NYC Connected
April 2018

Truth in Broadband: Access and Connectivity in New York City

Mayor's Office of the
Chief Technology Officer

Foreword

We live in a world where technology is so integrated into daily life that making use of it can often be taken for granted. For many of us, technology is the medium for basic tasks like work, healthcare, banking, schoolwork, following current events, and staying in touch with friends and family. For the City, we rely on New Yorkers being able to use the City's digital services to access information and benefits.

Much of this technology interplay with our lives is anchored in access to the internet, or broadband connectivity, the very fundamental and essential ingredient to fully participating in today's world and economy. We've come to rely on the internet and the ease of access to information, services, and social connections that come with using it.

The unfortunate truth is that we cannot take broadband connectivity for granted. I'm not only referring to remote, rural areas of the country. As we see in this report, the number of people in New York City without a broadband subscription at home is equivalent to the population of Houston. Even those who have a connection may be struggling to afford it, or may have only a single option for broadband service. All of us are facing the federal government's removal of privacy and net neutrality protections which undermines our ability to rely on the internet as a safe and equitable platform.

Mayor Bill de Blasio has put forth a goal in OneNYC: The Plan for a Just and Strong City to bring high speed, affordable, and reliable broadband service to all residents and businesses everywhere in New York City by 2025. This goal does not stand alone. It is an integral part of all that we aim to achieve as a government and as a city. Without broadband for everyone, we cannot achieve the Mayor's vision to make New York City the fairest big city in America.

We've made progress holding internet service providers accountable for their commitments, launching the largest and fastest municipal free Wi-Fi program in the world, and delivering internet access directly to public housing residents. This report shows that we still have work to do. But now, for the first time, we have a comprehensive picture of the disparities in broadband across the city and how they tie to age, race, income, education level and where you live.

We used publicly available data to look at two essential dimensions of universal broadband: **access** (the service options we have); and **adoption** (those of us are actually subscribing to one of those service options). The data aren't perfect. Where the data fell short, particularly for more subjective areas like affordability and privacy, we asked questions and invited your responses.

The measurements in this report allow us and the public to benchmark the City's strategy to bring affordable and reliable broadband options to all New Yorkers. This report moves us one step closer to "Truth in Broadband," when all New Yorkers know what kind of internet service is available and how it compares with others across the city. As the gaps between different parts of the city and communities become clearer, we can join together to achieve the goal of #BroadbandForAll and #NYCconnected.

Miguel Gamiño, Jr.
Chief Technology Officer
City of New York

Acknowledgements

This report was developed by the NYC Mayor's Office of the Chief Technology Officer in close collaboration with the NYC Mayor's Office for Economic Opportunity's Poverty Research Unit and the NYC Mayor's Office of Data Analytics, as well as with contributions from the NYC Department of Information Technology and Telecommunications and the NYC Economic Development Corporation.

We would also like to thank our other contributors and reviewers.

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Introduction

Internet access is essential for full participation in our city and economy. Our goal is to make sure every New Yorker has a world-class connection to the internet, and is able to benefit from that access. To achieve this, we are investing in broadband infrastructure, creating new ways to bring service to all areas of New York City, and providing education and resources allowing all New Yorkers to thrive online. In *One New York: The Plan for a Strong and Just City*, the City made a commitment to ensure all its residents and businesses have access to broadband service with five initiatives to achieve this vision:

- Promote competition in the residential and commercial broadband markets,
- Provide high-speed residential internet service for low-income communities without internet service,
- Increase investment in broadband corridors to reach high-growth business districts, with a focus on emerging outer-borough hubs,
- Upgrade and expand public broadband to create high-speed citywide access, and
- Invest in innovative ways to provide high-speed internet to homes, businesses, and the public.[1]

The Mayor's Office of the Chief Technology Officer (MOCTO) has established NYC Connected as the program to implement the Mayor's commitment to connect every resident and business with affordable, reliable, high speed internet service by 2025.

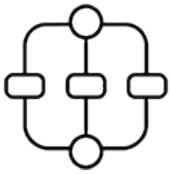
"Every resident and business will have access to affordable, reliable, high-speed broadband service everywhere by 2025."

One New York:
The Plan for a Strong and Just City

[1] *One New York: The Plan for a Strong and Just City*, The City of New York (2015), available at https://onenyc.cityofnewyork.us/ (hereinafter "OneNYC").

The Goals of NYC Connected

These goals all require “Truth in Broadband” – the empowerment of all New Yorkers with reliable, accessible information about the quality of their internet service, the availability of other options, and how those options compare with the rest of the city.



Ensure high-quality internet everywhere

We’re working to guarantee high-quality service and continuous improvements are available to the entire city.

Eliminate cost as a barrier to access

We’re making internet service affordable to ensure all New Yorkers can access this essential utility.

Make the internet a just and equitable platform

We’re educating and engaging our communities to support equitable use of the internet and to address the complexities that come with its expansion – especially issues of privacy and net neutrality.

Executive Summary

Broadband means always-on internet service capable of a certain speed. MOCTO has identified five principles for broadband service: Equity, Performance, Affordability, Privacy, and Choice. These principles are standards against which to judge the available service.

They are also guideposts for the City's own actions. This report describes how broadband service in New York City, and the infrastructure through which it is provided, currently delivers on these five principles:

Equity: Nearly one third of households (31%) in New York City lack a home broadband subscription. Pronounced inequities exist among income groups as well as other demographics, such as age, race, education, employment status, language, household size and disabilities status.

Performance: Nearly all of the city's census blocks have at least one option for broadband service available, but large sections of upper Manhattan, the south Bronx and central Brooklyn do not have gigabit-level service available. Nearly half of small businesses (44%) have no gigabit service option.

Affordability: Affordability is generally a factor of price and household income. The report includes information on these two factors, but does not draw a conclusion on what percentage of household income spent on broadband service is affordable.

Privacy: In the absence of federal privacy rules, internet service providers are now allowed to collect and use a wide range of customer data without seeking a user's explicit consent. Currently in New York City, it is practically impossible to have an internet service account and to use the internet for civic engagement, to pursue education, to do business, to seek employment, for recreation and entertainment and for safety and health purposes, without exposing sensitive information to an internet service provider.

Choice: More than two thirds of households (69%) and nearly three quarters of small businesses (72%) have only one or two options of broadband providers. Similarly, nearly three quarters of small businesses (73%) have fewer than three options for commercial fiber service, including fourteen percent (14%) that have no commercial fiber provider available in their census block.

In presenting the analyses in this report, we also discuss the limitations in the available data and the challenges that differing definitions of "broadband" pose for assessing the broadband access and connectivity in New York City. For example, the Federal Communications Commission Form 477 data counts any census block where an internet service provider has a single customer as having that level of service available across the entire census block, which may overstate the number of households and businesses that can readily obtain a broadband connection. The American Community Survey data on "broadband" subscribership is also likely an overcount because the category is not based on speed, but rather on technology, with options that would not meet the 25 megabits per second (Mbps) download and 3 Mbps upload benchmark for "broadband" service. Such shortcomings in publicly available data impact the ability to precisely reflect and track the availability and the adoption of broadband service in New York City and thus cannot depict with complete accuracy broadband service as all New Yorkers experience it.

Definitions and Data Sources

This report presents broadband access and connectivity in New York City according to the five principles of Equity, Performance, Affordability, Privacy, and Choice, based on analyses of publicly available data. This data includes the American Community Survey from the U.S. Census Bureau, which is gathered through surveys of residents; the Federal Communications Commission Form 477, which is self-reported by internet service providers; and information on neighborhoods, defined as Neighborhood Tabulation Areas (NTAs), from the New York City Department of City Planning. For businesses, we rely on InfoUSA June 2016 extract – verified businesses,[2] which is not publicly available but is the standard source for business-related analysis by the New York City Economic Development Corporation (EDC). This report focuses on data related to fixed broadband providers, not mobile service providers, satellite providers, or fixed terrestrial wireless providers, except where noted below.

The Federal Communications Commission (FCC) sets a standard for "broadband" as an internet service with a download speed of at least 25 megabits per second (Mbps) and an upload speed of at least 3 Mbps.[3] The City has endorsed this speed standard in comments to the FCC[4] and currently uses it as the standard measure for evaluating performance in New York City.

As we continue to use the internet for more things, the standard will need to go up. If the FCC does not adjust its broadband definition accordingly, the City could adopt its own standard. This way, "broadband" will always mean internet service that is fast enough for New Yorkers to take advantage of nearly everything the internet has to offer, and not to fall behind on access to important tools and resources.

The FCC collects data on fixed broadband providers twice a year through its Form 477 data collection.[5] The Form 477 is submitted by internet service providers (ISPs) and details the name of the company providing service, the census blocks in which service is provided, the maximum advertised upload and download bandwidth, and the technology used to provide service, among other indicators.[6] The ISPs submit their technology type to the FCC as "satellite," "asymmetric xDSL," "symmetric xDSL," "VDSL," "ADSL2, ADSL2+," "optical carrier/fiber to the end user," "cable modem-DOCSIS 1, 1.1 or 2.0," "cable modem-DOCSIS 3.0," "cable modem-DOCSIS 3.1," "cable modem other than DOCSIS," "terrestrial fixed wireless," "electric power line," or "other copper

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[2] According to the definition of small businesses from the NYC Department of Small Business Services, businesses are counted if employment size is no more than 120. *Hereinafter* "EDC Data."

[3] *2018 Broadband Deployment Report*, Federal Communications Commission, para. 15 (Feb. 2, 2018), *available at* https://apps.fcc.gov/edocs_public/attachmatch/FCC-18-10A1.pdf.

[4] *See* City of New York comments in the matter of Inquiry Concerning Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion (Thirteenth Section 706 Report Notice of Inquiry), Federal Communications Commission, GN Docket No. 17-199 (Sept. 21, 2017), *available at* https://www.fcc.gov/ecfs/filing/1092164733930.

[5] *Fixed Broadband Deployment Data from FCC Form 477*, Federal Communications Commission (Dec. 2016), *available at* https://www.fcc.gov/general/broadband-deployment-data-fcc-form-477 (*hereinafter* "FCC Form 477 Data").

[6] *Explanation of Broadband Deployment Data*, Federal Communications Commission (Nov. 20, 2017), *available at* https://www.fcc.gov/general/explanation-broadband-deployment-data.

wireline."[7] Any census block where an ISP delivers one connection is counted as having that level of service available across the entire census block. The City uses this data from the FCC to measure the speed aspect of broadband performance, as well as to document choice options and where in the city different providers offer broadband service.

The City does not use the FCC's data to assess broadband adoption because the data lacks sufficient geographic granularity, as noted above, and the ISP's self-reported data to the FCC on actual consumer subscribership is not publicly available.[8] The FCC has a pending proceeding regarding modernizing the Form 477 Data Program which seeks input from stakeholders on how to improve the accuracy and quality of Form 477 data and address gaps in data collection.[9]

Broadband price information is not always readily available and internet service offerings are not standardized across providers. The FCC does not comprehensively collect data on internet service pricing.[10] The City therefore does not analyze pricing in this report.[11]

The American Community Survey (ACS) is an annual survey undertaken by the U.S. Census Bureau that collects information on a wide range of demographic questions, as well as on internet subscribership and device access.[12] The ACS surveys a random, representative sample of households in every state, as well as Washington, D.C. and Puerto Rico. This report relies on said demographic data to determine broadband subscribership and access to computing devices in New York City at the household level.

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[7] *Technology Codes Used in Fixed Broadband Deployment Data*, Federal Communications Commission (last visited Mar. 9, 2018), https://www.fcc.gov/general/technology-codes-used-fixed-broadband-deployment-data.

[8] *See, e.g.*, Eric Null, *Why Can't the U.S. Government Make a Decent Broadband Map?*, Slate (Mar. 28, 2018), https://slate.com/technology/2018/03/why-cant-the-u-s-government-make-a-decent-map-of-broadband-access.html (noting that "without improving data collection, it's likely to be more of the same: ISP-reported data that paints a rosy picture of broadband availability and competition in the United States.").

[9] Modernizing the FCC Form 477 Data Program (Further Notice of Proposed Rulemaking), Federal Communications Commission, WC Docket No. 11-10, 82 Fed. Reg. 40118 (Aug. 24, 2017). The City filed comments in this proceeding as well. *See* City of New York reply comments in the matter of Modernizing the FCC Form 477 Data Program (Further Notice of Proposed Rulemaking), Federal Communications Commission, WC Docket No. 11-10, 82 Fed. Reg. 40118 (Oct. 24, 2017), *available at* https://www.fcc.gov/ecfs/filing/1024631803665.

[10] We note that the FCC does collect some pricing data in specific circumstances, such as from schools and libraries that participate in the E-rate program, which subsidizes internet access to those institutions. *See* Modernizing the E-rate Program for Schools and Libraries (Report and Order and Further Notice of Proposed Rulemaking), Federal Communications Commission WC Docket No. 13-184, 79 FR 49159 (Jul. 23, 2014) and 47 C.F.R. § 54.504(a)(2).

[11] The Appendix does include residential pricing information, provided in January and February 2018 by the four ISPs that offer broadband service to the most number of census blocks in NYC – Verizon, Charter, Altice, and RCN. Census block information is based on FCC Form 477 Data.

[12] *American Community Survey*, United States Census Bureau (2016), https://www.census.gov/programs-surveys/acs/ (data available at https://www.census.gov/programs-surveys/acs/data.html). Data is available to the public in Public Use Microdata Area (PUMAs), geographic areas consisting of at least 100,000 people).

ACS defines "broadband" based primarily on the technology used (as understood by respondents), rather than the specific upload and download speed of a connection. Fiber, cable and digital subscriber line (DSL) services are grouped together in the survey, even though DSL is not generally capable of delivering a 25 Mbps download speed, and cable service may be delivered at speeds below that level. The City therefore uses ACS data as a means of comparison for purposes of equity across other demographic categories, but not as a means of evaluating the principle of Performance, for which the City uses speed data.

The City has used the percentage of households with an internet subscription of any kind, from the ACS, as the key indicator for broadband in OneNYC and subsequent progress reports. The most recent ACS has implemented changes in how broadband is defined and how questions about broadband are asked. The 2016 ACS includes five categories for paid internet service to the household:

- "broadband (high speed) internet service such as cable, fiber optic, or DSL service installed in this household,"
- "cellular data plan for a smartphone or other mobile device,"
- "satellite internet service installed in this household,"
- "dial-up internet service installed at this household," and
- "some other service."[13]

These changes make it impossible to compare this year's results perfectly with past years. However, they provide a clearer summary distinction between having broadband and not having broadband. The ACS percentage of households without broadband is also a better measure of the gap in our universal broadband goal than the measure of those without any home internet service because the goal is a certain quality of connection for all New Yorkers, not just any connection.

Therefore, when using ACS data and as an overall key indicator of the success of the universal broadband program, we focus on the households who said they did or did not have a "broadband" subscription (cable, fiber optic, or DSL service) in their home. A smartphone with a data plan and internet access without a subscription are not included in the analyses in this report, though that data is available in the supporting tables prepared with this report.[14] We also note that the ACS percentage for broadband is likely an overcount because, as mentioned, the category is not based on speed, but rather on technology with options that would not meet the FCC's 25 Mbps/3 Mbps standard for "broadband."

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[13] For the full 2016 questionnaire, *see The American Community Survey Questionnaire 2016*, U.S. Department of Commerce, https://www2.census.gov/programs-surveys/acs/methodology/questionnaires/2016/quest16.pdf.

