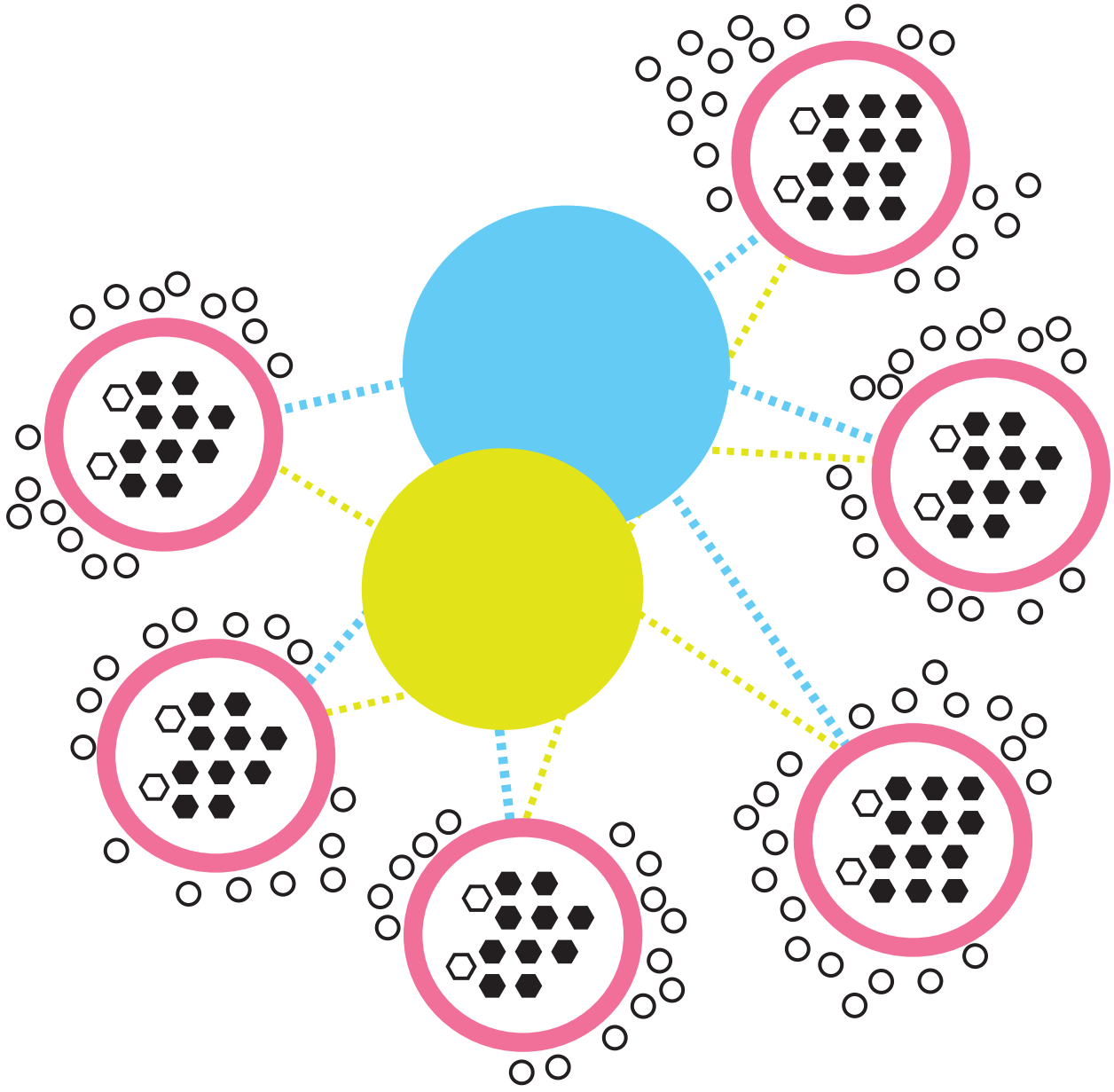
OPEN TECHNOLOGY INSTITUTE

RISE : NYC Stage 2 Proposal
Resilient Mesh Wireless



The Open Technology Institute
New America Foundation
August 1, 2014

I. APPLICANT INFORMATION

Applicant business name
Open Technology Institute,
New America Foundation

Stage 1 application number
0102

Applicant business address
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Form of business entity
501(c)3 Nonprofit Organization

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OTI is a program of the New America Foundation, a nonprofit, nonpartisan public policy institute that invests in new thinkers and new ideas to address the next generation of challenges facing the United States. Launched in 1999, the institute is now led by President Anne-Marie Slaughter and a Board of Directors chaired by Eric Schmidt.

The Open Technology Institute (OTI) has experience building and implementing community technology projects across the US and abroad, and was the lead evaluator of over $20 million in federally-funded broadband adoption programs in Detroit and Philadelphia. OTI is committed to supporting engaged, self-sufficient communities by promoting safe and affordable access to connectivity. We view technology not as an end in and of itself, but a means. Across our work, we are guided by principles of Openness, Privacy, Justice, Collective Self-Determination, Service and Integrity.

Installation, Procurement, and Technical Support
Sky-Packets

Corporate Biznis, Inc.
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Melville, NY 11747

Principal Ownership: Steve Amarante (51%) and Henry Quintin (49%). Sky-Packets, a division of Corporate Biznis, Inc, is based in Nassau County, New York and is a privately held company.

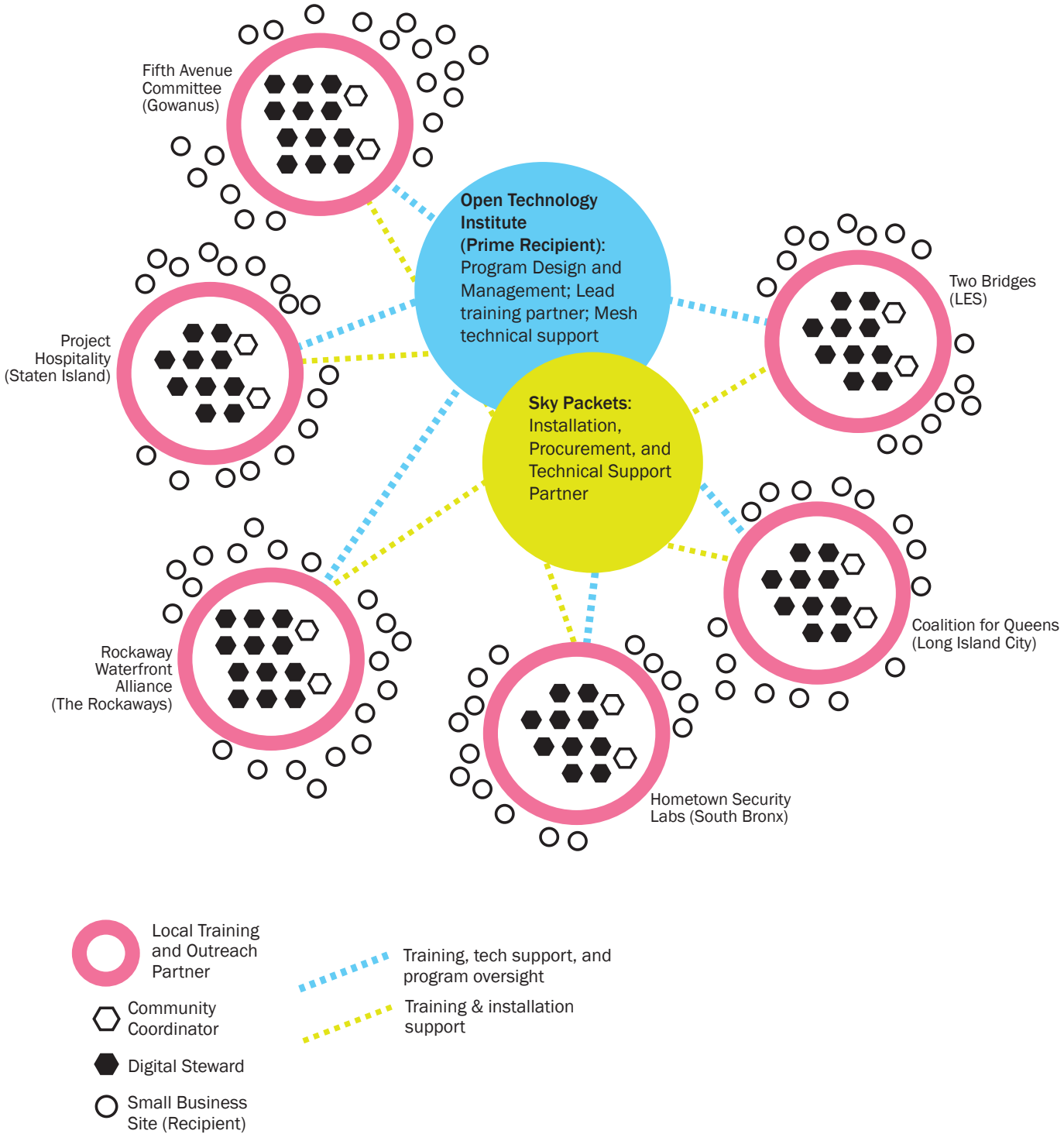
Sky-Packets is a forward-thinking company whose mission is to provide Wi-Fi mesh technology to Property Managers, Developers, Municipalities, Commercial and Business Districts, fundamentally changing the economics of providing Internet access. With Wi-Fi Mesh, Sky-Packets offers a lower-cost, higher service level alternative to accessing high-speed internet service. By focusing on rapid network deployment and simplified operations, Sky-Packets provides all aspects of wireless network implementation and consulting. Sky-Packets has deployed over 100 Wi-Fi networks in the US, including the largest Wi-Fi network in the nation in Harlem, New York, several wireless corridors for the NYCEDC, the largest outdoor Wi-Fi network in Washington D.C. and the Town of Babylon in Long Island. Additionally, Sky-Packets currently designs and maintains Wi-Fi Networks for Google, Inc in New York and other parts of the US.

Digital Stewards Training Partners

In order to engage local communities in the project and mobilize neighborhood-based teams of "Digital Stewards" to install and maintain the networks, OTI will contract with community-based organizations in Sandy-affected neighborhoods. Currently we have informal agreements with community organizations that have played key roles in Sandy recovery and local workforce development (see Appendix for letters of support): the Fifth Avenue Committee in Gowanus, Two Bridges in Lower Manhattan, Project Hospitality in Staten Island, the Rockaway Waterfront Alliance, Home(town) Security Labs in the South Bronx, and the Coalition for Queens in Long Island City. We look forward to finalizing agreements with these and a community partner in one additional neighborhood to host our Digital Stewards training program to support installation and maintenance of network nodes at local business sites. In addition, we will continue to work with the Red Hook Initiative, building on our successful collaboration on the RHI Wi-Fi mesh network.

II. PROJECT TEAM COMPOSITION

ROLES AND RESPONSIBILITIES



III. PROJECT TECHNICAL INFORMATION

TECHNOLOGY SPECIFICATIONS

1. Overview

OTI's resilient mesh wireless technology allows communities to build and maintain their own local wireless networks. The technology incorporates a number of distinct features in its design, installation, operation and maintenance to maximize the economic and disaster mitigation benefits for participating small businesses.

