

Attachment 1
Northrop Grumman Systems Corporation
Application for Special Temporary Authority

Northrop Grumman Systems Corporation (“Northrop Grumman”) is grateful to the Commission and the First Responder Network Authority (“FirstNet”) for the special temporary authority (“STA”) that was granted on May 1, 2013 (Call Sign WGNXHQ) to build a trial Long Term Evolution (“LTE”) network to test hypothetical first-responder communications in and between the New York City metro area and the Washington, DC/Northern Virginia metro area (the “Demo Network”). The Demo Network will use FirstNet’s 700 MHz band spectrum for local test communications in New York and Northern Virginia. The purpose of the Demo Network is to develop, implement, test and demonstrate how a primary state public safety network operations center (“NOC”), with local content and local control, will interface with a regional network core as part of the FirstNet Nationwide Network. The network core in the Demo Network will house and enable use of three critical first responder features to ensure the integrity of the first responder network – identity management, cyber security and an applications delivery platform.

Since grant of the STA in May, Northrop Grumman has been hard at work on the Demo Network, acquiring equipment, leasing real estate for the antenna sites, obtaining city permits, acquiring fiber optic backhaul between New York and Northern Virginia, and developing applications that will be critical to the FirstNet core. Northrop Grumman’s investment to date in the Demo Network is over \$2 million. Unfortunately, Northrop Grumman has not yet had the opportunity to utilize the FirstNet spectrum to begin testing the Demo Network. Unexpected obstacles were encountered in both New York and Northern Virginia, producing delays, but Northrop Grumman has worked through the challenges and anticipates that the Demo Network will be built and operational in October. Visits to the Demo Network by Congressional Staff, NTIA and FCC leaders, FirstNet staff and leaders, and important stakeholders, including the Public Safety Advisory Council, the Statewide Interoperability Coordinators from four states, and the U.S. Army are anticipated beginning in November 2013 and continuing through early 2014.

Given that the Demo Network will be operational in October, and the STA granted under Call Sign WGNXHQ expires on November 1, 2013, the instant application requests special temporary authority to operate the Demo Network, and utilize the FirstNet 700 MHz spectrum, from November 2, 2013, through May 1, 2014.

Obstacles that caused deployment delays for the Demo Network included difficulty in obtaining rights to use two transmission sites in New York City, one in Brooklyn and one in Manhattan, for construction of the short-term Demo Network, and difficulty obtaining cost-effective backhaul between McLean and Falls Church, Virginia. Northrop Grumman also had to obtain a permit from the Department of Buildings in New York City. Northrop has successfully concluded the site license agreements and permitting in New York City, and decided upon a different architecture in Northern Virginia due to the exorbitant costs of acquiring short-term backhaul between McLean and Falls Church. With contractual arrangements concluded, construction has begun at the Brooklyn site and will commence shortly at the Manhattan location. Installation of the fixed Alcatel-Lucent eNodeB in the Northern Virginia (McLean) location will occur in the next two weeks.

Two adjustments to the Demo Network that the FCC authorized under Call Sign WG9XHQ are reflected in this STA application: (1) there will be one fixed (not mobile) transmit location in Northern Virginia (the McLean site) – the Falls Church site is eliminated; and (2) the fixed transmitter in McLean will be deployed at the same address, but will be placed inside the Northrop Grumman Innovations Center to test the interface of wireless devices with the Demo Network inside a model regional core building. Northrop Grumman determined that the Falls Church site is unnecessary to test the applications and the network core concepts.

