



Public Safety Radio System Assessment



Agenda

- **Introductions**
- **Background**
- **Current System**
- **Issues**
- **Considerations**
- **Options**
- **Processes**
- **Questions**



Richland County Current System

- VHF Frequency Band Operation
- Narrowband Analog Operation
- Sheriff (Law) Repeater
- Fire (EMS) Repeater
- Multiple Location Use (5-6 Sites)
- Interoperability Channels
- Tone & Voice Paging (272 units)
- Dispatch Center
- Wireline Connectivity
- Tower Site Leases



Stakeholders

- Mobile Units – 153
- Portable Units – 203
- Control Stations – 11

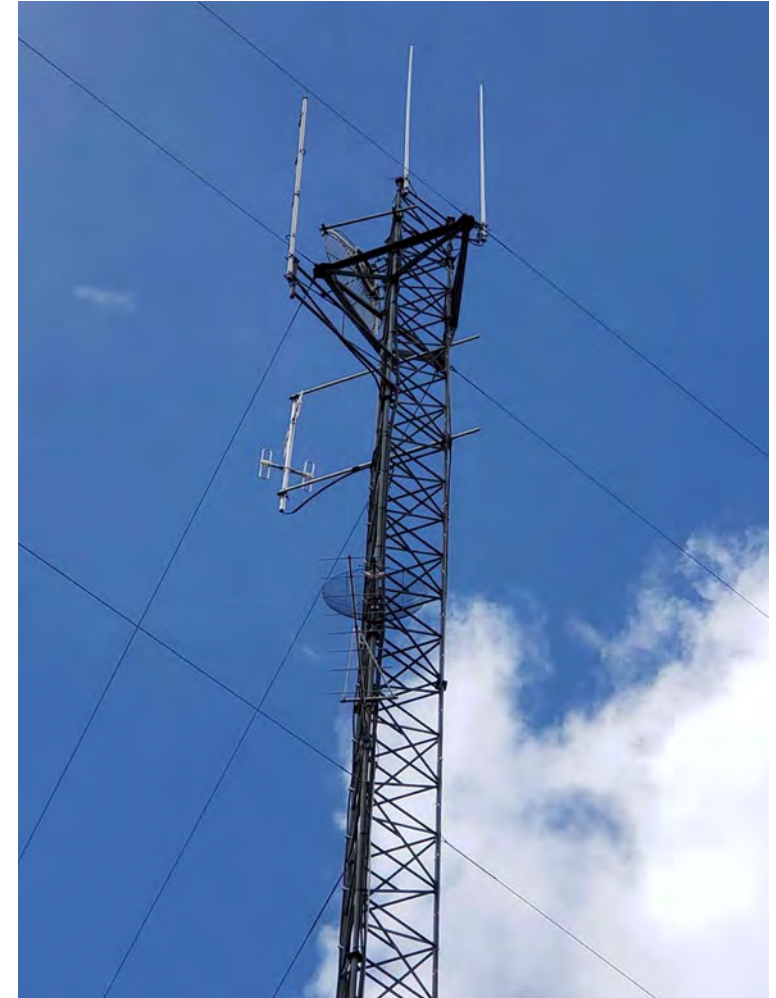
- Total Subscribers - 367

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Richland County Sites



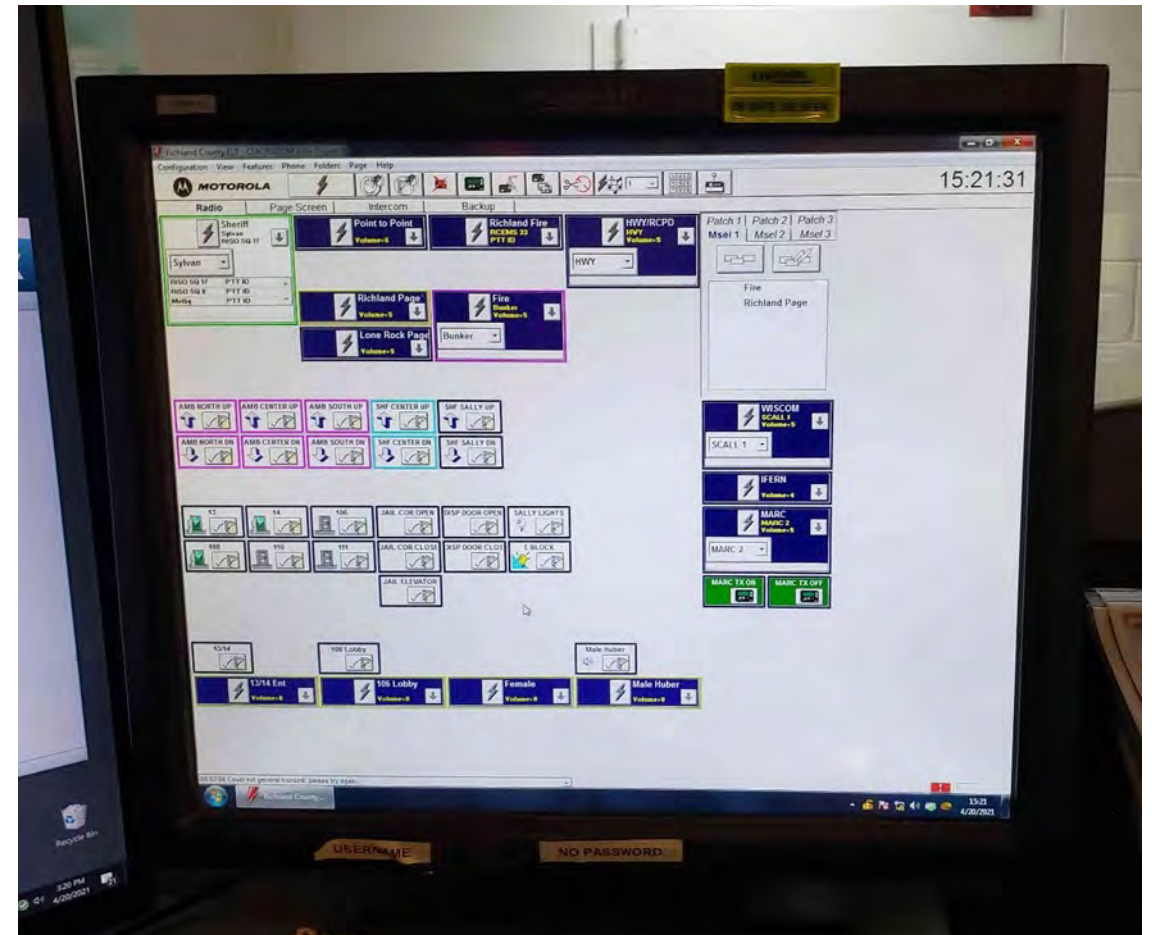
- Bunker Hill Site
- Dispatch Center Site
- Eagle Tower Site
- Lone Rock Site
- Sylvan Site
- Tower Hill (USCC) Site
- Tower Hill Site
- WRCO Site