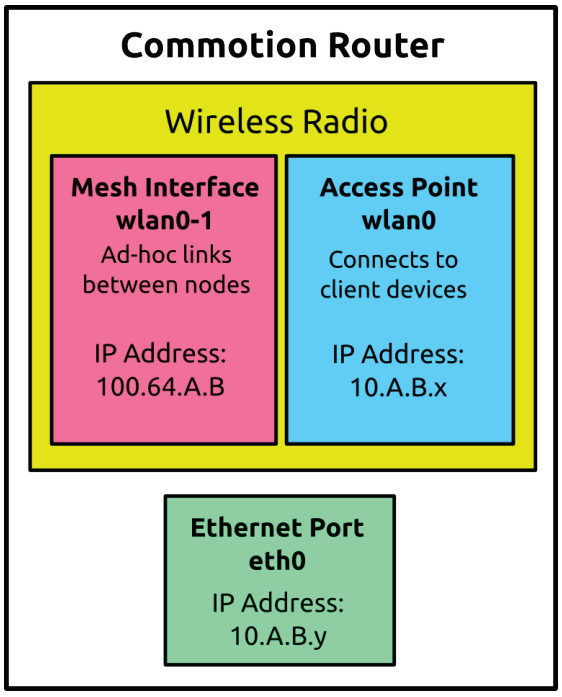
- User experience is identical to a standard Wi-Fi network under normal conditions.
- If some nodes in the network are damaged or disabled, the mesh firmware dynamically routes traffic around the outage, finding the best path to the Internet at any time.
- The mesh wireless routers are service provider-grade equipment, and require minimal electricity. They resist damage from weather, are easily transportable, and can be powered with battery packs if needed.
- A team of neighborhood "Digital Stewards" receive in-depth training for network maintenance and emergency repairs, building employable skills in the process.
- Business owners receive basic training to restore or reconfigure their mesh wireless kit in the event of a disaster, or if they relocate, and are supported by Digital Stewards from the local community.
- Each small business is connected to at least two neighbors for backup communications service.
- Multiple businesses in each area are connected to each other for additional backup service options, neighborhood Wi-Fi Internet coverage, and in-network communication.
- Local area network capability means communication among neighbors is still possible even if a storm severs all connections to the Internet.
- A lightweight server with a suite of free and open source applications will enable chat, message board and other emergency data communications on the local network.
- Support from network stewards/trainees, additional backup service options, cooperative bandwidth purchasing, and the option of public Wi-Fi coverage enhance the resilience and economic benefits to small businesses that work together in the target areas.

2. Mesh Firmware

OTI developed Commotion Wireless, an open-source toolkit of software and instructional materials, to facilitate participatory deployment of resilient and decentralized mesh networks. A Commotion-powered network can distribute an Internet connection across a wide area; users connect to it

with their computers or smartphones as they would any Wi-Fi access point. Within the network, the mesh software determines the optimal route to the Internet, dynamically adjusting if one connection goes down. Users or administrators of the network can add new nodes on an ad-hoc basis to expand coverage or meet changing needs. The network can also function as a self-contained "intranet" with local content and applications, so even if the neighborhood is completely cut off from the Internet, neighbors can still communicate with each other.

There are a variety of mesh solutions on the market. Commotion does not rely on a management solution in the cloud, so all of its features are available regardless of Internet connectivity. The Commotion Router package is built on top of numerous open-source software packages, including OpenWRT and Serval, so there is no licensing fee. The software is designed to replace common router operating system "firmware," such as AirOS on Ubiquiti AirMax devices, to enable mesh networking capabilities. The mesh routing protocol used by Commotion is the Optimized Link State Routing protocol (OLSR), and allows the mesh nodes to route traffic and add new nodes dynamically.



The Commotion software is designed to automatically configure as many parameters of the mesh network for the user as possible. After installing the firmware on a router, the user runs a "Setup Wizard" with a graphical user interface to name the node and assign it a password for the network, which creates secure connections among the nodes, user access points and IP addresses. Each device uses the OLSR routing protocol to find its neighbors within the wireless broadcast range and automatically connect to them. Once these connections are formed, the devices route connections through any device participating in the network. If an Internet connection or local application is available on the network, each node advertises those services and users can connect to them right away.

The Open Technology Institute released Commotion 1.0 at the beginning of 2014 and continues to improve the software and construction toolkit. The Commotion software is available for free to anyone under the GNU General Public License. OTI incorporates other wireless components into our networks, as appropriate. These may include other mesh elements, point-to-point links and point-to-multipoint links where these provide added stability or resilience, or otherwise meet the specific needs of the host community.

3. Hardware

OTI's resilient mesh technology uses multiple small, low-cost devices to build a decentralized network with limited points of failure which can be

quickly modified or repaired. The software runs on commercially available wireless devices, including ones that many people may already have in their homes. OTI utilizes Ubiquiti's line of AirMax routers due to the excellent build quality, reasonable cost, and considerable range (depending on physical obstructions and radio interference). Multiple models are rated for outdoor use, and the equipment is consistently proven and used by Wireless Internet Service Providers (WISPs) worldwide. The typical device draws approximately 10 watts of electricity – about the same as a digital alarm clock – and can be powered from the grid, with solar panels, or with battery packs.

Participating small business owners will receive three pre-configured mesh nodes and a selection of mounting hardware. OTI and our installation vendor Sky Packets will work with the business to determine the best combination of hardware for the business's location and needs. One node will be for their business location; the other two devices will be in places that provide alternate connections to the Internet in case the small business loses connectivity, or will serve as critical links for local communication.

4. Installation

OTI and local teams of Digital Stewards, along with our installation vendor Sky Packets, will work with business owners to determine the optimal method of installation at their site and the two nearby backup sites. We will ensure: a stable connection among the three devices; the secure placement of the hardware; and the portability of the mesh technology so the small businesses can use the three devices or move them as needed. Many of the small business installations will be as simple as attaching a suction cup to the inside of a street-facing window and plugging into a wall outlet. We will show the business owner how to install and configure the devices. All of these installations will be non-permanent; the business owner will be able to move all three devices and set them up at a new location, or even expand the network as they see fit.

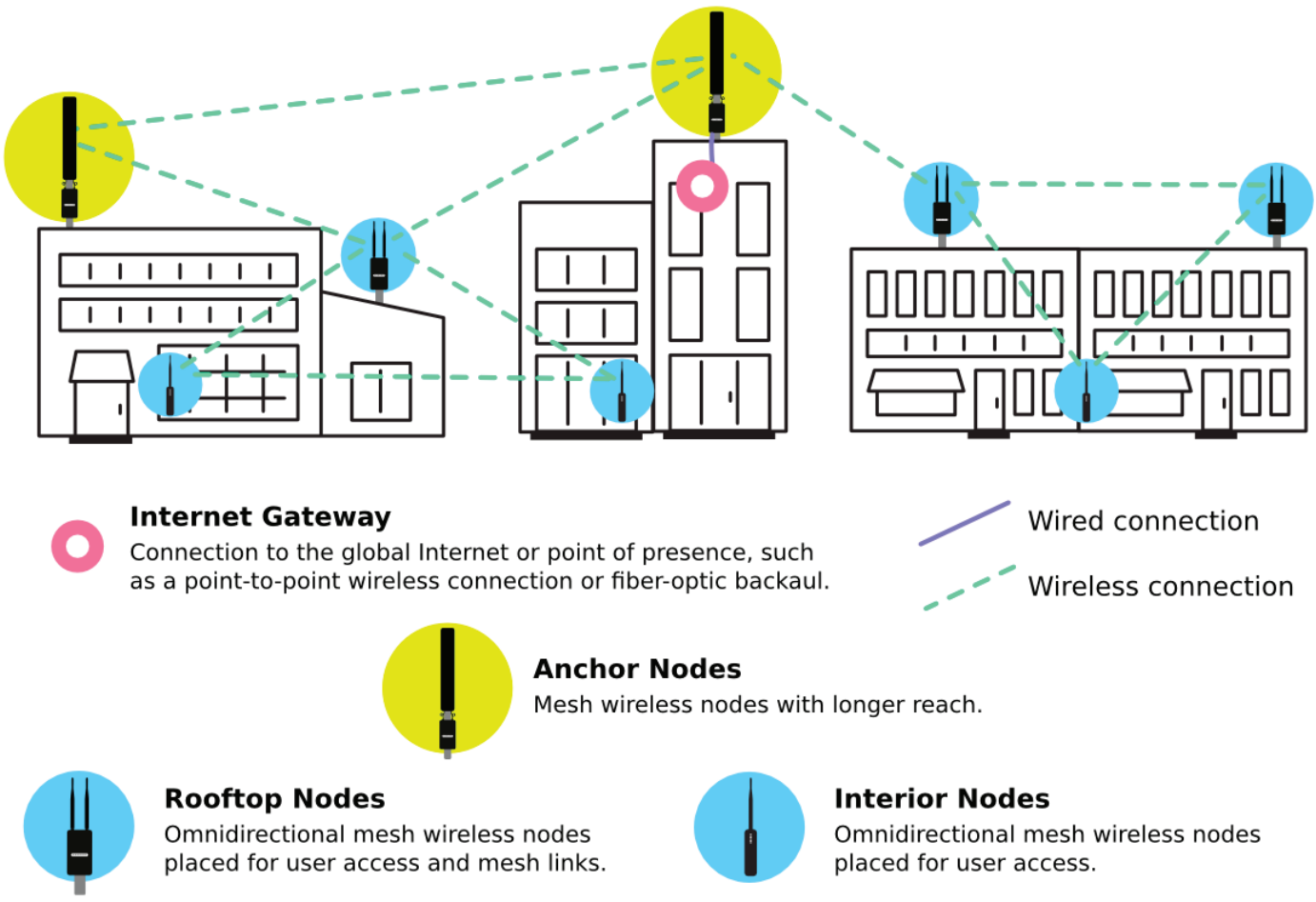
More advanced rooftop installations at small businesses or at strategic points nearby will enable interconnection among multiple small business sites in an area, bringing the network to a larger scale and potentially connecting together small businesses and other community anchors for maximum resilience benefit. In addition, more powerful "anchor" interconnection points at high points in the area will be fortified with higher power routers, a robust backup electricity solution, and secure mounting equipment. The most complex installations will be performed by Sky Packets with support as needed from OTI and the Stewards.

In areas where three or more small businesses are within range of each other, we will incorporate high speed (greater than 50Mbps) Internet gateways (connections from the mesh network to the global Internet) at multiple points in the network from multiple service providers to promote network adoption, enhance the benefit to the small businesses and mitigate risk of losing connectivity in a disaster.

This installation architecture – interior access nodes, rooftop distribution and access nodes, higher-power anchor nodes, and distributed gateways – will scale from isolated one-business sites to clusters of 20 or more sites, and can adapt to shifting needs in each area based on economic or environmental conditions.

