



OFFICE OF EMERGENCY MANAGEMENT AND COMMUNICATIONS
CITY OF CHICAGO

September 24, 2014

FILED ELECTRONICALLY

Federal Communication Commission
Office of Engineering and Technology
Experimental Licensing Branch
Chief Julius Knapp”
455 12th Street SW
Washington, D.C. 20554

**Re: Request for Expedited Processing and grant for a 180-day Experimental
Station Temporary Authorization for the City of Chicago, Illinois**

Dear Mr. Knapp,

The City of Chicago Office of Emergency Management and Communications and Purdue University, hereby, request pursuant to 47 C.F.R. Chapter 1, Subchapter A, Part 5, Subpart A, § 5.3 (a),(d),(e),(f),(i), §5.61 and any other applicable rules which apply through the Office of Engineering and Technology of the Federal Communication Commission (FCC) request an Station Temporary Authorization through the Experimental Radio Service for the contribution in testing and evaluating prototype equipment. The proposed joint request between the City of Chicago Office of Emergency Management and Communications (OEMC) and Purdue University (Purdue) respectfully seek approval of our request by Federal Communication Commission for Special Temporary Authorization (STA) to operate within the set jurisdiction limits in the 700 MHz public safety broadband (band14) spectrum, currently licensed to the First Responder Network Authority (FirstNet), for only 180-days.

Narrative Statement

With courtesy from the Department of Homeland Security (DHS) grant program this joint testing of this Public Safety Broadband Network (PSBN) undertaking between the OEMC and Purdue has been in planning phase for several months. Our request is a two-fold mission, aligning a Purdue academic research project from the Department of Homeland Security (DHS) grant program with an OEMC LTE performance based public safety communications test. This will allow the data to be collected, studied and analyzed in a much needed testing-bed environment of new and emerging technologies within the prototype equipment phase while officers are in the field, during real time situations, special events including a created controlled environments for both OEMC and Purdue.

NAME, ADDRESS, PHONE NUMBER AND EMAIL:

- 1) Office of Emergency Management and Communications
1411 West Madison Street
Chicago, IL 60606
Attention: Deputy Director of Public Safety IT
Daniel Casey
312-746-8962
Daniel.casey@cityofchicago.org

Purdue University
401 South Grant Street,
West Lafayette, IN 47907
Attention: Managing Director
Kaethe Ann Beck
765-494-0536
kaethe@purdue.edu

EXPLANATION OF WHY AN STA IS NEEDED:

- 2) The OEMC and Purdue are in need of an STA as a vehicle to gather valuable information in a temporary controlled situation to further the scientific and technical radio research in the broadband LTE public safety environment. The STA is to evaluate technical equipment in loss or gains, quality connection, communication function, operational data and engineering data, including field strength of data transmission.

DESCRIPTION OF THE OPERATION TO BE CONDUCTED AND ITS PURPOSE:

Program Objectives:

- 3) The LTE Pilot project testing will be accomplished by the Chicago Police Department (CPD) under the authority of the City of Chicago's OEMC and Purdue University in real-time environments for such technologies as; real-time video intelligence (RTVI), VidSys (a material software mapping/plotting video camera placement program), ShotSpotter (automatic gunshot detection), Computer Aided Dispatch (CAD), CLEAR-(database lookups, mapping function), Streaming Video- through RTVI, and wireless broadband throughout the jurisdictional limits.
- 4) This joint mission outlines some specific goals for a test plan designed to characterize the performance of the network with the following single and multi-user technical conditions and Purdue University will be utilizing a three phase approach. **First**, a continuous video quality test designed to measure the video quality when video is streamed in real-time over the LTE network. **Second**, measurement will be done to characterize the performance of applications of interest under various test conditions. **Third**, network performance measurements to test the key performance indicators associated within the LTE network.

TIME AND DATES OF PROPOSED OPERATION:

- 5) Our request is for 180-days and will commence operations on the day the FCC grants this request until the expiration of such grant. All proposed operations will be for testing purposes only and will be conducted for research in a mission-critical environment.

