II. BROADBAND AVAILABILITY

Before determining the size of the Investment Gap, it is necessary to determine the current state of broadband deployment. This includes the level of service currently supported (or which will be in the near-term without government support) as well as the proximity of unserved areas to broadband infrastructure that can be leveraged to serve the area.

The complexity of this analysis is driven by the need for a very granular geographic view of the capabilities of all the major types of broadband infrastructure as they are deployed today, and as they will likely evolve over the next three to five years without additional public support.

These data are not available: There is a lack of data at the required level of granularity, both in terms of which people have access to which services, and of which people are passed by different types of physical infrastructure. To solve this problem, we combine commercial and public data on availability and infrastructure with statistical techniques to predict or infer the data needed to complete our data set.

In some cases we use broadband availability data to predict the location of broadband infrastructure, and in some cases we use the location of broadband infrastructure to predict the availability of broadband capable networks. In areas where we do not have data, we combine data from other geographies with limited physical infrastructure data in a large multi-variant regression model. We use this regression model to predict availability by speed tier and to fill in gaps, especially last mile gaps, in our infrastructure data.

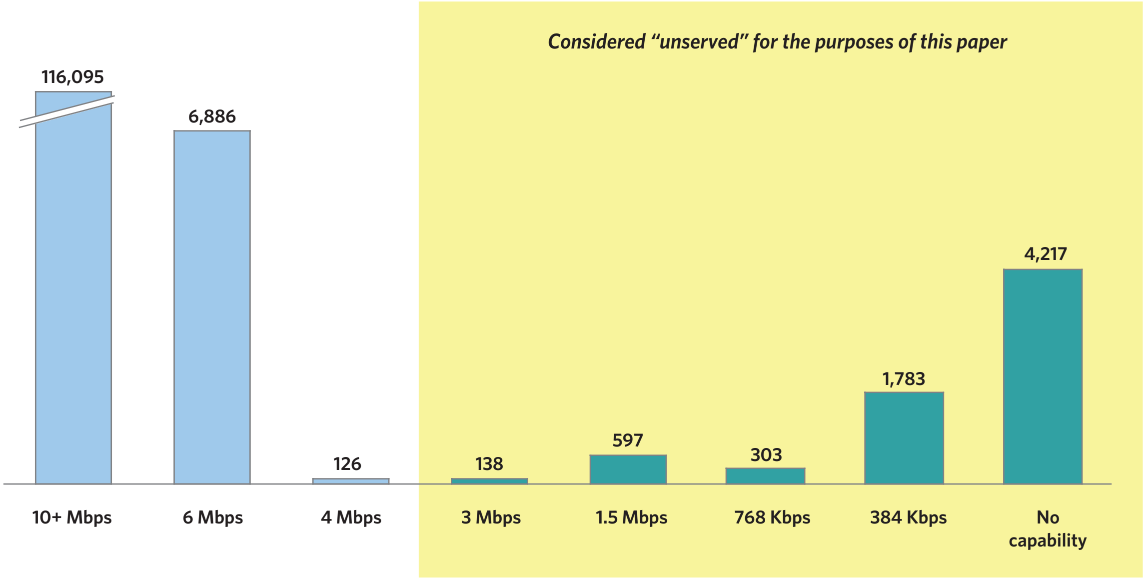
Once current availability is determined, we forecast the future state by relying on recent publicly announced network build-out plans.

Where the quality of data is limited, broadband-gap calculations will be affected. For example, there are 12 wire centers in Alaska that show no population within their boundaries and an additional 18 wire centers that have no paved public-use roads (i.e., no roads other than 4-wheel-drive or forest-service roads). All 30 of these wire centers were excluded from wired broadband-gap calculations; however, all areas with population were covered by the wireless calculations. In addition, due to insufficient demographic and infrastructure data to calculate baseline availability for Puerto Rico and the U.S. Virgin Islands in the Caribbean, and Guam, American Samoa and the Northern Marianas in the Pacific, these areas are excluded from further analysis.

CURRENT STATE

Although 123 million housing units already have broadband networks available that are capable of providing service that meets the National Broadband Availability Target of at least 4 Mbps download and 1 Mbps upload, many Americans do not. Currently, 7 million housing units representing 14 million people are left without broadband that meets the National Broadband Availability Target. See Exhibit 2-A.

Exhibit 2-A:
Highest Speed Capability of Available Wired Broadband Networks in the United States[1]

