



Ulster County Public Safety Radio System Status Discussion

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Project Process



- Existing System Review – “What you have now”
 - » System Equipment
 - » Spectrum Use
 - » Coverage Capabilities
 - » Operational Review
- Operational Enhancement Review – “What you need”
 - » End User and Stakeholder Operational Enhancement Review
 - » Survey and Interview potential end users
 - » Review and assess desired operational enhancements
 - » Review and assess interoperability
 - » Review and develop list of enhanced features and functions
 - » Review and assess required operational enhancements

Project Process



- Research Resources – “What tools you have”
 - » New Spectrum Availability
 - » Candidate Site Opportunities
 - » Interconnect Opportunities
- Design Alternatives – “Given needs and tools, what’s the solution”
 - » Operational Feature and Functions
 - » System and Subscriber Equipment
 - » Spectrum Use
 - » Site Coverage
 - » Interconnect Capabilities
 - » Cost Estimates

User Needs – End Users



- Fire and EMS
 - » Coverage – mobile fair; poor – portable and pager coverage
 - » Cost of subscribers
 - » Lack of communications interoperability
 - » Lack of basic features - Unit ID and emergency
- Law Enforcement
 - » Congestion – majority indicate occurs daily
 - » Coverage – mobile fair; poor - portable
 - » Cost of subscribers
 - » Lack of communications interoperability
 - » Lack of basic features - Unit ID and emergency
 - » Secure communications – Access and encryption

User Needs - Dispatch



- Fire
 - » Simplex operations - can only hear one side of conversation, can cause many unheard and overlapping conversations.
 - » Non-simulcast – Need to page at multiple sites to page areas, additional sites to improve coverage only add to problem and number of sites to page. Limited capability to hear wide-area communications.
 - » Sequential regionalized paging
- EMS
 - » Limited channels for operations.
 - » Non-Simulcast
 - » Sequential regionalized paging

User Needs - Dispatch



- Law Enforcement
 - » System is used primarily for dispatching 911 calls
 - » Non-simulcast
 - » Most agencies have additional systems they operate for local communications
 - » Dispatch does not have access to local systems

User's Requirements/Design Goals



- Improve coverage for voice and paging
- Improve communications efficiency and reduce congestion
- More talk paths for communications - 10-18 talk paths
- Affordable – system and subscriber
- Basic features – Unit ID/Emergency Button
- Secure communications – system access and encryption
- Interoperability –
 - » Fire/EMS/Law Enforcement on same band or possibly divided between Fire/EMS and Law Enforcement
 - » All law enforcement operate on same radio system
 - » Inter-county/regional communication integration – communications and operationally
- Technically sound but not complicated
- A platform that can be expanded

Resources - Frequency Bands



- VHF Low-band
 - » Limited to generally simplex operations
 - » Not usually simulcast
 - » Growing ambient noise issue
 - » Poor portable and in-building coverage
- VHF High-band
 - » Repeater operations common
 - » Small but recognizable noise issue
 - » Provides good rural coverage, moderate in-building coverage
 - » Badly congested, no spectrum
 - » Reviewed Law Enforcement design plan. Not viable for County-wide operations

Resources - Frequency Bands



- UHF
 - » Repeater operation common, good band organization
 - » Clean
 - » Provides moderate rural coverage, good in-building coverage
 - » Congested, limited frequencies
 - » Only able purchase very limited amount of frequencies at significant cost and difficult process
- 700/800 MHz
 - » Repeater operation common, good band organization
 - » Clean spectrum
 - » Provides less favorable rural coverage, moderate in-building coverage
 - » Frequencies generally available
 - » 700 MHz encumbered by 6.25 requirement by 2017 that forces on to a TDMA – more expensive technology

How Did We Get To This Point?



