DOITT

FCC Broadband Field Hearing

THE ROLE OF BROADBAND IN IMPROVING PUBLIC SAFETY COMMUNICATIONS AND EMERGENCY RESPONSE

Panel #3

Requirements Needed for Public Safety Mobile Wireless Network

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DOITT

NYC WiN

NYCWiN

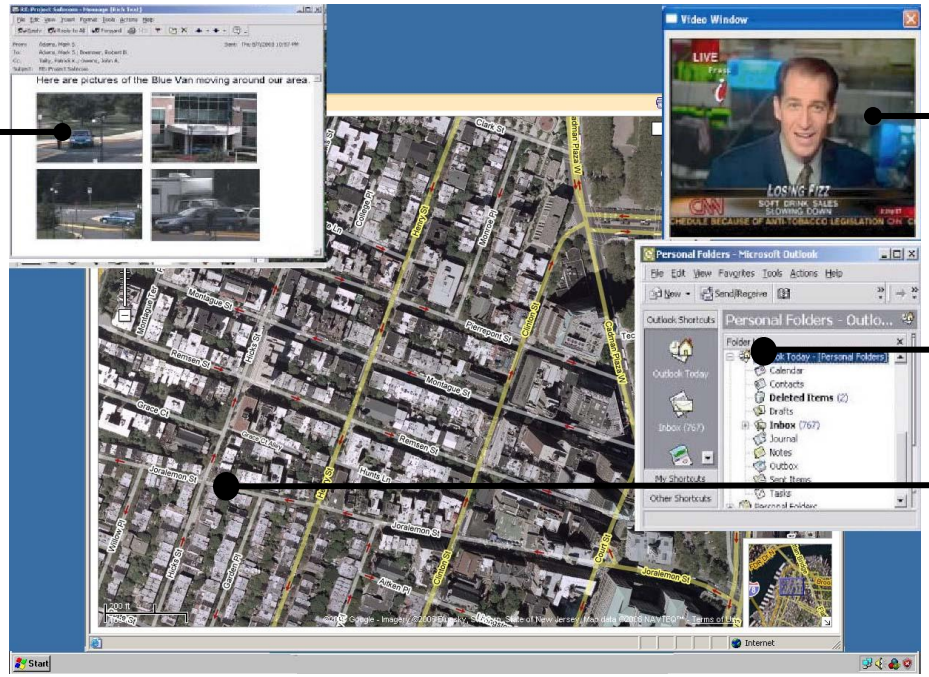
NEW YORK CITY WIRELESS NETWORK

broadband data network
mobile and fixed wireless solutions

PROJECT BACKGROUND

The New York City Wireless Network (NYCWiN) is a broadband wireless network designed to support the City's public safety and public service agencies. The network enables a wealth of mobile and fixed wireless applications, including:

High-Resolution Photos



Streaming Video

Agency Databases

GPS Tracking

OBJECTIVES FOR WIRELESS BROADBAND

Enhance Public Safety

Improve command and control and situational awareness capabilities:

- Streamline and improve daily public safety operations
- Integrate communications to improve citywide response

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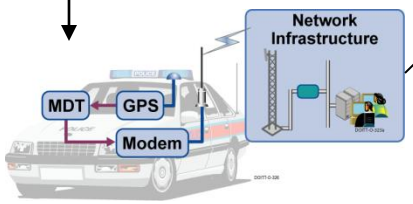
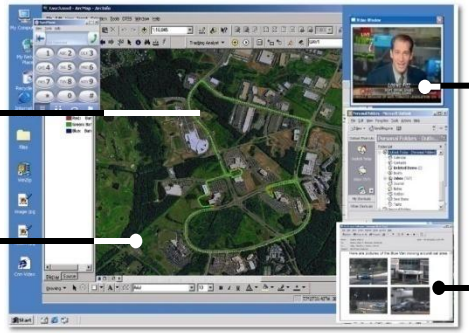


Applications

Vehicle Location



Streaming Video

Video

Enable the Mobile Workforce

Enhance ability to work at anytime from anywhere

- Real-time access to agency applications
- Real-time access to City maps, building diagrams, streaming video, etc.