[14] Confusingly, the 2016 ACS data dictionary codes the "cellular data plan for a smartphone or other mobile device" category as "BROADB[A]ND." Additionally, the Census's American Fact Finder tables summarize the first three of the paid internet service options – all but "dial-up" or "other" – as "Broadband of any type." As discussed in the section above, the City disagrees with this categorization, as the maximum speeds available via these other technologies do not support speeds that meet the FCC definition of broadband of at least 25/3 Mbps. We therefore stress that the 31% figure in the section on Equity *underestimates* the number of New Yorkers who lack home broadband subscriptions.

Equity

The goal of universal broadband requires that no one will face a barrier based on who they are or where they are. Equity therefore applies across all the broadband principles. Disparities in access to affordable, reliable connections not only impact access itself, but also mean that improvements in internet service benefit some groups more than others.

We have used the 2016 American Community Survey data to review whether all New Yorkers have the ability to connect without facing a barrier due to their:

- Income level
- Age (for those 18 and over)
- Race
- Education
- Employment status
- Primary language
- Household size
- Disability

There are severe disparities across each of the above categories, as represented by the percentage of home broadband subscriptions for each demographic. There are also geographic disparities, both in rates of adoption and in the extent of broadband choice as discussed in that section, below.

The City plans to build on this report in the future with further analysis of related aspects of broadband access and use such as services provided via public Wi-Fi and public computer centers and the job opportunities and working conditions in the industry.

NEARLY ONE THIRD OF NEW YORK CITY HOUSEHOLDS LACK A HOME BROADBAND SUBSCRIPTION

Overall, the percentage of New York City households with no home internet subscription of any kind has changed little in the most recent data from the roughly 20% that was previously reported in the OneNYC 2017 progress report.[15] But a larger portion of the city – 31% of all households, according to the American Community Survey definition – do not have a broadband subscription.[16]

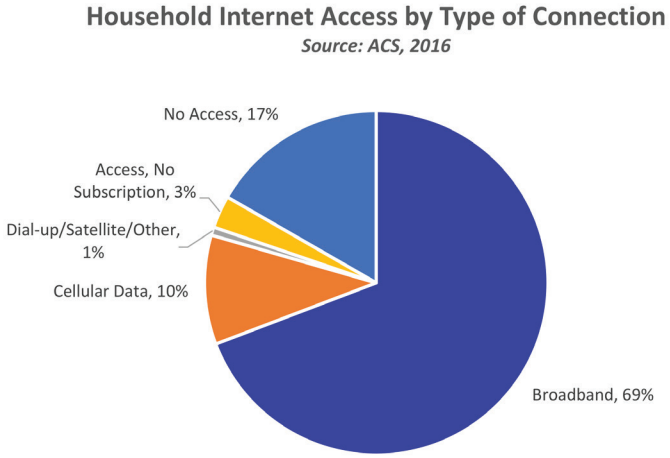

Figure 1

PRONOUNCED INEQUITIES EXIST AMONG INCOME GROUPS

Home broadband subscribership tracks closely with income level, and a large disparity exists between the high and low ends of the income spectrum. More than half (56%) of New York City's lowest-income households lack a home broadband subscription. This rate is nearly double that for the citywide population, and more than *five times* the rate for the highest-income households.[17]

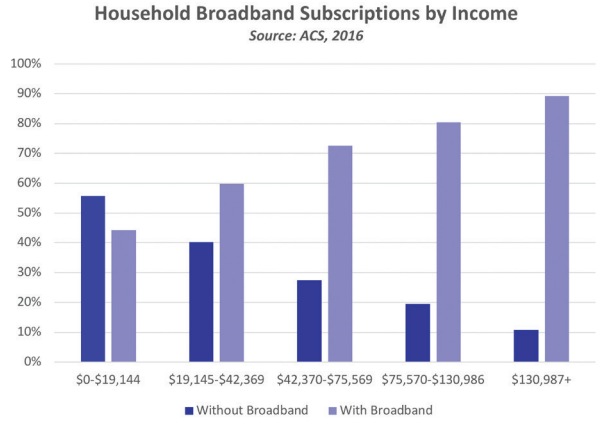

Figure 2

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[15] 2016 American Community Survey Public Use Microdata Sample (*hereinafter* "2016 ACS Data") *and* OneNYC 2017 Progress Report at p.74, *available at* http://onenyc.cityofnewyork.us/wp-content/uploads/2017/05/OneNYC_Progress_Report_2017.pdf.

[16] 2016 ACS Data. Figure 1 shows that 31% of New York City households lack a broadband subscription. The chart is based on the service reported that provides the highest possible speed to the household. Therefore, households reporting a "broadband" connection could also have a "cellular data plan," "satellite," "dial-up," and/or "other." Similarly, households reporting "cellular data" could also have "satellite," "dial-up," and/or "other," but not "broadband" service, which is capable of higher speeds than "cellular data." The other options, "dial-up/satellite/other," "access, no subscription," and "no access" are exclusive.

[17] 2016 ACS Data.

INEQUITIES EXIST ACROSS A RANGE OF OTHER DEMOGRAPHIC GROUPS

Age: New Yorkers of different ages have distinctly different rates of broadband subscribership, and older adults are particularly vulnerable to being disconnected. New Yorkers 65 and over are 1.65 times more likely than other age groups to lack a home broadband subscription. They are nearly three times as likely to lack any home internet subscription at all.[18]

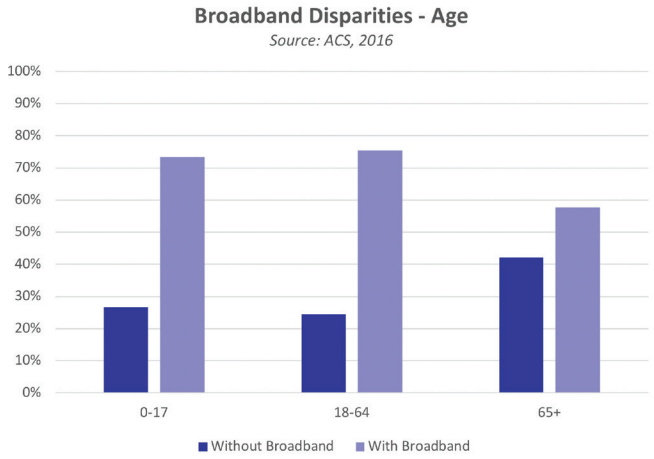


Figure 3

Race: Black and Hispanic New Yorkers have significantly lower rates of home broadband subscribership than White or Asian New Yorkers: 32% of Black New Yorkers and 33% of Hispanic New Yorkers lack a home broadband subscription, a figure that stands at 21% and 23% for White and Asian residents, respectively.[19]

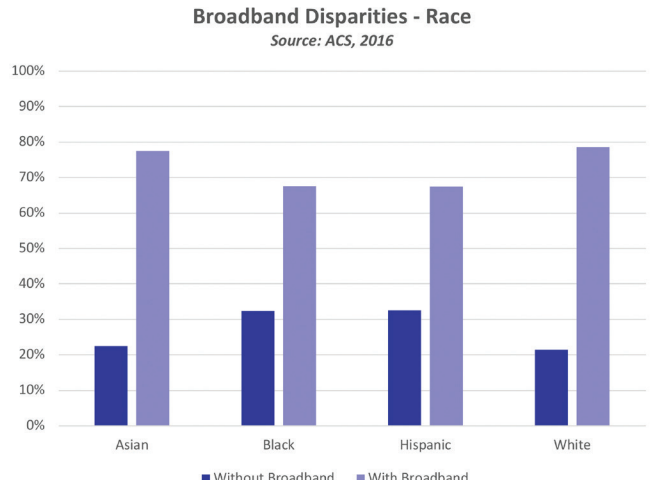


Figure 4

Formal Education: New Yorkers with lower levels of education are markedly more likely to be without a home broadband subscription: 31% of those with a high school degree/equivalency, and fully 45% of those with less than a high school degree/equivalency, lack a home broadband subscription. This is in contrast with only 15% of those with a bachelor's degree or higher lacking home broadband.[20]

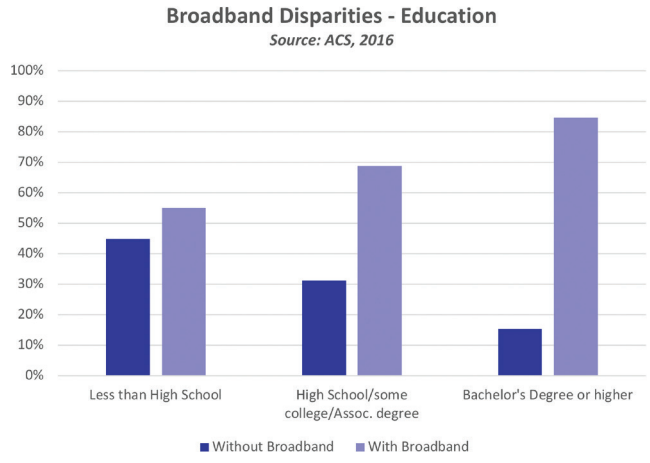


Figure 5

[18] 2016 ACS Data.

[19] 2016 ACS Data.

[20] 2016 ACS Data.

Employment status: Unemployed New Yorkers have slightly lower rates of broadband access at home than those who are employed. However, those who are outside the civilian labor force lack broadband subscriptions at a significantly higher rate.[21]

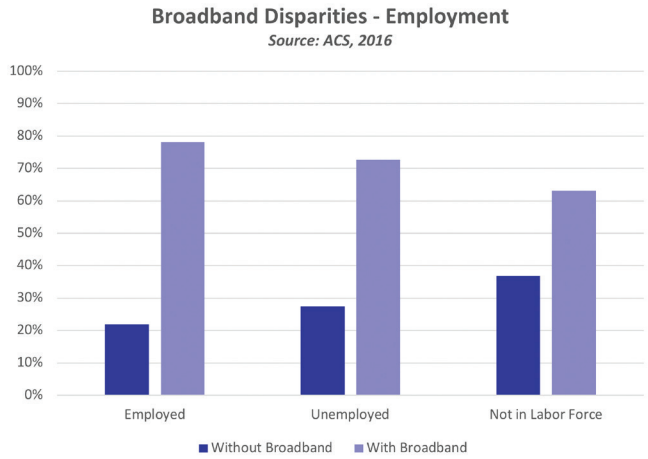


Figure 6

Language: Among those who speak New York City's four most common languages at home, those who speak Spanish and Chinese tend to have lower home broadband access than those who speak English and Russian.[22]

Household size: Forty-two percent of single-person households in New York City lack a broadband subscription.[23] For households with 2-7 people, this figure trends significantly lower, at around 25%. Thirty-six percent of 8-person households lack a broadband subscription.[24]

Disability status: New Yorkers who report a physical, mental or emotional difficulty/disability have significantly lower home broadband subscription rates than the general population.[25]

[21] 2016 ACS Data.

[22] 2016 ACS Data.

[23] 2016 ACS Data.

[24] 2016 ACS Data.

[25] 2016 ACS Data. Note that the analysis performed for this report combined all types of disabilities/difficulties included in the 2016 American Community Survey. For more detail on the questions asked therein, *see The American Community Survey Questionnaire 2016*, U.S. Department of Commerce, https://www2.census.gov/programs-surveys/acs/methodology/questionnaires/2016/quest16.pdf.

DEVICE ACCESS GENERALLY TRACKS WITH BROADBAND ACCESS

Access to a computing device[26] is indispensable to realizing the benefits of broadband. Rates of access to both a full-capacity device (laptop or desktop) and a home broadband subscription generally trend lower than home broadband alone, citywide, and the demographic factors associated with New Yorkers' ownership or use of computers tends to mirror the association with home broadband subscriptions.[27] For example, 36% of the lowest-income households have access to both a desktop or laptop and a home broadband subscription, while 88% of the highest-income households have access to both a laptop or desktop and a home broadband subscription.

Approximately 12% of households have no home access to a computing device of any kind and 7% of households report having access to only a smartphone to meet their online needs.[28]

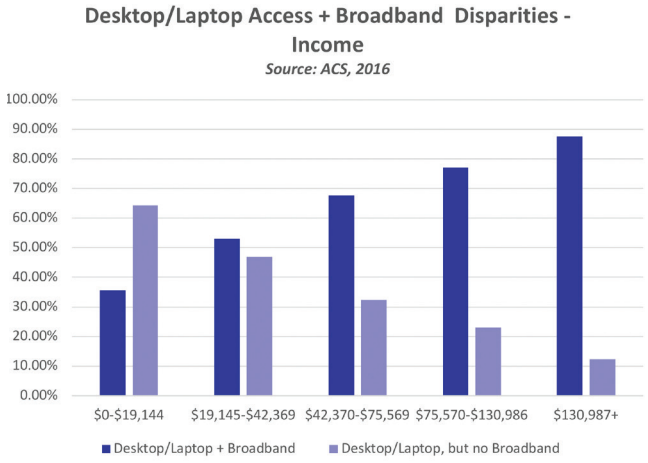


Figure 7

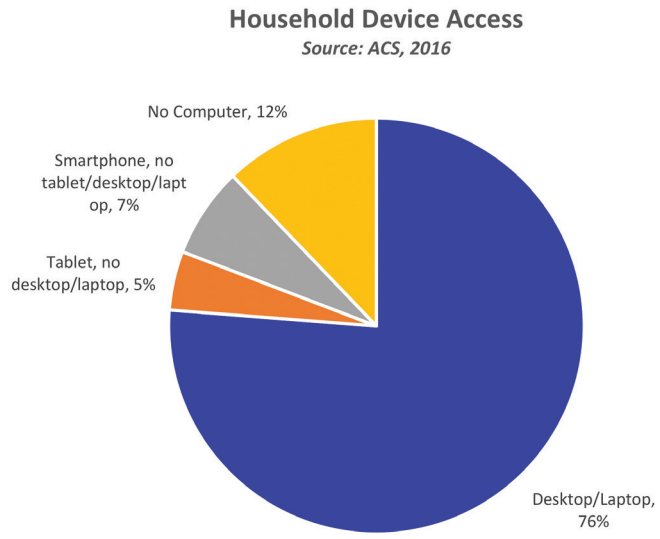


Figure 8

[26] Of any sort, including, but not limited to, desktops, laptops, tablets, and smartphones.

[27] 2016 ACS Data.

[28] 2016 ACS Data. In the pie chart showing household device access (Figure 8), households reporting ownership or use of a "Desktop/Laptop" could have access to tablets, smartphones and/or "other computers" as well. Households reporting having access to a "Tablet, no desktop/laptop" could have access to smartphones and/or "other computers" as well. Households reporting "Smartphone, no tablet or desktop/laptop" could have "other computers" as well.

Performance

The principle of Performance means that the internet should be fast and reliable, and the quality should improve over time. Wide disparities in performance levels can cause divides comparable to the one between having a connection and having none. Services and applications that are designed to serve only those groups who can access the higher levels of service gain benefits that are not available to others. Transitions to new standards, such as the wireless 5G standard currently under development, need to be completed quickly and universally throughout the city to avoid making current performance disparities even worse.