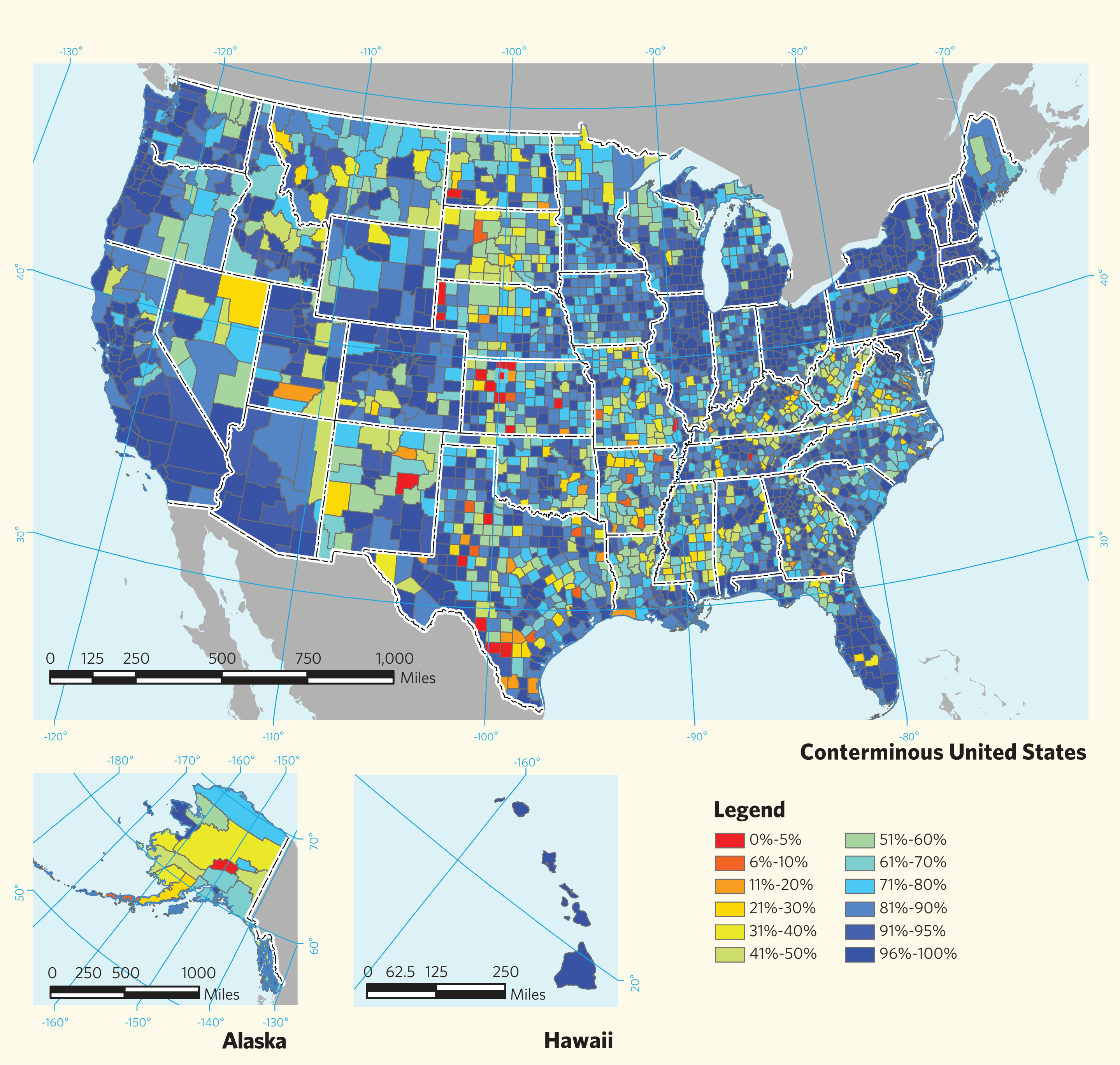


Housing units in thousands, downlink bit rate capability

Exhibit 2-B presents the distribution of these 7 million housing units across the United States. The number of unserved housing units in each county is calculated based on the methodology described below. That number is then divided by the total number of housing units in the county to get the percentage of homes served.

Exhibit 2-B:

Availability of Broadband Networks Capable of Meeting the National Broadband Target



Purpose of the Analysis

Before determining the size of the Investment Gap, it is necessary to determine who is unserved as well as the adjacent broadband infrastructure that could be leveraged to serve them. The distance and density dependencies of both current availability and the cost of providing service to those who do not currently have it required that we take into account the geography of each unserved area at a very granular level. That, in turn, requires that we create a geographically based view of current networks and broadband capabilities in order to calculate the Investment Gap.

Our current-state model calculates the likely broadband performance from multiple technologies at the census-block level to determine the highest level of broadband service available for each census block nationwide.

This model serves two main purposes:

- ➤ It determines the number and location of housing units and businesses that do not have broadband infrastructure available that meets our performance target.
- ➤ It provides the location of network infrastructure that can be used as the foundation for building out broadband networks to these unserved housing units; these infrastructure data provide an essential input into the economic model.

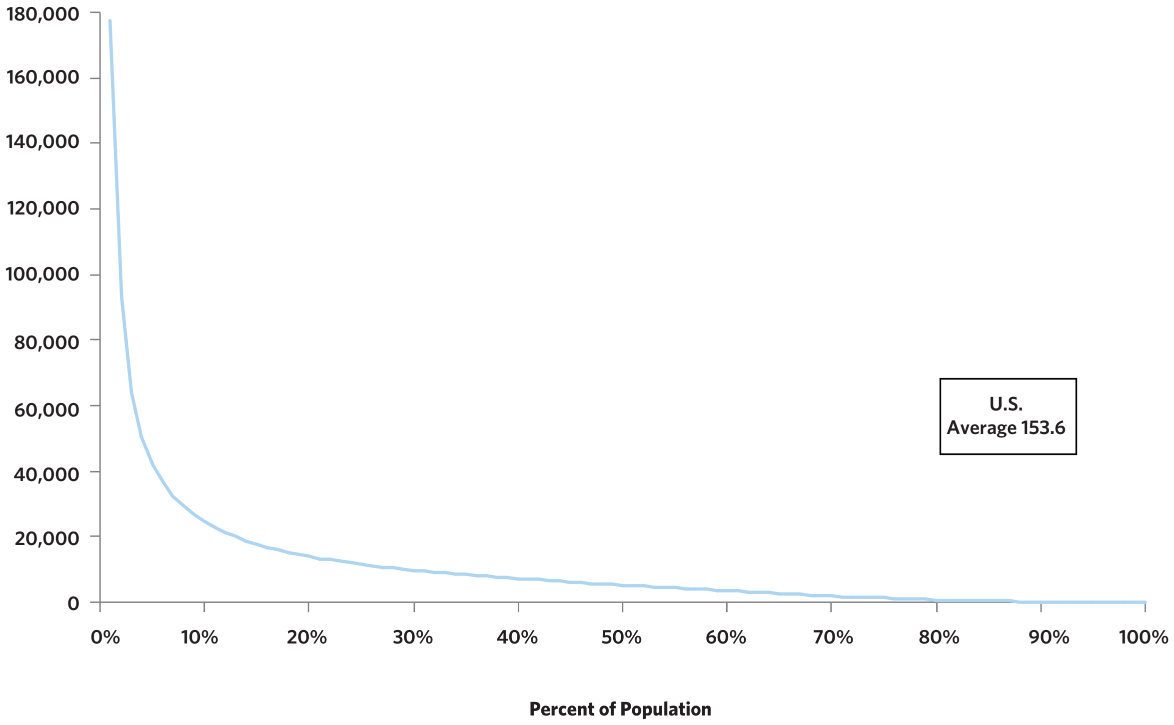
Number and location of the unserved

Once the availability of each network technology is determined at the census block level, we determine the highest speed broadband service available for each census block nationwide. Using this speed availability data and the national broadband target, we are able to determine what census blocks are currently "unserved." Then using census data for each block, we are able to determine the number of unserved housing units along with the demographic characteristics of the unserved.

Due to higher network costs per home passed, most of the unserved are located in less dense and/or rural areas. Although more sparsely populated states tend to have a larger portion of residents that are unserved, nearly every state has unserved areas. When examining the population density of the entire United States as in Exhibit 2-C, not just the unserved, one can see that a large portion of the population lives in areas of relatively low population density.

The average population density of populated census blocks in the United States is 153.6 people per square mile, though approximately three quarters of the population lives in areas of lower density. Unserved census blocks have a much lower density, with an average of only 13.8 people per square mile. The population density of the unserved follows a similar pattern to that of the country, with some areas being far more rural than others (see Exhibit 2-D). These areas of extremely low

Exhibit 2-C: *Population Density of the United States, Per Square Mile of Inhabited Census Block*



population density are some of the most difficult and expensive areas to serve.

The U.S. Census Bureau has categorized areas as urban areas, urban clusters and all other areas. Exhibit 2-E shows statistics of the unserved in terms of these definitions. As we can see, the deployment problem is one that predominantly exists outside of urban areas.

Since fixed broadband connects homes, not people, and most broadband networks are built along roads, either buried or on telephone/electric poles, an even more important driver of the cost to serve rural areas than population density is the number of road miles per housing unit of an area. Areas with more road miles per housing unit are even more likely to be unserved than areas of low population density. This is because the few homes in a rural area are sometimes clustered, which would decrease the number of road miles as well as the cost to serve.

The average number of road miles per housing unit in the United States is 0.07, which is much lower than the average unserved area of 0.41. But the average does not tell the whole story. A small portion of the population lives in areas with very high road-mile-to-housing-unit ratio, which tend to be the areas of the country that are unserved. Even within those unserved areas, there are portions that have an extremely high number of road miles per housing unit, which will be far more costly to serve than others. See Exhibits 2-F and 2-G.

