They Should Have Seen It Coming

"Those who do not remember the past are condemned to repeat it."
George Santayana

"That men do not learn very much from the lessons of history is the most important of all the lessons of history."
Aldous Huxley

In the 1990s, billions of dollars were invested in many redundant fiber-optic telecommunications networks in North America and around the world. According to their promoters, these networks were necessary to deliver the promise of the Internet to communities around the world. Each of those network construction projects was at best, superfluous and at worst, a complete waste of money. The resulting business failures, hastened by the dot-com crash, could have been avoided if the heads of the new telecommunications companies had paid attention to an obvious historical analogy: the hype, explosive investment, and spectacular failure catalyzed by the completion of the first transcontinental railroad. On May 10, 1869, the Golden Spike was driven, uniting the Central Pacific Railroad and Union Pacific Railroad, thus creating the first transcontinental railroad.

Chapter 1 of "Telebomb" explains the seven generations of communications technology that can be seen along the highways, rail beds, and waterways of the United States:

- Natural waterways
- Man-made waterways
- Railroads
- Copper telegraph and telephone networks
- The original U.S. Route system
- The Interstate Highway System
- Modern fiber-optic telecommunications networks

Each of these communications technologies was a product of its place in history. One can imagine the struggle of 4,000 immigrants laboring to build railroads and canals in the mid-19th century and compare it to the labor of a handful of workers with backhoes and spools of fiber-optic cable in the late 1990s.

Modern telecommunications networks are engineering marvels on the same order as the canals and railroad networks of the mid- to late 19th century and the Interstate Highway System begun in the mid-20th century. In fact, the long-haul telecommunications networks in the United States are, in the main, built alongside the older forms of communications and transportation, coursing the countryside of America alongside train tracks and intercity roads. The telecommunications network is the inheritor of the tradition of better, faster communication that has marked the growth and prosperity of America. Before the advent of electronic communications, all messages were carried by whatever physical conveyance was available, including river and canal boats, trains, and trucks.