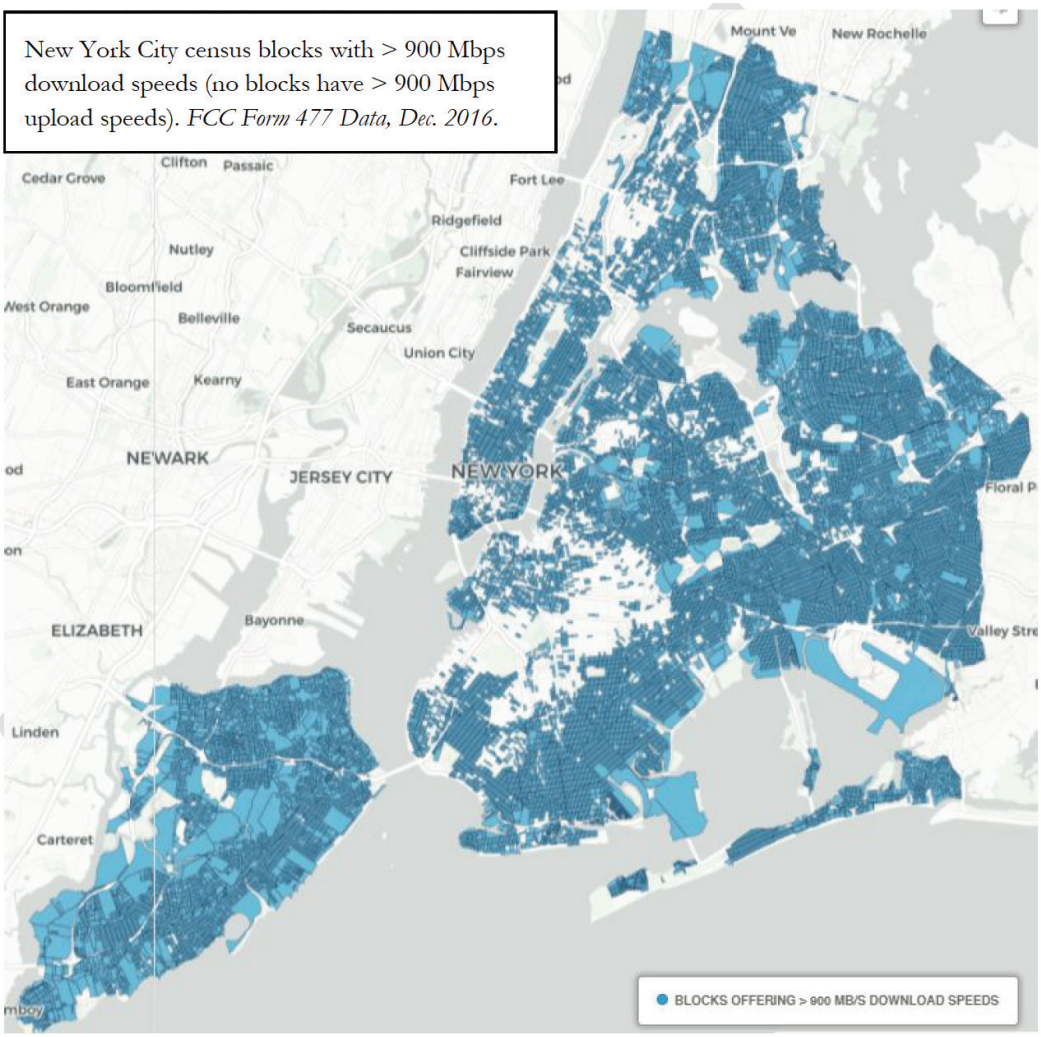
To meet the principle of Performance, the internet must also be reliable and resilient. New Yorkers should have internet service that works all day, every day, even during severe weather events, power outages, or other emergency conditions. New Yorkers should be able to know about the quality of their internet service and whether it deviates from what their provider has promised and what they deliver. New Yorkers should not have to worry that an ISP is slowing some content, prioritizing other content, throttling certain connections or generally not providing an open connection at the promised speed.

On January 22, 2018, MOCTO issued a Request for Information (RFI) seeking input from industry and subject matter experts to help implement a system for monitoring the quality and performance of internet service providers.[29] The data generated from such a system would be vital for consumers, planners, and regulators interested in promoting fair and trustworthy broadband and a free and open internet. Comments to the Truth in Broadband RFI were due on March 16, 2018.

[29] *NYC Connected Truth in Broadband Request for Information*, Mayor's Office of the Chief Technology Officer (Jan. 22, 2018), http://www1.nyc.gov/office-of-the-mayor/news/052-18/truth-broadband-mayor-s-office-issues-rfi-promote-open-transparent-internet.

NEARLY ALL NYC CENSUS BLOCKS HAVE A 25 MBPS SERVICE OPTION AVAILABLE

According to data provided to the FCC, 99% of census blocks in the city have at least one option for internet service at a 25 Mbps download speed.[30] This represents 100% of the city's households and 99.25% of businesses.[31]



New York City census blocks with > 900 Mbps download speeds (no blocks have > 900 Mbps upload speeds). *FCC Form 477 Data, Dec. 2016.*

Figure 9

[30] FCC Form 477 Data. Our discussion on Performance focuses on technologies that can deliver broadband speeds or higher and thus does not include internet service offered using DSL or legacy copper infrastructure.

[31] FCC Form 477 Data; 2016 ACS Data.

MOCTO has issued a request for information for citywide, gigabit-class broadband infrastructure.[32] 1000 Mbps (1 Gbps) does not have significant performance benefits over 999 Mbps, but it is helpful as a future threshold performance.

Currently, based on the available data, only one ISP reports to the FCC that they offer service at 1 Gbps in New York City.[33] A number of other providers offer "gigabit service" at download speeds up to 1 Gbps, especially at or above 900 Mbps thresholds. The map in Figure 9 shows where such service is available, by census block.[34]

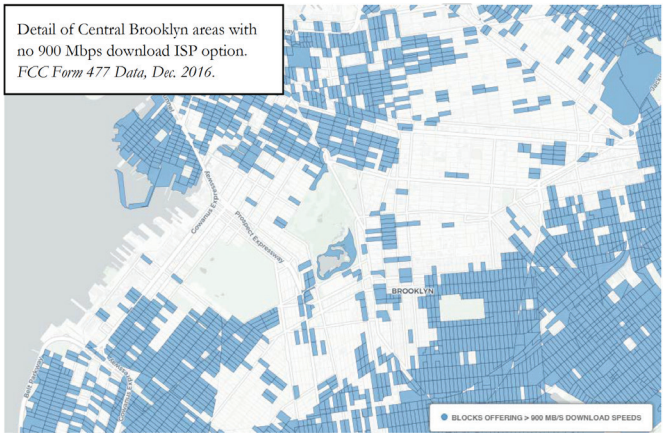


Figure 10

Figure 11

[32] *NYC Connected Citywide Broadband Request for Information*, Mayor's Office of the Chief Technology Officer (Nov. 14, 2017), https://tech.cityofnewyork.us/2017/11/15/mayors-office-of-the-cto-issues-rfi-on-citywide-broadband-deployment/.

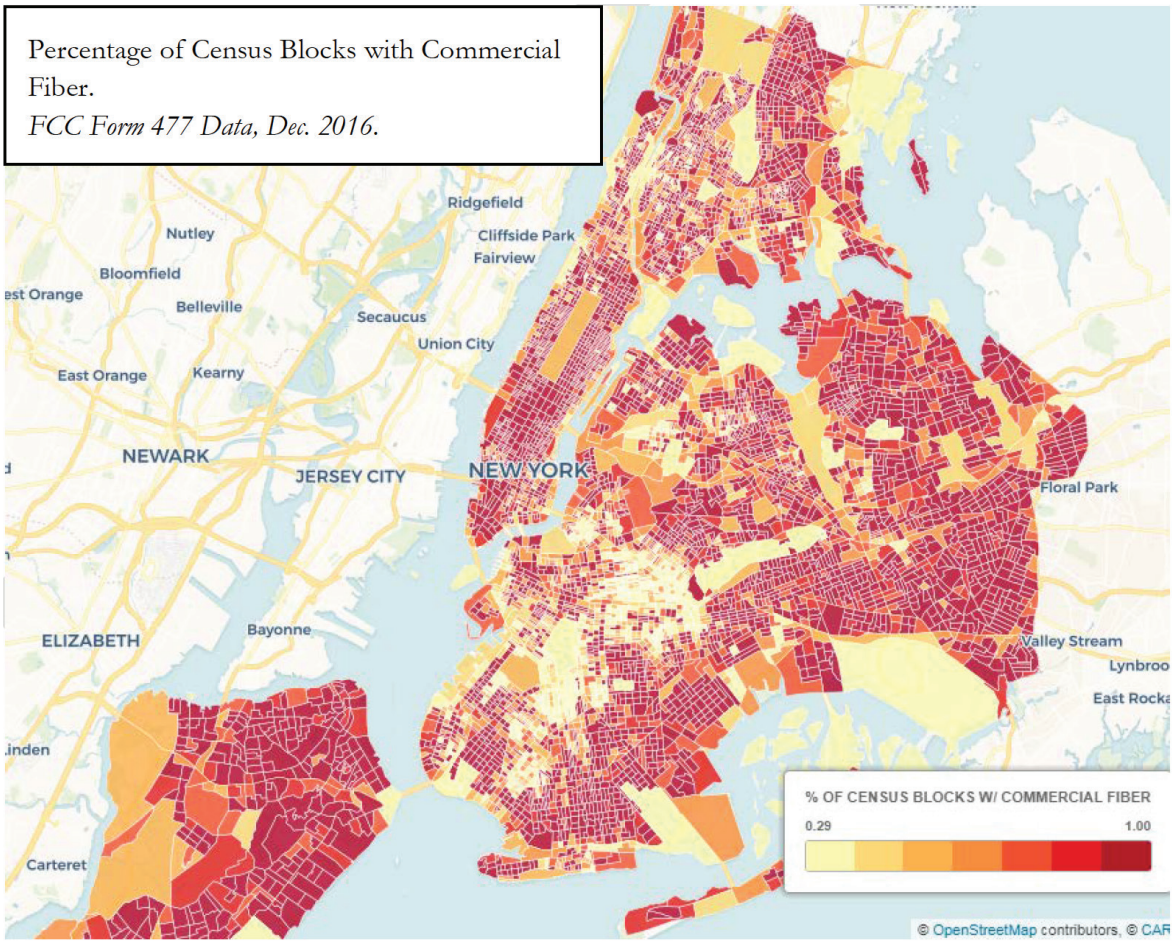
[33] FCC Form 477 Data.

[34] FCC Form 477 Data. This map includes providers offering download speeds greater than 900 Mbps, excluding the one provider who reported speeds at 1 Gbps, discussed above.

NEARLY HALF OF SMALL BUSINESSES HAVE NO 1 GBPS SERVICE OPTION

Nearly half (44%) of small businesses have no 1 Gbps service option.[35] If upper speed levels are not available at an affordable level throughout the city, it can limit what kinds of businesses can be in certain areas or the potential for businesses in certain neighborhoods to grow and adopt new technologies.

Commercial fiber providers, where available, can deliver nearly unlimited bandwidth. Monthly prices can vary significantly, but one of the main drivers of cost is the distance from a provider's current infrastructure. 86% percent of businesses are in census blocks where commercial fiber is already available.[36]



Percentage of Census Blocks with Commercial Fiber.
FCC Form 477 Data, Dec. 2016.

Figure 12

[35] FCC Form 477 Data; EDC Data.

[36] FCC Form 477 Data; EDC Data.

Affordability

The principle of Affordability is that cost should not be a barrier to any New Yorker who wants to connect to the internet. The price of internet service remains an important component of lower subscription rates among lower income households. The expense of a broadband connection, when combined with the cost for other basic services and the cost of housing, can be a significant contributor to the unaffordability of New York City for many households. Conversely, making broadband affordable can ease the monthly budgets of millions of New Yorkers struggling to pay all of their monthly bills.

Affordability is generally a factor of price and household income. Broadband price information is not always readily available and can be confusing to decipher since service may be bundled with phone or television, may not account for modem fees, and can be obscured by introductory discounts. Data on household income is available from the American Community Survey.

Affordability is not well understood as it applies to broadband, as opposed to something like rent where it is widely accepted that anything over a third of your monthly income would be unaffordable. Unlike rent or other utilities, which vary household to household, broadband price is generally fixed based on the provider and the product (there is some variation in New York City because every provider is not available to every household.) Table 1 shows what a standardized percentage would mean as a monthly price for different income levels.[37]

[37] As a point of reference, the International Telecommunications Union's (ITU) Broadband Commission has set 5% of gross national income per capita (GNI p.c., or the total income of a country divided by population) as a target for fixed broadband affordability for developing countries. *ICT Facts and Figures 2017*, International Telecommunication Union (July 2017), https://www.itu.int/en/ITU-D/Statistics/Documents/facts/ICTFactsFigures2017.pdf. The ITU found broadband prices for developed countries were 1.7% of GNI p.c. in 2013. *The World in 2013 ICT Facts and Figures*, International Telecommunications Union (Feb. 2013), https://www.itu.int/en/ITU-D/Statistics/Documents/facts/ICTFactsFigures2013-e.pdf. GNI or per capita income can skew a benchmark in areas with high income inequality.

TABLE 1 - Sample Broadband Monthly Price as a Percentage of Household Income Benchmarks[38]

Benchmark	HH Annual Income	Monthly Price as % of Household Annual Income						Percentage of NYC population at or above this income level	Percentage of NYC households at or above this income level
		0.5%	1%	2%	3%	5%	10%		
Example	$12,000	$5	$10	$20	$30	$50	$100	91.4%	88.5%
Federal poverty threshold	$19,078	$8	$16	$32	$48	$79	$159	84.6%	80.9%
Median income in the Mott Haven-Port Morris neighborhood in the Bronx	$20,334	$8	$17	$34	$51	$85	$169	83.1%	79.4%
NYCgov poverty threshold for a household of three	$27,951	$12	$23	$47	$70	$116	$233	76.8%	73.2%
Federal near poverty threshold	$28,617	$12	$24	$48	$72	$119	$238	76.2%	72.7%
Example	$36,000	$15	$30	$60	$90	$150	$300	69.8%	66.6%
NYCgov near poverty threshold	$41,927	$17	$35	$70	$105	$175	$349	64.9%	61.9%
Citywide median household income	$65,000	$27	$54	$108	$163	$271	$542	50.0%	47.4%
Median income in the Upper East Side - Carnegie Hill neighborhood in Manhattan	$155,213	$65	$129	$259	$388	$647	$1,293	15.9%	14.8%

[38] *The New York City Government Poverty Measure*, 2005-2015, New York City Mayor's Office for Economic Opportunity (Mar. 2017), *available at* http://www1.nyc.gov/site/opportunity/poverty-in-nyc/poverty-measure.page. Poverty threshold benchmarks in Table 1 were prepared using 2015 American Community Survey Public Use Microdata Sample data. Income threshold benchmarks in Table 1 were prepared using 2016 ACS Data.

Note that an affordable percentage based on a citywide income threshold will never be universally affordable. Affordability based on an area median income, for example, will be unaffordable for half of the households in that area by definition. For some households, the only affordable price will be free. To achieve universal affordability, a provider or providers will have to deliver a product at a low enough price to meet most people's needs; the remainder would have to be supported by other means, such as a discount option, the federal Lifeline subsidy program, or a free alternative.

Privacy

As the City of New York moves toward universal broadband connectivity for its residents, visitors, businesses, and institutions, current trends in the regulatory and political environment and in the broadband industry have created an urgent need for comprehensive privacy protections at the local level. Based on national research, the growing loss of online privacy appears to be having disproportionate impacts on low-income New Yorkers, those who are foreign born, and seniors.[39]

In early 2017, Congress voted to repeal critical privacy protections for internet users, and the President signed this joint resolution into law on April 3, 2017.[40] Under the Congressional Review Act,[41] this disapproval resolution also prohibited the nation's top telecom regulator, the FCC, from seeking to restore similar federal privacy regulations in the future.

