

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554**

In the Matter of

Inquiry Concerning Deployment of Advanced
Telecommunications Capability to All Americans
in a Reasonable and Timely Fashion

GN Docket No. 18-238

**COMMENTS OF
THE MASSACHUSETTS DEPARTMENT OF
TELECOMMUNICATIONS AND CABLE**

Commonwealth of Massachusetts
Department of Telecommunications and Cable

KAREN CHARLES PETERSON
COMMISSIONER

1000 Washington Street, Suite 820
Boston, MA 02118-6500
(617) 305-3580

Dated: September 17, 2018

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554**

In the Matter of

GN Docket No. 18-238

Inquiry Concerning Deployment of Advanced
Telecommunications Capability to All Americans
in a Reasonable and Timely Fashion

**COMMENTS OF
THE MASSACHUSETTS DEPARTMENT OF
TELECOMMUNICATIONS AND CABLE**

The Massachusetts Department of Telecommunications and Cable (“MDTC”)¹ respectfully submits these comments in response to the Fourteenth Broadband Deployment Report Notice of Inquiry (“NOI”) released by the Federal Communications Commission (“Commission”) on August 9, 2018, in the above-captioned proceeding.² The Commission initiated the NOI to solicit data and information to assist in its annual task, as required by section 706 of the Telecommunications Act of 1996, as amended,³ of determining whether broadband is being deployed to all Americans in a reasonable and timely fashion.⁴ As there have been no developments in the industry that would support conclusions different than those the MDTC presented in response to the Thirteenth Broadband Deployment Notice of Inquiry, the MDTC

¹ The MDTC is the exclusive state regulator of telecommunications and cable services within the Commonwealth of Massachusetts. MASS. GEN. LAWS ch. 25C, § 1.

² *In re Inquiry Concerning Deployment of Advanced Telecomms. Capability to All Ams. in a Reasonable & Timely Fashion*, GN Docket No. 18-238, Fourteenth Broadband Deployment Report Notice of Inquiry, FCC 18-119 (Aug. 9, 2018) (“NOI”).

³ Telecommunications Act of 1996 § 706(b), 47 U.S.C. § 1302(b).

⁴ NOI, ¶ 1.

attaches those comments hereto and urges the Commission to adopt the recommendations therein.⁵ The MDTC also offers comment on certain other topics the NOI raises.⁶

As discussed in Section I of the attached comments, the Commission should continue to conclude that mobile services are not full substitutes for fixed services.⁷ Consumers and businesses rely on both fixed *and* mobile broadband services, often using both in distinct ways. The Commission’s analysis should reflect this practice and should not diverge from its conclusion that mobile services are not full substitutes for fixed services.

Additionally, the MDTC recommends that the Commission assess fixed broadband availability using a definition of “available” similar to that used for the Form 477.⁸ While this definition lacks sufficient granularity,⁹ given the highly location-specific nature of fixed broadband investment and the uncertainty before a competitive broadband project is proven viable, the Commission should consider only broadband service that is actually available.¹⁰

⁵ See *In re Inquiry Concerning Deployment of Advanced Telecomms. Capability to All Ams. in a Reasonable & Timely Fashion*, GN Docket No. 17-199, MDTC Comments (Sept. 21, 2017) (“MDTC Comments”).

⁶ The MDTC’s silence on any matter not addressed in these comments does not connote agreement or opposition by the MDTC.

⁷ See NOI, ¶ 11; MDTC Comments at 3-4.

⁸ See NOI, ¶ 16; FCC Form 477 Local Telephone Competition and Broadband Reporting Instructions at 34 (Dec. 5, 2016).

⁹ E.g., NOI, ¶ 16; *In re Modernizing the FCC Form 477 Data Program*, WC Docket No. 11-10, Utah Governor’s Office of Economic Development Comments at 1-2 (Sept. 18, 2017).

¹⁰ *But see In re Communications Marketplace Report*, GN Docket No. 18-231, USTelecom Comments at 1 (Aug. 17, 2018) (arguing for counting both actual and potential competition in Commission analyses).