Enhancements

1. Improved Coverage
2. Reduced congestion - 10-18 talk paths
3. Affordable
4. Interoperability – within and/between agencies
5. Basic Features – UID Emergency
6. Secure Communications
7. Basic and expandable

Resources

1. Spectrum – Only 700/800 provided the channels required
2. Sites – Limited amount of vintage sites

Limitations

1. 700 MHz eliminated because of 2017 requirement requiring TDMA only

Solution

1. 800 MHz, Project 25 System
2. Simulcast Trunked

Design Alternatives



- Option 1 – Improve current system
 - » Fire – VHF-low band, EMS – VHF-high band, LE – VHF-high band (Eliminated – Coverage/Noise)
- Option 2 – All services use same band
 - » All VHF-high band (Eliminated – Frequency)
 - » All UHF – Conventional/Trunking (Eliminated – Freq.)
 - » All 700 MHz (Avoided – 2017 Requirement)
 - » **All 800 MHz – Recommended***
- Option 3 – Split band by service
 - » Fire/EMS – UHF Band, LE – VHF-high band (Eliminated – Functionality - Frequency)
- Option 4 – Split band by area
 - » LE/Fire/EMS – UHF Valley, VHF-high band Catskills (Eliminated – Functionality)
 - » LE/Fire/EMS – 800 Valley, VHF-high band Catskills (Eliminated – Functionality)

Site/Coverage

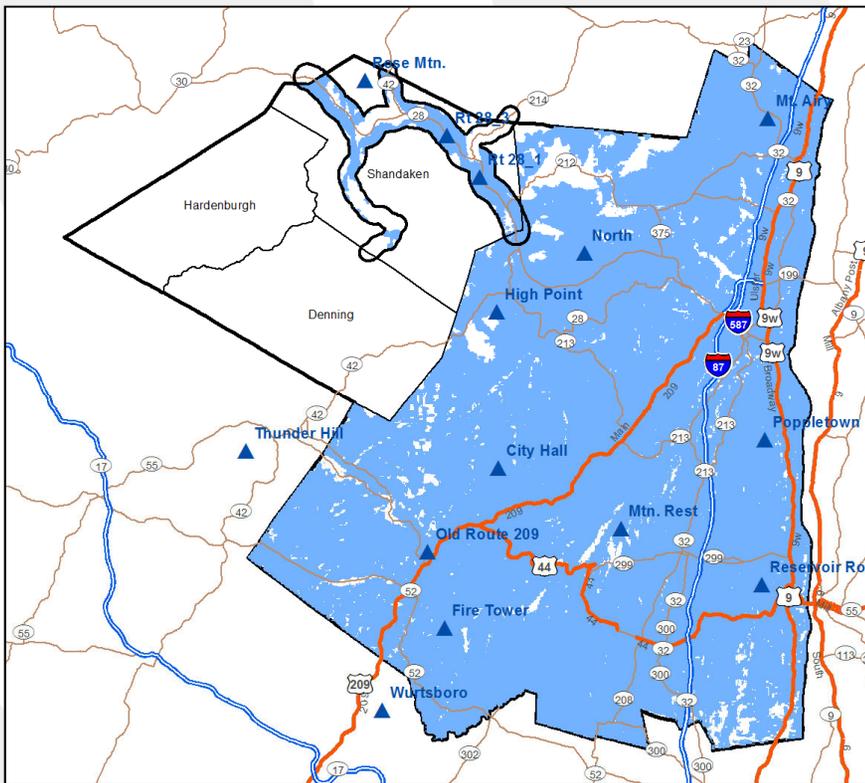


- Current Industry Design Standards
 - » 90-95% Mobile Coverage or Portable Coverage
 - » Current propagation studies indicate current coverage is well below desired design standards.
- Ulster County Design Standards
 - » Given terrain in Catskill Region, even mobile level of coverage would be very difficult to obtain throughout the County
 - » Hudson Valley - Provide 95% mobile coverage/increased portable coverage
 - » Shandaken – Mobile coverage focused on R28 corridor
 - » Denning and Hardenburgh - recommend not providing additional sites and allow dispatching by Sullivan and Delaware County for Fire-EMS. Law enforcement system remains the same

