Washington County
PENNSYLVANIA

Washington County, Pennsylvania

P25 System Public Safety Radio End User Meeting

January 29, 2025

Information and Future Updates

This presentation reflects our current understanding of the Washington County public safety radio project, based on the information available at this stage. As we continue working closely with first responder leaders and other stakeholders, we expect to refine and enhance certain aspects to best meet the needs of the community. We are committed to keeping the public informed and will provide updates as new details emerge.

Presented 01-29-2025

Tonight's Agenda

1. **Call to Order**

2. **Prayer led by Reverend Robert Grewe**

3. **Pledge of Allegiance led by Commissioner Sherman**

4. **Welcome and Opening Remarks – Commissioner Sherman**

   a. **Introduce Subcommittee/Commissioners**

5. **Presentation by MCP: Old Business: Review of Communication Challenges (10-15 min)**

   a. **Current System Shortcomings**

6. **New Business: Presentation by Motorola: Proposed Solutions and Benefits (10-15 min)**

7. **Q&A Session**

8. **Closing Remarks and Next Steps**

System Assessment

Coverage
Capacity
Reliability
Interoperability
Maintenance
Lifecycle
Subscribers
Data Capability

- Stakeholder interviews
- Technical review of current system
- Documented all existing systems
- Evaluated system options to address shortcomings with the existing system

Key Issues with Existing System
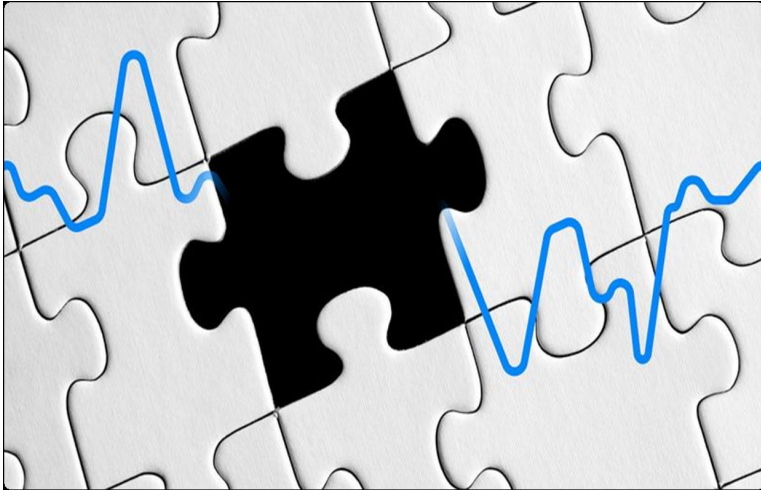
- Poor radio coverage for mobile and portable radios
- Co-Channel Interference
- Inadequate number of channels resulting in channel congestion
- Lack of system redundancy
- Non-redundant backhaul network
- Lack of Interoperability in and out of County
- System/Sites not up to public safety standards

Current System Coverage

Talkback Radio Coverage – Existing VHF Radio System

| Scenario	Number of Sites	Coverage Area	Mobile	Portable On-street (Outdoor) Countywide
EMS Channel	9	Countywide composite Coverage	78.3%	29.7%
Fire Channel	12	Countywide Composite Coverage	89.4%	33.6%
Law Channel	14	Countywide Composite Coverage	85.6%	33.2%

Procurement
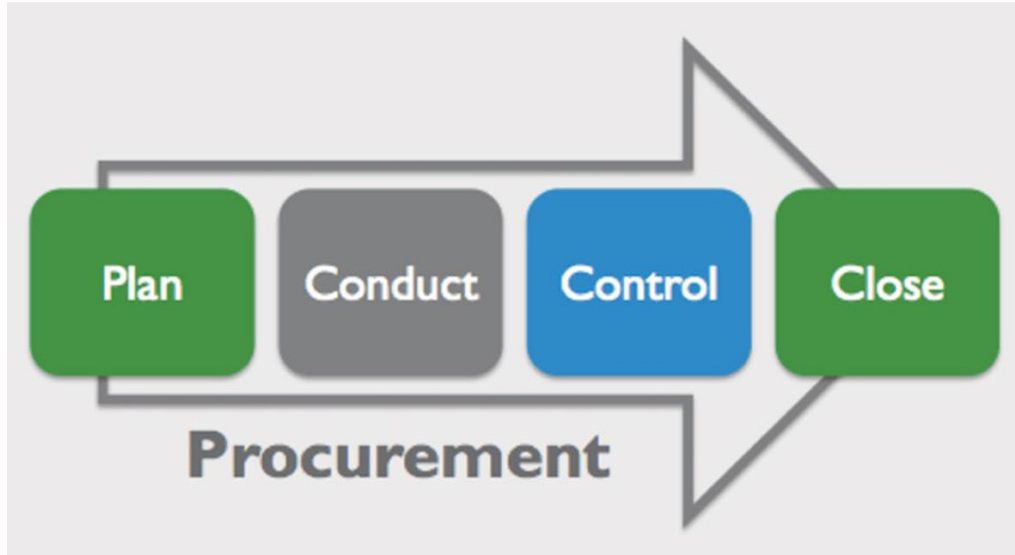
- Requirements definition process
- RFP issued with requirements
- Pre-proposal conference
- LMR sub-committee review and evaluated/scored
- Final negotiations conducted