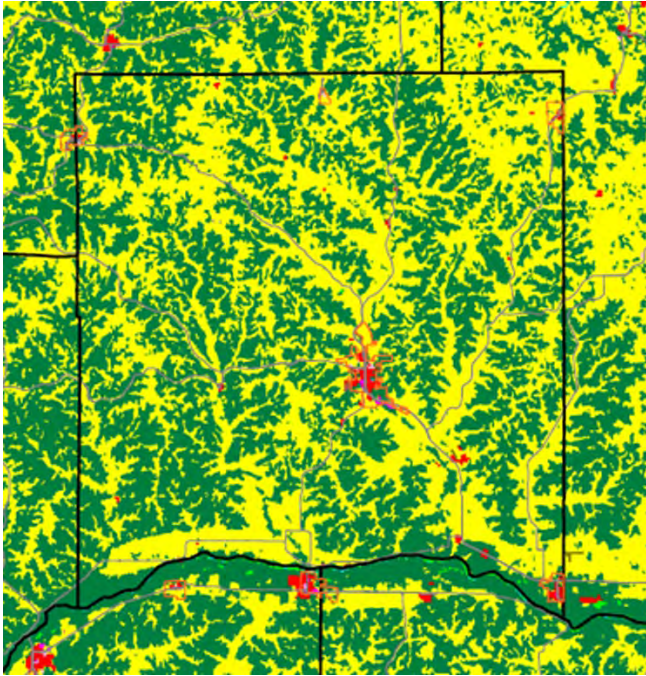
- Layout
- Door Controls
- Intercom
- Operations
- CAD/911/Recording
- Backup
- EOC



- Equipment Serviceability
- Disparate Support
- Channel Design
- Paging Coverage
- Redundancy and Reliability
- Interoperability
- Governance
- Coverage Levels