CLASS OF STATION (FIXED, MOBILE OR BOTH) AND CALLSIGN OF STATION (IF APPLICABLE):

- 6) FX – MO

DESCRIPTION OF THE LOCATIONS(S) AND IF APPLICABLE, GEOGRAPHICAL COORINAES OF THE PROPOSED OPERATIONS:

7) Location of Proposed Operations

The OEMC will initialize, install and configure one primary location locations which will be strictly located within Chicago Police District 7¹

Location/Site 1: Primary Location - 6 month trial location
Chicago PD, District 7 Headquarters², Chicago, IL
1438 West 63rd Street
41-46-47.7N
087-39-36.0W

EQUIPMENT TO BE USED, INCLUDING NAME OF MANUFACTURER, MODEL AND NUMBER OF UNITS:

8) Site 1 - Technical Specifications for Fixed Base Station – Motorola RBS 6201 LTE Base Station³

Major Equipment: 1eNodeB, 3 sector antennas, RTVI server, 1 Switch, 1Firewall, and 1CPG. All installation will be fixed within existing CPD shelter and pad, with antennas mounted on current tower at 130ft position. Two stands of existing fiber between the tower shelter and the communications room will complete the primary major equipment design.

Mobile – Motorola UM 1000 LTE USB Modem⁴
50 units will be operating during this testing.

All equipment will be properly secured and installed in a professional manner and workmanship consistent with R56 installation standards and in compliance with the National Electrical Code (NEC) , EIA, Federal Aviation Administration (FAA) and the FCC standard and regulations.

FREQUENCY (OR FREQEUNCY BANDS) REQUESTED:

9) OEMC request authorization to operate in 758-768/788-798 MHz also known as band 14 licensed to FirstNet which is to be utilized on a nationwide basis.

¹ See Exhibit A & B: Coverage Map of District 7 and Area of Operations Map

² See Exhibit C: Chicago Police Department Headquarters

³ See Exhibit D: RBS 6201 Base Station

⁴ See Exhibit E: UM1000LTE USB Modem

**MAXIMUM EFFECTIVE RADITED POWER (ERP) OR EQUIVALENT ISOTROPICALLY
RADITED POWER (EIRP):**

- 10) Fixed location will be operating at (40) W (ERP) and the Mobile units will be operating at 2 W (ERP)

**EMMISSION DESIGNATOR OR DESCRIBE EMISSION (BANDWIDTH MODULATION,
ETC.):**

- 11) OEMC proposed to operate using OFDM modulation. The primary emission designator for the Fixed location is 10M0D7D and for the mobile units are 5M00G7D, 5M00W7W, 5M00D7D, 5M00G2D, 10M0G7D, 10M0W7W, 10M0G2D and 10M0D7D. Other emission modes may be utilized, but in no event will the emissions will extend beyond the frequency bands requested.

OVERALL HEIGHT OF ANTENNA STRUCTURE ABOVE THE GROUND:

- 12) Site 1 - CPD District 7 Headquarters – 150 ft. overall height of Monopole structure, with 3 - 4 ft. antennas mounted at the 130 ft. level

For **Purdue**, the testing scenarios will include a baseline performance of the network during a stream of pre-encoded video as if it was live. At the end of each test, the reference video and the captured (degraded) video are compared and a quality measurement is obtained using the following criteria: (The following is not a complete list of items which will be tested and evaluated.)

- Network Traffic
- UDP (User Data Protocol)

1. Objective Perceptual Video Quality Measurement

- Objective Quality (ITU-T J.341 Model, Peak Signal-to-Noise-Ratio (PSNR), Structural Similarity (SSIM)
- Streaming Protocols (RTSP over TCP, RTSP over UDP, RTSP over HTTP, RTP over UDP)
- Video Resolution and Data Rate (CIF - 1Mbit/s through 1080P-15Mbit/s);
- Testing Conditions (Band =14);
- Network Traffic (3 distinct levels of congestion are introduced in the network by the mixture of data streams): Low, medium and high traffic.

- Single User, Static Condition (Video quality measurement using streaming protocols under static conditions with no network congestion.) centered close to cell with good signal close eNodeB (SINR)
- Single User, Dynamic Condition (Video quality measurement using streaming protocols under dynamic conditions with no network congestion.) centered close to cell with good signal close eNodeB (SINR)
- Multi User, Static Conditions (Video quality measurement using streaming protocols under static conditions with network congestion.) centered close to cell with good signal close eNodeB (SINR)
- Multi User, Dynamic conditions (Video quality measurement using streaming protocols under static conditions with network congestion.) centered close to cell with good signal close eNodeB (SINR)