In building the Demo Network, Northrop Grumman has taken every possible step to ensure that the configuration closely resembles the real-world anticipated architecture of the FirstNet core network. In the Demo Network, the Solutions Center in Brooklyn represents how a primary state NOC, with local content and local control, will interface with a regional network core in the FirstNet network. The Northrop Grumman Innovation Center in McLean will model the regional network core. The slides attached hereto at Exhibit 1 depict: (1) a nationwide distributed network for FirstNet, including local hubs, regional hubs and the nationwide network core; and (2) how FirstNet can leverage existing commercial and municipal infrastructure for first responders communications through the core network. Features in the core network will afford FirstNet with the ability to manage the network and utilize critical identity management features and cyber security technology to protect the integrity of the communications and protect the operation of the network. An applications delivery platform also will be implemented in the core network, providing an “apps store” for fire, police and EMS. One of the applications that will be tested in the Demo Network is the Law Enforcement Information Exchange (“LInX”), which provides Department of Defense-level security capabilities and features that are capable of addressing sensitive and mission critical homeland security and law enforcement intelligence needs across jurisdictions. LInX helps find hidden associations and connections within existing law enforcement records sources. In addition, part of deploying a real-world test case for the FirstNet network is to choose and deploy equipment in the Demo Network from diverse vendors. The Demo Network demonstrates the LTE interoperability of using fixed Alcatel-Lucent eNodeB transmitting equipment in McLean, and mobile Nokia Solutions and Networks transmitting equipment in New York City, all connected to a Cisco core through fiber optic backhaul that connects the three locations.

While working through the cumbersome contractual requirements in New York and Northern Virginia, Northrop Grumman worked in parallel to make significant progress on developing and testing its identity management solution on the applications delivery platform, using public safety applications from the Association of Public-Safety Communications Officials (“APCO”) website. Northrop Grumman also continued work on its “tiered” cyber security solution for testing on the Demo Network, which may be one of the most sophisticated cyber security solutions ever used for a public safety network in America. Because FirstNet will be a national mission-critical asset, Northrop Grumman takes seriously solutions that will ensure network integrity and protect the network.

Since a number of the Broadband Technology Opportunities Program (“BTOP”) grants for public safety networks are not moving forward,¹ and other BTOP public safety grants are well over a

¹ FirstNet announced that agreements could not be reached with Adams County Communications Center, Inc. in Adams County, Colorado; the City of Charlotte, North Carolina; and the New Jersey Department of the Treasury. See “FirstNet Approves Spectrum Lease Agreement with New Mexico; Provides Status Update on Remaining Projects,” FirstNet Press Release (Aug. 13, 2013), *available at* <http://www.ntia.doc.gov/press->

year away from being operational (*e.g.*, LA-RICS), or have been suspended (*i.e.*, the state of Mississippi BTOP public safety grant),² this Demo Network presents an excellent opportunity to operationally emulate the functioning of the FirstNet core network before FirstNet breaks ground, allowing for testing and evaluation of local wireless operations, public safety applications, and interface of a primary state NOC with a regional network core. In fact, the FirstNet Technical Team has requested to see the Demo Network in late 2013 or early 2014. They want to see a representative core network that has all of the necessary functionality (*e.g.*, identity management, cyber security and an applications delivery platform).

Consistent with information Northrop Grumman previously provided the FCC and FirstNet, Northrop Grumman confirms the following as part of this application:

- 1) The STA will enable Northrop to construct and operate a trial 700 MHz LTE network in and between New York City and Northern Virginia. The objective is to use the 700 MHz LTE network with end-user devices and a backhaul system to test and develop enhanced first responder applications and solutions that will reside in the core network. The trial network will serve as an expository vehicle upon which advanced concepts of hypothetical first responder communications will be demonstrated.
- 2) In both locations, the trial network will utilize 758-768 MHz as the downlink band and 788-798 MHz as the uplink band.
- 3) One fixed base station will be deployed in Northern Virginia (in McLean), and two mobile base stations will be deployed in New York City (one in Brooklyn and one in Manhattan). The FCC already has this information, but for convenience we have attached hereto at Exhibit 2 the “perspectives” from the two New York City sites, together with RF site antenna configuration information for each site.
- 4) A fully redundant backhaul link will be deployed to couple the operations in these locations to a common LTE-evolved packet core.
- 5) Twenty experimental end-user devices will be provisioned for testing and demonstration by Northrop employees. In the New York locations, the end user devices will be operated within a radius of three miles or less of the base stations. In Northern Virginia, the end-user devices will be operated indoors.
- 6) Northrop’s temporary operations will not be used in actual mission-critical operations or in the delivery of live transmissions to protect life, property, or safety.

release/2013/firstnet-approves-spectrum-lease-agreement-new-mexico-provides-status-update-rem. (“While we were hopeful these talks would conclude successfully, in the end we couldn’t finalize agreements that made sense given FirstNet’s task of designing, deploying and operating a nationwide, interoperable public safety broadband network.”).