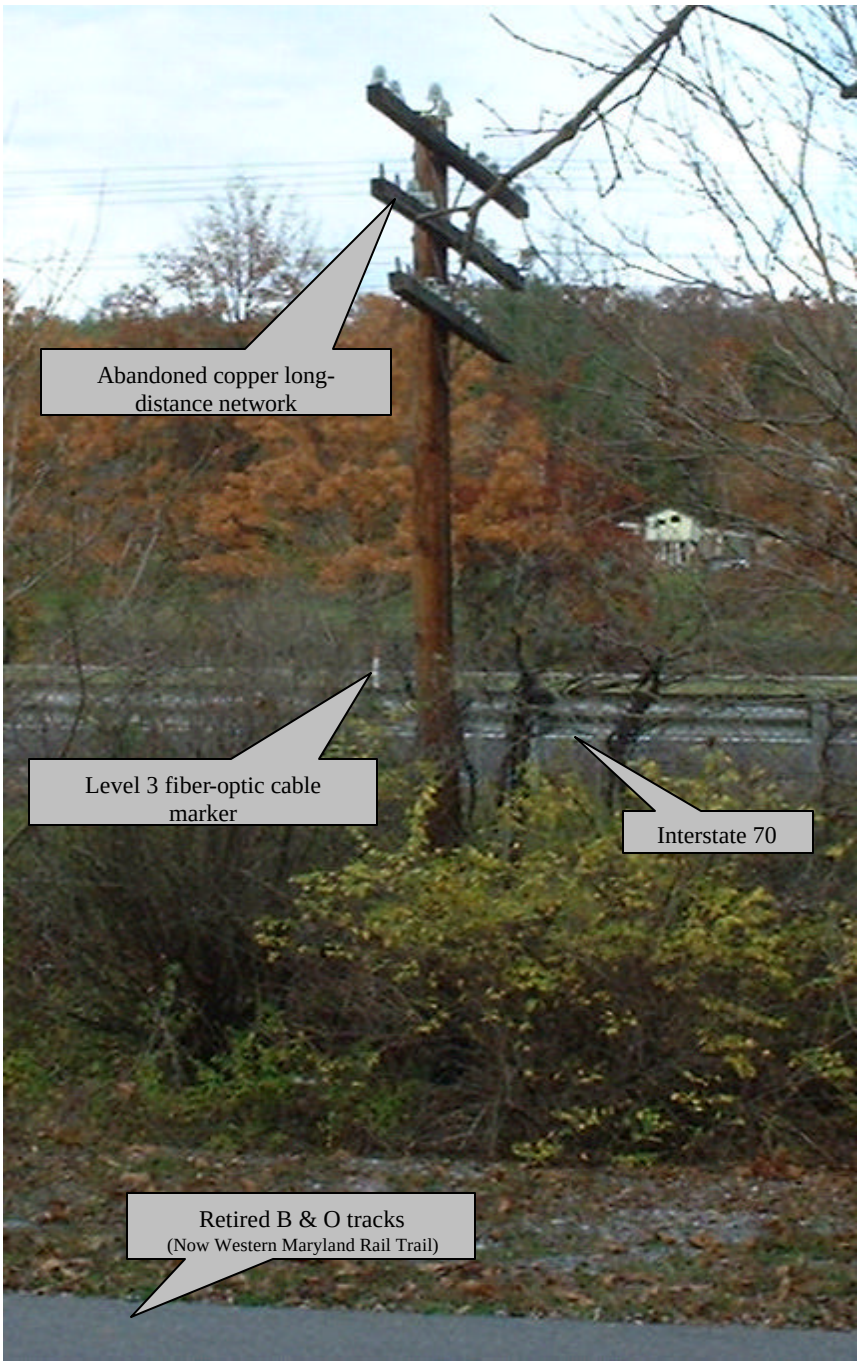

Figure 2. Abandoned long-distance lines between retired B&O rail bed and Interstate 70[1]

The physical presence of modern telecommunications networks does not amaze as did the transportation and communication marvels of the past. There are no striking locomotives or interstate tractor-trailers. The modern communications networks are silent and invisible except for the orange-topped markers posted every few thousand feet. Modern networks don't even have the nostalgic crackling and buzzing associated with wet power lines.

[1] Photo by the author

This change from very visible forms of communication to nearly invisible ones is another manifestation of electronic devices replacing mechanical ones. These ever smaller yet ever more powerful devices impress us based on their capabilities rather than their size. One of these capabilities is that these new devices can communicate with one another and with other devices across the world using the Internet. And what is the Internet but a collective set of connected networks run by most of the telecommunications carriers around the world? The inner workings of these networks are not well understood by individual users, in part because the Internet can't be seen in the way that the operations of canals and railroads of the past could be observed by those who depended on them for communication, both personal and commercial.

The Beginning of the Telecommunications Industry

The beginning of the disappearance of modern communications technology began with the telephone network. Alexander Graham Bell's telephone networks began appearing across the country in the late 1870s. The investments in these early networks were protected by Bell's patents on the telephone throughout the late 19th century. Additionally, Bell's telephone system was protected by a 1913 agreement, known as the Kingsbury Commitment, between the U.S. Department of Justice and American Telephone & Telegraph. In that agreement, AT&T agreed to provide long-distance service to all independent (non-Bell) phone companies. It also agreed not to buy any more local companies. In return, AT&T became a protected monopoly in the markets it already served. The net result was that although the investments in the original telephone networks were private, they were protected from competition. The investments were safe and provided slow, predictable returns.

Figure 3. Sign showing "93M ToB." This is presumed to be a marker from the old National Road indicating that it is 93 miles from Baltimore. Today it sits between the lanes of I-70 in western Maryland.[2]

The stability of local and long-distance telephone network investments held until the break-up of the Bell System on January 1, 1984. At that time the long-distance market was officially opened to all comers but the local telephone business was still considered by most to be a "natural monopoly." The main post-divestiture competitors to AT&T (which retained the long-distance business) built fiber-optic networks. The new fiber technology was originally more expensive to build but offered superior quality and significantly higher call-carrying capacity to the old copper networks. These networks were also readily expandable, which rendered the subsequent flurry of fiber network construction in the 1990s no more than expensive bets on the future of the network.

Steel Rails vs. Fiber Optics

The fiber-optic network deployments of the 1990s resembled the canal vs. railroad investments of the early 19th century more than any of the other communications technology revolutions. Not only was the money privately raised, but there were many companies

[2] Photo by the author

competing for investment dollars. The results for the fiber-optic network constructors were similar to those of the canal vs. railroad races: poorly served and unserved customers, lost investor dollars, laid-off employees, and stranded assets.

One contrast between the mid-19th-century transportation projects and the modern telecommunications network construction was that the 19th-century projects competed with different technologies (canal vs. railroad). Thus there was a legitimate argument about which technology was better. We know today that railroads won the contest, but that was not widely understood until 1869.

The builders of fiber-optic networks 125 years later could not lay claim to competing technology as the reason for building so many overlapping networks. They were competing against one another with essentially the same technology. In the 1990s, at least six different telecommunications companies planned, funded, and substantially completed construction of networks crossing North America and connecting it with Europe and Asia. These networks were in addition to the very large networks already in place and operated successfully by the existing "Big 3" long-distance network providers: AT&T, MCI and Sprint.

