

Chapter 2

Nothing Endures but Change: Thinking Strategically about ICT Convergence

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Countries that adopt policies enabling convergence among telecommunications, media, and computing services will enhance the impact of information and communication technology (ICT) on economic development. Technological innovation and market demand are driving the ICT sector toward convergence. This trend matters because convergence can lower entry barriers, allow service providers to try new business models, promote competition, reduce costs for service providers and users, and broaden the range of services and technologies available to users. At the same time, convergence can also lead to market consolidation, reduced competition, and new barriers to entry. This trend and its implications apply to countries at all development stages, from mature to low-income economies.

This chapter explains convergence and its main forms; shows that convergence is already a widespread, market-driven reality; discusses some of the main opportunities and challenges it poses to businesses, users, and governments; and describes potential government policy responses—along with the likely outcomes and potential benefits and risks.¹

Understanding Convergence

Convergence is shorthand for several changes occurring in the ICT sector. Broadly speaking, convergence refers to the erosion of boundaries among previously separate services, networks, and business models in the sector.

There are three main forms of convergence. The first, service convergence, or “multiple play,” allows a firm to use a single network to provide several communication services that traditionally required separate networks. The second form is network convergence, where a common standard allows several types of networks to connect with each other. Consequently, a communication service can travel over any combination of networks. While these two forms of convergence are technological, the third form, corporate convergence, results from mergers, acquisitions, or collaborations among firms. Under the third form, newly organized business entities offer multiple services and address different markets. Table 2.1 summarizes the three forms of convergence and associated benefits, risks, and policy implications.²

Convergence Is Reality

Convergence is primarily a process that results from service providers adopting new technologies and business models allowed by technology and driven by demand. The factors pushing service providers toward converged business models are increasingly common worldwide, including in developing countries.

The fundamental technology drivers for convergence have been the digitization of communication and the falling costs of computing power and memory. Both factors have increased a network’s capacity to carry information while bandwidth remains fixed. Consequently, the capacities of

Table 2.1 Different Forms of Convergence

Dimension	Service convergence	Network convergence	Corporate convergence
Definition	Service providers use a single network to provide multiple services.	A service can travel over any combination of networks.	Firms in one sector acquire, merge, or collaborate with firms in other sectors.
Examples	Service providers offer telephony, television, and Internet services using telephone, cable television, or fixed wireless networks. Examples include providers in Chile, Arab Republic of Egypt, India, Poland, and Ukraine.	Internet telephony services such as Skype and Jajah carry voice telephony using the Internet and traditional networks. In the United Kingdom, BT's Fusion service carries calls over WiFi (wireless fidelity) and cellular networks.	Internet, media, and telecommunications firms partner, merge, or expand their range of services. Such developments have occurred in Brazil, Nigeria, and Sri Lanka.
Benefits	Service providers can enter new sectors, use their networks more efficiently, offer discounts, and increase access to new ICT services.	Reduced costs can lower tariffs. Network integration permits mobility for consumers and expands coverage.	Mergers create opportunities for new services and markets, lower costs and tariffs, and increase the coverage of individual firms.
Risks	Subscribers could be locked into one service provider. Smaller firms, especially those without their own broadband networks, might get pushed out of the market.	Service providers could reduce investments in network infrastructure, slowing build-out.	Mergers could lead to market dominance, less competition, and less diversity of media content.
Policy implications	Multiple play changes the scope and boundaries of markets and alters entry barriers.	Connecting different networks allows location- and network-independent service provision.	Mergers create new business models and alter the market structure, changing the dynamics of the sector.

Source: Authors' analysis.

telephone, cable TV, and wireless networks have grown steadily. More recently, the growing use of Internet protocol (IP)-based packet-switched data transmission has made it possible for different devices and applications to use any one of several networks and for previously separate networks to interconnect. Together, these factors have facilitated the growth of multimedia communication. This has reduced costs and eased the design and deployment of multimedia access devices, and has thus led to a proliferation of increasingly inexpensive digital devices. For example, the personal computer or mobile telephone can now receive and transmit different types of media and services because of enhanced processing power and memory capacity.

With these technical factors evolving, convergence has found significant market traction with service providers seeking to increase revenues and cut costs of service provision. Service providers around the world are embracing convergence through investment in all-IP networks—estimated to reach a cumulative total of \$200 billion in 2015—and in converged business models. In an indication of this expanding underlying technological base, one analyst estimates that the global IP switch and router market grew about 10 percent in 2007, to \$11 billion (*Marketwire* 2008). One major IP network

equipment manufacturer has seen sales in emerging markets double since 2005, well above its worldwide sales growth of 40 percent (*Cisco Systems* 2007).

The deployment of broadband networks is another market factor supporting convergence. Broadband connectivity facilitates convergence because it allows the provision of multimedia content—such as compact-disc-quality audio and streaming video—at reasonable prices. As of 2007, broadband was commercially available in 166 countries (ITU 2006), and nearly a quarter of the 300 million subscribers were in middle-income countries (*Internet World Stats* 2007).

Indeed, demand for converged services is quite evident. By late 2007, there were more than 30 million “triple-play” subscribers worldwide—typically receiving telephony, video, and Internet services over broadband networks (*Pyramid Research* 2007). Skype, an Internet telephony service, has more than 300 million subscribers in 225 countries and territories (*Skype* 2008) and carried 13.75 billion minutes of international computer-to-computer calls in 2007 (*TeleGeography* 2007).