Coverage – Proposed



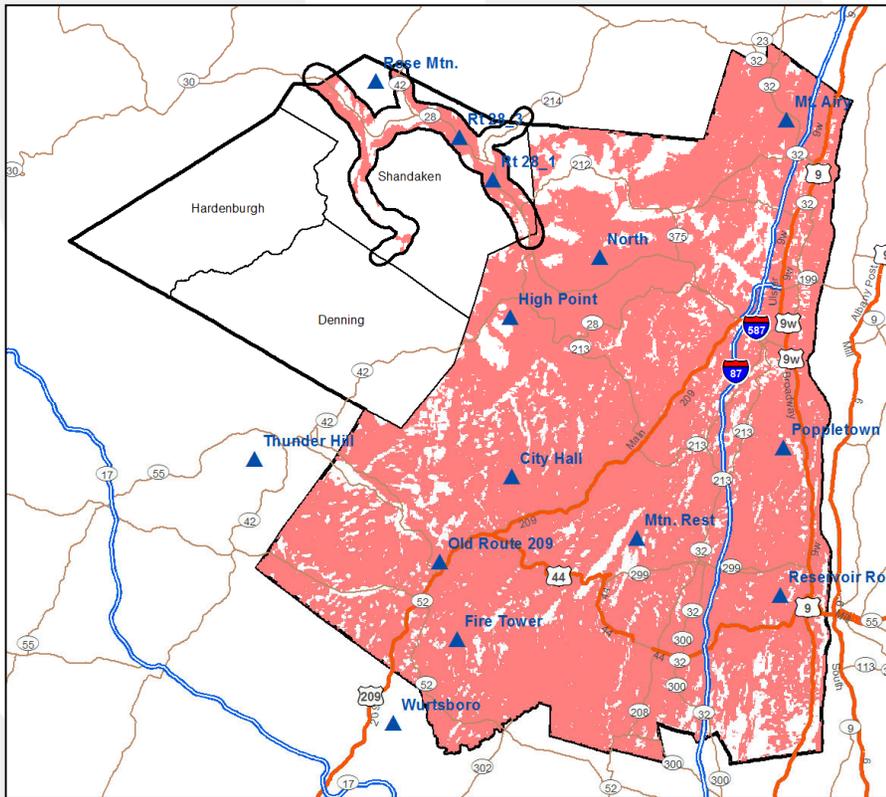
- 800 MHz - 14 Site Design – Mobile Coverage – Hudson Valley 94.2%, Rt. 28 Area 62.4%



Coverage – Proposed



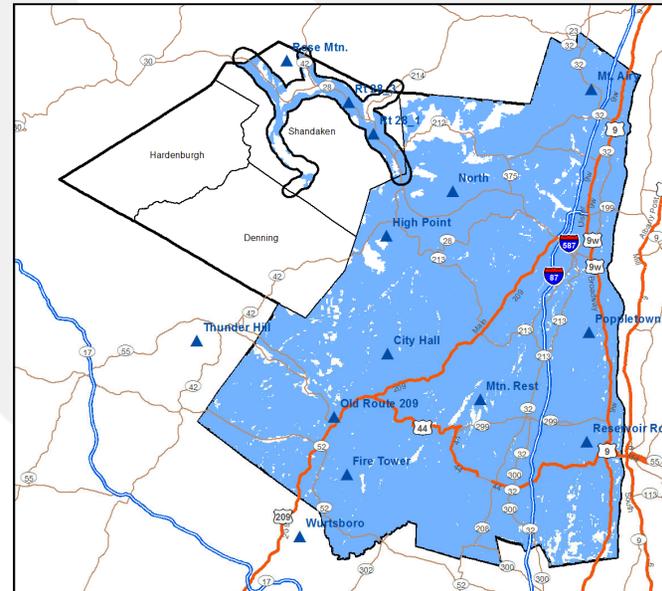
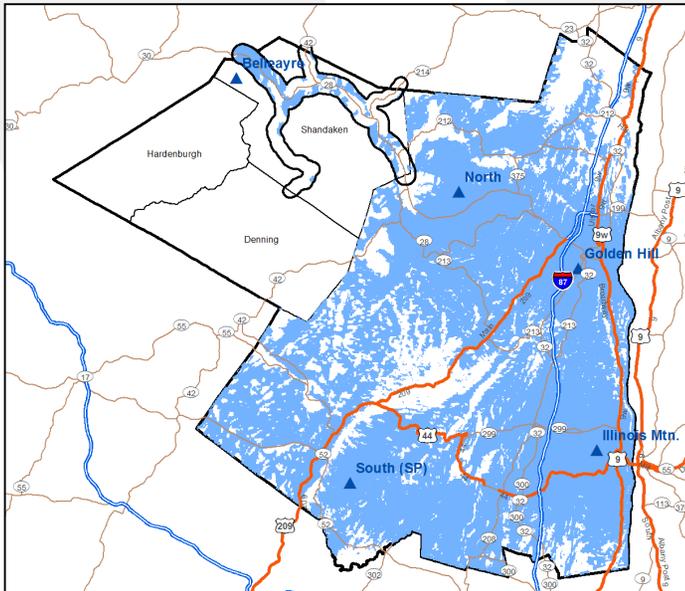
- 800 MHz – 14 Site Design – Portable Coverage - Hudson Valley 84.9%, Rt. 28 Area 53.6%