² See Tammy Parker, “FirstNet: Mississippi Halts BTOP Program, Motorola Solutions Accused of Unsavory Lobbying,” *Fierce Broadband Wireless* (July 24, 2013), *available at* <http://www.fiercebroadbandwireless.com/story/firstnet-mississippi-halts-btop-program-motorola-solutions-accused-unsavory/2013-07-24>.

7) Northrop has implemented internal procedures to monitor and maintain control of the handsets and will promptly respond to any reports of harmful interference. Each unit will be registered to its recipient, and Northrop will maintain a record of each device so that each can be easily recalled at any time during testing and when testing is complete.

8) Northrop has analyzed information from the FCC's license databases and has determined that the proposed operation will not interfere with, or create significant potential interference with, public safety operations in the 700 MHz band.

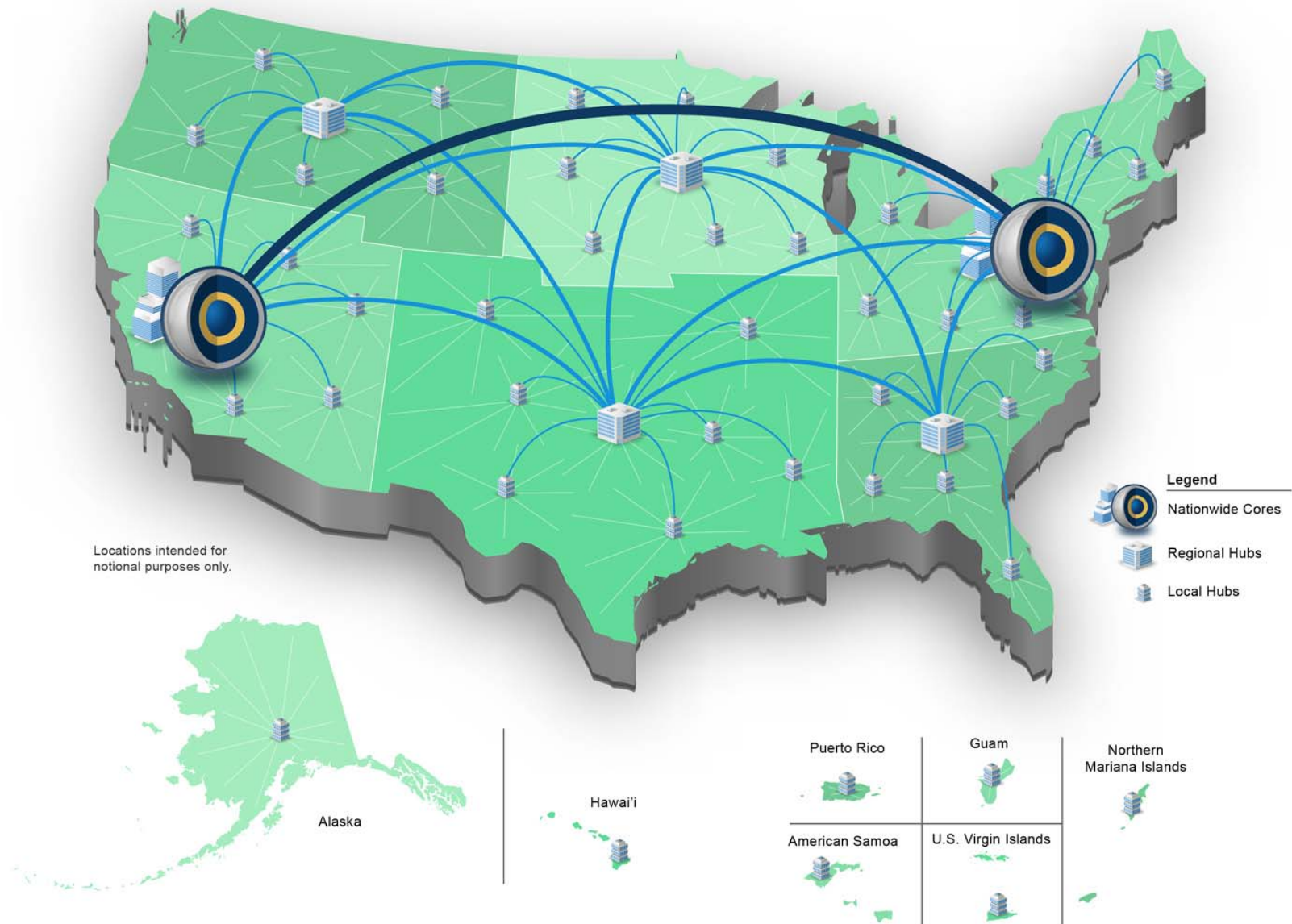
9) Northrop understands that FirstNet has the right to monitor its operations. Northrop also understands that if additional time for its trial is needed beyond May 1, 2014 that it will be required to file an application with the FCC and, once again, seek FirstNet's consent.