Given the fact that the unserved are overwhelmingly in rural areas, one might expect that the unserved are in the territories of rural telecom companies. In fact, this is not the case: 52% of unserved housing units are in census blocks where one of the three Regional Bell Operating Companies, or RBOCs, (AT&T, Qwest or Verizon) is the dominant local exchange carrier; an additional 15% of unserved housing units are in census blocks

Exhibit 2-D:
Population Density of the Unserved, Per Square Mile of Inhabited Census Block

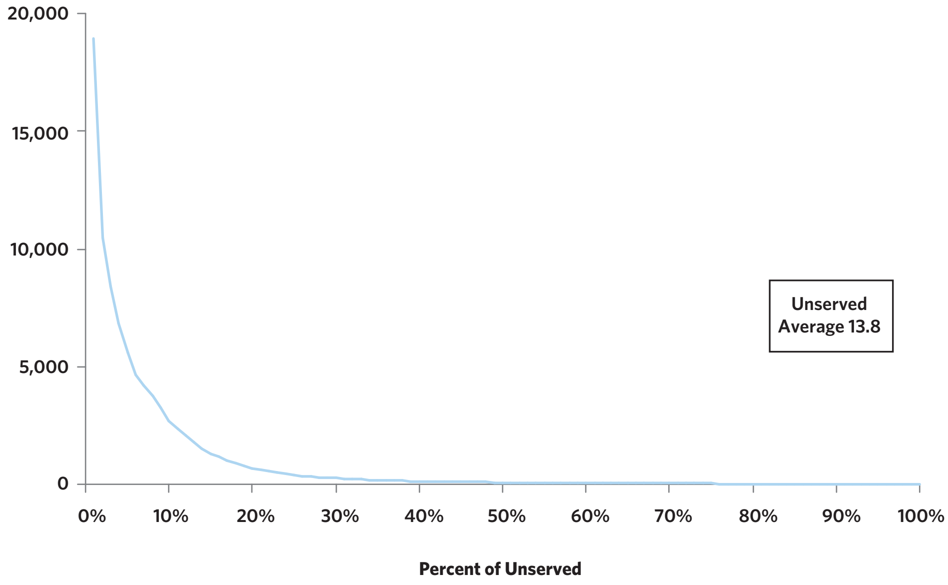


Exhibit 2-E:
Statistics of Urban Areas/ Clusters, and All Other Areas

Categories	AveragePeople/Sq. Mile	% of Population Unserved	# of Unserved Housing Units	Total Housing Units
Urban Areas/Clusters	2,900	1%	.7M	100M
All other areas	19	20%	6.3M	30M
Total	153.6	5%	7.0M	130M

Numbers do not sum due to rounding.

where a mid-size price-cap carrier is the dominant provider.[2] Only one-third of housing units are in census blocks where a rate-of-return carrier is the dominant provider.

Location of network infrastructure

We model each broadband network type independently to ensure a comprehensive view of infrastructure availability. Knowing where each type of network is currently deployed gives us the ability to calculate the incremental costs to upgrade the performance of an existing network as well as determine the likely location of middle and second mile fiber[3] that could be used to calculate the costs of deploying a new network.

There is a lack of comprehensive and reliable data sufficiently granular for the analysis we have described. To estimate the current state of broadband capable networks, we use the best available commercial and public data sources that meet our granularity, budget and timing requirements. We use infrastructure and speed availability data from a handful of states that were collected prior to the National Telecommunications and Information Administration (NTIA) mapping effort that is currently underway.[4] After evaluating numerous commercial data sets, we license the subset that best meets our needs.[5] We also examine Form 477 data and Form 325 data collected by the FCC but ultimately determine that these data are insufficiently granular.

The NTIA mapping effort will be complete in early 2011, and along with further revisions of the Form 477 data, they may be useful in refining our models in the future, but this will depend on the granularity of the data collected.

Network technologies modeled

The following sections include a description of our approach, data sources used, assumptions and risks for each of the three network technologies we modeled: cable, telco and wireless.

Cable

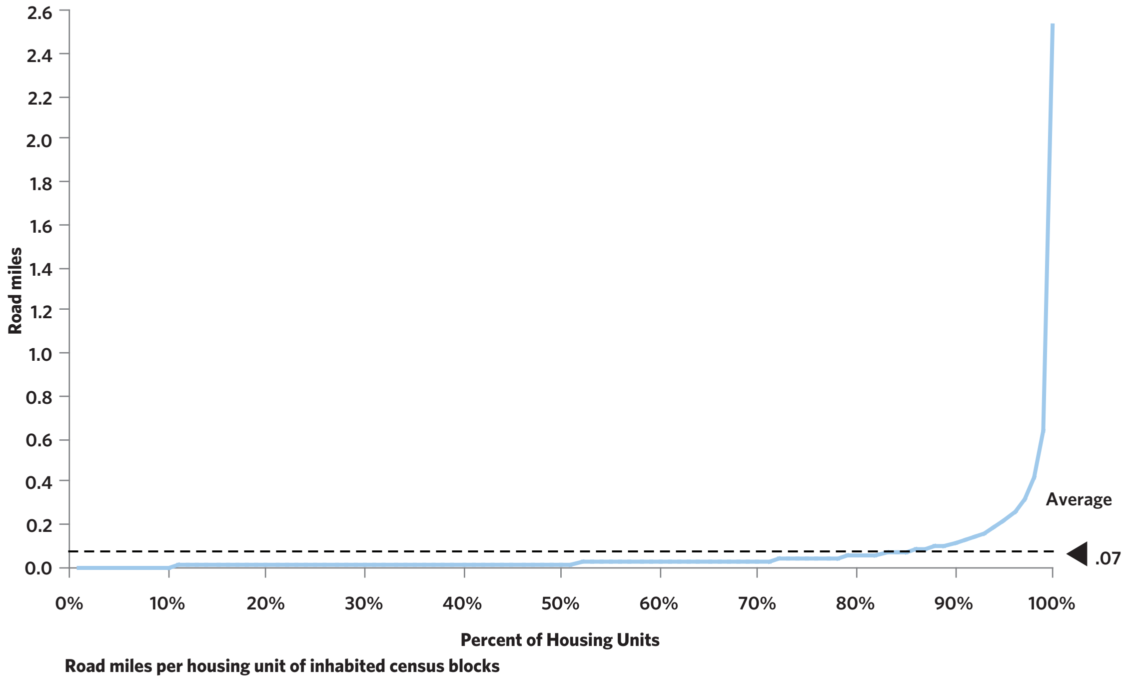
In order to determine broadband performance availability and infrastructure locations for cable networks, we use network availability data and estimated infrastructure locations based on cable engineering principles.

Data sources

In order to identify areas where cable broadband networks are located we license availability data from a commercial source[6] and collect publicly available infrastructure data from the state of Massachusetts.

We license a commercial data set from Warren Media called MediaPrints that provides data about nationwide availability of cable networks.[7] This data set includes geographic franchise boundaries as well as network capability information for cable

Exhibit 2-F:
Linear Density of the United States, Ratio of Road Mile to Housing Units



Road miles per housing unit of inhabited census blocks operators nationwide. We use network capability information to exclude franchise areas where operators are still operating networks that have not been upgraded to provide two-way broadband access— i.e., we rely on a field indicating that the cable operator provides Internet services. Without detailed data on the specific services offered by each cable system, we have to make assumptions about one-way and two-way cable plant. We assume that all two-way cable plant is DOCSIS-enabled since we estimate the incremental revenue of providing broadband would likely exceed the DOCSIS upgrade costs once a cable network has been upgraded to two-way plant. We assume that the cost of upgrading areas with one-way cable to a network that supports broadband is equal to a greenfield build (i.e., we treat areas with one-way cable plant the same way we treat areas unserved by cable). We are also aware that MediaPrints may not include every cable network, but we believe the ones it excludes are smaller and are more likely to be one-way plants.