Key System Changes

- Transition from analog to digital
- Transition from VHF to 800 MHz
- Transition from zoned system to simulcast
- Transition from conventional to trunking
- Increased channel capacity
- Improved Network Connectivity
- More resilient and redundant network
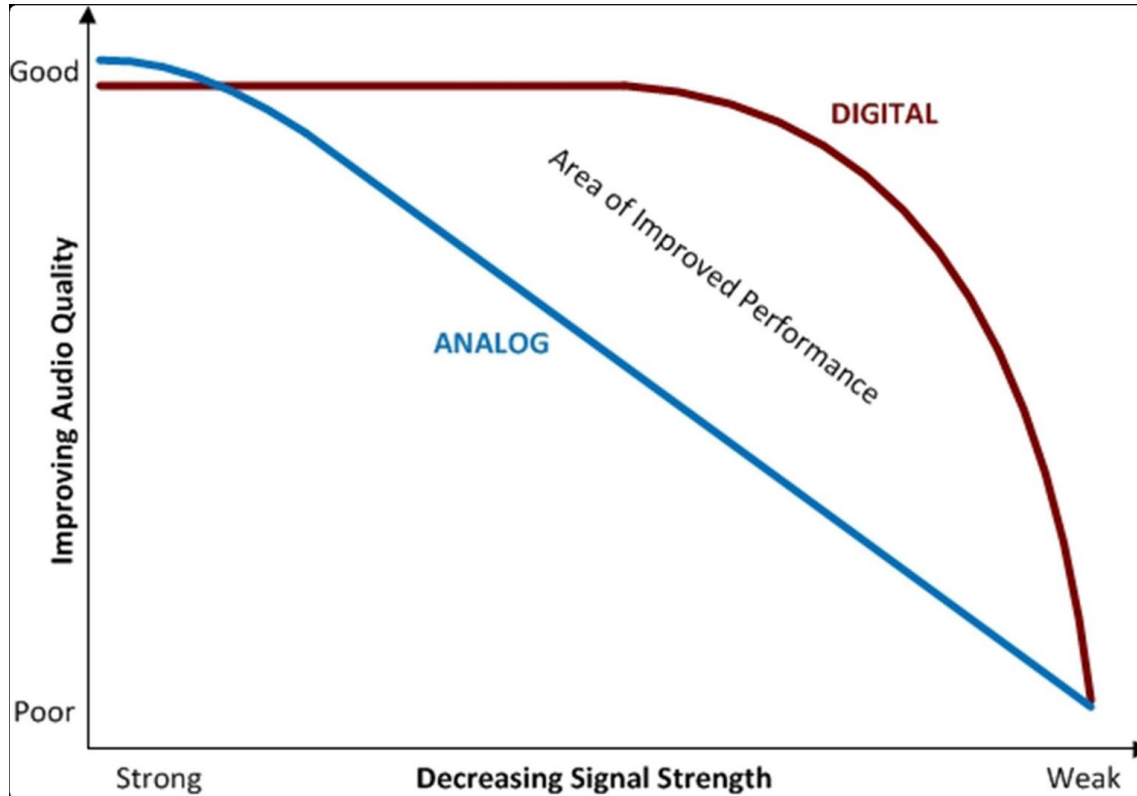- Enhanced Interoperability

Analog -> Digital
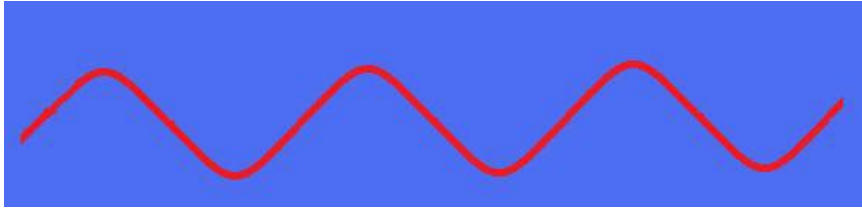
Analog −Electrical signal directly varies with the frequency and amplitude of the audio source signal
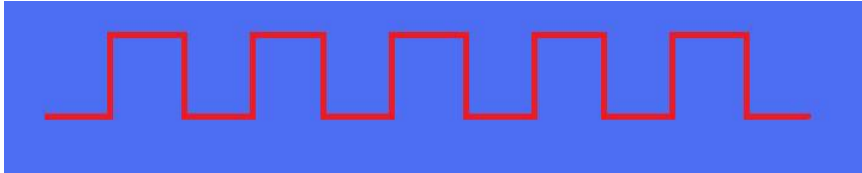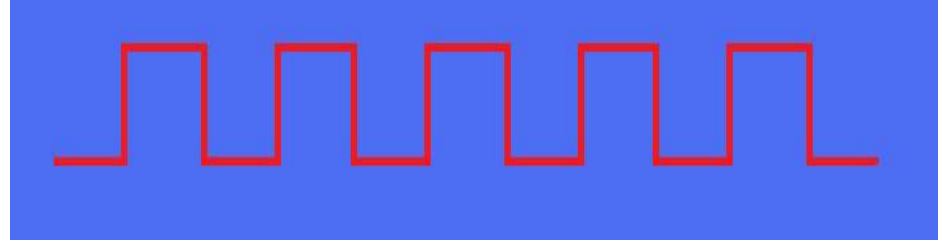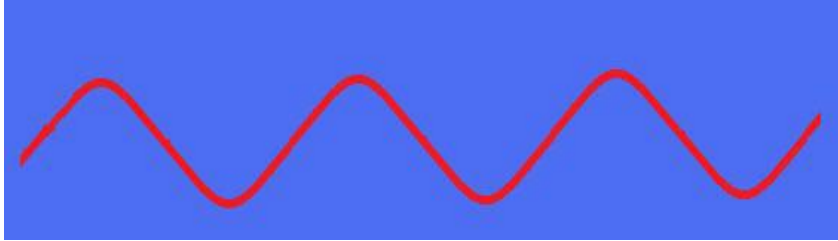

