and should therefore pay only the amount indicated above. The LRIC approach does not include service-specific fixed cost or joint and shared costs. These cost concepts are discussed in the sections below.

Note that the entrant is not required to pay for the use of the incumbent operator's access services. This is because these are traditionally considered as fixed with respect to the volume of traffic. Hence the entrant does not cause any additional access cost to the incumbent operator. Most telecommunications economists suggest that the costs of access services (including the local loop) should generally be recovered from the incumbent operator's subscribers through connection and subscription prices.

Given that the entrant is requesting interconnection at the local switch, it is not using the incumbent operator's transmission or tandem switching services and hence should not have to pay for them.

Regulators have not generally set the interconnection amount charges solely on LRIC. Interconnection prices based only on LRIC will generally be lower than those based on other costing methodologies. Such low prices may promote market entry. Prices based solely on LRIC are generally considered to be too low, and to not adequately compensate the

incumbent operator for the use of its network. Such rates will generally not provide sufficient compensation for the incumbent operator to properly maintain its network and to build additional needed infrastructure.

1.4.4.3 TSLRIC/LRAIC Approaches

The LRIC approach discussed above does not include service-specific fixed costs. The fixed costs of the local-switching services (10) are being borne wholly by the incumbent operator. Most regulators have established that the size of the increment should be set as the entire service. This issue was discussed in section 1.4.4.1.

Under the TSLRIC/LRAIC approaches, the regulator would set an interconnection charge of 1.5. As indicated in Figure C-15, this charge is made up of LRIC plus a proportion (for example 10%, equal to the entrant's market share) of the service-specific fixed cost of the local switch (10).

1.4.4.4 Allocation of Joint and Shared Costs: Mark-ups

The TSLRIC/LRAIC approach does not include any of the joint and shared costs of the incumbent operator. Generally, most regulators have determined that the interconnection amount should include a component that accounts for an allocated part of joint and shared costs. This has traditionally been implemented by including a mark-up to supplement TSLRIC/LRAIC.

This situation is analogous to that discussed in the natural monopoly pricing section. In that section we found that marginal cost is below average costs, and setting a regulated price equal to marginal cost will not allow the operator to recoup all of its costs. In order for the operator not to lose money and go out of business, the regulator had to set at least some prices above marginal costs. The sum of all the "mark-ups" over marginal should be set so that the operator could break even.

Similarly, in our example, the regulator should be concerned that the incumbent operator is able to recoup all of its forward-looking costs, including joint and shared costs. The issue is one of overall cost recovery. If no mark-up is included in the

interconnection amount, the incumbent operator will have to recoup all of its joint and shared cost from its own customers and/or other entrants. Many regulators have determined that this would not be a fair and equitable distribution of these indirect costs.

The mark-up may be uniform or non-uniform. Regulators have generally set uniform mark-ups. In our example, a uniform percentage mark-up would be 20%. This is calculated as the percentage of indirect cost (30) to the total costs (150) of the firm. Applying the 20% mark-up on the TSLRIC/LRAIC amount would result in an interconnection amount of 1.8.

As noted in Box B-4, Ramsey principles would suggest that a non-uniform mark-up, based on the inverse-elasticity rule, may be more economically efficient than a uniform mark-up. Regulators have not generally adopted such an approach.

1.4.4.5 Structure of Interconnection Prices

Note that in our example we have referred to interconnection amounts. These amounts are similar to the revenue requirement concept introduced in Module 4. That is, the interconnection amount constitutes the total monetary sum to be paid over a certain period. This is not the same as interconnection prices or rates. These relate to the manner in which the interconnection amount is recovered. We also refer to this issue as the structure of interconnection prices. The structure of interconnection prices is an important matter that will have an impact on the economic and administrative efficiency of the entire interconnection regime.

For any specific interconnection amount, there are a number of alternate pricing structures. For example, interconnection prices may be set based on one or a combination of the following:

- > Usage-based (e.g. minutes, calls, etc.);
- > Flat-rated (fixed amount per period, independent of usage);
- > Time-of-day (peak and off-peak, etc.);
- > Network functionality (call set-up and call duration, etc.); and
- > Capacity-based (fixed available capacity, measured in bandwidth, E1's, T1's, etc.).

Generally, the structure of interconnection prices should reflect the underlying cost structure, if this is known. The price structure should also be relatively easy to implement and administer and should ensure adequate cost recovery.

For instance, in the TSLRIC/LRAIC plus uniform mark-up discussion above, the total interconnection amount was determined at 1.8. Recall that the local switch had a fixed cost of 10 and a variable cost of 5, a 2:1 relation between fixed and variable costs. Hence, one option is to have flat-rated pricing to recoup the fixed cost component of the interconnection amount, 1.2 and usage-based pricing to recoup the variable cost component, 0.6. Flat-rated prices could include fixed monthly charges for the number of ports used by the entrant in the incumbent's local switch or other alternatives. Usage-based prices could include per minute or per call charges for the entrant's calls.

Note that in practice most regulators have adopted usage-based pricing only. In our example the entire interconnection amount of 1.8 would be collected by per minute or per call charges. This decision has generally been based on a number of factors, including administrative efficiency. Pricing based on usage only is also recommended when the regulator is uncertain of the relation between fixed and variable costs.

APPENDIX C - GLOSSARY

Note: This glossary includes terms commonly used in telecommunications regulation and the telecommunications business generally. Definitions are adapted from non-definitive reference sources, including ITU reports (see sources note). The definitions have no official status. Terms in italics are defined elsewhere in the Glossary.

Abuse of Dominance - Conduct by a firm, made possible by its dominant position in a market (see Dominance and Market Power), that is or may be harmful to competition in that market. The concept of abuse of dominance is a broad and evolving one that covers different types of conduct. Examples include anti-competitive cross-subsidization, and vertical price squeezing. (See Module 5.)

Access charge – A form of interconnection payment, usually consisting of an amount per minute, charged by network operators for the use of their network by other network operators. (See Module 3)

Access Deficit Charge (ADC) – Mechanism used to finance universal service in competitive markets. New operators typically pay ADCs to subsidize incumbent operators for the deficit they incur in providing local access services that are priced below cost. (See Module 6.)

Agreement on Basic Telecommunications (ABT) – This World Trade Organization (WTO) agreement came into effect on 1 January 1998. Properly cited as the Fourth Protocol to the General Agreement on Trade in Services, this agreement is discussed in Module 1. See also the entry below for the *WTO Regulation Reference Paper*, which is reproduced in Appendix A.

Advanced Mobile Phone System (AMPS) - An analogue cellular telephone service standard utilizing the 800 to 900 MHz band (and recently also the 1800-2000 MHz band).

Air time - The minutes of calls a subscriber makes from a mobile phone. Also referred to as talk time.

