

LinkNYC Link5G Design Proposal

Presented by Department of Information Technology & Telecommunications, CityBridge, and ZenFi Networks

A brief recap of what we shared in October...



What's the Purpose of LinkNYC?

To provide free and equitable access to connectivity, information, and wireless services.



The Case for LinkNYC: The Digital Divide in New York City

Figure 12: Households in New York City with Home Broadband or Mobile Broadband



Figure 13: New York City's Digital Divide Relative to Other Cities' Total Populations

Source: HR&A Advisors



Source: The New York City Internet Master Plan - Jan 2020



Even when New Yorkers have options, choice (and affordability) is limited

Map 6: Residential Broadband Choice Source: December 2017 FCC Form 477 Version 2 data. analyzed by the NYC Mayor's Office of the CTO.

- Today, the digital divide exists in large part because the cost of in-home Wi-Fi is unaffordable.
- It is unaffordable because there is limited competition in the residential broadband market citywide.
- As you can see from the City's examination of residential broadband options, most households in the City only have one or two choices for internet service.
- That translates to **minimal competition and minimal** affordability.







Source: The New York City Internet Master Plan - Jan 2020

How Does LinkNYC Provide Free and Equitable Access?

- High-speed, free public Wi-Fi throughout NYC
- Free nationwide digital calling
 - o 911 / 311 access
 - Access to all social services hotlines
 - Video-relay service for deaf and hard of hearing community
- Access to government and social services websites
- Advertising space for the City, community information, and local businesses
- USB port for free charging of mobile devices





People Use the Links!

- Since inception, there have been 10 million+ users of LinkNYC's Wi-Fi network!
 - The Aunt Bertha social services directory for jobs, housing, food, and other programs is accessed over 10,000 times per month.
 - The most searched for service during the pandemic has been people looking for food pantries.
- Since start of 2020, over 5 million calls!
 - The most dialed number is the EBT hotline.
- Free advertising for over 1,300 small and local businesses.
- The largest free public Wi-Fi network in the U.S.
- And these usage statistics are with a Link footprint primarily in Manhattan!





How Have New Yorkers Used Links?



Use Case: Wi-Fi

An EMT was able to do his courses for college in between calls using LinkNYC's free highspeed Wi-Fi



Use Case: Nationwide Calling

A runaway teen was able to call her parents with LinkNYC's free phone calls



Use Case: Access to Government Services

A New Yorkers in transitional housing was able to locate a nearby food pantry through Aunt Bertha on LinkNYC's tablet

Rebooting LinkNYC: Link5G



LinkNYC: Franchise Rebooted & Redesigned

The original LinkNYC program, built primarily in Manhattan, relied solely on advertising revenue.

That financial model failed. The program did not grow throughout the outer boroughs, and by 2019, LinkNYC faced bankruptcy.

LinkNYC Free W

In 2021, the City amended the franchise and introduced a mixed financial model – advertising and 5G cellular services revenue – and CityBridge brought in a strategic investor and partner: ZenFi.

The introduction of 5G meant that the franchise will bring next-gen cellular connectivity to underserved areas citywide.



Highlights of the LinkNYC 2021 Amendment:

2021 – the Year of 5G	The City is committed to having the most up-to-date, equitably distributed, highest quality telecommunications infrastructure of any major city in the world, and the reboot of the LinkNYC program means underserved areas citywide will have better access to and options for 5G.
Commitment to Equity	90% of new installations, which have free digital calling, free high-speed Wi-Fi AND are 5G enabled, will be built in the outer boroughs and above 96th Street in Manhattan.
Design Consistency	New Link5G design aims to maintain the aesthetic of both the existing LinkNYC footprint and the approved 5G shroud for pole tops.
Enhanced Services	Link5G design will enhance neighborhoods' cellular connections and provide businesses and pedestrians with improved high-speed Wi-Fi coverage.
New Strategic Partner	ZenFi, long-time City franchisee for Information Services & Mobile Telecom (e.g., 5G), invested \$200 million in LinkNYC and is the primary partner with CityBridge for the LinkNYC reboot



Link5G Addresses the Digital Divide

- 40% of New York City households lack the combination of home and mobile broadband, including 18% of residents — more than 1.5 million people — who lack both.
- In response to a survey of LinkNYC Wi-Fi users during the COVID pandemic, 30% reported no other access to broadband internet, even with most kiosks in Manhattan.
- Link5G will expand the free LinkNYC Wi-Fi network and bring mobile broadband and fiber infrastructure directly to underserved communities.





Equitable Deployment Mandate

CityBridge must build a minimum of 739 new Links in thirteen equity community districts (outlined in red on the map).