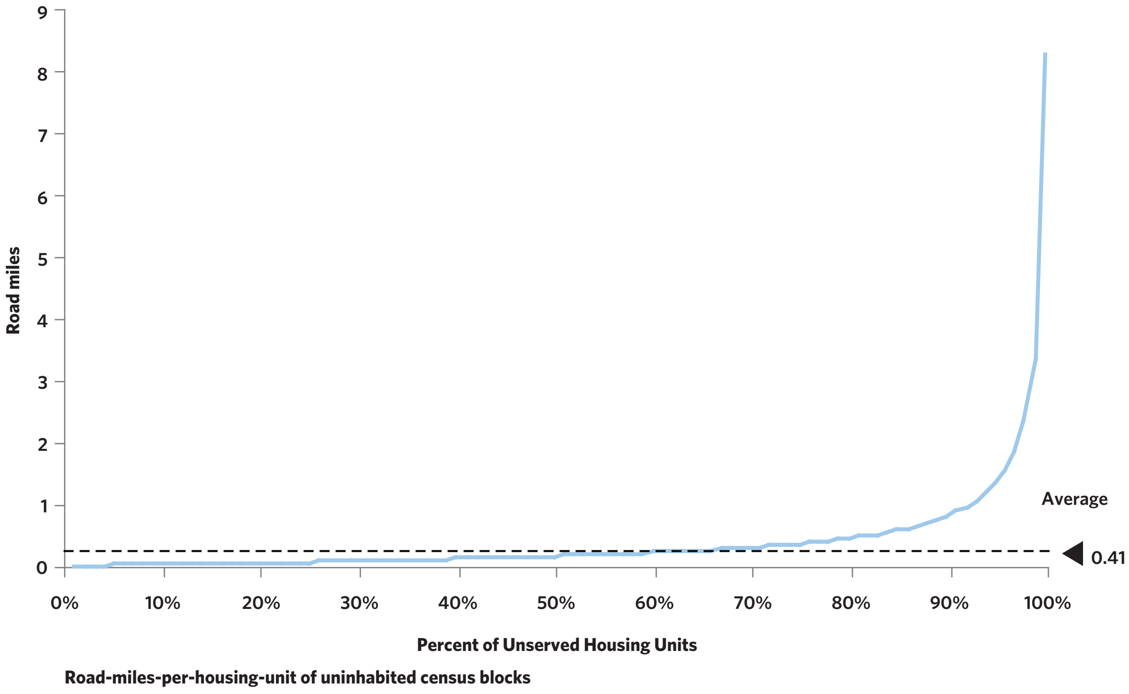
Another limitation is that the MediaPrints data do not allow us to distinguish between areas that have been upgraded from DOCSIS 2.0 to DOCSIS 3.0. In the absence of a data source that identifies the areas where DOCSIS 3.0 has been rolled out, we resort to mapping only the markets where we were able to find public announcements about DOCSIS 3.0 deployments at the time of analysis. This method understates the number of homes passed by DOCSIS 3.0 especially since the DOCSIS 3.0 rollouts proceeded quickly even as the analysis continued. But given that DOCSIS 2.0 areas exceed the broadband target speed of 4 Mbps download and 1Mbps upload, this underestimation does not affect the number of unserved or, therefore, the Investment Gap.

We are not able to acquire cable infrastructure data aggregated by any commercial or public source other than in the state of Massachusetts. These data are of limited use in the state of Massachusetts and, as we explain below, are of limited value for our nationwide analysis.

Risks

As stated previously, we may underestimate the number of housing units served in some areas since MediaPrints does not have data for every cable system, but we believe this number is small. This underestimation may be balanced by the fact that broadband availability is likely slightly overstated in the areas where MediaPrints has franchise data; this is due to the fact that cable operators do not typically build out service to every housing unit in their franchise area. We do not believe this overestimation to be significant because even large cable operators with large franchise areas tend to build out broadband to the vast majority of homes passed.[8] See Exhibit 2-H.

Exhibit 2-G:
Linear Density of the Unserved, Ratio of Road Miles to Housing Units



We attempt to correct for this overestimation by comparing the MediaPrints franchise boundaries with actual cable strand maps from the state of Massachusetts.[9] In Massachusetts, operators must provide strand maps to the franchise board, which then publishes them into the public record. Unfortunately, with limited actual information available, we are unable to do a comprehensive comparison. As a result, there is not a pattern to the overestimation that could be applied nationwide.

Capabilities

As discussed in the section on hybrid fiber-coaxial (HFC) technology later in this document, we assume broadband-enabled cable networks are capable of delivering at least 10 Mbps actual download speeds, and those that have been upgraded to DOCSIS 3.0 are assumed to deliver 50 Mbps actual download.

Telco

Since we are not able to acquire a nationwide data set of either availability as a functon of broadband speed or telco infrastructure, we have to take a different approach to model telco. For telco networks we take a five-step approach to calculating availability nationwide:

1. Map availability data in areas where these data are available
2. Use telco infrastructure and engineering assumptions to estimate availability in areas where infrastructure data are available
3. Create a multivariable regression equation using demographic data (the independent variables) to predict broadband availability (the dependent variable), using states where availability data are available as sources for the regression
4. Apply regression equation to areas of the country where only demographic data exist to estimate speed availability
5. Use engineering principals and assumptions to infer infrastructure for estimated speed availability

Data sources

Although a nationwide data set of broadband availability consistent with the 4 Mbps download target is not available, there are a few states that have published availability data at different performance levels. The analysis relies on availability data from the states of California, Minnesota and Pennsylvania, and a combination of availability and infrastructure data is used from the states of Alabama and Wyoming.[10]

Some nationwide telco infrastructure data are used in conjunction with engineering principles and performance availability to more accurately estimate infrastructure locations. These data include locations of telco network nodes, such as central offices and regional tandems, from the Telcordia's LERG database, wire center boundaries from TeleAtlas and location of fiber infrastructure from GeoTel and GeoResults.

In addition to performance availability data and infrastructure data, demographic data are in the regression. These data are based on census forecasts from Geolytics for consumers and GeoResults for businesses.

We are forced to use a statistical model for telco plant because we are not able to acquire a nationwide data source of availability or telco infrastructure locations. An ideal data set for these purposes would focus on actual speed available (not on demand or subscribership), would be geographically granular (to distinguish among service speeds at longer loop lengths) and would provide information about the location of infrastructure (to feed into the economic model).

Unfortunately, no available data source meets all these requirements. Telcordia states that the CLONES database has the locations of all relevant telco infrastructure nationwide, but the FCC was not able to negotiate mutually agreeable license terms.

