Internet Access

Regulatory Levers for a Knowledge Economy

International experience shows that the critical factors in building knowledge-based economies include broad access to the Internet through low-cost, high-quality connections, high computer literacy and comfort in using the Internet, and useful content and innovative Internet applications to create value. This Note focuses on the first factor, proposing a regulatory strategy to expand Internet access through lower costs and higher-quality service. Although many developing countries have reformed their communications sector, few have made achieving this kind of Internet access an explicit goal.

Internet access depends on four critical players: First, providers of telecommunications infrastructure (bandwidth capacity) for international access to the global Internet backbone. Second, providers of national long-distance telecommunications transmission capacity (such as leased lines) to connect Internet service providers (ISPs) with one another and with international connectivity nodes. Third, providers of local loop access (narrowband and analogue, such as traditional copper wire connections, or broadband and digital, such as digital subscriber lines [DSL], cable television modems, and fixed wireless service). Fourth, ISPs, which provide Internet services to customers using these layers of networks.

Expanding Internet access requires cooperative behavior by these players, and regulators have a key role in ensuring such behavior. A regulatory strategy for doing so focuses on promoting the telecommunications infrastructure, enabling viable ISPs, ensuring efficient pricing, maintaining appropriate service quality, supporting diffusion in remote areas, and ensuring legal certainty for electronic transactions.

Promoting the telecommunications infrastructure

Competition is key. So regulators should take a permissive approach to licensing multiple financially sound providers (owners and resellers) of telecommunications infrastructure for international connectivity, alternative national long-distance networks, and local loop access. To ensure competition in the ISP market, regulators should require no formal licensing for ISPs; simple registration should suffice.

The biggest potential bottleneck for Internet access is the local loop. The local loop has mostly
been analogue copper telephone lines, owned and provided by the monopoly incumbent telecommunications operator. Copper wires are not suitable for moving large volumes of data cheaply and quickly. Improving local access therefore requires providing alternative local broadband access (through cable television networks, fixed wireless, fiber optic, and other technologies) or upgrading the quality of the copper loop with DSL technology and unbundling it by opening it to use by competing providers.

The constraints in the local loop have led to increasing recognition that competition in the local loop is a prerequisite for effective competition in broadband services—and that regulators can use this competition as a lever to unlock the potential for broadband services. A case in point is the experience of the Republic of Korea, a world leader in broadband, which shows that ensuring competition not only between but within access technologies accelerates the development of the broadband network. A market with multiple service providers for each type of access technology—such as cable modem, DSL, fixed wireless, fiber-optic cable, and local multipoint distribution systems (LMDS)—is more competitive than a market with just one provider for each.

Regulators could also use the unbundling of the local loop from incumbent local carriers to unlock the potential of broadband as well as to promote the development of alternative service providers. Unbundling lowers both economic and technical barriers to competitive entry by precluding the need to build duplicate networks. Broadband and other alternative service providers can build some elements of the network while leasing others from the incumbent. Regulatory action is also needed to ensure that access to low-priced unbundled components does not prevent the development of competition from alternative networks in the longer term.

In Singapore the incumbent operator, SingTel, must offer other operators local loops, including feeder and distribution plant, the distribution point at a building, and, in some cases, inside wiring. For unbundling to be even more effective, the incumbent should also be required to offer access to main distribution frames in local switching centers and “line sharing,” the provision of high-frequency portions of loops for DSL service (ITU 2001). By late 2002 more than 40 countries had mandated local loop unbundling (ITU 2002b).

**Enabling viable Internet service providers**

To ensure that ISPs can be viable, regulators need to guarantee a fair and competitive market for the services ISPs need, such as leased lines and local loop access. Most ISPs depend on incumbent operators for their services. High costs for these services can threaten ISPs’ commercial viability and mean higher prices for end users. An effective regulatory regime for interconnection and infrastructure sharing would ensure that all interested operators can use existing facilities at prices that reasonably reflect costs, avoiding undue duplication of networks and undue competitive advantage for incumbents.

Interconnection prices and conditions largely determine whether competition will emerge and ISPs will succeed. Good interconnection frameworks promote efficient infrastructure development by providing proper incentives for operators to build their own networks and to use parts of others. Bad ones can act as barriers to competitive entry, undermining investment in new infrastructure and depriving the public of innovative service options (ITU 2002b). The United States and Korea both have interconnection regulations supportive of ISPs. The U.S. regulator requires incumbents to provide key infrastructure to ISPs and new entrants at reasonable rates, allowing them to be profitable. The Korean regulator obliges dominant telecommunications operators to provide cost-based interconnection services to other operators and to value-added service providers such as ISPs.

ISPs could also ensure cost-efficient interconnection and traffic exchange by entering into peering agreements with other ISPs. Under these agreements an ISP with its own backbone network allows traffic from other large ISPs in exchange for access to their backbones on a settlement-free basis. Where there is a big size difference between ISPs, a transit agreement provides an interim step toward peering. Under this kind of agreement a smaller backbone operator pays a larger operator a line access charge for wholesale access to the Internet.
What regulatory actions are needed to promote infrastructure sharing? International experience suggests that they include requiring incumbents to publish timely and easily accessible information on the location of infrastructure (such as ducts and towers) and the capacity available for sharing and to develop clear guidelines for pricing shared infrastructure and co-locating the equipment of competitors and the incumbent. Also important are regulatory safeguards such as requiring each operator to make infrastructure capacity available to all interested operators (including itself) on a nondiscriminatory basis and requiring regulatory approval of rules for rationing scarce capacity.