There has also been consolidation in the development and provision of content and services. Investments, mergers, and cross-holdings in the media and telecommunications

industries have increased the number of content creators and network operators with access to content and delivery mechanisms. The development of online advertising has allowed many content providers to offer their services free or well below cost. Such arrangements allow consumers to sample content and find uses for it, even if only in a limited manner. As a result, consumers create demand for content, resulting in higher demand for services that can support it.

These technical and market factors driving convergence are visible in countries across the full range of economic development stages. While high-income countries have had these conditions in place for some time, there are clear indications that even low-income countries and population groups are now recognizing these forces and the resulting convergence as a reality. Box 2.1 provides examples of convergence in emerging markets and low-income countries.

Implications of Convergence for the ICT Sector

Convergence has far-ranging implications for ICT service providers and users. It changes business models, expands markets, increases the range of services and applications available to users, and alters market structure and dynamics. Furthermore, given that ICT is a critical input to economic and social activities,³ convergence has an indirect effect on social and economic development.

There are also risks and challenges. Most prominently, convergence may lead to monopolization, allowing larger firms to extend their reach into new markets or raising entry barriers for new entrants. Hence, policy makers must think strategically about convergence and its role in their economy in order to enhance its benefits and contain risks.

Changing Business Models for Service Providers

Service providers in both the telecommunications and media sectors have seen convergence as a powerful way of increasing revenues and reducing costs.

Increased revenues. By offering a wider range of services, service providers can capture more revenues from their subscribers. A major U.S. cable TV operator saw its average monthly revenues per subscriber jump from \$42 in 1998 to \$102 in 2007, with non-TV services such as telephony or broadband Internet now contributing one-third of its total revenues (Comcast 2007). In Chile, about 60 percent of

VTR's 853,000 cable TV subscribers also use telephone or Internet services, increasing the company's revenues by 44 percent between 2005 and 2007 (Liberty Global 2007). More recently, telecommunications firms are seeing payoffs from diversification. One U.S. firm now derives 25 percent of its retail revenues from broadband and video services, and two of the country's largest telecommunications firms saw their revenues from video service quadruple between 2007 and 2008 (AT&T 2008 and Verizon Communications 2008).

Reduced costs. Service providers also see convergence as a way to cut costs and operating expenses. BT (2006) expects that its all-IP network will help reduce operating expenses by £1 billion a year. Savings are expected because this network replaces the company's 17 separate networks, including its traditional telephony network, with one—integrating a number of operational and network management systems (*Dow Jones International News* 2008). Similarly, Verizon expects that migrating its customers to an all-fiber-optic IP network will save more than \$1 billion a year on network maintenance (*Providence Journal* 2007).

Use of standardized IP networks is also driving cost savings. Telecom Italia cut costs by 60 percent by introducing IP technology for calls between Milan and Rome (*The Economist* 2006). Service convergence also cuts costs by increasing network use. Traditionally, telephone and cable TV networks provided only one service. Today these networks can carry multiple services, lowering the cost of each.

However, such cost reductions come at a high upfront price. BT's savings will follow a £10 billion (\$16 billion) investment between 2004 and 2011 (*Business Monitor International* 2008a). Similarly, Verizon expects to spend about \$23 billion building its U.S. network (*Providence Journal* 2007). The high capital spending required to offer converged services creates a new entry barrier that small or new service providers might not be able to overcome.

Expanded Access through Larger Markets

Convergence expands consumers' access to services because it lowers prices, which in turn increases the addressable market and widens coverage by using multiple infrastructures.

Lower prices for consumers. The reduced costs of operating converged networks and providing multiple services translate into lower prices for consumers. The starkest examples of this phenomenon come from the voice telephony market, where voice-over-Internet protocol (VoIP)

Box 2.1 Examples of Convergence in Developing Countries

Service Convergence

- Argentine cable TV operators Multicanal and Cablevision are investing about \$310 million in fiber-optic networks in 2008, with plans to offer triple-play services. In July 2008, however, fixed telephony service providers Telecom Argentina and Telefónica Argentina failed to get court approval to launch triple-play services.
- In 2006, Telefónica Chile began offering Internet protocol television (IPTV) and satellite television services to counter a decline in fixed-line revenues and subscriptions. Cable TV operator VTR saw its triple-play subscriber base double in 2006, and is considering acquiring a third generation (3G) license to add mobile voice services to its portfolio.
- India's incumbent public telecommunications provider, MTNL, started offering IPTV services in Mumbai in 2006. The service now offers about 150 channels, costs about \$5 a month, and has a reported 6,000 subscribers. A number of private operators have since begun offering IPTV services.
- In March 2008, Ukraine's Comstar began offering IPTV services over its fiber-based, next-generation network—making Comstar the country's first triple-play voice, video, and Internet provider. The company will soon face competition from Golden Telecom Ukraine and fixed-line operator Ukrtelecom. The IPTV offerings follow broadcaster Viasat's plans to introduce digital satellite TV services in 2008.
- Africa's service providers are beginning to invest in multiple play. In March 2008, Ghana Telecom announced plans to introduce IPTV services. The legalization of voice-over-Internet (VoIP) in Cape Verde in May 2008 has led service provider Cabo Com to announce investments in triple-play services, while looking to compete in broadband pricing.

Network Convergence

- Jajah is a service that carries calls between traditional telephones over the Internet. This combines wide access to telephones with the lower costs of carrying calls over the Internet. Launched in 2006, Jajah now connects customers across 200 countries.

