SHARE INFRASTRUCTURE, EXPAND THE INTERNET

Emerging best practices demonstrate the power of partnerships

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Utilities that share their infrastructures will help reduce the costs and time to deploy telecommunications networks. Governments that create an enabling environment and support partnerships to share infrastructure will help to expand the reach of the Internet, connecting more people to economic and knowledge opportunities around the world.

Connecting to cyberspace requires an immense physical infrastructure. The telecom networks on which the Internet runs are built using thousands of miles of fiber optic cables—overland and submarine—and hundreds of towers carrying antennas. So expanding the reach of the Internet implies significant civil works to create ducts and towers that carry those cable and antennas. Estimates are that civil works make up more than half of the cost of building networks.

This is why telecommunications companies (telcos) often look for ways to share other networks' infrastructures, increasingly across sectors. Being able to run fiber optic cables in an existing duct or put an antenna on a power transmission tower means cutting the costs and time to deploy networks. Fiber optic cables in Paris and some of Japan's cities run through the municipal sewers. In India's mountainous northeast, some states connect to the global Internet via fiber

optic cables laid along the tops of the electrical power transmission towers, which also host mobile telephone networks' antennas. And in Chisinau and Tbilisi, companies compete to get access to municipal ducts and poles.

Yet many utilities have not begun to share their infrastructures, and many countries have not promoted or at least permitted such sharing. In some cases, this is because of policy or regulatory restrictions. At other times, it is due to the lack of coordination across agencies, poor information sharing, or limited institutional capacity. By creating an enabling environment and the mechanisms for such partnerships, governments can play a role in cutting costs and expanding the reach of Internet services. The entry of alternative providers into telecom markets can promote competition by opening new facilities. This is especially true for the developing world, where energy, transport, and water and sanitation systems are being built or improved, and where telecom incumbents might have monopoly power.

Such partnerships—where public utilities host telecom networks' cables or antennas—will benefit host infrastructures as well. Utilities can earn additional revenues by leasing these (often under-used or unused) assets, and can use this connectivity to support their own "smart systems" such as power grid monitoring or intelligent transport systems. The overall benefit, however, is to those citizens and businesses that get to access Internet services and connect to economic and knowledge opportunities globally. Considering the experiences of various utilities and countries will help identify emerging best practices.

EXPERIENCES WITH SHARING

For some time now, electric power transmission utilities around the world have been installing fiber optic cables to help with grid monitoring and control. However, the internal requirement was a fraction of the installed data capacity. India's PowerGrid recognized the potential to use this excess capacity—available on 30,000 kilometers (km) of its network—to provide national connectivity services to a range of telecom networks and government agencies. The utility is also beginning to use its many towers to host antennas for mobile telephone networks. This business contributed about 1.8 percent to revenues and has led the utility to be a key member of the national knowledge and fiber optic backbone networks. Similarly, since 1995, Turkey's transmission utility, TEIAS, has been sharing with telcos about 13,000 km of fiber optic cables installed on its network. Initially sharing exclusively with incumbent Turk Telecom, TEIAS has been leasing its fiber to various private networks since the telecom sector was liberalized.

PowerGrid and TEIAS follow different models. While PowerGrid has a tariff "menu" for various services, TEIAS bids out leases of its fiber. As a result, PowerGrid remains fully responsible for the operation and maintenance of connectivity, while TEIAS passes this responsibility on to leasees. The institutional structures vary accordingly. In both cases, however, telecom regulators enabled this new business by having a liberal licensing regime that permitted the utilities to

enter the telecom market. And a new electricity market law and licensing regulation has permitted TEIAS to lease excess fiber optic capacity.

Similarly, gas transmission utilities can also open installed fiber optic capacity. Indonesia's PGASCOM, part of a leading gas transmission and distribution utility, offers upstream data connectivity services across the Sumatra and Java regions. Germany's GasLINE, formed in 1996, offers connectivity capacity to telecommunication companies using fiber optics installed on the rights-of-way of 15 national and regional gas utilities.

REGIONAL REWARDS

Regional connectivity initiatives could also benefit from such sharing. The Baltic Optical Network is an alliance that uses each of the three countries' electricity transmission infrastructures, creating an 8,000 km fiber optic network. Each of these networks is a part or spin-off from each utility's IT and telecom teams. PowerGrid has also connected with Bhutan's electricity transmission utility, helping add redundancy to Bhutan's international Internet connectivity.

