DSA Tech Action Working Group Municipal Broadband Network Report

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I. Introduction

Internet service providers have failed New Yorkers. With the onset of the COVID-19 crisis, internet access has become even more critical to New Yorker's lives in going to school, finding employment, accessing government services, connecting with loved ones, and engaging with our democracy. Internet access in New York City, however, remains expensive and slow, and barriers to access fall disproportionately along lines of race, age, disability, immigration status, and economic status.

In order to remedy the existing internet access inequities and build a more prosperous City for all New Yorkers, we must completely reorient our approach to internet service delivery away from private providers that are focused on short term, investor returns, and towards a reliable, universal delivery of municipal utility services approach.

An affordable, lighting fast, fully unionized, democratically run and municipally owned universal fiber to the premises network that prioritizes marginalized New Yorkers and good union jobs is within our reach. We have the infrastructure, workers, and money to build the network. What we need now is the will to begin the process of breaking free from the private provider stranglehold to start building an internet network that will serve all New Yorkers now and into the future.

*** This report was written in March and April of 2021 and may be updated as the local, regional and national broadband landscape changes***

II. Internet Access in New York City

A. Overview

There is much blame to go around that led to this breaking point of dysfunctional internet service in New York City amidst a pandemic. The City is at fault for handing over the City's streets and other public spaces to Verizon, Spectrum, Altice and other internet service providers (ISPs) for the installation of infrastructure to deliver broadband and other services like cable tv hoping that "competition" amongst them would lead to expanded access, faster internet speeds, and lower subscription costs.

That theory has failed with 46% of NYC households living in poverty not having broadband at home,[1] access to internet service deeply segregated by race,[2] New Yorkers paying some of the highest fees relative to internet speed amongst big cities worldwide,[3] and hundreds of thousands of students, elders and shelter residents lacking a home broadband connection in the midst of a pandemic.[4]

Percentage of Households Without Broadband Internet
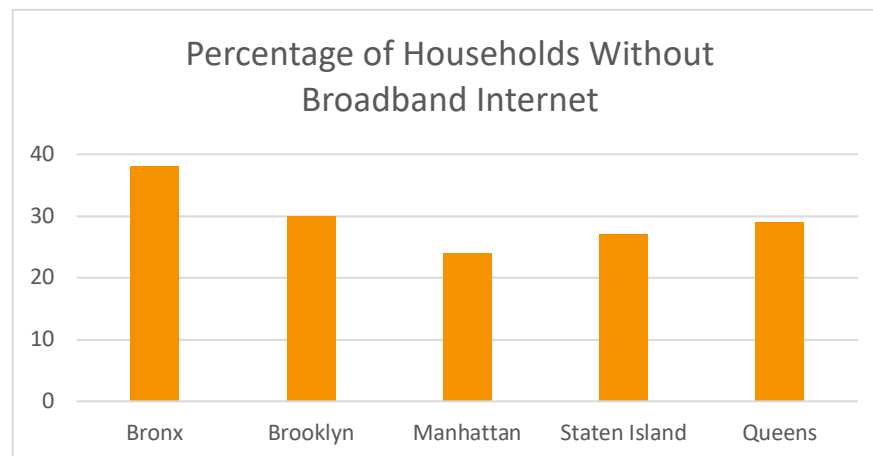
Millions of New Yorkers don't have access to broadband internet at home.[5]

B. Current State of the Internet

The internet is an interconnected network of wires and cables that only moves as fast as the infrastructure that carries it, and New York City's infrastructure is outdated and slow. In 2020, most New Yorkers fortunate enough to have home internet service barely met the United States' inadequate definition of "broadband" internet which is 25 Mbps download speed and 3Mbs upload speed.[6] By global standards, the City is failing to ensure the ability of its citizens to

stay apace with the world's increasingly fast internet speeds.[7] And at the center of the connectivity crisis in New York are the households and individuals that cannot even obtain access to internet services, however inadequate, due to high prices and an unwillingness by the greedy ISPs to expand their services to some neighborhoods or buildings.

The City of New York has long relied on public-private partnerships in the form of non-exclusive "franchise" agreements with companies to provide internet service in the five boroughs. The hope was that competition between ISPs would increase access and internet speeds while driving down prices. The uneven access, slow speeds and high prices New Yorkers face reveals just how misplaced this hope was. Even where some neighborhoods have more than one ISP operating, the presence of two ISPs isn't real competition, especially given the ISPs reluctance to compete over individual buildings.[8]
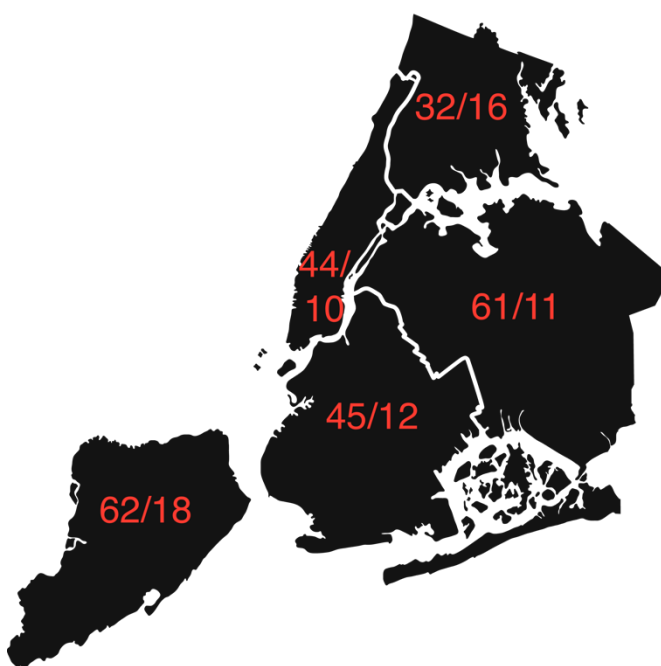
Median Average Speed in 2020 by Borough (download/upload Mbps)[9]

New Yorkers fortunate enough to have home broadband are paying high prices for awful internet service. Multiple people using multiple devices and performing high bandwidth activities cannot function properly with the speeds most New Yorkers experience. As technology continues to advance, these issues will only get worse.

There are currently three primary franchise agreements for internet service in New York — Verizon, Spectrum and Altice.[10] Each company's agreement with the City covers partially overlapping territories that entitles each to dig up and occupy the City's streets and other real estate assets to install infrastructure to deliver internet and other services to households and businesses.

Initially, these companies connected people to the internet using copper ("DSL") or cable lines that connect to an already existing telephone or television line. While this is cost-effective for ISPs to rollout, it comes at a cost — internet speed. Agreements by the ISPs to significantly upgrade this legacy technology, specifically to bring fiber optic cable connections to households

("fiber to the premises"), the only future-proof internet service delivery technology that can consistently permit high bandwidth activities by multiple users, has been uneven in the case of Verizon, and nonexistent for Spectrum and Altice, despite public statements to the contrary.[11]

More recently, the City with its Internet Master Plan has taken the first steps towards building some internet infrastructure that doesn't rely exclusively on the major franchisees. But make no mistake – whether it's a non-exclusive franchise or some other form of public-private partnership, the result is the same: after a giveaway of public money, real estate and other assets, the greedy private partners fail to deliver on their commitments, with negative effects that disproportionately fall on the most marginalized communities.

The City needs to move beyond a reliance on partners to solve our multiple, intersecting internet connectivity issues, and mistreatment of workers, by delivering universal service to all New Yorkers itself as a utility service.

C. Consequences of Public-Private Partnership

The wrongheadedness of the public-private partnership model is that the City will spend billions of dollars, give away infrastructure and then still be left hoping that competition emerges to solve the digital divide and connectivity issues that plague our City. As we've seen with the public private partnership model in the past, when our partners fail to deliver and the City fails to hold the ISPs accountable, the consequences are dire.

1. Digital Redlining

One consequence of the public-private partnership model has been "digital redlining", the standard business practice of the ISPs where they focus their services – especially the faster ones – on high-income areas while only partially rolling out services in lower income neighborhoods with a high percentage of non-white residents.[12] The dynamic is pervasive across the City – it's not a coincidence that many of the areas Verizon failed to connect under the terms of its franchise agreement also happen to be areas with a large number of lower income, non-white residents, or that over one full year into the pandemic, thousands of students experiencing homelessness who need internet to attend remote school are still unable to do so.[13] Nor is it a coincidence that the neighborhoods with the slowest internet speeds in 2020 in Brooklyn, the Bronx and Manhattan were Brownsville, West Farms and Chinatown, all neighborhoods with a high percentage of non-white, lower income residents.[14]

These systemic inequities in access to critical internet services, and the ability to participate in society, are a direct result of the public private partnership model that subsidizes and then permits private entities to seek profits, all while lacking accountability.

The negative effects of digital redlining has impacted lower-income neighborhoods across the City, but the negative impacts have fallen disproportionately on dozens of neighborhoods with thousands of lower income residents in the Bronx, Brooklyn and Queens, that have very low home broadband adoption rates relative to the rest of the City, and shamefully

high percentages of blocks within those neighborhoods where the ISPs do not even offer their faster services.[15] And even if the services were available, the prices would be too high for many households to afford.

Absent massive subsidies and strict oversight, there is every incentive for private profit making entities to focus services on higher income neighborhoods. It poses the question – if the plan to fix the connectivity crisis in New York is to spend billions of dollars while committing large amounts of additional municipal resources like real estate assets and administrative oversight, why doesn't the City just cut out the unreliable partner and deliver internet itself?

2. The Trouble with Oversight

The City's track record of oversight in internet service delivery has been abysmal. Many of the workers who built the ISP broadband networks like the IBEW Local 3 Spectrum workers have been subjected to anti-worker tactics like union busting and denied fair wages and benefits,[16] and the ISPs have failed to expand their networks to underserved communities as promised, and rewarded customers with ever-increasing monthly costs, mystifying fees and horrible customer service. Time and again, the City has failed to hold the ISPs accountable.

And even with the subscription fees allowing the ISPs to recoup their costs and profit, leading to staggeringly high amounts of concentrated wealth,[17] the ISPs still send their armies of lobbyists to Washington, Albany, and City Hall to try and slash taxes further, avoid regulations, paper over their predatory practices, explain away their broken promises, and extract sweetheart deals to further subsidize the services they provide to less than full-paying customers.[18] It's a disgraceful (though common) business model among our partners – keep the staggeringly high profits private, socialize the losses, avoid taxes at all costs, provide horrible to middling service depending on the means of the customer and treat your workers poorly.

Why would the City want to continue to rely on these companies that have proven time and again to be so unreliable? But more importantly, why would the City continue to rely on a public-private partnership model that has proven to be so fundamentally flawed? The time has come to radically shift our approach of internet service in New York City away from the private ISPs focused on short term, investor returns, and towards a reliable, universal delivery of critical utility services approach. We have the resources we need to begin the process of breaking away from the ISPs in order to achieve equitable internet access that puts New York internet users and workers first.

D. ISP Details

It's striking just how similar the details of each ISPs performance over the last decade have been: Segregated service delivery, union busting, high prices, slow speeds, horrible customer service and absolutely no one holding the company's accountable. While it's critical to highlight that the flaws in internet service in New York City are not just a product of the specific

companies that have received franchises in the past, but the public private partnership approach itself, it is also critical that we honestly assess the practices of our existing partners so that the next ten years of internet access in New York City isn't a repeat of the past.