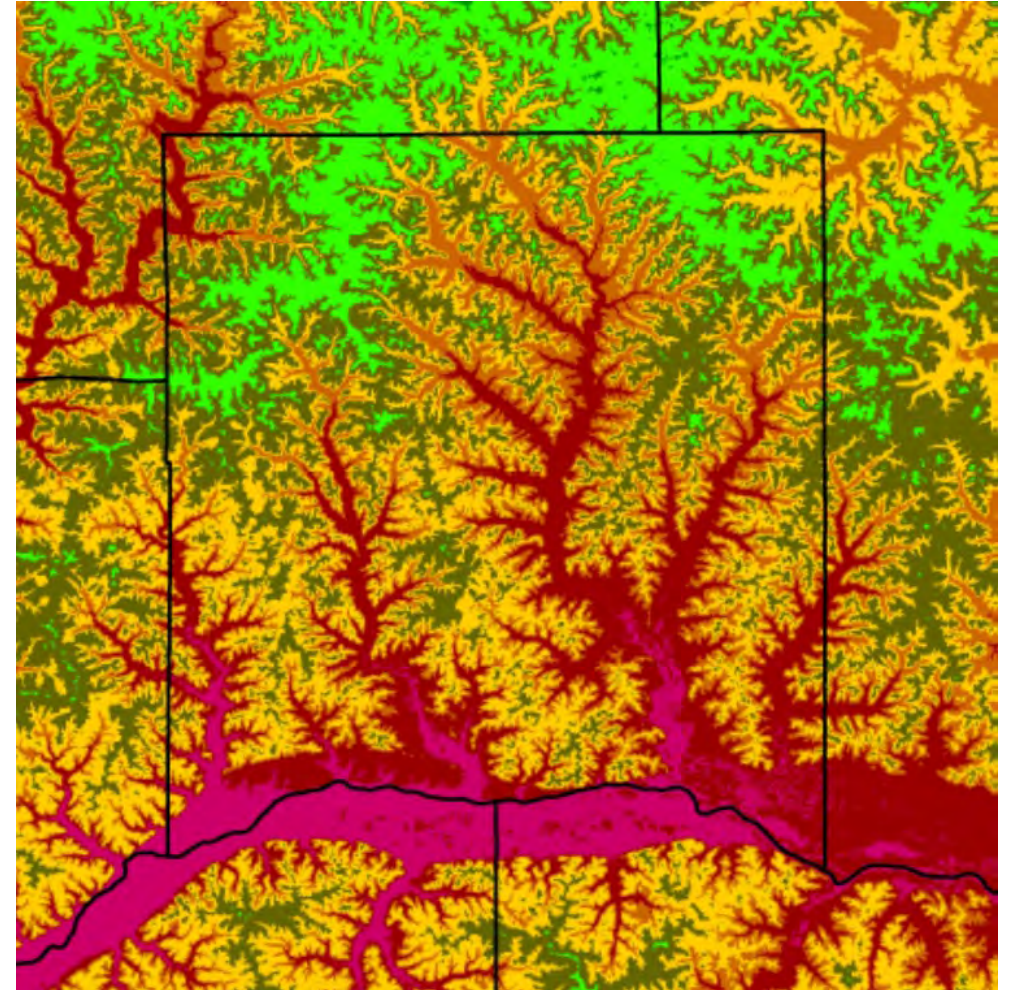


Predicting Coverage

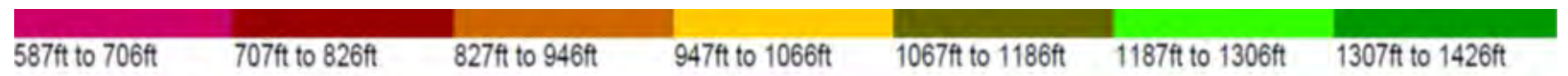


LAND CLUTTER

TERRAIN



- Sheriff Repeater
- Fire Repeater
- Paging Channel



Coverage Today

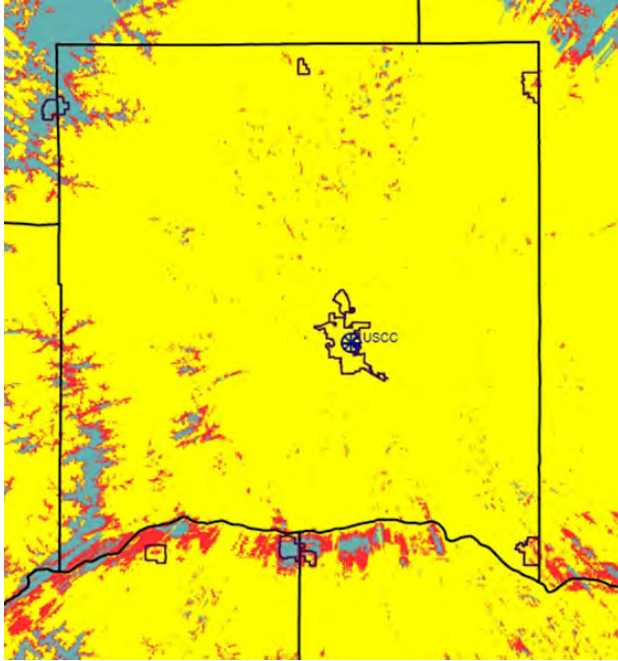


Figure 1 - Mobile Talk Back

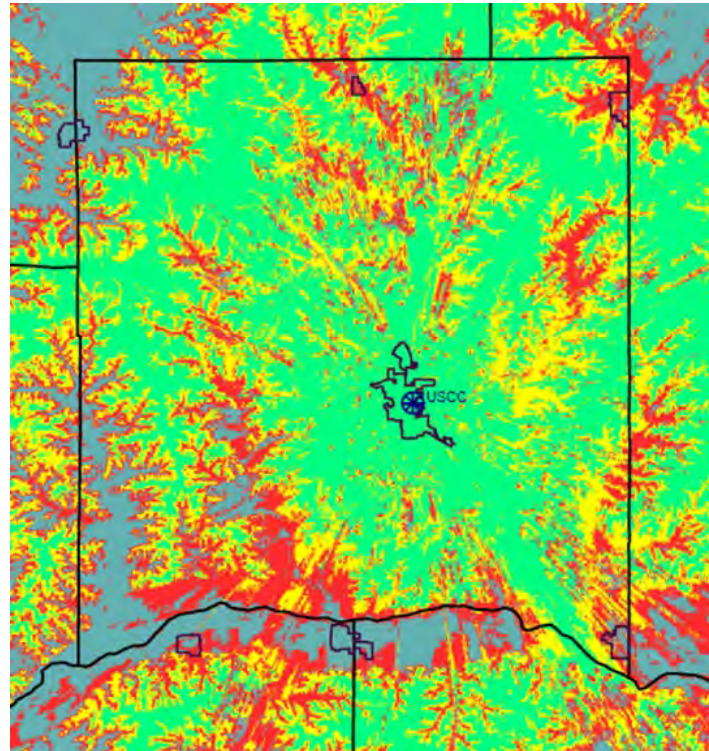


Figure 1 - Portable Talk Out

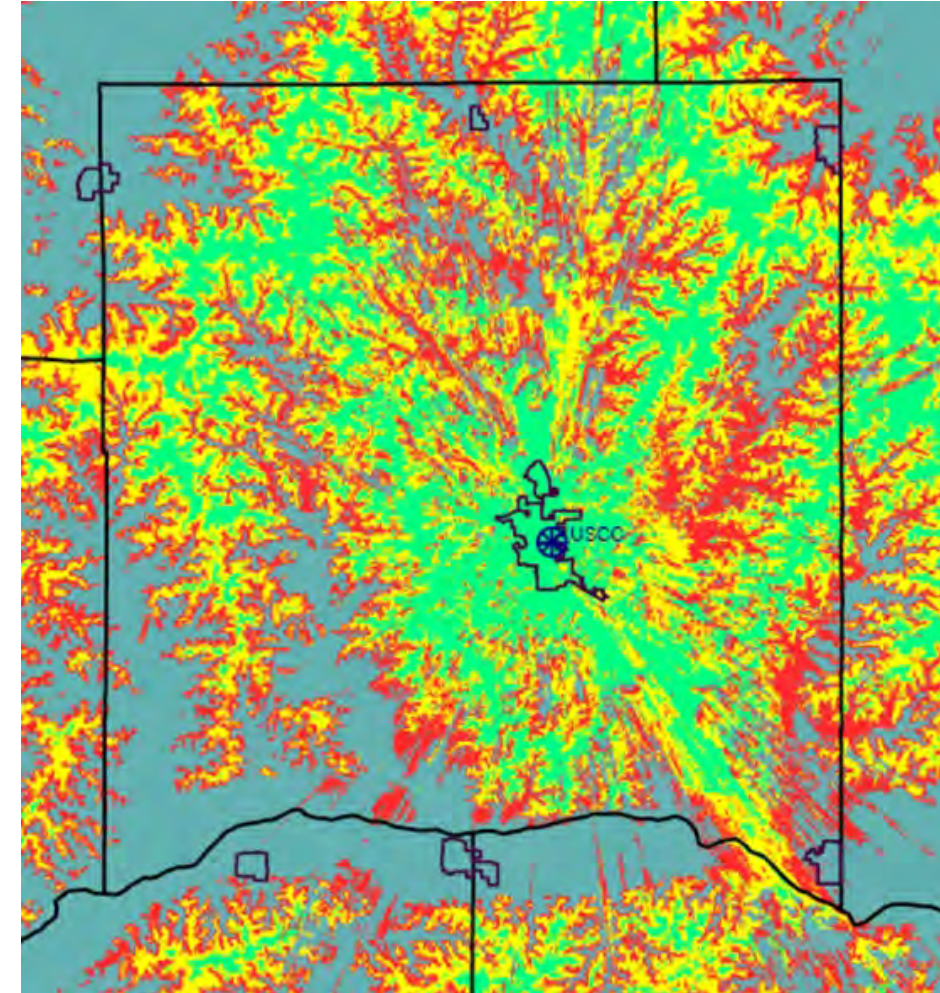


Figure 1 - Portable Talk Back

Coverage Today

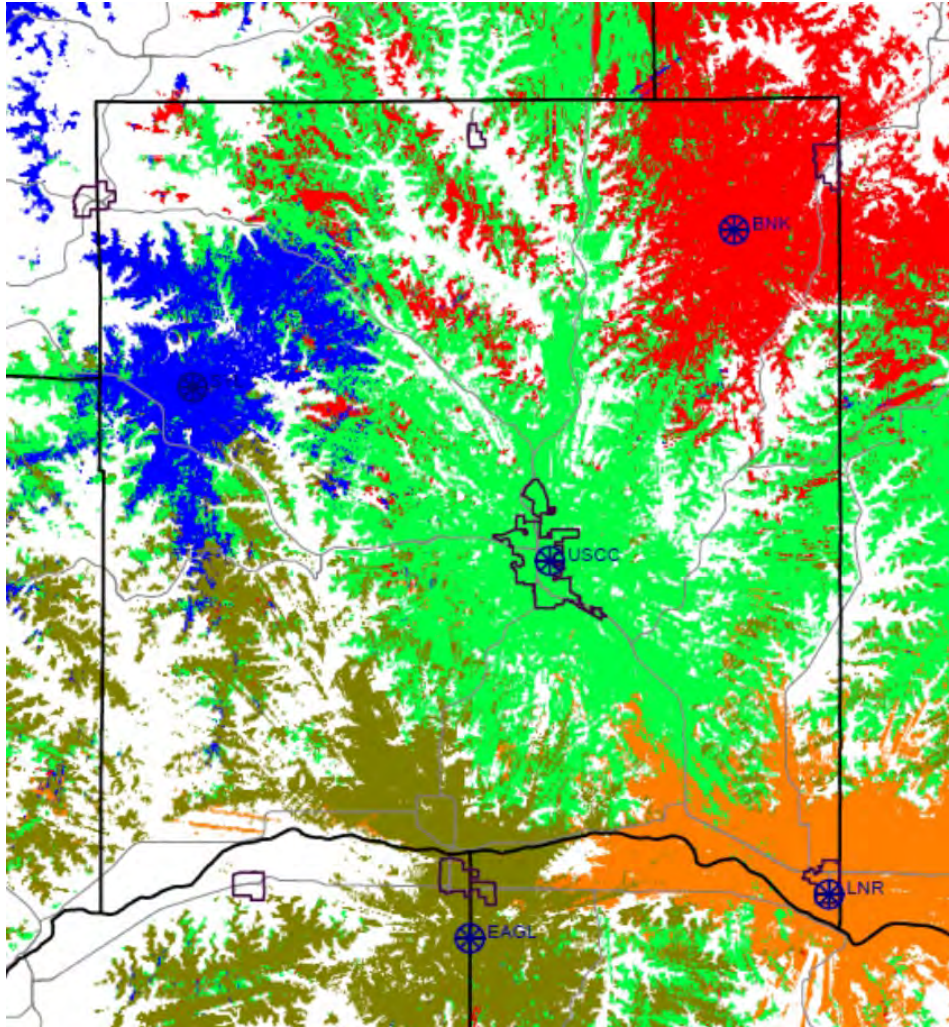


Figure 20 - PTO - 8 dB - Likely Server Map