Digital−Analog audio signal is converted to an electrical signal in binary code (on-off) format

Analog and Digital Audio Quality

Analog and Digital Comparison

Analog	Digital
Audio quality **degrades as signal decreases**	High quality audio **until cutoff point**
Additional features limited because of inability to transmit data	**Large number of features** based on capability of transmitting voice and data interchangeably
No encryption capability	Can be **fully encrypted**
Only available in most **basic systems**	Required for **advanced systems**

VHF and 800 MHz Comparison

VHF	800 MHz
Highly congested band, **limiting availability** of frequencies for systems with high-capacity demands	**High quantity of frequencies** available
Poorly organized band without paired transmit/receive frequencies	**Pre-paired frequency** assignments
Subject to **high levels of interference**	Better frequency coordination processes to **limit interference**
Signals travel further over hilly terrain and through trees	Signals don't travel as well over hilly terrain and through trees
Poor in-building penetration for dense structures	**Good in-building penetration** for dense structures
No tower-top amplifiers to improve talk-in performance	**Tower top amplifiers**

Why 800 MHz was Selected
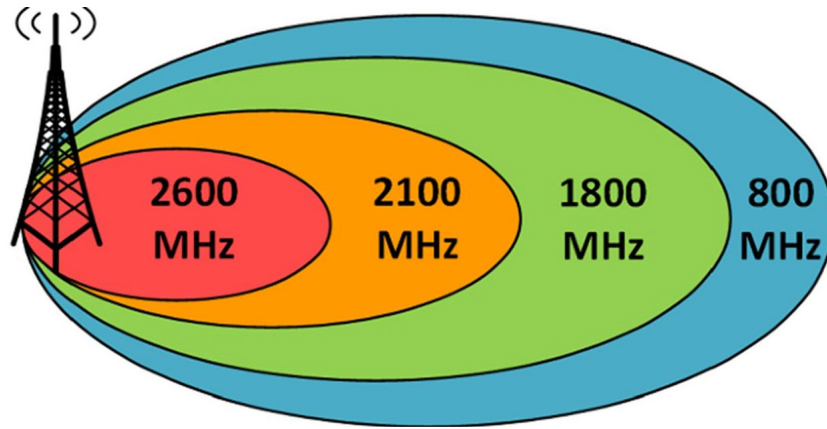
- Lack of VHF frequencies to support reliable countywide trunked system
- VHF frequencies could not be licensed with countywide footprint
- Frequencies would have severe power/height limitations
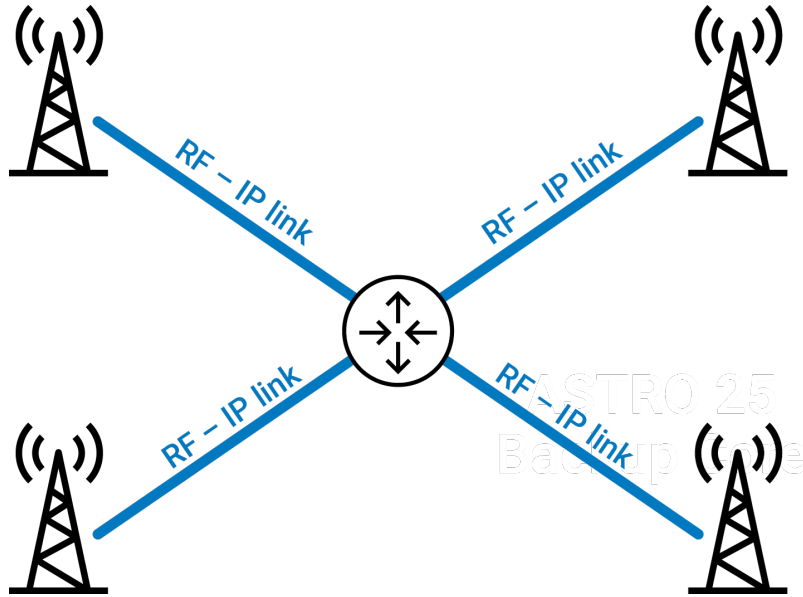- System would be subject to high levels of interference