Verizon

Franchise:	Covers all five boroughs
Franchise Expiration:	July 16, 2023
Available to:	More than 2.7 million households[19]
Broadband Technology:	Primarily fiber to the premises
Internet Speeds:	200/200 Mbps – 940/880 Mbps
Fiber Availability:	QNS: 93% ; BK: 76% ; BX: 88% ; SI: 99%; MAN: 82%[20] (reliance on FCC data)[21]
Intro Subscription Price:	$40/mo - $80/mo (plus $15/mo for modem w/ WiFi rental and $100 installation fee)
Low Cost Offering:	200/200 Mbps for $20/mo (plus $15/mo for modem w/ WiFi rental and $100 installation fee) to those who are eligible[22]
Labor Practices:	Hostilities with unionized workers in 2016 that resulted in a significant strike.[23]
Covid-19 Practices:	Excluded many low-income households from emergency pandemic programs.[24]
Expansion Issues:	Was supposed to make it's FiOS service available to all New York City households in 2014. After the City sued the company for noncompliance with the terms of the franchise agreement in 2017, the company finally agreed in late 2020 to start delivering FiOS to some of the underserved communities it previously avoided.[25]
Key Assets:	Controls all the underground conduit through which fiber is installed in the Bronx and Manhattan through its Empire City Subway subsidiary,[26] and is by far the largest owner of utility poles outside Manhattan on which fiber is installed.[27]
Customer service issues:	Responsiveness of customer service based in part on customers wealth.[28]
Service Outage:	At least hundreds of significant outages over the life of the current franchise agreement.[29] Major service outage in January 2021.[30]
Service Repair Charges:	Upwards of $100 for many technician visits
Fraud:	Had to pay a $17 million fine in 2017 for its role in a fraudulent scheme involving federal subsidies to connect New York City public schools with the internet (E-Rate), and resulted in the City having to pay a $3 million fine and being barred from collecting $120 million dollars in federal reimbursements it was otherwise entitled to.[31]

Spectrum

Franchise:	Covers Manhattan, Brooklyn, Queens and Staten Island
Franchise Expiration:	July 18, 2020
Available to:	More than 2 million households[32]
Broadband Technology:	Primarily provides service through a hybrid fiber-coax network. Multiple subscribers share the total bandwidth that can be transmitted through the "last mile" of cable to the home, that results in slower service.[33]
Internet Speeds:	200/10 Mbps – 940/35 Mbps
Fiber Availability:	Qns: 1.6% ; BK: 00.55% ; SI: 00.64% ; Man: 15.5%[34] (reliance on FCC data)[35]
Intro Subscription Price:	Intro $50/mo - $109/mo (plus $10 router fee, $50 installation fee) and goes up after 1 year
Low Cost Offering:	30/4 Mbps for $15/mo (plus $5/mo for WiFi router) to those who qualify[36]
Labor Practices:	Spectrum's anti-worker stance and union busting tactics has resulted in the longest current strike in the nation with the IBEW Local 3 Spectrum workers having been on strike since 2017.[37]
Covid-19 Practices:	Workers at the company called out the lack of safety protections given to them while trying to keep quarantining households connected, and the company insisted on call center and other office workers go into crowded offices despite social distancing guidelines, only changing course upon public criticism. Many workers got sick and some died.[38] Blocked NYC families with unpaid bills from remote learning deals.[39]
Expansion Issues:	In 2018 New York State almost kicked Spectrum out of the state for lying about the expansion of its service to underserved communities.[40]
Key Assets:	Owns underground conduit in Brooklyn, Queens, Staten Island; some last mile fiber lines for enterprise service; INET infrastructure from franchise agreement.[41]
Customer service issues:	Customer service rated amongst the lowest of all ISPs in the Northeast[42]
Service Outages:	Thousands of significant service outages over the life of the current franchise agreement.[43]
Service Repair Charges:	Upwards of $50 for many technician visits
Fraud:	In 2018 New York State fined Spectrum more than $174 million for defrauding New York customers by lying about the speeds of the service it was providing.[44]

__Optimum__

Franchise:	Covers Brooklyn and the Bronx
Franchise Expiration Date:	July 18, 2020
Available to:	More than 1 million households[45]
Broadband Technology:	Primarily provides service through a hybrid fiber-coax network. Multiple subscribers share the total bandwidth that can be transmitted through the "last mile" of cable to the home, that results in slower service.[46]
Internet Speeds:	300/35 Mbps – 940/50 Mbps
Fiber Availability:	BX: 4%; BK: n/a[47] (reliance on FCC data)[48]
Intro Subscription Price:	Intro $40/mo - $75/mo (plus $10/mo modem fee) and goes up after 1 year
Low Cost Offering:	30/3 Mbps for $15/mo ($30 installation fee) to those who qualify[49]
Labor Practices:	Much of the company is not unionized, in part because of a year's long union busting campaign and other anti-worker tactics.[50] Transitioned many technical workers into a separate company with a contract worker type of wage structure.[51]
Covid-19 Practices:	Workers at the company called out the lack of safety protections given to them while trying to keep quarantining households connected.[52] Blocked NYC families with unpaid bills from remote learning deals.[53]
Expansion Issues:	Dangled fiber to the premises in NYC footprint in 2015 to appease NYC/NYS officials after it purchased Cablevision and made big layoffs.[54] Fiber to the premises rollout in NYC barely noticeable.
Key Assets:	Underground conduit in Brooklyn;[55] some last mile fiber lines for residential and enterprise service; INET infrastructure from franchise agreement.
Customer service issues:	2nd lowest customer satisfaction rating of all ISPs in the Northeast.[56]
Service Outages:	Many significant service outages over the life of the current franchise agreement.[57]
Service Repair Charges:	Charges $7.99/mo for service protection so customers can avoid $80 charges for individual service calls. Paying the fee also grants priority status in the queue for customer support calls.[58]
Fraud:	In 2019 the City accused Altice of being in violation of its franchise agreement for overcharging customers.[59] In 2018 New York State fined Altice for lying about the speeds of the service it was providing.[60]

III. Benefits of a Municipal Network

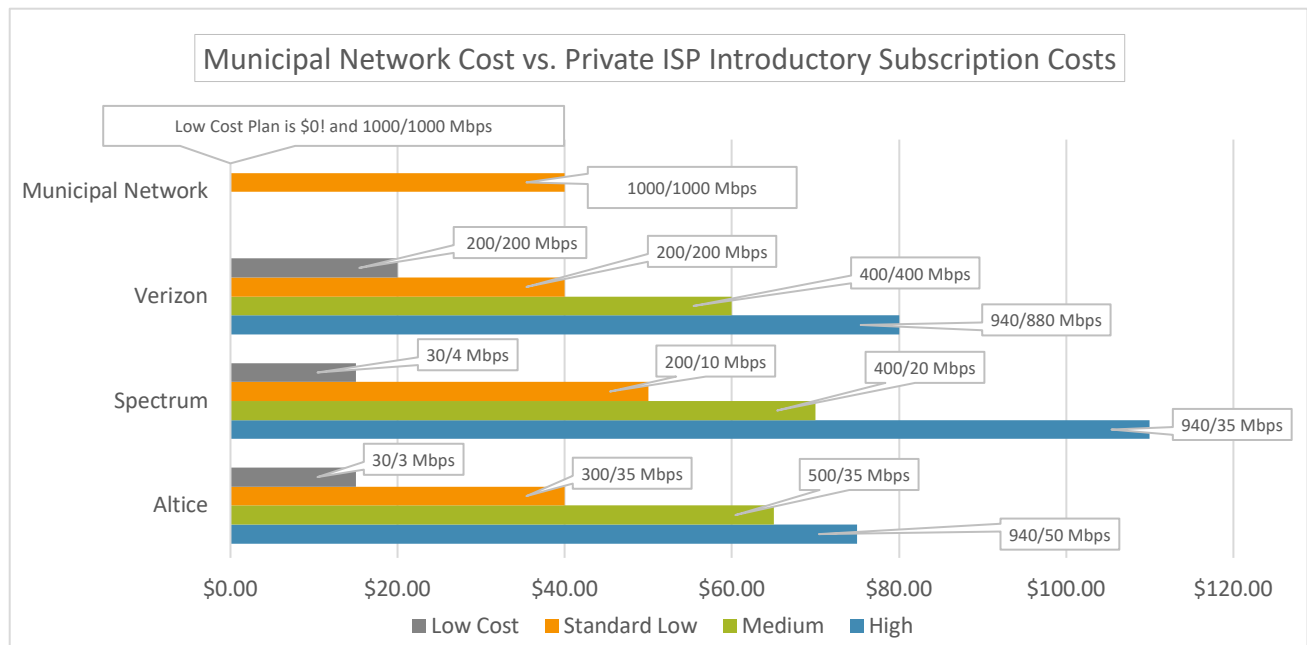## A. Benefits for Residents

1. Overview

A municipal broadband fiber to the premises network will be a transformational utility service for New York City. Every single New Yorker no matter who they are or where they live will receive gigabit service, i.e., 1000 Mbps download and upload speeds, delivered to their home, wherever that may be. That means all children will have the internet access they need to succeed in school, all adults will be able to access online resources and services and participate in the local economy more effectively, and seniors will be able to access health information and care.

New Yorkers need access to gigabit speeds in order to perform crucial everyday tasks – online school, telemedicine, work, etc., especially in households with multiple people using multiple devices, performing high-bandwidth activities like video calls and streaming. And by bringing fiber into every New Yorkers home now, it will ensure that they can benefit from future technological developments and meet future technological demands – a fiber to the premises connection is the only future proof internet access solution.[61]

Universal fiber to premises and the infrastructure that will reach to every corner of the City to help realize that vision will also allow for a massive expansion of free outside the home connectivity options like WiFi in streets, parks, on transportation and in-stores.

2. Price and Speed

Unlike the private ISPs who offer deceptive promotional rates and charge exorbitant fees for equipment purchase, rental, data overages, installation, activation, termination, and service charges, **the municipal network will have one straightforward low price of $40 for those who can afford it, and be free for those who cannot afford it.** All customers will receive the same great service. Nor will there be any fees with the municipal network. Non-profit or commercial entities with significant resources, should they want the service, may be required to help shoulder some of the costs by covering their reasonable equipment fees along with higher subscription costs.

Municipal Network Cost vs. Private ISP Introductory Subscription Costs

Municipal Network — Low Cost Plan is $0! and 1000/1000 Mbps — 1000/1000 Mbps

Verizon — 200/200 Mbps — 200/200 Mbps — 400/400 Mbps — 940/880 Mbps

Spectrum — 30/4 Mbps — 200/10 Mbps — 400/20 Mbps — 940/35 Mbps

Altice — 30/3 Mbps — 300/35 Mbps — 500/35 Mbps — 940/50 Mbps

Legend: Low Cost — Standard Low — Medium — High

Offering the same gigabit internet speeds at one straightforward price of $40 for households that can afford it, and free for those that cannot, will mean around 5x-33x faster download speeds and 5x-333x faster upload speeds than the low cost and standard low offerings from Spectrum, Verizon, Altice, and will be significantly cheaper and faster, especially on upload speeds, than the standard low, medium and most high offerings from the ISPs. The high cost offerings from the ISPs are often above $100 per month for the faster speeds, <u>especially after the one year promotional period ends and factoring in the additional monthly fees</u>.

3. Net Neutrality and Privacy

With the municipal network, users won't have to worry about violations of net neutrality, meaning all data that flows through the municipal network will be treated equally, and the municipal network won't engage in shady business practices like allowing the network to become congested with traffic and then using that congestion as leverage to extract payments from network users as private ISPs have done.[62] Formal classification of internet services as a utility is a political football,[63] and one benefit of the municipal network is that the City at the local level can secure both now, and into the future, universal access and equal treatment of users. The necessity of broadband internet as an essential part of all people's lives has never been clearer, and the City can secure for all residents, what other levels of government cannot guarantee.

And unlike the ISPs, for the municipal network, the privacy of users is paramount. The ISPs are able to sell customers' web browsing history, device location information, and other sensitive data to third parties.[64] The municipal network would explicitly prohibit such practices and collect as little information as necessary to operate the network, be transparent about what information is collected, store the information securely, and maintain confidentiality between individuals and the municipal broadband network. And because the network will be

democratically run with privacy advocates having a hand in all operational aspects of the network, encroachment from law enforcement and other governmental or private persons or entities who may seek to utilize the network to put individuals or the City at risk will be thwarted.

4. Network Investment

Private ISPs are also notorious for underinvesting in their networks, and customer service,[65] including multiple language services and outreach to marginalized communities because its costly to do so and investors prefer short term profits.[66] In turn this leads to slow service, significant service outages, long customer service wait times,[67] and coupled with high costs, lower adoption by immigrants,[68] those with disabilities,[69] and other marginalized communities. The problem isn't the business practices of one unsavory ISP; rather, it is the built into the very foundation of ISPs and public private partnerships.

The municipal network's only mandate is to deliver a universal, inclusive, reliable service while finding a sustainable path forward over the coming decades that doesn't impact the delivery of other critical services - this is a path that we know is well within our reach.

B. Benefits for Workers

1. Wages and Benefits

The municipal network will be democratically run with workers having an actual seat at the table, and be 100% staffed and worked on by local union labor. From the person who builds the network next year to the customer service rep you call in ten years when you are moving away, the worker you interact with will be a member of your community which means good, local union jobs and better customer service.

The municipal network will also have a significant positive impact on the take home pay and benefits provided to network workers. As one example, field technicians with the municipal network would likely be guaranteed through collective bargaining to make more than the prevailing wage for telecommunications workers after a negotiated period of time. The prevailing wage in New York City for a telecommunications worker, i.e., the fair local wage for public works projects guaranteed under law is $45.88 per hour with a Supplemental Benefit Rate of $23.15 per hour that covers payments for health, pension and other benefits.[70]

Experienced Verizon field technician workers have the benefit of being unionized, and have collectively bargained for raises that are guaranteed to meet the prevailing wage,[71] unlike Spectrum and non-union Altice technicians that do not have such certainty.

As for benefits, a defined benefit pension would be available to the municipal network workers,[72] and workers would receive a range of extremely competitive health care options with free or low cost employee contributions for individual and family coverage, and lower

deductibles and copays than private ISPs.[73] That means more in take home pay for workers every two weeks and less costly health care coverage for what is likely comparable if not better health coverage with the municipal network.