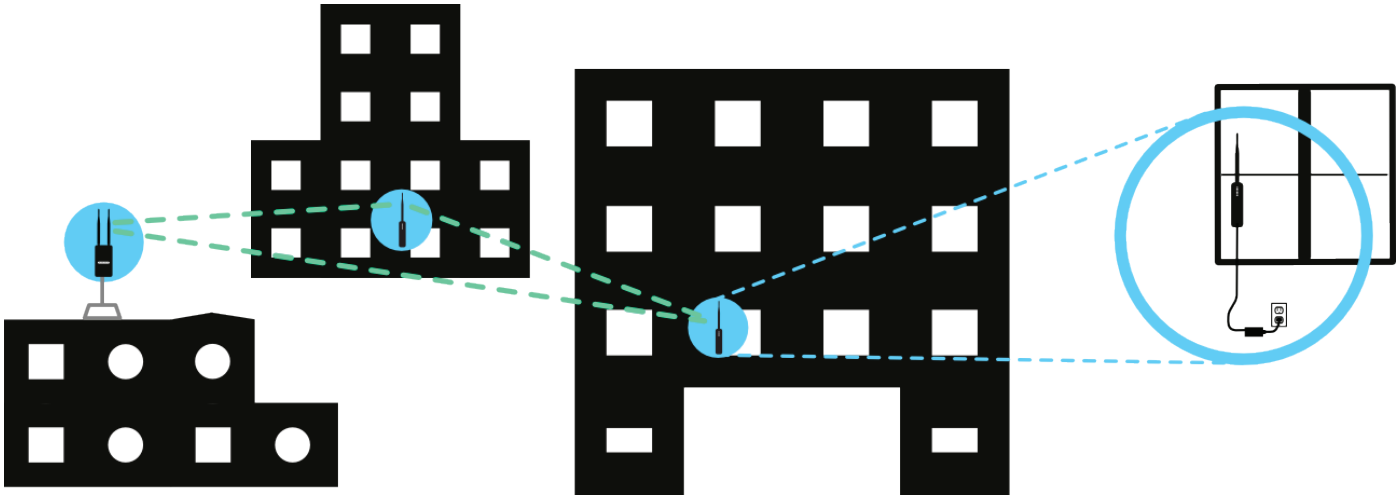
Network at scale

The diagram below shows the different installation types and an Internet gateway in combination. A mesh network can be constructed with any combination of these installation types, but this architecture balances coverage, stability, resilience, and ease of installation.



Small Business Installation

A typical small business site will host a mesh router in a street-facing window, connected to two other nearby locations to provide WiFi in the area as needed as well as backup Internet service and wireless coverage in an emergency. The interior installations provide coverage inside the business location and the nearby exterior space. The routers can be installed or relocated by the business owner with minimal training; OTI and local Digital Stewards will provide training and support.



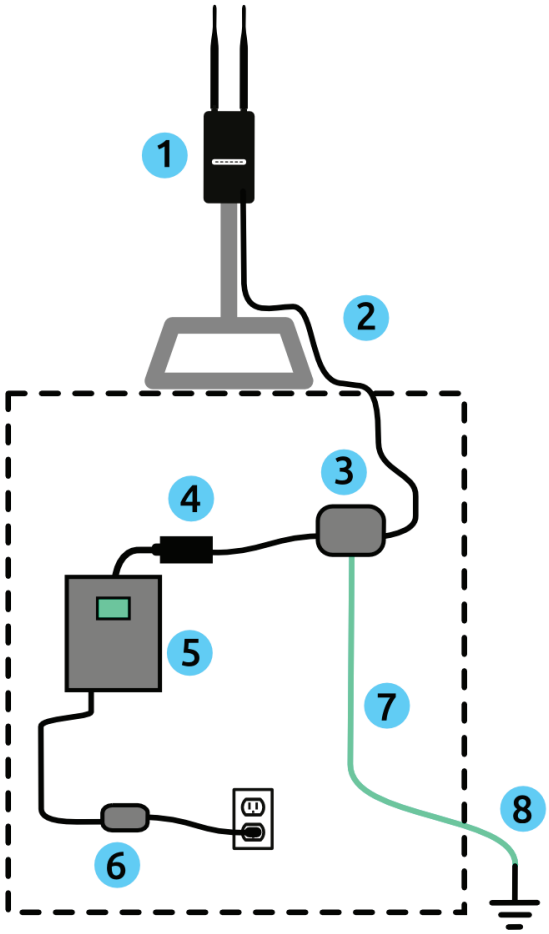
Small business installations will consist of the following types of equipment:

- Ethernet cable and power-over-ethernet injector.
- Consumer grade uninterruptible power supply.
- Window-mounting bracket, which uses a suction cup to attach to the window.
- Medium-power wireless node, such as a Ubiquiti PicoStation M2 or NanoStation M2, with omnidirectional or directional antennas. Directional antennas increase the range of connections to other mesh nodes; a separate, consumer grade, non-mesh router can attach for additional indoor coverage. An omnidirectional device can serve both purposes with greater simplicity but lower performance.

Rooftop Installation

Rooftop installations increase the working range to other mesh nodes and scale up the network overall, though they may not provide interior coverage. These nodes provide both user access and mesh links to other nodes. Depending on placement and proximity to the ground, they can provide coverage for users' client devices at street level. The skill level required for these installations depends on the type and accessibility of the roof and the availability of a power source.

These sites will consist of the following types of equipment, as shown in the detailed system diagram below.



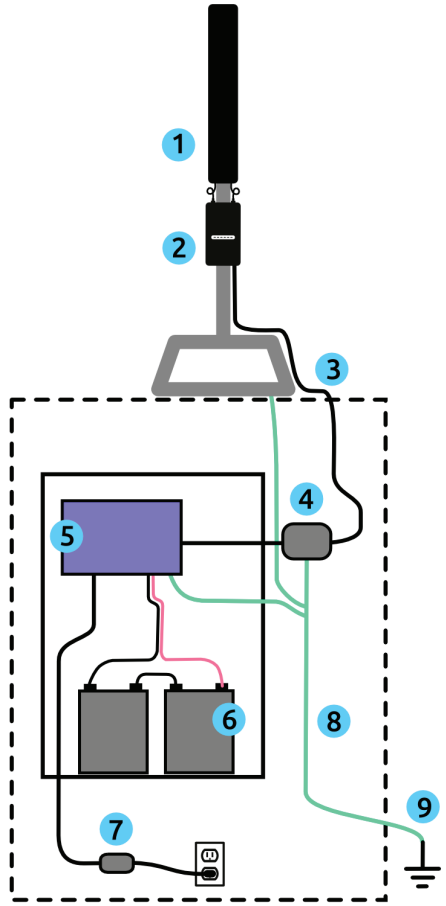
Rooftop Installation system diagram

1. High powered mesh node - A powerful wireless mesh node with 24dBm of power output or greater.
2. Shielded outdoor grade Ethernet cable - UV resistant for outdoor use, shielding grounds outdoor mesh equipment in case of static or power surges.
3. Surge arrester - Protects indoor equipment from power surges, and drains static charge from outdoor equipment.
4. PoE power supply - Converts electrical power to DC power for mesh nodes and injects it on to the Ethernet cable. Typically supplied with the wireless router.
5. UPS unit - Charges batteries from utility power and provides AC power for up to 24 hours.
6. AC power surge protector - An off-the-shelf surge arrestor to protect from utility power spikes.
7. Ground wiring - #10 copper wire grounding the arrestor to dissipate static and surges.
8. Earth ground - The ground wiring should be bonded to a building ground, such as at the electrical panel.

Anchor Installation

In areas with multiple small business sites, anchor nodes will provide interconnection among the sites. They will be located at high points in the neighborhood, ideally on key institutions that have already been outfitted with resilient electricity sources or other supplies. These will have line of sight to the rooftop or interior nodes throughout the neighborhood. They will be the sites for the Internet gateways for the network or will connect to those gateways to provide Internet distribution to the small businesses throughout the area. They are also ideal sites to install servers that will provide

local applications over the network. The equipment at these sites is comparable to that of the rooftop installations, but with greater power and additional backup power capabilities.



Anchor Installation system diagram

These sites will consist of the following types of equipment, as shown in the detailed system diagram above.

1. High gain omnidirectional antenna - A MIMO Wi-Fi antenna with at least 10dBi of gain for extended coverage.
2. High powered mesh node - A powerful wireless mesh node with 24dBm of power output or greater.
3. Shielded outdoor grade Ethernet cable - UV resistant for outdoor use, shielding grounds outdoor mesh equipment in case of static or power surges.
4. DC Regulator - Maintains constant DC power level to mesh node. Provides surge arresting feature.
5. DC UPS unit - Keeps batteries charged from utility power, and transfers power for mesh equipment to battery when utility power fails.
6. Backup batteries - 36Ah capacity, wired for 24V DC output. Directly powers the mesh equipment through the DC UPS unit. Can maintain power for up to 72 hours.
7. AC power surge protector - An off-the-shelf surge arrestor to protect from utility power spikes.
8. Ground wiring - #10 copper wire grounding the vital parts of the system to dissipate static and surges.
9. Earth ground - The ground wiring should be bonded to a building ground, such as at the electrical panel.

Gateway

Gateways connect the mesh networks to the Internet. We will incorporate high speed (greater than 50Mbps) Internet gateways at multiple points in the network from multiple service providers to enhance the user experience and mitigate risk of losing connectivity. In an emergency, Internet service can be distributed throughout the entire network from any functioning gateway, though a node's proximity to the gateway impacts speed and reliability. So long as one business still has service after a storm, or if emergency responders can bring in a satellite or long distance terrestrial wireless connection, then everyone on that neighborhood's mesh network can potentially connect to the Internet.

5. Resilience and Repair

OTI's resilient mesh wireless incorporates three additional network components that increase the mesh network's utility at times when Internet or electrical systems fail.

Local Area Network capability

Each network has a server that provides text chat and other applications to everyone on the local area network without the need for an Internet connection. The server can support additional local applications based on the needs and capabilities of the small businesses and other network users.

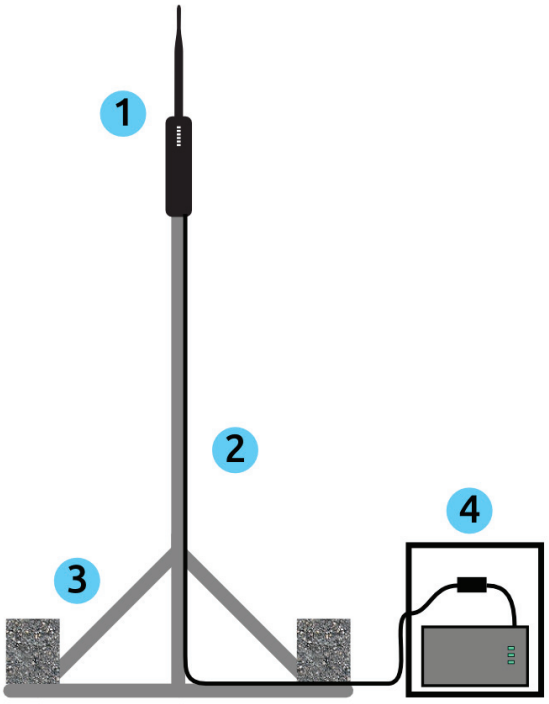
Power supply

As described above, the installations at small businesses and network anchors will have integrated backup power elements. Each site will have an uninterruptible power supply (UPS) that provides stability during normal operation; it prevents brief power interruptions from causing the router to turn off and back on. If electricity goes out for a longer period, the UPS model at the small business sites can power a mesh router for approximately 24 hours and the model at the anchor points for 72 hours before needing to be recharged or replaced.