Corporate Convergence

- Since 2006, Brazil has seen convergence among telephone and cable companies. Telemar acquired Way TV, while Telefónica bought a stake in TVA. Convergence is emerging in response to the introduction of triple-play services by NET Serviços, which has an estimated 400,000 subscribers.
- In 2007, MTN Nigeria acquired VGC Communications, a fixed and wireless phone provider. This move came after VGC secured a unified license to offer fixed and wireless telephony, Internet, and value added services in 2006. The chief executive officer of MTN noted that the company made the acquisition with the intention of accessing VGC's infrastructure and staff to achieve convergence.
- Sri Lanka's Dialog Telekom now offers telecommunications and media services. It has become a quadruple-play operator, offering fixed and mobile voice, TV, and Internet service, albeit on separate networks. Its satellite TV service reaches more than 60,000 households, while its mobile phone service has 4.3 million subscribers and will soon include 3G services.

Source: Authors.

technology has significantly changed price structures. VoIP has affected the pricing of international call traffic because it allows carriers to bypass and compete with traditional call pricing regimes. In 2007, one-fifth of international voice telephony traffic (in terms of minutes) used VoIP. In fact, VoIP traffic grew five times faster than did traditional voice traffic (TeleGeography 2007). Services that use the Internet to carry telephone calls offer significant discounts to consumers (box 2.2).

Many service providers also give discounts on bundles of services, charging less than if subscribers paid for each separately. Such discounts can be as high as 40 percent (Pyramid Research 2007, p. 14). Lower prices increase the addressable market and make some services more attractive to users who are price conscious or unsure of the usefulness of new services. In Sweden, for example, a cable TV company offering triple-play services gives subscribers the least expensive service free (OECD 2006).

Wider coverage. Convergence also allows service providers to reach new subscribers. Multiple play allows new services to travel over existing networks, expanding the reach of communication services. One recent report found that telecommunications firms offering IP television (IPTV) have succeeded in countries with relatively low pay TV penetration but high broadband penetration (Telecommunications Management Group 2008).

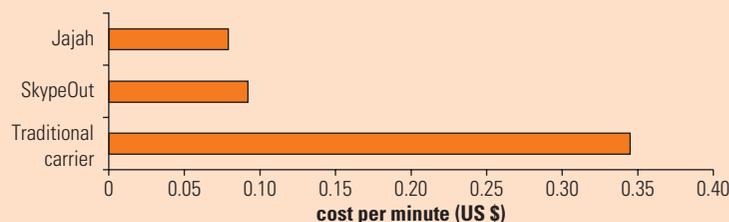
The evolution of digital video broadcasting (DVB) and mobile TV will enable the use of triple play over wireless networks, further extending the reach of services. The provision of DVB over cellular networks has recognized potential to increase the number of TV viewers in countries such as Kenya and the Philippines.⁴ New broadband wireless technologies are also raising expectations. For example, in 2005, Kenya Data Networks began deploying a WiMax system designed to offer converged services, such as voice and data (*All Africa* 2005). Wireless triple play will be especially

Box 2.2 The Impact of Voice-over-Internet Protocol on International Calling Prices

Internet-based VoIP services such as Skype make it possible to have long-distance telephone conversations that are much cheaper than with traditional long-distance services. Lower costs are also possible for telephone-based services conducted over Internet networks—such as Jajah, which uses the Internet to carry phone conversations. If all the international calls made to just the top 10 destinations from the United States used Jajah, the annual savings would top \$2.5 billion.

If a country's licensing regime prevents the entry of VoIP-based providers or restricts the type of technology they can use, it reduces the benefits of convergence for consumers. Moreover, countries that have banned these technologies have undermined their technological competitiveness. Failure to legalize VoIP reduces the opportunities for entrepreneurs to develop businesses into a core of fast-growing information technology (IT) startups, which tends to happen in countries where VoIP is legal.

VoIP and Traditional Carrier Charges for Calls from the United States to India



Sources: Authors' estimates based on tariff data from service providers' Web sites, TeleGeography traffic estimates, and Economist Intelligence Unit 2007.

useful in developing countries, where mobile phone subscription is far more common than ownership of personal computers or TVs.

Further, network convergence allows any combination of communication networks to carry services. A lot of nontraditional infrastructure can now carry telephone services, including cable TV and electricity distribution networks. This development can significantly improve coverage, even in low-income countries. In one set of low-income countries, wireline telephones reach an average of just 7 percent of households, while 33 percent of households are electrified and 18 percent subscribe to cable TV (Figure 2.1). Thus, having a combination of networks to carry communication services can move countries closer to universal service.

Broader Range of Services and Applications

Convergence enables ICT users to access a range of services through a wide variety of devices, including mobile phones. Some 3.9 billion mobile phones are in use worldwide, giving these devices enormous potential for providing multimedia services. Already, 27 percent of U.S. mobile phone users between the ages of 25 and 34 watch video on their cell phones (Economist Intelligence Unit 2008). South African media conglomerate Naspers has plans to expand its mobile television services into four new African markets, after introducing it in Namibia, Kenya, and Nigeria (Reuters 2008). Similarly, an estimated 66 million mobile phone subscribers