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Exhibit 1

Northrop Grumman Systems Corporation Application for Special Temporary Authority

Nationwide Distributed Network



Leveraging Existing Infrastructure

Proposed FNN Architecture

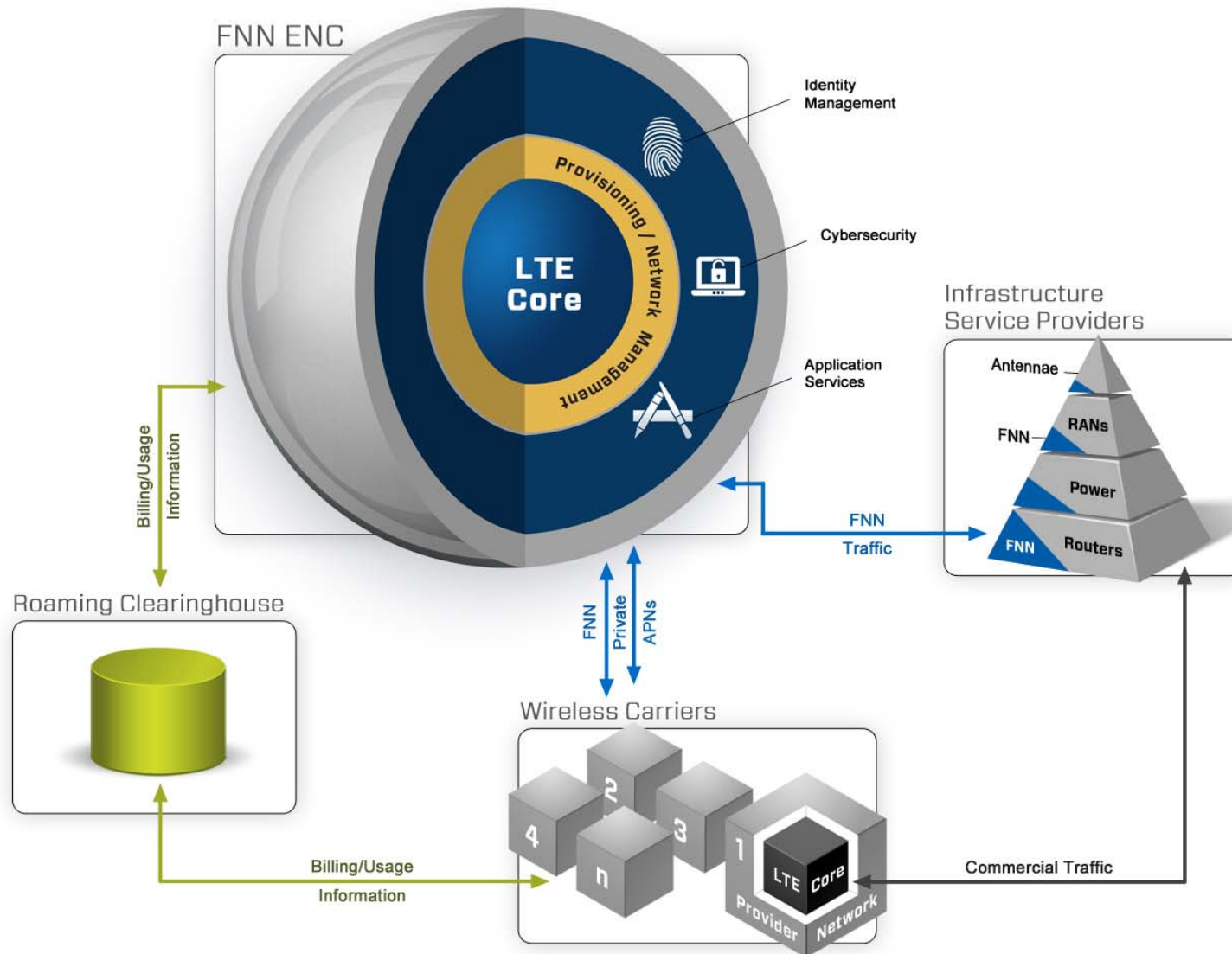


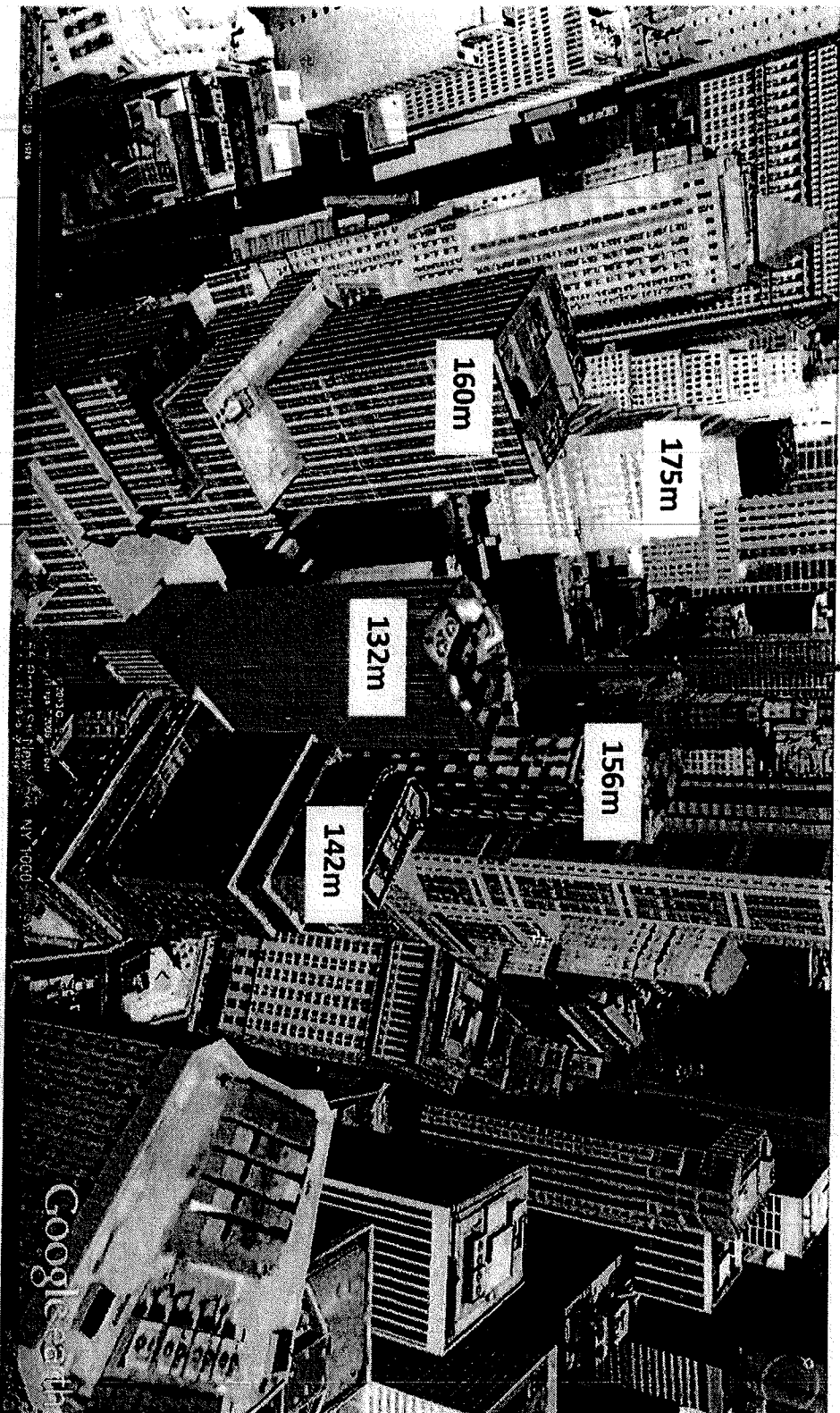
Exhibit 2
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NY City Sites