Allocated Cost - A joint or common cost that has been divided among services in accordance with a set formula or by judgement. This is also known as a distributed cost. (See Appendix B: The Economics of Telecommunications Prices and Costs)

Amplifier - Device used to boost the strength of an electronic signal over an analogue transmission facility.

Analogue - Analogue signals carry information in continuous, varying electrical waves. Analogue was the original recording and transmission technology (preceding digital technology). It is still used in many communications applications.

Asynchronous Transfer Mode (ATM) - A method to send data packets at irregular intervals by preceding each packet with a starter bit and following the data packet with a stop bit. It is asynchronous in the sense that time between packets varies.

Asynchronous Transmission - Transmission of data over a network in which each character of information is individually synchronized by means of a start and stop bit to provide character framing. The time between characters may vary (see ATM).

Automatic Number Identification (ANI) – Application able to transmit and display the telephone number of the calling party to the party answering the call. (See also *Calling Line Identification*)

Average Cost - A specified cost divided by the quantity of output. [By default, usually refers to the average of total cost, which is total cost divided by the specified volume of output.] (See Appendix B: The Economics of Telecommunications Prices and Costs)

Avoidable Cost - A cost that would not be incurred if output volume was reduced. (See Appendix B: The Economics of Telecommunications Prices and Costs)

Backbone Network - A network that links smaller or lower-speed networks.

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Bandwidth - The range of frequencies that can pass along a transmission line or other medium. In analogue systems it is measured in terms of Hertz (Hz) and in digital systems in bit/s per second (bit/s). The higher the bandwidth, the greater the amount of information that can be transmitted at the same time. High bandwidth channels are referred to as broadband which typically means 1.5/2.0 Mbit/s or higher.

Bandwidth on demand - Capability of an end user or network device to access available network capacity at a rate as required by the application being utilised for a specified period.

Base station - A radio transmitter/receiver and antenna used in the mobile cellular network. It maintains communications with cellular telephones within a given cell and transfers mobile traffic to other base stations and the fixed telephone network.

Basic telecommunications service - Generally refers to voice telephony service, though some definitions also include telex and telegraph services.

BDT - ITU Telecommunication Development Bureau. (See Module 1 for description of the ITU)

Best effort - The service model for standard Internet service. In the face of congestion of a network interface, packets are discarded without regard to user or application until traffic is reduced.

Bill and Keep - Interconnection arrangement where no charges are payable between interconnecting operators for termination of each other's traffic. (Another term for *Sender Keep All*; See Module 3).

Bit ("Binary Digit") - A bit is the primary unit of electronic, digital data. Written in base-2, binary language as a "1" or a "0".

Blocking - The inability to complete a call because all possible paths between the calling station and the destination are already in use. Users are alerted to this condition through a busy signal.

Bps - Bits per second is a measure of the rate of data communications representing the number of bits transmitted every second. (10 **Mbps** (Megabits)

= 10 million bits per second; 10 **Gbps** (Gigabits) = 10 billion; 1 **Tbps** (Terabits) = 1 trillion)

Broadband - Broadband communications use transmission media with a large bandwidth such as wireless, coaxial or fibre-optic cable. This allows transmission at higher speeds (bps). Broadband transmission techniques can permit more than one device to transmit at the same time using different frequencies. Services provided include video, voice and additional data channels.

Build-Operate-Transfer (BOT) - A project whereby a private company is awarded a concession to build a telecommunications network or service and operates it for a certain period of time before handing over ownership to the national telecommunication administration or PTO. (See Module 2)

Build-Transfer-Operate (BTO) - A project whereby a private company is awarded a concession to build a telecommunications network or service, hands over ownership to the national telecommunication administration or PTO, and operates it for a certain period of time. (See Module 2)

Byte - (1) A set of bits that represent a single character. A byte is composed of 8 bits. (2) A bit string that is operated upon as a unit and the site of which is independent of redundancy or framing techniques.

Calling Line Identification (CLI) - Relies on ANI to capture and use the telephone number of a calling party for various purposes (e.g. calling line identification display, or call blocking).

Calling Party Pays (CPP) - The billing option whereby the person making the call is charged. This is in contrast to billing the recipient of the call. Calling party pays is the norm on fixed telephone networks and is used for an increasing number of mobile networks.

Carrier - See *Common Carrier*. This term is also used to describe the presence or absence ("no carrier") of information on a cable or other transmission medium.

CCITT - Comité Consultatif Internationale de Télégraphique et Téléphonique (International Consultative Committee on Telephones and

Telegraphs). The former name of ITU-T, CCITT was the primary international standards body for telecommunications. (See description of ITU in Module 1).

CCSS7 - See *Signalling System Number 7*.

Cell - The geographic area covered by a single base station in a cellular mobile network.

Cellular - A mobile telephone service provided by a network of base stations, each of which covers one geographic cell within the total cellular system service area.

Central Office - Location where local subscriber loops are controlled, connected and switched to other destinations in the public switched network system. Central Office is the term used in North America for a local telephone Exchange (see below). In addition, the term "Central Office" is frequently used as a synonym for the switching equipment itself.

CEPT - Committee of European Post and Telephone (See Table of International Organizations, Module 1).

Channel – (1) A path for electrical transmission. Also called a *circuit*, line, link or path. (2) A specific and discrete bandwidth allocation in the radio frequency spectrum.

Circuit - A telecommunications channel established between two or more points, allowing the exchange of sources information between these points.

Circuit Switched Connection - A temporary connection that is established on request between two or more terminals (stations) in order to allow the exclusive use of that connection until it is released.

Coaxial Cable – A type of electrical communications cable used to provide cable television and also used in the LAN environment in other networks. Coaxial cable consists of an outer conductor and an inner conductor, separated from each other by insulating material, and covered by some protective outer material. This medium offers large bandwidth, supporting high data rates with relatively high immunity to electrical interference and a low incidence of

errors. Coaxial cable is subject to distance limitations and is relatively expensive and difficult to install.

Code Division Multiple Access (CDMA) - A technology for digital transmission of radio signals based on spread spectrum techniques where each voice or data call uses the whole radio band and is assigned a unique code. Used in cellular and other wireless mobile services.

Collocation - Facility-sharing in which an operator, often an incumbent operator, provides space in its switching exchanges or other premises for communications equipment, such as transmission cables, of competitive operators to facilitate interconnectivity to end-users. (See Module 3.)

Common Carrier - A North American term for a telecommunications operator that provides public telecommunications services, including access to the public switched telecommunications network and telecommunications transport services.

Common Cost - A cost incurred when a production process yields two or more services. This is also referred to as shared cost if it applies to all of the operations of the operator. For example, the cost of the building to house a telecommunications exchange may be described as a common cost of serving both business and residential customers. The salary of the operator's president may be considered a shared cost of all services (this type of cost is often also referred to as an "overhead" cost) (See Appendix B: The Economics of Telecommunications Prices and Costs.)