These were chosen by the City based on:

- Lack of broadband options
- Lower median annual income
- Lack of Links
- High levels of pedestrian / street traffic

These districts are in all 5 boroughs and include neighborhoods hit hard by the pandemic, such as:

Bronx:	Hunts Point and Longwood
Brooklyn:	Bushwick, Brownsville and Ocean Hill
Manhattan:	Inwood and Washington Heights
Queens:	Rockaway, Jamaica and Hollis
Staten Island:	Port Richmond, St. George, Stapleton





Equitable Deployment Mandate

Borough	Community District	Number of CD Structures	
Вкору	2	31	
Total: 80	5	20	
Total. 80	7	29	
	4	44	
Brooklyn	9	14	
Total: 147	12	57	
	16	32	
Manhattan	3	65	
Total: 138	12	73	
Queens	12	104	
Total: 180	14	76	
Staten Island	1	117	
Total: 194	3	77	
Total		739	





Link5G & The Digital Divide



New York City's Comprehensive Approach to the Digital Divide

LinkNYC Free Wi

The City is taking a multi-pronged approach to tackling the Digital Divide because not one approach or solution is enough.

- Internet Master Plan for Universal Broadband
- Broadband @ NYCHA
- Building publicly-owned broadband
 infrastructure
- 5G on rooftops, building facades & pole tops
- New franchise agreements for residential broadband
- Link5G

Where Link5G Goes, Fiber Follows

Over 25% of capital commitment will be invested in fiber infrastructure to extend connectivity to every community district in New York City.

By building fiber across the outer boroughs and above 96 Street, CityBridge's strategic investor, ZenFi, can leverage that fiber to expand the City's usable broadband fiber footprint.



Link5G Design



Introducing Link5G



Introducing Link5G

Consistent look and feel with existing kiosk







We iterated through several form factor options

Each design iteration was reviewed by partners for technical usability, structural stability, safety, and consistency of design resulting in the final Link5G design



* Note that the 'flag' style display was rejected by City Planning as a potential concern and prohibited by the Franchise amendment

We iterated through several form factor options



Design Objective	1	2	3	4	5	6	7
5G Ready	No	No	No	No	Yes	Yes	Yes
Directional Antenna	No	No	Yes	Yes	Yes	Yes	Yes
Future-proof	No	No	No	No	Yes	Yes	Yes
Familiar Design	No	No	No	No	No	Yes	Yes

Evolution of Link5G

Updated design responsive to PDC feedback



Articulation of volume to reduce perceived size



1

To reduce the impact of the required volume of the shroud, it has a cloud-like color which helps make it look lighter.

Finish PMS 643, satin

2

3

The structural pole has a reflective metallic finish helping to blend in with the surrounding environment and its tapered front gives orientation. The black front further breaks up the volume and emphasizes the user interface. The interface module is consistent with the LinkNYC.

Finishes

Back & Sides: anti-graffiti metallic paint, semi-gloss Pole Front: black, satin

The floating display section is hugging the pole and frees up sidewalk space. The all-glass front with black mask achieves a minimalistic expression and is in harmony with existing street furniture (LinkNYC and WalkNYC). The bottom edge of the display housing is 27" from the ground per ADA.

Finishes

Glass: black painted-back Housing: anti-graffiti metallic paint, semi-gloss

Link5G Design Expands All Carrier Network Coverage & Public Wi-Fi

- With 5 bays in full use, CityBridge has calculated the following:
- Transmission bays start at 19.5'
- 29" separation between transmission bays
- 5" for ventilation
- 5 bays required for free Wi-Fi and sufficient space for 5G transmitters

19.5' + (29" x 5) + 5" = 32' total height

Note: Certain slides presented by DoITT during the October 18, 2021 PDC Committee Meeting were based, in part, on information sourced and representations made by CityBridge. These slides include, but are not limited to, slide 17.



Link5G Design Expands Broadband Infrastructure



Link5G Design Improves All Forms of Connectivity

- Multi-tenant, multi-service means New Yorkers have access to the most available wireless technologies
- More wireless access=better connectivity options for more people
- Wi-Fi and 5G are complementary, not substitutes
 - overlapping coverage means connectivity is always available
 - Wi-Fi and 5G technologies are used for different purposes by different users
 - 5G provides different classes of service and continuity for users moving across the City

"A gigabyte is a gigabyte, no matter how it gets over the air. We need *both* Wi-Fi and our cellular network in New York to give our users consistent, reliable service." - Global Connection Management at a major carrier



Key points from the October 18 committee meeting...



Program Scope

Full Buildout

 After the full build under the 2021 Amendment: 65% of the Links will be in the outer boroughs and above 96th Street.