Finally, as outlined in the attached comments, the MDTC (1) supports the Commission's proposal to evaluate fixed and mobile services using four categories: fixed services only, mobile LTE services only, fixed and mobile LTE services, and fixed or mobile LTE services;¹¹ (2) urges the Commission to incorporate affordability in its Section 706 analyses;¹² and (3) believes that the Commission can speed employment of next-generation facilities by more closely coordinating its efforts with those of state and local governments.¹³

Massachusetts is an ideal partner for the federal government in the area of broadband expansion. Massachusetts has some of the most well developed communications infrastructure in the nation. In Massachusetts, 97% of the population has access to broadband at 25/3, with the Commonwealth boasting 0.79 broadband connections per household, the third highest subscribership ratio in the nation.¹⁴ And yet, as Massachusetts lacks ubiquitous coverage, Massachusetts state government seeks to promote investment in the communications network, funding both middle and last mile broadband projects.¹⁵ The Commonwealth looks forward to

¹¹ See NOI, ¶ 7; MDTC Comments at 3-4.

¹² See NOI, ¶¶ 16-19; MDTC Comments at 4-5.

¹³ See NOI, ¶ 24; MDTC Comments at 6 (discussing the potential benefits of synthezation of state and federal broadband infrastructure funding).

¹⁴ See FCC, Fixed Broadband Deployment Data from FCC Form 477, MA - Fixed - Dec 16v1, <https://transition.fcc.gov/form477/BroadbandData/Fixed/Dec16/Version%201/MA-Fixed-Dec2016.zip>; FED. COMM'NS COMM'N, FCC INTERNET ACCESS SERVICES REPORT: STATUS AS OF DECEMBER 31, 2016 29-30 (2018).

¹⁵ See, e.g., Press Release, Mass. Exec. Office of Hous. & Econ. Dev., Baker-Polito Administration Announces \$1.1 Million for "Last Mile" Broadband Connectivity for Royalston (Sept. 6, 2017), <http://www.mass.gov/hed/press-releases/administration-announces-last-mile-funds-for-royalston.html>.

continuing to work with the Commission to close the remaining broadband availability gaps in Massachusetts.

The MDTC welcomes this opportunity to comment and thanks the Commission for its consideration and continued efforts to close the digital divide.

Respectfully submitted,

KAREN CHARLES PETERSON
COMMISSIONER

By: /s/ Sean M. Carroll
Sean M. Carroll
Deputy General Counsel

/s/ Jacob S. Levine
Jacob Levine
Economist

Massachusetts Department of
Telecommunications and Cable
1000 Washington Street, Suite 820
Boston, MA 02118-6500
(617) 305-3580

September 17, 2018

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554**

In the Matter of

Inquiry Concerning Deployment of Advanced
Telecommunications Capability to All Americans
in a Reasonable and Timely Fashion

GN Docket No. 17-199

**COMMENTS OF
THE MASSACHUSETTS DEPARTMENT OF
TELECOMMUNICATIONS AND CABLE**

Commonwealth of Massachusetts
Department of Telecommunications and Cable

KAREN CHARLES PETERSON
COMMISSIONER

1000 Washington Street, Suite 820
Boston, MA 02118-6500
(617) 305-3580

Dated: September 21, 2017

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554**

In the Matter of

GN Docket No. 17-199

Inquiry Concerning Deployment of Advanced
Telecommunications Capability to All Americans
in a Reasonable and Timely Fashion

**COMMENTS OF
THE MASSACHUSETTS DEPARTMENT OF
TELECOMMUNICATIONS AND CABLE**

The Massachusetts Department of Telecommunications and Cable (“MDTC”)¹ respectfully submits these comments pursuant to the Thirteenth Broadband Deployment Notice of Inquiry (“NOI”) released by the Federal Communications Commission (“FCC”) on August 8, 2017, in the above-captioned proceeding.² The FCC initiated the NOI to solicit data and information to assist it in its annual task, as required by Section 706 of the Telecommunications Act of 1996, as amended,³ of determining whether broadband is being deployed to all Americans in a reasonable and timely fashion.⁴ In the NOI, the FCC seeks comments on several issues related to interpreting Section 706 and measuring the availability and deployment of broadband.⁵ The MDTC limits its discussion to three questions posed by the NOI.⁶

¹ The MDTC is the exclusive state regulator of telecommunications and cable services within the Commonwealth of Massachusetts. MASS. GEN. LAWS ch. 25C, § 1.