DIAL 311

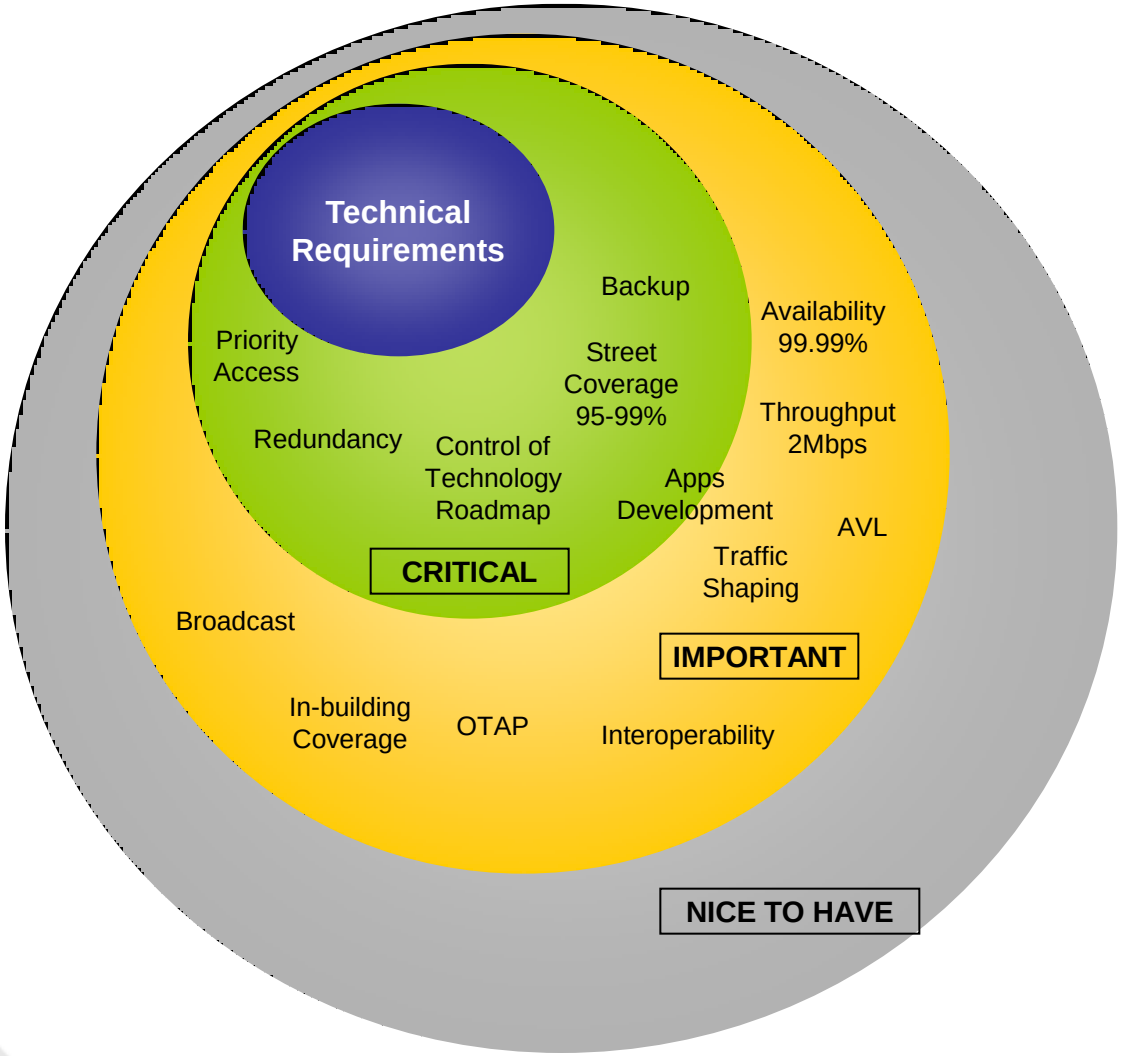
PUBLIC SAFETY CANNOT RELY ON COMMERCIAL NETWORKS

Major Incidents	Commercial Network Impacts
WTC Attacks: 1993 and 9-11-01 Northeast Blackout: 8-14-03 Queens Blackout: 7-18-06	Power, Backhaul, Capacity and Coverage
Carrier Outage: 183 Sites down 8-10-06 (between 3:00am – 9:41pm)	Backhaul, Capacity and Coverage
American Airlines Flight 587: 11-12-01 SI Refinery Explosions: 2-21-03 SI Ferry Crash: 10-15-03 Midtown Building Collapse: 7-10-06 Cory Lidle Plane Crash: 10-11-06 Steam Pipe Explosion: 7-18-07 Crane Collapses: March and May 2008 Miracle on the Hudson: 1-15-09 Helicopter/Plane Crash on the Hudson 8-8-09 Annual and Special Events	Capacity and Coverage





NETWORK ATTRIBUTE REQUIREMENTS



CRITICAL: Mission critical

IMPORTANT: Addresses tactical and operational business issues.