In the absence of federal privacy rules, internet service providers are now allowed to collect and use a wide range of customer data without seeking a user's explicit consent. Currently in New York City, it is practically impossible to have an internet service account and to use the internet for civic engagement, to pursue education, to do business, to seek employment and for recreation and entertainment and for safety and health purposes without exposing sensitive information to an ISP. This leaves consumers exposed and with little to no control over how their personal data is used online; many consumers essentially must choose between having privacy and using the internet.[42]

ISPs are taking advantage of the federal deregulation, revamping their business models to make privacy a premium option for users who are willing and able to pay more. For example, in 2017, Verizon introduced a new program called Verizon Up, offering consumers discounts and perks for agreeing to share Web browsing history with "vendors and

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[39] Mary Madden, *Privacy, Security, and Digital Inequality: How Technology Experiences and Resources Vary by Socioeconomic Status, Race, and Ethnicity*, Data & Society (Sep. 27, 2017), https://datasociety.net/output/privacy-security-and-digital-inequality/; Kenneth Olmstead and Aaron Smith, *Americans and Cybersecurity*, Pew Research Center (Jan. 26, 2017), *available at* http://www.pewinternet.org/2017/01/26/americans-and-cybersecurity/.

[40] *See* Joint Resolution, Providing for congressional disapproval under chapter 8 of title 5, United States Code, of the rule submitted by the Federal Communications Commission relating to "Protecting the Privacy of Customers of Broadband and Other Telecommunications Services," Pub. L. No. 115-22, 131 Stat. 88 (2017), *available at* https://www.congress.gov/115/plaws/publ22/PLAW-115publ22.pdf.

[41] 5 U.S.C. §§ 801-802.

[42] *See Take It Or Leave It: How NYC Residents Are Forced to Sacrifice Online Privacy For Internet Service*, Digital Equity Laboratory, The New School (Mar. 2018), *available at* https://www.newschool.edu/digital-equity-lab/take-it-or-leave-it.pdf. This report, a first-of-its-kind "internet privacy" ranking for New York City, created scores based on 44 points of information for 15 indicators, including how accessible the privacy policies are, whether they are available in languages other than English, the companies' collection and sharing of user information, their retention of user information, their security practices, whether a customer can access their information and control how their information is used, among others. The report is highly critical of internet service provider privacy policies – of the 11 residential and mobile service providers examined in the report, the highest score was a 14.5 out of 44, the lowest score was an 8 out of 44, and seven out of the eleven ISPs scored within the 11-13 range.

partners."[43] These new types of programs should be carefully examined within the context of the research discussed below, which suggests the communities that are most likely to face household financial pressures to enroll in these programs may also be the most sensitive to privacy concerns.

A team of researchers from the University of Washington demonstrated that a malicious actor with about a thousand dollars could use mobile advertising networks to identify a person's precise location, learn details about them including demographics and the types of apps they have installed on their phones, and make correlations for even more sensitive discoveries.[44] At the same time, there is a growing market for consumer products that protect your privacy including services to regularly remove your information from data brokers, password managers, disposable email addresses to limit tracking across websites, and encrypted data storage. One researcher totaled this up to "$2,200 and countless hours trying to protect my privacy" over the course of a year, leading her to conclude that "privacy is becoming a luxury good."[45] Recent research shows that privacy issues disproportionally impact vulnerable populations, making this a clear issue of equity. One survey found that foreign-born Hispanics were the most likely demographic to feel as though they have "little or no control" over how much personal information is collected about them and how it is being used, while also having limited ability to use privacy-protecting tools and methods.[46] Another survey found that more than half of Americans age 50 and older feel less safe in recent years when it comes to their personal information, but this age group is also most likely to feel "password challenged," limiting how they can act on their own to protect their privacy.[47]

Within this void of protections at the national level and growing threats to privacy in the private sector, states and municipalities are exploring ways to protect their residents and visitors. Legislation has been introduced in at least 17 states, including in New York State.[48]

Links to the privacy policies of the four ISPs that offer broadband service to the greatest number of census blocks in New York City – Verizon, Charter, Altice, and RCN – are in the Appendix.[49]

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[43] Jon Brodkin, *Verizon wants you to give up Web privacy – in exchange for movie tickets*, Ars Technica (Aug. 3, 2017), https://arstechnica.com/information-technology/2017/08/want-verizon-rewards-just-let-vendors-and-partners-see-your-browsing-history/.

[44] Andy Greenberg, *It Takes Just $1,000 to Track Someone's Location with Mobile Ads*, Wired (Oct. 18, 2017), https://www.wired.com/story/track-location-with-mobile-ads-1000-dollars-study/.

[45] Julia Angwin, *Has Privacy Become a Luxury Good?*, The New York Times (Mar. 3, 2014), https://www.nytimes.com/2014/03/04/opinion/has-privacy-become-a-luxury-good.html.

[46] Mary Madden, *Privacy, Security, and Digital Inequality: How Technology Experiences and Resources Vary by Socioeconomic Status, Race, and Ethnicity*, Data & Society (Sept. 27, 2017), https://datasociety.net/output/privacy-security-and-digital-inequality/.

[47] Kenneth Olmstead and Aaron Smith, *Americans and Cybersecurity*, Pew Research Center (Jan. 26, 2017), http://www.pewinternet.org/2017/01/26/americans-and-cybersecurity/.

[48] *Status of Internet Privacy Legislation by State*, ACLU (accessed Feb. 26, 2018), https://www.aclu.org/issues/privacy-technology/internet-privacy/status-internet-privacy-legislation-state.

[49] Census block information is based on FCC Form 477 Data. Provider websites were last visited on Mar. 12, 2018.

Choice

The principle of Choice is that there should be enough competition to sustain the other principles. At a minimum, every household and business should have three options for broadband service to avoid a duopoly and ensure no area of the city faces a monopoly. Greater levels of choice may bring greater benefit, but three serves as a minimum threshold.[50]

As described above, the FCC's Form 477 appears to require ISPs to report service as "available" to a census block if service is available to any one end user premises within the census block. Therefore, the resulting data reported by the FCC to the public may appear as if service is available from a particular ISP to every household or business within a census block when in fact service may not be available to some or even many households or businesses within that census block.[51] Therefore, a census block could have "choice" according to this data while a household or building within the census block may, in fact, only be able to get service from one or two providers.

There are 10 ISPs that claim in their FCC Form 477 reports to offer broadband speeds to residential consumers[52] and 25 ISPs that claim in their FCC Form 477 reports to offer broadband speeds as a commercial service.[53] However, no provider offers fixed broadband service in every census block in the city.[54]

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[50] *Measuring the Information Society Report*, International Telecommunications Union (2014), https://www.itu.int/en/ITU-D/Statistics/Documents/publications/mis2014/MIS2014_without_Annex_4.pdf.

[51] The FCC Form 477 standard for whether service is "available" from a reporting ISP to a census block is different, in both language and substance, from the standards required to be met by the City's cable television franchisees under their respective franchise contracts with the City regarding deployment and service availability. Nothing in this report is intended to express or describe any information, conclusion or opinion on the degree to which any of these franchisees have or have not complied with their franchise contract obligations. Compliance with such obligations is the subject, as of the issuance of this report, of litigation between the City and Verizon New York, Inc. Questions have also recently been raised by the New York State Public Service Commission regarding the quality of broadband service reporting data submitted to that entity by Charter Communications, Inc.

[52] FCC Form 477 Data. (list derived from Dec. 2016 FCC Form 477 Data, as prepared by MODA, by excluding ISPs in NYC that report to: 1. offer commercial service, and 2. offer service using cable modem-DOCSIS 1, 1.1, or 2.0, cable modem other than DOCSIS, DSL, copper, terrestrial fixed wireless, or satellite technologies, leaving only residential providers using cable modem-DOCSIS 3.0 or 3.1 or optical fiber to the end user, chosen because those technologies are the only ones reported that typically provide access to speeds over 25/3 Mbps.). See Appendix.

[53] FCC Form 477 Data (list derived from Dec. 2016 FCC Form 477 Data by excluding ISPs in NYC that report to: 1. offer residential service, and 2. offer service using cable modem other than DOCSIS, cable modem other than DOCSIS, DSL, copper, terrestrial fixed wireless, or satellite technologies, leaving only commercial providers using cable modem-DOCSIS 3.0 or optical fiber to the end user, chosen because those technologies are the only ones reported that typically provide access to speeds over 25/3 Mbps.). *See* Appendix.

[54] FCC Form 477 Data.

69% OF HOUSEHOLDS HAVE ONLY 1 OR 2 CHOICES OF BROADBAND PROVIDERS

Based on the FCC's data, at least 69% of New York households lack access to more than two ISPs offering broadband service as defined here.[55] Within that total, at least 14%, again according to FCC data, have only one option for broadband service.

Households that have three or more options for their choice of broadband provider are heavily concentrated in Manhattan and Brooklyn, where 50% and 41% of households, respectively, are reported in the FCC data to have such choice.[56] In Queens, only 27% of households are thus reported to have such choice among three or more broadband providers.[57] In Staten Island and the Bronx, effectively none, 0.10% and 0.23%, respectively, are reported to have such choice.[58]

TABLE 2 - Percent of Households Served by 1 or More ISPs by Borough

Percent of Households Served by 1 or More ISPs by Borough

Source: FCC Form 477 Data, Dec. 2016, as prepared by MODA

Borough	1 ISP	2 ISP	3+ ISPs
Bronx	27.98%	71.79%	0.23%
Brooklyn	4.40%	54.71%	40.89%
Manhattan	18.76%	31.83%	49.41%
Queens	11.49%	61.17%	27.34%
Staten Island	8.45%	91.46%	0.10%
New York City	**13.54%**	**55.44%**	**31.02%**

[55] FCC Form 477 Data. "Neighborhoods," as noted above, are defined by Neighborhood Tabulation Areas (NTAs). See Appendix for map of New York City NTAs.

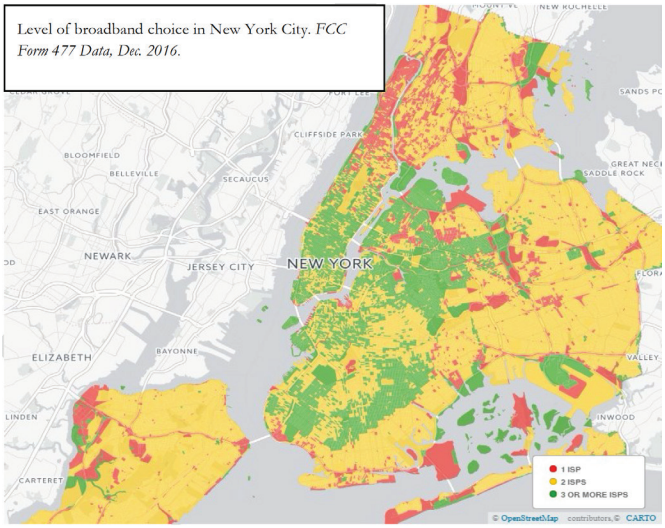
[56] FCC Form 477 Data.

[57] FCC Form 477 Data.

[58] FCC Form 477 Data.

72% OF SMALL BUSINESSES HAVE ONLY 1 OR 2 CHOICES OF BROADBAND PROVIDERS

Based on the FCC's data, at least 72% of New York City small businesses lack access to more than two ISPs offering broadband services as defined here.[59] Within that total, at least 13% of small businesses across New York City have, again according to the FCC's data, only one option.[60] Some, about 0.2%, appear to have no such broadband provider available.[61]



Level of broadband choice in New York City. *FCC Form 477 Data, Dec. 2016.*

Figure 13

TABLE 3 - Percent of Small Businesses Served by 0 or More Broadband ISPs by Borough

Percent of Small Businesses Served by 0 or More Broadband ISPs by Borough
Sources: FCC Form 477 Data, Dec. 2016 and EDC Data, as prepared by MODA

Borough	0 ISP	1 ISP	2 ISP	3+ ISPs
Bronx	0.12%	28.80%	70.90%	0.18%
Brooklyn	0.04%	3.69%	50.95%	45.31%
Manhattan	0.11%	6.80%	26.89%	66.19%
Queens	0.63%	12.85%	57.40%	29.12%
Staten Island	0.08%	12.08%	87.70%	0.14%
New York City	**0.20%**	**12.84%**	**58.77%**	**28.19%**

14% OF SMALL BUSINESSES HAVE NO CHOICE OF COMMERCIAL FIBER PROVIDER

There is an even more pronounced disparity in access to commercial fiber service according to the FCC data – 14% percent of small businesses have no commercial fiber provider option and 41% have one option.[62]

Percent of Small Businesses Served by 0 or More Commercial Fiber ISPs by Borough
Sources: FCC Form 477 Data, Dec. 2016 and EDC Data, as prepared by MODA

Borough	0 ISP	1 ISP	2 ISP	3+ ISPs
Bronx	16.42%	55.43%	22.32%	5.83%
Brooklyn	29.98%	53.41%	13.42%	3.19%
Manhattan	4.65%	16.22%	22.51%	56.62%
Queens	13.67%	70.19%	14.73%	1.41%
Staten Island	10.56%	77.04%	11.72%	0.68%
New York City	**13.52%**	**40.66%**	**18.54%**	**27.28%**

TABLE 4 - Percent of Small Businesses Served by 0 or More Commercial Fiber ISPs by Borough

[59] FCC Form 477 Data; EDC Data.

[60] FCC Form 477 Data; EDC Data.

[61] FCC Form 477 Data; EDC Data.

[62] FCC Form 477 Data; EDC Data.

Conclusion

There are limited available public data on broadband and they do not define broadband in the same way. This situation poses a challenge for assessing the broadband access and connectivity, designing targeted solutions and tracking the impact of City initiatives. Still, we use the data here to deliver the most complete picture of broadband in New York City yet presented, using the five principles of Equity, Performance, Affordability, Privacy, and Choice to frame the discussion. In presenting the analyses in this report and gathering feedback from the public and from subject matter experts, we also aim to highlight the limitations in the available data.

As mentioned earlier, the data analyzed in this report has important limitations and thus cannot provide the basis for a fully accurate depiction of broadband service as all New Yorkers experience it; we discuss these shortcomings above. One of the purposes of this report is to engage New Yorkers in the interpretation of publicly available information and to consider what additional information we need to fully understand broadband access and connectivity in our city and for each resident and business. We welcome your feedback by email at connected@cto.nyc.gov.

Glossary and Acronyms

ACS	American Community Survey
Broadband	An internet service with a download speed of at least 25 megabits per second (Mbps) and an upload speed of at least 3 Mbps, according to the current FCC standard. The City also uses this speed standard to evaluate an ISP's performance.
Census block	Small, statistical areas that nest into other census geographic entities, like census tracts.
Census tract	Statistical subdivision of a county averaging about 4,000 inhabitants.
DCP	New York City Department of City Planning
DOCSIS	Data-Over-Cable Service Interface Specifications. Cable modems based on these specifications are a common way cable companies provide internet service.
DOITT	New York City Department of Information Technology and Telecommunications
DSL	Digital Subscriber Line. DSL and other variations of DSL, e.g., xDSL, VDSL, etc., are technologies that transmit data over traditional copper telephone lines.
EDC	New York City Economic Development Corporation
FCC	Federal Communications Commission, the federal agency tasked with regulating telecommunications.
Gbps	Gigabit(s) per second, a measure of the speed of a data transfer, equivalent to 1,000 Mbps.
GNI pc / PCI	Gross national income per capita, or the total income of a country divided by population.
Industrial Business Zones (IBZs)	City-designated areas designed to foster business by providing expanded business services for industrial and manufacturing entities.
ISP	Internet Service Provider
Mbps	Megabits per second, a measure of the speed of a data transfer.
MOCTO	New York City Mayor's Office of the Chief Technology Officer
MODA	New York City Mayor's Office of Data Analytics
Neighborhood Tabulation Areas (NTAs)	Aggregations of census tracts that are subsets of New York City's 55 Public Use Microdata Areas (PUMAs). Primarily due to these constraints, NTA boundaries and their associated names may not definitively represent neighborhoods.
NYC	New York City
NYC Opportunity	New York City Mayor's Office for Economic Opportunity
Public Use Microdata Area (PUMA)	Geographic areas consisting of at least 100,000 people.