² *In re Inquiry Concerning Deployment of Advanced Telecomms. Capability to All Ams. in a Reasonable & Timely Fashion*, GN Docket No. 17-199, Thirteenth Broadband Deployment Notice of Inquiry, FCC 17-109 (rel. Aug. 8, 2017) (“NOI”).

³ Telecommunications Act of 1996 § 706(b), 47 U.S.C. § 1302(b).

⁴ NOI, ¶ 1.

⁵ *Id.*, ¶ 2. Because the FCC distinguishes the terms “broadband” and “advanced telecommunications capability” in the NOI, we use the term “broadband” herein to refer only to broadband which meets the FCC proposed definition of “advanced telecommunications capability,” namely fixed broadband which meets the speed benchmarks of 25 Mbps download and 3 Mbps upload, and mobile broadband which meets the speed benchmarks of 10 Mbps download and 1 Mbps upload, unless otherwise indicated. *See id.*, ¶¶ 1 n.2, 5, 19.

⁶ The MDTC’s silence on any matter not addressed in these comments does not connote agreement or opposition by the MDTC.

First, the MDTC supports the FCC’s proposal to recognize a distinction between fixed and mobile advanced telecommunications capability for purposes of Section 706 analysis.⁷ The FCC should both 1) evaluate the deployment of fixed and mobile broadband as separate and distinct ways to achieve advanced telecommunications capability⁸ and 2) evaluate the deployment of advanced telecommunications capability based on the joint availability of both fixed and mobile broadband services.⁹ Massachusetts consumers rely on both fixed and mobile broadband, using the services for different purposes. To properly measure the availability of advanced telecommunications capability, the FCC should measure the availability of fixed broadband, the availability of mobile broadband, and the availability of both fixed and mobile broadband.

Second, the MDTC interprets Section 706 to require that the determination of availability of advanced telecommunications capability be tested by considering functional availability, in addition to physical availability.¹⁰ In the *1999 First Broadband Deployment Report*, the FCC stated that availability “refers to a consumer’s ability to purchase a capability that has been deployed.”¹¹ Because providing affordable broadband service is essential to achieving the goals of Section 706, the MDTC urges the FCC to include affordability when evaluating the availability of advanced telecommunications capability.

Third, the MDTC recommends that the FCC enable increased coordination of federal, Tribal, state, and local efforts to improve broadband deployment. Specifically, the FCC should make clear its willingness to distribute more federal funds to encourage the deployment of broadband capability where state and/or local funding is also available for this purpose than where such state and/or local funding is not available. This improved coordination would incentivize and maximize state and local funding for broadband deployment, and in doing so “increase the availability of advanced telecommunications services.”¹²

⁷ NOI, ¶ 5.

⁸ *Id.*, ¶ 9.

⁹ *Id.*, ¶ 10.

¹⁰ *See* 47 U.S.C. § 1302(b).

¹¹ *In re Inquiry Concerning the Deployment of Advanced Telecomms. Capability to All Ams. in a Reasonable & Timely Fashion, & Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecomms. Act of 1996*, CC Docket No. 98-146, Report, 14 FCC Rcd. 2398, 2410, ¶ 30 (1999).

¹² NOI, ¶ 49.