Coverage – Current vs 800 MHz



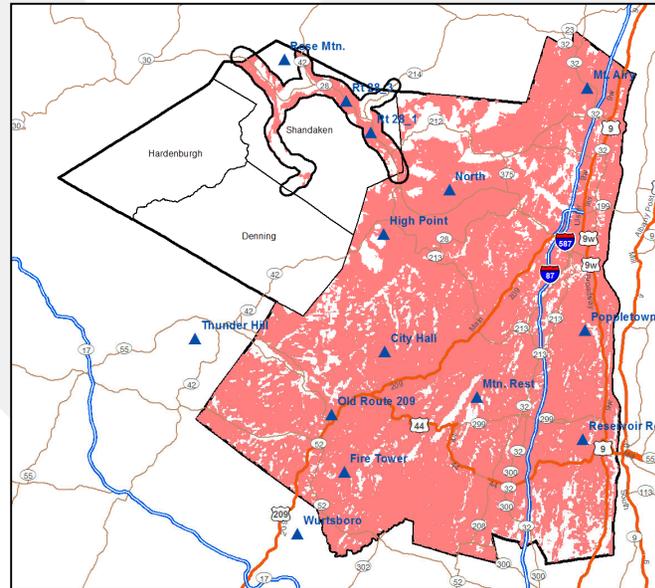
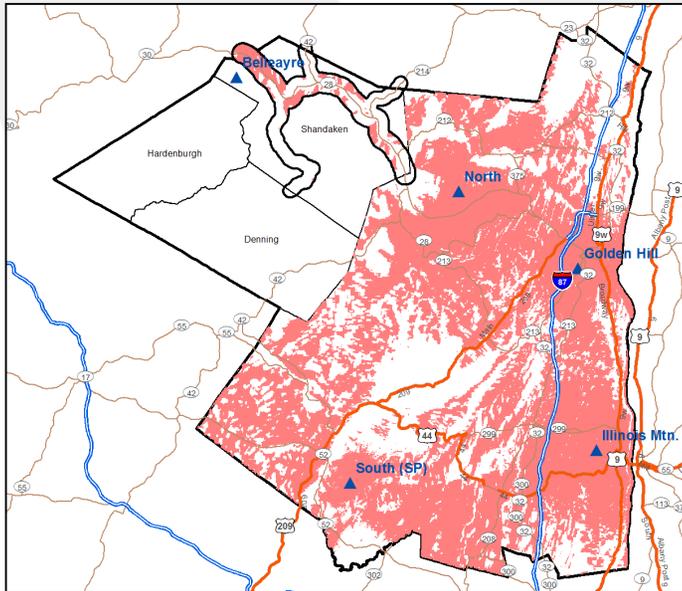
- Fire – VHF Low-band – Mobile