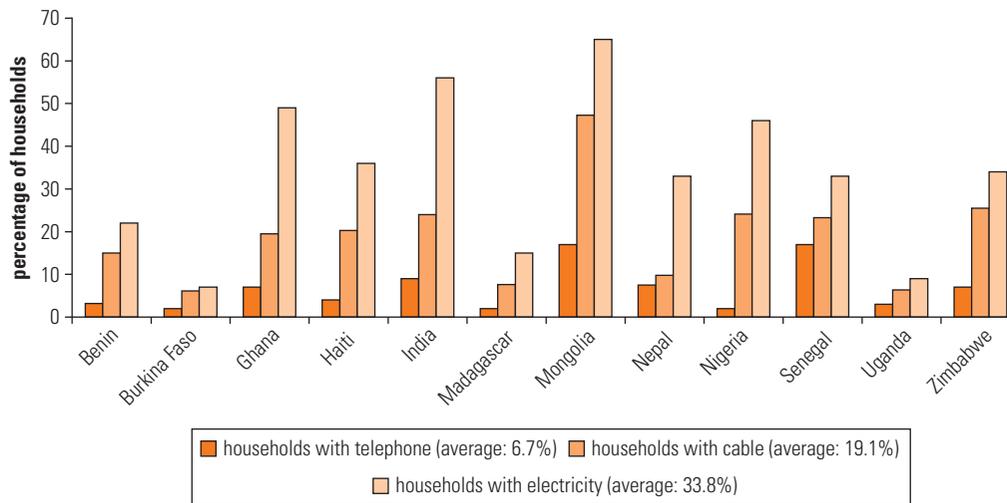
in India can access Internet services (TRAI 2008). A 2005 survey of 4,000 mobile phone users found that nearly a third were using their phones for e-mail or Internet browsing (OECD 2007, figure 5.8).

Thus, if service providers build service-converged networks, then financial services, public services, and entertainment applications will be able to reach a far larger portion of the world’s population. Similar possibilities arise from the mixed use of cable TV, wireless broadband, and other ICT networks. Access to high-quality, reliable, affordable ICT networks can significantly strengthen governance through e-government applications and provide opportunities for the remote delivery of health information or education services.

Increased demand for content and applications over converged networks drives significant economic development. For instance, media and entertainment expansion into mobile telephony is growing rapidly: mobile gaming is a \$4 billion global market, and in 2005 alone, more than 420 million songs were downloaded onto mobile phones around the world (SSKI Research 2007). Creation of these new markets drives employment and investment and catalyzes network growth.

Moreover, online services such as blogs, video repositories, and social networking tools create opportunities for social development. The information and knowledge channels created allow the exchange of ideas and provide a platform

Figure 2.1 Household Penetration of Wireline Telephone, Cable Television, and Electricity Networks in Selected Countries



Sources: UNDP 2007; World Bank 2007.

for creativity. Convergence also significantly alters the structure of the media sector, where content creation and distribution were traditionally in the hands of a few firms or the state. In Myanmar, for example, protesters' unprecedented access to digital video communication over the Internet enabled significant worldwide media coverage of recent pro-democracy demonstrations (*Oxford Analytica* 2007).

Altered Market Structure and Dynamics

Service providers that offer new services and reduce costs alter the structure and dynamics of the markets in which they operate. Thus, convergence can increase competition in a market. However, it also raises the threat of reduced competition. Consequently, convergence has significant implications for competition in the ICT sector.

Potential to increase competition. The different forms of convergence enable greater competition across ICT markets by reducing barriers to market entry and providing market access to new service providers. With multiple play, telephone or cable TV companies can leverage existing networks to offer nontraditional services. Network convergence expands market access by connecting new service and application providers to consumers.

Cable TV companies began to provide Internet and telephone services in the mid- to late 1990s using quickly maturing VoIP technology. For example, as of June 2008, the U.S. cable TV provider Comcast has 5.6 million telephone subscribers (Comcast 2008), almost triple the number it had in 2006, while U.S. telecommunications firm Verizon lost 15 percent of its fixed telephone subscribers due to increased competition from mobile telephones and broadband, especially cable TV broadband over that time (Verizon Communications 2007).

Following the stabilization of IPTV technologies in the mid-2000s, telephone companies are getting into the media business. Hence, while traditional telecommunications companies faced greater competition in their original lines of business in the 1990s, they are now entering and competing in the media space. Telephone companies are deploying new networks to provide triple-play services or have been investing billions of dollars to upgrade their networks. These investments are paying off. In July 2008, Verizon reported that it had 1.4 million video service subscribers on its new fiber-optic network. Indeed, broadband and video services are driving its growth. Revenues in these segments were up

by 53 percent even as overall revenues grew by just 1 percent over the previous four quarters (Verizon Communications 2008).

Cable TV companies are now starting to look to network convergence to counter the entry of telecommunications companies into the media business. Comcast has joined a consortium that plans to deploy wireless broadband services—leading to a quadruple-play business model that includes fixed and mobile telephony, cable TV, and Internet services (*FinancialWire* 2008). Similarly, France Telecom has added to its fixed and mobile telephony and Internet service offerings by offering video services, and the United Kingdom's NTL, a cable TV operator, acquired Virgin Mobile—a mobile telephony service provider—to extend its capabilities to wireless (Incode 2006). This move from triple to quadruple play suggests growing competition between telecommunications and media companies.

In competitive markets, service providers will pass lower costs on to users in the form of lower prices. The French Internet service provider Iliad led significant price reductions in the triple-play market by reducing its bundled tariff; the rest of the market soon followed (*The Wall Street Journal* 2006). This would not have been possible without Iliad's converged use of its network to deliver voice and video services.

Competition between networks that offer similar services also drives investments. This is especially apparent from the high levels of capital spending recently seen in the telecommunications sector. Of the 10 countries with the highest broadband penetration, 9 also have strong cable TV infrastructure (Noam 2007). The ability of cable TV infrastructure to carry converged services has driven investments in fiber-optic networks by telecommunications operators.