Competitive Local Exchange Carrier (CLEC) - Term originating in North America to identify a new entrant in the local exchange network services market. It generally competes with an *ILEC*.

Connectivity - The capability to provide, to end users, connections to the Internet or other communications networks.

Corporatization - Corporatization involves legal changes to grant a government-owned telecommunications operator administrative and financial autonomy from the central government.

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Cross-subsidy – Covering the cost of offering some services through excess revenues earned from other services. In telecommunications, the term “anti-competitive cross-subsidy” normally refers to a practice by a dominant firm of offering services in competitive markets at low (e.g. below-cost) prices, while maintaining overall firm profitability by charging above-cost prices in monopoly markets, or in other markets where the firm enjoys *Market Power*. (See Module 5).

Customer Premises Equipment (CPE) - A term developed in North America to describe any apparatus from PBX switching systems to telephone handsets that are located on the customer's premises, rather than on the telephone company's premises. The term CPE is commonly used to refer to equipment that is owned by the customer (end user).

Dedicated Access Lines – Telecommunications lines dedicated to or reserved for use by particular users along predetermined routes. They interconnect a switching system to a dedicated customer and may be connected to specific telephone, *key telephone system* or *PBX*. Also referred to simply as “dedicated lines”.

Dial Tone - A signal heard when the telephone handset is off-hook, indicating that the exchange or PBX is ready to accept and process a dialled number.

Dial Tone Delay - Refers to the time it takes to obtain a dial tone after a telephone handset is taken off hook. Average dial tone delay is a common measure of service performance quality.

Digital - A communications technique in which sound is represented as discrete *Bits*. The digits are transmitted as a series of pulses. Digital transmission differs from analogue transmission in that digital technology converts analogue sounds or electrical signals into the *Bits*, which can be transmitted without distortion or need of amplification. Digital networks allow for higher capacity, greater functionality and improved quality. GSM, CDMA and TDMA networks are all digital. The Internet is also a digital network.

Digital Network - A telecommunication network in which information is converted into a series of distinct electronic pulses and then transmitted as a digital bit stream (see also *Digital* and *Analogue network*).

Digital Signal Level 1 (DS1) - Digital Signal level 1 refers to a digital hierarchy of circuits or channels operating at 1.544. This corresponds with the North American and *Japanese T1* designation.

Direct Cost - A cost that can be attributed solely to the production of a specific item. A direct cost does not require a cost allocation (or distribution) to separate it from the costs incurred in the production of other items. An indirect cost, however, does require such an allocation. An operator that produces a single product sold in a single market incurs only direct costs. When an operator is engaged in producing multiple products or serving multiple markets, however, it will normally also incur indirect costs such as joint and/or common costs. (See Appendix B: The Economics of Telecommunications Prices and Costs.)

Domain Name - The registered name of an individual or organization eligible to use the Internet. Domain names have at least two parts and each part is separated by dot. The name to the left of the dot is unique for each top-level domain name, which is the name that appears to the right of the dot. For instance, The International Telecommunication Union's domain name is *itu.int*. “ITU” is a unique name within the gTLD “int”.

Dominance – An extreme form of *Market Power*. (See below) While the definition of market dominance varies with the laws of different countries, a finding of dominance usually requires proof of a relatively high market share and the existence of significant barriers to entry into the markets in which a firm is dominant. (See Module 5.)

Download - The process of loading software or files from one device to another across a network.

Dual Tone Multi-Frequency (DTMF) - A method of signalling initiated from the pushbutton touch-tone keys of the telephone. The exchange recognizes each digit dialled by the caller by means of a unique frequency generated by the touch-tone keys. DTMF

is used for many value-added features, such as voice-mail, tele-ordering and automated response software.

E-1 - A European and international digital standard referring to any transmission line or connection operating at the rate of 2.048 Mbps. (See also T-1 for a description of the comparable North American standard.)

Electromagnetic Interference (EMI) - Interference caused to telecommunications signals by electromagnetic radiation.

Electronic Data Interchange (EDI) - EDI is the computer-to-computer exchange of business documents between companies, using a public standard format. Rather than preparing paper and sending it through the mail, or using other communications methods such as fax, EDI users exchange business data directly between their respective computer systems.

Electronic Mail (E-Mail) - Host computer or LAN-based electronic mail systems employ software-defined "mail boxes." Other computer terminals can access the E-mail program to view, answer, broadcast, delete, forward, or file E-mail message text and images.

Encryption - The translation of data into a secret code. Encryption is the most effective way to achieve data security. To read an encrypted file, one must have access to a secret key or password that enables it to be decrypted.

End User - The individual or organization that originates or is the final recipient of telecommunications messages or information (i.e. the consumer).

Enhanced services - Telecommunications services provided over public or private networks which, in some way, add *value* to the basic carriage, usually through the application of computerized intelligence, for instance, reservation systems, bulletin boards, information services. Also known as *Value Added Services*.

Equal Access - The ability of telecommunications users to access the services offered by new entrants

as easily as to those of incumbent operators. (See Module 3.)

Essential Facilities - In telecommunications regulation, this term generally refers to facilities associated with a telecommunications network or service that are exclusively or predominantly provided by a monopolist or a small number of suppliers, and that cannot feasibly be substituted by competitors for economic or technical reasons. The concept of *Essential Facilities* is discussed in detail in Modules 3 and 5.

Exchange - The term *Exchange* is generally used to refer to Switches that are connected to the PSTN. Local exchanges connect local loops from end users to trunks which are connected to other exchanges, including tandem exchanges and international gateway exchanges, all of which are different types of switches. In North America, the term Central Office is usually used to refer to a local *Exchange*. In some countries, including those in North America, the term *Exchange* or *Exchange Area* refers to the local area served by one or more local *Exchanges*. (See also definition of *Switch*.)

Exchange Point - Points within a network at which IP packets are exchanged between ISPs.

Extranet - An Extranet is an *Intranet* that is partially accessible to authorized outsiders through the use of passwords.

Facilities-based Operator - A *PTO* that operates its own network transmission facilities (wires, cables, microwave routes, radio transmitters and receivers, satellite transponders, etc.). A facilities-based operator is usually contrasted with a "*Reseller*" (see definition below).

Fibre Optics - A technology that uses pulses of light as a digital information carrier, transmitted through thin strands of glass. *Fibre Optic Cable* is a transmission medium composed of such glass strands. Fibre optic cable provides higher transmission rates than wire or co-axial cable and is immune from electrical interference.