2. Growing the Ranks of Unionized Telecommunications Workers

It is also important to emphasize that the municipal network will grow the total number of workers, specifically union workers in New York City. Rhetoric about municipal broadband "crowding out" private investment and thereby eliminating existing or future jobs is a cable and telecom lobby falsehood aimed at fighting off competition so the monopolies can be left alone to continue milking big profits from crumbling infrastructure. The same tired lies about government action or regulation stifling investment and by extension jobs has been debunked countless times before.[74]

With the exception of Verizon's past FiOS rollout, and commitment to hook up an additional 500,000 plus homes due to a lawsuit settlement,[75] none of the ISPs have made significant progress towards providing last mile fiber to households in New York City, particularly in lower-income neighborhoods. It's not clear how investment by the ISPs would be "crowded out" and jobs would be eliminated now or in the future for a business practice, last mile fiber deployment with a focus on lower-income neighborhoods, that the ISPs have no designs on doing at scale in the first place (with the exception of Verizon).

The reality is the municipal network will set the standard for a worker and customer centric network that the ISPs will be forced to compete with. Many New York households, non-profits and businesses will sign up for the municipal network and many won't. All the while, the ISPs will continue to provide service to households, enterprise customers, wireless customers, invest in 5G expansion and more. The sky-high profits of the ISPs will suffer as they lose some customers and are forced to provide services and wages at levels they would not absent the existence of the municipal network. But the ranks of unionized telecom workers will continue to grow as competition increases in America's largest and most lucrative market, and new positions and opportunities are created.

C. Benefits for the City in the Future

Not only will the money invested to build the network today directly translate to increased access, lower prices and immediate benefits for local workers, but the long-term economic benefits to New York City as a whole will be significant. A few billion dollars spent in the near term on a municipal network and repaid over decades seems like a fantastic deal when you compare it with the City's estimates of jobs and wealth created through universal broadband,[76] to say nothing of a municipal fiber to the premises network that would likely push these estimates even higher, with incredible monetary savings, an increase in wages for workers, and with the expansion of internet access, educational, health and economic benefits that will flow to all New Yorkers.

Universal fiber to premises and the infrastructure that will reach to every corner of the City to help realize that vision will also allow for the City to save money over the long term. Not only will the City save money by ensuring that future proof fiber technology is in place that won't require costly upgrades, but the City will also save money by forgoing or limiting costly contracts with private ISPs such as the leased fiber lines from Crown Castle/Lightower to connect public schools and the City's hospitals.[77] Since 2010, the City has spent many billions of dollars with private telecoms on communications infrastructure and services, and a ubiquitous City-owned fiber to the premises network will allow for the City to forgo many of these costly contracts.[78]

The ISPs underinvestment in their networks also has a critical publicly safety element beyond the everyday outages. As the City and region becomes more vulnerable to extreme weather events due to climate change, pandemics and other unforeseen disasters, affirmative steps and investment must be taken immediately to ensure that when the next event arrives, we have resilient, durable networks in place that are widely distributed to all New Yorkers so that the City and everyone in it can remain safe and connected. We rely on the private ISPs for critical public safety functions, yet they are always looking to do the bare minimum,[79] and do not have the long-term preparedness, inclusive mindset that we must demand of our 21st century critical infrastructure – durable, climate resistant systems built by union labor whose rewards flow evenly to all members of the community.

D. Next Steps

New York City also has the benefit of learning from other localities that made the smart decision to break free from their reliance on the private ISPs to start delivering internet to all residents as a straightforward utility-like service. Nationwide, these municipal broadband networks have proven to be faster, more affordable, and more transparent than private ISPs.[80]

The quicker the Mayor and City Council take the necessary steps to stand up an entity that can begin to leverage the existing City owned networks and infrastructure and planning and building out new infrastructure to begin delivering fiber to the doorstep of every New Yorker, the sooner we as a City can start to realize the immediate and long term benefits of a municipal universal gigabit service.

IV. Infrastructure and Workers

A. Existing City Owned Infrastructure

New York City would not be building a municipal fiber to the premises network from scratch. There is a vast amount of infrastructure that the City owns or may use immediately to launch the municipal network. **Given the failures of private ISPs, the City should utilize its existing internet infrastructure to help launch the municipal network.**

The City already operates multiple massive fiber networks for municipal purposes that span the five boroughs, connecting thousands of miles of fiber optic cable with thousands of separate buildings.[81] These existing networks include the ones operated by New York City's Department of Information Technology and Telecommunications (DoITT),[82] Department of Education,[83] Health and Hospitals,[84] Fire Department,[85] and Police Department.[86]

In addition to these existing networks, there are massive amounts of additional City owned infrastructure that can be leveraged immediately to launch a municipal fiber to the premises network. Many of these assets like City owned buildings are already connected with the above mentioned networks. The infrastructure, much of which is detailed in the City's Universal Solicitation for Broadband Assets List,[87] spans everything from existing fiber pathways in public housing buildings (NYCHA),[88] to hundreds of fiber connected libraries spanning all five boroughs.[89] Add to this fiber connected and conduit dense intersections with traffic signals, cameras, sensors, lights, readers and poles, operated by the Department of Transportation,[90] and the open access fiber backbone and additional infrastructure the City will own in 2021 through the recently issued Broadband RFP,[91] and you can start to get a sense of the massive amount of existing infrastructure available to leverage in order to provide affordable, lightning fast internet to every single New Yorker as a utility service.

B. Closely Aligned Institution Infrastructure

Other City owned, closely affiliated, or ideologically aligned institutions may have excess capacity on their existing networks or other infrastructure that can be leveraged to help scale a municipal broadband network. Many of these institutions like the **City University of New York's** 25 campuses are connected through a combination of the fiber network provided by the New York State Education and Research Net (NYSERNet)[92] and leased infrastructure from local ISPs.[93]

Many other non-profit service providers, arts, and academic institutions may be able to aid in the launch of the municipal broadband network through infrastructure and knowledge sharing, and will be able to benefit from the expansion of the municipal network as their broadband subscription costs go down, potentially as low as $0 per month, that will free up and advance their ability to care for, educate and enlighten the communities they serve.

C. Privately Owned Infrastructure

There is a vast amount of privately owned infrastructure like utility poles,[94] conduit[95] and fiber spread across the five boroughs that the City can also leverage to deploy the municipal fiber to the premises network. The key piece of infrastructure is the Verizon subsidiary Empire City Subway's (ECS) underground conduit system in the Bronx and Manhattan that the City can use for free and direct ECS to expand in the public rights of way at ECS's expense.[96] The presence of preexisting infrastructure like underground conduit can reduce construction costs for the municipal network significantly. Though much of the privately owned infrastructure with the major exception of Empire City Subway conduit is not free for the City to use just yet, there are a variety of tools available to make this infrastructure free or low-cost for the City to utilize.

D. Workers

Even with all the existing infrastructure, it means nothing without the experienced workers ready to leverage it to quickly launch and build out the network to connect all New Yorkers.

The experienced IBEW Local 3 Spectrum workers who have been on strike for over four years are ready to hit the ground running to use their expertise to help launch the municipal network. IBEW Local 3 has deep experience constructing fiber optic networks, maintaining the networks, and troubleshooting issues when they arise. Who better to spearhead the process of deploying the municipal network to every residence and some non-profits and businesses in New York, and then continuing to maintain and operate the network once it has been constructed.

The City, as previously mentioned, already operates multiple massive fiber networks through agencies like DoITT and DOE's DIIT, and internally building up the capacity to gradually widen the scope of service beyond the existing municipal purposes to include residential and enterprise service would be manageable. Additional existing City workers like the 24/7 rapid response multilingual 311 Call center workers, and the multi-agency efforts put into the recently issued Broadband RFP, all point to a wealth of valuable existing talent and experience that could immediately be put to use bringing fast, affordable internet to every New Yorker in a few years with amazing customer service.

V. Network Design

A. Overview

The municipal broadband fiber to the premises entity would be responsible for a number of network design, construction and operational tasks in order to serve New Yorkers, including the following:

- Planning, materials, and labor to install fiber optic cables in all public rights of way ("**outside plant**" construction);

- Planning, materials, and labor getting the fiber from the public rights of way into individual buildings ("**service drops**");

- Installing network electronics, e.g., routers and switches, in City owned facilities;

- Installing customer premises equipment in each housing unit or business that connects each individual subscriber with the municipal network ("**customer premises equipment**");

- Fiber network upkeep and customer service, along with various network operational tasks e.g., community outreach, onboarding new subscribers and billing.

B. Detail
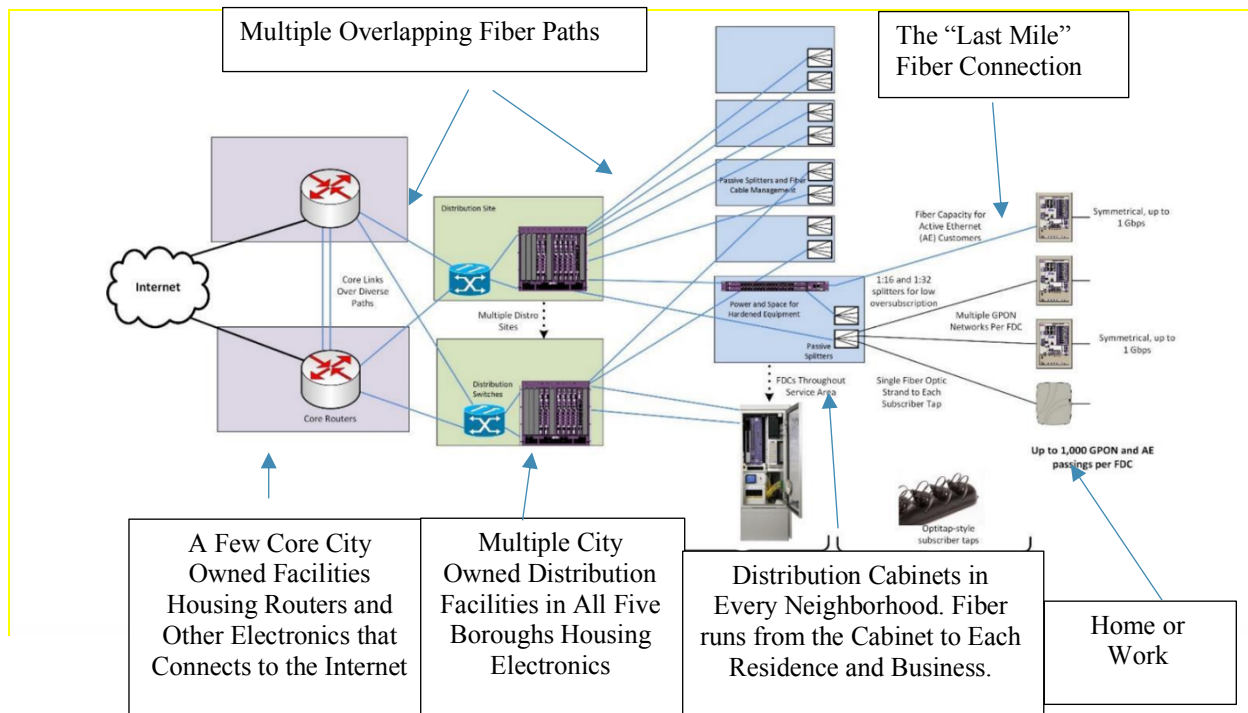
The above graphic[97] lays out the basic construction tasks that lie ahead in order to launch the municipal broadband fiber to the premises network.

- Find space in a small number of City-owned facilities to house network electronics like routers, and is connected to the public internet (backhaul); and install fiber that connects these core facilities to:

- a larger number of City-owned distribution facilities throughout the five boroughs to house network electronics like switches; and install fiber that connects the distribution facilities to:

- a larger number of distribution cabinets in every neighborhood; and install fiber from the cabinets that connects to:

- every housing unit and some businesses. Every unit also receives customer premises equipment.

One key task of the municipal fiber to the premises team will be identifying the publicly owned, closely affiliated and privately owned infrastructure mentioned in the previous section and making it available to build on as the above construction tasks are undertaken.

VI. Network Costs

A. Overview

The biggest costs to build the municipal fiber to the premises network are the outside plant construction of installing fiber in public rights of way, and the service drop and customer premises equipment costs of bringing fiber into every building and connecting each individual subscriber with the municipal network.

There are a variety of tools available to the City to drive down these costs significantly, and it is up to the City, local and state legislators to relentlessly use every available tool at their disposal to see to it that every single New Yorker has the affordable, fast internet access now and into the future that they need.