Singapore is a useful example of the potential for increased competition. In late 2007, StarHub was the territory's monopoly cable TV provider. Now SingTel, the incumbent telecommunications company, has begun to invest in and roll out a new IPTV operation, ushering service convergence into the market. The broadcasting regulator noted that the new service will "inject vibrancy into the Singapore media scene and offer consumers more choices" (*Business Times Singapore* 2006).

Risk of reduced competition. Although convergence has the potential to increase competition and reduce tariffs, it can also reduce or undermine competition (Katz and Woroch 1998). When the Brazilian telephone company Telemar

acquired cable TV operator Way TV in 2006, regulator ANATEL responded to concerns about competitive implications by conducting a review. (Ultimately, it found no reason to stop the acquisition.) The country's association of cable TV operators opposed the deal, saying that the entry of the larger operators could impede competition. However, the association's view was also seen as a defensive response to the entry of a new player in the market (*Global Insight Daily Analysis* 2007).

The potential reemergence of natural monopolies is becoming an important issue in the converged broadband era. Natural monopolies may arise when economies of scale or scope are pronounced. IP and broadband networks often require substantial upfront fixed costs and have falling per-unit costs. Incumbent cable TV and telephone companies with the resources to build or upgrade their networks to offer converged services will have a better chance at attaining market power. This leads to an even more challenging environment for new entrants that might not have the networks or resources to challenge a natural monopoly. Such a situation is especially likely in many developing countries, where there are few infrastructure owners to begin with.

Further, if only one service provider owns a backbone or access network, it might not provide competitors with access to it, or charge high interconnection rates. Alternatively, a firm might not have incentives to make significant upfront investments in networks if it believes that competitors might too easily access its facilities. In 2006, German incumbent Deutsche Telekom suggested that it would cut investments in its hybrid fiber very-high-speed digital subscriber line (VDSL) network if forced to open the network to competitors (*Telecom Policy Report* 2006). While the German government gave Deutsche Telekom permission to keep its network closed to protect its return on investment, the European Commission saw this as anticompetitive—benefiting Deutsche Telekom but cutting off potential benefits to the market from increased competition from other service providers (*Tarifica Alert* 2007). Such developments are reflected in growing debates on network neutrality and open network access (Frieden 2006).

Convergence can also reduce competition in other ways. Alternative providers might not be able to replicate pricing options or bundles of services offered by the dominant or larger service provider, increasing costs for subscribers changing services and reducing competition. In addition, concerns about changing telephone numbers, TV channel numbers or programs, or even e-mail addresses

might dissuade consumers from seeking out less expensive or higher-quality services.

The merging of telecommunications or media firms might also reduce the diversity of content available to users. In 2003, when the U.S. Federal Communications Commission relaxed restrictions on cross-ownership of media outlets, one of the main reasons for opposition was that it would allow mergers and acquisitions that could reduce the diversity of new and local content (Goldfarb 2003). In a sign of the social implications of advanced ICT, most of the 3 million responses received were by e-mail.

Responding Strategically to Convergence

The discussion above suggests that convergence is likely to gain further momentum around the world. As demand and supply align, advanced ICT networks could emerge as quickly in developing as in developed countries—even in poor countries with a late start. This shift would enable the realization of significant benefits and enhance the development impact of ICT.

For that to happen, it is essential that policy and regulatory frameworks allow markets to function. The well-known success of mobile telephony worldwide has had as much to do with market liberalization as with high demand and low-cost technologies. Research on the diffusion of advanced telecommunications services in developing countries finds that the rate of adoption depends on the existence of an appropriate business environment—which, in turn, is directly dependent on the regulatory and policy environment (Antonelli 1992, p. 11).

A key strategic consideration for governments is the implication of convergence for competition and market structure in the ICT sector. If developing countries seek to maximize the benefits of convergence, they could consider policies that increase access to advanced technologies and innovative, high-quality services by opening markets and removing regulatory barriers to new technologies and business models (Guermazi and Satola 2005, p. 25). Such policy frameworks will create the conditions needed to promote competition. However, consistent oversight might still be required to ensure that convergence does not lead to monopolization.

Governments seeking to maximize the benefits and minimize the risks of convergence will have to think strategically about their policy responses to convergence. If policies restrict convergence from playing out in the market, do not promote competition, or fail to address the risk of

monopolization, they will lead to suboptimal outcomes that reduce the development impact of ICT.

Policy Responses

Although convergence is a universal phenomenon, its implications and appropriate policy responses vary by country, depending on prevailing circumstances and legacy factors (Raja and Williams 2007). Still, it is possible to define some useful—if broad—categories of policy responses to convergence. Some countries resist the introduction of convergence. Others “wait and watch,” embarking on changes only when they consider them necessary. A third response is to create enabling policies for convergence.

These three categories describe how countries have responded to convergence. Yet the typology is also useful in understanding the implications and outcomes of these different types of responses. Table 2.2 summarizes these responses and the outcomes of each.

Resistance

Governments may believe that convergence will undermine social, political, cultural, or economic goals. In developing countries, VoIP is often perceived as potentially undermining the revenues of incumbent telecommunications operators (and of government, if the incumbent is a state enterprise)—especially when lack of competition has allowed these firms

to draw large monopoly rents (ITU 2007, p. 13). Similarly, the political, cultural, and social importance of broadcasting and media often makes governments wary of new providers.