Zoned System -> Simulcast
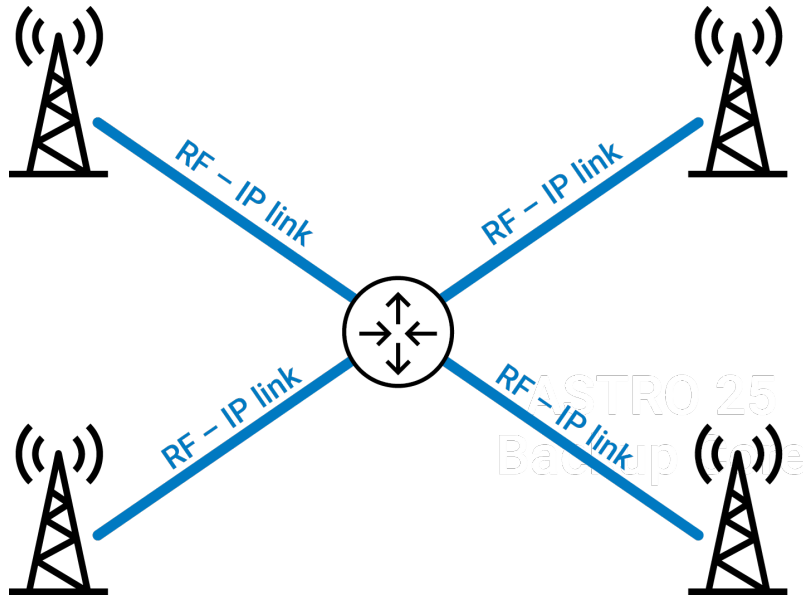
Zoned System

- Each channel has a different coverage area
- User experience limited to channel they are operating on
- Radio channel change needed to switch between operational channel and coverage

RF – IP link

RF – IP link

RF – IP link

RF – IP link

Zoned System -> Simulcast

Simulcast System

- All channels work at all tower sites

Conventional -> Trunking

Conventional	Trunking
Each channel uses a **specific frequency**	System uses a **pool of frequencies**, and "talk groups" are dynamically assigned when a call is initiated
Adding a channel **requires licensing new frequencies**, purchasing repeaters, and expanding antenna systems	**Virtually limitless number of talk groups** that can be assigned without any hardware changes
Channel change required to switch between different sites/zones	Radios can seamlessly **roam from one site to another**
Limited ability to support data	**Integrated** voice and data

Additional Trunking Benefits
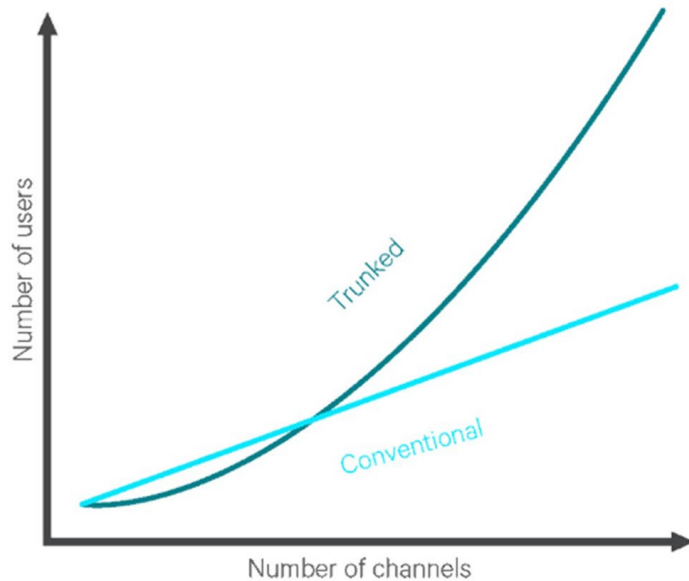
- Access control – only authorized radios are allowed access to the network
- Shared talk groups and roaming capability with shared-core users (ICORRS)
- Network security
- Component redundancy
- Remote system monitoring
- Flexibility to support future expansion

What is APCO Project 25

- Standard for public safety digital radio
- Allows for interoperability between radios and systems from different manufacturers
- Radios must be capable of operating in the same frequency band
- Technology required for most federal grants

ICORRS - What is it?