Coverage – Current vs 800 MHz



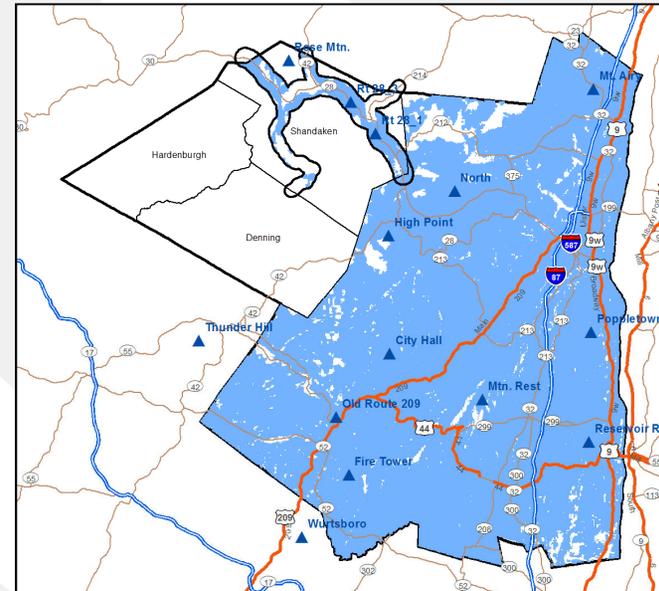
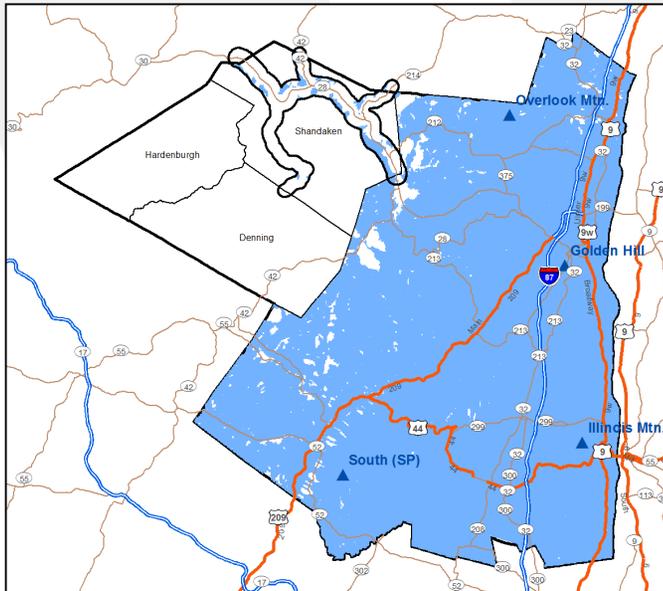
- Fire – VHF Low-band – Portable



Coverage – Current vs 800 MHz



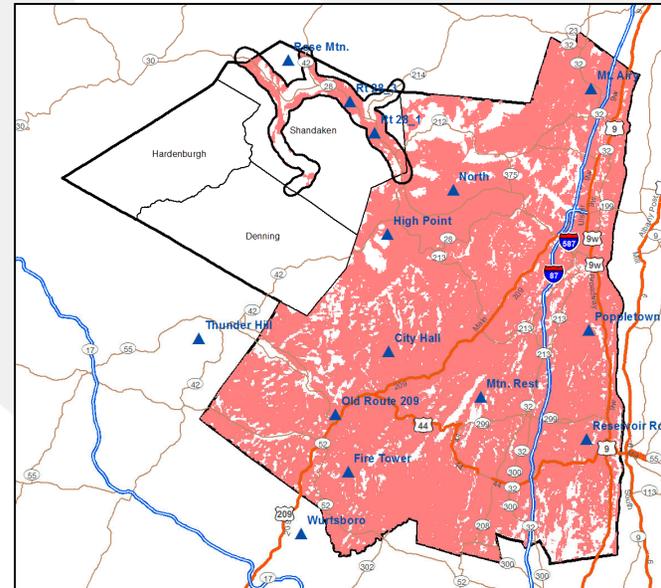
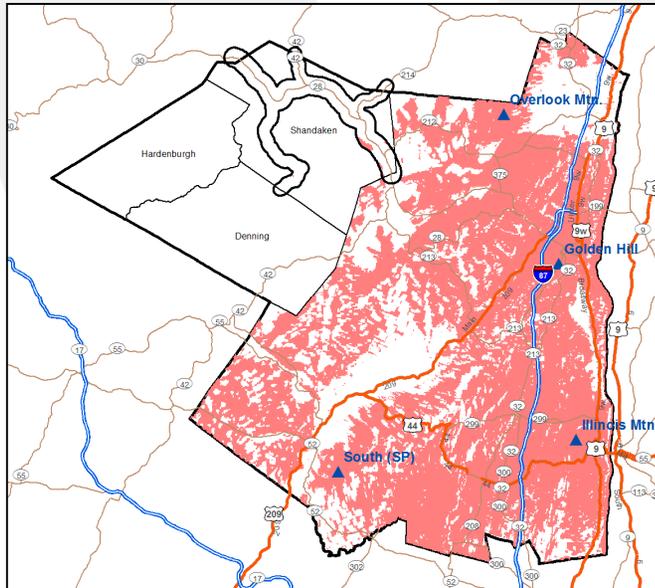
- Law – VHF High-band - Mobile