2. Subjective Quality Assessment of CPD applications

- Performance Testing Methodology and Criteria (Rating clarity of picture or video- delays or problems as environment changes.)
- Static Environment Test Procedures (Testing procedures for in-field users to confirm LTE network connectivity for in-car PDT with fixed in location with and without moving or changing environments.)
- Dynamic Environment Test Procedures (Confirmed LTE network connectivity while user opens applications in-car PDT (Streaming Video))
- Single User, Single Applications (Coverage area affiliates and confirms connectivity on the LTE network with single applications)
- Single User, Multiple Applications (Coverage area affiliates and confirms connectivity on the LTE network with multiple applications)
- Multiple User, Single Application (Two users coverage area affiliates and confirms connectivity on the LTE network with single applications)
- Multiple Users, Multiple Applications (Two users coverage area affiliates and confirms connectivity on the LTE network with multiple applications)

Compliance and Certification

The OEMC and Purdue understands and certifies that it will comply with all restrictions outlined within the STA grant and FirstNet concurrence of our STA requested parameters. OEMC acknowledges the following condition will apply for this grant. **A)** This proposed operation will not cause or create any significant potential harmful interference or degradation to existing public safety operations within the 700 MHz band and OEMC is obligated to tolerate incumbent interference or degradation without recourse to the FCC or FirstNet. **B)** Operation will commence upon the Commission's grant and will continue no longer than the expiration date of this grant. **C)** The limited use of the requested spectrum and testing equipment is understood and

acknowledged by that participation by public safety officers in the field will not utilize mission-critical operation or the delivery of live transmissions in their daily duties to protect, life, property or the safety of the citizens. **D)** OEMC also recognizes that all operation is on a secondary basis and any report of interference is the sole responsibility of the OEMC to correct or cease all operation until a resolution to the interference or degradation is resolved. **E)** For purposes of testing OEMC will utilize band 14 on an experimental basis only and shared use of the subjected radio spectrum is strictly prohibited to other outside entities and **F)** If FirstNet initiates operations in the Chicagoland area, OEMC will be required to yield all operations for any deployment by FirstNet immediately upon request by FirstNet.

Public Interest Statement

OEMC submits that issuance of this Experimental STA License is requested in which the best public interest would be served. Grant of this experimental license will permit OEMC and Purdue to collect valuable information per the terms of the grant outlined by the Department of Homeland Security. It will enhanced and educate the public safety interest in the new LTE technology and Purdue will provide unique benefits to both the public safety community and to the educational research project and broadly advance the public interest in multiple concrete ways.

Grant of this application is in the public interest because it will aid in the development and ultimate deployment of LTE mission-critical communication systems in furtherance of FirstNet's mission to create a nationwide public safety network for emergency responders, as directed by the Middle Class Tax Relief and Job Creation Act of 2012.

The Commission has ruled that where it would clearly serve the public interest and not undermine Congress's goals or FirstNet's mandate, the Bureau should issue STA's allowing Public Safety entities to move ahead to use this spectrum. OEMC has met the requirements for STA and respectfully request the Bureau grant our request.