NICE TO HAVE: Non-Critical attributes

NYCWiN Overview

Dedicated Communications Infrastructure

- Government-owned
- Strict service level agreements (SLA)
- Ubiquitous citywide broadband coverage
- 24 x 7 remote, redundant monitoring and management

Public Safety Grade

- Built to support mission critical and public safety agencies
- Secure and encrypted end-to-end communications
- Priority-driven data throughput control

Robust and Resilient Infrastructure

- Designed to withstand natural and man-made disasters

Next-Generation Communications Infrastructure

- Not just wireless, but multiple communications capabilities
- Technology roadmap outlines long term scalability

NYCWiN Applications

Wireless Meter Reading

Remote Traffic Control

Handheld Applications

Sensor Management
NBC, weather, etc.

Wireless Video
Incident Video and video-conferencing

Mobile data & License Plate Recognition
Fixed and Mobile

Emergency Call Boxes

Automatic Vehicle Location

INTEROPERABLE VIDEO SYSTEM

Centralized Video Management at Command Centers

TECHNICAL FEATURES

Uniform Geographical Coverage

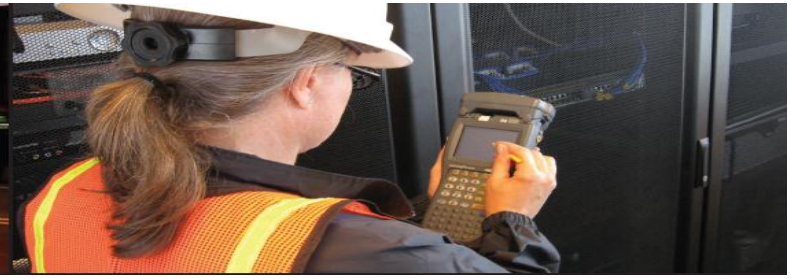
- 95%-99% coverage Citywide
- Modest radio site count (~400 citywide) as compared to WiFi or mesh solutions requiring in excess of 15,000 access points across NYC
- Fully validated with drive testing

Broadband with Mobility

- >1 Mbps up to 70 mph
- Average >1.2 Mbps downlink, and >500 kbps uplink per user
- Technology roadmap for significant improvement

Robust Against Worst Case Scenarios

- **Power** – 24 hour+ back-up power at all sites (generator or batteries)
- **Backhaul** – redundancy preserves full network functionality in the face of microwave link, hub site or commercial leased line circuit outages.
- **Operations Centers** – Redundant, active/active data centers; each can support full network operation



TECHNICAL FEATURES

Technology: UMTS TD-CDMA

- Standards-based (3GPP), Commercially deployed
- Flexible downlink / uplink bandwidth
- Strong RF performance in complex multi-path environments
- Strong link budget performance
- Technology roadmap to Long Term Evolution (LTE)

Spectrum

- 10 MHz, 2.5 GHz leased spectrum

End-to-End Security

- FIPS 140-2 compliant encrypted mobile VPN
- Strong, two-level authentication
- Comprehensive physical and cyber security mechanisms