Fixed Cost - A cost that does not vary by volume of production. A specific type of fixed cost is sunk costs, costs that cannot be changed or avoided even

by ceasing production entirely. For instance, head office space is a fixed cost, but the labour component of the installation of the copper wire in the local loop is a sunk cost. Neither fixed nor sunk costs enter into marginal-cost pricing decisions because neither varies with output. (See Appendix B: The Economics of Telecommunications Prices and Costs.)

Fixed Line - A physical line connecting the subscriber to the telephone exchange. Typically, *fixed-line network* is used to refer to the *PSTN* (see below) to distinguish it from mobile networks.

Frame Relay - A fast packet switching technology that eliminates much of the processing and delay of traditional X.25 packet switching.

Frequency - The number of cycles per second at which an analogue signal electrical current alternates, usually measured in Hertz (Hz). One Hertz is one cycle per second. It is also used to refer to a location on the radio frequency spectrum, such as 800, 900 or 1800 Mhz.

Fully Distributed Costs (FDC) – Approach for allocating telecommunications costs to different telecommunications services (also referred to as “fully allocated costs”). This approach is usually based on an allocation of historical accounting of costs to various broad service categories. After assigning direct costs to each category, the Joint and Common Costs are allocated to applicable service categories based on formulas that reflect relative usage or other factors. (See Appendix B: The Economics of Telecommunications Prices and Costs.)

Gateway - Any mechanism for providing access to another network. This function may or may not include protocol conversion.

GATS - General Agreement on Trade-In Services (See Module 1 and WTO)

Gbps - Billion *bits* per second.

General Packet Radio Service (GPRS) - An enhancement for GSM, based on packet-switched technology enabling high-speed data transmission (115 kbit/s per second).

Gigabit - One billion *bits*.

Global System for Mobile communications (GSM) - European-developed digital mobile cellular standard. For more information, see the GSM Association website at <http://www.gsmworld.com/index.html>.

Graphic User Interface (GUI) - A computer terminal interface that employs a bit-mapped screen. Graphical interfaces typically have Windows, Icons, Mice, Menus and Pointers. The GUI permits mixed graphics and text, and incorporates easy-to-use visual representations of system functions. The GUI was popularized in personal computing, with the introduction of the Apple *Macintosh* computer, and later with Microsoft's *Windows* operating system.

Half-Circuit - A component of an international circuit between two countries that originates in one country and terminates at a theoretical midpoint between the countries.

Hand-off - A central concept of cellular technology, enabling mobility for subscribers. It is a process by which the *Mobile Telephone Switching Office* passes a mobile phone conversation from one radio frequency in one cell to another radio frequency in another as a subscriber crosses the boundary of a cell.

Head-End – The point in a broadband network that receives signals on one set of frequency bands and retransmits them on another set. The head end of a cable TV network generally receives satellite, off-air and wireline TV and multimedia signals, and retransmits them to end users through a fibre optic or co-axial cable distribution network.

Hertz (Hz) - The frequency measurement unit equal to one cycle per second.

High Speed Circuit Switched Data (HSCSD) - An intermediary upgrade technology for GSM based on circuit-switched technology and enabling data service speed of 57 kbps.

Host - Any computer that can function as the beginning and end point of data transfers. Each Internet host has a unique Internet address (IP address) associated with a domain name. A host

computer provides services such as database access, computation or other processing, and special programs or other content. A host computer is the primary or controlling computer in a multiple computer installation.

HTTP - HyperText Transport Protocol (see WWW).

IEEE - Institute of Electrical and Electronic Engineers. An international standards-setting organization.

IETF - Internet Engineering Task Force. An organization responsible for updating and maintaining TCP/IP standards.

IMT-2000 - *International Mobile Telecommunications*. The ITU third generation mobile cellular standard. For more information see the website at <http://www.itu.int/imt>.

In-Band Signalling - A communications technique used between switches and communications equipment in which the control signals are exchanged within the standard bandwidth of the telecommunications signal.

Increment - A specific non-minimal increase or decrease in volume of production. (See Appendix B: The Economics of Telecommunications Prices and Costs.)

Incremental Cost - The change in total cost resulting from an increment. Incremental cost equals total cost assuming the increment is produced, minus total cost assuming the increment is not produced. Because a wide variety of different increments can be specified, incremental cost can conceptually range all the way from total cost per unit (entire output as the increment) to marginal cost (one unit as the increment). The size of the increment used in any specific cost analysis will be a matter of judgement. The most common practice is to use the entire service or element as the increment, in which case the service or element specific fixed costs of the service or element would be included in the increment. (See Appendix B: The Economics of Telecommunications Prices and Costs.)

Incumbent Operator - The established telecommunications network operator(s) in a country. Normally the entity that operates all or most of the PSTN infrastructure in a country. In many countries this was the Posts, Telephone and Telegraph (PTT) administration of the national government. In some countries it was or now is a private sector operator. In both cases, incumbent PTOs generally operated as monopolies. (See also definition of PTO).

Incumbent Local Exchange Carrier (ILEC) - Term originating in North America to identify the incumbent operator that runs the local exchange network. It is or was typically the dominant provider of local PSTN services. See also *Competitive Local Exchange Carrier*.

Inflation Factor - Variable included in a price cap formula to reflect or represent changes in the input costs of telecommunications operators. (See also *Price Cap*.) (See Module 4.)

Information infrastructures, Information superhighway - High-speed communication networks capable of carrying voice, data, text image and video (Multimedia) information in an interactive mode.

Integrated Services Digital Network (ISDN) - A set of CCITT standards that provides for the transport of digital voice, data, image and video services.

Interactive Voice Response (IVR) - A voice processing system that allows the storage and retrieval of digital data, including data in the form of the human voice, through user interaction with the touch-tone keys of the telephone. The IVR's pre-recorded voice commands guide the caller through a menu, and the caller responds by touching the appropriate numbered or lettered key(s).

Interconnection - The physical connection of telephone networks owned by two different operators in order to allow customers connected to different networks to communicate, to ensure the interoperability of services. (See Module 3)

Interexchange Carriers (IXC) - A term originating in North America to describe long-distance telecom-

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munications operators that provide service between cities or other local exchange areas.

Interface - The logical or physical connection between two networks, systems or devices; the point of interconnection of two components and the basis on which they exchange signals according to some hardware or software protocol.

Internet - The collection of interconnected networks that use the Internet Protocols (IP).

Internet Backbone - The high-speed, high capacity lines or series of connections that form a major pathway and carry aggregated traffic within the Internet.

Internet Content Provider - A person or organization, that provides information via the Internet either with a price or free of charge.

Internet Exchange Point (IXP) - Refers to a *Network Access Point (NAP)* where connections are made to dedicated Internet backbone networks or where ISPs connect with one another. NAPs serve as data interchange points for backbone service providers. NAPs and Metropolitan Area Exchanges (MAEs) are generally referred to as public Internet Exchange Points (IXPs).