Appendix

Map of NYC Neighborhood Tabulation Areas

New York City Neighborhood Tabulation Area Map.

Source: NYC Dept. of Planning. Available on NYC Open Data.

ACS Data – Internet Access

2016 American Community Survey Public Use Microdata Sample (ACS, 2016).[1]

Internet Access, City Totals *Source: ACS, 2016*		
	Persons[2]	**Households**
Total:	8,360,751	3,114,826
With paid internet access	7,047,291	2,499,502
Broadband[3]	6,079,127	2,155,777
Cellular data plan, but no broadband	902,562	319,717
Dial-up, satellite and/or other, but no broadband or cellular data plan	65,602	24,008
Internet access without paying	236,159	95,264
No internet access	1,077,301	520,060

[1] *American Community Survey*, United States Census Bureau (2016), https://www.census.gov/programs-surveys/acs/ (data available at https://www.census.gov/programs-surveys/acs/data.html). Data is available to the public in Public Use Microdata Area (PUMAs), geographic areas consisting of at least 100,000 people.

[2] The 2016 American Community Survey collects internet and device access data at the household level. In this and all internet and device access tables included below, "persons" figures represent persons in *households* with access to these resources.

[3] As indicated in the main body of this report, the 2016 American Community Survey includes five categories for paid internet service to the household: 1) "broadband (high speed) internet service such as cable, fiber optic, or DSL service installed in this household," 2) "cellular data plan for a smartphone or other mobile device," 3) "satellite internet service installed in this household," 4) "dial-up internet service installed in this household," and 5) "some other service." For the full 2016 questionnaire, *see*, *The American Community Survey Questionnaire 2016*, U.S. Department of Commerce, https://www2.census.gov/programs-surveys/acs/methodology/questionnaires/2016/quest16.pdf. The descriptions used in this Appendix are shortened versions of these five categories. As in the main body of this report, the break-out used here is based on the service reported that provides the highest possible speed to the household. Therefore, households reporting a "broadband" connection could also have a "cellular data plan," "satellite," "dial-up," and/or "other." Similarly, households reporting "cellular data" could also have "satellite," "dial-up," and/or "other," but not "broadband" service, which is capable of higher speeds than "cellular data." The third option presented here, "dial-up, satellite and/or other," represents access to one or any combination of these services, but excludes those with "broadband" or a "cellular data plan." "Internet access without paying," and "no internet access" are exclusive.

ACS Data – Internet Access (cont.)

Internet Access by Annual Income Group *Source: ACS, 2016*		
	Persons	**Households**
Household Income $0-$19,144	1,225,907	628,333
With paid internet access	792,882	357,744
Broadband	618,152	277,874
Cellular data plan, but no broadband	160,142	73,302
Dial-up, satellite and/or other, but no broadband or cellular data plan	14,588	6,568
Internet access without paying	50,436	27,541
No internet access	382,589	243,048
Household Income >$19,144-$42,369	1,599,120	617,720
With paid internet access	1,220,249	451,883
Broadband	999,897	369,583
Cellular data plan, but no broadband	201,669	75,196
Dial-up, satellite and/or other, but no broadband or cellular data plan	18,683	7,104
Internet access without paying	58,198	21,882
No internet access	320,673	143,955
Household Income >$42,369-$75,569	1,706,840	631,419
With paid internet access	1,459,585	531,192
Broadband	1,244,058	458,300
Cellular data plan, but no broadband	206,541	69,435
Dial-up, satellite and/or other, but no broadband or cellular data plan	8,986	3,457
Internet access without paying	49,608	20,454
No internet access	197,647	79,773
Household Income >$75,569-$130,986	1,871,821	623,207
With paid internet access	1,708,802	568,768
Broadband	1,498,083	501,745
Cellular data plan, but no broadband	195,921	62,140
Dial-up, satellite and/or other, but no broadband or cellular data plan	14,798	4,883
Internet access without paying	44,664	15,303
No internet access	118,355	39,136
Household Income $130,986+	1,957,063	614,147
With paid internet access	1,865,773	589,915
Broadband	1,718,937	548,275
Cellular data plan, but no broadband	138,289	39,644

ACS Data – Internet Access (cont.)

Internet Access by Annual Income Group (cont.) *Source: ACS, 2016*		
	Persons	**Households**
Dial-up, satellite and/or other, but no broadband or cellular data plan	8,547	N/A
Internet access without paying	33,253	10,084
No internet access	58,037	14,148

ACS Data – Internet Access (cont.)

Age (Persons in households with access type) *Source: ACS, 2016*	
0-17 Years Old	1,787,952
With paid internet access	1,539,672
Broadband	1,312,042
Cellular data plan, but no broadband	212,174
Dial-up, satellite and/or other, but no broadband or cellular data plan	15,456
Internet access without paying	49,868
No internet access	198,412
18-64 Years Old	5,462,328
With paid internet access	4,758,448
Broadband	4,124,821
Cellular data plan, but no broadband	595,677
Dial-up, satellite and/or other, but no broadband or cellular data plan	37,950
Internet access without paying	157,246
No internet access	546,634
65 Years Old and Older	1,110,471
With paid internet access	749,171
Broadband	642,264
Cellular data plan, but no broadband	94,711
Dial-up, satellite and/or other, but no broadband or cellular data plan	12,196
Internet access without paying	29,045
No internet access	332,255

ACS Data – Internet Access (cont.)

Race (Persons in households with access type) *Source: ACS, 2016*	
White, non-Hispanic	2,651,953
With paid internet access	2,301,210
Broadband	2,083,659
Cellular data plan, but no broadband	201,419
Dial-up, satellite and/or other, but no broadband or cellular data plan	16,132
Internet access without paying	66,347
No internet access	284,396
Black, non-Hispanic	1,827,102
With paid internet access	1,494,118
Broadband	1,235,272
Cellular data plan, but no broadband	241,624
Dial-up, satellite and/or other, but no broadband or cellular data plan	17,222
Internet access without paying	55,469
No internet access	277,515
Asian, non-Hispanic	1,187,501
With paid internet access	1,045,164
Broadband	920,270
Cellular data plan, but no broadband	119,924
Dial-up, satellite and/or other, but no broadband or cellular data plan	4,970
Internet access without paying	27,938
No internet access	114,399
Hispanic	2,448,435
With paid internet access	1,992,496
Broadband	1,652,541
Cellular data plan, but no broadband	313,620
Dial-up, satellite and/or other, but no broadband or cellular data plan	26,335
Internet access without paying	78,933
No internet access	377,006

ACS Data – Internet Access (cont.)

Education Level (Persons in households with access type) *Source: ACS, 2016*	
For persons 25 and older	
Less than high school graduate or equivalency	1,066,590
With paid internet access	724,442
Broadband	587,638
Cellular data plan, but no broadband	127,868
Dial-up, satellite and/or other, but no broadband or cellular data plan	8,936
Internet access without paying	34,297
No internet access	307,851
High school graduate (or equivalent), some college, or associate's degree	2,607,327
With paid internet access	2,117,143
Broadband	1,790,305
Cellular data plan, but no broadband	301,827
Dial-up, satellite and/or other, but no broadband or cellular data plan	25,011
Internet access without paying	84,550
No internet access	405,634
Bachelor's degree or higher	2,187,245
With paid internet access	2,038,240
Broadband	1,851,492
Cellular data plan, but no broadband	176,640
Dial-up, satellite and/or other, but no broadband or cellular data plan	10,108
Internet access without paying	47,378
No internet access	101,627

ACS Data – Internet Access (cont.)

Employment Status (Persons in households with access type) *Source: ACS, 2016*	
In the civilian labor force:	4,374,183
Employed	4,083,884
With paid internet access	3,646,583
Broadband	3,192,621
Cellular data plan, but no broadband	429,696
Dial-up, satellite and/or other, but no broadband or cellular data plan	24,266
Internet access without paying	103,387
No internet access	333,914
Unemployed	290,299
With paid internet access	253,302
Broadband	210,892
Cellular data plan, but no broadband	39,918
Dial-up, satellite and/or other, but no broadband or cellular data plan	N/A
Internet access without paying	6,167
No internet access	30,830
Not in labor force	2,380,793
With paid internet access	1,768,718
Broadband	1,503,243
Cellular data plan, but no broadband	239,869
Dial-up, satellite and/or other, but no broadband or cellular data plan	25,606
Internet access without paying	80,712
No internet access	531,363

ACS Data – Internet Access (cont.)

Language Spoken at Home (Persons in households with access type) *Source: ACS, 2016*	
English Only	3,956,477
With paid internet access	3,415,968
Broadband	2,982,411
Cellular data plan, but no broadband	401,781
Dial-up, satellite and/or other, but no broadband or cellular data plan	31,776
Internet access without paying	108,938
No internet access	431,571
Most common language for City population (Spanish)	1,893,394
With paid internet access	1,518,223
Broadband	1,259,006
Cellular data plan, but no broadband	239,846
Dial-up, satellite and/or other, but no broadband or cellular data plan	19,371
Internet access without paying	59,050
No internet access	316,121
Second most common language for City population (Chinese)	336,366
With paid internet access	269,557
Broadband	228,310
Cellular data plan, but no broadband	39,947
Dial-up, satellite and/or other, but no broadband or cellular data plan	N/A
Internet access without paying	8,636
No internet access	58,173
Third most common language for City population (Russian)	170,980
With paid internet access	148,113
Broadband	132,810
Cellular data plan, but no broadband	13,189
Dial-up, satellite and/or other, but no broadband or cellular data plan	N/A
Internet access without paying	4,085
No internet access	18,782

ACS Data – Internet Access (cont.)

Number of People Living or Staying at Address (Households) *Source: ACS, 2016*	
1 Person Household	1,011,580
With paid internet access	692,441
Broadband	590,400
Cellular data plan, but no broadband	93,043
Dial-up, satellite and/or other, but no broadband or cellular data plan	8,998
Internet access without paying	38,696
No internet access	280,443
2 People Household	874,681
With paid internet access	722,244
Broadband	630,323
Cellular data plan, but no broadband	87,231
Dial-up, satellite and/or other, but no broadband or cellular data plan	4,690
Internet access without paying	23,698
No internet access	128,739
3 People Household	495,134
With paid internet access	436,093
Broadband	375,186
Cellular data plan, but no broadband	57,228
Dial-up, satellite and/or other, but no broadband or cellular data plan	3,679
Internet access without paying	12,064
No internet access	46,977
4 People Household	392,434
With paid internet access	352,132
Broadband	303,328
Cellular data plan, but no broadband	45,280
Dial-up, satellite and/or other, but no broadband or cellular data plan	3,524
Internet access without paying	12,725
No internet access	27,577
5 People Household	193,168
With paid internet access	171,379
Broadband	147,626
Cellular data plan, but no broadband	22,080

ACS Data – Internet Access (cont.)

Number of People Living or Staying at Address (Households) (cont.) *Source: ACS, 2016*	
Dial-up, satellite and/or other, but no broadband or cellular data plan	N/A
Internet access without paying	5,689
No internet access	16,100
6 People Household	77,780
With paid internet access	67,332
Broadband	59,651
Cellular data plan, but no broadband	7,127
Dial-up, satellite and/or other, but no broadband or cellular data plan	N/A
Internet access without paying	N/A
No internet access	9,701
7 People Household	34,030
With paid internet access	29,304
Broadband	25,822
Cellular data plan, but no broadband	3,030
Dial-up, satellite and/or other, but no broadband or cellular data plan	N/A
Internet access without paying	N/A
No internet access	3,644
8 People Household	17,967
With paid internet access	14,799
Broadband	11,536
Cellular data plan, but no broadband	N/A
Dial-up, satellite and/or other, but no broadband or cellular data plan	N/A
Internet access without paying	N/A
No internet access	N/A

ACS Data – Device and Internet Access

2016 American Community Survey Public Use Microdata Sample (ACS, 2016).[4]

City Totals *Source: ACS, 2016*		
	Persons[5]	**Households**
Total:	8,360,751	3,114,826
Owns/Uses a desktop or laptop computer[6]	6,743,866	2,373,942
With paid internet access	6,346,402	2,223,809
Broadband	5,668,206	1,996,117
Dial-up internet alone	20,314	8,389
Cellular data plan alone or with dial-up or satellite	621,639	208,167
Without paid internet access	397,464	150,133
Owns/Uses a tablet alone or with smartphone or "other"	379,955	142,753
With paid internet access	311,726	114,901
Broadband	224,548	82,254

[4] *American Community Survey*, United States Census Bureau (2016), https://www.census.gov/programs-surveys/acs/ (data available at https://www.census.gov/programs-surveys/acs/data.html). Data is available to the public in Public Use Microdata Area (PUMAs), geographic areas consisting of at least 100,000 people.

[5] As noted above, the 2016 American Community Survey collects device and internet access data at the household level. In this and all device tables included below, "persons" figures represent persons in *households* with access to these resources.

[6] See above for breakdown of categories used in the 2016 ACS for internet service, and on what the categories listed here include and exclude. As noted in the body of this report, the 2016 American Community Survey includes four categories for device "ownership or use": 1) "desktop or laptop," 2) "smartphone," 3) "tablet or other portable wireless computer," and 4) "some other type of computer (specify)." For the full 2016 questionnaire, *see*, *The American Community Survey Questionnaire 2016*, U.S. Department of Commerce, https://www2.census.gov/programs-surveys/acs/methodology/questionnaires/2016/quest16.pdf. The descriptions used in this Appendix are shortened versions of these four categories. As in the main body of this report, the break-out used here is based on the device reported that provides the highest capacity to the household. Therefore, households reporting a "desktop or laptop" device could also have access to a "smartphone," "tablet or other portable wireless computer," and/or "other." Similarly, households reporting "tablet or other portable wireless computer" could also have access to a "smartphone," and/or "other," but not a "desktop or laptop," which generally has higher capacity. The third option presented here, "smartphone and/or 'other computer'" represents access to one or both of these devices, but excludes those with a "desktop or laptop" or a "tablet or other portable wireless computer." "'Other computer' alone," is exclusive.

ACS Data – Device and Internet Access (cont.)

City Totals (cont.) *Source: ACS, 2016*		
	Persons	**Households**
Cellular data plan alone or with dial-up or satellite	83,045	30,520
Without paid internet access	68,229	27,852
Owns/Uses a smartphone and/or other computer	552,657	218,669
With paid internet access	323,233	126,672
Broadband	142,806	53,509
Cellular data plan alone or with dial-up or satellite	177,870	72,166
Without paid internet access	229,424	91,997
Owns/Uses an "other computer" alone	N/A	N/A
With paid internet access	N/A	N/A
Broadband	N/A	N/A
Cellular data plan alone or with dial-up or satellite	N/A	N/A
Without paid internet access	N/A	N/A
No computer	682,015	378,677

ACS Data – Device and Internet Access (cont.)

Smartphone Access *Source: ACS, 2016*		
	Persons	**Households**
Owns/Uses a smartphone	7,001,987	2,433,251
With paid internet access	6,419,509	2,212,512
Cellular data plan alone or with dial-up or satellite	807,642	282,200
Broadband	5,575,537	1,918,625
Without cellular data plan	945,977	313,966
Without paid internet access	582,478	220,739

ACS Data – Device and Internet Access (cont.)