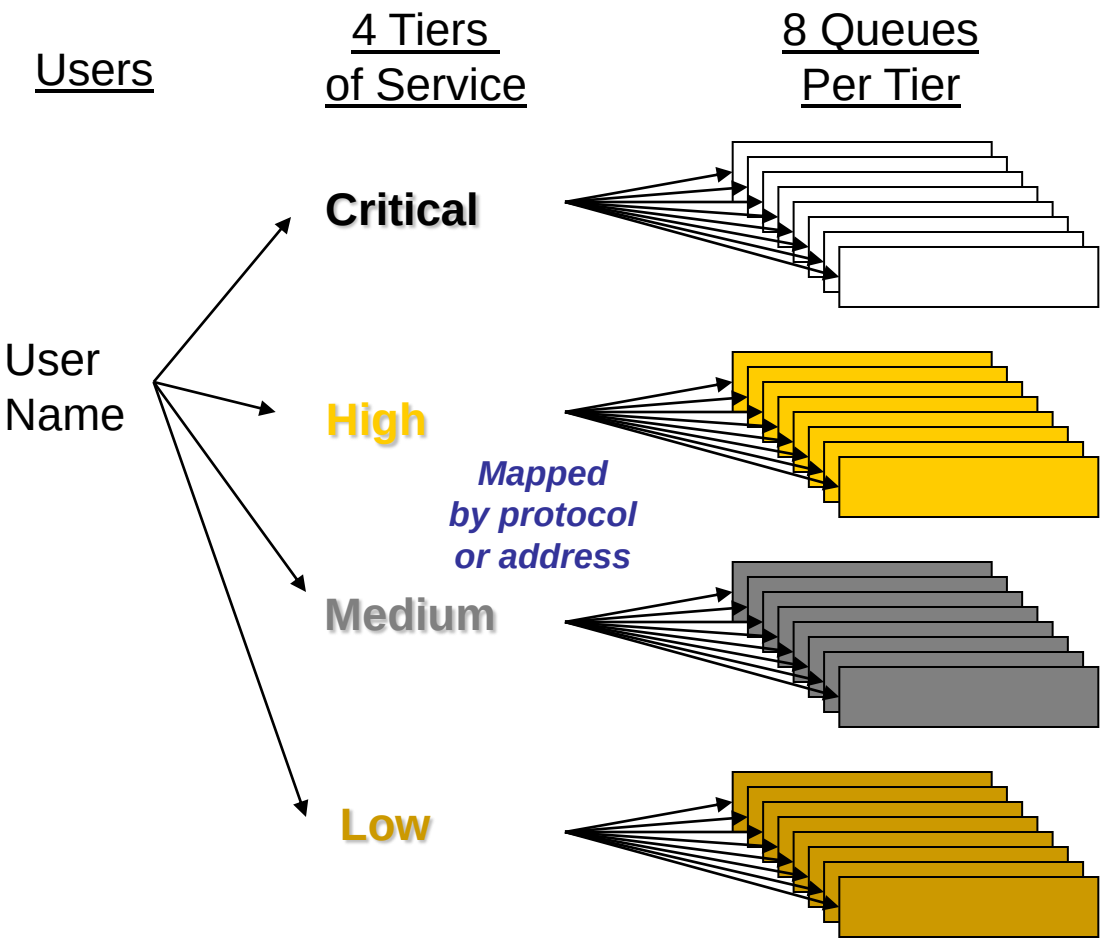
Interoperable

- IP-centric with connectivity to agency networks
- Common broadband frequency shared by all agencies

TECHNICAL SOLUTIONS

Network Management	Combined enterprise IT best practices and commercial wireless network element management with public safety grade redundancy and security
Flexible wireless coverage	Deployed site antennas with dynamic, remotely controlled down-tilt, enabling rapid changes to respond to outages, events or seasonable re-optimization
Device ecosystem	Partnered with supplier to develop modem to public safety environmental specs but in standard embedded module form factor that is compatible with many of-the-shelf devices
Reliable Backhaul	Deployed redundant architecture of point-to-point microwave and optical Ethernet circuits
Prioritization	Integrated dynamic quality of service capabilities embedded in the network technology with user provisioning and mobile security architecture

QUALITY OF SERVICE CAPABILITIES



WEIGHTING
Relative Bandwidth Allocation

RATE LIMIT
Max Bandwidth Allowed

FAIRNESS
Bandwidth Allocation between Cell Edge and Cell Core

Flexibility to prioritize traffic by user and by application

Network Operations Centers (NOC)

Fully Redundant

- Primary and alternate locations with complete failover capability
- Multiple telecommunications providers
- Normal = load-share; Emergency = full redundant failover between NOCs
- Redundant power (generator) and telecommunications to each RAN

Controls, Manages and Monitors the Network

- Provides complete help desk/trouble ticket solution
- Supports network administration, security and alarms