I. The FCC Should Examine Separately (1) the Availability of Fixed Broadband, (2) the Availability of Mobile Broadband, and (3) the Availability of Both Fixed and Mobile Broadband Simultaneously in Order to Determine the Physical Availability of Advanced Telecommunications Capability

The MDTC urges the FCC to separately analyze and report on the physical availability of fixed broadband service, the physical availability of mobile broadband service, and the simultaneous physical availability of both fixed and mobile broadband services. This three-part analysis would most closely reflect the way American households currently use broadband services. Today, consumers rely on both fixed and mobile broadband services, using each in distinct yet complementary ways. There is widespread agreement on the ubiquity of the practice among American households today of “multi-homing,” or accessing both fixed and mobile broadband on multiple platforms.¹³ This pattern is even more pronounced in Massachusetts than it is nationally. As of December 2015, there were 91.6 mobile broadband subscriptions per 100 residents over the age of 14 nationally and 99.3 mobile broadband subscriptions per 100 residents over the age of 14 in Massachusetts.¹⁴ Similarly, FCC data¹⁵ shows that as of June 2016, while 47% of Americans subscribed to fixed broadband service, 77% of Massachusetts households subscribed to fixed broadband service.¹⁶

¹³ See ANDRES V. LERNER & JANUSZ A. ORDOVER, AN ECONOMIC ANALYSIS OF TITLE II REGULATION OF BROADBAND INTERNET ACCESS PROVIDERS 36-37 (2017), contained in Comments of Verizon, *In re Restoring Internet Freedom*, GN Docket No. 17-108 (July 17, 2017) (“[C]onsumers generally do multi-home by accessing online content and services on multiple platforms, such as one or more wireless broadband services, a wireline broadband service at home, a wireline broadband service at work, and Wi-Fi networks at numerous locations (e.g., Starbucks, libraries, airports.)”); Reply Comments of AARP, *In re Restoring Internet Freedom*, GN Docket No. 17-108 (Aug. 16, 2017) (“AARP Reply Comments”).

¹⁴ Connections over 200 kbps in at least one direction. Calculated by the authors from FCC, *Internet Access Services: Status as of December 31, 2015*, Figure 34 (Nov. 2016), https://apps.fcc.gov/edocs_public/attachmatch/DOC-342358A1.pdf; and United States Census Bureau / American FactFinder, “DP05: ACS Demographic and Housing Estimates.” 2015 5-year estimates, *American Community Survey*. U.S. Census Bureau’s American Community Survey Office, 2015, U.S. Census Bureau, American FactFinder, ACS Demographic and Housing Estimates, 2015 5-year estimates, American Community Survey, https://factfinder.census.gov/bkmk/table/1.0/en/ACS/15_5YR/DP05.

¹⁵ FCC Form 477 Data does not currently break down residential mobile broadband connections by state. In order to ensure that Massachusetts’ higher rate of mobile broadband subscriptions per 100 households does not simply reflect a higher rate of commercial mobile broadband subscriptions, the MDTC calculated the ratio of residential to commercial mobile broadband subscriptions and the rate of commercial mobile broadband subscriptions per employer for both Massachusetts and for the nation as a whole. Both the ratio and the rate were substantially similar for Massachusetts and for the nation, suggesting that Massachusetts’ higher rate of mobile broadband subscriptions per 100 households does in fact reflect a higher mobile broadband take-up rate among Massachusetts households than among households nationwide.

¹⁶ FCC, *Residential Fixed Internet Access Service Connections per 1000 Households by Census Tract, as of June 2016* (May 18, 2017), <https://www.fcc.gov/maps/residential-fixed-internet-access-service-connections-per-1000-households-by-census-tract/>.

However, multi-homing does not mean that consumers consider fixed and mobile broadband services fungible. As one commenter noted: “While it is certain that many consumers utilize different sources of broadband Internet access, it is not reasonable to assume that consumers can easily switch between these options, or would want to.”¹⁷

The importance of multi-homing is clearly evident in Massachusetts, where many communities are prepared to expend significant taxpayer dollars to acquire fixed broadband capabilities for their residents despite the presence of multiple mobile broadband providers. For example, while the approximately 1,800 residents of the Town of Leverett, in rural Franklin County, Massachusetts, were served by multiple mobile broadband providers,¹⁸ in 2012 Leverett’s residents voted to spend \$2.9 million in town funds to be combined with state funds to install fiber for fixed broadband service.¹⁹ Today, despite the town being served by four national mobile broadband providers, 85% of Leverett’s households subscribe to the resulting fixed broadband service. Town residents also pay an average of \$100 annually in additional property taxes to pay for the project, down from an initial average of \$217 annually.²⁰ Leverett residents’ decision to incur these costs for simultaneous fixed and mobile broadband service is not unique. In September 2015, the residents of Ashfield, Massachusetts voted to build a fiber network to facilitate fixed broadband access, authorizing \$2.3 million in town funding to be combined with state funds.²¹ Other Massachusetts communities continue to move forward on similar projects.²² These and other examples of Massachusetts consumers going to great effort and personal expense to gain simultaneous access to mobile and fixed broadband services demonstrate that the marketplace considers these services distinct. Therefore, to properly evaluate deployment, the FCC should examine their availability as both separate and complementary services.

