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Universal access and local internet markets in the US

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Abstract

Concern over the potential need to redefine universal service to account for Internet-related services motivates this study of the geographic spread of commercial Internet service providers (ISPs), the leading suppliers of Internet access in the US. The paper characterizes the location of 40,000 access points, local phone numbers offered by commercial ISPs, in the Fall of 1997. Markets differ widely in their structure, from competitive to unserved. Over 92% of the US population has easy access to a competitive commercial Internet access market, while approximately 4.5% of the US population has costly access. © 2002 Elsevier Science B.V. All rights reserved.

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1. Motivation

Governments frequently revisit the principle of universal service, making it an enduring issue in communications policy. In past eras this goal motivated policies which subsidized the operation of the telephone network in low-density areas. In recent decades the same concerns motivated policies to eliminate large disparities in the rate of adoption of digital communication technology within the public-switched telephone network (Cherry and Wildman, 1999).

Policy makers in the new information economy face similar issues in a different guise. The burgeoning literature discussing the “digital divide” (see, e.g. National Telecommunications and Information Administration, 1999) has prompted many analysts to anticipate a need to redefine universal service goals

to account for Internet-related services.² In fact, these issues are already on the policy agenda. For example, the 1996 Telecommunications Act contains provisions to collect funds to finance the diffusion of Internet access to public institutions, such as schools and libraries. The result is the E-rate, currently a US\$ 2.25 billion federal program administered by the Federal Communications Commission (FCC). Using revenues generated from charges levied on users of long-distance services, the Universal Service Administrative Company reimburses firms providing telecommunications services, Internet access, and internal connections to eligible schools and libraries.

² A complete bibliography is impossible. For some recent studies, see US Advisory Council on the National Information Infrastructure (1996), National Academy of Engineering (1995), National Telecommunications and Information Administration (1995), Information Infrastructure Task Force (1993, 1994), Drake (1995), Kalil (1995), Kahin (1991), Kahin and Keller (1995), National Research Council (1996), Teske (1995), Compaine and Weinraub (1997), Mueller (1997), and Werbach (1997).

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Researchers and policy makers are, however, concerned with more than the provision of access to public or quasi-public institutions. Specifically, researchers have pondered the role of government in closing the “digital divide.” Thus, a central question is whether privately motivated firms in the Internet access business achieve some universal service goals as a by-product of their competitive conduct. The contrast with historical issues in telephony helps frame the question. As much scholarship has shown, private firms did develop service over a remarkably large geographic area without government intervention, but economies of density also limited this spread until government subsidies explicitly intervened decades later.³ At the turn of the century, low-density areas were more expensive to serve than high density areas, so only major cities and nearby towns received telephone service during the era when the technology first diffused. Telephony then spread to isolated and low-density areas, with some cities receiving minimal service or none at all.

Will a similar pattern characterize the diffusion of the Internet infrastructure? Not necessarily, because the Internet had a very unusual genesis, with considerable involvement of the National Science Foundation and the Department of Defense (Greenstein, 2000). Unlike telephony, where the technology and commercial business co-evolved, Internet technology incubated under government supervision for over two decades prior to commercialization, making it ripe for immediate diffusion and commercialization. Also unlike telephony, where the new network developed in opposition to—and in competition with—the existing telegraph network, commercial Internet services could be retrofitted onto the existing communications infrastructure. Finally, the Internet is not a fixed technology diffusing across time and space without changing form. Instead, it is a malleable technology, embedded in equipment which employs Transmission Control Protocol/Internet Protocol (TCP/IP) standards. The technology takes different forms in commercial settings than it did in academic use. Thus,

there is little historical precedent for speculating about the present setting. Upon commercialization, it was unclear whether economies of density or other factors would influence the diffusion of the Internet over geographic space.⁴

In this study we examine the geographic spread of commercial Internet service providers (ISPs), the leading suppliers of Internet access in the US. We focus on these suppliers and their conduct for two reasons. First, market-based transactions with ISPs have become the dominant form for delivery of on-line access for medium and small users. In the absence of changes in government policy,⁵ the preeminence of commercial development is now widely forecast to continue. Second, surveys consistently reveal that the US population is far from universal adoption of Internet services at home.⁶ Yet, such surveys beg the question of whether all households have access to Internet service at the same low cost.

The first part of this paper provides a framework for thinking about the geographic diffusion of commercially-oriented Internet-access providers. In the long run, ISPs choose where to locate as a strategic matter. One business model relies on a firm structure providing a national service, another relies on a local or regional firm providing local or regional services.⁷

Since all consumers have access to the Internet at some price, the key question for marginal adopters is whether they can cheaply access the Internet over a telephone line. Because “cheap” is synonymous with a local telephone call to an ISP, the spread of commercial ISPs to low-density areas is a useful metric

³ This is a large literature. See, for example, Mueller (1997), Barnett (1990, 1997), and Weiman (2000) about the early telephone industry. The closest analogue to the current paper is Baum et al. (1995) which examines the population dynamics of facsimile transmission service organizations.

⁴ For a summary of this and related debates, as well as an argument in favor of imposing access fees, see Werbach (1997), Garcia and Gorenflo (1997), or Sidek and Spulber (1998).

⁵ For example, as of this writing, the Federal Communications Commission does not charge access fees to ISPs, but is considering a number of proposals to do so. See the discussion and request for comment at <http://www.fcc.gov/>.

⁶ See, for example, Kridel et al. (1997), Maloff Group International Inc. (1997), Compaine and Weinraub (1997), or Clemente (1998).

⁷ The conclusions from the first part of the paper will be familiar to regular readers of commercial press for the ISP industry. For surveys of the on-line industry and attempts to analyze its commercial potential, see Hoovers (1997), Juliussen and Juliussen (1996), or Maloff Group International Inc. (1997). Also, see inter@tive Week or Boardwatch.

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