Qwest Communications International, Williams Communications, and Level 3 Communications all built significant new fiber-optic capacity in the United States. 360networks did the same, but focused on a northern route through Canada and across the Atlantic Ocean. Global Crossing and Tycom built transoceanic networks.

The excess supply that hit the market almost simultaneously in the late 1990s created price wars that exhausted the resources of the weakest of the new carriers. Had these new builders just learned the lessons of the railroad builders, they might have been able to avoid such colossal wastes of money.

What Goes Around…

> *"In a large number of cases, [they] became a purely speculative enterprise; the capitalists who engaged in this business had no interest in transportation but were seeking merely to make their fortunes out of constructing the lines."*[3]
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> *"The stock-jobbing that had formed so large a part of their history added nothing to their popularity."*
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> *"The … Commission … on the whole …was a failure. Such was the judgment passed by [a justice] of the United States Supreme Court when he remarked in one of his decisions that the commission was 'a useless body for all practical purposes.' "*

These quotes could have been written about the overcapacity situation in the long-haul telecommunications market at the turn of the 21st century. In fact, they were written in 1919 about the railroad overinvestment and failures that created economic havoc in the United States and contributed to the Panic of 1873. The "Commission" in this case was the new Interstate Commerce Commission, not the Federal Communications Commission, but complaints about federal oversight, or lack thereof, are still common today.

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[3] All quotes from John Moody, "The Railroad Builders, A Chronicle of the Welding of the States", PocketPCpress, 2001 (1919), ISBN B000059SBQ

The Panic of 1873 was started by the failure of Jay Cooke & Co, the principal backer of the Northern Pacific Railroad. It roiled the U.S. equity and bond markets. The New York Stock Exchange was closed for 10 days. The Northern Pacific was the least attractive of the railroads then building transcontinental routes and failed as a result of not being able to monetize the assets granted to it (mostly real estate) as part of the charter for the railroad.

The Northern Pacific was one of four transcontinental links started in the wake of the completion of the first transcontinental railroad in 1869. In addition to the Northern Pacific, the Texas Pacific, Southern Pacific, and the Atchison, Topeka & Santa Fe rail companies all began to build transcontinental railroads in different latitudes after the Golden Spike was set. The result was that the nation was well on its way to five times the cross-country rail capacity that existed only a few years before.

The industrial revolution was in full swing. Manufacturing capacity in the United States was growing at a rapid pace. The missing link was the means to get the goods produced by these new factories into the hands of businesses and individuals efficiently and at a low cost. Like the Internet boom, the completion of the first transcontinental railroad touched off an explosion of hype about how the new networks would transform daily life in America. Also like the Internet, those who spread the hype were eventually proved right. Unfortunately for many investors, the hype preceded reality by about 20 years in the case of the railroads and by about five years in the case of the Internet.

One ironic difference between the race to cover the United States with railroads and the race to cover the United States with optical fiber is that, before the new networks were begun, there was already enough fiber in the hands of the Big 3 to handle the demand actually generated by the Internet. MCI, Sprint, and AT&T had essentially stopped constructing long-haul fiber-optic networks by 1994 because they were able to harness ever more powerful electronics to increase their capacity rather than go to the expense of planting more fiber in the ground. The network-building boom of the 1990s was completely unnecessary.

Eventually, three of the six railroad companies went through some form of receivership between the early 1870s and the 1890s. The railroads did rebound, though. They were part of a strong railroad system by the turn of the 20th century. Key to the rebound of the railroads from the overbuilding hangover of the 1870s was the fact that no credible threat existed for their product. Trucking wouldn't flourish as an industry until the U.S. Route system became a reality in the 1930s. And even then it would complement rather than compete with railroads until the Interstate Highway System was begun in the 1950s.

Modern Fallout

The results, so far, for the long-haul telecommunications networks are very similar. Three of the six carriers mentioned above (Williams, 360networks, and Global Crossing) went through Chapter 11 bankruptcy proceedings, the modern equivalent of receivership. Two of the companies, Qwest and Tycom, were absorbed into larger and more stable enterprises. Tycom was taken over by its long-term corporate parent, Tyco (which had problems of its own). Qwest married well, merging with former Bell Company USWest in 2000. USWest, renamed Qwest, wrote off the "classic Qwest" national fiber build in 2003. Only Level 3 survived the Telebomb intact, though it has yet to report an annual profit.

Like the railroad networks of the late 1800s, though, the long-haul fiber-optic transmission business has few competitors. Satellites, free-space optics, terrestrial radio, and

copper circuits all had cost disadvantages in long-haul transmission before the race to cover the country in fiber-optic capacity began. And now that fiber-optic network assets are being sold at fire sale prices, the cost advantages fiber has over the other technologies are now multiplied. Carriers that own fiber-optic networks need not fear competition from other technologies; their only competition is among themselves.