ICORRS = Inter County Regional Radio System

- Motorola core radio system infrastructure shared by member agencies
- Member Agencies: Armstrong, Butler, Cambria, Lawrence, Mercer, Fayette, Indiana, Somerset, Allegheny (under construction), Westmoreland
- Component redundancy
- Access control –only authorized radios are allowed access to the network
- Remote system monitoring
- Flexibility to support future expansion
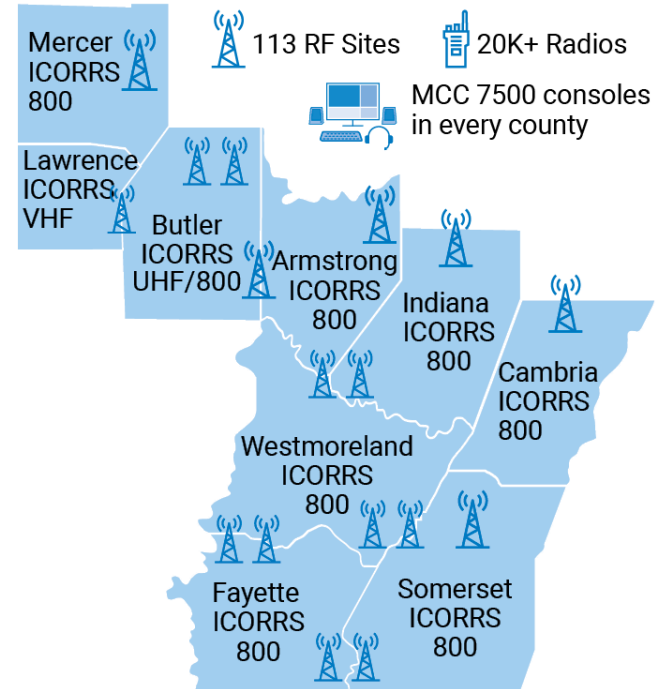
ICORRS - Key Benefits

- Reduced core maintenance and upgrade costs
- Leverage existing core-level system enhancements and redundant components
- Ability for radios to roam between different member county systems (subject to agency approval)

Joining ICORRS Regional Network
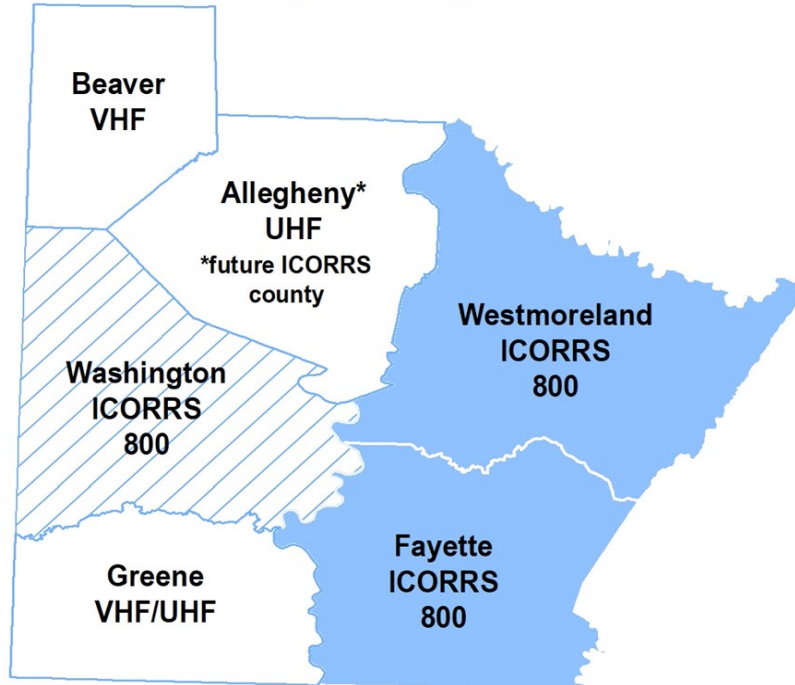
Design overview

- Standards based P25 Architecture
- 113 - RF Sites
- All Bands Supported (VHF, UHF & 7/800MHz)
- Secure AES FIPS 140-2 Encrypted Communications
- Enhanced Data, OTAR, OTAP, Radio Management, Group Services, Location & Asset Management
- Existing Comprehensive Backhaul Network
- Existing ISSI connection to STARNet
- Leverages all assets and resources within the network