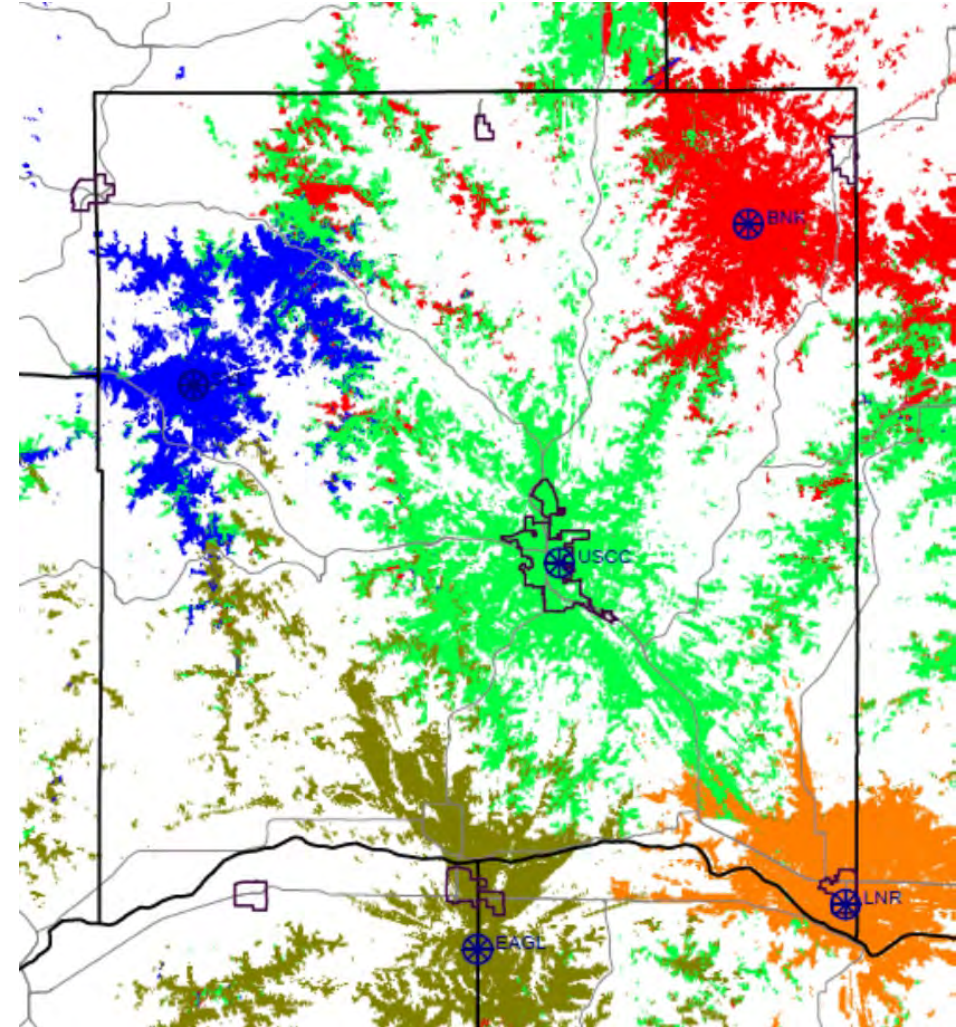


Figure 21 - PTB - 8 dB - Likely Server Map

Interoperability

Organization	Neighbor	Agency	Radio Band	Frequency Information
Richland County	Sauk County WI	Sheriff	VHF	155.700 (82.5)
		Fire	VHF	151.250 (97.4)
		Paging	VHF	155.775 (82.5)
Richland County	Vernon County WI	Sheriff	VHF	154.995 (167.9)
		Fire	VHF	154.860 (136.5)
		Paging	VHF	154.175 (167.9)
Richland County	Crawford County WI	Sheriff	VHF	155.685 (152)
		Fire	VHF	154.310 (151.4)
		EMS	VHF	155.655 (151.4)
Richland County	Grant County WI	Sheriff	VHF	155.865 (123.0)