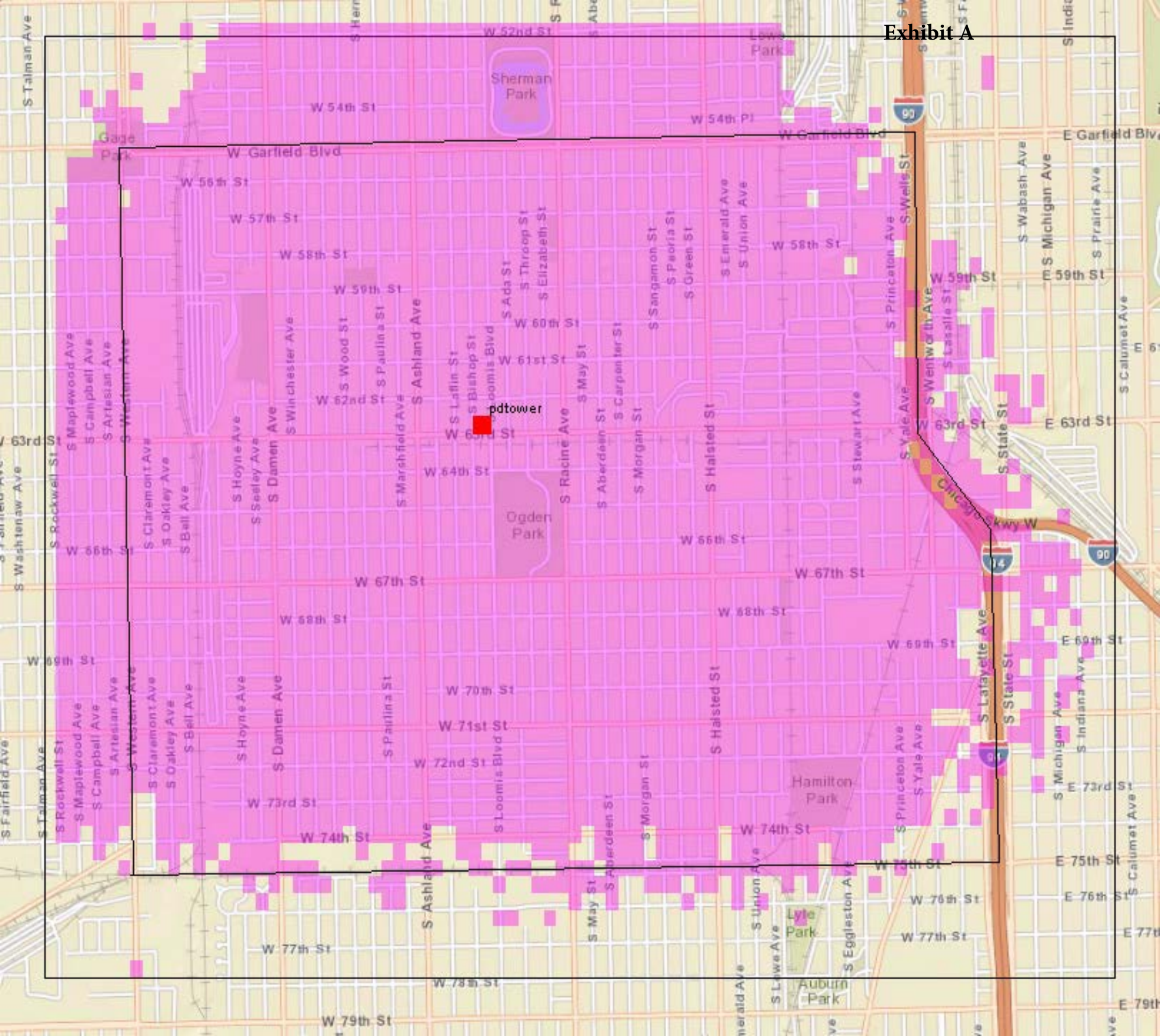
Conclusion

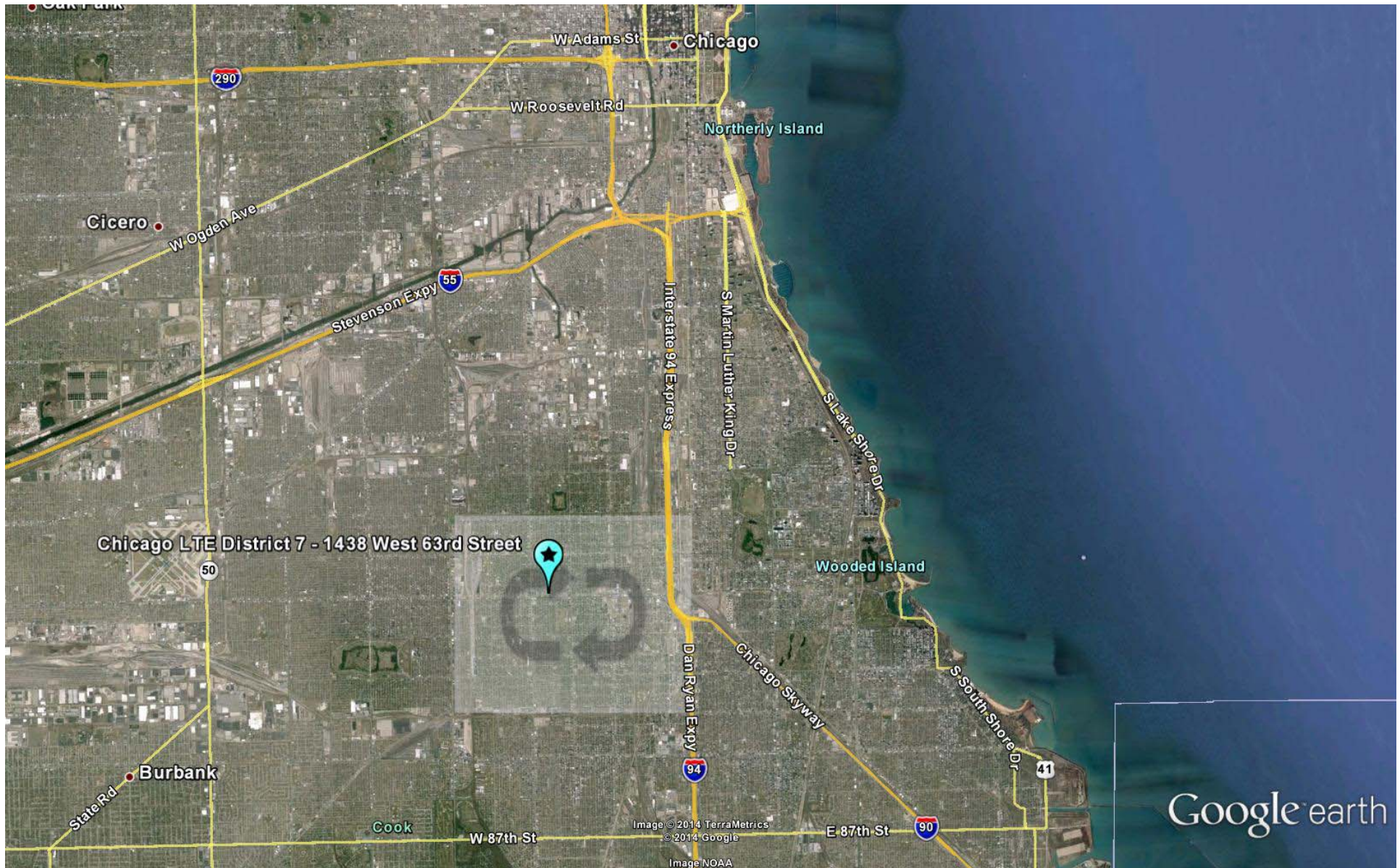
For the foregoing reasons, grant of this application is consistent with the Act and the Commission's rules, the Commission's actions in prior grants of experimental licenses and the public interest. Accordingly, OEMC and Purdue respectfully request the Commission's approval of this application.