Data from the FCC's Form 477 are useful for many types of analysis; but, given that Form 477 data are collected at the census tract level, they are not granular enough to accurately estimate service availability and speed as noted in the September 2009 Open Commission Meeting. In the upper left

Exhibit 2-H:
Cable Broadband Deployment for a Few Large MSOs as a Percentage of Homes Passed

Company	Cable Broadband Deployment (as of March 31, 2009)	Homes Passed (Millions)	Percent of Cable Homes Passed
Cablevision	100.0%	4.8	4%
Charter	94.9%	11.3	9%
Comcast	99.4%	50.6	40%
Mediacom	100.0%	2.8	2%
TWC	99.5%	26.8	21%

of Exhibit 2-I, we create an example of what perfect information on availability might look like. However, as noted in the lower left, Form 477 data provide information about the number of subscribers at a given speed, not the availability of service. Therefore, using Form 477 data to estimate availability requires making several assumptions as noted in the upper right of the exhibit. The result of these assumptions, as noted in the lower right, is that we are likely to overestimate the availability of service by relying on data collected at the census-tract level.

The ongoing efforts by states to map broadband availability, as coordinated by the NTIA as part of the Broadband Data Improvement Act[11] and funded by the Recovery Act,[12] may lead to a nationwide availability map that will be useful in this type of analysis, but the map will not be available until early 2011.

Statistical modeling where data did not exist

To estimate availability where no actual performance availability or infrastructure data exist, we create a regression equation that represents the relationship between demographic data and broadband availability data. The multivariable regression is based on more than 100 variables from population density to income levels to education levels. After determining how best to express the variables (in many cases by using their logarithms), initial models are estimated at all target speeds (ranging from 768 kbps to 6.0 Mbps) for each census block, using both forward and backward stepwise logistic regression. We use a logit regression rather than continuous so that we could use different variables and different weightings for each of the target speeds. Separate regressions are made for different speeds (768 kbps, 1.5 Mbps, 3.0 Mbps, 4.0 Mbps and 6.0 Mbps) inside and outside the cable franchise boundaries, for a total of 10 logit regressions. Accuracy rates among the 10 models were typically between 80% and 90%. Additional information on development of these statistical equations can be found in Attachment 4 of CostQuest Model Documentation.

We then use that series of statistical equations to predict broadband availability (from telco networks) at different speeds in each census block based on their demographics. This availability estimate is used to help determine what census blocks are unserved. Next, we estimate the location of network infrastructure necessary to provide that predicted level of service according to the approach outlined below. The network infrastructure location information generated by this current state model is fed into the economic model so the costs of upgrading and extending networks can be estimated accurately.

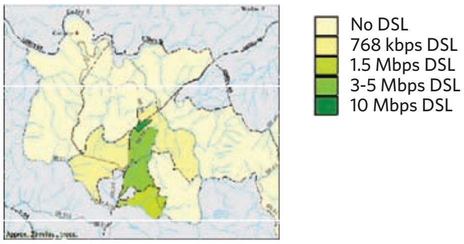
Risks

As with any statistical method, there will be errors (either over- or under-predicting the availability at a given speed) in any single, particular, small geography. However, we believe the results should be correct in aggregate. Even though we are able to achieve accuracy rates between 80% and 90% when we apply the regression to areas of known performance, the main risk in this approach is the possibility of systematic differences between the states for which we have data and the states for which we do not.

Since the statistical regression relies on a small number of states, to the extent that the tie between demographics and

Exhibit 2-I:
Assumptions Required to Use Tract-Level Data Likely Overestimate Availability

It is **unlikely that service is evenly distributed throughout a given census tract**



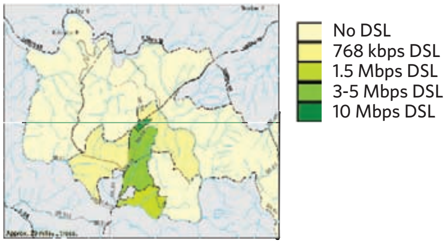
Form 477 was **not designed to address this distribution question**

Census tract	Housing Units	Total ADSL subs	ADSL: 768k–1.5Mbps	ADSL: 1.5–3.0Mbps	...
3749265	1,229	208	6	97	

As a result, minimal **assumptions are necessary in order to make any estimate**

1. Service available anywhere in a tract is available to every housing unit (HU) in that tract
2. The speed provided to the highest-speed HU in each tract is available to every HU in that tract

These necessary assumptions **probably overstate availability**



Sources: Census Bureau; March 2009 Form 477 data; OBI analysis network availability in the rest of the country is not the same as these states, the regression will not be accurate. The states we used in our analysis have a wide variety of rural and urban areas and have varied geographic challenges which are advantageous, but there is no way to verify our outputs without additional data.

Aligning infrastructure with availability data

We estimate the current state of broadband-capable networks using speed availability data and infrastructure data. In the areas where we have infrastructure data we use engineering assumptions to estimate speed availability. In areas where we have availability by speed we use engineering assumptions to estimate the likely location of infrastructure. In this way we are able to estimate both availability by speed and infrastructure locations nationwide.

Exhibit 2-J illustrates these two approaches. On the right-hand side is an illustration of determining speed availability from infrastructure. Imagine that data indicate the presence of a Digital Subscriber Line Access Multiplexer (DSLAM) at No. 1. Using the location of the DSLAM as a starting point, we can trace out a distance along road segments that corresponds to availability for a given speed; for 4 Mbps service, that distance is approximately 12,000 feet.

On the left-hand side is an illustration of determining infrastructure from speed availability. Imagine that we have data for the area shaded in blue that indicates it has 4 Mbps DSL. We know then that homes can be a maximum of 12,000 feet from a DSLAM. Standard engineering rules, combined with clustering and routing algorithms, allow the model to calculate the likely location of efficiently placed infrastructure. See CostQuest Model Documentation for more information.

Wireless

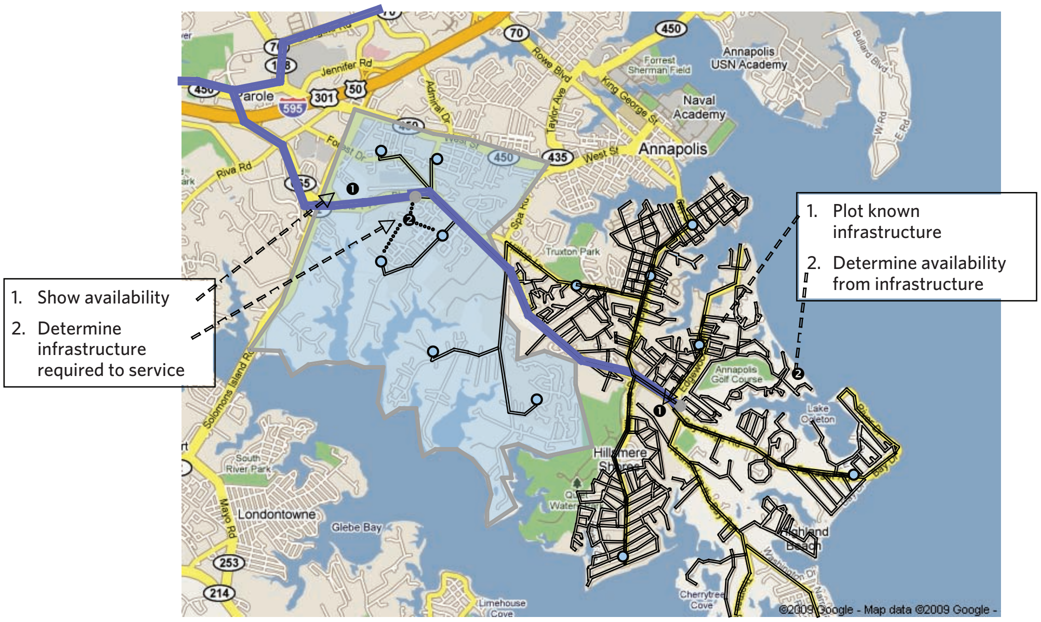
We rely on a nationwide data set of performance availability for wireless networks as well as infrastructure data in the form of tower site locations. With these two data sets we are able to estimate current availability as well as potential infrastructure locations that could be used to deploy into unserved areas. We do not create a full propagation model but rather, rely on coverage data to determine availability.