Response kit

Each network will be outfitted with a number of portable mesh response kits. This kit can extend coverage to emergency aid distribution points or can replace a network node destroyed in a storm.

The kits will contain enough basic equipment to set up new mesh nodes on short notice, even where power may be down. These kits will consist of the following types of equipment, shown as a sample installation.



Response Kit system diagram

1. Medium-power wireless node, such as a Ubiquiti PicoStation M2, with an omnidirectional 5dBi antenna.
2. Shielded outdoor grade Ethernet cable.
3. Portable tripod mount – A sturdy, lightweight portable mast for setup on any flat surface, such as the SuperAntenna PT3 portable tripod, secured with concrete block ballast.
4. Portable battery pack(s), such as the Energizer XP18000A, these provides a mesh node with power for 6 to 8 hours. Shown with waterproof enclosure and DC Power-over-Ethernet (PoE) adapters.

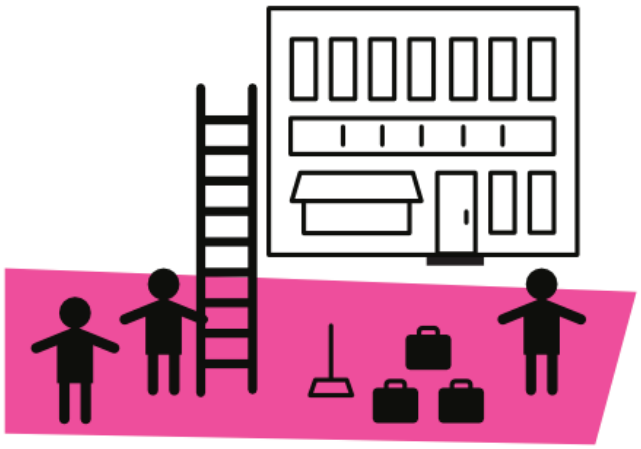
These kits may be stored with individual small businesses or at anchor locations where battery packs can be recharged from a generator or comparable electricity source.

6. Operation and Maintenance

OTI's resilient mesh wireless includes a neighborhood training program that ensures the local community has the skills and resources to repair or reconfigure the network following a disaster. This includes a team of neighborhood Digital Stewards for each neighborhood or cluster of small business sites. The Stewards conduct basic installations, provide ongoing maintenance and support, and are the first to respond in the event a disaster strikes their community. They also teach basic networking skills to each small business owner to minimize support requests and ensure that the small businesses have the skills to install or move and re-install the technology themselves as needed. Instructional materials and user guides are designed for simplicity and are available for free on the Commotion Wireless website.

Stewards of Resilient Mesh Wireless

OTI has developed the Digital Stewards training curriculum to go along with mesh network construction to facilitate neighborhood self-sufficiency with the technology. We will work with community-based organizations to hire an on-site coordinator for each neighborhood network, recruit training participants from the neighborhood, provide a training facility, and coordinate logistics with the network sites. (See the letters of support in an appendix to our proposal for expressions of interest from organizations in each network deployment area.) The size and scope of the training is proportional to the number of small business sites in an area, and customized to the needs, resources and culture of the neighborhood.



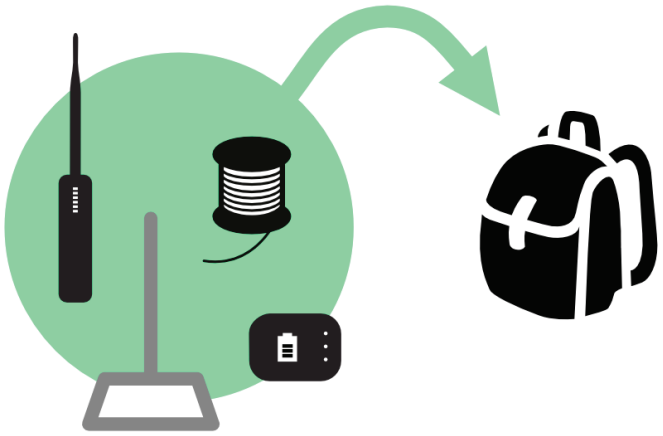
In the first phase of the project, OTI, with support from an educational consultant, will conduct a train-the-trainer program for the technicians from Sky Packets and the on-site coordinators. Each coordinator will then lead recruitment of neighborhood participants for the Digital Stewards training program. The participants are generally selected based on their commitment to the neighborhood and desire to learn at least one of three core competencies for mesh network construction: community engagement, network administration, and installation or equipment set-up work. They become the stewards of their local resilient mesh wireless network.

OTI and Sky Packets will work closely with the Digital Stewards through each stage of network planning, construction and maintenance. The Digital Stewards will conduct site assessments for each small business location, help determine the nearby mesh links for each site, and identify potential anchor points. They will configure and test the mesh wireless equipment and conduct or participate in the installations, depending on whether it is the simpler in-window method or a more complex rooftop installation. The Digital Stewards will test and monitor network performance. Sky Packets will be on site to supervise or conduct installations and will provide customer support and quality assurance, according to OTI's network specifications.

The training program will address the use of the mesh response kits in various disaster scenarios, based on the neighborhood's experience during Sandy. This will include the use of the network for preparation, evacuation, response and recovery.

Trainings for Small Businesses

The Digital Stewards will serve as the primary points of contact for the small businesses in their neighborhoods. They will conduct troubleshooting and call on Sky Packets and OTI as needed for more complex support requests. With support from their on-site coordinators, the Digital Stewards will train the small businesses in the use of the network – how to power cycle a router, check if it's working, and connect a client device. They will show the small businesses how to set up their three nodes themselves in case they need to relocate. They will also explain how to reconfigure their network connection in the event of an emergency and how to use the local area network capability and install and use local applications.



OTI will work with the Digital Stewards to monitor user experience through interviews, surveys and focus groups. Following a successful network launch, we will work with the small businesses to formulate future needs and design additional applications and neighborhood network sustainability plans to carry the initiative beyond the grant period and OTI's handoff to full community governance.

Commotion Construction Kit

The Digital Stewards curriculum uses the Commotion Construction Kit (CCK), a modular set of user guides and instructional materials with accessible graphics and hands-on activities for users of all skill levels. The CCK covers many broadly applicable skills in wireless networking and community technology, as well as the more specific techniques of mesh networks. (See the Construction Kit at commotionwireless.net.)

OTI maintains an open source, Creative Commons licensed repository of the CCK graphics and modules just as we do with the Commotion software code, and we incorporate user additions, modifications and innovations into the curriculum on an ongoing basis. Like the Commotion firmware, these materials are freely available in web and printable formats for commercial or non-commercial use by anyone who wants to build, expand or modify a resilient mesh wireless network in their community.

Conclusion

OTI's resilient mesh wireless technology incorporates numerous best practices to ensure that small businesses will have a robust public Wi-Fi solution for their neighborhood and a reliable backup communications service in moments of crisis. The major distinction between OTI's model and traditional wireless networks is the increase in human and social capital. Our model uses all aspects of network construction as a training opportunity, which results in greater community self-sufficiency, economic opportunity, and sustainability.

Case Study: Red Hook WiFi

In Fall 2011, the Red Hook Initiative (RHI), a Brooklyn non-profit focused on creating social change through youth engagement, decided to build a wireless mesh network to serve the neighborhood. With support from the New America's Open Technology Institute and input from local residents, RHI initiated the network to support local communication among the residents of the Red Hook Houses and to provide Internet access to residents that might not otherwise bea able to afford it.

OTI worked with RHI to design and plan the RHI WiFi network using OTI's Commotion Wireless mesh platform. Originally, OTI provided only remote support. RHI independently installed the first nodes at RHI and on the roof of an apartment building overlooking Coffey Park. The physical limitations of the concrete-block NYCHA structures, as well as social and city-imposed limitations, created an initial obstacle to providing Internet access within the buildings themselves. Yet with the Coffey Park node, the possibility of creating a community wireless network covering public spaces in the neighborhood began to take shape. OTI began formally collaborating with RHI. Together, we reached out to other potential node hosts and began developing tools for local communication over the network.

Then, on October 29, 2012, Superstorm Sandy devastated low-lying Red Hook. Amid power outages and flooding, the need to communicate, organize volunteers, and share information became crucial. Once the storm surge receded, RHI's building was one of the few locations in the neighborhood that had power and Internet service. The Commotion nodes stayed in place and the RHI Wifi network (unlike cell and cable networks) was operational through the storm. In the next days, the RHI Wifi network became a lifeline for the community. Over 300 residents were accessing the network to communicate with loved ones, access news, and seek assistance in recovery. RHI was able to coordinate with residents and volunteers.

"We immediately saw communications as one of the critical needs in the community," said RHI Media Programs Coordinator Tony Schloss. "We wanted it to be as easy as possible for people to contact their networks to find housing, gain access to information, and report their safety."

As recovery progressed, FEMA reached out to RHI about leveraging the network to support formal recovery efforts in Red Hook. RHI, OTI, FEMA, the International Technology Disaster Resource Center, and other volunteers set up a FEMA satellite Internet gateway on the roof of RHI and installed additional routers in the neighborhood. These routers connected RHI, Coffey Park and other key aid distribution points. The satellite link provided Internet service through the mesh network to residents, first responders, and recovery volunteers.

With power and water still missing from much of Red Hook, many local businesses, organizations and residents reached out to help. BKFiber, a local internet service provider (ISP) volunteered an Internet gateway, adding bandwidth to RHI Wifi. To add the gateway into the mesh, OTI, RHI and Brooklyn Fiber installed a wireless access point on the 3rd floor of the Visitation Church Rectory on the west side of Coffey Park. The church was also without power, but the routers were able to be run off of uninterruptible power supplies for 12 hours at a time, with the local team swapping them out.

RHI WiFi coverage area directly after Sandy

The storm made clear the value of this infrastructure. With support from NYC's Center for Economic Opportunity Work Progress Program, RHI and OTI launched a training program in January 2013 to engage neighborhood residents in maintaining and growing the wireless network. Modeled after the Digital Stewards curriculum developed by OTI and Allied Media Projects in Detroit, Michigan, RHI's Digital Stewards program trained 8 young adults to install new routers, maintain existing ones, and promote adoption of the network throughout Red Hook. The RHI Digital Stewards performed outreach to local businesses and other node hosts, produced digital media about the businesses and their own experiences, designed new local area network applications for neighborhood residents, and worked to identify revenue sources to achieve a community-controlled network for everyone to use.

After FEMA's support for a satellite link ended, RHI formed a partnership with BKFiber. The deployment has helped grow BKFiber's business considerably; they now have greater awareness in the community, access to more mounting sites, and potential employees from the training program.

The deployments in Detroit and Red Hook have shown that this model is both replicable and scalable. Detroit's training program now supports seven small-scale networks in that city. After the initial year-long training program in Red Hook, Red Hook Initiative maintains the network independently and is conducting another round of trainings with their own staff. The network now consists of over 20 nodes, with to-user download speeds of 2-10 Mbps, depending on the location in the network. The number of users on the network varies from 25-150 depending on time of day. The young people from the neighborhood that trained as Digital Stewards are employed in the field by companies like BKFiber and Sky-Packets, have related fellowships or internships, or are applying their skills to other technologies, such as audio-visual installation.