Sincerely

A handwritten signature in black ink, appearing to read 'Gary Schenkel', with a large, stylized loop at the end.

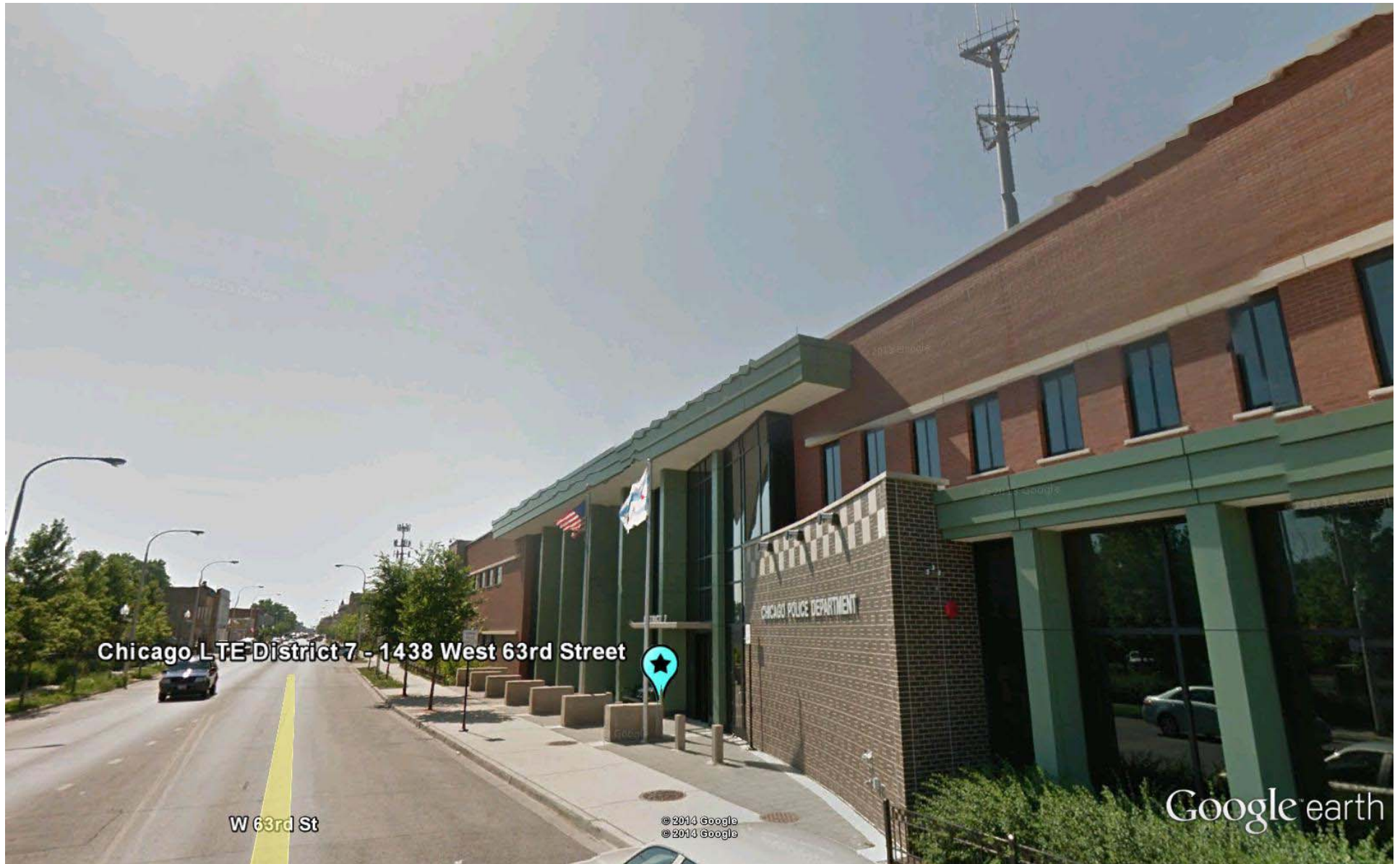
Gary Schenkel
Executive Director
Office of Emergency Management and Communication
City of Chicago, Illinois