Inter-County Regional Radio System – ICORRS

113 RF Sites

20K+ Radios

MCC 7500 consoles in every county

Mercer ICORRS 800

Lawrence ICORRS VHF

Butler ICORRS UHF/800

Armstrong ICORRS 800

Indiana ICORRS 800

Cambria ICORRS 800

Westmoreland ICORRS 800

Fayette ICORRS 800

Somerset ICORRS 800

ICORRS - Key Benefits

Washington County, Pennsylvania
ICORRS Interoperability and Mutual Aid

Beaver VHF

Allegheny* UHF
*future ICORRS county

Westmoreland ICORRS 800

Washington ICORRS 800

Greene VHF/UHF

Fayette ICORRS 800

- Common ICORRS radio template
- Reduce the need to carry multiple radios using Interop talk groups
- Washington County talk groups can appear on other county consoles for back up needs
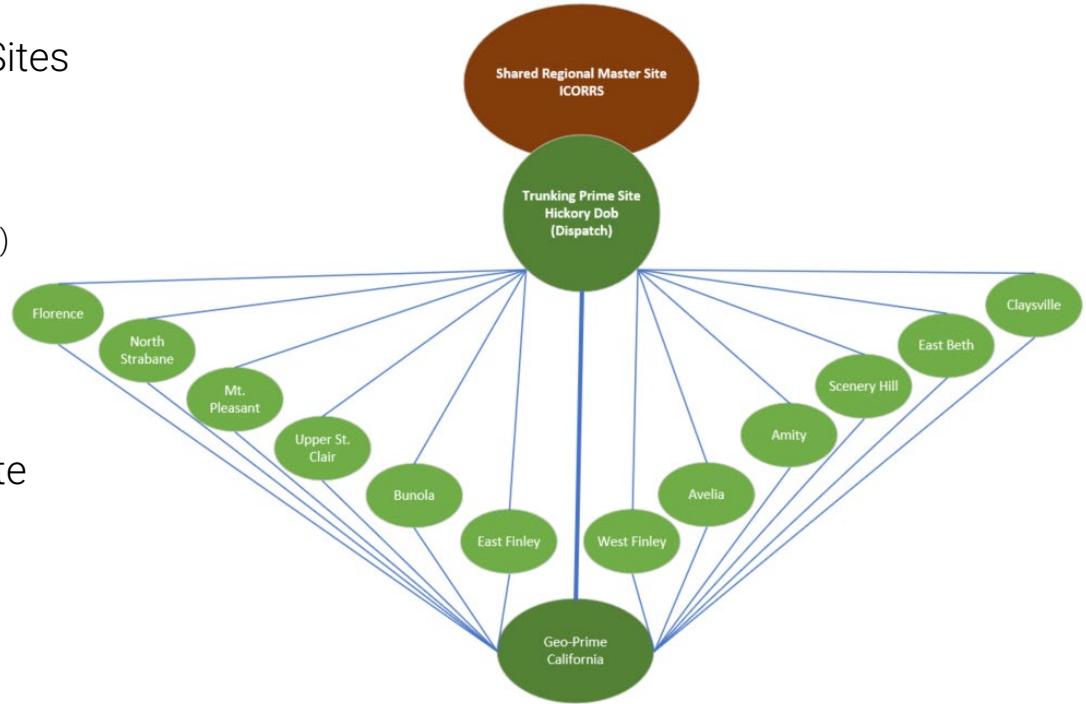
New System Solution

- New Countywide Simulcast Project 25 digital network

- ICORRS Regional Network Connectivity

- New Licensed Microwave Network

- System Coverage

- Project Schedule

- Radio Subscriber Units

New System Solution

- Fourteen (14) 800 MHz Simulcast Sites
- Shared Regional Master Site
  - ICORRS Core
- One (1) Dispatch Site (Existing Consoles)
  - Hickory Dob
- Trunking Prime Site
  - Hickory Dob
- Geo-redundant Virtualized Prime Site
  - California
- Eight (8) Channels
  - Ten (10) TDMA Talkpaths
  - Two (2) FDMA Talkpaths
 - 1 Control Channel

New Microwave System Solution
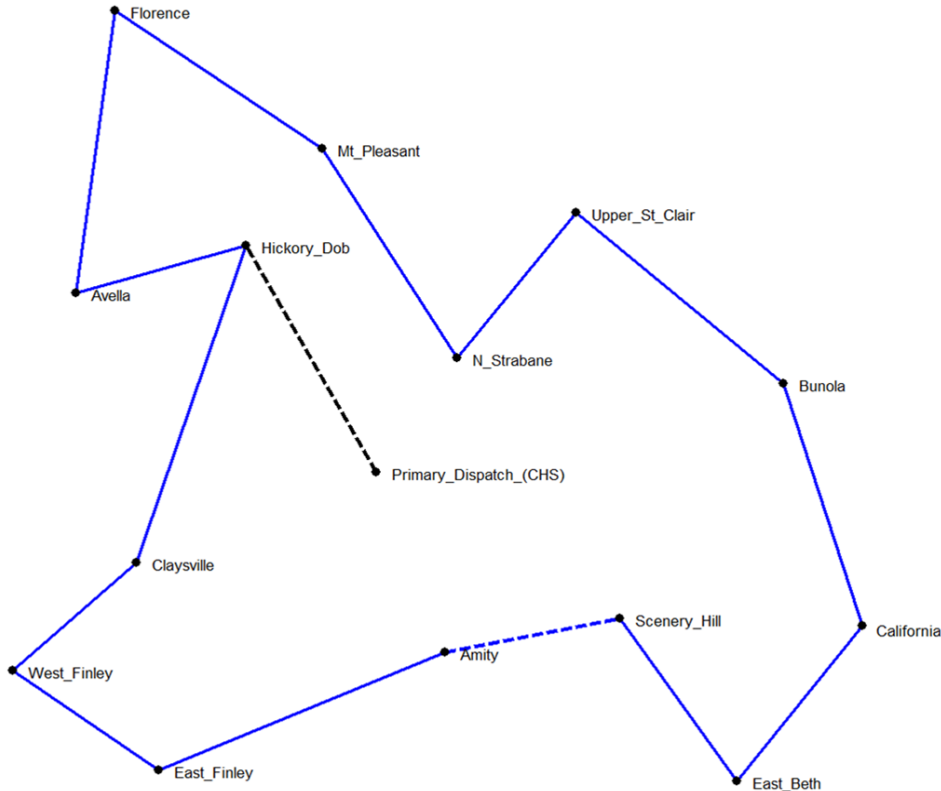
- Aviat Licensed Microwave with MPLS Overlay
- 14 Links
- One (1) SAR-8 Router per site
- Availability 5-9s or better
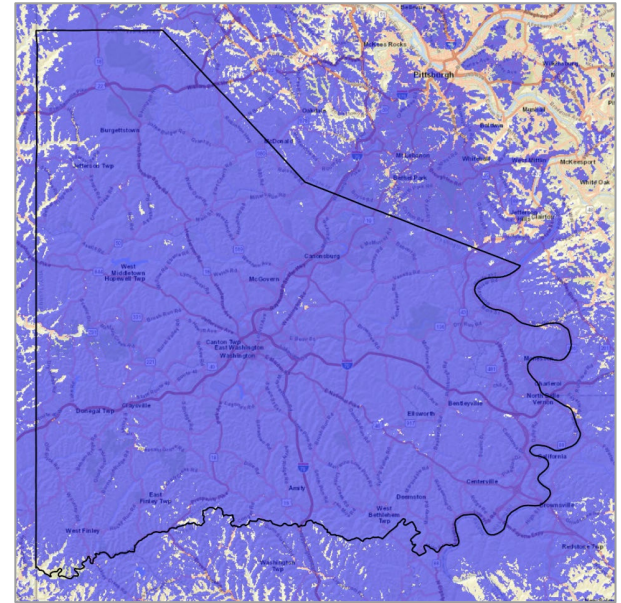 - 99.999% reliability