Based on Open Standards

- Uses Manager-of-Managers architecture
- Provides Asset Management and Tracking

Subscriber provisioning

- Web portal for each agency

FLEXIBLE SITE CONFIGURATIONS

Concealed Monopole
Specialized Zoning

Indoor Installation
Small Equipment Footprint

Antenna
Slim Antenna

PUBLIC SAFETY SUBSCRIBER DEVICES

Laptop Modem Card

Desktop Modem

USB Modem

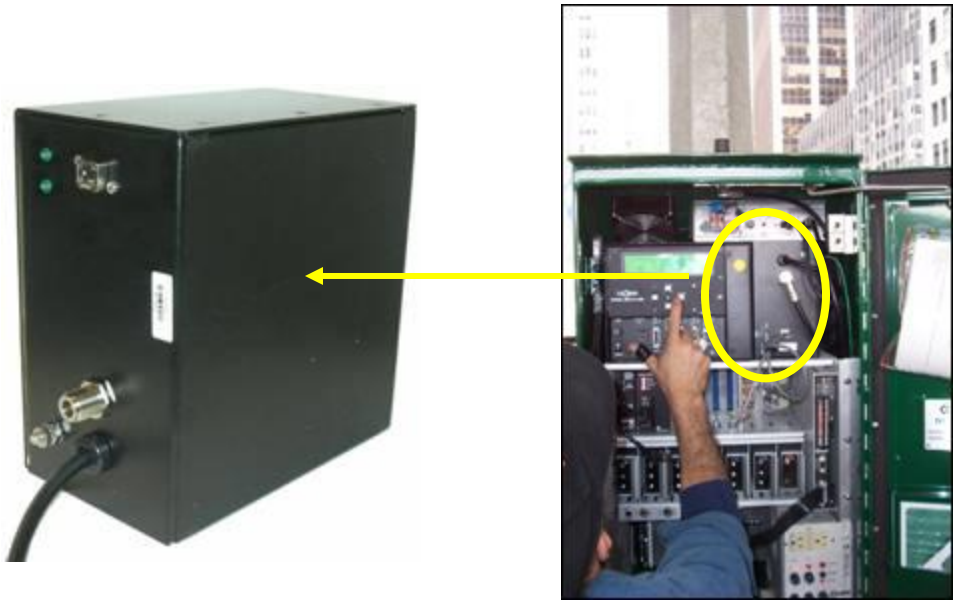
Fixed Modem

Call Box

Mobile Modem

AVL Modem

WIRELESS TRAFFIC CONTROLLER



Environmentally designed and integrated fixed modem installed in traffic controllers

- Ethernet, power and RF interfaces
- Moxa embedded computer running Linux
- Wireless modem
- National Control Devices relay for remote power reset
- MeanWell power supply
- Tested to meet -20 C to + 60 C operation, 10-95% humidity (non-condensing)

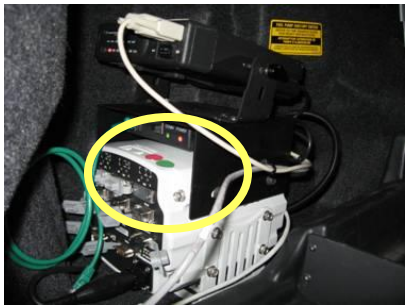
VEHICLE-MOBILE MODEM

Class 1 Mobile Modem

- Internal TD-CDMA modem
- Internal computer enabling network connection & encryption
- PPPoE capable device
- Size approximately 5.4” L x 4.9 ” W x 1.1” H
  - Black Anodized Aluminum Case
- Mount
  - 4 Top Mount Screws for bracket
- Interfaces – Exterior
  - Single Ethernet and USB connector (ruggedized)
  - Locking 12-Volt power input (splash/dust proof)
  - TNC-Type antenna adapters (splash/dust proof)
- Indicators
  - Power status
  - Network Connection status
  - Ethernet Connection status

Environmental

- -20° C < Operating Temperature < 60° C
- 10% < Operating Humidity (Non-Condensing) < 95%
- Vibration levels per MIL-STD-810F



Installed Unit in Vehicle Trunk

CONCLUSION

- The completion of NYCWiN demonstrates how broadband commercial data networks can be designed and built to meet the most stringent requirements for reliability, availability, quality of service, and security.

- NYCWiN is only the beginning of enhancing the ability to communicate critical information to and from first responders, streamline and improve daily public safety operations and enhance data interoperability

- It is clear that in the very near future, both escalating public safety demand and the emergence of innovative broadband applications will require significantly more dedicated public safety spectrum