Computer/Internet Access by Annual Income Group *Source: ACS, 2016*		
	Persons	**Households**
Household Income $0-$19,144	1,225,907	628,333
Owns/Uses a desktop or laptop computer	674,228	304,013
With paid internet access	584,864	260,195
Broadband	500,624	223,832
Cellular data plan alone or with dial-up or satellite	73,488	32,083
Dial-up and/or satellite only	10,752	4,280
Without paid internet access	89,364	43,818
Household Income >$19,144-$42,369	1,599,120	617,720
Owns/Uses a desktop or laptop computer	1,128,534	411,676
With paid internet access	1,031,746	377,143
Broadband	890,017	327,664
Cellular data plan alone or with dial-up or satellite	125,707	43,434
Dial-up and/or satellite only	16,022	6,045
Without paid internet access	96,788	34,533
Household Income >$42,369-$75,569	1,706,840	631,419
Owns/Uses a desktop or laptop computer	1,393,682	512,495
With paid internet access	1,308,668	478,568
Broadband	1,159,412	426,754
Cellular data plan alone or with dial-up or satellite	141,038	48,981
Dial-up and/or satellite only	8,218	N/A
Without paid internet access	85,014	33,927
Household Income >$75,569-$130,986	1,871,821	623,207
Owns/Uses a desktop or laptop computer	1,680,815	558,935
With paid internet access	1,601,818	534,368
Broadband	1,428,612	479,566
Cellular data plan alone or with dial-up or satellite	159,111	50,273
Dial-up and/or satellite only	14,095	4,529
Without paid internet access	78,997	24,567
Household Income $130,986+	1,957,063	614,147
Owns/Uses a desktop or laptop computer	1,866,607	586,823
With paid internet access	1,819,306	573,535
Broadband	1,689,541	538,301

ACS Data – Device and Internet Access (cont.)

Computer/Internet Access by Annual Income Group (cont.) *Source: ACS, 2016*		
	Persons	**Households**
Cellular data plan alone or with dial-up or satellite	122,295	33,396
Dial-up and/or satellite only	7,470	N/A
Without paid internet access	47,301	13,288

Privacy Policies of the Four Largest ISPs Serving NYC

Below are links to the privacy policies of the four ISPs that offer broadband service to the most number of census blocks in NYC – Verizon, Charter, Altice, and RCN. Census block information is based on December 2016 FCC Form 477 Data, *prepared by* MODA. Provider websites were last visited on March 12, 2018.

ISP Name	Link to Privacy Policy
Altice (Optimum)	https://www.optimum.net/pages/PrivacyExisting.html
Charter (Spectrum)	https://www.spectrum.com/policies/spectrum-customer-privacy-policy.html
RCN	https://www.rcn.com/hub/about-rcn/policies-and-disclaimers/privacy-policy/
Verizon	http://www.verizon.com/about/privacy/full-privacy-policy

ISPs Offering Residential Broadband

December 2016 FCC Form 477 Data, *prepared by* MODA.

ISP Name *DBA Name	**Technology Type**	**Number of Census Blocks Served**[7]
Verizon New York Inc.	Optical Carrier / Fiber to the end user	27813
Charter Communications Inc.	Cable Modem-DOCSIS 3.0	25430
Optimum	Cable Modem-DOCSIS 3.0	12896
RCN	Cable Modem-DOCSIS 3.0	2554
RCN	Optical Carrier / Fiber to the end user	619
RCN	Cable Modem-DOCSIS 3.1	198
Xchange Telecom	Optical Carrier / Fiber to the end user	18
Fairpoint Communications	Cable Modem-DOCSIS 3.0	3
Comcast	Cable Modem-DOCSIS 3.0	2
Atlantic Broadband Finance, LLC	Cable Modem-DOCSIS 3.0	1

[7] The FCC Form 477 standard for whether service is "available" from a reporting ISP to a census block is different, in both language and substance, from the standards required to be met by the City's cable television franchisees under their respective franchise contracts with the City regarding deployment and service availability. Nothing in this appendix is intended to express or describe any information, conclusion or opinion on the degree to which any of these franchisees have or have not complied with their franchise contract obligations. Compliance with such obligations is the subject, as of the issuance of this report, of litigation between the City and Verizon New York, Inc. Questions have also recently been raised by the New York State Public Service Commission regarding the quality of broadband service reporting data submitted to that entity by Charter Communications, Inc.

ISPs Offering Residential Broadband (cont.)

ISP Name *DBA Name	**Technology Type**	**Number of Census Blocks Served**
Brooklyn Fiber	Optical Carrier / Fiber to the end user	1
Privatel Inc.	Optical Carrier / Fiber to the end user	1

Source: list derived from Dec. 2016 FCC Form 477 data, as prepared by MODA, by excluding ISPs in NYC that report to:

1. offer commercial service, and
2. offer service using cable modem-DOCSIS 1, 1.1, or 2.0, cable modem other than DOCSIS, DSL, copper, terrestrial fixed wireless, or satellite technologies,

leaving only residential providers using cable modem-DOCSIS 3.0 or 3.1 or optical fiber to the end user, chosen because those technologies are the only ones reported that typically provide access to speeds over 25/3 Mbps.

ISPs Offering Commercial Broadband

December 2016 FCC Form 477 Data, *prepared by* MODA.

ISP Name *DBA Name	**Technology Type**	**Number of Census Blocks Served**[8]
Lightower	Optical Carrier / Fiber to the end user	6955
Lightpath	Optical Carrier / Fiber to the end user	898
Charter Communications Inc.	Optical Carrier / Fiber to the end user	708
Level 3 Communications, LLC	Optical Carrier / Fiber to the end user	672
PAETEC Communications, Inc.	Optical Carrier / Fiber to the end user	321
Cogent Communications	Optical Carrier / Fiber to the end user	202
Zayo Group, LLC	Optical Carrier / Fiber to the end user	138
PAETEC Business Services	Optical Carrier / Fiber to the end user	87
US LEC Communications, LLC	Optical Carrier / Fiber to the end user	87
Spectrotel	Optical Carrier / Fiber to the end user	64
MCI	Optical Carrier / Fiber to the end user	22
InterGlobe	Optical Carrier / Fiber to the end user	16
Brooklyn Fiber	Optical Carrier / Fiber to the end user	8
Telefonica USA	Optical Carrier / Fiber to the end user	6
RGSI	Optical Carrier / Fiber to the end user	5

[8] The FCC Form 477 standard for whether service is "available" from a reporting ISP to a census block is different, in both language and substance, from the standards required to be met by the City's cable television franchisees under their respective franchise contracts with the City regarding deployment and service availability. Nothing in this appendix is intended to express or describe any information, conclusion or opinion on the degree to which any of these franchisees have or have not complied with their franchise contract obligations. Compliance with such obligations is the subject, as of the issuance of this report, of litigation between the City and Verizon New York, Inc. Questions have also recently been raised by the New York State Public Service Commission regarding the quality of broadband service reporting data submitted to that entity by Charter Communications, Inc.

ISPs Offering Commercial Broadband (cont.)

ISP Name *DBA Name	**Technology Type**	**Number of Census Blocks Served**
NetFortris	Optical Carrier / Fiber to the end user	3
Orange Business Services U.S., Inc.	Optical Carrier / Fiber to the end user	3
Comcast	Cable Modem-DOCSIS 3.0	2
McLeodUSA Telecommunications Services, L.L.C.	Optical Carrier / Fiber to the end user	2
QCSTelecom	Optical Carrier / Fiber to the end user	2
Tierzero	Optical Carrier / Fiber to the end user	2
Zayo Enterprise Networks	Optical Carrier / Fiber to the end user	2
Block Line	Optical Carrier / Fiber to the end user	1
Call One Inc.	Optical Carrier / Fiber to the end user	1
Transbeam	Optical Carrier / Fiber to the end user	1

Source: list derived from Dec. 2016 FCC Form 477 data by excluding ISPs in NYC that report to:

1. offer residential service, and
2. offer service using cable modem other than DOCSIS, cable modem other than DOCSIS, DSL, copper, terrestrial fixed wireless, or satellite technologies,

leaving only commercial providers using cable modem-DOCSIS 3.0 or optical fiber to the end user, chosen because those technologies are the only ones reported that typically provide access to speeds over 25/3 Mbps.

ISP Choice by Neighborhood

December 2016 FCC Form 477 Data, *prepared by* MODA.

The below charts show the percent of households in each NTA (as defined by the New York City Dept. of City Planning), separated by borough, that are served by 1, 2, 3-4, or 5 ISPs, as a percentage of estimated total households.

	1 ISP	2 ISP	3-4 ISP	5 ISP
Bronx	27.98%	71.79%	0.23%	0.00%
Allerton-Pelham Gardens	5.49%	94.51%	0.00%	0.00%
Bedford Park-Fordham North	33.24%	66.76%	0.00%	0.00%
Belmont	45.72%	54.28%	0.00%	0.00%
Bronxdale	13.11%	86.89%	0.00%	0.00%
Claremont-Bathgate	47.85%	52.15%	0.00%	0.00%
Co-op City	87.79%	12.21%	0.00%	0.00%
Crotona Park East	17.85%	82.15%	0.00%	0.00%
East Concourse-Concourse Village	25.53%	74.47%	0.00%	0.00%
East Tremont	16.57%	82.43%	1.00%	0.00%
Eastchester-Edenwald-Baychester	8.09%	90.30%	1.61%	0.00%
Fordham South	56.47%	43.53%	0.00%	0.00%
Highbridge	30.66%	69.34%	0.00%	0.00%
Hunts Point	28.05%	71.95%	0.00%	0.00%
Kingsbridge Heights	38.72%	61.28%	0.00%	0.00%
Longwood	25.63%	74.37%	0.00%	0.00%
Melrose South-Mott Haven North	38.35%	61.65%	0.00%	0.00%
Morrisania-Melrose	17.37%	82.63%	0.00%	0.00%
Mott Haven-Port Morris	33.19%	66.81%	0.00%	0.00%
Mount Hope	54.66%	45.34%	0.00%	0.00%
North Riverdale-Fieldston-Riverdale	21.61%	78.39%	0.00%	0.00%
Norwood	18.90%	81.10%	0.00%	0.00%
park-cemetery-etc-Bronx	96.92%	3.08%	0.00%	0.00%
Parkchester	17.71%	82.29%	0.00%	0.00%
Pelham Bay-Country Club-City Island	3.68%	96.32%	0.00%	0.00%
Pelham Parkway	12.23%	87.48%	0.29%	0.00%
Rikers Island				
Schuylerville-Throgs Neck-Edgewater Park	14.22%	85.78%	0.00%	0.00%
Soundview-Bruckner	15.35%	84.65%	0.00%	0.00%

ISP Choice by Neighborhood (cont.)

Bronx (cont.)	1 ISP	2 ISP	3-4 ISP	5 ISP
Soundview-Castle Hill-Clason Point-Harding Park	25.43%	74.57%	0.00%	0.00%
Spuyten Duyvil-Kingsbridge	28.84%	71.16%	0.00%	0.00%
University Heights-Morris Heights	41.20%	58.80%	0.00%	0.00%
Van Cortlandt Village	35.67%	64.33%	0.00%	0.00%
Van Nest-Morris Park-Westchester Square	10.64%	89.36%	0.00%	0.00%
West Concourse	49.45%	48.27%	2.28%	0.00%
West Farms-Bronx River	21.13%	78.87%	0.00%	0.00%
Westchester-Unionport	19.96%	80.04%	0.00%	0.00%
Williamsbridge-Olinville	3.20%	96.80%	0.00%	0.00%
Woodlawn-Wakefield	6.90%	90.10%	3.00%	0.00%

ISP Choice by Neighborhood (cont.)

	1 ISP	2 ISP	3-4 ISP	5 ISP
Brooklyn	**4.40%**	**54.71%**	**40.61%**	**0.28%**
Bath Beach	25.01%	62.27%	12.71%	0.00%
Bay Ridge	10.75%	45.37%	43.88%	0.00%
Bedford	0.00%	59.57%	39.64%	0.80%
Bensonhurst East	2.95%	48.00%	49.05%	0.00%
Bensonhurst West	2.87%	56.67%	40.13%	0.33%
Borough Park	0.00%	48.19%	51.81%	0.00%
Brighton Beach	24.34%	72.58%	3.09%	0.00%
Brooklyn Heights-Cobble Hill	0.14%	25.25%	66.66%	7.95%
Brownsville	0.38%	53.24%	46.38%	0.00%
Bushwick North	0.15%	33.96%	65.89%	0.00%
Bushwick South	0.00%	68.82%	31.18%	0.00%
Canarsie	8.18%	76.35%	15.47%	0.00%
Carroll Gardens-Columbia Street-Red Hook	0.07%	38.71%	61.21%	0.00%
Clinton Hill	0.17%	34.36%	65.47%	0.00%
Crown Heights North	0.00%	65.59%	34.33%	0.08%
Crown Heights South	0.00%	69.09%	30.91%	0.00%
Cypress Hills-City Line	8.62%	87.58%	3.80%	0.00%
DUMBO-Vinegar Hill-Downtown Brooklyn-Boerum Hill	3.13%	34.34%	61.53%	0.99%
Dyker Heights	0.36%	6.47%	93.16%	0.00%
East Flatbush-Farragut	0.00%	7.79%	92.21%	0.00%
East New York	12.92%	85.78%	1.30%	0.00%
East New York (Pennsylvania Ave)	20.13%	79.87%	0.00%	0.00%
East Williamsburg	0.50%	34.73%	64.77%	0.00%
Erasmus	0.00%	89.47%	10.53%	0.00%
Flatbush	0.00%	62.93%	37.07%	0.00%
Flatlands	2.97%	44.33%	52.70%	0.00%
Fort Greene	1.62%	39.21%	55.28%	3.89%
Georgetown-Marine Park-Bergen Beach-Mill Basin	5.92%	94.08%	0.00%	0.00%
Gravesend	16.22%	83.78%	0.00%	0.00%
Greenpoint	1.36%	18.85%	79.79%	0.00%
Homecrest	3.35%	84.40%	12.25%	0.00%
Kensington-Ocean Parkway	0.00%	78.51%	21.49%	0.00%
Madison	1.73%	98.27%	0.00%	0.00%
Midwood	1.39%	26.42%	72.19%	0.00%
North Side-South Side	0.16%	38.03%	60.98%	0.83%

ISP Choice by Neighborhood (cont.)

Brooklyn (cont.)	1 ISP	2 ISP	3-4 ISP	5 ISP
Ocean Hill	0.00%	78.73%	21.27%	0.00%
Ocean Parkway South	0.00%	11.18%	88.82%	0.00%
Park Slope-Gowanus	0.27%	34.68%	65.04%	0.00%
park-cemetery-etc-Brooklyn	14.05%	32.96%	52.99%	0.00%
Prospect Heights	0.00%	16.31%	83.69%	0.00%
Prospect Lefferts Gardens-Wingate	0.00%	51.54%	48.46%	0.00%
Rugby-Remsen Village	0.00%	21.50%	78.50%	0.00%
Seagate-Coney Island	7.88%	92.12%	0.00%	0.00%
Sheepshead Bay-Gerritsen Beach-Manhattan Beach	12.60%	87.40%	0.00%	0.00%
Starrett City	89.84%	9.44%	0.71%	0.00%
Stuyvesant Heights	0.00%	88.24%	11.76%	0.00%
Sunset Park East	0.00%	18.58%	81.42%	0.00%
Sunset Park West	0.33%	43.37%	55.10%	1.20%
West Brighton	48.14%	48.61%	0.00%	3.25%
Williamsburg	1.73%	57.25%	39.95%	1.07%
Windsor Terrace	0.22%	61.78%	38.00%	0.00%

ISP Choice by Neighborhood (cont.)