Multi-Tenant

- Link5G will dramatically improve the quality of multiple carriers' networks in all communities.
- Multiple carriers with good coverage = more competition = more opportunities for network of future across all five boroughs AND more affordable cellular plans.



Bridging the Divide & Rightsizing the LinkNYC Program

- The new financial model eliminates hurdles that hampered the program from inception.
- Mixed model of advertising + 5G revenues **AND** rational payments to City that will not equal operating costs of program.
- Big point: LinkNYC program has cost New Yorkers \$0, and Link5G keeps to that – franchisee must pay for the installation, operation, maintenance, enhancements and, if ever required, removal of the kiosks.



Link5G versus Other Multi-Tenant 5G Street Furniture

Link5G vs. Other 5G Street Furniture



* Technology estimates are based upon publicly available data

** Exposed radios means that each carrier site has different visual presentation

is structure is 60 - 80' tall

Siting Link5G

- LinkNYC governed by extensive siting criteria and Link5G must follow those criteria **plus**:
 - \circ No more than one Link5G per block
 - \circ Only one Link5G on either side of a block
 - Minimum of 200 feet between Link5Gs



Siting Link5G

- Link5G is also managed with great consideration given to community input:
 - DoITT provides borough presidents' offices with proposed borough-wide plan and specific maps for community districts.
 - Both pay phone replacement and Greenfield sites receive more community review thanks to DoITT's management approach.



Siting Link5G

Pre-Construction



* The formal letter is the Greenfield process; DoITT consults Borough Presidents' offices on **all** proposed LinkNYC locations

Design

Familiarity

• Link5G's design incorporates aesthetics of the current Link: color, advertising screen; user interface.

Future Proof

 CityBridge designed Link5G's shroud to fit all known forms and configurations of 5G radios and antennas and consulted with carriers to ensure the shroud could accommodate any tech changes in next decade.

Height

 30+ feet ensures that the 5G signal is effectively broadcast from optimal height for all carriers to reach New Yorkers' mobile devices.





~10Gbps of Aggregate Throughput

Throughput is a maximum aggregate value tested under Lab conditions. This will vary in the field based on radio manufacturer specifications, signal strength, signal quality, number of simultaneous users, climate conditions, free space loss & external interferences
Design: Link5G Supports the Entire Cellular Spectrum

Link5G means you'll get reliable high-speed cellular coverage at home, super-fast outside of your home, and Wi-Fi in and outside of home.



Design

• From Antenna Design (full statement submitted to PDC):

"Based on our study of this design problem, we believe this is the best way to solve it. We are dealing with a structure that requires both a considerable height and a large volume at the top. ... To reduce the impact, we minimized the physical size as much as possible, within the given technical and business constraints. ... Making them more "integrated" would mean that we have to physically add volume, making the structure even larger, when we think that the sheer size here is really the most problematic factor. When an object has an architectural scale, one unarticulated volume appears bigger than a well-articulated volume. There is an abundance of examples for this – from classical Greek order to modern housing complexes and skyscrapers. ... We do not believe that any feasible design changes will improve the current design."

Density & 5G Pole Top Shrouds

- 5G on street poles alone will not be sufficient in most neighborhoods: more street furniture and city assets are required to meet the density requirements for to successfully build a robust 5G network citywide.
- And that is the central purpose of Link5G: redesigning the Links to be at once the Link kiosks with all the functionality that New Yorkers have come to expect and to greatly expand the critical infrastructure that will support 5G's buildout.





Link5G in Commercial and Residence Districts



Link5G in NYC Commercial Overlay



Link5G in NYC Commercial



Link5G in NYC Commercial

5G Poletop Shroud Comparison

(approved single tenant)



Link5G in NYC Commercial Overlay

Link5G in NYC Commercial

Link5G in NYC Commercial

(Kingsbridge Heights, Bronx)

(Kingsbridge Heights, Bronx)

(Kingsbridge Heights, Bronx)

(Bushwick, Brooklyn)

(Bushwick, Brooklyn)

(Bushwick, Brooklyn)

(Prospect Lefferts Garden, Brooklyn)

Link5G Siting Illustrated

Not drawn to scale.

