

# An Update on Mobile Broadband Availability in the United States

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## INTRODUCTION

Mobility is a growing aspect of e-commerce, as more B2C sites develop apps and web pages optimized for viewing on mobile devices<sup>1</sup> and as usage of mobile broadband grows. Mobile e-commerce is not just traditional e-commerce with a wireless “last mile” path to the Internet. Mobility changes the strategic and competitive situation in material ways for e-commerce. For example, while Google garners between 65 and 85% of searches on the World Wide Web,<sup>2</sup> most mobile users search for products and stores through apps rather than through a web page.<sup>3</sup> Thus, other e-commerce and search providers such as Yelp view mobility as a trend that acts as an important disintermediator, reducing the impact of Google’s dominance on its rivals. As mobile e-commerce continues to grow, its potential for disruption of established e-commerce markets grows apace. The threat of disruption is not idle, for mobile broadband availability and adoption continues to expand across the world at a rapid rate. From 2011 to 2014, the number of mobile broadband subscriptions worldwide rose from half a billion to 2.3 billion (ITU, 2014). Within the United States, mobile broadband subscriptions grew by 65% during that same period, and there were 197 million mobile broadband connections at the start of 2014 (FCC, 2014).

This chapter updates a study of data from 2010 on broadband provision and diffusion throughout the United States (Prieger & Church, 2012). In the present chapter, data from the FCC’s Form 477 on all broadband providers, both fixed-line and mobile, are examined at the Census tract level as of year-end 2013. The FCC requires all facilities-based providers of broadband to report their service twice a year – providing a census, not a sample – of all broadband providers in the United States.

Three questions relevant to the rapidly expanding broadband market are explored. First, to what extent are rural areas lagging urban areas in deployment? E-commerce holds great promise for rural areas, given that rural residents have less access to brick-and-mortar retail stores than urban dwellers. Thus, the monitoring of broadband deployment in rural areas is important both for industry and for purposes of public policy. Second, how do the sociodemographic characteristics of the area affect the probability that mobile broadband is available? Coupled with marketing studies conducted by e-commerce sellers pertaining to their products, this information will be useful to help sellers target customers. Finally, what is the role of mobile broadband in filling the geographical gaps left by fixed line broadband deployment? One of the present authors has written extensively in the area of the first two topics, exploring how broadband deployment relates to area characteristics and other determinants of profitability (Connolly & Prieger, 2009; Prieger, 2003, 2015; Prieger & Hu, 2008; Prieger & Lee, 2008). The third topic is much less explored in the literature, and was first investigated in work by the authors (Prieger 2013;

Prieger & Church, 2012), who found that mobile broadband provision helps fill gaps left by fixed-line broadband providers.

Building on the previous work, this chapter updates the landscape of mobile broadband deployment with the latest available statistics and discusses changes observed between 2010 and the end of 2013. In the following section, a brief background on broadband research, technology, and definitions is presented. The main section follows, in which the broadband data are explored. Both basic descriptive and regression analyses are presented. After outlining a few directions for future research, a final section offers concluding thoughts.

## BACKGROUND

The availability of broadband, both fixed and mobile, has been studied systematically by many authors. Previous waves of the FCC data examined here have been explored by Grubestic and Murray (2004), Prieger (2003, 2013), Prieger and Church (2012), Prieger and Lee (2008), and Xiao and Orazem (2005). General findings include the following: rural areas and other areas with lower population density are likely to have fewer broadband providers, as are areas with lower income. Perhaps surprisingly, after controlling for other socioeconomic factors, areas with more minorities typically have either the same number of providers or more than otherwise comparable areas with fewer minorities.

Mobile broadband is not universally available at high speeds due to the nature of the network infrastructure. Transmission of data from the end-user's mobile device uses radio spectrum that the FCC licenses to carriers for mobile communications. The transmission is received by the service provider's access network at the location of the closest base transceiver station (BTS), which contains antennas and radio systems for transmitting and receiving. At this point, the data transmission typically switches from wireless to landline connections on the network as it is passed on to other network elements on the way to the Internet backbone. Due to geographical limitations in the footprint of wireless antennas and strong economies of scale in the network equipment, areas with denser populations are much less expensive to serve than rural areas. This explains why, even setting aside any actual or perceived differences in demand for mobile broadband in rural areas, lower density regions will generally have fewer providers and a lower speed of service than urban areas.

Over the years, accepted definitions of "broadband" have changed. While the term broadband loosely refers to high speed data transmission, specific thresholds must be defined for quantitative analysis. In the analysis here, various thresholds on downstream and upstream speeds are employed as the data allow. The FCC collects data on all providers offering any network speed of more than 200 kbps at least one way. With this low threshold, 3G and 4G mobile technology standards (e.g., HSPA, EVDO, and LTE) qualify as broadband. By this definition, there were 197 million mobile broadband subscribers in the US (FCC, 2014) at the beginning of 2014. Of these, 133 million connections had download speeds at or above 3 Mbps and upload speeds at or above 768 kbps.

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