B. High Cost Estimate

This is an estimate of the costs for the City to build a municipal fiber to the premises network, assuming the status quo, and none of the many significant cost savings available to the City:[98]

Jurisdiction	Street Miles	Passings	Households	Outside Plant Cost	Cost Per Passing	Central Network Electronics	Service Drop and Customer Premises Equipment Costs	Total Cost
Bronx	1363	102,123	499,728	$204,246,000.00	$2,000.00	$149,918,400.00	$599,673,600.00	$953,838,000.00
Manhattan	1037	155,921	758,133	$311,842,000.00	$2,000.00	$227,439,900.00	$909,759,600.00	$1,449,041,500.00
Brooklyn	2111	332,685	950,856	$1,330,740,000.00	$4,000.00	$285,256,800.00	$1,141,027,200.00	$2,757,024,000.00
Queens	3228	365,089	799,234	$1,460,356,000.00	$4,000.00	$239,770,200.00	$959,080,800.00	$2,659,207,000.00
Staten Island	1189	130,553	166,152	$522,212,000.00	$4,000.00	$49,845,600.00	$199,382,400.00	$771,440,000.00
Total	8928	1,086,371	3,174,103	$3,829,396,000.00	$3200 Citywide Average	$952,230,900.00	$3,808,923,600.00	**$8,590,550,500.00**
		Tax lots by borough used as the passing figure which excludes buildings that don't pay property taxes	Figures from NYC Internet Master Plan: Adoption and Infrastructure Data by Neighborhood	Assumes 50% construction cost savings in Manhattan and Bronx because of ECS franchise. If some Bronx passings were to rely on existing poles instead of existing or soon to be built ECS franchise conduit, cost estimates assumed to be the same.	Assumes 50% construction cost savings in Manhattan and Bronx because of ECS franchise.	Assumes $300 per household	Assumes $1200 per household service drop and customer premises equipment installation costs. $500 per household is the assumed cost of customer premises equipment. Commerical buildings not included in service drop/equipment assumption, but included in passing assumption.	

C. Tools to Drive Down Construction Costs

1. Driving Down Outside Plant Costs

The status quo estimated outside plant construction costs are significantly higher in Brooklyn, Queens and Staten Island because there is no agreement in place with a private

provider like ECS to absorb the construction costs of installing underground conduit through which fiber will be installed in the public rights of way. The existence of conduit has been estimated to save outside plant construction costs by as much as 87% in dense, high-cost metro areas like New York City.[99]

However, there are still massive amounts of existing private conduit and utility poles in Brooklyn, Queens and Staten Island on which fiber can be installed.[100] Federal and state law requires that providers make their conduit and utility poles available to requestors like a municipal broadband network for a fixed rental fee.[101]

Utilizing existing available conduit and utility poles wherever it is available in Brooklyn, Queens and Staten Island will drive down outside plant construction costs significantly. Also, by following the lead of neighboring states[102] and amending New York State law, we can make the rental costs for the City's fiber network $0 on the existing conduit and utility poles that would bring the rental costs in Brooklyn, Queens and Staten Island in-line with the free rental in ECS conduit in Manhattan and the Bronx.

Also, up to 60% of the construction costs for utilizing existing utility poles is the "make ready" work of preparing poles to safely receive additional wires like municipally owned fiber because most poles are crowded with multiple wires and other attachments from multiple providers or utilities.[103] Amending state law to make all pole owners whether of utility poles or underground conduit and other private attaching entities responsible for their own expenses to accommodate the municipal networks attachment on a strict enforced timeline, will also result in significant construction cost savings and speed up deployment.[104] **We cannot tolerate the ISPs dragging their feet and making the costs of utilizing their conduit and utility poles prohibitively expensive.**[105]

Here is an illustration of the potential cost savings of using existing conduit and utility poles wherever it is available and making the costs of "make ready" and conduit preparation work be covered by the owners and other private entities. <u>Savings in yellow.</u>

Jurisdiction	Street Miles	Passings	Outside Plant Cost (NO SAVINGS)	Cost Per Passing (NO SAVINGS)	Existing Conduit Construction Costs (SAVINGS)	New Conduit/Utility Pole Construction Costs (SAVINGS)	Existing Pole Construction Costs (SAVINGS)	New Cost Per Passing (SAVINGS)	Total Outside Plant Cost (SAVINGS)
Bronx	1363	102,123	$204,246,000.00	$2,000.00	n/a ECS	n/a ECS	n/a ECS	$2,000.00	$204,246,000.00
Manhattan	1037	155,921	$311,842,000.00	$2,000.00	n/a ECS	n/a ECS	n/a ECS	$2,000.00	$311,842,000.00
Brooklyn	2111	332,685	$1,330,740,000.00	$4,000.00	$166,342,500.00	$332,685,000.00	$332,685,000.00	$2,500.00	$831,712,500.00
Queens	3228	365,089	$1,460,356,000.00	$4,000.00	$182,544,500.00	$365,089,000.00	$365,089,000.00	$2,500.00	$912,722,500.00
Staten Island	1189	130,553	$522,212,000.00	$4,000.00	$65,276,500.00	n/a	$195,829,500.00	$2,000.00	$261,106,000.00
Total	8928		$3,829,396,000.00	$3200 Citywide Average	$414,163,500.00	$697,774,000.00	$893,603,500.00	$2200 Citywide Average	$2,521,629,000.00
		Tax lots by borough was used as the passing figure which excludes buildings that don't pay property taxes	Assumes 50% construction cost savings in Manhattan and Bronx because of ECS franchise. If some Bronx passings were to rely on existing poles instead of existing or soon to be built ECS franchise conduit, cost estimates assumed to be the same.	Assumes 50% construction cost savings in Manhattan and Bronx because of ECS franchise.	Assumes 25% of construction will be in areas with existing conduit coverage which results in savings of 50%. Cost of conduit preparation covered by owner.	Assumes 25% of construction will be in areas without available conduit or utiity poles. Assumed that no new construction is needed on Staten Island.	Assumes 50% (and 75% in SI) of construction will be in areas with existing utility poles and the cost of "make ready" will be covered by pole owner resulting in savings of 50%.		

$2.5 billion in outside plant construction costs compared with the status quo estimate of $3.8 billion results in cost savings of almost 36%!

2. Driving Down Service Drop Costs

A. Conduit and Poles

Under the ECS franchise agreement, ECS is required to install, maintain and expand the underground conduit network in the Bronx and Manhattan as directed by the City.[106] This includes the requirement to install conduit up to the private property line of each building, the point at which the public right of way becomes private property. The City must demand that ECS start living up to the terms of the franchise agreement and run conduit up to the private property line of each building for the municipal network's use.

Much like the outside plant, construction utilizing existing available conduit that runs up to, and into each building, and utility pole "aerial drops" wherever it is available in Brooklyn, Queens and Staten Island, and also Manhattan and the Bronx, will drive down the service drop costs significantly. The previously mentioned pole attachment amendment to state law would make the rental costs for the City's fiber network $0 in the existing conduit that runs up to each building (ECS is already free), and utility pole aerial drops.

B. Landlords

There is also much that can be done to drive down service drop costs and facilitate the deployment of the municipal network by requiring landlords to accommodate the municipal network in their buildings. Currently, there is a variety of tactics used by landlords and ISPs to keep out competition,[107] particularly in buildings with multiple tenants, and the existing federal and state laws leave too much wiggle room, but leave the door open for local action.[108]

By amending local law to require buildings to have entrance conduit or alternative suitable pathways connecting the building with the public right of way, it can work in tandem with the ECS demands, utilization of existing entrance methods, and the state pole attachment amendment to drive down construction and operational costs.

In addition, passing a local law with real teeth that requires landlords to permit the municipal network to perform installations and prohibits all forms of exclusivity deals and delay tactics from landlords and ISPs will help to open up buildings to the municipal network. The local law can require buildings have sufficient non-exclusive in-building pathways and wiring to the extent permissible to run the municipal network which will also help to drive down service drop costs and make the adoption rates of the municipal network proceed without unnecessary delay.[109]

Here is an illustration of the potential cost savings of getting ECS to comply with the terms of the franchise agreement, and an aggressive approach to using existing entrance methods into buildings wherever it is available, and requiring landlords to open up their buildings to the municipal network. <u>Savings in yellow.</u>

Jurisdiction	Street Miles	Passings	Households	Service Drop and Customer Premises Equipment Costs (NO SAVINGS)	Existing Service Drop Construction Costs (underground/aerial) and Customer Premises Equipment (SAVINGS)	New Service Drop Construction Costs (underground/aerial) and Customer Premises Equipment (SAVINGS)	Total Service Drop and Customer Premises Equipment Costs (SAVINGS)
Bronx	1363	102,123	499,728	$599,673,600.00	$337,316,400.00	$149,918,400.00	$487,234,800.00
Manhattan	1037	155,921	758,133	$909,759,600.00	$511,739,775.00	$227,439,900.00	$739,179,675.00
Brooklyn	2111	332,685	950,856	$1,141,027,200.00	$641,827,800.00	$285,256,800.00	$927,084,600.00
Queens	3228	365,089	799,234	$959,080,800.00	$539,482,950.00	$239,770,200.00	$779,253,150.00
Staten Island	1189	130,553	166,152	$199,382,400.00	$112,152,600.00	$49,845,600.00	$161,998,200.00
Total	8928	1,086,371	3,174,103	$3,808,923,600.00	$2,142,519,525.00	$952,230,900.00	$3,094,750,425.00
		Tax lots by borough was used as a placeholder for passings which excludes buildings that don't pay property taxes		Assumes $1200 per household service drop and customer equipment installation costs. $500/household is the assumed cost of customer premises equipment. Commerical buildings not included in installation assumption, but included in passing assumption.	Assumes $900 per household and that 75% of passings would completely utilize existing building entrance methods (aerials drops, entrance conduit, ECS running conduit up to private property line, etc). Assumes $500 for customer premises equipment, installation and materials.	Assumes $1200 per household and that 25% of passings would require new or partially new entrance methods. Assumes $500 for customer premises equipment, installation and materials.	

Around $3.1 billion in service drop and customer premises equipment costs compared with the high estimate of $3.8 billion in the status quo estimate results in cost savings of almost 20%!

D. Low Cost Estimate

This is an estimate of the total costs for the City to build a municipal fiber to the premises network, assuming it uses the tools outlined above to drive down costs.

Jurisdiction	Street Miles	Passings	Households	Outside Plant Cost	Cost Per Passing	Central Network Electronics	Service Drop Construction Costs	Total Cost
Bronx	1363	102,123	499,728	$204,246,000.00	$2,000.00	$149,918,400.00	$487,234,800.00	$841,399,200.00
Manhattan	1037	155,921	758,133	$311,842,000.00	$2,000.00	$227,439,900.00	$739,179,675.00	$1,278,461,575.00
Brooklyn	2111	332,685	950,856	$831,712,500.00	$2,500.00	$285,256,800.00	$927,084,600.00	$2,044,053,900.00
Queens	3228	365,089	799,234	$912,722,500.00	$2,500.00	$239,770,200.00	$779,253,150.00	$1,931,745,850.00
Staten Island	1189	130,553	166,152	$261,106,000.00	$2,000.00	$49,845,600.00	$161,998,200.00	$472,949,800.00
Total	8928	1,086,371	3,174,103	$2,521,629,000.00	$2200 Citywide Average	$952,230,900.00	$3,094,750,425.00	**$6,568,610,325.00**
		Tax lots by borough was used as the passing figure which excludes buildings that don't pay property taxes	Figures from NYC Internet Master Plan: Adoption and Infrastructure Data by Neighborhood	Assumes 50% construction cost savings in Manhattan and Bronx because of ECS franchise. Assumes 25% of construction will be in areas with existing conduit coverage, and the cost of prep is covered by conduit owner resulting in 50% savings. Assumes 50% of construction will be in areas with existing utility poles and the cost of "make ready" will be covered by pole owner resulting in savings of 50%. Assumes 25% of construction will be in areas without available conduit or utility poles. Assumed that no new construction is needed on Staten Island.		Assumes $300 per household	Assumes 75% of passing's would completely utilize existing building entrance methods (aerials drops, entrance conduit, ECS running conduit up to private property line, etc.) and cost $900 per household. Assumes remaining 25% of passing's would require new or partially new entrance methods and cost $1200 per household. Assumes $500 for customer premises equipment, installation and materials throughout.	

$6.6 billion in total costs compared with the high estimate of $8.6 billion in the status quo estimate results in cost savings over 20%!

E. Commercial Service Estimate[110]

Extending the network to non-profit service providers, arts and educational institutions and small to medium sized businesses is a cost effective strategy to bring the benefits of the network to a vital segment of the New York ecosystem. Doing so will also help bring in additional revenue by charging those organizations with means, whether non-profit or for-profit more than residential customers, while also requiring they cover the cost of their equipment. **<u>Like households, non-profit organizations or small businesses that cannot afford the service, will not be charged anything.</u>**

Jurisdiction	Commercial Passings	Total Businesses in NYC	Outside Plant Cost	Central Network Electronics	Service Drop Construction Costs	Customer premises equipment:	Total Cost
Five Boroughs	100,079	200,158	n/a	$24,018,960.00	$80,063,200.00	$16,000,000.00	$120,082,160.00
Notes	Commercial tax lots by borough was used as a placeholder for passings which excludes buildings that don't pay property taxes	Figure provided by NYC	Each commercial building already passed under the high and low estimates but not hooked up to the network.	Assumes $300 per business	Assumes $1000 per passing to get fiber from right of way into the building, 40% of businesses sign up, and the network covers the full cost of service drop.	Assumes $500 per business, 40% of businesses sign up, and 60% of businesses that sign up can afford to pay for their own equipment.	