Presented 01-29-2025
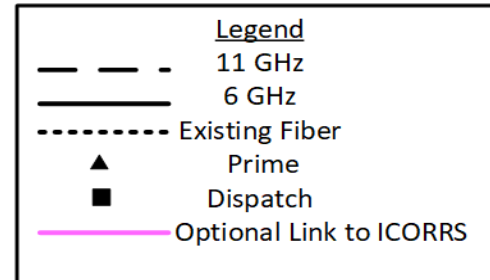
New System Coverage

Mobile Coverage

- Single Simulcast Cell
- 95% Service Area Reliability for Mobile
- APX 4500 Mobile, ¼ Wave Antenna, Center of Roof
- DAQ 3.4
- <1% Grade of Service
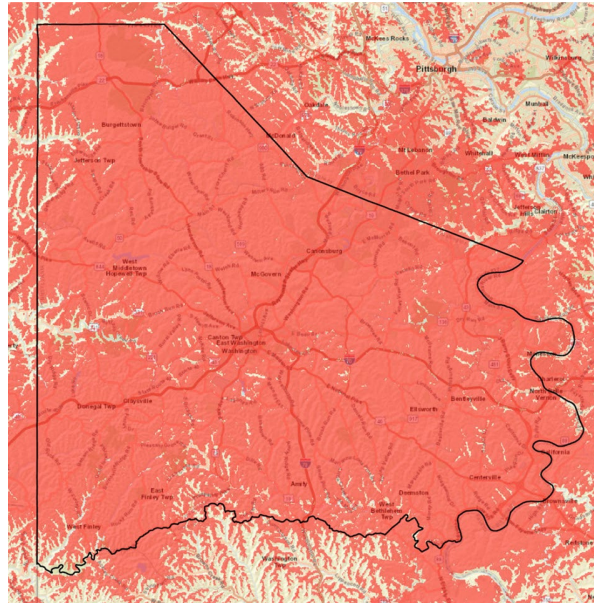- Inbound/Outbound BER Independently
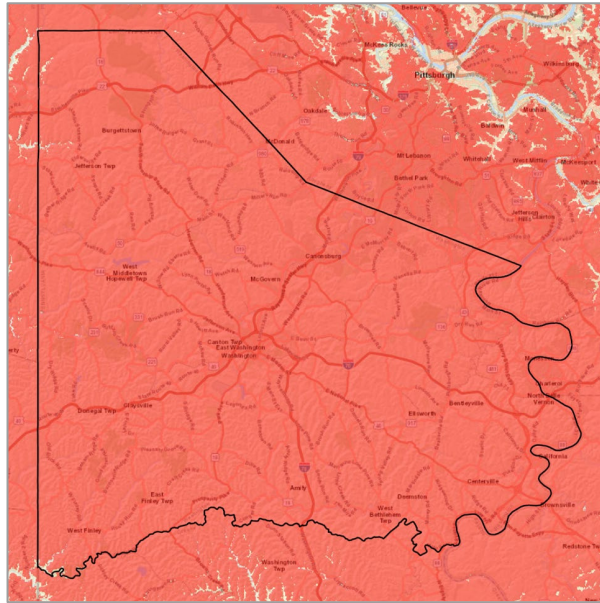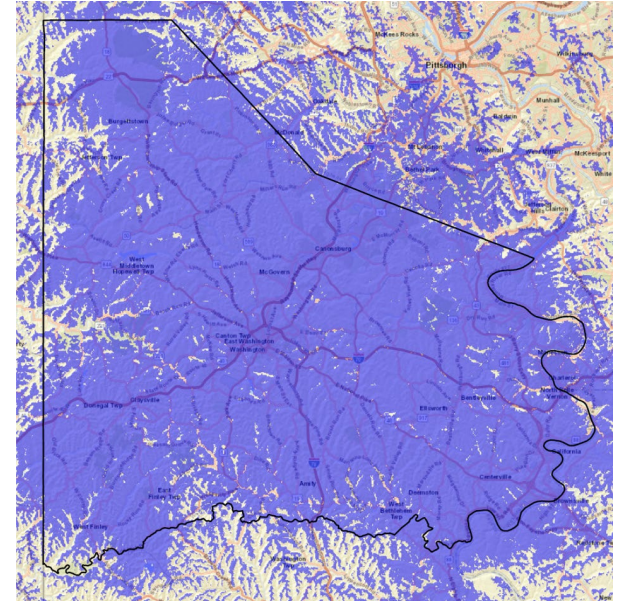
Inbound