		Fire	VHF	155.745 (91.5)
		Paging	VHF	155.925 (CSQ)
Richland County	Iowa County WI	Sheriff	VHF	155.7225 (BOC NAC)
		Fire/Paging	VHF	154.385 (77.0)
Richland County	State of Wisconsin	State Patrol	WISCOM	VHF Trunked

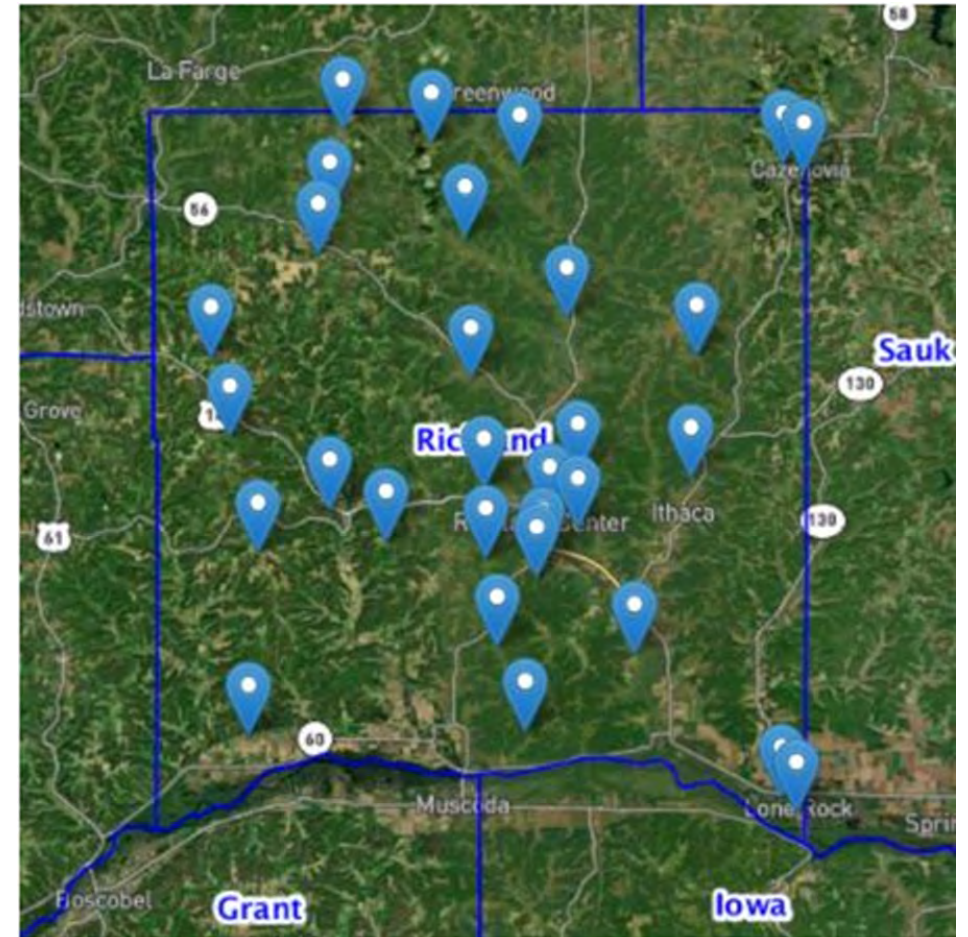
New System Considerations

- Public Safety standards portable radio coverage level expectations of 95% reliability for 95% of coverage area.
- Redundancy and Reliability
- Channel Capacity
- Interoperability
- Security
- Features
- Secure communications
- Governance
- Support