Commercial properties are passed under the high and low estimates detailed above, but unlike the household utility service model, businesses are only hooked up to the municipal network upon request.

F. Operational Costs

1. The municipal network team would understandably grow over time as it expands its footprint and signs up new users. The employees would be spread across functions primarily consisting of service and network technicians, customer service representatives, outreach/signup representatives, call center support, and more. This core team and overall operations would be steered by the democratically elected board that would consist of elected representatives of the workers and other individuals from within and outside government that could lend their expertise across a variety of functions like network operations, expansion, government, privacy and more.

2. **If there were 2000 employees[111] of the municipal broadband network with a total labor cost (wages + benefits) averaging $90,000 per year,[112] that would be $180,000,000 per year towards the municipal networks operational budget.** Benefits and wages would be collectively bargained for, but likely in line with other municipal workers.

3. Fiber network maintenance costs are approximately 1% of the total construction cost,[113] per year, or approximately $65-$85 million per year based on the total cost estimates.

4. There are additional overhead costs of running a large scale operation day to day, and we assumed an additional 20% on top of the labor and network maintenance costs.

G. Cost Summary

1. **$6.5-$8.5 billion in construction costs to connect all households in NYC, <u>paid back gradually</u>. $120 million to connect those businesses that request the service.**

2. **$300 million per year in operational costs, labor and network maintenance, <u>scaled gradually</u>.**

VII. Phased Deployment

A. Three Year Plan and Beyond

The network is a utility meant to serve all households, and therefore all households are connected to the network under the model proposed here. There are approximately 3.2 million households in NYC, and this is one model to gradually roll out the network to all households over three years while prioritizing the most marginalized communities first.[114] Extending the network for commercial service starts in year two. Numbers are rounded as a reference.

1. Year One

The focus of year one is bringing the network to the communities that need it the most. The majority of households will not be paying anything for the service.

- o   Households Connected: 1.1 million households connected
- o   Total Subscribers: 550,000 subscribers
- o   Estimated Paying Subscribers: 165,000 (30% of subscribers)
- o   Estimated Subscriber Fees: 165,000 paying subscribers X $40/mo = **$80,000,000**

2. Year Two

The focus of year two is bringing the network to any remaining communities that really need it, while also supplementing the network's revenue by initiating service to businesses. The majority of households will not be paying anything for the service.

- o   Households Connected: 2.2 million households connected
- o   Total Subscribers: 1.1 million subscribers
- o   Estimated Paying Subscribers: **440,000** (40% of subscribers)
- o   Estimated Subscriber Fees: 440,000 paying subscribers X $40/mo = **$210,000,000**

- o   Businesses Connected: 27,000[115]
- o   Estimated Paying Business Subscribers: **16,000** (60% of subscribers)
- o   Estimated Subscriber Fees: 16,000 paying subscribers X $100/mo = **$20,000,000**

3. Year Three

The focus of year three is bringing the network to the rest of New York, while continuing to supplement the network's revenue by connecting additional businesses. By this point, half of

households will be paying for the service as the network penetrates higher income neighborhoods.

- o Households Connected: 3.2 million households connected
- o Total Subscribers: 1.6 million subscribers
- o Estimated Paying Subscribers: **800,000** (50% of subscribers)
- o Estimated Subscriber Fees: 800,000 paying subscribers X $40/mo = **$384,000,000**

- o Businesses Connected: 54,000
- o Estimated Paying Business Subscribers: **32,000** (60% of subscribers)
- o Estimated Subscriber Fees: 32,000 paying subscribers X $100/mo = **$40,000,000**

4. Year Four

With all households connected to the network, the focus of year four is providing great customer service, trying to sign-up additional households, especially those that could benefit from free service, and to finish connecting businesses that want the service.

- o Households: **Same as Year 3**
- o Businesses Connected: 80,000
- o Estimated Paying Business Subscribers: 48,000 (60% of subscribers)
- o Estimated Subscriber Fees: 48,000 paying subscribers X $100/mo = **$60,000,000**

5. Year Five

With all households and many businesses connected to the network, the assumption is that while subscriber numbers may continue to go up, the focus is providing great customer service. The best way to make the network appealing to existing and prospective subscribers is to invest in the network and prove what a great service it is!

- o Households: **Same as Year 3**
- o Businesses: **Same as Year 4**

B. Household and Commercial Subscriber Summary

Commercial Subscriber Numbers (subscribers; paying subscribers)	Household Subscriber Numbers (connected; subscribers; paying subscribers)
• **Year 1: n/a** • **Year 2: 27,000; 16,000** • **Year 3: 54,000; 32,000** • **Year 4: 80,000; 48,000** • **Year 5: Growing Year 4 #**	• **Year 1: 1,100,000; 550,000; 165,000** • **Year 2: 2,200,000; 1,100,000; 440,000** • **Year 3: 3,200,000; 1,600,000; 800,000** • **Year 4: Growing Year 3 #** • **Year 5: Growing Year 4 #**
Commercial Subscriber fees (millions) • **Year 1: n/a** • **Year 2: $20** • **Year 3: $40** • **Year 4: $60** • **Year 5: $60**	**Household Subscriber fees (millions)** • **Year 1: $80** • **Year 2: $210** • **Year 3: $384** • **Year 4: $384** • **Year 5: $384**

VIII. Paying for the Network

A. Funding the Network

- **Costs:**

  a. **Borrowing:**

  - For illustration, assume $6.5 billion in bond (s) issued with a 30 year repayment will require over a $215 million payment per year at its peak ($6.5 billion/30 years = $215 million+/year). There's many ways this could be structured. **Here is one sample example:**

    - **Year 1: $50 million/year repayment**
    - **Year 2: $75 million/year repayment**
    - **Year 3: $100 million/year repayment**
    - **Year 4: $150 million/year repayment**
    - **Year 5: $215 million/year repayment**
    - **Year 6: over $215 million/year repayment (and will continue on until repaid)**

  b. **Operational**

  - The municipal broadband network team would scale as it expands its footprint and signs up new users. Assuming that the network has 2000 employees at a **total labor cost of $180 million per year** (wages and benefits), the rest of the operational budget would go towards network maintenance, estimated at 1% of the total construction cost, and office overhead. These costs would be incurred gradually.

    - **Year 1: $100 million/year**
    - **Year 2: : $200 million/year**
    - **Year 3-forward: $300 million/year**

  c. **Commercial**

  - As detailed in section V (E), the total anticipated cost of connecting the non-profits, and small and medium sized businesses that want the service to the network is $120 million. It is assumed that these costs would be evenly incurred in years 2-4, $40 million per year.

- Year 1: $0
- Year 2: $40 million
- Year 3: $40 million
- Year 4: $40 million
- Year 5: $0

• Revenue:

a. Subscriber Fees:

- The estimated subscriber fees from households and businesses outlined in Section VII can help to cover the majority of the anticipated construction and operational costs of the network. But they likely cannot cover the entire cost of loan repayment, commercial construction and operations.

Combined costs (loan; biz; op, millions)	Combined Subscriber fees (millions)
• Year 1: $50; $0; $100 = $150	• Year 1: $80
• Year 2: $75; $40; $200 = $315	• Year 2: $230
• Year 3: $100; $40; $300 = $440	• Year 3: $424
• Year 4: $150; $40; $300 = $490	• Year 4: $444
• Year 5: $215; $0; $300 = $515	• Year 5: $444
• Year 6: $215; $0; $300 = $515+	• Year 6: $444

Here are some of the of additional funding sources available to the network to compensate for the manageable anticipated discrepancy between costs and revenues.

b. City Funds

- Allocating capital funds to help kickstart the network and bridging moderate gaps in the costs of providing a great, universal utility service, and the amount of revenue collected to help sustain the utility service seems like a very wise use of City funds. That said, there may be a need for additional sources of funding to help sustain the network and provide cushion should costs or subscriber numbers take time to meet expectations.

c. Federal Funding

- Federal money can help jumpstart a municipal broadband network rather than going right back to Verizon, Spectrum and other monopolies that created the digital divide in the first place.

- Major subsidies for broadband infrastructure and services have been passed and are being contemplated by Congress, and would be available to the municipal network to leverage to speed deployment.[116] There is even some indication that municipal networks may get prioritized in how the funds are distributed.[117]

- The FCC has stood up programs like the $50 Emergency Broadband Benefit,[118] and is extending broadband subsidies beyond school and library campuses to students struggling with connectivity at home to meet educational needs.[119] These programs, some of which may extend beyond the current moment can help to offset some of the costs of construction and operations of the network, now and into the future.

- **$1 billion in federal funding could decrease yearly costs for the network by $33 million. $500 million in funding could decrease yearly costs by $16.5 million.**

d. ISP Tax

- An ongoing modest tax on ISP intrastate revenues to fund municipal broadband efforts in NYC and elsewhere.[120]

- The largest ISPs have millions of customers in New York State and billions of dollars in intrastate revenues. **A tax in the range of 3% could potentially bring in at least tens of millions of dollars per year for the NYC municipal network and other networks across the state.**

e. Leasing

- The City will own a massive amount of fiber and other infrastructure that it can lease to other service providers to help cover the cost of build-out and operations.

f. Savings

- While the City spends funds on construction and operations it will also be saving money that it is otherwise spending on communications infrastructure and services with private entities. These costs are

widespread and significant.[121] But they wouldn't be necessary or would at least be significantly lower with the presence of a municipal network.

B. Summary of Tools to Drive Down Network Costs

• Local Action

i. **Forcing ECS to comply with franchise agreement meaning clean conduit in all Manhattan and Bronx rights of way and extending all the way to private property lines**

ii. **Passage of local legislation**
   - Requiring buildings to have entrance conduit or alternative suitable pathways connecting the building with the public right of way.

   - Prohibition on all forms of exclusivity deals and delay tactics for installs from landlords and ISPs for the municipal network, and requiring buildings make in-building pathways and wiring available for the municipal network to utilize.

iii. **Franchise Agreements**
   - The City should seriously consider taking on the fight of not renewing the holdover Cable Franchise Agreements with Spectrum and Altice. But if it does move for renewal than it needs to demand open access infrastructure, in-kind fiber, conduit and other infrastructure with no strings attached, stringent labor protections, high performance standards on speed, price and privacy controls.[122] And other consumer protections need to become more stringent, not less like in the last round of cable franchise agreements.[123] Other franchise agreements like the information services franchises must include these demands as well – the more infrastructure the City is able to extract from the franchisees, the more it can roll the infrastructure into the municipal network and protect consumers.[124]

iv. **Other Contracts**
   - All City contracts for communications infrastructure like "Stream 3" of the recently issued Broadband RFP should also meet the above demands. Anytime the City is spending money or giving away infrastructure for communications purposes, the resulting infrastructure should be open access that will allow the municipal network to utilize it, and meet high standards on labor protections, speed, price and the rest.

   - There may be opportunities to do targeted buy-outs of infrastructure like leased lines whose contract is set to expire for cheaper than it is to build.

- **State Action**

  i. **Passage of State Legislation**

  - Private pole owners and attachments must pay "make ready" costs to clear space for municipal network on all utility poles and prepare underground conduit at their own expense on strict timelines for use by the municipal network (Pub Serv L §119-a)

  - Pole attachment fee $0 for municipal networks (Pub Serv L §119-a)

  ii. **State Funding**

  - NYS is also making financial commitments for broadband connectivity that may assist in launching the municipal network.[125]

ENDNOTES

[1] NYC Internet Master Plan, Page 46. (https://www1.nyc.gov/assets/cto/#/project/internet-master-plan)

[2] About 30 percent of Hispanic and Black New Yorkers lack broadband internet access compared to 20 percent of White New Yorkers and 22 percent of Asian residents. New York City Comptroller, "Census and The City: Overcoming NYC's Digital Divide in the 2020 Census," July 23, 2019. (https://comptroller.nyc.gov/newsroom/comptroller-stringer-as-census-moves-online-new-york-citys-digital-divide-threatens-to-help-trump-undercount-communities-of-color/)

[3] Becky Chao, Claire Park, "Cost of Connectivity 2020," New America, July 15, 2020, Page 4. (https://www.newamerica.org/oti/reports/cost-connectivity-2020/focus-on-the-united-states)

[4] Citizens Committee for Children of New York, "New York City's Digital Divide," April 24, 2020. (https://s3.amazonaws.com/media.cccnewyork.org/2021/01/CCC-COVID-19-Series-NYC-Digital-Divide-Child-Well-being.docx.pdf); Rachel Vick, "For 484,000 NYC seniors, digital divide complicates vaccine access," Queens Daily Eagle, January 22, 2021. (https://queenseagle.com/all/for-484000-nyc-seniors-digital-divide-complicates-vaccine-access); New York City Bar Association, "Close the Digital Divide!" October 26, 2020. (https://www.nycbar.org/media-listing/media/detail/nyc-digital-divide-lack-of-internet-access-in-shelters)

[5] NYC Open Data: Adoption and Infrastructure Data by Neighborhood. https://data.cityofnewyork.us/City-Government/Internet-Master-Plan-Adoption-and-Infrastructure-D/fg5j-q5nk

[6] The Federal Communications Commission's current definition of "broadband" internet is 25 Mbps download speed and 3Mbs upload speed — a low standard that was set over the objections of most internet companies. Consensus among experts is the United States should raise that standard to at least 100 Mbps for download and upload speeds, if not higher. STATEMENT OF FCC COMMISSIONER JESSICA ROSENWORCEL: https://docs.fcc.gov/public/attachments/FCC-19-102A4.pdf; Makena Kelly, "Senators call on FCC to quadruple base high-speed internet speeds," The Verge, March 4, 2021. (https://www.theverge.com/2021/3/4/22312065/fcc-highspeed-broadband-service-ajit-pai-bennet-angus-king-rob-portman)

[7] EU plans to have 1000 Mbps in every home by 2025: https://ec.europa.eu/digital-single-market/en/broadband-strategy-policy; Many countries like South Korea are infamous for their fast internet: https://www.cnet.com/home/internet/south-korea-gets-super-duper-fast-internet/; Canada defines broadband as 50 Mbps: https://crtc.gc.ca/eng/internet/performance.htm.