Thus, governments may resist convergence and take steps to prevent new services and providers from entering the market. In 2006, for example, 36 of 54 African countries forbade VoIP (Balancing Act 2006). Moreover, some countries broadly accept the idea of convergence but restrict specific modalities. For example, in the United Arab Emirates, incumbent Etisalat offers a full range of converged telecommunications and video services, but Internet telephony services like Skype were banned in 2006 (*Business Monitor International* 2008b). Concerns involving content regulation have led Bahrain, which has a liberal telecommunications sector, to restrict private participation in media services, preventing fully converged services (Reporters without Borders 2008). And India, in spite of having an open, competitive media sector, does not allow private FM radio stations to broadcast news (TRAI 2008).

Resisting convergence reduces potential benefits, is difficult to enforce, and inevitably leads to pressures for reform. Restrictions cause users to lose potential benefits from innovations and cost reductions. Since Kenya legalized VoIP in 2004, prices for international calls have fallen by up to 80 percent. Legalization of VoIP drove both its own growth and the adoption of broadband and triple play in Kenya, Tanzania, and Uganda (Balancing Act 2007). Where VoIP is

Table 2.2 Policy Responses to Convergence around the World

Indicator	Resist	Wait and watch	Enable
Perceptions	Government believes that convergence may undermine social, political, cultural, or economic goals.	Government believes that existing policies accommodate convergence, or decides not to act.	Government believes that convergence can benefit the ICT sector and economy at large.
Actions	Government takes steps to prevent new services and providers from entering the market.	Government makes no policy changes. Issues are dealt with on a case-by-case basis.	Government updates policies, promotes industry responses, or directly invests.
Outcomes	New services cannot develop legally, but may still defeat restrictions. Users lose potential benefits from innovations and cost reductions. Government faces increasing pressure to remove restrictions.	Case-by-case decisions allow progress but expose policy inconsistencies. Growing uncertainty discourages investors and operators. Government faces increasing pressure to revise policies.	Market evolves with new services and business models. Growth and innovation accelerate. Users benefit from increased access and choice, and reduced prices.

Source: Authors' analysis.

permitted, small providers can evolve into IT (information technology) businesses (Economist Intelligence Unit 2007).

Even if new services cannot develop legally, innovators may still defeat restrictions. The global gray market for international voice telephony, accounting for between a quarter and a third of international call revenues, attests to the possibility of service provision regardless of market restrictions.

Resisting convergence may protect the short-term interests of governments and specific players. Nevertheless, the evolution of technology and the potential for provision despite restrictions will ultimately undermine such a policy. Resistance will simply delay convergence and its benefits while undermining policy credibility.

Wait and Watch

Governments may believe that their existing policies accommodate convergence or decide not to act on market developments. Countries seeking to maintain a laissez-faire approach may choose not to regulate for or against convergence. On the other hand, some governments may not have the political capacity to resist or enable convergence, so wait and watch may be their only practical option.

Under the wait-and-watch approach, governments do not change their policies. Instead, they rely on existing policy, legal, and regulatory instruments to deal with issues on a case-by-case basis. In the United States, the Federal Communications Commission and Department of Justice track mergers and acquisitions in the ICT sector. In addition to the Federal Communications Commission's powers, general competition law is used to address issues of monopoly and anticompetitive behavior.

The wait-and-watch approach does not necessarily restrain convergence. Nevertheless, it can lead to confusion and uncertainty. Convergence blurs the boundaries among ICT subsectors, and case-by-case decisions on structural issues might expose inconsistencies due to the different business and regulatory histories of each subsector (Bar and Sandvig 2000). Overlapping or conflicting rules and policies increase regulatory risk and the cost of capital by up to 6 percentage points, depending on the country or region—slowing investment in infrastructure and services (see Estache and Pinglo 2004; Jamison, Holt, and Berg 2005; Kirkpatrick, Parker, and Zhang 2006; and Smith 2000).

The potential for such conflict has grown with service providers adopting new business models. For example, the

U.S. “wait and watch” response is leading to conflicts and concerns. A dispute over the introduction of IPTV services in the state of Connecticut led telecommunications operator AT&T to consider cancelling \$336 million in investments and suspending 1,300 jobs (*New Haven Register* 2007). The conflict arose because the state required city-level franchising for cable TV operators. Hence, AT&T faced delays and increased costs if its video service was to be treated as a cable TV service because instead of securing one statewide telecommunications license, it would have had to seek licenses in every city. This conflict was resolved in October 2007 after 17 months of uncertainty (*Telecommunications Reports* 2007). The process saw the state cable TV regulator reversing decisions and being challenged in the courts twice. Consequently, not only did the uncertainty cause risk to significant investment and job creation for the state, it also undermined the credibility of regulation.

As conflicts and uncertainty grow, governments face increasing pressure to revise policies. The absence of a response can have a significant negative effect by failing to provide certainty for investors and not providing a way to overcome inconsistencies in legacy frameworks. As such, the United States is now concerned that it is falling behind its European and Asian peers in broadband penetration and low tariffs (EDUCAUSE 2008), leading to calls for government intervention and a national broadband strategy in a market that has typically adopted a laissez-faire approach to the ICT sector (NTIA 2008). Therefore, while a wait-and-watch approach may not prevent convergence, it can lead to suboptimal benefits.

Enable

Some governments believe that convergence can benefit the ICT sector and the economy at large, and choose to create environments that actively promote innovation and competitive service provision. International experiences with the mobile telephone revolution show that when service providers are allowed to offer services, face few government restrictions, and have explicit or implicit government support, such markets can develop very quickly. A similar expansion in investments and access to advanced ICT services can result from the creation of enabling policy environments for convergence.