Connectivity



Figure 25 – Eagle/Lone Rock Elevation Profile

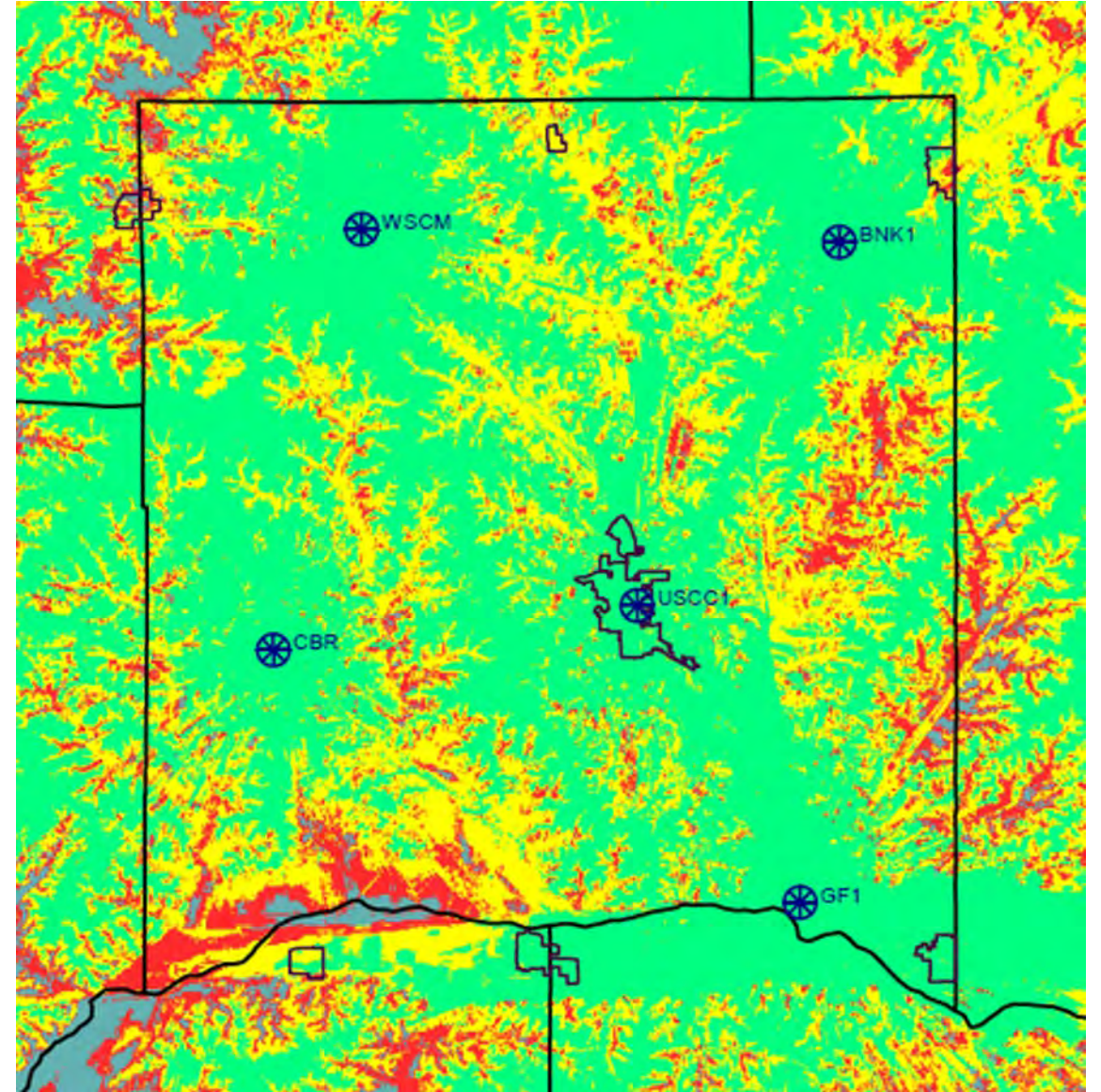


Richland County Options

- Developed 3 Viable Solutions
 - Improve Public Safety Coverage
 - Analog vs. P25 Digital
 - Dispatch Center Consoles
 - Independent Jail System
 - Network vs. control station
 - Subscriber Equipment
 - Backhaul
 - Hardened Sites
- Project Cost Breakdown
 - Radio System
 - Field Terminal Equipment
 - Civil Work
 - Professional Services
 - Contingency Funds

