

RURAL INFRASTRUCTURE BRIEFINGS

The Evolution and Reinvention of Rural Telecom Networks

These Briefings showcase different facets of the rural infrastructure industries: power, energy, and utilities; water utilities; and communications.

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Introduction

Universal Service remains a central tenet of U.S. telecom policy. Its premise is that all Americans, including those who live in rural communities, should have equal access to advanced telecommunications and information services. However, despite the Federal Communications Commission’s (FCC) many initiatives, the rural/urban digital divide persists, to the detriment of rural businesses and residents. *(See textbox.)*

In the past, the FCC established various cost-recovery programs aimed at ensuring Universal Service in voice communications, but has reoriented this financial support in recent years toward broadband connectivity. In Its 2015 Progress Report, the FCC announced that, “the day may be fast approaching when we would consider ‘advanced telecommunications capability’ to be fully deployed only in areas where consumers have access to both mobile and fixed high-speed broadband.” Toward that end, the FCC has disbursed more than \$438 million through its Connect America Fund, Phase I, funding to such telecom stalwarts as AT&T, CenturyLink, and Frontier Communications, with the aim of bringing broadband service to more than 1.6 million unserved rural Americans.

Network Convergence

Prior to enactment of the Telecommunications Act of 1996, rural telecom systems or networks were separate, self-contained, and easily distinguished from their urban counterparts. America’s communications infrastructure was then bifurcated between narrowband voice service (telephone) and one-way video entertainment products (cable TV), with mobile wireless voice (still essentially a narrowband product) added in the 1980s and ‘90s. Each of these segments of the communications industry had its own physical infrastructure (e.g., twisted pair, coaxial cable, or electromagnetic spectrum), its own regulatory framework, and its own separate and distinct customer bases. There was also little or no competition among them.

With the rise of the Internet in the 1990s and the introduction of smartphone technology in 2007, the entire telecom industry has been reinvented. Communications networks have been converging since then towards Internet-based protocols (IPs) dependent upon an increasingly optical, fiber-based physical

infrastructure. These networks have become increasingly interconnected and dense, with fiber “backbone” routes connecting cities and “middle mile” connections linking Internet access points to neighborhoods. “Last mile” connectivity to individual homes and businesses still depends largely on legacy copper infrastructure, but these copper wires are gradually being replaced by fiber “drops” from neighborhood nodes to individual homes and businesses.

Ownership of the various network elements, meanwhile, has become highly fragmented. Gone forever are the days of the monopoly telephone company controlling one specific regional territory with network elements that it alone owns. Today, fiber routes, data centers, cell towers and the physical last mile connections may all be owned by different companies, yet all of these network elements are essential to create the seamlessly operating telecom network that underpins America’s vibrant economy – including small towns and rural communities as well as major metropolitan areas. All of these telecommunications segments require the ongoing capital investment that CoBank helps provide.

Rural Telecom’s Evolution

The rural telecom industry has always struggled to survive. Because of rural America’s much lower population densities, lower service usage, and lower disposable incomes, rural communications providers often have found it difficult to generate sufficient income to support and upgrade the far-flung and costly infrastructure needed to connect rural communities, households, and businesses with each other and the rest of the world.

Rural telecom providers have always faced the fundamental challenge that it is uneconomical to provide the costly telecom services to customers located in low-density rural areas. The costs were (and remain) simply too great to be recovered solely from rural subscribers. Since the Telecommunications Act of 1996, the U.S. government has used a system of inter-carrier compensation and Universal Service Fund (USF) payments to provide subsidies to support the high cost of serving low-density rural areas. The smaller rural local exchange carriers (RLECs) were the ones most

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heavily dependent on these subsidies. For decades, the USF along with other government programs and local cooperative efforts succeeded in providing basic telephone service for virtually every U.S. household and business in rural America.

But within the past 15 to 20 years, the nation’s telecommunications industry has undergone profound technological, structural, and regulatory change. None of the industry today, including the rural segment, looks or functions the same as it did formerly. Moreover, in response to these sea changes, the FCC has sought to curtail the USF and other subsidies for legacy voice

The Rural/Urban Digital Divide

In its “Broadband Progress Report for 2016,” the FCC reported that 39 percent of rural Americans (or 23 million people) lack access to 25 Mbps/3 Mbps broadband service (i.e., the FCC’s benchmark standard for this service), whereas only 4 percent of urban Americans lack access to this benchmark level of service. Similarly, the FCC also found that only 41 percent of the nation’s elementary and high schools lack access to this benchmark level of service, where the preponderance of these underserved schools are located in rural communities. (In the previous year’s progress report, the FCC reported that only 41 percent of rural elementary and high schools are linked to the Internet with high-speed broadband fiber whereas nearly 70 percent of urban schools enjoy high-speed broadband access.)

networks and re-direct the financial support toward broadband investments designed specifically to benefit rural America.