Data sources

In order to identify areas where wireless networks are located, we license a commercial data set from American Roamer. This data set provides wireless coverage by operator and by network technology deployed. The wireless technology deployed allows us to estimate the speeds available. As noted in the National Broadband Plan, American Roamer data may overstate coverage actually experienced by consumers as they rely on advertised coverage as provided by many carriers, who may all use different definitions of coverage. These definitions may differ on signal strength, bitrate or in-building coverage.

American Roamer only recently started mapping Wireless Internet Service Providers (WISP) coverage and estimates it has mapped only 20% of WISPs. We do not include WISP coverage in our model due to the current scarcity and reliability of the data.

Exhibit 2-J:
Aligning Infrastructure with Availability



Like telco infrastructure, wireless infrastructure location information (typically towers) is fed into the economic model so the costs of upgrading and extending networks can be calculated accurately. We used Tower Maps data to identify the location of wireless towers in unserved areas that could be used for fixed wireless deployments.

Risks

We potentially overstate the current footprint because what is commercially available is typically based on carrier reported data, perhaps at relatively low signal strength. Overstating the current footprint could lead us to underestimate the cost of future wireless build outs to provide service to the areas currently unserved.

FUTURE STATE

We do not expect the number of unserved housing units to decline materially between now and 2013. Our analysis indicates that most unserved areas are NPV negative to serve with broadband, and so we have made the conservative assumption that there will be few new or upgrade builds in these areas. While significant investments are being made to upgrade the speed and capacity of broadband networks, those investments tend to be made in areas that are already well served. Moreover, those network upgrades are not ubiquitous throughout currently served areas. Therefore, as applications become more advanced and higher performance networks are required—i.e., if the broadband target grows significantly over time—the number of people with insufficient broadband access may actually increase.

Wired network upgrades

Both telephone and cable companies are upgrading their networks to offer higher speeds and greater-capacity networks. Cable companies are upgrading to DOCSIS 3.0, which will allow them to transfer to broadband some of the network capacity that is currently used for video. Telephone companies are extending fiber closer to end-users, in some cases all the way to the home, in order to improve the capacity and speed of the network. Besides providing a faster, higher-capacity broadband network, once fiber is within approximately 5,000 feet of the home, the network has the ability to offer multi-channel video services in addition to broadband and voice.

The Columbia Institute for Tele-Information recently released a report called "Broadband in America" in which it tried to identify as many of the major publically announced network upgrades as possible. Verizon has announced that it plans to pass 17 million homes by 2010 with its fiber-to-the-premises (FTTP) service called FiOS.[13] Many other small incumbent local exchange carriers (ILECs) also plan to aggressively build FTTP networks where it makes financial sense.[14] AT&T has announced that it will build out FTTN to 30 million homes by 2011.[15] This means that at least 50 million homes will be able to receive 20 Mbps+ broadband from their local telco within the next two years. The cable companies have also announced upgrades to DOCSIS 3.0 over the next few years with analysts predicting cable operators will have DOCSIS 3.0 covering 100% of homes passed by the end of 2013.[16] Exhibit 2-K highlights some of the major publicly announced upgrades to wired broadband networks.

As shown in Exhibit 2-L, for proven technologies, when operators publically announce plans to upgrade their network, they tend to complete those builds on time.

Using these public announcements and our current availability assessment, we create a forecast of wired broadband availability in 2013. We assume that FTTP and upgrades will take place in markets with cable that will be upgraded

Exhibit 2-K: Publicly Announced Wired Broadband Upgrades

Technology	Companies	2009	2010	2011
FTTP	• Verizon • Cincinnati Bell • Tier 3 ILECs	• All providers (17.2MM—as of Sept) • Verizon FiOS (14.5MM– as of June)	• Verizon FiOS (17MM)	
FTTN	• AT&T • Qwest	• Qwest (3MM)	• Qwest (5MM)	• AT&T U-verse (30MM)
DOCSIS 3.0	• Comcast • Cablevision • Cox • Knology • Time Warner • Charter • Mediacom • RCN	• Comcast (40MM) • Charter (St. Louis) • Mediacom (50% of footprint) • Knology (50% of footprint) • RCN (begin deployment)	• Comcast (50MM) • Cablevision (entire footprint) • Cox (entire footprint) • Time Warner (New York City) • Knology (entire footprint)	

Exhibit 2-L:
With the Exception of Satellite, Most Announced Broadband Deployments are Completed on Schedule

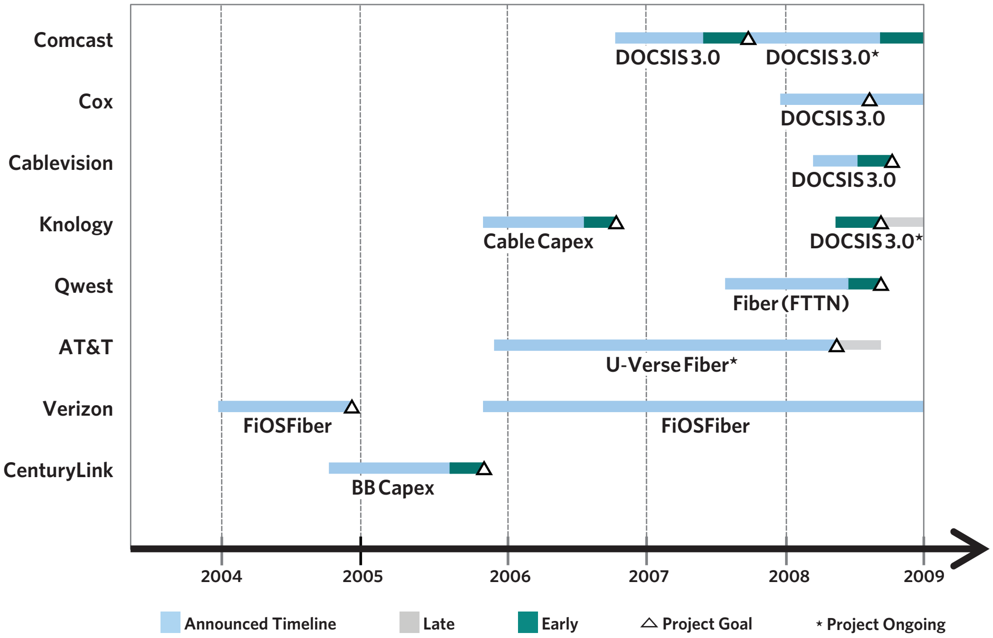
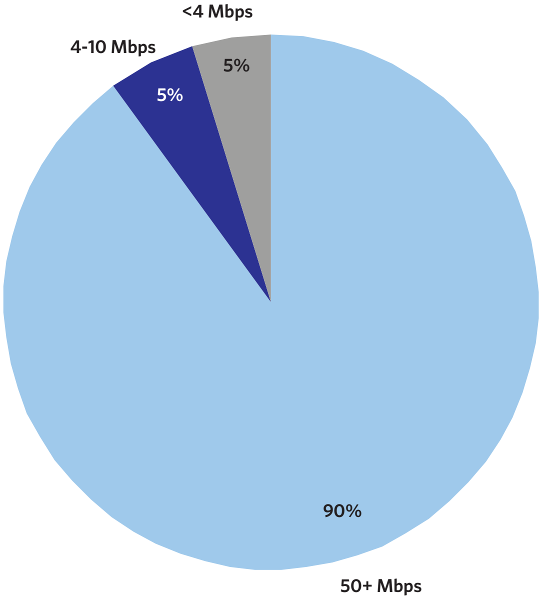