Lowering the cost of local access

The pricing structure for access to the communications infrastructure plays a big part in determining access to the Internet, its level of use, and the development of e-applications. Per-minute phone charges (on top of per-hour Internet access charges in some cases) discourage extensive use of the Internet. By contrast, flat-rate access to the infrastructure and the Internet encourages greater use of the Internet, promotes migration to faster, “always on” solutions available through broadband, and generates demand for new interactive services and content, catalyzing e-applications.

Pricing thus calls for policy and regulatory intervention. While the Organisation for Economic Co-operation and Development recommends against regulatory tariff setting, it does recommend policy support for tariff options favorable to “always on” capabilities as well as support for competition in infrastructure, the unbundling of local loops, and the competitive development of high-speed access options. The United Kingdom and the United States are among the countries that apply flat-rate pricing for local calls (box 1). Other countries price Internet traffic at lower rates than telephone calls.

Lowering the cost of international access

Prices for bandwidth to access the global Internet backbone fell significantly in most industrial countries in the late 1990s, but the same cannot be said for developing countries. Even in countries allowing local ISPs to connect directly with the global Internet backbone, the costs of doing so remain high. The high prices of international connectivity have been attributed to many factors, including the use of expensive transmission mediums such as satellite links and the lack of competition in the market for such connectivity (ITU 2002a). To increase competition, regulators could foster access to a broader range of high-speed and high-bandwidth international providers—especially fiber-optic networks and satellite operators. Regulators could also consider imposing requirements to allow new entrants connectivity options equal to those of incumbents.

The limited availability of leased lines and their high prices in many developing countries are another major constraint on international connectivity. There is thus a clear need for regulators to ensure that markets move toward more competitive supply and cost-oriented prices.

Another recommended solution to the high cost of international connectivity in developing countries is to use Internet exchanges to aggregate demand for international bandwidth. Most industrial countries have allowed private companies to establish transparent and neutral exchanges of ISP traffic locally. These exchanges, or network access points, improve the performance of national infrastructure and increase the efficiency of the use of international bandwidth while reducing costs to ISPs. To maximize the economies of scale offered by network access points, regulators need to take actions to reduce the prices of backbone services. Pooling international access (bandwidth) can also reduce access costs to providers. A good example of this practice...
is the Irish government’s purchase of large capacity (from Global Crossing), which it then sells to small providers at low cost.

**Maintaining quality**
The quality and speed of Internet access play an increasingly important role in the extent to which the Internet is used, especially for business transactions. Improvements in service quality normally follow the introduction of real competition, as service providers compete with one another to attract and retain customers. But if there is too little competition among infrastructure providers, competing service providers may find themselves constrained by the quality of the infrastructure, typically provided by the incumbent operator. Regulators can promote better quality by requiring incumbent infrastructure providers to offer service level agreements (SLAs). As the experience of Ireland shows, a properly constructed SLA can benefit users (box 2).

**Supporting diffusion**
Putting in place a pro-competitive market structure might not ensure Internet access in all areas. Closing the gaps in access might require specific measures like those taken by regulators in Chile, Estonia, Malaysia, and Korea. In Chile the regulator established a universal Internet access fund to subsidize service provision in rural, remote, and low-income areas that might be unattractive to competitive market players. Estonia made Internet access for every citizen a constitutional right. As a result, all schools and many public libraries and municipal centers are connected to the Internet. In Malaysia the Communications and Multimedia Commission recently initiated the Collective Internet Access program to promote installation of adequate Internet access technologies in all communities. Korea mandated universal access at a speed of 2 megabits a second.

**Setting up a legal and regulatory framework for electronic transactions**
Laws and regulations relating to Internet transactions need to be modernized in order to build trust in the Internet as a medium for carrying out business. Electronic transactions are far more impersonal, anonymous, and automated than face-to-face or even telephone transactions. And merchants and consumers all over the world are discovering that the digital environment strains the rules and laws of conventional commerce. For all these reasons caution and even distrust have slowed the development of online transactions. Governments need to address the lack of legal certainty by establishing clear policies and regulations on such key issues as taxation, digital signatures, electronic payments, electronic security, and protection of privacy, consumer rights, and copyright and intellectual property rights.

**Note**
1. See Analysys Consulting (2002) for more detailed treatment of this subject.

**References**


**Box: Performance improvements from service level agreements in Ireland**
Ireland’s telecommunications regulator has required the fixed line incumbent operator, Eircom, to provide carrier services to other licensed operators. Service level agreements (SLAs) set out the minimum quality standards Eircom must meet in providing these services (delivery times, delivery process points) and the penalties it must pay if it fails to meet them. Such agreements also cover delivery of leased lines and ISDN (integrated services digital network) services to other licensed operators. The SLA framework has led to big improvements in Eircom’s performance: delivery times for leased lines fell from 54 days in February 2001 to 16–20 in March 2002.