	1 ISP	2 ISP	3-4 ISP	5 ISP
Manhattan	**18.76%**	**31.83%**	**31.57%**	**17.84%**
Battery Park City-Lower Manhattan	8.15%	24.57%	46.40%	20.88%
Central Harlem North-Polo Grounds	52.61%	44.56%	2.82%	0.00%
Central Harlem South	37.39%	52.29%	10.32%	0.00%
Chinatown	4.10%	50.30%	38.88%	6.72%
Clinton	1.53%	14.49%	40.84%	43.14%
East Harlem North	20.75%	77.26%	1.99%	0.00%
East Harlem South	19.68%	56.51%	21.24%	2.57%
East Village	0.82%	36.80%	52.24%	10.13%
Gramercy	0.00%	13.31%	55.95%	30.74%
Hamilton Heights	64.70%	23.16%	9.73%	2.41%
Hudson Yards-Chelsea-Flat Iron-Union Square	1.04%	14.48%	54.00%	30.49%
Lenox Hill-Roosevelt Island	7.45%	34.95%	34.94%	22.66%
Lincoln Square	7.78%	27.64%	31.30%	33.28%
Lower East Side	3.84%	30.20%	57.98%	7.98%
Manhattanville	72.20%	13.49%	14.30%	0.00%
Marble Hill-Inwood	71.43%	25.64%	2.94%	0.00%
Midtown-Midtown South	0.00%	10.87%	51.94%	37.18%
Morningside Heights	30.56%	33.38%	29.41%	6.65%
Murray Hill-Kips Bay	0.00%	11.82%	39.59%	48.59%
park-cemetery-etc-Manhattan				
SoHo-TriBeCa-Civic Center-Little Italy	2.36%	41.11%	50.93%	5.59%
Stuyvesant Town-Cooper Village	22.59%	12.48%	14.66%	50.27%
Turtle Bay-East Midtown	0.84%	12.89%	31.52%	54.76%
Upper East Side-Carnegie Hill	4.45%	53.28%	32.20%	10.07%
Upper West Side	15.93%	34.06%	33.75%	16.26%
Washington Heights North	69.38%	30.62%	0.00%	0.00%
Washington Heights South	81.36%	18.64%	0.00%	0.00%
West Village	0.22%	28.50%	49.17%	22.11%
Yorkville	2.05%	38.39%	37.90%	21.66%

ISP Choice by Neighborhood (cont.)

	1 ISP	2 ISP	3-4 ISP	5 ISP
Queens	**11.49%**	**61.17%**	**23.80%**	**3.54%**
Airport				
Astoria	10.78%	21.06%	55.66%	12.50%
Auburndale	5.16%	94.53%	0.31%	0.00%
Baisley Park	7.74%	92.26%	0.00%	0.00%
Bayside-Bayside Hills	6.31%	93.69%	0.00%	0.00%
Bellerose	11.10%	82.95%	5.95%	0.00%
Breezy Point-Belle Harbor-Rockaway Park-Broad Channel	11.43%	87.85%	0.73%	0.00%
Briarwood-Jamaica Hills	11.74%	78.14%	7.76%	2.37%
Cambria Heights	1.88%	97.08%	1.04%	0.00%
College Point	5.08%	94.46%	0.46%	0.00%
Corona	16.66%	6.35%	64.14%	12.85%
Douglas Manor-Douglaston-Little Neck	12.59%	80.37%	7.03%	0.00%
East Elmhurst	8.47%	91.53%	0.00%	0.00%
East Flushing	1.20%	92.05%	6.75%	0.00%
Elmhurst	10.15%	6.50%	73.68%	9.66%
Elmhurst-Maspeth	13.37%	12.13%	69.09%	5.40%
Far Rockaway-Bayswater	17.24%	76.84%	5.92%	0.00%
Flushing	3.28%	50.38%	38.47%	7.87%
Forest Hills	17.03%	57.45%	19.22%	6.31%
Fresh Meadows-Utopia	17.22%	46.63%	28.59%	7.56%
Ft. Totten-Bay Terrace-Clearview	12.56%	87.44%	0.00%	0.00%
Glen Oaks-Floral Park-New Hyde Park	9.13%	80.11%	10.76%	0.00%
Glendale	9.16%	75.67%	15.17%	0.00%
Hammels-Arverne-Edgemere	22.75%	77.25%	0.00%	0.00%
Hollis	2.72%	97.28%	0.00%	0.00%
Hunters Point-Sunnyside-West Maspeth	18.74%	34.65%	39.93%	6.68%
Jackson Heights	32.30%	56.55%	10.23%	0.92%
Jamaica	30.60%	69.40%	0.00%	0.00%
Jamaica Estates-Holliswood	9.38%	90.62%	0.00%	0.00%
Kew Gardens	29.95%	64.31%	5.74%	0.00%
Kew Gardens Hills	33.56%	63.79%	2.64%	0.00%
Laurelton	0.69%	99.31%	0.00%	0.00%
Lindenwood-Howard Beach	12.86%	85.13%	2.01%	0.00%
Maspeth	0.27%	7.21%	75.84%	16.68%
Middle Village	7.53%	24.00%	66.32%	2.16%

ISP Choice by Neighborhood (cont.)

Queens (cont.)	1 ISP	2 ISP	3-4 ISP	5 ISP
Murray Hill	4.97%	76.36%	18.67%	0.00%
North Corona	4.69%	67.98%	27.33%	0.00%
Oakland Gardens	11.79%	78.37%	2.14%	7.69%
Old Astoria	5.94%	11.10%	64.32%	18.64%
Ozone Park	7.67%	90.16%	2.17%	0.00%
park-cemetery-etc-Queens	72.69%	21.25%	6.07%	0.00%
Pomonok-Flushing Heights-Hillcrest	20.60%	79.16%	0.25%	0.00%
Queens Village	5.73%	92.62%	1.65%	0.00%
Queensboro Hill	13.48%	86.17%	0.35%	0.00%
Queensbridge-Ravenswood-Long Island City	1.27%	49.83%	43.85%	5.05%
Rego Park	15.44%	57.28%	17.07%	10.21%
Richmond Hill	4.19%	95.81%	0.00%	0.00%
Ridgewood	0.35%	6.75%	92.67%	0.23%
Rosedale	6.45%	79.75%	13.80%	0.00%
South Jamaica	8.88%	91.12%	0.00%	0.00%
South Ozone Park	3.61%	96.39%	0.00%	0.00%
Springfield Gardens North	0.62%	99.38%	0.00%	0.00%
Springfield Gardens South-Brookville	13.06%	86.94%	0.00%	0.00%
St. Albans	2.65%	97.35%	0.00%	0.00%
Steinway	10.51%	4.47%	74.33%	10.69%
Whitestone	7.66%	92.34%	0.00%	0.00%
Woodhaven	2.06%	87.15%	10.79%	0.00%
Woodside	14.30%	14.16%	61.42%	10.12%

ISP Choice by Neighborhood (cont.)

	1 ISP	2 ISP	3-4 ISP	5 ISP
Staten Island	**8.45%**	**91.46%**	**0.10%**	**0.00%**
Annadale-Huguenot-Prince's Bay-Eltingville	12.05%	87.95%	0.00%	0.00%
Arden Heights	3.84%	96.16%	0.00%	0.00%
Charleston-Richmond Valley-Tottenville	14.44%	85.56%	0.00%	0.00%
Grasmere-Arrochar-Ft. Wadsworth	17.20%	82.80%	0.00%	0.00%
Great Kills	3.61%	96.39%	0.00%	0.00%
Grymes Hill-Clifton-Fox Hills	4.36%	95.64%	0.00%	0.00%
Mariner's Harbor-Arlington-Port Ivory-Graniteville	8.91%	91.09%	0.00%	0.00%
New Brighton-Silver Lake	1.79%	98.21%	0.00%	0.00%
New Dorp-Midland Beach	3.39%	96.61%	0.00%	0.00%
New Springville-Bloomfield-Travis	15.69%	84.31%	0.00%	0.00%
Oakwood-Oakwood Beach	5.59%	94.41%	0.00%	0.00%
Old Town-Dongan Hills-South Beach	7.56%	92.44%	0.00%	0.00%
park-cemetery-etc-Staten Island				
Port Richmond	13.12%	86.28%	0.60%	0.00%
Rossville-Woodrow	9.24%	90.76%	0.00%	0.00%
Stapleton-Rosebank	7.18%	92.18%	0.64%	0.00%
Todt Hill-Emerson Hill-Heartland Village-Lighthouse Hill	14.63%	85.19%	0.18%	0.00%
West New Brighton-New Brighton-St. George	5.84%	93.80%	0.35%	0.00%
Westerleigh	3.52%	96.48%	0.00%	0.00%

Residential Pricing Information from Four Largest ISPs Serving New York City

The following residential pricing information was provided in January and February 2018 by the four ISPs that offer broadband service to the most number of census blocks in NYC – Verizon, Charter, Altice, and RCN. Census block information is based on December 2016 FCC Form 477 Data, *prepared by* MODA.

Verizon:

Residential Pricing Information: Verizon

Speed	Pricing Effective as of 1/18/2018 Year-1 Acquisition Online	Pricing Effective as of 1/18/2018 Year-2 Acquisition Online
50/50 Mbps	$39.99	$54.99
100/100 Mbps	$39.99	$54.99
150/150 Mbps	$74.99	$89.99
300/300 Mbps	$94.99	$109.99
500/500 Mbps	$194.99	$209.99
Gigabit Connection (up to 940/880 M)	$79.99	$79.99

Acquisition Pricing

The above reflects the current Acquisition pricing (the monthly recurring charge (MRC) for new Fios Internet customers) and is subject to change. Taxes and fees are extra.

The above reflects online purchase pricing for orders placed via verizon.com. Live Channel orders -- for example, those placed through the call centers or door-to-door agents -- are $10 more per month for both Year-1 and Year-2.

These prices are offered on a month-to-month basis (no term contract involved). However, the prices are only guaranteed for the first 12 months (reflected in the Year 1 pricing column).

The Year-2 pricing column shows the current pricing rate for the second year of service.

Speed Profile

If an address is eligible for Gigabit Connection, the two other speed options available at that address are 50/50Mbps and 100/100Mbps.

If an address is not eligible for Gigabit Connection, all the other non-Gigabit Connection speeds above are generally available, although 500/500Mbps may be limited.

Router

A customer may provide his or her own router on Fios Internet standalone service.

If customer who procures the router from Verizon may opt to pay a $10 monthly recurring lease or $149.99 one-time purchase price.

Broadband Lifeline

Customers who qualify for the FCC's Lifeline Broadband discount are eligible for a $9.25 monthly Lifeline discount off of any of the above MRC charges.

Charter (Spectrum):

Spectrum

Residential Broadband Services and Pricing

For Manhattan, NY, Effective January 2018. All charges exclude applicable taxes, FCC fees, franchise fees and the Broadcast TV Surcharge.

SPECTRUM STANDARD SERVICE OFFERINGS (MONTH-TO-MONTH PLAN) *	
Spectrum Internet 100/10	$64.99
Spectrum Internet 100/10 with Spectrum TV	$54.99
Spectrum Internet 100/10 with WiFi	$69.99
Spectrum Internet Ultra 300/20	$89.99
Spectrum Internet Ultra 300/20 with Spectrum TV	$79.99
Spectrum Internet Assist 30/4 **	$14.99
Spectrum Internet Assist 30/4 with WiFi **	$19.99
Everyday Low Price 3/1***	$14.99
Everyday Low Price 3/1 with WiFi***	$20.94
Click here for other pricing including promotions and options bundled with other services, like cable television and phone services.	
OTHER CHARGES AND TERMS *	
Data included with monthly charge	Unlimited
Charges for additional data usage	No Charge
Optional modem or gateway lease - Charter equipment included with service (Customers may use their own modem or gateway - Click here for our policy)	No Charge
Security Suite	No Charge
STANDARD ONE-TIME-CHARGES *	
Hourly Labor Charge	$49.99
Standard Installation Fee	$49.99
Spectrum Ultra Installation Fee	$49.99
WiFi Activation Fee (in addition to installation fee)	$9.99
Self-Installation	No Charge
WiFi Self-Installation (Must be existing video customer in order to qualify for self-installation)	$9.99
Move Transfer of Spectrum Service(s)	$9.99
Change of Service - Special Trip F	$49.99
Reconnection Fee	$4.99
Unreturned Equipment Fee	
eMTA/Modem, Phone Modem	$39.00
WiFi Modem/Extender/Router/Gateway	$78.00

* State, Local, Government Taxes and Fees may apply and vary by location. Prices above do not include taxes & fees. Rates my vary for promotional, packages & non standard events or service requests.

Other Services on Network
Information can be found in Network Management Practices Policy.

Charter (Spectrum) *cont.*:

PERFORMANCE: INDIVIDUAL EXPERIENCE MAY VARY	
Spectrum Internet 100/10	
Typical median download speed	100 Mbps or higher
Typical median upload speed	10 Mbps or higher
Typical median latency (in milliseconds)	28.02 ms
Typical median packet loss	0.08%
Spectrum Internet Ultra 300/20	
Typical median download speed	300 Mbps or higher
Typical median upload speed	20 Mbps or higher
Typical median latency (in milliseconds)	28.02 ms
Typical median packet loss	0.08%
Spectrum Internet Assist 30/4 **	
Typical median download speed	30 Mbps or higher
Typical median upload speed	4 Mbps or higher
Typical median latency (in milliseconds)	28.02 ms
Typical median packet loss	0.08%
Everyday Low Price 3/1***	
Typical median download speed	3 Mbps or higher
Typical median upload speed	Up to 1 Mbps
Typical median latency (in milliseconds)	28.02 ms
Typical median packet loss	0.08%

Metrics based upon measurements collected between 7pm – 11 pm from 10/1/2016 through 10/31/2016. Charter uses multiple methods to measure the performance of its products. Data was collected from the SamKnows FCC Measuring Broadband America panel where possible. Tiers that were not included in the Measuring Broadband America panel had data collected from an internal SamKnows panel. Download and upload speed metrics are produced for each individual tier. Latency and packet loss given minimal variation across tiers are based on measurements across all tiers.

Charter Internet customers can check the speed performance of their current Internet connection using the Charter Speed Test on Charter.com or Charter.net, which tests the speed that they are receiving on Charter's network to the end user device. These tests are dependent on a variety of factors, including the customer's home network configuration, modem, and Internet connected devices, and the time of day, and therefore do not reflect the performance of the Charter network only.

Network Management:

Application Specific Behavior? No, subject to Charter rights under the network management practices policy which prevents harmful or illegal activity.
Subscriber-triggered network management practices? No, subject to the restrictions and terms of Charter's Acceptable Use Policy and Charter's rights under the network management practices policy which prevents harmful or illegal activity.

Additional information on network management can be found in Charters Residential Internet Acceptable Use Policy ("AUP"), Commercial Internet Acceptable Use Policy, and Network Management Practices Policy.

Privacy Policy:
Charter values our Customers' privacy and will collect, use and otherwise handle your information in accordance with Charter's Privacy Policy.