Exhibit 2-M:
Projected 2013 Availability of Broadband Capable Networks



Fastest downlink speed capability of broadband networks
Percent of U.S. population with network availability, Mbps

to DOCSIS 3.0. Therefore, as Exhibit 2-M shows, all of the announced upgrades will likely take place in areas that were already served. Without government investment, the difficult-to-reach areas will remain unserved while the rest of the country receives better broadband availability.

Wireless network upgrades

The wireless broadband networks are still in the nascent stages of development and continue to evolve rapidly with new technologies, applications and competitors.

Many operators still have significant areas covered by 2G technologies but have already announced upgrades to 4G data networks. Mobile operators are investing heavily in network upgrades in order to keep pace with exploding demand for mobile data services.

By 2013, Verizon plans to roll out Long Term Evolution (LTE) technology to its entire footprint, which covered 288 million people at the end of 2008.[17] AT&T has announced that it will undertake trials in 2010 and begin its LTE rollout in 2011. Through its partnership with Clearwire, Sprint plans to use WiMAX as its 4G technology. WiMAX has been rolled out in few markets already and Clearwire announced that it plans to cover 120 million people by the end of 2010.

For well-known technologies, when operators publically announce plans to upgrade their network, they tend to complete those builds on time. However, as was the case with WiMAX, when a technology is still being developed, technological issues can significantly delay planned deployments. LTE is an example of a new wireless technology that has not been deployed yet commercially on a wide scale so we must be cautious about planned deployment schedules.

As we discuss later in this document these commercial 4G build outs may not fully meet the National Broadband Availability Target without incremental investment; but the commercial investments in these deployments will certainly improve the incremental economics of 4G fixed wireless networks in those areas.

Due to the lack of geographic specificity and overlapping coverage areas we were not able to precisely forecast future wireless coverage speeds that will be available in years to come based on public announcements.

Satellite network upgrades

The capacity of a single satellite will increase dramatically with the next generation of high throughput satellites (HTS) expected to be launched in the next few years. ViaSat Inc., which acquired[18] WildBlue Communications in December 2009, and Hughes Communications Inc. plan to launch HTS in 2011 and 2012, respectively.[19] [20] These satellites each will have a total capacity of more than 100 Gbps, with some designated for upstream and some for downstream. After the launch of the new satellites, ViaSat expects to offer 2-10 Mbps downstream while Hughes suggests it will offer advertised download speeds in the 5-25 Mbps range.[21] Despite this additional capacity, our analysis suggests it will be insufficient to address more than 3.5% of the unserved. See Chapter 4 on satellite.

Conclusion

While such investments in technology and broadband networks may help bring faster speeds to those who are already served, and could potentially reduce the average cost per subscriber, it is far from certain that they will decrease the number of unserved.

Exhibit 2-N:
Publicly Announced 4G Wireless Deployments

Technology	Companies	2009	2010	2011	By 2013
LTE	▪ Verizon ▪ AT&T ▪ MetroPCS ▪ Cox		▪ Verizon (100MM) ▪ AT&T (Trials)	▪ AT&T (start deployment) ▪ Cox (start deployment) ▪ MetroPCS (start deployment)	▪ Verizon (entire network)
WiMAX	▪ Clearwire ▪ Open Range ▪ Small WISPs	▪ Clearwire (30MM) ▪ WISPs (2MM)	▪ Clearwire (120MM)		▪ Open Range (6MM)

Exhibit 2-O:
Specific Company Historical Performance Against Announced Completion Dates

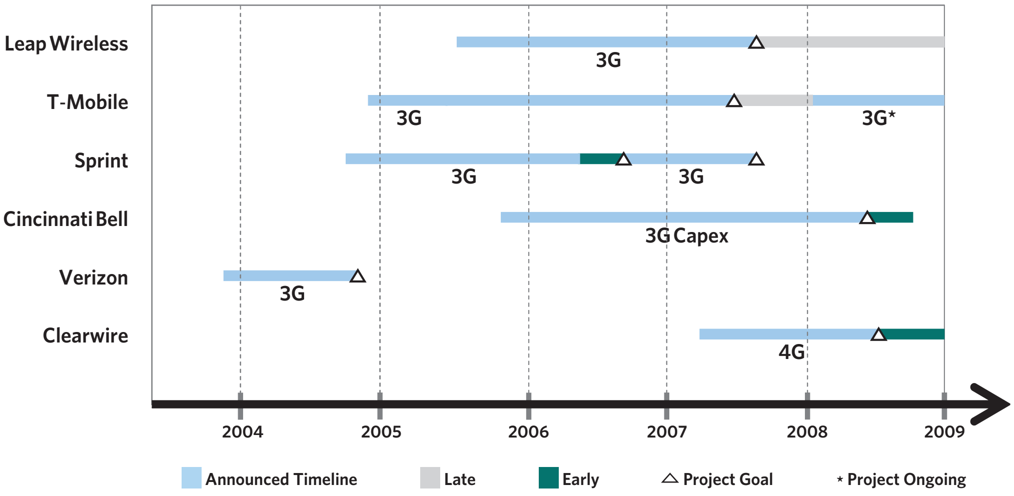


Exhibit 2-P:
Publicly Announced Total Near Term Satellite Broadband Capacity[22]

