Available online at www.sciencedirect.com
ScienceDirect
Government Information Quarterly 23 (2006) 503–506
Government Information Quarterly

Discussion

Disorderly infrastructure and the role of government

Christian Sandvig *

244 Lincoln Hall, University of Illinois at Urbana-Champaign, 702 S. Wright St., Urbana, IL 61801, USA

Available online 22 September 2006

The articles in this volume portray government investment in wireless as a creature of recent events.[1] A case can be made for government, municipal, and community wireless today because digital convergence has combined with improvements in wireless technology, changes in federal spectrum regulation, slow private wireline broadband deployment, and the recent collapse of the capital markets. This is certainly accurate, but it overstates the degree to which the current historical moment is special. This comment steps back to ask: How do infrastructures usually come to exist? In addition, what role would we expect governments to play in infrastructure development?[2]

To choose one telling comparison, at the beginning of the 20th century, the exciting technology was the plain, old telephone system. Recalling the development of this infrastructure cements the importance of government efforts in wireless today. For the last hundred years, it has been a truism in telecommunications circles that a telephone network (or any wired infrastructure) is more expensive in rural areas than urban areas. In the United States, a provider might cross miles of dusty prairie with only the occasional farmer for a customer. If a telephone company did not particularly want to offer service to an isolated homestead a century ago, we cannot blame them. We do not blame them today, as rural telephone service is subsidized in many countries.

* Fax: +1 217 244 1598.
E-mail address: csandvig@uiuc.edu.

[1] See Sirbu and Gillett (this volume) and Stone, Maitland, and Tapia (this volume).

[2] This comment is a revised version of remarks originally prepared for "Casting a Wider Net: Integrating Research and Policy on the Social Impacts of the Internet," September 27, 2002, Oxford Internet Institute, Oxford University, UK.

doi:10.1016/j.giq.2006.07.008

However, it has been largely forgotten that, before 1920, rural farmers in the United States were more likely to have a phone than city-dwellers. In this early period, rural telephone penetration was higher, and it grew faster than it did in cities (C.S. Fischer, 1987). The explanation for this puzzle is revealing. In telephone system history, the years after the expiration of the Bell patents in the late 1890s are called, "the independent era." By 1907, there were over 18,000 telephone systems. Some were municipal, some were cooperatives, some were experiments, some were profit-making ventures, some were investment scams, and some were illegal "wildcat" lines.

During this period, anyone could open the Montgomery–Ward mail order catalog and purchase not just a telephone but also spools of wire, insulators, lineman's climbing spurs, and kneepads. Some systems were technically sophisticated, whereas others just ran the telephone current over whatever old barbed-wire fences were handy (some of the independents did not even have switching, or they had switching only during the day, when the farmer's daughter was awake and near the switchboard.).

Who were these wildcat operators and independents? Looking back at the historical record, it seems that they involved all sorts of organizations, especially local governments and communities. In 1910, one could join the Liberty Home Telephone Company of Liberty, Tennessee, with three things: (1) $25, (2) a promise to donate your labor as needed, and (3) a pole. The Liberty Telephone Company was founded by a family who wanted a phone. During this period, the established telephone companies (Bell, and also, later on, large urban independent companies) were not serving rural areas because they were thought to be unprofitable. Claude Fischer's meticulous social history of the telephone shows the problems with this thinking (C. Fischer, 1994).

Although it is true that there were far fewer subscribers-per-mile of telephone wire in rural areas, cost included not just the amount of wire and the number of poles. More wire was used in rural areas; however, land and labor were cheaper and, most significantly, rural dwellers were willing to pay more than their urban contemporaries for telephone service. Although the phone was a convenience for those living in urban areas, it was a necessity for those living in isolated areas, and they begged for it. Nonetheless, during the early part of the 20th century, the telephone companies in the United States were working to generate demand among affluent city dwellers while simultaneously ignoring the pleas of rural users.

The carriers, it turns out, would not build any infrastructure for farmers because they believed farmers were stupid and poor. Fischer notes that the lack of penetration was not the result of calculations about the economics of provision, but rather the result of cultural ideas held by providers. "Farmers, as a class, are troublesome customers," (C. S. Fischer, 1994, p. 96) a telephone company executive explained in 1903. The surviving memoranda and correspondence from the telephone industry derided the farmer's "bumptiousness" (p. 96) and described farmers as "uneducated" (p. 98), "hardheaded, shortsighted, and tight-fisted" (p. 96). They were prone to "misuse telephones" (p. 98). "If you gave them a telephone, they would probably only want to play banjo to each other anyway," (p. 96) the telephone men wrote.