Complaints or Inquiries:

If you have any questions or concerns regarding your Charter Internet service, you may contact Charter customer service by calling 1-888-438-2427 or contact us online at Charter.com. To submit complaints to the FCC, you can contact the FCC by phone at 1-888-225-5322, online at consumercomplaints.fcc.gov or online at www.fcc.gov/guides/getting-broadband.

FCC Resources
Learn more about the terms used on this form and other relevant information at the following FCC's links:
https://www.fcc.gov/general/glossary-telecommunications-terms or https://www.fcc.gov/consumers/guides/consumer-labels-broadband-services?from=home

** Availability of offer based on eligibility and service address that has been pre-qualified. Click here for additional details.
***Spectrum equipment not included with service. Modem lease available for $10.00 per month.

Altice (Optimum):

Residential Pricing Information: Altice (Optimum)

Please find below our current product pricing for internet only service.

Optimum 100 @ 100 mbps @ 39.99 mo./1 yr.
Optimum 200 @ 200 mbps @ 49.99 mo./1 yr.
Optimum 300 @ 300 mbps @ 59.99 mo./1 yr.

This includes a free smart router and installation.

As we mentioned, we are also offering Economy Internet for qualifying new customers with a 30 Mbps service priced at $14.99 month. To qualify for this service, you need to qualify for the National School Lunch Program or be a Senior citizen who is eligible for Supplemental Security Income (SSI) as well as not have been a Optimum broadband customers in the prior 60 days.

We also offer Optimum Packages, which include cable tv, internet and phone. Please find that product pricing below.

Optimum Core TV- Internet 200 mbps and phone @ 69.99 mo./3yrs
Optimum Core TV- Internet 300 mbps and phone @ 79.99 mo./3yrs
Optimum Select TV- Internet 300 mbps and phone @ 89.99 mo./3yrs

RCN:

Note: the below RCN rate card does not show the available promotional or bundled package pricing.

Phone

Unlimited Calling Plan Includes Local, Regional & Long Distance Calling and 5 Calling Features: Basic Voicemail, Caller ID Deluxe, Call Waiting, Call Waiting ID Deluxe and Three-Way Calling	$45.00
Additional Lines	$25.00

Directory Listings (Not applicable for cord computer lines)

Single Listing	Included
Each Additional Listing	$2.50
Non-Directory Listed Service	$1.95
Non-Published Service	$2.50

Domestic Directory Assistance (per call)

Local/Intralata Directory Assistance	$1.25
National Directory Assistance	$1.25
Reverse Directory Assistance	$1.25
Directory Assistance Call Completion	$0.35
Directory Assistance Surcharge	$1.75
International Directory Assistance	$7.94
International Calling[7]	Varies

Phone Features (per use)

Anonymous Call Rejection	$3.50
Call Block	$5.60
Call Forward Variable	$3.60
Call Return	$5.40
Call Waiting	Free
Call Waiting ID Deluxe (with Call Waiting and Caller ID)	Free
Call Waiting Fax Ring	Free
Call Waiting Deactivation	Free
Caller ID Blocking	Free
Caller ID Deluxe	Free
Call Trace	$3.50
Distinctive Ring 1	$4.90
Distinctive Ring 2	$7.00
Priority Call	$4.30
Repeat Call	$4.30
Selective Call Acceptance	$3.50
Select Call Forward	$3.80
Speed Dial 8	$3.50
Speed Dial 30	$3.55
Three Way Calling	Free
Ultra Call Forward	$7.00
Voice Mail – Basic	Free
Voice Mail – Family	$10.00
Voice Mail – Value	$7.00

Installation Fees & Other Charges

Account Activation Fee	$9.99
Installation (Digital TV, Phone or Internet)[6]	$49.95
Prewired Additional Outlet (After first 4)	$14.95
Unwired Additional Outlet	$35.00
New Jack Installation	$35.00
Custom Installation / Wiring /Repair (Per 30 Minutes)[12]	$35.00
Technician Visit[12]	$54.95
Relocate Outlet	$35.00
Upgrade (Trip Required)	$49.95
Downgrade	$5.00
Additional Converter Box Request	$14.95
Customer Equipment Hook-Up (TiVo, DVD, VCR)	$14.95
Home Service – Customer Education	$49.95
Seasonal Disconnect / Reconnect (per line of business)	$4.95/mo
Transfer of Service (not including Tech visits)	Free
Static IP Activation	$25.00
Home Networking (1st Computer or device)[10]	Free
Home Networking (per 2nd, 3rd and 4th Computer or Device)[11]	$4.95
Wire Maintenance (Monthly)	$4.95
Non-Pay Reconnect	$35.00
Returned Check Fee	$25.00
Payment by Phone Processing Fee (Via Automated Response Unit)	$4.50
Payment by Phone Processing Fee (Via Representative)	$6.95
Payment by Web Processing Fee (Via rcn.com)	$1.00
Late Fee – Video Services (on a delinquent balance of $10 or more)	$8.00
Late Fee – Internet Service	$9.00
Late Fee – Phone Service (on a delinquent balance of $5 or more)	1.50%
Auto-pay Denial Fee	$10.00
Broadcast TV Surcharge	$10.78
Sports Surcharge	$12.73
Cable Entertainment Networks Surcharge	$9.35
New York Municipal Construction Surcharge	$2.99
Unreturned Equipment	Actual Replacement Cost
Network Access and Maintenance fee	$1.97

(1) RCN (Limited Basic/Signature Digital) Cable TV service needed to access other levels of service. Digital converter box or Cable Card required. Prices noted do not include monthly price for Digital converter box unless otherwise noted. Includes On Demand, Interactive Program Guide and music channels. Availability of certain On Demand content may depend on subscription to another service.

(2) Must subscribe to Premiere Total or Premiere Sports tier to purchase NFL Red Zone. A subscription to NFL network is also required.

(3) To receive HD features and benefits, an HD television, HD converter remote control and other equipment is required. An HD-capable TV set with component, HDMI or DVI inputs that supports 1080i and meets RCN specifications for DVR service required. Advertised channels/stations may provide some non-HD programming. HD programming is limited to the programming provided to RCN in HD format by the content provider.

(4) All RCN TiVo services/products require RCN Internet service. Availability of third-party content subject to change and certain fees may apply. TiVo boxes must be broadband connected to perform multi-room viewing. Not all programs may be transferred using the multi-room viewing feature due to the use of copy protection mechanisms under the FCC's encoding rules (47 C.F.R. 76.1904). TiVo and the TiVo logo are trademarks or registered trademarks of TiVo Inc. and its subsidiaries worldwide. All other marks are property of their respective owners.

(5) Includes Interactive Program Guide, 45 music channels, certain digital channels, multiple screens of premium service(s) subscribed to separately, access to Pay-Per-View and RCN On Demand.

(6) Modem rental only required if subscriber does not own a cable modem. RCN does not certify support customer-owned DOCSIS 3.1 modems used for 1 Gig service.

(7) Please visit www.rcn.com for country-specific usage rates.

(8) Additional fees may apply for prewired installation. Unwired installation refers to installs up to 125 feet from existing RCN plant, primary outlet only, does not include wall fishing.

(9) Custom work includes, but is not limited to, wall fishing, extensive drop ceiling work, basement, crawlspace, attic work, removal or replacement of fixtures, relocation of drops, installation of customer-owned equipment, such as home theaters, DVR and High Definition TV equipment.

(10) Home networking service available for up to 4 computers and/or other computer related devices, such as gaming consoles and printers. RCN certified home networking device required.

(11) Each standard home networking installation must be within 150 feet of the RCN certified Home Networking Device and includes installation of modem/router, software, PC cards or USB adapters, computer set-up and file sharing.

(12) After initial installation, a $54.95 fee may apply for additional technician visits to the home and may be in addition to other one-time charges.

A Broadcast TV surcharge of $10.78 is applicable to all RCN cable packages with Basic Digital TV tier and higher and a Sports surcharge of $12.73 is applicable to all RCN Cable packages with Signature Digital TV Tier and/or Sports packages. An Entertainment Network surcharge of $9.35 is applicable to all Signature Digital TV tier and/or Premiere Tier and/or Premiere Movies and Entertainment and/or Premiere News and Information and /or Premiere Children and Family.

Internet download speeds are not guaranteed and may vary based on device, connection, & other factors outside of RCN's control. Certain equipment may be required to receive 1 Gigabit speeds and may vary due to conditions outside of network control, including customer location. All speeds not available in all areas.

*Rates effective January 2018. Not all channels, features and services are available in all areas; check for availability in your area. Some restrictions may apply. Applicable taxes, franchise fees or other surcharges may apply and are not included in the price. Services and pricing are subject to change. Services are subject to terms and conditions of RCN's subscriber agreements, online policies, and other applicable terms and conditions. Programming, channel location and packaging subject to change. All RCN prices listed are monthly, recurring charges unless otherwise indicated, excluding one-time fees such as installation, administrative, On DEMAND and/or Pay-Per-View charges. Internet speeds vary and are not guaranteed. Additional charges may apply for custom or non-standard installation. Cable TV: A digital converter is required. Phone: Regional calling area and LATA boundaries may apply. All sales subject to credit check and may require pre-payment of service or a deposit. Leased equipment must be returned to RCN if service is canceled. See our online disclosures at rcn.com for information about services offered in your area. The names, images, and logos of featured programs are the property of their respective owners. ©2018 RCN Telecom Services (New York), LLC. All rights reserved.

*Not available for new customers.

1.800.RING.RCN | rcn.com

RCN

RCN *(cont.)*

Note: the below RCN rate card does not show the available promotional or bundled package pricing.

Digital TV

Limited Basic[1]	$31.00
Signature[1]	$94.76
Premium Movie Channels	
HBO	$21.95
Showtime/The Movie Channel	$16.95
Cinemax	$11.95
Starz	$12.95
HBO/Cinemax	$21.95
Premiere Packages	
Premiere Total (includes all 4 packs)	$21.99
Premiere Sports	$11.99
Premiere News & Information	$6.99
Premiere Children & Family	$6.99
Premiere Movies & Entertainment	$11.99
Sports Packages	
NFL Red Zone (one-time fee)[2]	$59.99
Fox Soccer Plus	$14.95
MLB Extra Innings	Varies
NBA League Pass	Varies
NHL Center Ice	Varies
High Definition Package	
HD Expanded Tier[3]	$9.99
On Demand	
New Release – HD	$5.99
New Release	$4.99
Library Movie	$2.99
Double Feature	$4.99
Adult Programming	Varies
Events	Varies
Titles in Spanish	$1.99 – $3.99
Subscription On Demand	
Eros Now	$9.95
Filipino On Demand	$7.95
here! On Demand	$8.95
Too Much for TV On Demand	$17.99
DOG TV	$4.99

International Programming

Arabic	
ART (Arab Radio & Television)	$12.95
Bengali	
NTV	$14.95
ATN News	$7.95
Channel 24	$7.95
Desh	$7.95
ATN	$7.95
Boishak India	$7.95
Complete Bengali Pack	$19.99
Chinese	
CCTV-4 (China Central Television-4)	$11.95
CTI Zhong Tian	$11.95
CCTV-4 / CTI Zhong Tian	$11.95
Filipino	
TFC (The Filipino Channel)	$11.95
GMA Pinoy TV	$12.95
GMA Life TV	$9.95
GMA Pinoy TV / TFC	$19.95
GMA Pinoy TV / GMA Life TV / TFC	$29.95
GMA Pinoy TV / TFC / Filipino On Demand	$29.95
GMA Pinoy TV / GMA Life TV / TFC / Filipino On Demand	$35.95
Mabuhay Pack	$27.95
French	
TV5 MONDE	$9.95
Greek	
ANTENNA Satellite	$14.95
MEGA Cosmos	$11.95
ANTENNA Satellite / MEGA Cosmos	$25.95
New Greek TV	$14.95
Alpha	$4.95
4E	$4.95
RIK	$4.95
Complete Greek Pack	$39.99
Italian	
RAITALIA	$9.95
Japanese	
TV Japan	$24.95
Korean	
MBC (Munhwa Broadcasting Corporation)	$12.95
tvk24	$12.95
MBC / tvk24	$19.95
Pan-Asian	
MYX (Music Video Channel)	$4.95
Polish	
TVN24	$14.95
iTVN	$14.95
Portuguese	
RTPi (Radio e Televisão de Portugal)	$9.95
TV Globo Internacional	$19.99
PFC	$19.95
PFC / TV Globo	$29.95
Punjabi	
TV 84	$4.95
Channel Punjab	$4.95
Punjab TV	$4.95
Complete Punjabi Pack	$7.95
Russian	
Elite Pack	$24.99
Prestige Pack	$24.99
RTVI	$9.95
Channel One Russia	$14.95
RTN (Russian Television Network of America)	$15.95
NTV	$15.95
Channel One Russia / RTVI / NTV America	$24.99
Channel One Russia / RTN / one other Russian channel	$24.99
South Asian	
Aapka COLORS	$14.95
SBTN	$12.95
ITV Gold (India TV Gold)	$9.95
STAR India GOLD	$9.95
Star Bharat	$9.95
STAR India PLUS	$11.95
Sahara Filmy	$11.95
SONY TV	$14.95
TV Asia	$14.95
Zee TV	$14.95
ITV Gold / Zee TV	$19.95
TV Asia / Zee TV	$24.95
TV Asia / ITV Gold	$17.95
STAR India GOLD / Star Bharat / STAR India PLUS	$21.95
STAR India GOLD / Star Bharat / STAR India PLUS / ITV Gold	$26.95
STAR India GOLD / Star Bharat / STAR India PLUS / TV Asia	$27.95
STAR India GOLD / Star Bharat / STAR India PLUS / Zee TV	$34.95
STAR India GOLD / Star Bharat / STAR India PLUS / Zee TV / TV Asia / ITV Gold	$39.95
Chandi Pack / Chandi Pack PLUS	$32.95 / $40.99
Sona Pack / Sona Pack PLUS	$42.99 / $50.95
Spanish	
MiVisión Lite	$13.00
MiVisión Pack	$17.95
MiVisión Plus	$23.95
El Paquetón	$17.50
Mi Cine	$5.50
Mi Musica	$5.50
Urdu	
Filmazia	$4.95
Dawn	$4.95
APlus	$4.95
ATV	$4.95
Metro-One	$4.95
Complete Urdu Pack	$9.95

Internet

High-Speed Internet	
Downloads up to 5 Mbps / Uploads up to 512 Kbps*	$54.00
Downloads up to 10 Mbps / Uploads up to 2 Mbps*	$70.00
Downloads up to 25 Mbps / Uploads up to 4 Mbps	$82.00
Downloads up to 50 Mbps / Uploads up to 10 Mbps	$99.99
Downloads up to 75 Mbps / 110 Mbps / 155 Mbps Uploads up to 15 Mbps	$149.99
Downloads up to 330 Mbps / Uploads up to 20 Mbps	$249.99
1 GIG	$149.99
Home WiFi Service[9]	$5.50
Modem[6]	$10.00
1 Gig Modem[6]	$15.00
Static IP	$19.95
Internet Security	
McAfee PC Security	
Triple Play Bundle Customers	Free
Non Triple Play Bundle Customers	$3.95
McAfee Total Protection	
Triple Play Bundle Customers	$5.95
Non Triple Play Bundle Customers	$7.95

Equipment

TiVo Quad	$28.00
TiVo T6[4]	$39.99
MoCA Bridge	$3.99
Additional TiVo Preview Converters[4]	$13.00
TiVo Premiere[4]	$22.00
TiVo Wireless Adapter Rental	$2.00
DVR Converter[5]	$21.00
HD Converter	$13.00
Standard Converter[5]	$13.00
Cable Card	$2.00
TiVo Mini	$13.00

Why RCN?
In a word, quality.

RCN

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