[8] The reluctance of ISPs to compete is oftentimes executed in collaboration with landlords who profit off exclusive deals with specific ISPs. Susan Crawford, "The New Payola: Deals Landlords Cut with Internet Providers," Wired, June 27, 2016. (https://www.wired.com/2016/06/the-new-payola-deals-landlords-cut-with-internet-providers/)

[9] Measurement Lab, United States Dashboard, New York State Counties, Data collected: December 30, 2019-October 11, 2020. (https://datastudio.google.com/reporting/1djtGEuqV4Qwrj26GQTN_xzp3rsMYYcmv?s=rzD5rHYkLT4)

[10] New York City Cable Television Franchise Agreements: https://www1.nyc.gov/site/doitt/business/cable-tv-franchises.page. Spectrum's franchise is a legacy of the Time Warner franchise (past agreements in 2006, 1998) whom it merged with in 2016, while Altice' franchise is a legacy of the Cablevision franchise (past agreements in 2006, 1998) that it purchased in 2016. The Verizon franchise was initially granted in 2008. NYC's Fourth largest

ISP RCN is available in approximately 14% of the City. NYC Internet Master Plan, Page 15. Due to its significantly smaller size it will not be directly addressed in this report.

[11] Jon Brodkin, "Verizon wiring up 500K homes with FiOS to settle years-long fight with NYC," Ars Technica, November 30, 2020. (https://arstechnica.com/tech-policy/2020/11/verizon-wiring-up-500k-homes-with-fios-to-settle-years-long-fight-with-nyc/); Claire Atkinson, "Altice wants to expand Cablevision's Internet into NYC," NY Post, November 15, 2015. (https://nypost.com/2015/11/15/altice-wants-to-expand-cablevisions-internet-into-nyc/)

[12] Ernesto Falcon, "The FCC and States Must Ban Digital Redlining," EFF, January 11, 2021. (https://www.eff.org/deeplinks/2021/01/fcc-and-states-must-ban-digital-redlining)

[13] Hamza Shaban, "Mayors Blast Verizon For Skipping Poor Neighborhoods, But Company Says It's "PR Stunt"", Buzzfeed News, October 20, 2015. (https://www.buzzfeednews.com/article/hamzashaban/mayors-blast-verizon-but-company-says-its-union-stunt); Cailin Crowe, "NYC sued over homeless shelters' lack of Wi-Fi for students," Smart Cities Dive, January 6, 2021. (https://www.smartcitiesdive.com/news/nyc-sued-over-homeless-shelters-lack-of-wi-fi-for-students/592872/)

[14] Jameson Zimmer, "HOW COVID-19 IMPACTED INTERNET SPEED IN NYC BY NEIGHBORHOOD", Untapped New York. (https://untappedcities.com/2021/02/17/nyc-internet-speed-by-neighborhood/)

[15] NYC Open Data: Adoption and Infrastructure Data by Neighborhood. Compare: Home Broadband Adoption Rate; Percentage of Blocks with ISP Reported Speed Availability of >=900 Mbps; Estimated Lifeline Eligible Households. (https://data.cityofnewyork.us/City-Government/Internet-Master-Plan-Adoption-and-Infrastructure-D/fg5j-q5nk)

[16] New York City Central Labor Council, "LOCAL 3 RALLIES TO PROTECT PENSIONS AND BENEFITS OF STRIKING CABLE WORKERS", May 19, 2017. (https://www.nycclc.org/news/2017-05/local-3-rallies-protect-pensions-and-benefits-striking-cable-workers)

[17] Market Capitalization in March 2021: Verizon: $233 Billion; Charter/Spectrum: $136 Billion; Altice: $16 Billion

[18] Tony Romm, "Lacking a Lifeline: How a federal effort to help low-income Americans pay their phone bills failed amid the pandemic," Washington Post, February 9, 2021 (https://www.washingtonpost.com/technology/2021/02/09/lifeline-broadband-internet-fcc-coronavirus/); Francine McKenna, "With deferred liabilities, Verizon will get earnings benefit from tax bill," MarketWatch, January 23, 2018. (https://www.marketwatch.com/story/with-deferred-liabilities-verizon-will-get-earnings-benefit-from-tax-bill-2018-01-22); Heidi Welsh and Robin Young, "How Leading U.S. Corporations Govern and Spend on State Lobbying" Prepared by the Sustainable Investments Institute for The Investor Responsibility Research Center Institute, February 2017. (https://www.weinberg.udel.edu/IIRCiResearchDocuments/2017/02/Corporate-Lobbying-in-the-States-FINAL.pdf);

[19] FiOS penetration rate has been reported at over 40% of households where service is available which would be over 1.1 million customers in NYC. Sean Buckley, "Verizon Fios broadband reaches 40% penetration mark," Fierce Telecom, February 27, 2018. (https://www.fiercetelecom.com/telecom/verizon-fios-broadband-reaches-40-penetration-mark); Jon Brodkin, "Verizon wiring up 500K homes with FiOS to settle years-long fight with NYC," Ars Technica, November 30, 2020. (https://arstechnica.com/tech-policy/2020/11/verizon-wiring-up-500k-homes-with-fios-to-settle-years-long-fight-with-nyc/)

[20] BroadbandNow, Broadband Maps: Coverage and Availability. (https://broadbandnow.com/custom-maps) (search Verizon FiOS)

[21] FCC mapping data is flawed and the actual Verizon fiber coverage figures in the boroughs may be lower.

[22] Customers must meet the requirements of the Lifeline program to qualify for the Verizon low cost offering: https://www.verizon.com/info/low-income-internet/. Lifeline Eligibility: https://www.lifelinesupport.org/do-i-qualify/

[23] Jen Chung, ""What's Disgusting? Union Busting!" Verizon Workers Strike In Midtown," Gothamist, April 13, 2016. (https://gothamist.com/news/whats-disgusting-union-busting-verizon-workers-strike-in-midtown)

[24] Jon Brodkin, "Verizon refuses to give DSL users its low-income deals during pandemic," Ars Technica, April 7, 2020. (https://arstechnica.com/tech-policy/2020/04/verizon-refuses-to-give-dsl-users-its-low-income-deals-during-pandemic/)

[25] Jon Brodkin, "Verizon wiring up 500K homes with FiOS to settle years-long fight with NYC," Ars Technica, November 30, 2020. (https://arstechnica.com/tech-policy/2020/11/verizon-wiring-up-500k-homes-with-fios-to-settle-years-long-fight-with-nyc/).

[26] New York City Comptroller, Audit On The Payment By Empire City Subway Of License Fees Due The City And Compliance With Certain Provisions Of Its License Agreement," June 6, 2010. (https://comptroller.nyc.gov/reports/audit-on-the-payment-by-empire-city-subway-of-license-fees-due-the-city-and-compliance-with-certain-provisions-of-its-license-agreement/)

[27] Michael Pollack, "Questions on Telephone Poles and Subway Globes," New York Times, August 8, 2014. (https://www.nytimes.com/2014/08/10/nyregion/questions-on-telephone-poles-and-subway-globes.html)

[28] Khadeeja Safdar, "On Hold for 45 Minutes? It Might Be Your Secret Customer Score," Wall Street Journal, November 1, 2018. (https://www.wsj.com/articles/on-hold-for-45-minutes-it-might-be-your-secret-customer-score-1541084656)

[29] NYC Department of Information Technology and Telecommunications, Cable Report Cards. (https://www1.nyc.gov/site/doitt/residents/cable-report-cards.page)

[30] Jay Peters, "Verizon says Fios internet should be returning to normal in the Northeast after disruptive outage," The Verge, January 26, 2021. (https://www.theverge.com/2021/1/26/22250571/verizon-fios-outage-problem-issue-east-coast-google-zoom)

[31] Aaron Pressman, "Verizon Paying $17 Million In FCC Fraud Case, But Could Have Been Docked Much More," Yahoo Finance, October 19, 2017. (https://finance.yahoo.com/news/verizon-paying-17-million-fcc-190753730.html).

[32] NYC Internet Master Plan, Page 15. Total number of customers in NYC has been estimated at over 1.5 million: Teke Wiggin, "New York City Has 'a Once-in-a-Lifetime Opportunity' to Create an Internet for All," The Nation, August 20, 2018. (https://www.thenation.com/article/archive/new-york-city-has-a-once-in-a-lifetime-opportunity-to-create-an-internet-for-all/)

[33] BroadbandNow, Spectrum Coverage Map. (https://broadbandnow.com/Charter-Communications)

[34] BroadbandNow, Broadband Maps: Coverage and Availability. (https://broadbandnow.com/custom-maps) (search Spectrum)

[35] FCC mapping data is flawed and the actual Spectrum fiber coverage figures in the boroughs may be lower.

[36] Customers must meet the requirements laid out by Spectrum to qualify for the low cost offering: https://www.spectrum.com/internet/spectrum-internet-assist

[37] Hamilton Nolan, "The Longest Strike in America Needs a Political Savior," In These Times, February 13, 2020. (https://inthesetimes.com/article/spectrum-strike-labor-workers-new-york-picket-line)

[38] Amber Jamieson, "Cable Repair Technicians Don't Want To Get Infected, Or Infect You, With The Coronavirus," Buzzfeed News, March 23, 2020. (https://www.buzzfeednews.com/article/amberjamieson/coronavirus-cable-guys-repair-spectrum); Rachel Abrams, "Spectrum Employees Are Getting Sick Amid Debate Over Working From

Home," New York Times, April 21, 2020. (https://www.nytimes.com/2020/04/21/business/spectrum-employees-coronavirus.html)

[39] Reema Amin, "Cable Companies Relent After Pulling Internet Plug on Some Students," The City, March 27, 2020. (https://www.thecity.nyc/2020/3/27/21210396/cable-companies-relent-after-pulling-internet-plug-on-some-students)

[40] Jon Brodkin, "Charter avoids getting kicked out of New York, agrees to new merger conditions," Ars Technica, April 22, 2019. (https://arstechnica.com/tech-policy/2019/04/charter-avoids-getting-kicked-out-of-new-york-agrees-to-new-merger-conditions/)

[41] New York City Special Initiative for Rebuilding and Resiliency, "A Stronger, More Resilient New York: Telecommunications," June 11, 2013, Page 4. (https://www1.nyc.gov/assets/sirr/downloads/pdf/Ch_9_Telecommunications_FINAL_singles.pdf); Spectrum Enterprise Service: https://enterprise.spectrum.com/l/articles/gigabit-internet-nyc.html

[42] Danika Miller, "Spectrum TV Review", Reviews.com, November 19, 2020. (https://www.reviews.com/utilities/tv-providers/charter-spectrum-review/)

[43] NYC Department of Information Technology and Telecommunications, Cable Report Cards. (https://www1.nyc.gov/site/doitt/residents/cable-report-cards.page)

[44] Chaim Gartenberg, "Charter-Spectrum reaches $174.2 million settlement in New York AG's speed fraud lawsuit," The Verge, December 18, 2018. (https://www.theverge.com/2018/12/18/18146210/charter-spectrum-174-million-settlement-new-york-state-attorney-general-internet-speeds)

[45] NYC Internet Master Plan, Page 15. Altice penetration rate is reported at over 50% which would be over 500,000 customers in NYC. Mike Farrell, "Altice USA: We're Still on the Hunt," Multichannel News, November 9, 2020. (https://www.nexttv.com/features/altice-usa-were-still-on-the-hunt)

[46] New York State Attorney General, Investigation of Altice, December 21, 2018. (https://acaconnects.org/wp-content/uploads/2019/01/Dec.-21-2018-Altice-Executed-AOD.pdf)

[47] BroadbandNow, Broadband Maps: Coverage and Availability (https://broadbandnow.com/custom-maps) (search Altice)

[48] FCC mapping data is flawed and the actual Altice fiber coverage figures in the boroughs may be lower.