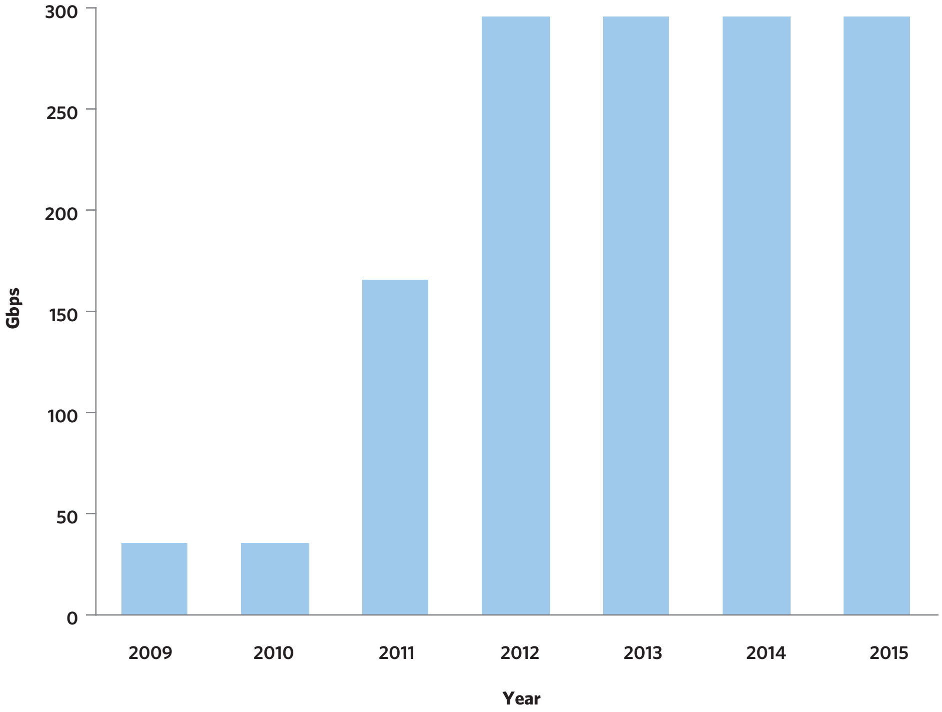


Exhibit 2-Q:
Commercial Data Sources Used to Calculate Availability

Vendor	Database	Use
American Roamer	Advanced Services	Wireless service footprint
Geolytics	2009 block estimates	Block level census estimates
	Estimates professional	Block group level estimates
GeoResults	National Business Database	Fiber served building (flag); business locations and demographics
GeoTel(imap)	MetroFiber	Metro Fiber Routes (GDT and Navteq)
	LATA Boundaries	Used for middle mile map to group switches into latas
	Fiber Lit Buildings (point)	Used to flag wire center boundaries as likely having fiber infrastructure
Telcordia	LERG	Switch office locations
TeleAtlas	Wire center boundaries	Wire center boundaries, domswitch, OCN, carrier name
	Zip code boundaries	Zip code boundaries
Tower Maps		Location of towers and sites
Warren Media	Warren Media	Cable-franchise boundary (by block group)

Exhibit 2-R:
Public Data Sources Used to Calculate Availability

Data Source	Database	Location
Alabama	State broadband availability	http://www.connectingalabama.com/ca/maps.aspx <http://www.connectingalabama.com/ca/maps/CBResults072909.zip>
California	State broadband availability	ftp://ftp.cpuc.ca.gov/Telco/Existing_Broadband_Service_Aggregated_072409.zip
Pennsylvania	State broadband availability	Available from Technology Investment Office
Minnesota	State broadband availability	Available from Technology Investment Office
Wyoming	State broadband availability	Available from State CIO
US Census	Tiger 2008	Blocks, Counties, Roads, Block Group Boundaries
	SF1	Summary File 1, US Census 2000
	SF3	Summary File 3, US Census 2000
FCC	Varies	Market Data Boundaries (adjusted for Census County Updates)
NECA	Tariff 4	PDF as filed 9/2009
Congressional Districts	110 Congress	http://www.nationalatlas.gov/atlasftp.html?openChapters=chpbound#chpbound

CHAPTER 2 ENDNOTES

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[1] DOCSIS 2.0 is capable of delivering ~10 Mbps, while DOCSIS 3.0 is capable of delivering ~50 Mbps. FTTN and FTTP can offer speeds well over 6 Mbps; however, the statistical-regression methodology used to estimate availability as a function of speed, combined with the source data for that regression, do not allow us to make estimates for telco-based service above 6 Mbps. *See* the Telco portion of this section for more detail.

[2] Mid-size carriers include Alaska Communications Systems, CenturyLink, Cincinnati Bell, Citizens Communications, Consolidated Communications, FairPoint Communications, Hawaiian Telecom, Iowa Telecom and Windstream.

[3] *See* Exhibit 4-BT for a description of middle versus second mile.

[4] The Broadband Data Improvement Act (BDIA), Pub. L. No. 110-385, 122 Stat. 4096 (2008).

[5] *See* Exhibits 2-Q and 2-R for a complete list of licensed data that we used.

[6] *See* Warren Media MediaPrints database, http://www.mediaprints.com/index.htm (accessed Aug. 2009) (on file with the FCC) (Warren Media database).

[7] *See* Warren Media MediaPrints database

[8] ROBERT C. ATKINSON & IVY E. SCHULTZ, COLUMBIA INSTITUTE FOR TELE-INFORMATION, BROADBAND IN AMERICA: WHERE IT IS AND WHERE IT IS GOING (ACCORDING TO BROADBAND SERVICE PROVIDERS) at 57 (2009) ("CITI BROADBAND REPORT"), available at http://www4.gsb.columbia.edu/citi/.

[9] Massachusetts General Laws Chapter 166A § 4 states, in part: "each applicant shall set forth as completely as possible the equipment to be employed, the routes of the wires and cables, the area or areas to be served." Upon its own investigation (Investigation of the Cable Television Division of the Department of Telecommunications and Energy on its Own Motion to Review the Form 100, CTV 03-3, November 30, 2004), the department (which became known as the "Department of Telecommunications and Cable" in April 2007) found, in part, at pages 18-19, that the statutory requirement referred to above is meant to promote "general use," and finds that "a strand map identifying the presence and location of the cable system within a specific community is sufficient to satisfy the statutory requirement." This order also finds that an issuing authority (a municipality) may request more detailed, technical information about a cable system than the cable plant map is required for general use, provided it is willing to enter into a non-disclosure agreement with the cable operator if requested.

[10] Infrastructure data were not accessed by the FCC directly but were analyzed for the FCC by a contractor with access to these data.

[11] The Broadband Data Improvement Act (BDIA), Pub. L. No. 110-385, 122 Stat. 4096 (2008).

[12] American Recovery and Reinvestment Act of 2009, Pub.L. No. 111-5, § 6001(k)(2)(D), 123 Stat. 115, 516 (2009) (Recovery Act).

[13] CITI BROADBAND REPORT AT 7.

[14] CITI BROADBAND REPORT AT 7.

[15] CITI BROADBAND REPORT AT 7.

[16] T. McElgunn, "DOCSIS 3.0 Deployment Forecast," Pike & Fischer, 2009.

[17] CITI BROADBAND REPORT AT 8.

[18] On October 1, 2009, ViaSat announced it had signed a definitive agreement to acquire privately held WildBlue. On December 15, 2009, ViaSat announced the completion of the announced acquisition; see ViaSat, WildBlue Communications Acquisition Closes, http://www.viasat.com/news/wildblue-communications-acquisition-closes (last visited Feb. 12, 2010).

[19] Letter from Mark Dankberg, Chairman & CEO, ViaSat, to Blair Levin, Executive Director of OBI, FCC, GN Docket Nos. 09-47, 09-51, 09-137 (Jan. 5, 2010) ("ViaSat Jan. 5, 2010 Ex Parte") at 2.

[20] Letter from Stephen D. Baruch, Counsel for Hughes Communications, Inc., to Marlene H. Dortch, Secretary, FCC (Oct. 26, 2009) ("Hughes Oct. 26, 2009 Ex Parte") at 6.

[21] CITI BROADBAND REPORT AT 57.

[22] Note that this forecast only includes publicly announced launches and not additional, planned launches that are likely. *See* Northern Sky Research, How Much HTS Capacity is Enough? (2009), http://www.nsr.com/AboutUs/PressRoom.html (last visited Jan. 20, 2010).