Red Hook Wifi's role in Sandy recovery was featured in a FEMA ThinkTank event at the White House in February 2013 and at a e Federal Communications Commission's Workshop on Network Resiliency that same month. A case study on the network appears in *Wireless Networking in the Developing World*, and Maya Wiley, then Director of the Center for Social Inclusion and now Counsel to the Mayor, profiled the project in an article in *The Nation* entitled, "To Help Connect the Two New Yorks, Bill de Blasio Should Build More Community Broadband: How high-speed Internet access is changing one Brooklyn neighborhood."

OTI has researched, deployed, and supported mesh networks around the world. Sky-Packets has built built over 100 networks in New York City alone. We have enlisted some of the city's most well-respected community organizations to partner with us in each borough. Our collaborative model is designed to address the major challenges to implementing resilient mesh wireless networks in New York City.

First the social network, then the mesh network

The most complicated aspect of this project is the social process. Communities that have survived extended periods of flooding and power outages, decades of financial disinvestment, or both tend to be skeptical of offers of intervention. That is especially true of new technologies packaged with bold promises. At least one of our proposed deployment zones has been promised "free Wi-Fi" in the past, only to see the company that made that promise fall apart. In our experience, technology cannot solve this problem. First, you have to build relationships of trust. Our model turns this challenge into an opportunity to build relationships and capacity within communities and activate small business owners as contributors to the project, not simply recipients. Trusted organizations will serve as local hubs for outreach to the small businesses and act as experts in the needs, resources and culture of the neighborhood. In this way, we avoid the common mistake of "cookie cutter" technology deployment and the small businesses and neighborhood residents gain the added benefit of social cohesion.

Installing at diverse and challenging sites

Each small business is unique, so installations cannot be standardized. One of the benefits to our installation model is that we can account for the specific needs and capacities of each business. Based on our experience teaching network construction, we have designed a community outreach process, including "Commotion Construction Kit" guides that the Digital Stewards will use to reach out to businesses, document installation environments, and identify the most suitable placement and installation method for each. Since each rooftop is different, the Digital Stewards will train in evaluating each situation and installing in the safest manner possible. Those sites that are deemed more complicated or hazardous than the norm will be supervised or performed by OTI's installation partner Sky-Packets. (See https://commotionwireless.net/docs/cck/ for a sample of the site assessment guide and community outreach process.)

Unlicensed spectrum and radio interference

The Commotion mesh platform uses Wi-Fi equipment operating using unlicensed spectrum in the 2.4GHz and 5GHz frequency bands. The equipment falls under FCC Part 15 unlicensed device regulations, and will stay within proper radio frequency (RF) power limits and be installed by (or under supervision of) professional installers. It is important to note that in urban areas the Wi-Fi bands are crowded (especially the 2.4GHz band) with many kinds of commercial wireless devices. However, the areas of NYC where we propose to install our technology have generally lower rates of broadband adoption

and correspondingly lower rates of Wi-Fi use. While smartphone ownership rates may be high and growing in these areas, these devices are lower-powered and can connect to the network, minimizing potential for interference. In addition, we can select channels that minimize interference, though it is impossible to find a completely "open" channel given the demand for unlicensed spectrum. Use of different frequencies across multiple layers of the network - for example a 5GHz mesh layer for anchor institutions and small business rooftops - can also help offload traffic from the 2.4Ghz band, increasing bandwidth across the network and minimizing the impact of interference. Our partner Sky-Packets, which has extensive wireless installation experience in New York City, is familiar with the RF engineering challenges.

Labor supply and matching location-specific demand

The investment from RISE:NYC will greatly lower barriers to initiating resilient mesh wireless networks across the city. In general, there is limited skilled labor to build and maintain local shared wireless infrastructure, especially considering the level of community engagement required for true sustainability and resilience. Environmentally and economically vulnerable parts of the city in particular tend to have a lower supply of skilled labor to support adoption of technology. By incorporating a robust training program into our deployments, we reduce the long-term need for outside technicians. We have proposed deployments and trainings distributed across the city in all five boroughs to ensure each region has access to a pool of Digital Stewards and an proof-of-concept network. We are establishing a pipeline specifically for low-income New York City residents to enter this growing sector of the tech industry. Some may choose an entrepreneurial path or go into related technology fields. Sky-Packets has already hired one of our Red Hook trainees and anticipates hiring more through this program; this initiative would greatly increase their capacity to support apprentices and engage more deeply with the communities using the networks they build. In fact, Sky-Packets' overall approach to building wireless networks will incorporate more resilience and economic development components, setting a new standard for the industry. Our proposal will thus increase both awareness and skilled labor supply, while transforming key business practices and establishing a baseline infrastructure to support broader deployment across the city.

The challenge of Internet access

Our technology can function as a self-contained local network and does not require Internet access to function and provide a benefit to small businesses. However, the availability of Internet service on the network will drive adoption and greatly enhance the economic and resilience benefits. Internet service options in the outer boroughs can be limited, however, especially for business and enterprise class connections, especially in areas where Superstorm Sandy damaged infrastructure. Our team has existing relationships with the city's Internet service providers, and we will work with them to expand or improve service options in our deployment areas, in line with the demand we expect to stimulate for both business and residential service. It will be a further challenge to sustain payments for Internet service on the mesh network beyond the grant period. Upon network completion, we will work with our community partners to develop a sustainability plan that will identify new sources of revenue to support the networks, for example via business associations. We expect that the physical and social infrastructure along with a clear demonstration of value emerging from this project will support this sustainability.

In preparing our RISE:NYC submission, OTI worked closely with a network of community-based organizations in vulnerable areas to identify small businesses that would benefit the most from our technology. We conducted outreach through existing Sandy recovery networks, worked with trusted community partners (see the letters of support in the Appendix) and distributed flyers (see Appendix for flyers in both English and Standard Chinese). Many small businesses expressed interest to us directly or through our partners. To the best of our ability given the time allotted, we have determined that each site meets the federal definition of small business and experienced a direct impact from Superstorm Sandy. We can provide further documentation upon request.

These businesses suffered a full array of impacts from Sandy, including many that were cut off from communication for days or longer due to storm damage, power outages and overtaxed repair crews. Their recovery from Sandy and preparedness for future storms is deeply hindered by the economic and social challenges in their neighborhoods, including poor infrastructure, declining commercial activity, limited job opportunities and social fragmentation. Our proposed solution leverages the neighborhood's resources to address all of these needs and maximize the benefits of resilient mesh wireless technology.

Each small business will receive three mesh nodes: one to locate on site and two at nearby points. These nodes connect them to other small businesses and potentially other sites in their neighborhood, as described in the technical specifications section. They can use the three nodes to provide Wi-Fi service to their customers on a regular basis in line with their Internet terms of service or through the service we will provision on the wider area network. If any business loses Internet service or power, it can tap into its neighbors' connections. We will provide support to the businesses to select the optimal points for their installations, and provide training so they have the skill to make necessary adjustments in an emergency. The business owner will be able to take the hardware if needed in an evacuation, and can use it to set up operations at a temporary location, then return to their normal place of business even if Internet service has not been entirely restored to the area.

In the main deployment zones, we will:

- Interconnect the three-node sites to extend the coverage area through the commercial district, enable additional backup service options and increase routing pathways;
- Install dedicated high-speed Internet service from multiple providers (where available);
- Add emergency in-network communication features; and
- Provide a dedicated support and response team in the neighborhood through a training program for low-income residents.

As described below, these components will provide a "network effect" of increasing economic and resilience benefits to the small businesses and will promote business retention and economic activity in these environmentally and economically vulnerable communities.

Network coverage in commercial districts

Neighborhood-scale Wi-Fi networks are well-established economic development tools. New York City is already making use of this strategy in prominent commercial districts through its Wireless Corridor Challenge, sponsored networks in Chelsea, Harlem and lower Manhattan, and the "Wi-Fi Payphone"

franchise. Wi-Fi coverage can attract customers and stimulate foot traffic, advertise local businesses and amenities, bolster an area's brand identity, and even lower the barrier to entry for new businesses. Our proposal would bring these benefits to the city's geographic and economic margins, with important modifications to account for local conditions in each neighborhood and in coordination with other community recovery and economic development plans.

High-speed Internet service options

Many New York City small businesses, especially in the outer boroughs, are stymied by the lack of options for broadband service. We will work with incumbent ISPs as well as new entrants to begin or improve service in each of our deployment zones. Expanded service options benefit small businesses purchasing broadband. More service options also mean more redundancy in the network and less chance of losing shared connectivity. In an emergency, as long anyone on the local network has a connection, the mesh technology will make it possible for business owners and residents to share it (though the quality of the connection may vary). Internet connection could come from a still-operational wired service, a long-distance wireless link to another neighborhood, or a satellite connection.

Emergency in-network communication features

Even if no Internet service is available in the area due to major damage to the city's infrastructure, a lightweight server with a suite of free and open source applications will enable chat, message board and other emergency data communications on the local network. (Voice and video communication is possible, as well, where local residents or responding technicians have the skill level to operate such systems.)

Dedicated support and response team

When disaster strikes, your neighbors are the first on-site. OTI's installation and training model gives these neighbors the skills and equipment to assess damage to a network and restore communications capability to the neighborhood. When outside help arrives, the Digital Stewards will be a clear point of entry for responders focused on communications needs in the impacted area.

Training program for low-income residents

Using the network installation as a training program provides job skills and employment opportunities to low-income residents. Some of the Digital Stewards will be able to work with companies like Sky-Packets to meet growing demand for Wi-Fi, or directly support businesses that were not included in the proposal but now want to join a network. For others, the Digital Stewards skills are broadly applicable, both across different industries where participants may find employment, and to meet the diverse and changing technology needs of neighborhood small businesses. Once the network is established, small businesses will also need basic services like websites, email lists, search engine optimization and social media.

A core design principle of our mesh networks is that healthy relationships in a community are the foundation for functioning technology, economic development and resilience. OTI's resilient mesh wireless builds the human capital of the neighborhood: the Digital Stewards, the relationships among residents and business owners, and the shared commitment of all to the well-being of the community. After Sandy, many neighborhoods found a new spirit of collaboration and mutual support. Our proposal will help capture that spirit and translate it into durable communications infrastructure.

V. IMPLEMENTATION COSTS AND TIMELINE

COST-REASONABLENESS

OTI's resilient mesh wireless solution uses low-cost hardware, free and open source software, unlicensed spectrum and significant investment in human and social capital to lower the ongoing cost of operating and expanding the networks.

Equipment comparison – The table below shows an example of hardware we will use in some installations, the Ubiquiti AirMax Rocket M2 access point, compared to two comparable enterprise solutions. Not only is the hardware itself less expensive, but the use of a license-free mesh firmware such as Commotion eliminates the biannual license fee.