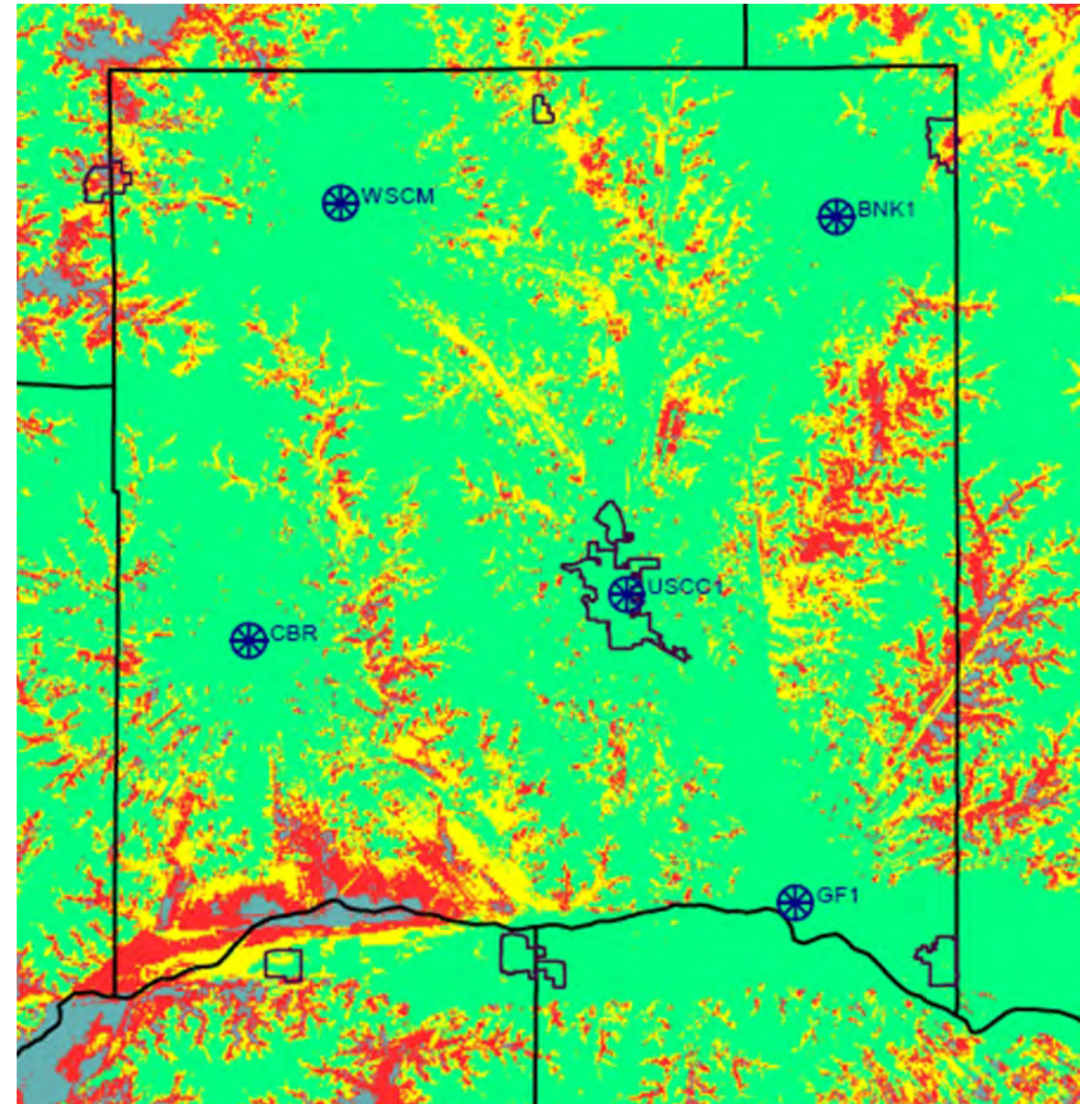
Option #1

Option	Description of Improvement	Estimated Cost	Outcome
1	<ul style="list-style-type: none"> ✓ VHF Analog Repeater Stations (X2 per site) ✓ Dedicated Paging operation is part of the design ✓ Coverage levels are improved Countywide ✓ Greenfield site likely needed ✓ Voting/Simulcast Controller Systems ✓ Transmit/Receive Antenna Systems ✓ Transmit/Receive Antenna Combining System ✓ Site shelter, grounding and structure enhancements ✓ Battery back -48-volt power systems ✓ Backup AC generator at all sites ✓ Minimal microwave network connection to all sites ✓ Site and system alarm capabilities ✓ Console X2 and associated radio equipment upgrades 	\$3,280,500	<p>This lowest cost option provides for improving operational coverage of the existing design.</p> <p>Using this option would have the County seeking a migration strategy to the extent possible of the existing system.</p> <p>95% countywide coverage levels would not be achieved with this option without design changes and additional cost.</p> <p>Sites are designed with dedicated shelter space and backup power capabilities (Hardened).</p> <p>Subscriber equipment has not been estimated as part of this possible phased approach with reuse being probable. Likely cost savings of at least \$1M.</p> <p>Would provide a completed design that may not be able to easily expand coverage levels down the road.</p>