II. The FCC Should Consider Affordability When Evaluating the Availability of Advanced Telecommunications Capability

The MDTC urges the FCC to adopt a functional availability analysis for purposes of Section 706. Simply because a consumer has physical access to broadband service does not mean that it is actually available in a meaningful way. Both Congress and the FCC have repeatedly stressed the need for deploying affordable broadband access to all Americans.

¹⁷ AARP Reply Comments at 36-37.

¹⁸ Form 477 Mobile Deployment Data.

¹⁹ Larry Parnass, *From unserved to connected: Leverett’s fiber-optic system a model for rural towns*, BERKSHIRE EAGLE, Mar. 17, 2017.

²⁰ Scott Merzbach, *Leverett will drop price of municipal Internet while upgrading bandwidth*, GREENFIELD RECORDER, Mar. 2, 2016.

²¹ Mary C. Serreze, *Six Massachusetts towns win broadband infrastructure grants to build fiber networks*, MASSLIVE.COM, May 9, 2017.

²² Heather Bellow, *With \$480,000 broadband grant, Alford is speeding up*, BERKSHIRE EAGLE, Aug. 22, 2017.

Indeed, one of the basic universal service principles enumerated by Congress is that “[q]uality services should be available at just, reasonable, and *affordable* rates.”²³

Massachusetts consumer behavior provides strong evidence of the link between affordability and availability. In keeping with the FCC’s renewed attention to using the tools of economics to inform policy decisions,²⁴ and in response to the NOI’s request for comment on ways to increase the economic rigor of the annual Section 706 reports’ analyses,²⁵ the MDTC has examined this link by testing for correlation between income and broadband subscription rates using multiple regression analysis. The results (see Appendix A) show a strong link between median household income and the subscription rates to available fixed broadband services.²⁶ For example, these results predict that in Massachusetts, households earning \$40,000 are less than two-thirds as likely to subscribe to fixed broadband services (52.4% subscription rate) as are households earning \$100,000 (82.4% subscription rate).

This significant correlation between income and subscription to fixed broadband services suggests the large role affordability plays in determining the functional availability of broadband.²⁷ In light of this established link, we urge the FCC to incorporate a measure of affordability as one factor when evaluating the availability of advanced telecommunications capability for purposes of its Section 706 report. Furthermore, since the Form 477 already collects subscriber counts for fixed broadband services and there exists a variety of consistent, reliable, and publicly available datasets with which to measure affordability, this approach can be accomplished without additional data collection and in a way that satisfies the NOI’s stated desire to establish a consistent, objective framework for the FCC’s Section 706 analyses.²⁸

²³ 47 U.S.C. § 254(b)(1) (emphasis added).

²⁴ *Chairman Pai Announces Leighton as Chief of Office of Strategic Planning & Policy Analysis*, FCC Press Release, June 28, 2017 (reiterating support for the creation of an Office of Economics and Data to provide the FCC with analysis and advice regarding communications issues.).

²⁵ NOI, ¶ 26.

²⁶ In order to avoid conflating a correlation between census tract income and fixed broadband subscription with a correlation between census tract income and fixed broadband availability, the authors have excluded from the calculation of subscription rates those Massachusetts census tracts which the Form 477 data show are unserved by a fixed broadband service meeting the minimum 25 Mbps/3Mbps standard. Nevertheless, because current Form 477 data do not distinguish those census tracts with fixed broadband service above this standard throughout the census tract from those census tracts with fixed broadband service above this standard in only a portion of the tract, some such conflation remains possible. As a robustness check, the authors reran the regression including county and an interaction term of county and median household income; the results were stable.