	Ubiquiti Rocket M2 Titanium	Meraki Cisco MR 66	Ruckus Wireless T300
Manufacturer list price	$229	$1299	$1295
Antenna	$260	$99	included
Total equipment cost	$489	$1398	$1295
Cloud License Fee (2 years)	$0	$300	$1200
Total Cost of Ownership	$489	$1698+	$2495+

Internet service – We budgeted $46,723 for Internet service, which will be available on the networks beginning in the second year. We based this projection on a cost for a megabit per second (Mbps) unit of download speed of $3.03, which we determined from the average of three levels of service from two different providers (see table, below). We plan to provide a gateway of 50 Mbps download gateway for every 10 nodes in a network, though the exact proportion will vary based on the number of providers in a neighborhood, available speeds, and network architecture.

Service Provider	**Cost**	**Download (Mbps)**	**Upload (Mbps)**	**Per Mbps down**	**Per Mbps up**
Verizon	$165	75	35	$2.20	$4.71
Verizon	$225	150	65	$1.50	$3.46
Brooklyn Fiber	$215	40	10	$5.38	$21.50
Average per Mbps:				$3.03	$8.70

The network in each area is not intended to replace existing service for businesses that currently rely on an Internet connection. However, based on the above rates, a hypothetical business that cannot afford any Internet service or cannot afford additional service to provide Wi-Fi to their customers would be able to purchase a Ubiquiti PicoStation M2 for $75, install the Commotion firmware for free and see a return on their investment within two weeks.

At the rate of $3.03 per Mbps, 50 Mbps of exclusive service to each of 70 sites would cost $127,260 without providing any area-wide Wi-Fi coverage. That's an annual difference of over $80,000.

Investment in Human Capital – The major distinction between OTI's model and traditional wireless networks is the increase in human and social capital of the people involved. A few skilled technicians might be able to complete all of the installations in the same time period – though they would be hindered by site-specific considerations and the time of traveling to each location for site assessments and basic testing, configuration and troubleshooting. But in the end, you would have only the technology in the community and not the skills necessary to maintain or expand that technology. Our model uses all aspects of network construction as a training opportunity, which results in greater community self-sufficiency, greater economic opportunity, and lower barriers to network expansion or construction in other parts of the city.

	Traditional Wi-Fi Network	**Resilient Mesh Wireless Network**
Skilled Technicians at Start	3	3
Newly-Trained Technicians	0	62
Small business owners with basic knowledge	0	70
Total Number of People with Tech Capacity	**3**	**135**

This model requires that people who have the technical skills also have teaching ability, but this almost never occurs naturally. We account in our proposal for the expense of developing those skills among the Sky-Packets technicians. OTI has already built a catalog of accessible instructional materials for building mesh wireless networks that are available online for free through a Creative Commons license. As a result, Sky Packets will be able to incorporate training and user capacity-building into future network construction without the direct involvement of OTI and the related expense. The investment in human and social capital will drive down the cost of resilient mesh wireless networks for New York City.

V. IMPLEMENTATION COSTS AND TIMELINE

IMPLEMENTATION TIMELINE

We have grouped our installation sites into eight zones based on the clustering of the small business sites. We will stagger the starting points across these zones in three waves to balance procurement and labor activities while creating opportunities for trainees and small business leaders to function as a cohort across neighborhoods. The initial trainees will help teach successive ones and provide Sky-Packets with the growing workforce this project will demand. We will begin with zones that have more sites and will require more time. Zones with fewer sites or "scatter sites" that will not be linked to each other and, consequently, that will not have a dedicated training program, will be the third wave of installations.

The following timeline and milestones represent an implementation process that can be grouped into four phases, though in practice these phases overlap with each other:

1. Labor Procurement

- Technical assistance providers
- Community partners
  - On-site coordinators
  - Installation trainees ("Digital Stewards")

2. Design

- Program design
- Site assessments
- Network design

NOTE: OTI uses collaborative design methods to maximize community engagement and the fit of our technology to the specific resources, conditions and goals of the host community.

3. Installations

Based on the site assessments, installations will be grouped into the categories described in the technical specifications section. All installations will be used as teaching opportunities, with the level of participation from trainees to be determined by the Sky Packets technicians based on the site assessments.

4. Network Completion

- Quality assurance
  - Technical monitoring
  - User experience assessment
- Resilience testing*

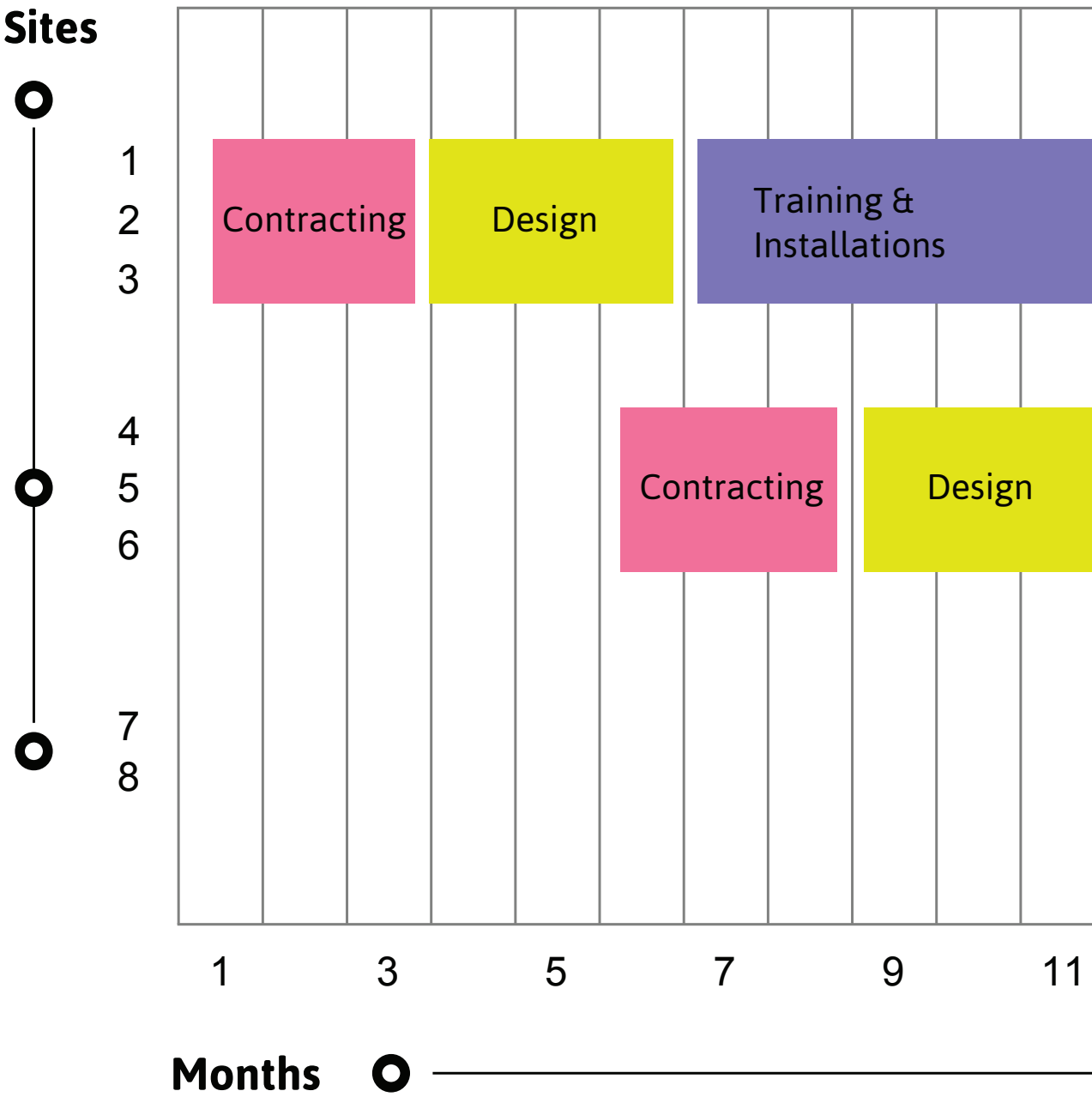
*Disaster scenarios to stress test all of the resilience features of the network including the self-healing functions of the mesh, backup power components and the capabilities of the on-site Digital Stewards.

V. IMPLEMENTATION COSTS AND TIMELINE

IMPLEMENTATION TIMELINE

Month	Activity	Completion Indicator
1	Labor procurement, contracting with technical assistance partners	Completed contracts with Sky Packets, education consultant
2	Labor procurement, contracting with community partners in zones 1,2,3	Completed contracts with 3 community partners
3	Preparation of training program and installation design documents, zones 1,2,3	3 training program and installation plans.
4	Labor procurement – on-site training program and small business outreach coordinators for zones 1,2,3	Hire 3 on-site coordinators.
5	Train the trainers for install technicians and zones 1,2,3 on-site coordinators.	20 hours of technical and pedagogical skill development.
6.A	Labor procurement - Digital Stewards	Recruitment of 36 Digital Stewards for training program
6.B	Labor procurement, contracting with community partners in zones 4,5,6	Completed contracts with 3 community partners.
7.A	Labor procurement, Training	Orientation for 36 Digital Stewards for training program
7.B	Preparation of training program and installation design documents, zones 1,2,3	3 training program and installation plans.
8.A	Preparation of design documents – network planning and community design charrettes for zones 1,2,3.	Network design sketches for zones 1,2,3.
8.B	Preparation of training program and installation design documents, zones 4,5,6.	3 training program and installation plans.
9.A	Material procurement – zones 1,2,3	
9.B	Labor procurement – on-site training program and small business outreach coordinators for zones 4,5,6	Hire 3 on-site coordinators.
10.A	Site Assessments – 1st group Stewards train & perform installs	Zones 1,2,3 site host agreements 10% complete.
10.B	Train the trainers for install technicians and zones 4,5,6 on-site coordinators.	20 hours of technical and pedagogical skill development.
11.A	Installation – 1st group Stewards train & perform installs	Zones 1,2,3 installation 10% complete.
11.B	Labor procurement - Digital Stewards	Recruitment of 36 Digital Stewards for training program
12.A	Site Assessments – 1st group Stewards train & perform installs	Zones 1,2,3 site host agreements 50% complete.
12.B	Labor procurement, Training	Orientation for 36 Digital Stewards for training program