As a result, the rural telecom industry is moving away from the former monopolistic business model employed so successfully by the RLECs – but it was also heavily reliant on regulatory support subsidies and legacy voice telephony. Today’s rural providers have had to become increasingly urbanized – and with global reach. As broadband and wireless connectivity has steadily eroded the economic importance and value of RLECs’ voice access lines while regulatory reform has shrunk their subsidies, these companies have begun investing in regional fiber networks, competitive local exchange carriers, and data centers. Their investments, acquisitions, and business plans generally have “followed the money” and thus targeted customers in higher density areas contiguous to their rural markets.

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Telecommunications networks everywhere benefit from global interconnectivity. Advances in IP-based services mean that telecommunications companies in rural areas can now also serve businesses located in major metropolitan areas or even other countries. This evolving interconnectivity, we believe, is creating a transformative business model for telecom providers whereby serving urban areas will become increasingly necessary and incidental to serving rural areas.

This new telecom business model is blurring the distinction between rural and urban. As traditional voice-related legacy subsidies decline, they are being replaced

by revenues from more urbanized customers. What has emerged is an evolving “self-subsidizing” business model in which revenues from urban subscribers implicitly subsidize rural subscribers. This new business model is indeed an attractive free market solution to the modernization of rural communications – one that the FCC would like to cultivate.

For some rural telecom providers, however, this new business model is not a workable solution. Some rural-based telecom companies operating in particularly low-density areas have been unable to exploit these opportunities to diversify. These companies have two choices. They may elect to merge with other similarly-positioned systems, or they may be acquired by larger companies wishing to consolidate these types of assets. In both cases, the aim is the same – to gain scale and cost efficiencies that allow the assets to be operated profitably with less reliance on direct subsidies.

Global Telecom Networks

Telecommunications networks today are, by their very nature, globally connected. The same physical infrastructure that serves rural subscribers also serves urban subscribers and networks, and U.S. domestic telecom networks are interconnected with international networks. The voice, video, and data content that flows across those networks is generally not originated or stored in rural areas. In fact, most of this content is stored on file servers located in mostly urban-based data centers and is replicated and transported to rural subscribers over these globally interconnected networks. When delivered to end-users in rural America, this Internet-based content is reformatted into data packets which then bounce back-and-forth between routers located alternately in both rural and urban areas before terminating on the end users’ televisions, computers, cell phones, or other hand-held electronic devices.

Whereas rural telecommunications networks used to be totally separate and distinguishable from urban networks, it is impossible today to isolate a rural telecommunications network from a global network. In fact, there is really just one single network, worldwide.

Moreover, many rural telecommunications companies operate their own data centers and provide broadband services not just to their rural customers, but also to urban customers. Going forward, as regulatory reforms continue to diminish subsidies for rural networks, the nation's telecom providers will necessarily have to rely on more urban-based revenue streams to support the telecom services provided to their rural customers. In effect, the two once-distinct customer bases – rural and urban – have blended into one.

Concluding Thoughts

Rural businesses, schools, municipalities, and families all need access to modern, high-speed broadband services to maintain their viability and improve the quality of their lives, just as much as their urban counterparts. Hence, the persistent urban/rural broadband access gap remains a critically important policy concern – and one that looms large in the FCC's policymaking deliberations about Universal Service.

In order to help bridge the rural/urban digital divide, Congress mandated that CoBank provide financial support to improve rural America's access to modern telecommunications and broadband services. In fulfilling this mission, CoBank makes loans and provides specialized financial products to a broad range of telecom industry enterprises – from the traditional voice service-oriented rural telcos to the wireless service providers that cover broad swathes of America and the cable and fiber infrastructure companies that tie rural, urban, and global telecom networks together.

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Years ago, rural telecommunications networks were separate and distinguishable from urban networks – but that's no longer true. Today, there is really just one single global telecommunications network to which all users – rural and urban, and worldwide – are linked. Here in the U.S., this evolving digital interconnectivity is creating a transformative business model for telecom providers whereby serving urban areas is becoming necessary and incidental to serving rural areas. Moreover, this global interconnectivity also means that the large telecom behemoths like AT&T and Verizon are just as important as the rural telcos in ensuring that rural customers have access to modern, high-speed broadband services. ■

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