²⁷ The MDTC is unable to test for correlation between income and mobile broadband subscribership because the Form 477 does not currently collect mobile broadband data at the census tract level and does not collect the necessary data about residents’ data plans.

²⁸ NOI, ¶ 23.

III. The FCC Should Enable Greater Coordination between Federal, State and Local Efforts to Increase Broadband Deployment

The FCC should coordinate federal support to increase broadband deployment with other funding opportunities.²⁹ Such coordination would increase both the speed and breadth of additional broadband deployment. As noted in past MDTC comments,³⁰ synthesizing federal funding for broadband deployment with state-funded broadband projects, such as eligible recipients of middle-mile Broadband Technology Opportunities Program (“BTOP”) funding, would extend broadband access further and more quickly than would funding projects in isolation. For example, the Massachusetts Broadband Institute³¹ (“MBI”) uses state funds in coordination with those of municipalities and private sector partners to close last-mile broadband gaps by connecting consumers with the MBI’s BTOP-funded middle-mile network. In 2014, the Commonwealth of Massachusetts authorized an additional \$50 million for use by the MBI to continue its efforts to bring fixed broadband service to unserved residents. The synergies that would be achieved from coordinating federal funds with these active state, local, and private sector efforts could bring broadband access to more Americans in a timelier manner.

IV. Conclusion

The MDTC urges the FCC to conduct its Section 706 analysis in ways that maximize the resulting report’s utility to consumers, industry decision makers, and policymakers. To do so, we emphasize three points raised by the NOI. First, the MDTC urges the FCC to analyze separately the availability of fixed broadband services, the availability of mobile broadband services, and the simultaneous availability of fixed and mobile broadband services, in order to reflect the way Massachusetts consumers access broadband today. Second, the MDTC urges the FCC to analyze both the physical and the functional availability of advanced telecommunications capability by incorporating an evaluation of affordability in its analyses. Third, the MDTC urges the FCC to explore ways to expand the impact of federal efforts to increase the availability of advanced telecommunications capabilities by more closely coordinating its efforts with those of state and local governments.

The MDTC welcomes this opportunity to comment and thanks the FCC for its consideration.

²⁹ See *id.*, ¶ 49.

³⁰ MDTC Ex Parte, *In re Connect Am. Fund*, WC Docket No. 10-90, (Jan. 9, 2017); MDTC Ex Parte, *In re Connect America Fund*, WC Docket No. 10-90, (May 17, 2016); see also Joint Comments of the MDTC and MBI, *In re Connect Am. Fund*, WC Docket No. 10-90, (July 21, 2016) (advocating for a grant-based CAF mechanism to support broadband deployment projects funded under appropriate state initiatives).

³¹ The MBI is a quasi-public agency working to meet the broadband access needs of unserved citizens throughout Massachusetts. See MASS. GEN. LAWS ch. 40J, §§ 6B-C.

Respectfully submitted,

KAREN CHARLES PETERSON,
COMMISSIONER

By: /s/ Mark A. Merante
Mark A. Merante, Competition Data Analyst

/s/ Jacob S. Levine
Jacob Levine, Economist

Massachusetts Department of
Telecommunications and Cable
1000 Washington Street, Suite 820
Boston, MA 02118-6500
(617) 305-3580