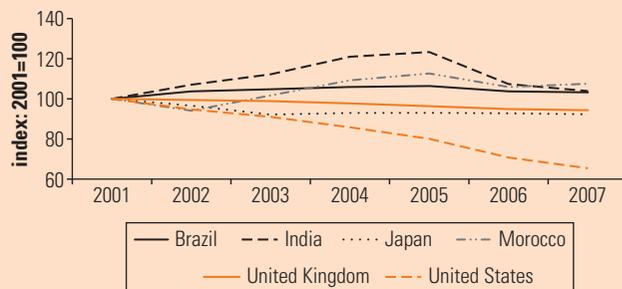
Enabling policy environments allow markets to evolve with the introduction of new services and business

Box 2.3 The Impact of an Enabling Environment for Convergence: Wireline Telephony and Job Creation

Around the world, the wireline telephony business is stagnating or shrinking because of the shift toward mobile, cable, and broadband telephony. This shift is threatening wireline telephone companies, raising the possibility of job losses.

In April 2008, U.S. telecommunications firm AT&T announced that it would cut 4,600 jobs in its shrinking wireline business. However, the company is simultaneously hiring about as many or more employees to support the rollout and operation of its expanding wireless, video, and broadband services. AT&T's shift into converged and broadband services is allowing it to keep its total headcount approximately the same. In fact, wireline firms worldwide invested more than \$36 billion in equipment throughout 2007, up more than 10 percent from 2006, with spending increasing on optical transport and routers as well as on VoIP equipment.

Subscriber Base for Wireline Services around the World



If policy prevents AT&T and similar firms from expanding into new market segments, they cannot build their businesses—leading to negative outcomes such as job losses. Restrictive government policies can prevent new business models and undermine economies. Enabling policies will allow an expansion in economic activity and potential job creation.

Sources: Authors' analysis; DellOro Research 2008; Pyramid Research 2008; *The Wall Street Journal* 2008.

models. Box 2.3 discusses the importance of allowing firms to overhaul their business models in response to changing technology and market conditions. Policies that promote convergence accelerate growth and innovation—reducing inconsistencies and artificial barriers, lowering risks and entry costs, and creating better environments for investments. In addition, users benefit from increased access and choices as well as reduced prices.

Creating an enabling environment can involve different levels of government engagement with the ICT sector. First, governments can amend policies to address convergence and

remove barriers and restrictions. At minimum, policy responses to convergence will resolve some of the conflicting rules among converging sectors and create level playing fields in the market.

Several countries have reformed their policy and regulatory frameworks to accommodate and enable convergence while simultaneously moving toward a greater focus on market forces. Kenya and Singapore, for example, have moved toward technology-neutral licensing regimes that allow service providers the flexibility to deploy the most efficient networks. Going further, the Republic of Korea,

Malaysia, and the United Kingdom, among others, restructured their legal and regulatory frameworks to align with convergence and allow multiple play without restriction.

Given that the primary implication of convergence is a change in market structure, policy makers have the opportunity to promote competition as they undertake policy reforms. Creating a competitive market on a level playing field has been recognized as the most effective way to drive growth, encourage efficiency (leading to reduced prices and improved quality), and promote investment.

The second level of government involvement may provide incentives for firms to invest in the deployment of advanced ICT services. Japan's government provided interest-free credit, subsidies, preferential tax rates, competition-enhancing rules, and other measures to promote the deployment and use of fiber-optic broadband networks (*Dow Jones International News* 2000). Today, Japan leads the world in fiber-optic home subscriptions, with more than 8 million homes connected (*The New York Times* 2007).

Finally, some governments directly invest in infrastructure and services. Government investment can provide a significant push during the early stages of convergence and make the government's policy stance clear. One study found that fiber-to-home deployments are financially feasible in cities if take-up is at least 25 percent of homes (Sigurdsson 2002). Passive infrastructure accounts for up to 80 percent of these costs (Gauthey 2006). Hence, governments that reduce the costs of rollout by sharing costs or providing rights-of-way can jumpstart development.

As part of their investments, governments can lead development of advanced networks or create open-access infrastructure that can attract private investment, such as France did. By 2006, 40 percent of French households had broadband service, and multiple service providers had benefited from the unbundling of incumbent France Telecom's network. Today, the national and local governments are investing in the rollout of open-access fiber networks, which private service providers will pay to use. Included in this plan is the opening of sewers and conduits to allow competitive service providers to lay their fiber-optic cables (*The Wall Street Journal* 2006). One study estimates that this approach will cut costs by up to 60 percent (Paul Budde Communication Pty Ltd 2008).

Direct investment, however, involves some risks and challenges. One is that public funding of broadband networks can distort the market. To address this issue, the European

Commission verifies that interventions are in line with state aid rules.⁵ These rules require justification for state intervention and an analysis of the impact of the aid on competition in the market. In areas where competing private operators are present, the European Commission can prohibit state investment if "intervention may crowd out existing and future investments by market players" (Papadias, Riedl, and Westerhof 2006). This implies that governments need to demarcate their roles as investors from possible roles as service providers. Put another way, public investments should not serve as a way for governments to reenter service provision, effectively rolling back the sector reforms of the past two decades.

Governments also risk investing in technologies or services that eventually might not find a mass market, become obsolete, or slow further innovation. France's recent successes in the broadband market came after much criticism of its deployment of the pre-Internet data service Minitel. The government invested \$11 billion in the system over 20 years, with service beginning in 1981. At that time, Minitel was an advanced data service and a pioneer in the market, though it remained a policy and business priority in France well beyond its useful life as the Internet took hold in other countries (*International Herald Tribune* 1996).