Sharing rights-of-way or assets of linear transportation infrastructures such as highways, roads, and railways can also help. Railways have fiber optic cables or microwave networks for traffic management and signaling systems. India's RailTel—a subsidiary of the Indian railways—has developed fiber optic networks using the railway's rights-of-way, and now provides data centers, tower space, and enterprise services. Some, such as Tunisia's railroad company, SNCFT, has leased its ducts, while Morocco's ONCF leases installed fiber optic lines to private telcos.

Use of rights-of-way alongside highways and city roads is a common method to roll out optical fiber networks. However, this often implies multiple digs that could cause damage and inconvenience many. Development of ducts alongside roads could alleviate these problems while cutting costs. For example, the MSRDC, a roads development agency in the Indian state of Maharashtra, has rolled out fiber optic cables on a major expressway, which it then leases. Such joint deployment has long been undertaken in the Republic of Korea. Information sharing and coordination across agencies is a key requirement for these efforts to work. As a result, countries across the European Union have been developing infrastructure atlases to enable sharing of geospatial data, mapping existing and planned infrastructure that can be used or developed. Portugal now has an atlas to map usable infrastructure such as ducts and fiber optic cables on public roads, railways, water, and gas networks. Similar initiatives across Europe are helping in coordination and dispute resolution.

EMERGING BEST PRACTICES

Governments at the national, regional, or local levels can consider some emerging best practices to promote sharing.

Opening markets. Some regulatory regimes prevent alternative infrastructure providers from entering the telecom market, while some might set difficult conditions such as high license fees.

EU countries have simplified authorization regimes in place, and in some countries, such as India, specific "infrastructure provider" licenses allowed companies like PowerGrid to enter the business-to-business market. Lifting restrictions on market entry, and hence on utilization of available infrastructure, will be an important first step.

Establishing coordination and dispute resolution mechanisms. Poor information sharing or coordination will hamper sharing. Cross-sector sharing needs a means of sharing information on the stock and flow of infrastructure. Developing infrastructure atlases, which map out all of the possible rights-of-way, ducts, or fiber optic cables available for shared use can help. Clarifying regulatory powers will also help; for example, in Lithuania, the telecom regulator can clarify if a non-telco infrastructure is shareable. In other cases, standards to develop and manage shared infrastructure are set up. Finland now requires all future transport infrastructures to have ducts for optical fiber. In Brussels, plans on significant infrastructure work have to be filed with a coordinating agency, facilitating co-investment and joint development.

Efforts will be needed to ensure coordination of regulatory regimes to avoid overlaps in competency. For example, telecom regulators are typically responsible for how utilities price data services, while the energy regulators should focus on the core business, and can assist in creating incentives for opening of the infrastructure. Dispute resolution mechanisms are also critical. In Lithuania, the telecom regulator can resolve disputes between two telcos; when a non-telco is involved, the case escalates to a court, where the telecom regulator can provide its opinion.

Building capacity. Some utilities (and governments) are wary of initiating infrastructure sharing efforts due to limited institutional capacity, either within regulatory agencies (for the utility or telecommunications) or within the utility. Utilities may face capacity constraints as starting a "non-core" business could shift limited resources away from the core utility business. However, as the foregoing examples have shown, different models exist, including outsourcing, spin-offs, and subsidiaries. Sufficient regulatory capacity—supported by an overall legal or policy framework—is needed to ensure that regimes for each sector are clear and proportionate.

Sharing infrastructures across sectors will help expand access to the Internet. The precise mechanisms to enable these partnerships will vary by location, host infrastructure, market structure, and legal and regulatory frameworks. The ultimate objective should be to ensure appropriate use of all possible infrastructures to include more people and businesses into the global information society.

The Public-Private Infrastructure Advisory Facility (PPIAF) and the World Bank Group are developing a toolkit on cross-sector infrastructure sharing. The aim of the toolkit is to assist stakeholders across all infrastructure sectors to identify opportunities to share elements of existing or planned infrastructure and to increase the efficiency of infrastructure investments through infrastructure sharing.