13.A	Installation – 1st group Stewards train & perform installs	Zones 1,2,3 installation 30% complete.
13.B	Preparation of design documents – network planning and community design charrettes for zones 4,5,6; Material procurement – zones 4,5,6	Network design sketches for zones 4,5,6.
14.A	Site Assessments – 1st group Stewards train & perform installs	Zones 1,2,3 site host agreements 100% complete.
14.B	Site Assessments, Material procurement – 2nd group Stewards train & perform installs	Zones 4,5,6 site host agreements 50% complete.Zones 4,5,6 installations 30% complete.
15.A	Installation – 1st group Stewards train & perform installs	Zones 1,2,3 installation 60% complete.
15.B	Site Assessments, Material procurement – 2nd group Stewards train & perform installs	Zones 4,5,6 site host agreements 100% complete.
16.A	1st group Stewards train & perform installs	Zones 1,2,3 installation 100% complete.
16.B	Installation – 2nd group Stewards train & perform installs	Zones 4,5,6 installations 60% complete.
17.A	Network testing, zones 1,2,3	3 resilient mesh wireless networks
17.B	Site Assessments – 2nd group Stewards train & perform installs	Zones 4,5,6 installations 90% complete.
18.A	Resilience Training, zones 1,2,3	3 completed practice scenarios
18.B	Installation – 2nd group Stewards train & perform installs	Zones 4,5,6 installation 100% complete.
19.A	Resilience Training, zones 1,2,3	3 completed scenario after-action reports
19.B	Network testing, zones 4,5,6	3 resilient mesh wireless networks
20.A	Zones 7, 8 scatter site small business installations and training	Zones 7,8 installations 30% complete
20.B	Resilience Training, zones 4,5,6	3 completed practice scenarios
21.A	Zones 7, 8 scatter site small business installations and training	Zones 7,8 installations 60% complete
21.B	Resilience Training, zones 4,5,6	3 completed scenario after-action reports
22	Network monitoring and quality assurance	3 as-built network diagrams for zones 1,2,3.
23.A	Zones 7, 8 scatter site small business installations and training	Zones 7,8 installations 100% complete.
23.B	Network monitoring and quality assurance	3 as-built network diagrams for zones 4,5,6.
24	Network monitoring and quality assurance	Project completion.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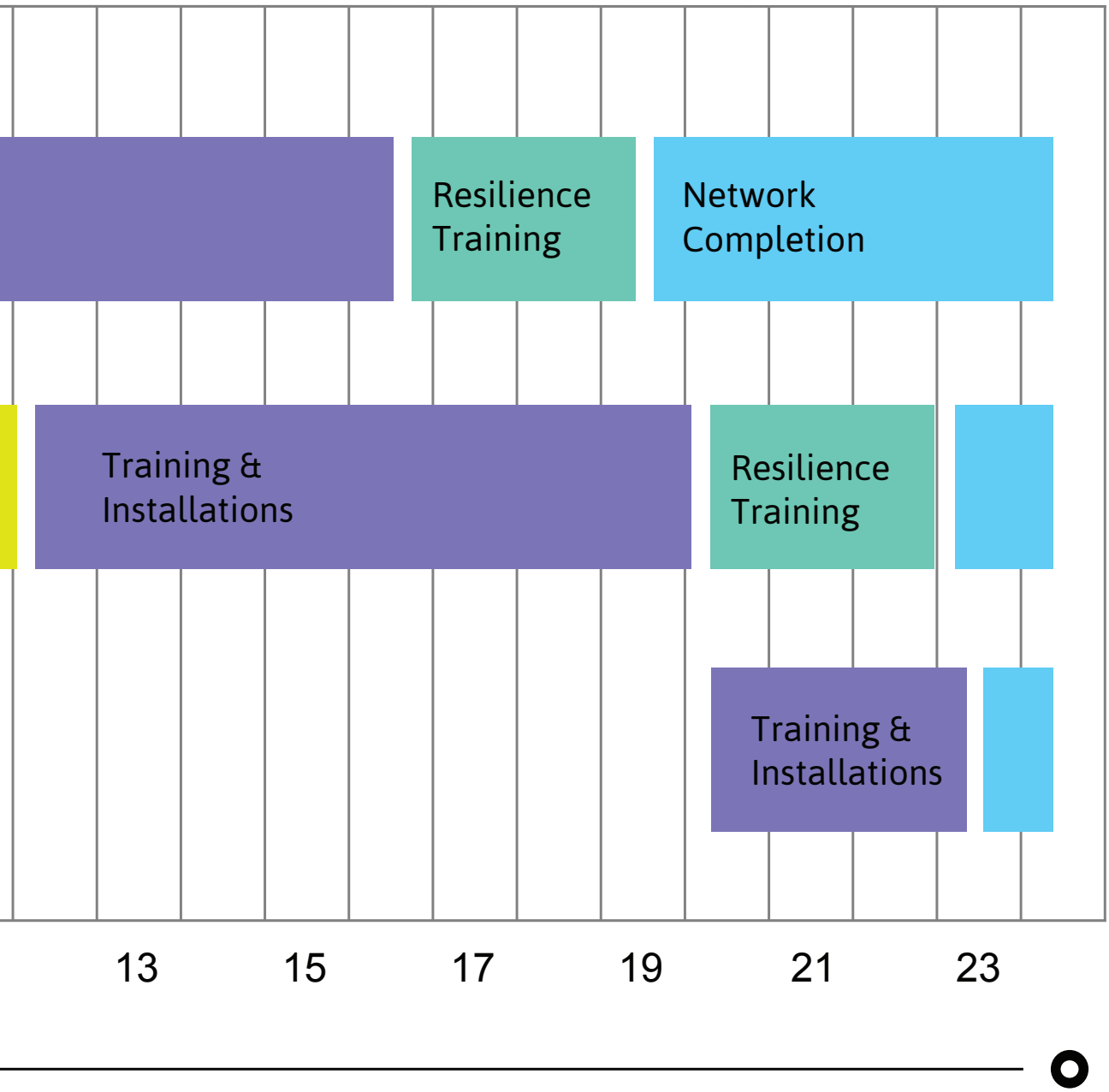
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To Help Connect the Two New Yorks, Bill de Blasio Should Build More Community Broadband

Maya Wiley | January 8, 2014
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Image

In the weeks following Hurricane Sandy, apartment buildings and schools across the Red Hook section of Brooklyn were left without power. (AP Photo/Beth Harpaz)

When Superstorm Sandy churned up fourteen-foot walls of water that slammed New York's coastal communities in October 2012, they also washed away any false notions we had that we care sufficiently for poor people.

One year later, Bill de Blasio was the candidate to beat to lead the city. He pulled to the head of a clutch of Democratic candidates in August 2013 thanks to a populist platform that acknowledged the need for economic and racial equity. Asserting that de Blasio would be the mayor of all New Yorkers, his son, Dante, delivered the technical knock-out in the primary race when he appeared in an ad with his big afro and his run-down of de Blasio positions: tax the rich to fund early childhood education and after-school programs, build affordable housing and stamp out the New York City Police Department's stop-and-frisk humiliation of black and Latino New Yorkers. By the August 13 mayoral debate, just a few days after the ad, de Blasio had vaulted [1] from his number-two position trailing Christine Quinn to a six-point lead. In a city that is about 67 percent people of color [2]—25.5 percent black and 29 percent Latino—we shouldn't be surprised.

Now Dante's dad is the city's 109th mayor, and the question is no longer what he will do if elected but how he will deliver in the face of rising sea levels and rising inequality, in a city that is still trying to rebuild after Sandy while facing ongoing budget constraints. A look at an innovative project in Red Hook, the low-lying, low-income Brooklyn neighborhood known for its Ikea and Fairway Supermarket, should give the newly minted mayor some hints for how he can support smart, community-inspired projects to make meaningful change.

Red Hook, Brooklyn, is a spit of land jutting out over the New York Harbor and looking across to the gleaming high rises of the financial district in Manhattan. Its views are amazing, its poverty stark. More than 5,000 of its 11,000 residents live in the Red Hook Houses, one of the city's largest public housing

developments and a place where the median household income of $17,000 is well below the city average of $57,000.

Red Hook is cut off from the rest of the borough by the Brooklyn Queens Expressway and has no subway access, forcing residents to rely on the bus, their feet or, for those lucky enough to afford it, a car. In good times, this means inconvenience and self-reliance; during Sandy it meant a fourteen-foot storm surge and a whole neighborhood inundated and isolated. Some public housing residents were without power for almost a month thanks to out-of-date boilers and electrical panels. Low-income homeowners and small businesses are still waiting for federal dollars to help them renovate. Four small businesses have already closed and many others teeter on the brink of bankruptcy.

Red Hook isn't the only community flooded by record storm surges, but what happened there represents a troubling trend. Roughly 2.5 million people live [3] in the New York City/Greater Jersey Area Federal Emergency Management Administration (FEMA) Flood Zone. They are often poor. About 66 percent of the most vulnerable populations live within a half mile from the FEMA Flood Zone, while 29 percent of the most vulnerable populations live in the Flood Zones. Many are people of color.

Like many low-income and minority communities, Red Hook has its assets along with its adversities. While it is in the flood zone, it also has a model project—high-speed Internet access. In 2011, a community based youth organization, the Red Hook Initiative [4] (RHI), wanted to engage more of the neighborhoods' youth who lived nearby. To do that, RHI needed high-speed Internet access

Red Hook is one of the New York neighborhoods identified by the Center for an Urban Future as having a "broadband gap [5]" for businesses. One local resident, who founded a neighborhood Internet service provider business called Brooklyn Fiber [6], said that the neighborhood would lose Internet access for weeks at a time. RHI, with the help of the Open Technology Institute at the New America Foundation and a Parsons School of Design graduate student, created a prototype for a wireless mesh network.

OTI has a detailed case study [7] full of the technical details on its website. But to summarize, it installed a fairly inexpensive wireless radio transmitter on RHI's roof and a router inside the RHI building that residents could use to access a wireless network in and around the building. When using the Wi-Fi, residents went to a server-based webpage with a "Shout Box" that allowed them to share comments or information. Wireless mesh networks can be expanded to cover greater geographic areas by simply adding more wireless radio transmitters. In March 2012, RHI allies added another radio transmitter on an apartment building overlooking the neighborhood's Coffey Park. A resident of the building donated the electricity to power the radio transmitter. Now two public spaces were connected in a wireless network and the message board expanded.

Wireless technology is not only cheaper to use, it can be more resilient during superstorms like Sandy. The wireless mesh network connects mobile phones and computers to one another so they can share any Internet access; a cellphone- or computer-user can connect without going through a central source, like Verizon's central station. Moreover, this innovation recognizes the importance of community participation in its development and applications. Residents wanted community bulletin boards and ways to find jobs and useful information. In a job-starved neighborhood, physically and psychologically cut off from so much of the city, this can save time and money.

When Hurricane Sandy hit, the RHI Wi-Fi network was a lifesaver. RHI still had power, so the Wi-Fi stayed up through the storm. In the days that followed, up to 300 people were using the network daily, according to OTI [7], communicating with loved ones, learning what was happening and getting help.

Perhaps because poor people are more likely to have a mobile phone than a computer, text messaging is the most common way residents could communicate. Within days of the storm, OTI had built upon the

RHI mesh network to allow messaging. This meant that residents could now text their needs and location to a contact number. The technology then mapped the information and shared it so that others in the community could respond. Remember, many public housing residents were too elderly or ill to climb the many stairs that stood between them and help during the weeks that their buildings had no electricity, heat, water or working elevators.

The dominoes of expanding Internet connectivity rippled through Red Hook for a time, getting help to those who needed it. FEMA set up a thirty-day satellite on RHI's roof to expand Internet access to coordinate response efforts. Brooklyn Fiber [6], the small, local for-profit ISP, volunteered an additional connection point to RHI Wi-Fi, while the RHI, OTI and Brooklyn Fiber trio were able to add a wireless access point to a local church that, like so much of Red Hook, was without power. The team added an uninterruptible power supply [8]—an emergency power system that stores energy in batteries or a flywheel—that could run the routers for twelve hours at a time.

Today, RHI is training young people to spread the word and help others access the network. Called "the Digital Stewards [9]," these residents, ages 19–24, get paid by RHI to install, maintain and promote the Wi-Fi network and use technology to develop the community. Make no mistake; these are young people who look like Dante. From job creation to educational advancements for our children, healthcare access, public safety and civic engagement, high-speed Internet access can promote economic growth and community wellbeing. In Red Hook's public housing, a stunning 75 percent of young people can't find jobs [10].