Internet Protocol (IP) Numbers - An IP number (also referred to as Internet address number) is the address of a host or other intelligent devices on the Internet. All servers and users connected to the Internet have an IP number.

Internet Service Provider (ISP) - ISPs provide end-users and other ISP access to the Internet. ISPs may also offer their own proprietary content and access to online services such as e-mail.

Intranet - An Intranet is a network, based on TCP/IP protocols, accessible only by an organization's employees, or other authorized users. Intranet websites are similar to other websites, but are surrounded by firewalls that prevent unauthorised access.

ISO - International Standards Organization - ISO promotes the development of standards for

computers and other products. It developed the OSI model for data communication.

ITU - International Telecommunication Union. (See Module 1 for a description of the ITU and its various components, including ITU-R, ITU-T and ITU-D.)

ITU-D - Telecommunication Development Sector of the ITU. (See Module 1 for description of the ITU.)

ITU-R - Radiocommunication Sector of the ITU. (See Module 1 for description of the ITU.)

ITU-T - Telecommunication Standardization Sector of the ITU. (See Module 1 for description of the ITU.)

Joint Cost - A specific kind of common cost incurred when a production process yields two or more outputs in fixed proportion. Joint costs vary in proportion to the total output of the joint production process, not to the output of the individual joint products. (See Appendix B: The Economics of Telecommunications Prices and Costs.)

Kbps - *Kilobits per second.*

Key Telephone System - A multi-line telephone system designed to provide shared access to several outside lines through buttons on the telephone set. It typically offers identified access lines with direct line terminations on a telephone set. The system is located on the user's premises and can operate independently or in conjunction with a *PBX*.

Kilobit - One thousand *bits*.

Layer - A conceptual level of network processing functions. In the OSI model, network processing is thought of as taking place in layers, from the physical transmission of data up to the issuing of an end-user command. Layers communicate only with those immediately above or below in the layer protocol stack, or with peer-level layers on other systems.

Leased Line - A point-to-point communication channel or circuit that is committed by the network operator to the exclusive use of an individual subscriber. Depending on the country, leased lines may or may not be permitted to interconnect with the *PSTN*.

Licence – A telecommunications licence generally refers to the authorization to provide telecommunications services or operate telecommunications facilities. A telecommunications licence usually defines the terms and conditions on which the licensee is authorized to operate and sets out its rights and obligations. (See Module 2.)

Licensing – Term used to refer to the administrative steps followed by an NRA or other licensing authority to issue a *licence*. (See Module 2.)

Line – It usually refers to the communications channel whereby end users connect to the *PSTN*. Also called a circuit, trunk or facility.

Local Area Network (LAN) - A communications network that provides high speed data transmission and a low error rate in connecting computers and other terminal devices, usually within relatively small areas. Most LANs are confined to a single building or group of buildings. However, one LAN can be connected to other LANs over any distance via telephone lines and radio waves. (See also *Wide Area Network*.)

Local Exchange Carrier (LEC) – The telecommunications operator that provides service to end users through its local exchanges, which are connected to the *PSTN*. (See also *ILEC* and *CLEC*.)

Local Loop - The transmission path linking end users (i.e. subscribers) to the nearest exchange. It generally consists of a pair of copper wires, but may also employ fibre-optic or wireless technologies. The local loop is sometimes referred to as the "last mile". (See also *unbundled local loop*.)

Long Run - A period over which all factors of production, including capital, are variable. In practice, a period of 10 to 15 years is sometimes selected by regulators for the purpose of LRIC analysis, for example.

Long Run Average Incremental Costs (LRAIC) – A variation on *LRIC* (See below) in which the increment is defined as the total service. Thus, it differs from *LRIC* and marginal cost approaches in that it includes fixed costs that are specific to the service. (See Appendix B: The Economics of Telecommunications Prices and Costs.)

Long Run Incremental Costs (LRIC) The incremental costs that arise in the long run with a specific increment in volume of production. LRIC is generally calculated by estimating costs using current technology and best available performance standards. When a cost study is based on the "costs of an efficient firm", it usually refers to LRIC-type methodology. In the presence of joint or common costs, the sum of the LRIC for all of the operator's services will be less than the total costs of the operator. Hence, the operator will not be able to recoup all of its costs. Regulators will generally allow a mark-up to be added to LRIC or LRIC-type costs for the firm to help recover all of its costs. (See Appendix B: The Economics of Telecommunications Prices and Costs.)

Main Telephone Line - Telephone line connecting a subscriber to the telephone exchange equipment. This term is synonymous with the terms main station, Direct Exchange Line (DEL) and main access line.

Marginal Cost - The change in total cost resulting from a very small change in the volume of output produced. Due to a number of practical issues, including the lumpiness of capital increments (i.e. the inability of telecommunications plant to be divided into very small parts, or scaled to provide an exact fit with the actual requirements of the network), marginal cost is difficult to estimate. Accordingly, most estimates of marginal cost are based on incremental cost. (See Appendix B: The Economics of Telecommunications Prices and Costs.)

Mark-up - A percentage or a fixed monetary amount that is used to take into account joint and common costs, for example, to supplement certain costing methodologies. Cost concepts that do not fully allocate (or distribute) all indirect costs generally require mark-ups. These cost concepts include incremental costing methodologies, including LRIC (and TSLRIC/LRAIC and TELRIC as discussed in detail in the cost methods section below). The mark-up may be uniform or non-uniform. While regulators have generally set uniform mark-ups to promote competition, the application of Ramsey principles suggests that a non-uniform mark-up may be economically efficient. (See Appendix B: The Economics of Telecommunications Prices and Costs)

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Market Power – Generally, a telecommunications operator or other firm is considered to have market power when it is able to establish and maintain prices or other key terms and conditions of sales in a market for a non-transitory period, without regard to the market or the actions of competitors, without losing sales to such a degree as to make this behaviour unprofitable. (See also *Dominance*, above and see Module 5.)

Megabit - One million *bits*. **Mbps** - Megabits per second.

Mobile Cellular Service - A communication service in which voice or data is transmitted by radio frequencies. The service area is divided into cells, each served by a transmitter. The cells are connected to a controlling switching exchange, which is connected to the worldwide telephone network.

Modem - Modulator/Demodulator. A conversion device installed in pairs at each end of analogue communications lines. The modem at the transmitting end modulates digital signals received locally from a computer or terminal. The modem at the receiving end demodulates the incoming analogue signal, converts it back to its original digital format and passes it to the destination device.

Multimedia - The presentation of more than one medium, typically images (moving or still), sound and text in an interactive environment. Multimedia requires a significant amount of data transfer and invariably requires computational facilities.

Multiplexer - A device that combines several communications channels onto a single circuit. The channels are combined by paralleling the channels in real time on the single circuit and distributing them in frequency (Frequency Division Multiplexing--FDM) or by time-sharing the channel (Time Division Multiplexing--TDM).