[49] Customers must meet the requirements laid out by Altice to qualify for the low cost offering: https://www.alticeadvantageinternet.com/

[50] M.L. Nestel, "Inside Cablevision's War With Big Labor," The Daily Beast, June 23, 2015. (https://www.thedailybeast.com/inside-cablevisions-war-with-big-labor)

[51] Mike Farrell, Altice USA Creating Tech Services Spinoff," Multichannel News, December 19, 2016. (https://www.nexttv.com/news/altice-usa-creating-tech-services-spinoff-409757)

[52] Gabriel Sandoval, Brooklyn Cable Guy's Diagnosis Raises Worry Virus Is One House Call Away," The City, March 24, 2020. (https://www.thecity.nyc/work/2020/3/24/21210414/brooklyn-cable-guy-s-diagnosis-raises-worry-virus-is-one-house-call-away)

[53] Reema Amin, "Cable Companies Relent After Pulling Internet Plug on Some Students," The City, March 27, 2020. (https://www.thecity.nyc/2020/3/27/21210396/cable-companies-relent-after-pulling-internet-plug-on-some-students)

[54] Claire Atkinson, "Altice wants to expand Cablevision's Internet into NYC," NY Post, November 15, 2015. (https://nypost.com/2015/11/15/altice-wants-to-expand-cablevisions-internet-into-nyc/)

[55] New York City Special Initiative for Rebuilding and Resiliency, "A Stronger, More Resilient New York: Telecommunications," June 11, 2013, Page 4. (https://www1.nyc.gov/assets/sirr/downloads/pdf/Ch_9_Telecommunications_FINAL_singles.pdf)

[56] JD Power, "TV and Internet Providers Hold Strong with Performance and Reliability, J.D. Power Finds," September 24, 2020. (https://www.jdpower.com/business/press-releases/2020-us-residential-wireline-satisfaction-studies)

[57] NYC Department of Information Technology and Telecommunications, Cable Report Cards. (https://www1.nyc.gov/site/doitt/residents/cable-report-cards.page);

[58] Optimum Service Protection Program: https://www.optimum.net/pages/service/protection-plan.html

[59] Michael Gartland, "Cable company Altice overcharged customers, city alleges ," New York Daily News, August 11, 2019. (https://www.nydailynews.com/new-york/ny-metro-altice-agreement-overcharge-20190811-6tt2g57sx5gixd5isfayqwwhbi-story.html)

[60] New York State Attorney General, Investigation of Altice, December 21, 2018. (https://acaconnects.org/wp-content/uploads/2019/01/Dec.-21-2018-Altice-Executed-AOD.pdf)

[61] Bennett Cyphers, "The Case for Fiber to the Home, Today: Why Fiber is a Superior Medium for 21st Century Broadband," EFF, October 16, 2019. (https://www.eff.org/wp/case-fiber-home-today-why-fiber-superior-medium-21st-century-broadband#fn40)

[62] Jon Brodkin, "AT&T whines about Calif. net neutrality law as ISPs' case appears doomed," Ars Technica, March 17, 2021. (https://arstechnica.com/tech-policy/2021/03/att-whines-about-calif-net-neutrality-law-as-isps-case-appears-doomed/)

[63] Makena Kelly, "Democrats are gearing up to fight for net neutrality," The Verge, March 9, 2021. (https://www.theverge.com/2021/3/9/22321995/net-neutrality-ed-markey-save-the-internet-open-ajit-pai-rosenworcel); Casey Lede, "State Net Neutrality Laws May Lead to Federal Legislation," The National Law Review, March 1, 2021. (https://www.natlawreview.com/article/state-net-neutrality-laws-may-lead-to-federal-legislation).

[64] Jon Brodkin, How ISPs can sell your Web history—and how to stop them," Ars Technica, March 24, 2017. (https://arstechnica.com/information-technology/2017/03/how-isps-can-sell-your-web-history-and-how-to-stop-them/)

[65] Jonathan Stempel, "Altice reaches $72 million settlement with New York over response to Tropical Storm Isaias," Reuters, March 18, 2021. (https://www.reuters.com/article/us-new-york-altice-usa-settlement/altice-reaches-72-million-settlement-with-new-york-over-response-to-tropical-storm-isaias-idUSKBN2BA2G9); Jon Brodkin, "Verizon agrees to fix failing broadband networks to settle investigation," Ars Technica, March 12, 2018. (https://arstechnica.com/information-technology/2018/03/verizon-agrees-to-fix-failing-broadband-networks-to-settle-investigation/); Anton Troianovski , "A Look inside Verizon's Flooded Communications Hub," Wall Street Journal, November 1, 2012. (https://www.wsj.com/articles/SB10001424052970204707104578091171538491386)

[66] See e.g., Altice explores selling off an NYC fiber unit to "repurchase shares or pay down debt." Gillian Tan, Gerry Smith, "Altice's Talks for Lightpath Stake Sale Collapse," Bloomberg Quint, August 8, 2019. (https://www.bloombergquint.com/business/altice-usa-stonepeak-talks-for-lightpath-stake-said-to-collapse)

[67] Kate Murphy, "Why Tech Support Is (Purposely) Unbearable," New York Times, July 3, 2016. (https://www.nytimes.com/2016/07/04/technology/why-tech-support-is-purposely-unbearable.html)

[68] Reema Amin and Shumita Basu, "For NYC students learning English, remote learning can come with steep barriers," Chalkbeat, April 20, 2020. (https://ny.chalkbeat.org/2020/4/20/21230497/for-nyc-students-learning-english-remote-learning-can-come-with-steep-barriers)

[69] NYC Mayor's Office of the Chief Technology Officer, "Truth in Broadband: Access and Connectivity in New York City," April 2018, Page 15. (https://tech.cityofnewyork.us/wp-content/uploads/2018/04/NYC-Connected-Broadband-Report-2018.pdf)

[70] New York City Comptroller, "CONSTRUCTION WORKER PREVAILING WAGE SCHEDULE," January 25, 2021, Page 90-91. (https://comptroller.nyc.gov/wp-content/uploads/documents/ConstructionWorkerSchedule-2020-2021.pdf)

[71] Communications Workers of America, Local 1101, "Verizon NY Plant Wage Schedule," June 21, 2020, Page 8. (https://local1101.org/system/files/cba_164_cwa_district_1_ny_plant.pdf)

[72]The New York City Employees' Retirement System (NYCERS) is a defined benefit retirement plan for public sector employees that offers benefits which are defined in law: https://www.nycers.org/

[73] Compare the employee contributions, deductibles and copays of the City's largest municipal union DC 37 (as a proxy for the municipal network), with those of Spectrum and Verizon. **DC 37:** https://www1.nyc.gov/assets/olr/downloads/pdf/health/employee-rates-march2021.pdf; https://www1.nyc.gov/assets/olr/downloads/pdf/health/sbc-dc37-medteam-2020-2021.pdf; **Spectrum** (2018): https://cache.hacontent.com/ybr/R515/03843_ybr_ybrfndt/downloads/LearnAboutBenefitSummary.pdf; **Verizon**: https://local1101.org/system/files/cwa_nyne-_verizon_mou-_final_-signed_2018_0.pdf

[74] George Ford, "Does Municipal Supply of Communications Crowd-Out Private Communications Investment? An Empirical Study." Applied Economic Studies, February 2005. (http://www.aestudies.com/library/crowdout.pdf); Christopher Alex Hooton, "Testing the economics of the net neutrality debate," Telecommunications Policy, September 9, 2019. (https://assets.documentcloud.org/documents/6430695/Net-Neutrality.pdf); Jon Brodkin, "AT&T slashed billions from network spending, cut tens of thousands of jobs," Ars Technica, January 30, 2020. (https://arstechnica.com/information-technology/2020/01/att-slashed-billions-from-network-spending-cut-tens-of-thousands-of-jobs/).

[75] NYC Mayor's Office, "Mayor de Blasio Holds Verizon Accountable to Connect Half a Million New York City Households to Broadband," November 24, 2020. (https://www1.nyc.gov/office-of-the-mayor/news/807-20/mayor-de-blasio-holds-verizon-accountable-connect-half-million-new-york-city-households-to)

[76] NYC Internet Master Plan, Page 14: estimated economic impact of universal broadband is 165,000 new jobs, up to a $49 billion increase in personal income, and up to $142 billion in incremental Gross City Product by 2045.

[77] Department of Education and the School Construction Authority, Report of the Finance Division on the Fiscal 2019 Preliminary Capital Budget, March 26, 2018, Pages 27-29. (https://council.nyc.gov/budget/wp-content/uploads/sites/54/2018/03/FY19-Department-of-Education-and-the-School-Construction-Authority.pdf); NYC Health and Hospitals, Information Technology Committee, January 14, 2016. (https://www.nychealthandhospitals.org/wp-content/uploads/2016/07/201601-it.pdf)

[78] Total City spending 2010-present on contracts with Verizon, Charter/TWC, Altice/Cablevision, Crown Castle/Lightower, AT&T, others. Checkbook NYC. (https://www.checkbooknyc.com/spending_landing/yeartype/B/year/122)

[79] Matthew Flamm, "Crossed Wires: Untangling NYC's broadband underground," Crain's New York, April 7, 2014. (https://www.crainsnewyork.com/article/20140407/TECHNOLOGY/304069996/crossed-wires-untangling-nyc-s-broadband-underground); Dante D'Orazio, INTO THE VAULT: THE OPERATION TO RESCUE MANHATTAN'S DROWNED INTERNET, The Verge, November 17, 2012. (https://www.theverge.com/2012/11/17/3655442/restoring-verizon-service-manhattan-hurricane-sandy)

[80] Becky Chao, Claire Park, "Cost of Connectivity 2020," New America, July 15, 2020, Page 6. (https://www.newamerica.org/oti/reports/cost-connectivity-2020/focus-on-the-united-states)

[81] The networks are made up of: (1) **City owned infrastructure** that may be leveraged to launch a municipal network after accounting for any technical or capacity limitations; (2) **leased infrastructure** that may be leveraged to launch a municipal network after accounting for any technical, capacity or contractual limitations; (3) **free infrastructure ("INET")** from cable franchise agreements with Verizon, Spectrum, Altice that may not be possible to use to launch a municipal network due to restricted use for "noncommercial purposes of the City and for no other purpose" (Cable Franchise Agreements, Appendix D). These restrictions do not apply to in-kind fiber provided under the "information services" franchises and "mobile subway stations" franchise that the City owns and may leverage for a municipal broadband network (Appendix B in both). Infrastructure that has been "piggybacked" onto INET, e.g., ancillary fiber leased or purchased on top of and integrated with INET may not be subject to the same restrictions as INET itself. See e.g., Letter from DoITT to FCC re: INET. July 25, 2019. (https://ecfsapi.fcc.gov/file/107250624929019/Letter%20of%20Opposition_To%20FCC_Notice%20of%20Ex%20Parte_In%20Kind%20Services_7.24.19.pdf)

[82] Operates CityNet, the City of New York's institutional fiber network, that interconnects hundreds of City agencies and entities throughout the five boroughs: https://www1.nyc.gov/site/doitt/agencies/citynet.page

[83] DOE's Next Generation Network provides bandwidth to support 1800+ schools in all five boroughs. Department of Education and the School Construction Authority, Five Year Capital Plan 2020-2024, February 2021, Pages 38-41, (https://dnnhh5cc1.blob.core.windows.net/portals/0/Capital_Plan/Capital_plans/02012021_20_24_Capital%20Plan.pdf?sr=b&si=DNNFileManagerPolicy&sig=WwokI89NRTMiZswqQQcotO34SDL%2F1bY9Ks4b9zn2UQI%3D)

[84] NYC Health and Hospitals, Information Technology Committee, January 14, 2016. (https://www.nychealthandhospitals.org/wp-content/uploads/2016/07/201601-it.pdf)

[85] In the process of connecting 218 fire houses, 35 EMS stations and up to 40 support facilities to a fiber network. Report of the Finance Division on the Fiscal 2021 Preliminary Plan, Fire Department of New York, March 3, 2020, Page 29. (https://council.nyc.gov/budget/wp-content/uploads/sites/54/2020/02/057-FDNY.pdf)

[86] 241+ facilities in all five boroughs connected to 750 mile proprietary fiber network. Susan Crawford and Laura Adler, "Culture Change and Digital Technology: The NYPD Under Commissioner William Bratton, 2014-2016," Berkman Klein Center Research Publication No. 2016-13, September 12, 2016. Page 23. (https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2839004); NYPD, "Developing the NYPD's Information Technology." (http://www.nyc.gov/html/nypd/html/home/POA/pdf/Technology.pdf)

[87] Open Data: Universal Solicitation for Broadband Asset Dataset. (https://data.cityofnewyork.us/City-Government/Universal-Solicitation-for-Broadband-Asset-Dataset/2bsr-c6qq)

[88] The number of NYCHA buildings that are fiber connected and have fiber pathways is set to grow dramatically through the City's litigation settlement with Verizon and the recently issued RFP. Nolan Hicks and Natalie Musumeci, "NYC gets Verizon to expand Fios broadband to 500K more households," NY Post, November 24, 2020. (https://nypost.com/2020/11/24/nyc-gets-verizon-to-expand-fios-broadband-to-500k-households/)

[89] Connected facilities span the New York Public Library, Brooklyn Public Library and Queens Public Library.