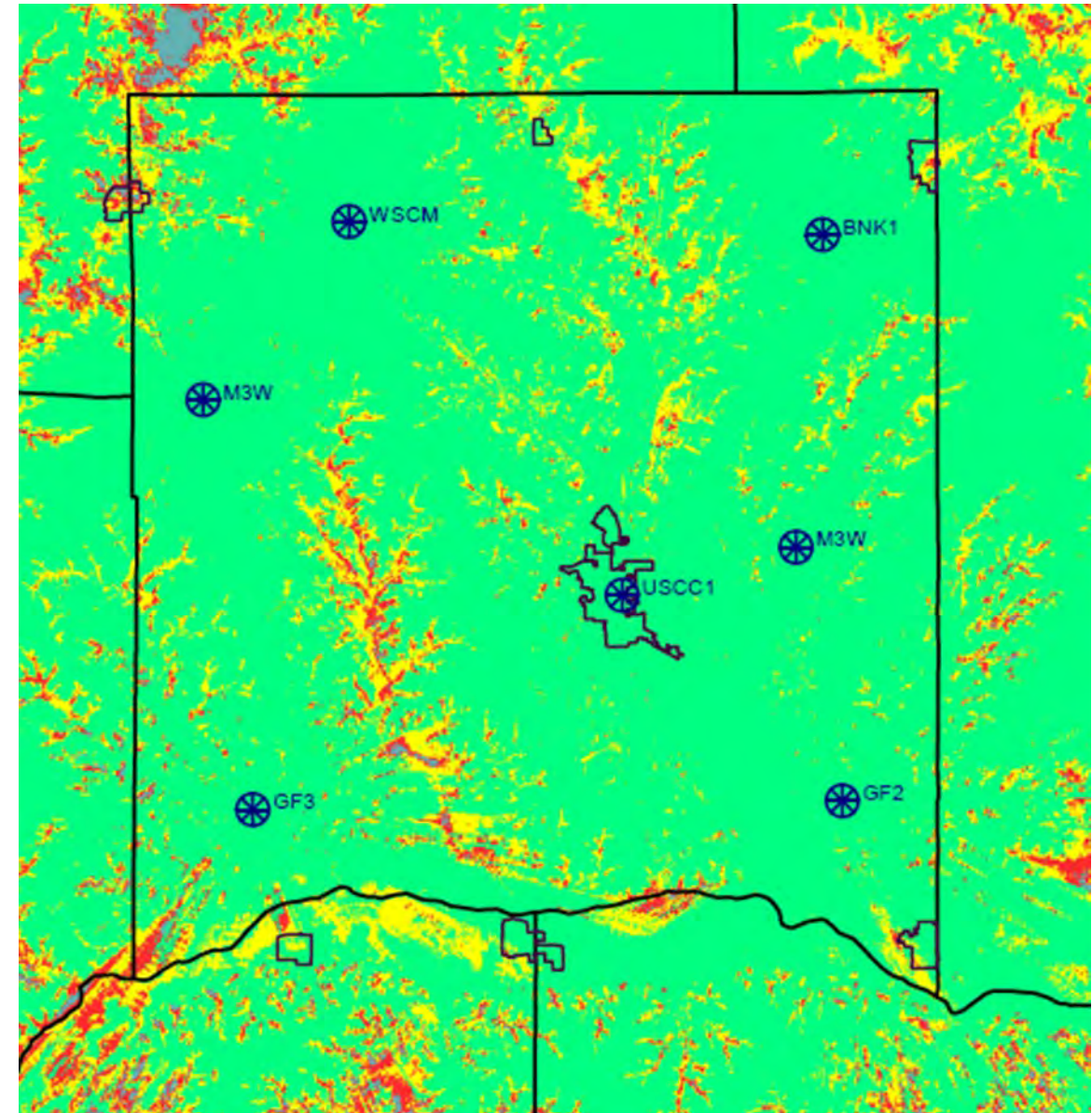
Option #2

Option	Description of Improvement	Estimated Cost	Outcome
2	<ul style="list-style-type: none"> ✓ VHF Digital P25 repeater stations (X3 per site) ✓ Standalone analog paging base station system ✓ Coverage levels improved to 90% on the street portable on the hip. ✓ Console X2 and associated radio equipment upgrades ✓ Public Safety grade P25 capable subscriber radios ✓ Voting/Simulcast Controller Systems ✓ Transmit/Receive Antenna Systems ✓ Transmit/Receive Antenna Combining System ✓ Site shelter, grounding and structure enhancements ✓ Battery back -48-volt power systems ✓ Backup AC generator at all sites ✓ Microwave ring network connection to all sites ✓ Site and system alarm capabilities ✓ P25 digital operation with noise-cancelling capabilities, Encryption, etc. 	\$5,792,000	<p>This option seeks to improve the Option #1 design coverage using a digital operation.</p> <p>A migration to P25 operation would provide the County improvements and capabilities of designed system coverage.</p> <p>Improvements include new system support of improved P25 capabilities.</p> <p>Subscriber radio equipment has been estimated for replacement to provide P25 operations.</p> <p>Subscriber equipment would support County and WISCOM operations.</p> <p>Would provide a completed design that may not be able to easily expand coverage levels down the road.</p>



Option #3

Option	Description of Improvement	Estimated Cost	Outcome
3	<ul style="list-style-type: none"> ✓ VHF Digital P25 repeater stations (X5 per site) ✓ P25 paging operation and subscriber equipment ✓ Console X2 and associated radio equipment upgrades ✓ Public Safety grade P25 capable subscriber radios ✓ Voting/Simulcast Controller Systems ✓ Transmit/Receive Antenna Systems ✓ Transmit/Receive Antenna Combining System ✓ Site shelter, grounding and structure enhancements ✓ Battery back -48-volt power systems ✓ Backup AC generator at all sites ✓ Ring topology microwave network connection to all sites ✓ Site and system alarm capabilities ✓ P25 digital operation with noise-cancelling capabilities, Encryption, etc. 	\$7,710,000	<p>Seeking to meeting in building public safety coverage levels with design.</p> <p>This option seeks to improve the Option #2 design by adding coverage with additional sites.</p> <p>A migration to P25 operation would provide the County improvements and capabilities of designed system coverage.</p> <p>Improvements include new system support of improved P25 capabilities.</p> <p>Subscriber radio equipment has been estimated for replacement to provide P25 operations.</p> <p>Paging operations is moved to P25 systems and pager equipment replacement is anticipated.</p>



Future Considerations

- System Operational Support
- System Maintenance (10 yrs)
- Implementation – 2 Years

Additional Costs	Description	Cost
Tower / Lease Fees	Lease fees for use of tower space on non-owned properties fluctuate depending on owner of the site. Fees are usually based on height of antenna, number of antennas, and space used. Land lease fees also possible for greenfield sites.	Monthly Fee (Est. \$2,000 - \$5,000/month)
Electrical Services	Sites having a dedicated County shelter facility would have a dedicated electrical service feed and is common in a modern system. With greater amounts of equipment at a site, they tend to consume more power than older system sites.	Monthly Fee \$150 - \$300/month per repeater site
Generator Maintenance	Sites using backup electrical generators will require a minimum yearly maintenance of those units and contracts should be put in place.	Yearly Fee
Generator Fuel	Sites using backup electrical generators will require fuel levels to be monitored and maintained.	As Needed
HVAC Servicing	As modern system equipment requires a regulated operating condition, it is critical to maintain air handling systems at sites.	Yearly contract
System Maintenance Fees	Systems maintenance contracts are commonplace with a modern radio network. Fees can include monitoring of alarms and technical support for repairs on a 24 X 7 X 365 need. Contracts are scaled based on the size and complexity of the system.	Yearly contract 4-5% of System Cost with yearly increase
System Updates	As modern systems are very software based, keeping up with changes means anticipating updates. Especially with trunking system as described in Option 3, the County must be aware the manufacturer continues to develop and provide upgrades which will have an ongoing cost. Recommendations are to stay within two versions of the current software offering.	Yearly contract 6-7% of System Cost

Project Steps

- Identify Model
 - Coverage Expectations
 - Subscribers?
 - Design
 - Options
- Budget Support?
 - Down payment with Contract
 - Milestone Payments
 - Civil RFB
 - Professional Services
- Paper Design
- 2-3 Year Timeline (2023 - ?)



RFP Development

- Performance Based
- Minimum Requirements
- Project Expectations
- Identified Coverage levels
- Primary – VHF -?
- Alternate – Open to Options
- Subscriber Equipment
- Paging Operation
- Civil Model

Phase II – RFP Development - RFP development as a phase incorporates time spent working with agencies who decide to take the next step in the procurement process and develop a request for vendors to use in the process of quoting them a replacement system. This phase takes some time to get the necessary consensus and a designated group together that works with TNCG to further identify and drill down on the specific needs of the replacement system. That group then oversees the document assembled by TNCG to its completion. (3-5 Month process)

Phase III – System Procurement Process, Contract Negotiations and Award Having reached a design that best meets all needs and having put in place the funding mechanisms needed to support the purchase, an RFP release is made. The Procurement phase takes in the time need to provide vendors time to build designs based on the RFP and work through negotiations to a solution that will meet all needs. (4-6 Month process)

Phase IV – System Implementation – Final project phase of system implementation depends on the level of system needs and many tower siting considerations of design. Most projects will require some level of developmental work. (18-30 Month process)



Discussion and
Questions