Multiplexing - (1) To combine the signals of two or more channels into one single channel for transmission over the telecommunications network. (2) Division of a transmission facility into two or more channels.

National Regulatory Authority (NRA) – See definition of *Regulator* below.

Network - A public and/or private communications transmission system that provides interconnectivity among a number of local or remote devices (e.g. telephones, exchanges, computers, television sets). The PSTN is operated by local PTOs. Like the PSTN, other private and public networks can comprise many point-to-point transmission media, including wire, cable and radio-based ones.

Network Access Point (NAP) - Point at which dedicated Internet backbone lines are reached or at which ISPs connect with one another. NAPs serve as data interchange points for backbone service providers. NAPs and Metropolitan Area Exchanges (MAEs) are increasingly referred to as public Internet exchange points (IXPs).

Network Redundancy - A telecommunications path that has backups connecting various points in case one path fails (e.g. if a cable is cut).

New Entrant - A new telecommunications service provider, including a new PTO.

Node - A computer, switch or other device when it is considered as part of a network.

Number Portability - The ability of a customer to transfer its service account from one operator to another without requiring a change in the customer's number.

Online Service and Software Companies - Companies which operate Internet sites whose principal function is to provide services in electronic form, including transactions with third parties, sales and support for its products and software which can be downloaded by end users for a fee or without charge.

Open System - A computing system that uses publicly available standards so that it can communicate with other systems using the same standards.

Open Systems Interconnection (OSI) - The overall name for *ISO's* classification of standards for global connectivity. *ISO* has developed a seven-layer model for standards-based networking and is in the

process of developing protocols that comply with this model.

Operating System - Software that provides the link between a computer's application programs and its hardware.

Out-of-Band Signalling - A communications technique used between switches and other telecommunications equipment in which the control signals are exchanged through a control channel that is separate from the channel(s) carrying the information.

Packet - A unit of information identified by a label at layer 3 of the OSI reference model. The term is used to describe a collection of bits that contain both control information and content. Control information is carried in the packet to provide for addressing, sequencing, flow control and error control at each of several protocol levels. A packet can be fixed or variable in length, but generally has a specified maximum length.

Packet Switching - A data telecommunications technique in which information is grouped into packets for ease of handling, routing, supervising and controlling on telecommunications networks. Packets are sent to their destination by the fastest route. The transmission channel is occupied only while the packet is being transmitted and the channel is then available to transfer other packets between other data terminal equipment. Individual packets may reach the destination by different routes and in the wrong order. The destination node is responsible for reassembling the packets into the proper sequence. Packet switching is used in most data networks, including those that use the older X.25 protocol, and the Internet, which uses TCP/IP Protocols.

Paging - A mobile radiocommunication service offering - usually one-way - of numeric or textual information to small pocket terminals.

PCM - Pulse Code Modulation. The technique most frequently used to sample and convert analogue signals to a digital format. In telephony, PCM is used to convert analogue voice signals to an 8-bit digital format at an 8 KHz rate, producing a serial bit stream of 64 kbps.

Peak rate - Term used for calls made during the busy part of the working day, at full tariff. *Off-peak* refers to calls made at other times, often with discounted tariffs.

Peering - The exchange of routing announcements between two Internet Service Providers for the purpose of ensuring that traffic from the first can reach customers of the second, and vice-versa. Peering takes place predominantly at IXPs and usually is offered either without charge or subject to mutually agreed commercial arrangements.

Penetration - A measurement of access to telecommunications, normally calculated by dividing the number of subscribers to a particular service by the population and multiplying by 100. Also referred to as *teledensity* (for fixed-line networks) or *mobile density* (for cellular ones).

Personal Communication Services (PCS) - In the United States and Canada, refers to digital mobile networks using the 1900 Mhz frequency. In other countries, refers to digital mobile networks using the 1800 Mhz frequency (See DCS-1800). The term *Personal Communications Network (PCN)* is also used.

Point of Interconnection (POI) - The physical location at which two networks interconnect.

Point of Presence (PoP) - A Point of Presence is a switch, node or other facility offering users access in a particular market (e.g. dial-up access to the Internet via a specific telephone number). The greater the number of PoPs, the higher the likelihood that users can connect using a local telephone call.

Port - The physical access point to a computer, switch, device, or network where signals may be supplied, extracted or measured.

Portal - Although an evolving concept, the term "portal" commonly refers to the starting point, or a gateway through which users navigate the World Wide Web, gaining access to a wide range of resources and services, such as e-mail, forums, search engines, and shopping malls. A mobile portal implies a starting point, which is accessible from a mobile phone.

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Post Telephone and Telegraph Administration (PTT) - Term used to designate government departments or agencies that traditionally owned and operated the PSTN as monopolies mainly in Europe, Asia and Africa.

Post, Telegraph and Telephone Administration (PTT) - The traditional organization of the communication sector in many countries was the PTT (the Post, Telegraph and Telephone Administration) wherein the government owns and operates both telecommunication and postal services.

Predatory Pricing – Anti-competitive practice of providing services at prices that are low enough to drive competitors out of a market, or prevent new entry by them, so as to monopolize the market. (See Module 5.)

Price Cap – Is a rules-based form of price regulation that uses a formula to determine the maximum allowable price increases for a regulated operator's services for a specified year or number of years. The formula typically allows an operator to increase its rates annually for a service or basket of services by an amount equal to inflation, less an amount equal to the assumed rate of productivity increases. Other variables may be taken into account in the price cap formula such as 'exogenous factors' outside of the operator's control and the quality of service provided by the operator. (See Module 4.)

Primary Rate Interface - Also called Primary Rate Access. A term used to designate an integrated services digital network (*ISDN*) interface standard that is designated in North America as having 23B+D channels, in which all circuit-switched B channels operating at 64 kb/s and in which the D channel also operates at 64 kb/s. The PRI combination of channels results in a *digital signal level 1 (or T1) interface* at the network boundary.

Private Branch Exchange (PBX) - Equipment that is located on a customer's premises that controls and switches information between local terminal equipment, such as telephones or data terminals, and provides access to the PSTN. Sometimes PBXs are referred to as Private Automatic Branch Exchanges (PABXs). (See also *Key Telephone System*.)

Private Network - A network based on leased lines or other facilities which are used to provide telecommunication services within an organization or within a closed user group as a complement or a substitute to the public network.

Private Ownership/Privatization - The transfer of control of ownership of a state enterprise to private parties generally by organizing the enterprise as a share company and selling shares to investors. More generally, the term is sometimes used to refer to a wide range of modalities whereby business is opened to private enterprise and investment.

Proprietary Standard - A standard that is owned or controlled by a single person or legal entity. A proprietary standard can be used for interoperability if the company that controls it is willing to license it and publish its specifications.