This sort of exclusionary reasoning was not reserved for rural customers only. C. Marvin (1988) observes that "arguments were made that the utility of the telephone could not be preserved without restricting its availability" (p. 101). This was both economic and cultural:

prices should be kept high, but telephone subscribers should also be a certain kind of person, preferably white and affluent (for a related example concerning the telegraph, see p. 94). That meant that telephones should only reach some neighborhoods.

In summary, the historical literature often portrays the powerful communications companies of one hundred years ago as inept or plutocratic. They were unable to foresee or accept even profitable uses of their existing facilities that would financially benefit them. Rather than expand their customer base, they often went to great lengths to restrict it, launching campaigns to discourage idle talking on the phone and (echoing Wi-Fi) initiating legal action to prevent connection sharing by telephone subscribers paying flat rates.

Dramatic growth in telephone use eventually arrived in part because more providers were allowed to experiment with new services and build networks in new locations. There are clear and useful parallels here, and they teach the lesson that large infrastructures are not necessarily the product of large industry. Some of the rural telephone cooperatives alluded to above still exist and even thrive; others were purchased or merged and then integrated into the telephone system that is still in use today. Either way, the role of independents was crucial in facilitating development of the system as a whole. In the popular mind, infrastructures like roads and telephones are monolithic projects, centrally deployed. However, the roads in rural areas of the United States were often first built by road cooperatives and neighborhood associations. Telegraphs, telephones, cable television systems, even railroads and canals, all had their disorderly phase in the beginning (H. Sawhney, 2003). Although these were sometimes sources of incompatibility and duplication, they were also sources of competition, experimentation, and innovation (e.g., for the case of electrification, see Hughes, 1993). We should not expect (or want) wireless Internet to be different.

In 2002, an hour and a half of driving in Manhattan with an antenna revealed 448 distinct Wi-Fi networks (Dragorn, 2002). In Alessandro Ovi's beautiful phrase, these are "water lilies," little ovals of connectivity that are not centrally deployed, that sometimes overlap a little, whose stems lead to the Internet—usually through a broadband connection (quoted in Negroponte, 2002, p. 1). There are different ideas about who should pay for these lilies and how they should work. Companies that tried to build one proprietary monolithic wireless system like this across the United States are now bankrupt (S. M. Cherry, 2002). Other lilies are provided by corporate carriers like Verizon,[3] whereas still others are a soup of organizational hybrids and experiments like Île Sans Fil and the Austin Wireless City Project.[4] To governments, this apparently chaotic mixture has seemed too new and too unstable to justify joining in (Bar & Galperin, 2004). But the messiness of these organically developing, overlapping lilies is not a mistake; it is a triumph. The ideal role for local governments and communities is what it has often been in the early stages of new infrastructure development. It is to serve the forgotten and the dispossessed, to experiment and pioneer systems that meet overlooked local needs, to partner with enthusiasts in ways that push the technology forward, to apply pressure to legacy carriers by investing in

[3] See Stone, Maitland, and Tapia (this volume).
[4] See Powell and Shade (this volume) and Fuentes-Bautista and Inagaki (this volume).

alternative networks, and to foster competition by insisting on widespread service, reasonable rates, compatibility, and interconnection on reasonable terms.

References

Bar, F., & Galperin, H. (2004). Building the wireless Internet infrastructure: From cordless Ethernet archipelagos to wireless grids. *Communication and Strategies*, *54*(2), 45−54.

Cherry, S. M. (2002). What went wrong at Ricochet? *IEEE Spectrum*, *39*(3), 60−61.

Dragorn (2002, Summer). The comprehensive guide to 802.11b wireless networks. *2600 Magazine*, *19*(2), 6−11.

Fischer, C. S. (1987, Fall). The revolution in rural telephony, 1900–1920. *Journal of Social History*, *21*, 5−26.

Fischer, C. S. (1994). *America calling: A social history of the telephone to 1940.* Berkeley: University of California Press.

Hughes, T. P. (1993). *Networks of power: Electrification in western society, 1880–1930.* Baltimore: Johns Hopkins University Press.

Marvin, C. (1988). *When old technologies were new: Thinking about electric communication in the late nineteenth century.* Cambridge: Oxford University Press.

Negroponte, N. (2002, October). Being wireless. Wired, 10(10). [On-line] Available: http://www.wired.com/wired/archive/10.10/wireless.html

Sawhney, H. (2003). Wi-Fi networks and the rerun of the cycle. *Info*, *5*(6), 25−33.