Perspectives

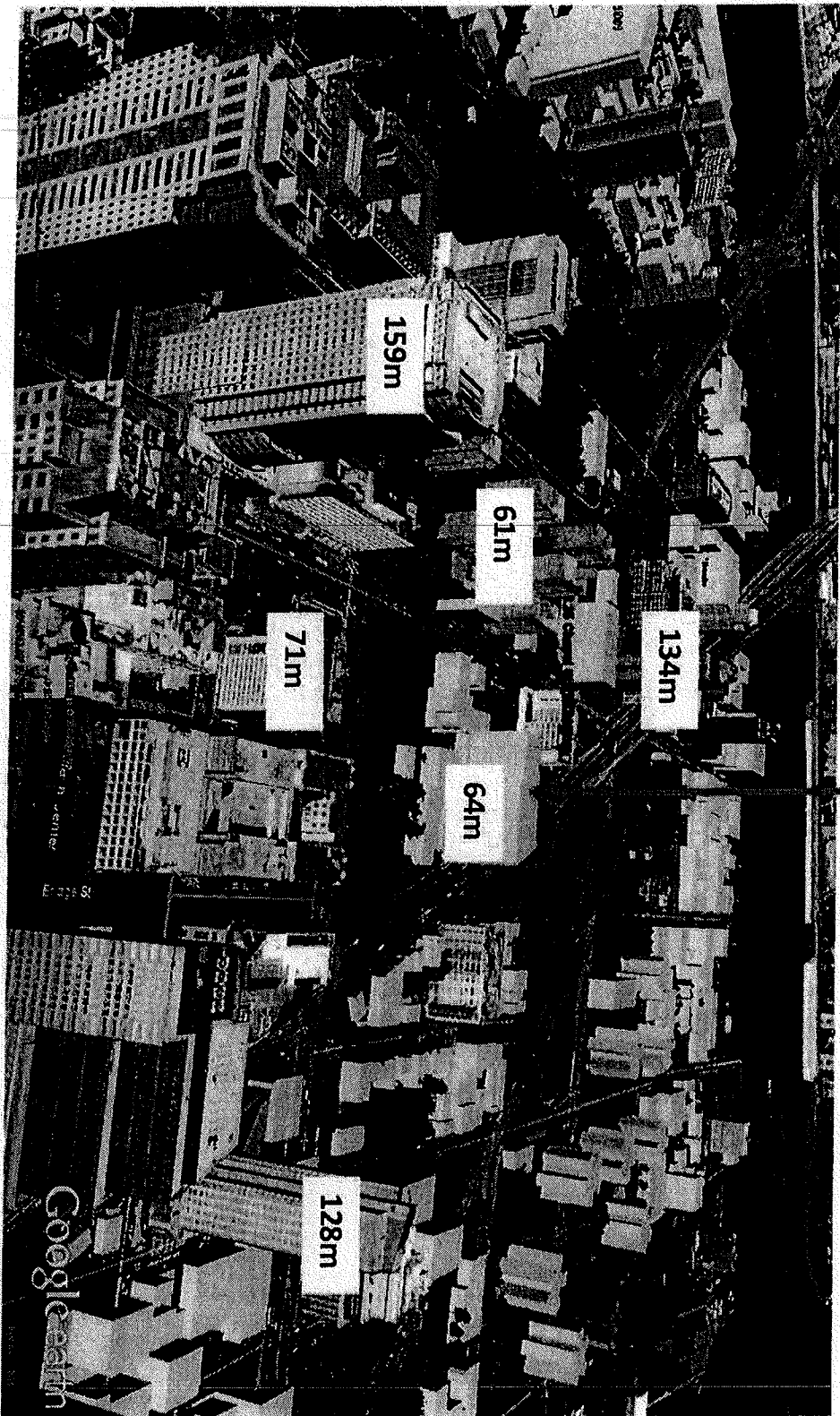
55 Broad St. Manhattan NY

Building Heights (from Google Earth) Relative to Mean Sea Level



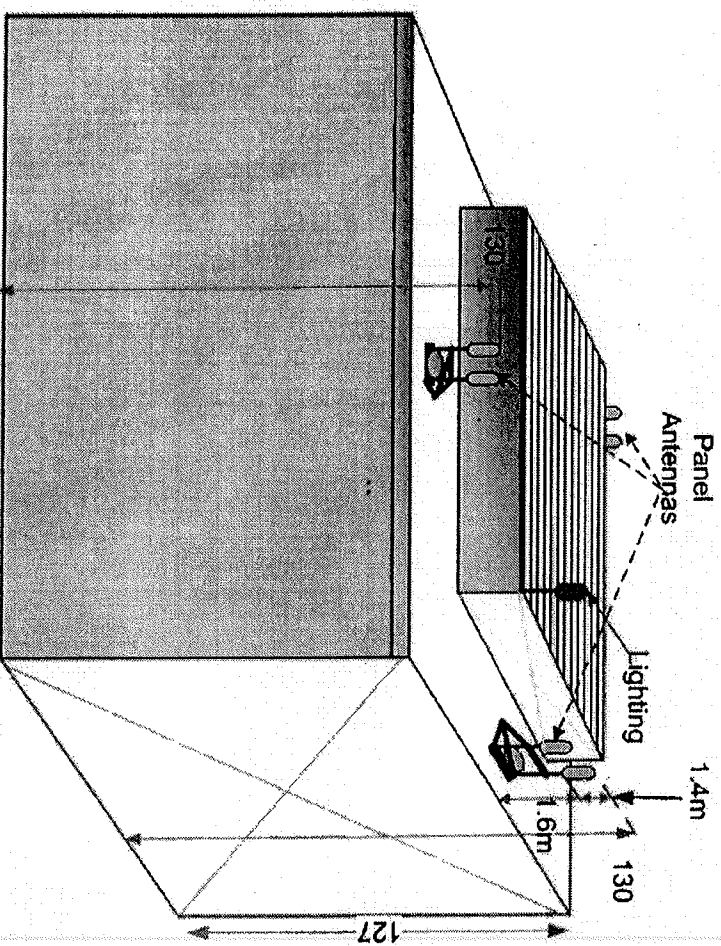
25 Chapel St. Brooklyn, NY

Building Heights (from Google Earth) Relative to Mean Sea Level



RF Site Antenna Configuration/Installation 55 Broad St. Manhattan, NY

- A general sketch of building rooftop panel antenna installation is shown in diagram
 - The panel antenna configuration model is shown in diagram with dimensions applicable to 55 Broad St. Manhattan, NY location) for three sector positions
 - Ground Elevation (Above Mean Sea Level) is 5m
 - Building Height Above Ground is 127m
 - Total Height (Ground to Tip of Antenna) is 130m
 - Lighting installation is as shown (in Red) assumed to be at least 1m higher than tip of panel antenna



RF Site Antenna Configuration/Installation 25 Chapel St. Brooklyn, NY

- A general sketch of building rooftop panel antenna installation is shown in diagram
 - The panel antenna configuration model is shown in diagram with dimensions applicable to 25 Chapel St. Brooklyn, NY location for three sector positions
 - Ground Elevation (Above Mean Sea Level) is 17m
 - Building Height Above Ground is 47m
 - Total Height (Ground to Tip of Antenna) is 50m
 - Lighting installation is as shown (in Red) assumed to be at least 1m higher than tip of panel antenna