September 21, 2017

APPENDIX

Table 1. Regression of Median Household Income on Consumer Fixed Broadband Subscription Rate, by Census Tract	
	% Point Change in Households Subscribed to 25/3+ fixed broadband
Median Household Income (thousands)	0.501*** (0.0437)
Median Household Income (thousands) Squared	-0.00190*** (0.000189)
Minority Population (% of total population)	-0.106*** (0.0181)
Population Over 65 Years Old (% of total population)	-0.211*** (0.0513)
Median Household Size	3.258*** (1.203)
Population with at least a Bachelor's Degree (% of population over 25 years old)	0.149*** (0.0258)
Constant	32.32*** (3.267)
Observations	1,400
R-squared	0.534
Standard errors in parentheses	
*** p<0.01, ** p<0.05, * p<0.1	
Subscription rates calculated by the authors from June 2015 FCC Form 477 data and United States Census Bureau / American FactFinder. "B25001: Housing Units" 2015 5-year estimates, American Community Survey, U.S. Census Bureau's American Community Survey Office, 2015, Web 25 August 2017 < http://factfinder2.census.gov >; U.S. Census Bureau, American FactFinder, ACS Demographic and Housing Estimates, 2015 5-year estimates, American Community Survey, https://factfinder.census.gov/bkmk/table/1.0/en/ACS/15_5YR/DP05 . All other data from United States Census Bureau / American FactFinder. U.S. Census Bureau's American Community Survey Office, 2015, Web, August 2017 < http://factfinder2.census.gov >.	

The MDTC tested whether median household income is correlated with the residential subscription rate for fixed broadband service in Massachusetts, calculated as the ratio of

“consumer connections”³² to housing units.³³ In order to control for demographic variables that might bias the results, the MDTC included in the regression the percentage of each census tract’s population that identified as non-white, that was over 65 years old, and that claimed to hold at least a bachelor’s degree, as well as each tract’s median household size. In addition to these demographic controls, the regression includes a quadratic variable for median household income in order to more precisely measure correlation at different levels of income.

These results show a strong, direct correlation between household income and the subscription rates for fixed broadband service among Massachusetts households, measured at the census tract level.³⁴ The coefficient on median household income (in thousands of U.S. dollars) shows that for the first \$10,000 increase in household income, the rate of subscription to available fixed broadband increases by 5.01 percentage points, after controlling for age, race, educational attainment, and household size. This means that Massachusetts households earning \$40,000 are less than two-thirds as likely to subscribe to fixed broadband services (52.4% subscription rate) than are households earning \$100,000 (82.4% subscription rate). The negative coefficient on the median income quadratic shows that this direct correlation between income and fixed broadband subscribership decreases slightly at higher income levels.³⁵ The demographic controls have the expected correlations.³⁶ These results are statistically significant at the 1% level and the authors have tested for heteroskedasticity with the White test.

³² FCC, *Tract-Level Fixed Broadband Subscribership* (June 2015), Massachusetts-specific data gathered through FCC Form 477 is obtained by MDTC pursuant to a September 12, 2008 non-disclosure agreement between the MDTC and FCC. (“2015 Form 477 Data”).

³³ United States Census Bureau/American FactFinder “B25001: Housing Units” *2015 5-year estimates, American Community Survey*, U.S. Census Bureau’s American Community Survey Office, 2015, Web 25 August 2017 <<http://factfinder2.census.gov>>; U.S. Census Bureau, American FactFinder, *ACS Demographic and Housing Estimates, 2015 5-year estimates, American Community Survey*, https://factfinder.census.gov/bkmk/table/1.0/en/ACS/15_5YR/DP05. All other data from United States Census Bureau / American FactFinder. U.S. Census Bureau’s American Community Survey Office, 2015. Web. August 2017 <<http://factfinder2.census.gov>>.

³⁴ FCC Form 477 data does not currently distinguish between those census tracts in which fixed broadband is available throughout the tract and those census tracts in which fixed broadband is available to only some geographies within the tract. In order to ensure that this ambiguity in the data does not bias our results, we reran the regression with a binary variable for each county and an interaction variable between the county variables and median household income. The results were substantially unchanged.

³⁵ For example, households that earned \$80,000 were only approximately 0.46 percentage points more likely to subscribe to available fixed broadband service than those that earned \$70,000, while those earning \$20,000 were approximately 0.48 percentage points more likely to subscribe than those earning \$10,000.

³⁶ Each one point increase in non-white percentage decreases the subscription rate by 0.1 percentage points while each one point increase in the percentage of the population 65 or older decreases the subscription rate by 0.2 percentage points. Each one point increase in the percentage of the population with at least a bachelor’s degree increases the subscription rate by 0.2 percentage points while each increase of one person in median household size increases the subscription rate by 3.3 percentage points. All results are significant at the 1% level.