Protocol - A set of formal rules and specifications describing how to transmit data, especially across a network or between devices.

Public Switched Telephone Network (PSTN) - The infrastructure of physical switching and transmission facilities that is used to provide the majority of telephone and other telecommunications services to the public. In a monopoly environment, one PTO owns and operates the PSTN. In a competitive environment, the PSTN typically comprises the interconnected networks of two or more PTOs.

Public Telecommunications Operator (PTO) - normally a "facilities-based operator" such as a telephone company, which provides telecommunications services to the public for compensation. The term "public" relates to the consumer rather than the ownership of the PTO. In some countries the terms "telecommunications common carrier", "common carrier" or simply "carrier" are used instead of PTO.

RAG - Radiocommunication Advisory Group of the ITU. (See Module 1 for description of the ITU.)

Rate of Return Regulation (ROR) - Is a rules-based form of price regulation designed to provide the regulated operator with relative certainty that it can meet its revenue requirements and that prices will be adjusted, as required to meet that objective. Under this scheme, the regulated operator's

revenue requirement is calculated and then service prices are adjusted so that its overall service revenues cover such revenue requirement. (See Module 4.)

Rate Rebalancing - It refers to the adjustment of rates charged for different services to more closely reflect their costs. In most countries, this means increasing local access rates and decreasing international, long distance, local usage rates and Internet access. (See Appendix B, Module 4 and Appendices to Module 6.)

Regulator - This term is used to refer to government agency, institution or official responsible for regulation of all or part of the telecommunications sector in a country. In some countries it is a National Regulatory Authority (NRA), an independent regulatory authority, or a Ministry of the Government. Sometimes, one entity is the regulator for some purposes and another entity for other purposes. Different institutional approaches to regulation are discussed in Module 1.

Reseller - A public telecommunications service provider that does not own network transmission facilities but obtains transmission facilities or services from others (usually from a PTO) for resale to its customers. These facilities or services may be resold with other services (e.g. value-added services) or without ("simple resale"). Some resellers operate their own switches, routers and processing equipment. Others do not.

Roaming - A service allowing cellular subscribers to use their handsets on networks of other operators.

Router - Specialized computers that receive transmissions of packets and compare their destination addresses to internal routing tables and, depending on routing policy, send the packets out to the appropriate interface. This process may be repeated many times until the packets reach their intended destination.

Routing Policy - An expression of how an ISP will choose to direct traffic on or off network. For example, ISPs may choose to route traffic with preference to certain paths or through other ISPs depending on the commercial relationships between the parties.

RRB - Radio Regulations Board of the ITU. (See Module 1 for description of the ITU.)

Sender Keep All - Another term for *Bill and Keep*. (See Module 3.)

Server - (1) A host computer on a network that sends stored information in response to requests or queries. (2) The term "server" is also used to refer to the software that makes the process of serving information possible.

Short Message Service (SMS) - A service available on digital networks, typically enabling messages with up to 160 characters to be sent or received via the message centre of a network operator to a subscriber's mobile phone.

Signalling System Number 7 - AN ITU-T common channel signalling protocol providing enhanced control functions such as look-ahead routing for high-speed digital communications services between intelligent network nodes. Signalling information is sent at 64 kbps. Also referred to as Common Channel Signalling System Number 7 (CCSS7), or CCITT Number 7 Signalling.

Significant Market Power – Test set out in several European Directives to identify operators that have greater than a 25% share of a particular telecommunications market and that are required to meet certain obligations (e.g. Article 4 of the *Interconnection Directive* mandates operators with significant market power to "meet all reasonable requests for access to the network, including access at points other than the network termination points offered to the majority of end-users"). (See Module 5.)

Spectrum - The radio frequency spectrum of Hertzian waves used as a transmission medium for cellular radio, radiopaging, satellite communication, over-the-air broadcasting and other wireless services.

Splitter - A device used in a cable system or wire network to divide the power of a single input into two or more outputs of lesser power. It can also be used when two or more inputs are combined into a single output.

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SS7 - See *Signalling System Number 7*.

Stand-alone Cost - The total cost to provide a particular product or service in a separate production process (i.e. without benefit of scope economies). (See Appendix B: The Economics of Telecommunications Prices and Costs.)

Standards - Recommendation for the protocol, interface, type of wiring or some other aspect of a network. Recommendations range from a conceptual definition for a general framework or model for communications architecture to specific interfaces. Standards are developed by internationally or nationally recognized bodies such as ITU-T or telecommunications equipment vendors.

Subscriber Identity Module (SIM) Card - A small printed circuit board inserted into a GSM-based mobile phone when signing on as a subscriber. It includes subscriber details, security information and a memory for a personal directory of numbers.

Switch - Telecommunications equipment that establishes and routes communications paths between different lines, trunks or other circuits. Switches establish circuits or paths between different end users or between other devices attached to telecommunications networks. A PBX is a form of switch located on customer premises. The term *Exchange* is generally used to refer to switches that are connected to the *PSTN*.

Synchronization - Timing pulses to maintain the proper identity between the transmitted and received pulses.

T-1 - A North American digital standard referring to any transmission line or connection operating at the DS1 rate of 1.544 Mbps. (See *T-1*.)

T-3 - Refers to transmission at 44.736 Mbps, etc. (See *E-1*)

Telecommunications Facility Provider - An entity that supplies underlying transmission capacity for sale or lease and either uses it to provide services or offers it to others to provide services.

Teledensity - Number of main telephone lines per 100 inhabitants.

Total Cost - The aggregate amount of all costs incurred in producing a specified volume of output. The sum of fixed and variable costs equals total cost. (See Appendix B: The Economics of Telecommunications Prices and Costs).

Transmission Control Protocol/Internet Protocol (TCP/IP) - The suite of protocols that defines the Internet and enables information to be transmitted from one network to another.

TSB - Telecommunication Standardization Bureau of the ITU. (See Module 1 for description of the ITU).

Type Approval - An administrative procedure of technical tests and vetting applied to items of telecommunication equipment before they can be sold or interconnected with the public network. Also known as homologation.

UMTS Terrestrial Radio Access (UTRA) - The European third-generation mobile standard ETSI has agreed on which draws upon both W-CDMA and TDMA-CDMA proposals.

Unbundled Local Loop - Access to the full and exclusive use of the copper pair connected to the customer and/or some form of shared access to the local loop. Full unbundling refers to access to raw copper local loops (copper terminating at the local switch) and subloops (copper terminating at the remote concentrator or equivalent facility). Shared access refers to the non-voice frequencies of a local loop and/or access to space within a main distribution frame (MDF) site of an operator for attachment of DSL access multiplexers (DSLAMS) and similar types of equipment to the local loop of the notified operator.