Coverage – Current vs 800 MHz



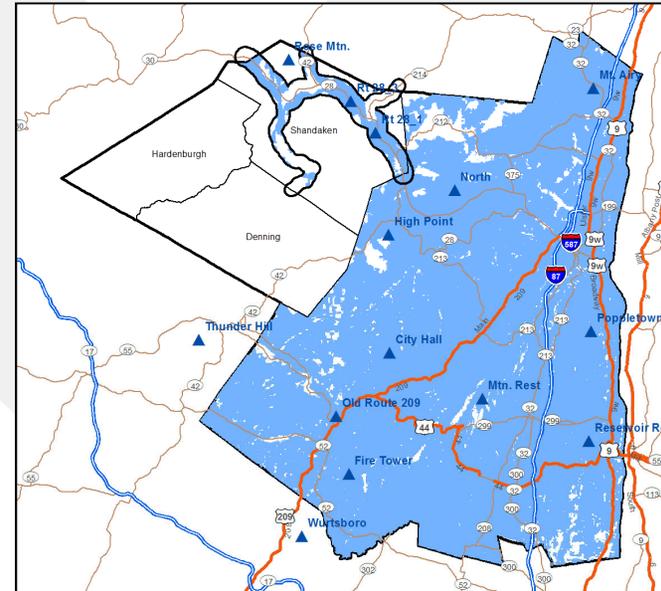
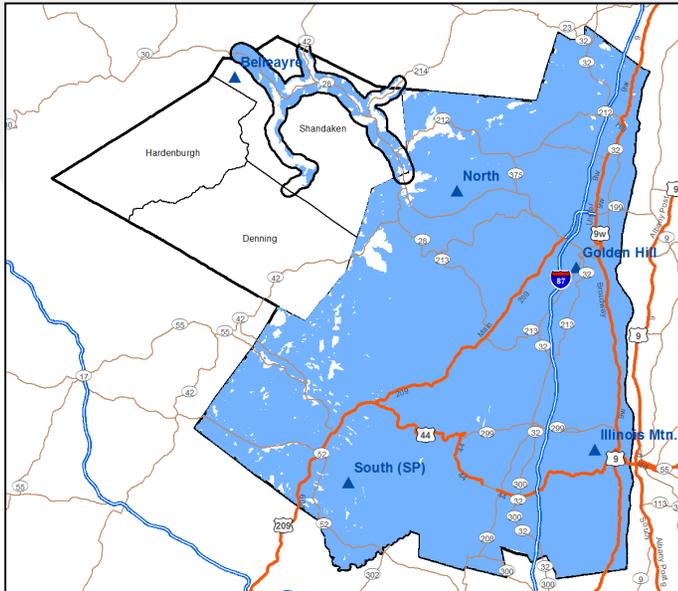
- Law – VHF High-band – Portable



Coverage – Current vs 800 MHz



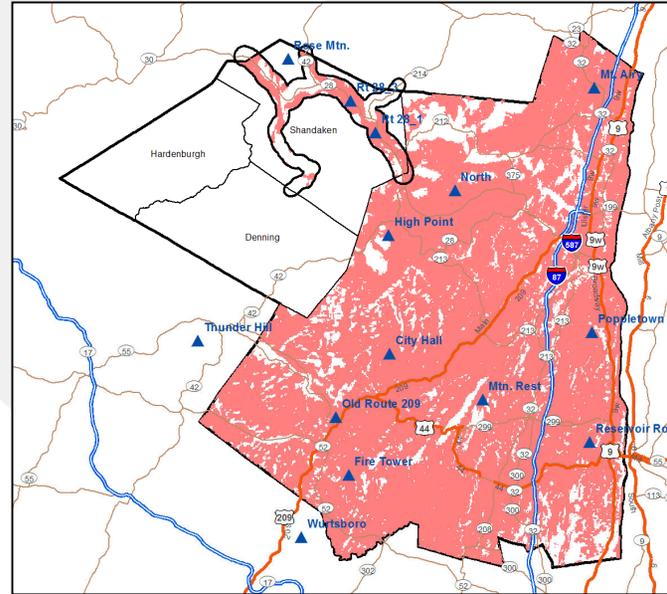
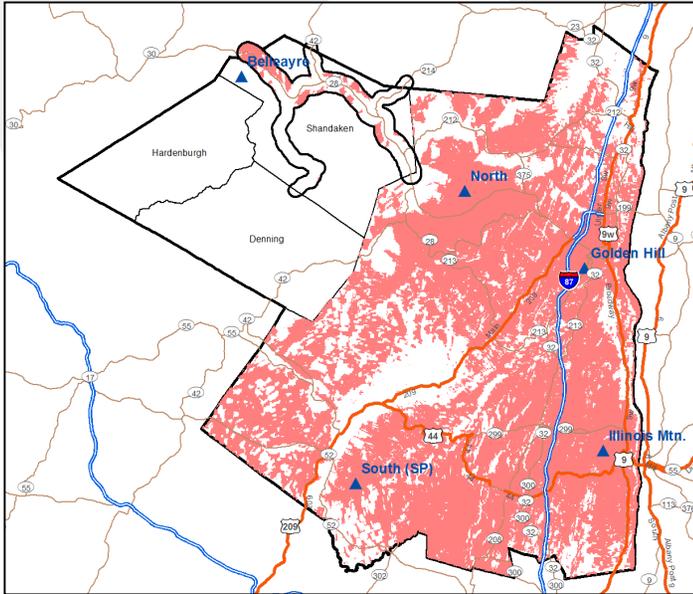
- EMS – VHF High-band – Mobile