The Area of Operation is Approximately 7.5 Square Miles

Testing will be conducted within the circumference of the muted area, located on this map. The 7th District antenna location is clearly marked with a blue icon. The center of Chicago is clearly marked for reference.



Location1- Primary testing for duration of STA

RBS 6201 LTE BASE STATION

Next Generation Indoor Enhanced NODEB for LTE Broadband Networks



The RBS 6201 is an indoor LTE eNodeB base station delivering cost-effective coverage and capacity unrivaled in the industry. Featuring a high degree of integration and modular building practice, the RBS 6201 is an entire site, including transmission and power in a single cabinet.

In partnership with Motorola the RBS 6201 is part of the RBS 6000 series of macro base station equipment designed and built by **Ericsson**, the world's leading provider of LTE technology and services to telecom operators. Motorola LTE broadband networks are designed using the field-proven performance of Ericsson LTE platforms.

FEATURES AND BENEFITS

Entire site in a cabinet design

All the LTE eNB components housed in a single cabinet for indoor deployments.

Intelligent power system

Provides efficient on-demand power matched to the current traffic load and to ensure optimal operation, minimal maintenance and extremely low power consumption.

Standards compliant LTE frequency bands

The RBS 6000 is compliant to 3GPP standards and supports the frequency bands defined by 3GPP standards for LTE deployments.

2x2 MIMO support

Improves data capacity and performance.

VSWR antenna supervision

Alerts the operator of antenna or transmission line failures.

Full IP connectivity

Easily connects to a wide variety of backhaul transport networks.

UM1000 LTE USB Modem



The UM1000 LTE USB Modem connects mobile computers and other devices to a Public Safety LTE network. Packaged in a small USB “thumb drive” form factor, it allows public safety personnel to take advantage of Public Safety LTE’s combination of high-speed data, prioritization capabilities, security, and control. The modem plugs into a device’s USB port, connecting the device to a Band Class 14 LTE network. It automatically installs the necessary connectivity and management software and draws power directly from the USB port, for easy, plug-and-play Public Safety LTE connectivity.



FEATURES AND BENEFITS

Broadband wherever you go.

The UM1000 modem connects to a high-speed, next-generation broadband network. This gives personnel access to large amounts of rich, relevant data at the point of activity: in the office, at the scene, or on the move.

Connects to Public Safety LTE.

The ability to work on a privately operated Band Class 14 LTE network lets public safety agencies enjoy a powerful combination of high data speeds, prioritization capabilities, security and control of a private network.

Small form factor.

The size of a thumb drive, a UM1000 LTE USB Modem is easy for personnel to carry wherever the job takes them. It draws power directly from the USB port, eliminating the need for additional accessories.

Plug-and-play simplicity.

Plugged into the USB port, the UM1000 modem automatically installs appropriate management and control software. In a few seconds, the device is ready to connect to a network.

Over-the-air software updates

can be performed automatically. This allows Information Technology staff to keep devices up-to-date, while personnel in the field continue to focus on their work.