The three levels of government involvement in ICT convergence can be cumulative. Creating a framework that promotes competition and innovation, however, may need to follow these stages in sequence. Experience suggests that the priority has been to remove policy and regulatory restrictions first, then create new frameworks to address convergence and promote competition and innovation, and finally move toward encouraging or investing in these technologies and services. These might be considered the stages in the creation of a policy framework that enables convergence.

The example of the United Kingdom is one that illustrates these stages. The United Kingdom began creating an enabling policy and regulatory framework in 2003, when it promulgated the Communications Act and created a converged regulator, the Office of Communications. In 2004, the government and regulator began to push incumbent BT to reorganize. The goal was to lead BT toward opening its local networks to competitors; the government believed that this move would promote competition and expand the penetration of broadband services.

Even so, in 2007, the government began discussions about investing in its own national fiber-optic network, at an estimated cost of about £10 billion. The reason for this move

was to catch up with other countries investing in fiber-optic infrastructure, “delivering considerably higher bandwidth than is available in the U.K.” (BBC 2007). Further, the government formed a “convergence think tank” in 2007 to suggest ways of improving policies given technological and market developments since the last major policy revisions in 2003.⁶ Thus, the government continues an evolving engagement with convergence, pointing to a migration through stages from a policy response to working with firms and, most recently, planning direct investment in the ICT sector.

Conclusion

Around the world, service providers embrace ICT convergence to enter new markets, drive growth, and improve their business prospects. Users are also responding, with significant numbers subscribing to innovative services at lower prices. New technologies and the market are driving convergence forward, leading to significant potential benefits.

A policy maker’s role is to respond to this changing environment. Different countries have followed different paths in response to convergence. With profound implications for the whole ICT sector, it is essential that policy makers have a firm understanding of the implications of convergence and their decisions.

In the long term, countries that resist are likely to miss the benefits of improved ICT networks and services. Some countries want to wait and watch as they may believe that their existing policies accommodate convergence or that the issue does not merit immediate attention, but risks remain because convergence typically does not fit easily into traditional policy frameworks. With the passage of time, the economic costs of regulatory uncertainty and inconsistency that hinder convergence will increase. The greatest benefits come in markets that enable convergence.

If a country decides to move toward enabling frameworks, it will at minimum need to review policies and regulations, and then implement coordinated measures. Indeed, translating a broad vision for convergence into specific policies and regulations is likely the more difficult task.

Emerging trends suggest some global best practice principles for regulatory frameworks to respond to convergence:

- *Create regulatory frameworks that promote competition.* Service providers can deploy converged services only if regulators lower entry barriers and allow innovation—

and, by doing so, increase competition, reduce prices, and drive growth. However, it is equally important that regulators prevent market failures and do not allow monopolization. Hence, regulatory frameworks that establish level competitive playing fields will provide the greatest benefits for users.

- *Rely more on market forces and less on regulation.* Maintaining legacy regulatory frameworks will likely stifle the growth of convergence. Instead, regulation can move toward allowing innovation and competition on a level playing field, then step back from intervening unless there are market failures.
- *Allow new technologies to contribute everything they have to offer.* Regulatory frameworks that are technology neutral and allow flexibility in service provision will encourage investments and innovation. Service providers can fully use their networks and reduce costs, increasing business viability and leading to markets that are more efficient. Users will benefit from lower prices, more choices, and increased competition.

Policy makers seeking to respond to and enable convergence will find that doing so promotes competition and supports innovation in services that benefit the ICT sector. Following these principles will lead to better outcomes for the ICT sector and the economy as a whole. A detailed examination of the specific regulatory issues is provided elsewhere.⁷

As a market phenomenon that can lower prices, expand coverage, and increase investments, convergence will enhance the effects of earlier sector liberalization efforts. Countries that begin on these second-generation reforms in the ICT sector will find themselves, and their economies, better off for it.

Notes

1. For conciseness, this chapter focuses on the supply of ICT services rather than on their demand and use, including content and applications. The chapter presents a selection of the different views on convergence found in current practice, taking into account the interests of ICT policy makers and businesses in the developing world.
2. Another often-discussed aspect of convergence relates to user devices. However, this chapter takes the view that converged multimedia devices are a driver and not a result of convergence.

3. There is a significant amount of literature dedicated to the analysis of the development impact of ICT. See, for example, Wang (1999) and Grace, Kenny, and Qiang (2004).
4. Many countries have also begun to consider digitizing terrestrial broadcasting. Such developments alter the scope of services that can be carried over the broadcast spectrum because they reduce the amount of spectrum needed to carry TV signals. The freed excess spectrum—the “digital dividend”—can be used for broadband and other new wireless services and networks, introducing convergence among wireless technologies. It can also significantly increase coverage, especially since the bands used for broadcasting have wider reach.
5. The Commission’s Director General for Competition “monitors state aid to the ICT sector and contributes to the development of State aid policy in this field. State aid is defined as an advantage in any form conferred on a selective basis to undertakings by national public authorities. In view of this definition, a number of measures such as research and development aid or regional aid to ICT companies have to be monitored by the director general in order to avoid market distortions. The director general also clears aid that is beneficial to consumers, by providing new research grants and encouraging the development of new products, such as open source.” More information is available at http://ec.europa.eu/comm/competition/sectors/ICT/overview_en.html.
6. More information on this think tank is available at <http://www.culture.gov.uk/Convergence/index.html>.
7. A more detailed examination of these possibilities, specifically for multiple play, is covered in Singh and Raja (2008).

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