[90] NYC Department of Transportation, Infrastructure, (https://www1.nyc.gov/html/dot/html/infrastructure/infrastructure.shtml)

[91] NYC Universal Solicitation for Broadband RFP, "Workstream" 1 and 3. (https://www1.nyc.gov/site/sbs/about/rfp-80121p0001-broadband.page)

[92] NYSERNet is a non-profit that supports research and educational organizations with affordable data and networking solutions: https://www.nysernet.org/about-us/member-institutions/

[93] City University of New York, Computing and Information Services: https://www.cuny.edu/about/administration/offices/cis/core-functions/

[94] Verizon and Con Ed own most utility poles in Queens, Brooklyn, Staten Island and the Bronx. Michael Pollack, "Questions on Telephone Poles and Subway Globes," New York Times, August 8, 2014. (https://www.nytimes.com/2014/08/10/nyregion/questions-on-telephone-poles-and-subway-globes.html)

[95] Verizon, Con Ed, Spectrum and Optimum own most of the conduit in Brooklyn, Queens and Staten Island. New York City Special Initiative for Rebuilding and Resiliency, "A Stronger, More Resilient New York: Telecommunications," June 11, 2013, Page 4. (https://www1.nyc.gov/assets/sirr/downloads/pdf/Ch_9_Telecommunications_FINAL_singles.pdf); Con Edison, For Telecom Partners Information Page: https://www.coned.com/en/business-partners/telecom-application-management?facettab=89db1009-875f-431f-9dec-0bb1aaf34f90. Verizon through Empire City Subway owns most conduit in the Bronx and Manhattan.

[96] New York City and Empire City Subway Franchise Agreement: https://books.google.com/books?id=D_tKAAAAMAAJ&pg=PA1320&lpg=PA1320&hl=en#v=onepage&q&f=false ; Susan Crawford, "I'm Suing New York City to Loosen Verizon's Iron Grip," Wired, June 21, 2017. (https://www.wired.com/story/im-suing-new-york-city-to-loosen-verizons-iron-grip/)

[97] Graphic Courtesy of CTC Technology and Energy

[98] **Cost per passing** figure of $4000 also assumes 50% savings in Manhattan and the Bronx because of Empire City Subway. Passing figure benchmarked against Verizon's estimated cost per passing of $3200, based on total Verizon expenditure of around $3.7 billion to pass roughly 2/3 of NYC households. See e.g., Patrick McGeehan, "New York City Sues Verizon, Claiming Broken Promises of Fios Coverage," New York Times, March 13, 2017. (https://www.nytimes.com/2017/03/13/nyregion/ny-sues-verizon-fios.html); NYC's Internet Master Plan, Page 40: estimate of $2.1 billion for a universal fiber network that extends to each intersection of the City but does not pass households; Fiber Broadband Association, "All-Fiber Deployment Cost Study 2019," September 10, 2019, Page 10. (https://ecfsapi.fcc.gov/file/1091254337624/Fiber%20Deployment%20Cost%20Study%20Letter.pdf) (estimate that a "complex" passing costs $3,656/passing). Keeping the assumed cost per passing on the high end aims to offset issues posed by utilizing a uniform figure across the City as opposed to a more granular estimate based on neighborhood density or by utilizing a passing figure based on buildings as opposed to individual households.

Cost per service drop of $1200/subscriber benchmarked against NYC recently paying Charter and Altice around $1200/unit to connect 10,500 individual shelter housing units: Andy Newman, "How the 3 Diallo Sisters Were Finally Able to Connect to Their Classes," New York Times, January 25, 2021. (https://www.nytimes.com/2021/01/25/nyregion/wifi-home-shelters.htm); Averages between the figures calculated for and given by ISPs, the Fiber Broadband Association, and detailed FTTP estimates for similarly high construction cost municipalities: See e.g., Fiber Broadband Association, "All-Fiber Deployment Cost Study 2019," Page 10; Terrence Patrick McGarty, "Fiber to the Home; Capital Costs and the Viability of Verizon's FIOS," Page 5. (https://www.researchgate.net/publication/237378204_Fiber_to_the_Home_Capital_Costs_and_the_Viability_of_Verizon's_FIOS); CTC Technology and Energy, San Francisco FTTP Study, October 2017, Page 41-42. (https://www.ctcnet.us/wp-content/uploads/2017/10/CTC-Deliverable-22-final-20171017.pdf); Sean Buckley, "CenturyLink: FTTP deployment costs range from $500-800 per home," Fierce Telecom, August 17, 2016. (https://www.fiercetelecom.com/telecom/centurylink-fttp-deployment-costs-range-from-500-800-per-home)

[99] CTC Technology and Energy, "A Model for Understanding the Cost to Connect Anchor Institutions with Fiber Optics," February 2018. (https://www.ctcnet.us/wp-content/uploads/2018/08/SHLB_ConnectingAnchors_CostEstimate.pdf) (see comparison of Table 3.5 Metro Underground-Dense Urban—New vs. 3.6 Metro-Underground-Existing Conduit)

[100] See Section IV, "Privately Owned Infrastructure".

[101] 47 U.S.C. § 224; NYS Pub Serv L §119-a

[102] Connecticut Code, Title 16, Chapter 283, Section 16-233.

[103] CTC Technology and Energy, "A Model for Understanding the Cost to Connect Anchor Institutions with Fiber Optics," February 2018. (https://www.ctcnet.us/wp-content/uploads/2018/08/SHLB_ConnectingAnchors_CostEstimate.pdf) (see table 4, New Aerial Construction Cost)

[104] Massachusetts has considered adopting a similar provision: https://muninetworks.org/sites/www.muninetworks.org/files/An%20Act%20to%20establish%20municipal%20access%20to%20utility%20poles%20located%20in%20municipal%20rights-of-way.pdf

[105] Verizon has a variety of tactics to drag out and drive up the time and cost of using conduit in Queens and Brooklyn. Matthew Flamm, "Race is on to bring broadband to outer boroughs," Crain's New York, June 18, 2019. (https://www.crainsnewyork.com/features/race-bring-broadband-outer-boroughs)

[106] New York City and Empire City Subway Franchise Agreement: https://books.google.com/books?id=D_tKAAAAMAAJ&pg=PA1320&lpg=PA1320&hl=en#v=onepage&q&f=false ; Susan Crawford, "I'm Suing New York City to Loosen Verizon's Iron Grip," Wired, June 21, 2017. (https://www.wired.com/story/im-suing-new-york-city-to-loosen-verizons-iron-grip/)

[107] Tyler Cooper, "Apartment Landlords Are Holding Your Internet Hostage," BroadbandNow, March 18, 2021. (https://broadbandnow.com/report/apartment-landlords-holding-internet-hostage/); Jon Brodkin, "NYC: Verizon demands exclusive deals from landlords before installing FiOS," Ars Technica, June 25, 2015. (https://arstechnica.com/information-technology/2015/06/nyc-verizon-demands-exclusive-deals-from-landlords-before-installing-fios/)

[108] Federal Communications Commission, FCCCIRC 1907-04, NOTICE OF PROPOSED RULEMAKING AND DECLARATORY RULING, June 19, 2019, Pages 1-6. (https://docs.fcc.gov/public/attachments/DOC-358068A1.pdf); NYS Pub. Serv. L § 228.

[109] San Francisco passed a similar local law, and NYC can learn from their experiences: https://sfgov.legistar.com/View.ashx?M=F&ID=4880107&GUID=B5B52CDA-BF62-47A1-95E1-5F7A2D9F90B9; Jon Brodkin, "This is crazy": "FCC kills part of San Francisco's broadband-competition law," Ars Technica, July 10, 2019. (https://arstechnica.com/tech-policy/2019/07/this-is-crazy-fcc-kills-part-of-san-franciscos-broadband-competition-law/)

[110] Estimate of the total number of NYC businesses based on figures provided by the City. New York City, "Small Business First." (https://www1.nyc.gov/assets/smallbizfirst/downloads/pdf/small-business-first-report.pdf)

[111] This is a rough estimate. Some benchmarks used for this figure include fiber the premises studies conducted for other municipalities adjusted for NYCs significantly larger size. See e.g., CTC Technology and Energy, Seattle FTTP Study, June 2015, Page 154. (https://www.seattle.gov/documents/Departments/Broadband/2016-6SeattleReport-Final.pdf); CTC Technology and Energy, San Francisco FTTP Study, October 2017, Page 188. (https://www.ctcnet.us/wp-content/uploads/2017/10/CTC-Deliverable-22-final-20171017.pdf)

[112] This is the Citywide average for municipal employees. Citizens Budget Commission, "The Cost of a Growing City Workforce," July 10, 2018. (https://cbcny.org/research/cost-growing-city-workforce)

[113] CTC Technology and Energy, San Francisco FTTP Study, October 2017, Page 89. (https://www.ctcnet.us/wp-content/uploads/2017/10/CTC-Deliverable-22-final-20171017.pdf)

[114] It is assumed that 50% of households will subscribe to the network given the performance and low cost of service, as compared to the reported 40% penetration rate achieved by FiOS. Sean Buckley, "Verizon Fios broadband reaches 40% penetration mark," Fierce Telecom, February 27, 2018. (https://www.fiercetelecom.com/telecom/verizon-fios-broadband-reaches-40-penetration-mark). Percentage of paying customers increases up to 50% each year as the network moves into higher income neighborhoods.

[115] Though the municipal network provides many of the same benefits for commercial service as household service, the fact that the service is only installed upon request by the business and is at a higher price point than residential service, $100/mo vs. $40/mo (but only for those businesses that can afford it), the estimated penetration rate is lower than residential service – 40% commercial vs. 50% residential.

[116] John Hendel, With $100B internet plan, Biden commits to bring down 'overpriced' broadband bills," Politico, March 31, 2021. (https://www.politico.com/news/2021/03/31/biden-internet-broadband-bills-478734); Makena Kelly, "Rep. Jamaal Bowman introduces new bill to lower broadband costs," The Verge, March 16, 2021. (https://www.theverge.com/2021/3/16/22333877/jamaal-bowman-broadband-internet-hud-subsidy)

[117] White House Press Release, March 31, 2021. (https://www.whitehouse.gov/briefing-room/statements-releases/2021/03/31/fact-sheet-the-american-jobs-plan/)

[118] FCC Emergency Broadband Benefit: https://www.fcc.gov/broadbandbenefit

[119] FCC Emergency Connectivity Fund to Close Homework Gap: https://www.fcc.gov/document/wcb-seeks-comment-emergency-connectivity-fund-close-homework-gap

[120] See e.g., NYS Senate Bill S3184: https://www.nysenate.gov/legislation/bills/2021/s3184

[121] See e.g., Section II, Benefits for the City in the Future; In 2020 NYC Department of Education paid T-Mobile $10/mo for 300,000 data plans for iPads: Susan Edelman, DOE's $269M iPad deal for remote learning is a 'waste of money,' says lawmaker," NY Post, April 25, 2020. (https://nypost.com/2020/04/25/nyc-spends-269-million-on-ipads-for-students-amid-coronavirus-lockdown/); City pays Charter/Spectrum $20/mo for WiFi for 10,500 shelter units: Andy Newman, "How the 3 Diallo Sisters Were Finally Able to Connect to Their Classes," New York Times, January 25, 2021. (https://www.nytimes.com/2021/01/25/nyregion/wifi-home-shelters.htm);

[122] Federal law may preempt some of these demands, but the scope of federal preemption on non-cable services isn't clear cut, and with some positive signals from federal regulators on deference to local action, now is the time to fight for more. See e.g., Congressional Research Service, The Cable Franchising Authority of State and Local Governments and the Communications Act, January 3, 2020. (https://www.everycrsreport.com/reports/R46147.html#_Ref26188715)

[123] Joshua Breitbart, "What the Verizon Deal Does -- and Doesn't – Do," Gotham Gazette, May 30, 2008. (https://www.gothamgazette.com/open-government/3984-what-the-verizon-deal-does-and-doesnt-do);

[124] It's becoming increasingly clear that states and localities can regulate information services: Jon Brodkin, AT&T whines about Calif. net neutrality law as ISPs' case appears doomed," Ars Technica, March 17, 2021. (https://arstechnica.com/tech-policy/2021/03/att-whines-about-calif-net-neutrality-law-as-isps-case-appears-doomed/); Stan Adams, "The D.C. Circuit's opinion in Mozilla v. FCC: What does it mean?," Center for Democracy and Technology, October 24, 2019. (https://cdt.org/insights/the-d-c-circuits-opinion-in-mozilla-v-fcc-what-does-it-mean/)

[125] New York State Governor, FY 2022 Announcement, April 6, 2021. (https://www.governor.ny.gov/news/governor-cuomo-announces-highlights-fy-2022-budget-reimagine-rebuild-and-renew-new-york); NYS Senate Bill 4878B: https://www.nysenate.gov/legislation/bills/2021/s4878/amendment/b