Outbound

New System Coverage

Portable Coverage

- Single Simulcast Cell
- 90% Service Area Reliability for Portable On-Street
- APX 4000/N50 Portable on Hip with ½ Wave Antenna and Remote Speaker Mic
- DAQ 3.4
- <1% Grade of Service
- Inbound/Outbound BER Independently

Inbound

Outbound

Preliminary Project Schedule/Timeline

2024	2025				2026				2027
Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1
Project Kickoff and CDR									
	Site Development (MCP Site Acq) (MSI Shelter Install)								
		Equipment Ordering							
				LMR Staging					
				MW Staging					
					LMR Install				
						Subscribers Ordering			
							FNE Optimization & Testing		
							Subscribers Programming		
							Coverage Testing		
								Final Acceptance & Start of Warranty	

New System provides you with:

Increased Radio Coverage	Reliable countywide coverage that is guaranteed and tested for mobile and portable radios
Increased System Capacity & Expandability	Providing system users faster access to critical communications with less channel contention
Enhanced Interoperability	Enabling users to communicate with other internal/external agencies when needed
Increased Reliability and Redundancy	Ensuring the network is available during times of emergency and in the moments that matter
Fully Designed and Guaranteed Network	Fully engineered system with frequency licensing included. Vendor responsible for all features and coverage per the contract
New Radios for System Users	Ensuring a fair distribution of new radios for system users • portables • mobiles • stations
Lifecycle Management Program	Ensuring the network maintains the latest release of software & hardware - consistent with all other partnering ICORRS counties

New Radio Subscriber Units

Types of Subscribers

- N50, N70, N70XE
- APX 4500 Enhanced
- APX 4500 Enhanced Control Station
- Also available:
  - APX 6000/XE
  - APX 8000/XE

APX N50 Single-Band Portable Radio

Providing secure communications your users can rely on in the field to stay organized for whatever the day throws at them.

Slim and Sleek.
Tough and Powerful.

- Optimizing space & speed
- Trusted APX quality
- ViQi Basic Voice Control
- A suite of accessories

Secure Communications.
Efficiently Managed.

- Secure communications
- MACE hardware encryption
- Advanced provisioning

Send Audio without Second Guessing.

- Loud and clear
- Adaptive audio engine
- Environmentally aware features

Connect and Collaborate.

- All operation modes & interoperability
- Wi-Fi
- SmartConnect

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APX N70 XE

Preliminary Design

- Ferrule Antenna
- Frequency Knob
- Volume Knob
- Molded-in Logo
- Monitor Button
- PTT
- 3" Display
- RATT Buttons
- Wake Button
- Keypad

- ABC Lever
- Top Display
- LED
- Secure Lever
- Emergency Button

- Speaker Housing
- ViQi Button
- Mini-GCAI Dust Cover
- UL Div 1 Battery

COMING IN JUNE 2025

MOTOROLA

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Advanced Lifecycle Test - Sequential

- Temperature Shock
- Temperature Cycling
- Drop
- Vibration
- Blowing Rain
- Dust
- Salt Fog
- UV Exposure
- Electro-Static Discharge (ESD)

APX Endoskeleton Design

APX 4500 Enhanced Single-Band Mobile P25 Radio

APX 4500 key features

Uncompromised Performance. Efficient Operation.

- **Control Head & Configuration**
  O2 (green & gray)

  Dash and remote mount

- **Rugged and Reliable**
  IP56 and MIL-STD 810

- **Data Modem Tethering**
  Connect to an in-vehicle modem

- **Security**
  AES/AES encryption

  Mulikey up to 128 keys

- **Impact Detection***

  Automatically alert dispatch

- **Built-in WI-FI***
  Up to 20-pre-provisioned hotspots

  Designed for Programming

* Enhanced features

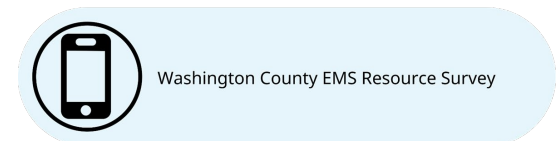**Available in High Impact Green or Gray**

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APX Mobile/Control Stations

APX 4500 Mobile Enhanced

- Mobile
- Tray
- Power supply
- Desk Mic

Required for Public Safety Department Radios

Fire Department Resource Form

Washington County Police Resource Survey

Washington County EMS Resource Survey

Thank You