Unbundling - Refers to the provision of components on a stand-alone basis. Therefore, interconnecting carriers can obtain access to single unbundled component without an obligation to buy other components as part of an "interconnection package" (See Module 3.)

Uniform Resource Locator (URL) - The standard way to give the address or domain name of any Internet site that is part of the World Wide Web (WWW). The URL indicates both the application

protocol and the Internet address, e.g. <http://www.itu.int>.

Universal Access – A term generally used to refer to a situation where every person has a reasonable means of access to a publicly available telephone. Universal Access may be provided through pay telephones, community telephone centres, teleboutiques, community Internet access terminals or similar means. (See also *Universal Service*; see Module 6.)

Universal Mobile Telecommunications System (UMTS) - The European term for third generation mobile cellular systems. For more information, see the UMTS Forum website at <http://www.umts-forum.org>.

Universal Service – Generally refers to a policy focused on promoting or maintaining “universal” availability of connections by individual households to public telecommunications networks. (See also *Universal Access*; see Module 6.)

Universal Service Obligation (USO) – Generally refers to the obligation imposed on a telecommunications operator to meet the policy objective of connecting all, or most, households to public telecommunications networks. The term is often used more generally to refer to operators' obligations to take initiatives to promote *Universal Access* as well as *Universal Service*. (See Module 6.)

Universality – Term used in this Handbook to refer generally to *Universal Access* and *Universal Service*. (See Module 6.)

Universality Fund / Universal Service Fund - Such funds typically collect revenues from various sources and disburse them in a fairly targeted manner to achieve specific universality objectives. Depending on the country, the source of revenues may include government budgets, charges on interconnecting services or levies on telecommunications services or operators. (See Module 6.)

Value Added Services (VAS) - Telecommunication services provided over public or private networks which, in some way, add *value* to the basic carriage, usually through the application of computerized intelligence, for instance, reservation systems,

bulletin boards, and information services. Also known as value added network services (VANS) and *enhanced services*.

Variable Cost - A cost that varies with increased volume of production. (See Appendix B: The Economics of Telecommunications Prices and Costs.)

Vertical Price Squeezing - Occurs when an operator with market power controls certain services that are a key input for competitors in subordinated or ‘downstream’ markets and where those same key inputs are used by the operator or its affiliates to compete in the same downstream markets. For example, an incumbent telecommunications operator often controls local access and switching services which are key for competitors to compete with the same incumbent operator in a ‘vertical’ market. (See Module 5.)

Very Small Aperture Terminal (VSAT) - A satellite earth station with a small antenna, usually six metres or less. Generally used for point-to-multipoint data networks, they have dramatically lowered the cost of satellite communications.

Virtual Private Network (VPN) - Uses a telecommunications operator's network to provide the functions of private lines. Users can design, change and manage a private network without having to invest in capital equipment or manage switching equipment and leased lines. Also known as a Software Defined Network.

Voice Mail/Voice Messaging - A technique for sending, storing and handling digitized voice information. Information is stored in “voice mail boxes”, one of which is assigned to each end-user on the system. Owners of voice mail boxes, and callers who access them, interact with the system through a touch-tone telephone key pad. Mailbox owners can retrieve, save, reply to, forward, forward with comments and delete voice messages.

Webcasting - A group of emerging services that use the Internet to deliver content to users in ways that sometimes closely resemble other traditional communication services such as broadcasting.

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Website/Webpage - A website (also known as an internet site) generally refers to the entire collection of HTML files that are accessible through a domain name. Within a website, a webpage refers to a single HTML file which, when viewed by a browser on the World Wide Web could be several screen dimensions long. A "home page" is the webpage located at the root of an organization's URL.

Whole Circuit - A circuit that connects points in different countries where a single entity owns the circuit in its entirety or owns leases, or operates two half-circuits in combination.

Wide Area Network (WAN) - A system of two or more LANs connected over a distance via telephone lines or radio waves.

Wireless Application Protocol (WAP) - A license-free protocol for wireless communication that enables the creation of mobile telephone services and the reading of Internet pages from a mobile terminal, thus being the mobile equivalent of HTTP (Hyper Text Transfer Protocol).

Wireless Local Loop (WLL) - A technique using radio technology to provide the connection from the telephone exchange to the subscriber.

World Wide Web (WWW) - (1) Technically refers to the hypertext servers (HTTP servers) which are the

servers that allow text, graphics and sound files to be mixed together. (2) Loosely refers to all types of resources that can be accessed, including - HTTP, Gopher, FTP, Telnet, USENET and WAIS.

WRC - World Radiocommunication Conference of the ITU. (See Module 1 for description of the ITU.)

WTAC - World Telecommunication Advisory Council of the ITU. (See Module 1 for description of the ITU.)

WTO - World Trade Organization. (See Module 1.)

WTO Regulation Reference Paper - A short paper including a set of principles for the regulation of basic telecommunications services. The paper was included with the commitments of most of the countries that signed the *WTO Agreement on Basic Telecommunications* (ABT). The WTO Regulation Reference Paper is included as Appendix A.

WTSC - World Telecommunication Standardization Conference of the ITU. (See Module 1 for description of the ITU.)

X-Factor - Productivity Factor in *Price Cap Regulation*. (See Module 4.)

3G - Third generation mobile communication system. (See IMT-2000.)

Sources: Various, including ITU, World Telecommunication Development Report, 1999; ITU, Challenge to Network, Internet Development, 1999, McCarthy Tétrault and public domain sources.

APPENDIX D - SELECTED SOURCES

Note: The following list of information sources is selective and not comprehensive. The list has been provided as a starting point for research, not to provide a balanced source of information on all issues. Most of the laws and regulations of ITU Member States are available from the regulatory database of the ITU, at <http://www7.itu.int/treg/>

Module 1 – Approaches to Regulation

Regulatory Documents

ACA (Australian Communications Authority). 1999. *Principles for Decision-Making*. Australia.
<http://www.austel.gov.au/publications/info/decision.htm>

CEC (Commission of the European Communities). 1987. *Towards a Dynamic European Economy: Green Paper on the Development of a Common Market for Telecommunication Services and Equipment*, (COM(87) 290 final, 30.06.97).

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<http://www.ispo.cec.be/infosoc/legreg/docs/9619ec.html>

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http://www.europa.eu.int/comm/competition/liberalization/legislation/voice_en.html

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<http://www.ispo.cec.be/infosoc/telecompolicy/VT/ONPVTEN.pdf>

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<http://www.ispo.cec.be/infosoc/legreg/docs/88c25701.html>

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<http://europa.eu.int/comm/enterprise/rtte/dir99-5.htm>

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- CITEL (Inter-American Telecommunications Commission). 2000. *Telecommunication Policies for the Americas: The Blue Book*, 2nd Edition, April, Washington, D.C.
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