

Backhaul and local-access infrastructure (word count prev699/now 583)

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Communication of data (including voice) requires networks that rely on wireguides (e.g., optical fiber) as well as wireless media. Networks have two distinct components: the local access network that connects users wirelessly or otherwise and the backhaul network that carries large volumes of data over distance, again using wireguided and wireless media. Technologies used and the economics of supplying services in the two segments are different.

Backhaul or backbone infrastructure: Recent, dramatic improvements in optical fiber technologies have brought down the costs of hauling massive amounts of data over long distances. Combined with the inherent advantages of a wireguide, this has made optical fiber the preferred medium for backhaul. However, digital microwave and satellites continue to be economical on thin routes. They are also relatively easier to defend against sabotage.

Local-access infrastructure: In OECD countries, the copper wires originally laid by monopoly telcos constitute the foundation of the local-access network with, for example, ADSL [Asymmetric Digital Subscriber Line] being an always-on data connection provided in addition to voice on the same copper “twisted pair.” This is supplemented by co-axial cable, originally intended for delivery of TV signals, and various forms of fiber deployments, such as fiber to the home (FTTH) and fiber to the curb (FTTC). Wireless in various forms is the dominant local-access technology in developing economies because of easy deployment and low capital requirements. Wire-guided media cannot support the business models that are successfully connecting unimaginable numbers to electronic networks.

Backhaul economics: Backhaul requires large, lumpy investments with relatively long gestation periods. At the point of laying a cable, only a miniscule portion of the capacity is used because it is dimensioned for future demand. Multiple suppliers of backhaul may exist in country, but the market is not competitive in many instances such as a city-pair, where there will be only one cable. Backhaul therefore constitutes an essential facility, because replication costs are very high. Incentives for sharing exist, either through “club consortia” such as those found in undersea cables, or with a single owner offering to carry the traffic of others. However, where backhaul facilities are owned by local-access providers, the tendency is to refuse use by others, or at least to make such use unattractive, through discriminatory pricing and access.

Local-access economics: The long-prevalent thinking that local-access networks were natural monopolies has been buried, at least in environments where wireless predominates. Multiple operators using different frequencies and/or different wireguides compete to provide various connectivity services to customers. However, as data use increases, requiring access to national or international sites, rather than only local switches, backhaul costs will begin to increase as a proportion of total costs.

Regulatory issues: A degree of redundancy in backhaul is necessary because communication networks increasingly constitute critical infrastructures. However, excessive duplication is inefficient. The extension of market power from monopolistic markets to workably competitive local-access markets is bad. In cases like BT, which has separated its backhaul and local-access businesses and offered backhaul at cost-oriented and non-discriminatory terms, the financial benefits to the operator have been considerable. Therefore, the assurance of cost-oriented and non-discriminatory access to backhaul is rising on regulatory agendas. Maintenance of competition and innovation at the local-access level requires enlightened spectrum management, including refarming (see spectrum note). If adequate competition in services is maintained, there is little need for price regulation. Quality of service experience is affected by many factors, including inadequate backhaul. Providing comparative information to customers and ensuring low switching costs are likely to be the most appropriate regulatory responses.

Additional Information

Studies

- Cave.M, (2006), Encouraging infrastructure investment via the investment ladder, *Telecommunications Policy*, 30(3/4): 223- 237.
- Esselar, S., Gillwald, A. and Sutherland, E. (2007, April). The regulation of undersea cables and landing stations. Research Paper, LINK Centre, University of the Witwatersrand, Johannesburg. <http://link.wits.ac.za/papers/esselaar-et-al-2007-undersea-cables.pdf>
- Singh, H. V. and Samarajiva, R. (2008). One backbone, or two? In Samarajiva, R. & Zainudeen, A. (eds.), *ICT infrastructure in emerging Asia: Policy and regulatory roadblocks*, New Delhi & Ottawa: Sage and IDRC.

Websites

- <http://www.ictregulationtoolkit.org/en/index.html>

See also... [related one-pager topics]

- Spectrum
- Under-serviced areas

- ...

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