Link5G Siting Criteria

*Not drawn to scale

Link5G (Non-Screen) Siting Criteria

*Not drawn to scale

Link5G in NYC (with siting annotation)

Link5G in NYC Commercial

5G Poletop Shroud Comparison

(with siting annotation)

Link5G Siting Criteria

Currently includes, but is not limited to:

- 3 feet of a traffic sign;
- 4 feet of a traffic light;
- 5 feet of the end of a ramp of an entrance to or an exit from a wheelchair lift;
- 15 feet of the entrance way of an outdoor or elevated subway entrance, except where the public pay telephone is attached to, or is immediately adjacent to, the building and clear pedestrian passage is maintained;
- 5 feet from a subway station entrance;
- 15 foot radius of a fire hydrant and, unless otherwise authorized by the Commissioner in writing, within 5 feet of a standpipe and/or sprinkler, siamese connection or wall hydrant;
- 3 feet from a subway grate, utility hole cover, or transformer vault;
- 15 feet of a sidewalk cafe;
- 15 feet of a bus stop zone unless the public pay telephone is attached to a bus stop shelter within the zone or is installed at the building line and does not obstruct pedestrian passage on the sidewalk;
- 15 feet of a newsstand unless the public pay telephone is attached to such newsstand or is installed at the building line and does not obstruct pedestrian passage of the sidewalk;
- 15 feet of a public pay toilet unless the public pay telephone is attached to such public pay toilet or is installed at the building line and does not obstruct pedestrian passage on the sidewalk;
- 5 feet of a bench located at the curbline;
- 10 feet of a driveway unless the public pay telephone is attached to or immediately adjacent to a building immediately adjacent to such driveway;
- 5 feet of a canopy as defined in § <u>19-124</u> of the Code;

- 4 feet of a mailbox located at the curbline;
- 4 feet of the base of a street light;
- 4 feet of a parking meter;
- 3 feet of a fire box unless otherwise approved in writing by the Commissioner;
- 3 feet of a news rack located at the curbline unless the public pay telephone is attached to the newsrack;
- 3 feet of a newsbox located at the curbline;
- 5 feet of a tree (without a tree pit);
- 3 feet of a grating if the public pay telephone is installed at the building line and does not cover the grating or in any way impede the opening of the grating;
- 3 feet of a signpole;
- 3 feet of the edge of a tree pit or planter located at the curbline.
- 4 feet from a "Pedestal Structure," (herein defined as any telecommunications utility box, cabinet, or enclosure and related construction, such as foundations, that is located, in whole or in part, above grade and within the public right-of-way of a public street and/or sidewalk, except when such structure is attached to a utility pole or other legal street furniture installation);
- 8 feet from a bicycle rack; and
- 4 feet of any sidewalk encumbrance not specifically enumerated herein.
- No more than one structure shall be installed on each block and, for the avoidance of doubt, on only one side of the street per block.
- No more than one structure shall be installed closer than 200 feet to an existing Structure

Link5G Detailed Design Drawings

INSTALLATION SEQUENCE

1. ANCHOR CAGE ASSEMBLED, LOWER TEMPLATE PLATE SET IN PLACE TEMPORARILY

2. ANCHOR CAGE SET IN PLACE, CONDUIT ROUTED THROUGH HOLES, GROUNDING ROD INSTALLED

SECTION D-D SCALE 1 : 16

SECTION F-F SCALE 1 : 12

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New Yorkers on Link5G

New Yorkers on Link5G

"People need a way to be able to communicate sometimes on the street, if you lost your phone, you will be able to go up to a kiosk and be able to dial and make a call. And those calls are free, which is important."

- Bob Ponce, Harlem resident

"I use the LinkNYC every day that I come into the city. It's a good thing for me because it gives me the free Wi-Fi service as I ride my bike making deliveries."

- Amir Bey, bicycle courier

"I think it's going to be an incredible solution...it's activating the fiber infrastructure that is all throughout the city, which is important to make sure everyone else has ubiquitous access to the internet."

- Bruce Lincoln, Sr. Fellow, Columbia Institute for Tele-Information

"When I'm outside of Manhattan, like the Bronx, Brooklyn and Queens, it would be a blessing to residents of those areas."

- Amir Bey

Link5G The Path Forward for LinkNYC

- The pandemic has made clear that we do not have the luxury of time to bridge the digital divide. We must act NOW.
- Link5G is the only path forward to sustain the LinkNYC program and expand into neighborhoods that will most benefit from free, high-speed internet, mobile broadband, and fiber infrastructure.
- After extensive consultation with engineers, designers and technical experts, we are confident that Link5G is the right design for New York City.
- Digital equity is necessary to fully participate and access opportunities in society. Approval of this design is all that stands between in the way of fulfilling our purpose to provide digital connectivity to all residents of New York City.





Without Link5G...

- Risk of Link kiosks going dark across the five boroughs.
- No further expansion of LinkNYC program beyond Manhattan and limited outer borough neighborhoods

 leaving most vulnerable New Yorkers without critical access to broadband connectivity.
- Loss of street furniture advertising used by local small businesses and communities.
- No publicly accessible option for 911/311.
- Loss of revenue stream from a marquee franchise program.
- Loss of 25% advertising space for City to promote its initiatives and public service announcements.



