

Technology investment strategy in the presence of competitor entry: Broadband deployment in the US telecommunications industry

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Abstract

We evaluated the broadband deployment strategy of incumbent firms in the local exchange sector of the US telecommunications industry (1994–1998), each of which must devise strategies for dealing with new firms entering their markets. We found that incumbents consistently under-invested in fiber optics that would have enabled them to upgrade their broadband infrastructure in the face of competitive entrants. Contrary to theories of entry deterrence, this behavior did not signal accommodation by monopolistic incumbents. Rather, it was consistent with an entrapment strategy: when a new firm entered and invested in capacity, the incumbents used their monopoly power to deny access or to provide poor-quality access, thereby making the competitors' product quality worse than the incumbent's, leading to customer dissatisfaction and revenue losses that could eventually weaken the rival.

Yet, such a strategy was dysfunctional. A strategy of investment would have been best for the incumbents since the gains from triggering network externalities would have been substantial. As new competitors entered the incumbents' markets, the best strategy for the incumbents would have been to reciprocate positively, invest in fiber capacity, and then play *tit for tat*. If the incumbents had invested in broadband and even more competitive entrants followed, which in turn caused greater broadband investment, and so on, the wiring of the entire United States by new entrants and incumbents with broadband technology would today be complete.

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1. Introduction

The fusion of computer and telecommunications technologies in the early part of this decade started a digital convergence that was meant to reshape the landscape of communications industry and the world at large. In keeping with the changing times, the Telecommunications Act of 1996 was enacted by the US

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Congress to update the Communications Act of 1934 and provide a new framework that relies on competition and market forces to advance the deployment of advanced communications infrastructures.

One of the salient features of the act was that it strove to provide a level playing field for competitive local exchange carriers that sought to challenge the dominance of incumbent local exchange carriers (ILEC). The incumbent firms, mostly the “Baby Bell” operating companies, controlled the local loop—the connection from the home or business to the local switch—for over 100 years. The 1996 Act outlined the rules by which the incumbents would have to open up their networks so new competitors could interconnect and offer comparable services to local subscribers. At one time there were approximately 2000 new competitors in the United States. Yet, according to the Federal Communications Commission (FCC), by the turn of the 21st century the combined market share of these new competitors was less than 5%. The monopolistic incumbents still dominated the market, and of course, now the competitors are extinct.

We investigated incumbent firms’ investment strategies in broadband capacity in the face of emergent competitive threats from new competitors. The issue of rivalry between incumbents and new entrants is age-old, and has received continual attention both from theorists and empirical scholars of strategy. There is scant evidence of incumbent behavior in response to entry threats in the communications sector because for so long the sector was a monopoly [1]. The 1996 Act provided fertile ground investigating incumbent firms’ behavior when faced with entry by competitors. We used data from the FCCs *Statistics of Communications Common Carriers* [2], the *Federal-State Joint Board Monitoring Reports* [3], and a report on *Competition in the Telecommunications Industry* [4].

Our results cover the period both before the Act of 1996 went into effect as well as after its implementation. We found that incumbent firms consistently under-invested in optical fiber when faced with competitive threats from new entrants. However, contrary to the classic theory of entry deterrence, this was not a signal of accommodation by the monopolistic incumbents that faced new entries into the market. Rather, under-investment by a monopolist firm suggested that the monopolist was unwilling to share the market with entrants and unwilling to provide interconnection facilities to new entrants, which eventually created a scarcity of capacity. Unavailability of capacity would, then, render new competitors’ business models unsustainable.

Consistent with this strategy, we found that an incumbent firm invested less in broadband when it held a higher proportion of business lines in its operating domain, thus not allowing the entrant to share potential opportunities in relatively lucrative market segments.

2. Background

The Telecommunications Act of 1996 represented a major overhaul of telecommunications regulatory policies that had been in place since the Act of 1934 that created the US FCC. The goal of the 1996 Act was to encourage vigorous competition in telecom markets, as well as requiring incumbent firms to provide equal access to their systems for carriers in other segments of the industry.

As a result of this act, new competitors were able to compete with incumbent firms in several ways. First, competitors could resell local services purchased from the incumbent firms; second, competitors could be provided services such as the Internet; and third, they could be competitive access providers who built their own infrastructures. The competitors generally focused on business services in major metropolitan areas where the cost of laying fiber optic systems could be justified by economies of density [5]. In all cases, the competitors had to seek interconnection via the incumbent firms’ networks.

Between 1994 and 1998, new competitors increased their investments in fiber optics from 400,000 to 3.1 million miles while incumbents increased their fiber optics network from 9 to 16.1 million miles [6]. The proportion of new competitors’ fiber miles to incumbent firms’ fiber miles rose from 4.2% to 16.1%—more than a three-fold increase in the extent of entrants’ commitment to doing business, in a 4-year period.

Despite the rapid growth of the Internet, and the increasing demand for bandwidth to carry voice, data, and video over high-speed networks, the deployment of fiber optic lines to American households, schools, and libraries remained insignificant. A study of the impact of broadband communications on the US economy estimated potential economic benefits of over \$400 billion from the deployment of broadband [7].

Prior to the passage of the Act of 1996, many ILEC firms made substantial promises to policy makers, hoping to change the way incumbents were regulated. The ILECs used these promises to convince regulators

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