Tyquan Carter is a rapper and lifelong Red Hook resident and community advocate. He is young, he is black, and the Internet gave him a voice and job opportunities. He made a short film about the storm called *Tyquan's Hook: a True Storm Story*, for which he also wrote the script and music. If you have Internet access, you can watch [11] the trailer on YouTube. Carter could make this documentary thanks to training he received from Dance Theatre Etcetera and RHI. He is now earning money doing promotional videos for a local church and a dance company while he looks for more work in a field he has learned to love. Carter uses the Web to promote his documentary, but Internet access represents more than that for Carter and so many other residents. It is also knowledge. He reads online books, blogs and uses YouTube tutorials on photography, camera functions and a range of other topics he needs to improve in his new craft. That means Internet access.

Far too many Red Hook residents still don't have access to affordable Internet. The local ISP provider charges less than cable, but it still costs an average of $75 a month. Carter is two blocks from RHI and his aunt is five blocks away. Neither can access the free service. Like many low-income communities of color, Red Hook has fewer people using high-speed Internet than the average New York neighborhood. According to the Federal Communications Commission report released just before Hurricane Sandy, 19 million Americans still lack access [13] because the physical infrastructure to connect to broadband doesn't exist where they live. Thanks to the corporate telecommunications giants', like Verizon, holding a monopoly and using expensive infrastructure, like copper wiring, high-speed Internet is often too costly to make subscriptions affordable. In urban communities, 57 percent percent of blacks and 58 percent of Latinos respectively versus 77 percent of whites had at-home Internet subscriptions [14] in 2011. Blacks and Latinos are also more likely than whites to report that lack of broadband was a major disadvantage in their accessing employment opportunities, getting information on health, connecting to government services, staying abreast of news, keeping up with developments in the local community and acquiring new knowledge.

Red Hook and other local initiatives are trying to change this. The Institute for Local Self-Reliance has

found that more than 3 million Americans have access to high-speed Internet through publicly owned networks [15], which have saved these communities millions of dollars and motivated incumbent providers to improve services because of increased competition. New York is getting a big infusion of federal dollars to rebuild [16] after Hurricane Sandy. Mayor de Blasio should look for ways to leverage some of those dollars to better equip low-lying, low-income communities to weather the roiling seas of climate change and the economy.

High-speed Internet access won't stop future superstorms and it won't solve all the unfairness that low-income New Yorkers face. But with strong alliances between community members, local nonprofits, businesses and technology experts, it will bring affordable, local innovation that helps us build stronger, fairer and more resilient communities.

Source URL: http://www.thenation.com/article/177839/mayor-de-blasio-should-build-more-community-broadband

Links:
[1] http://www.dailykos.com/story/2013/08/13/1231049/-BIG-SURPRISE-in-new-poll-for-NYC-Mayor-Bill-DeBlasio-leads-by-6-Beats-Quinn-Thompson-in-runoff
[2] http://www.nyc.gov/html/dcp/pdf/census/census2010/t_pl_p2a_nyc.pdf
[3] http://www.rebuildbydesign.org/teams/mit-zus-urbanisten/
[4] http://rhicenter.org/
[5] http://nycfuture.org/research/publications/is-there-a-broadband-gap-for-businesses-in-brooklyn
[6] http://bkfiber.com/
[7] http://oti.newamerica.net/blogposts/2013/case_study_red_hook_initiative_wifi_tidepools-78575
[8] http://en.wikipedia.org/wiki/Uninterruptible_power_supply
[9] http://www.rhidigitalstewards.wordpress.com/
[10] http://www.dnainfo.com/new-york/20131031/red-hook/red-hook-nonprofit-launches-5m-campaign-for-youth-education
[11] http://youtu.be/AbW3YOENVRE
[12] https://subscribe.thenation.com/servlet/OrdersGateway?cds_mag_code=NAN&cds_page_id=122425&cds_response_key=I12SART1
[13] http://www.fcc.gov/reports/eighth-broadband-progress-report
[14] http://www.pewinternet.org/Press-Releases/2010/Home-Broadband-2010.aspx
[15] http://www.muninetworks.org/reports/how-chattanooga-bristol-and-lafayette-built-best-broadband-america
[16] http://www.dnainfo.com/new-york/20131028/noho/13b-federal-funds-for-sandy-rebuilding-coming-nyc

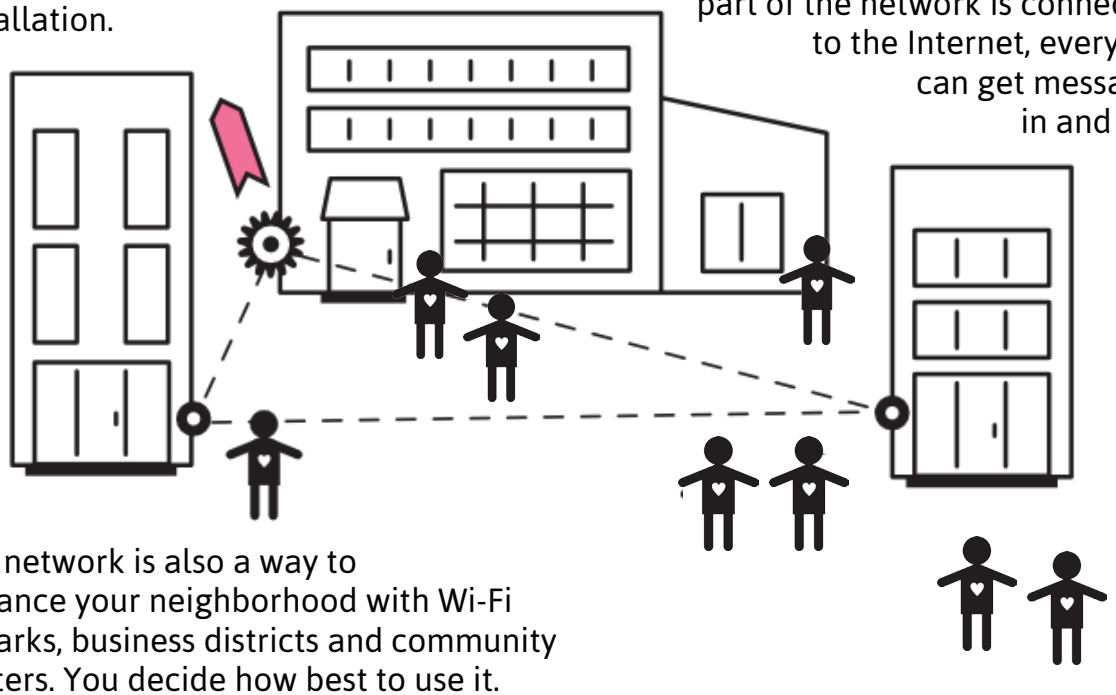
Are you a small business that was cut off by Superstorm Sandy?

A wireless network

can keep you and your neighbors connected.

Customized "mesh Wi-Fi" routers connect you to your neighbors. You agree to host one. We handle installation.

We train a team of your neighbors to respond in a disaster. As long as one part of the network is connected to the Internet, everyone can get messages in and out.



The network is also a way to enhance your neighborhood with Wi-Fi in parks, business districts and community centers. You decide how best to use it.

We need small businesses in your area to sign up to host a mesh wireless router:
http://nyc.opentechinstitute.org.

New York City will be making innovative technologies available at no cost to small businesses that were harmed by Superstorm Sandy. The funding will come from the New York City Economic Development Corporation's RISE NYC competition using federal aid. Mesh Wi-Fi is a proposal of the Open Technology Institute and has not yet been selected for an award.
For more information, email: nyc@opentechinstitute.org.

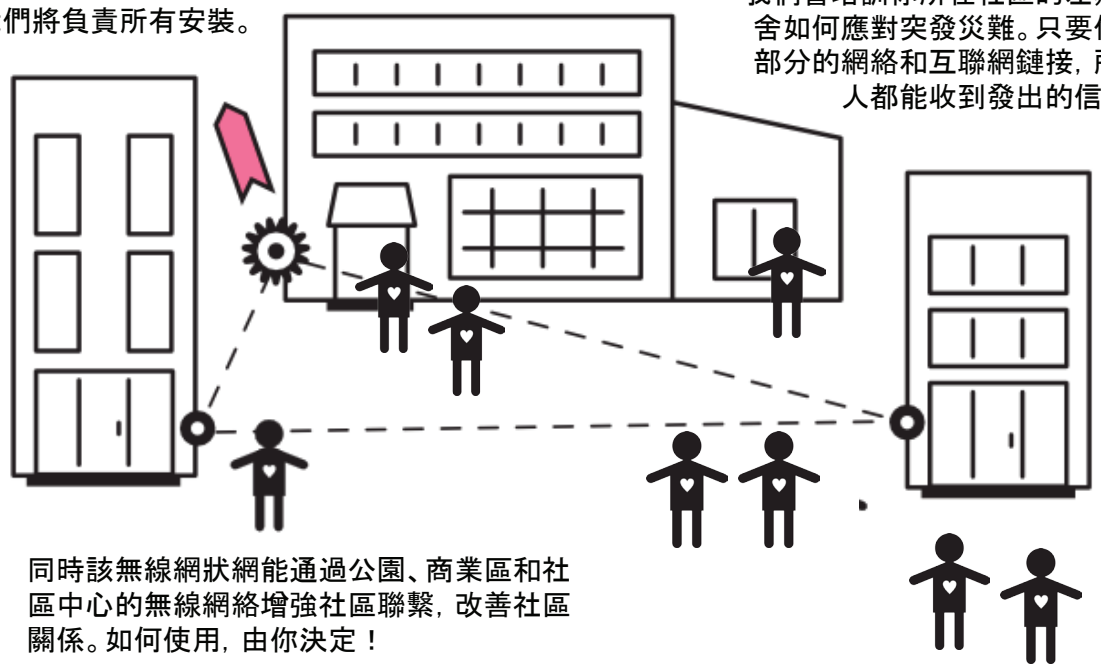
OPEN TECHNOLOGY INSTITUTE

你的生意受到颶風桑迪的影響了嗎？

一個無線網絡能幫助連接你和你的社區。

我們為中小型商業量身定制的“無線網狀網”路由器可以將你和你的社區連接起來。只要你同意，我們將負責所有安裝。

我們會培訓你所在社區的左鄰右舍如何應對突發災難。只要任一部分的網絡和互聯網鏈接，所有人都能收到發出的信息。



同時該無線網狀網能通過公園、商業區和社區中心的無線網絡增強社區聯繫，改善社區關係。如何使用，由你決定！

我們呼籲你所在社區的中小型商業都能到以下網址申請註冊一個無線網狀網路由器：
http://nyc.opentechinstitute.org.

紐約市為所有在颶風桑迪中受到影響的中小型商業免費提供最新科技支援。所有費用來自紐約市經濟發展局的RISE NYC的聯邦經濟援助。無線網狀網方案由Open Technology Institute提出，目前尚未得到任何獎項。
了解更多信息請發郵件至nyc@opentechinstitute.org

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