Coverage – Current vs 800 MHz



- EMS – VHF High-band – Portable



Site/Coverage – Current vs 800 MHz



- Summary Coverage Table

System	Operation	% Existing VHF Coverage	% 800 MHz Coverage
Law Enforcement	Mobile, Hudson Valley	96.8	94.2
Law Enforcement	Mobile, Rt. 28 Area	17.5	62.4
Law Enforcement	Portable, Hudson Valley	66.7	84.9
Law Enforcement	Portable, Rt. 28 Area	1.9	53.6
Fire	Mobile, Hudson Valley	75.1	94.2
Fire	Mobile, Rt. 28 Area	35.7	62.4
Fire	Portable, Hudson Valley	62.0	84.9
Fire	Portable, Rt. 28 Area	27.4	53.6
EMS	Mobile, Hudson Valley	97.1	94.2
EMS	Mobile, Rt. 28 Area	58.9	62.4
EMS	Portable, Hudson Valley	67.6	84.9
EMS	Portable, Rt. 28 Area	20.3	53.6

800 MHz P25 Trunked Alternative



- Coverage for mobile similar – portable greatly improved
- Greatly expand capacity for all users - no congestions
- Affordable – system and subscriber – choose the most affordable route for trunked subscribers; federal grant eligible
- Basic features – provide UID, emergency
- Provide secure communications – system access and encryption
- All users would be able to operate from one common system, for local and county operations
- Technically sound, proven technology
- Platform that can be expanded and enhanced

System Costs



(Costs at time of purchase – system sold in last 6 or 7 years)

- Madison County \$14 million
- Oswego County \$20 million
- Saratoga County \$17 million
- Tompkins County \$14 million
- Rockland County \$20 million
- Nassau County \$42 million
- Onondaga County \$32 million

System Costs



- Site - \$ 4,500,000 USD
- Interconnects - \$ 3,000,000 USD
- Radio System - \$12,474,984 USD
- **Total System Cost - \$19,974,984 USD**

- **Yearly System Maintenance - \$600K to 1,100K USD**

Subscriber Costs



- Portables (Motorola)
 - » Tier 1 – XTS1500 \$1,500
 - » Tier 2 - XTS2500 \$2,100
 - » Tier 3 - APX4000 \$2,546
 - » Dual Band Portable – APX7000 \$4,617

- Mobiles (Motorola)
 - » Tier 1 – XTL1500 \$1,736
 - » Tier 2 – XTL2500 \$3,023
 - » Tier 3 – APX6500 \$3,266
 - » Dual Band Mobile – APX7500 \$5,156

Timeline



- 2012
 - » Procure necessary frequencies to hold position
- 2013
 - » Begin site acquisition and approvals
 - » Site development procurement – civil, shelter, tower procurement
 - » MW procurement
 - » Radio system procurement
 - » Site approvals and begin site development
 - » Site development
- 2014
 - » Complete site development
 - » Install MW system
- Late 2014-2015
 - » Install Radio System

Summary



- Better coverage
- Greatly increase capacity
- Most affordable solution given the requirements
- All users on same system
- Basic features – provide UID, emergency
- Provide secure communications – system access and encryption
- Pragmatic, expandable, technically sound, proven technology