International Wireless and Communications Expo
College of Technology Las Vegas, Nevada
March 27, 2017

P25 User's Perspective

Interoperability, and Customer Applications Update for 2017

Presented by:
PTIG - The Project 25 Technology Interest Group
www.project25.org – Booth 746

Program Participants

Moderator

- **Del Smith**, PTIG Chairman, Operations Manager, ALASKA LAND MOBILE RADIO

Panelists

- **Steve Nichols**, Director, PROJECT 25 TECHNOLOGY INTEREST GROUP
- **James Downes**, Chairman, FEDERAL PARTNERSHIP FOR INTEROPERABLE COMMUNICATIONS (FPIC) Chairman, P25 Steering Committee
- **Chuck Brotherton**, Wireless Communication Services Manager, CITY OF Austin TX
- **Richard Schmahl,** Program Director, SWIC and CO-SPOC, STATE OF OHIO MARCS
- **Tom Bretthaur**, Data Systems Manager, STATE OF OHIO MARCs
- **Scott Wright**, Telecommunications Engineer, CONNECTICUT DEPARTMENT OF EMERGENCY SERVICE AND PUBLIC PROTECTION
- **Ernie Blair,** CEO/Director Radio Infrastructure, HUNTSVILLE-MADISON COUNTY AL 9-1-1 SYSTEM
- **Kevin Jenkins,** Executive Director, CALHOUN COUNTY, AL 9-1-1 DISTRICT.

Take Away Topics To Look For

A look at P25 in the field and user supported experiences.

How and Why P25 is Useful to So Many Public Safety Users.

How is P25 Being Deployed for Interoperability.

Challenge the Myths, See the Realities of P25 Pros and Cons.

The Reality of Multiple Vendor Interoperability with P25.

Get Acquainted with System Level Interoperability

- P25 is about More than Multiple Choice Mobiles & Portables.

Get Acquainted with PTIG Resources for your Information.

Project 25 Technology Interest Group (PTIG)

What do we do?

- Provide a forum for users and manufacturers
- Manage education and training on Project 25
- Create and distribute Project 25 information
- Support the TIA standards process
- Offer Users access to the standards process without the rigor of TIA membership
- Maintain a “neutral ground” among the competing manufacturers and providers

And…

- Present Classroom Training and Panels such as THIS SESSION.

Founding Member

COBHAM

Sustaining Members

AECOM

HARRIS

MOTOROLA SOLUTIONS

RELM WIRELESS

CODAN RADIO COMMUNICATIONS

TiL

AIRBUS DS Communications
home of VESTA®

ICOM

EFJohnson TECHNOLOGIES
JVCKENWOOD Group

tait communications

JVCKENWOOD

Vertex Standard

ZETRON

Project 25 Technology Interest Group: Corporate and Professional Members

41 Vendors for Project 25 Equipment and Services

Available in VHF, UHF, 700, 800, and 900 MHz

16 Fixed station/repeater suppliers

14 Subscriber suppliers:

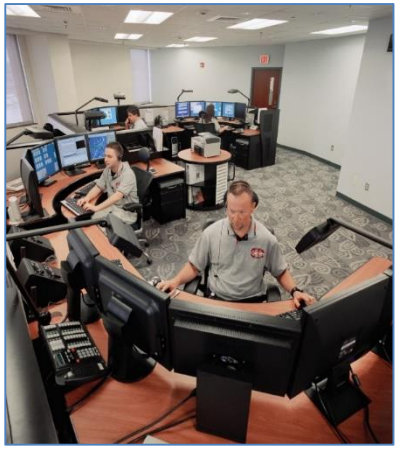
Mobiles, Portables, Vehicle Repeaters, Pagers

13 Console suppliers

15 Network providers

8 Test equipment suppliers

11 Consultant services



Project 25 Products and Services Available

PTIG Member Organizations www.Project25.org Note: BOLD – PTIG Sustaining Members	Web Address	Fixed Stations & Repeaters	Mobile & Portable Radios	Pagers	Vehicle Repeaters	Consoles	Networks	Software	Test Equipment	Systems Integration	Consultant Services
AECOM	www.aecom.com/communicationstechnology										
AIRBUS DS COMMS	www.airbus-dscomm.com										
AVTEC	www.avtecinc.com										
BLACK & VEATCH	www.bv.com/publicsafety										
CATALYST	www.catcomtec.com										
CISCO	www.cisco.com										
COBHAM	www.ats.aeroflex.com										
CODAN RADIO	www.codanradio.com/lmr										
COMPLIANCE TESTING LLC	www.compliancetesting.com										
DVA CONSULTING	www.dvaconsult.com										
DVSI	www.dvsinc.com										
EF JOHNSON	www.efjohnsontechnologies.com										
ETHERSTACK	www.etherstack.com										
FEDERAL ENGINEERING	www.fedeng.com										
5 x 9 COMMUNICATIONS	www.5x9comm.com										
FUTURECOM SYSTEMS	mark.townson@futurecom.com										
GENESIS GROUP	www.GenesisWorld.com										
HARRIS CORPORATION	www.pspc.harris.com										
ICOM AMERICA	http://www.icomamerica.com/en/landmobile/										
IDA CORPORATION	http://www.idaco.com										
INTER TALK SYSTEMS (Formerly Pantel)	www.intertalksystems.com										
JVC KENWOOD	www.kenwood.com/usa/com/lmr										

Project 25 Products and Services Available

PTIG Member Organizations www.Project25.org Note: BOLD – PTIG Sustaining Members	Web Address	Fixed Stations & Repeaters	Mobile & Portable Radios	Pagers	Vehicle Repeaters	Consoles	Networks	Software	Test Equipment	Systems Integration	Consultant Services
LOCUSUSA	www.locususa.com										
MIDLAND RADIO	www.midlandradio.com										
MOTOROLA SOLUTIONS	www.motorolasolutions.com/en_us/products/p25-story.html										
POWERTRUNK (TELTRONIC)	www.powertrunk.com										
RELM WIRELESS	www.relm.com										
RFTECHNOLOGY	www.rftechnologyamericas.com										
SIMOCO	www.simocogroup.com										
SPECTRA ENGINEERING	www.spectraeng.com.au										
STANDARD COMM PTY LTD - GME	www.gme.net.au										
TAIT COMMUNICATIONS	www.taitradio.com										
TECHNISONICS	www.til.ca										
TELEVATE	www.televate.com										
TELEX RADIO DISPATCH (BOSCH)	www.telex.com										
TIMCO ENGINEERING	www.timcoengr.com										
UNICATIONS USA	www.unicationUSA.com										
VALID8	http://www.valid8.com										
VERTEX STANDARD	www.vertexstandard.com										
ZETRON	www.zetron.com										
Note: BOLD=PTIG Sustaining Members											
40		16	13	1	7	13	15	7	8	17	10

WWW.Project25.org

Project 25 Technology Interest Group (PTIG)

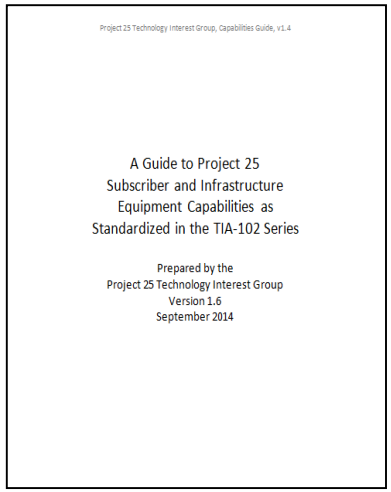
Documents available at www.Project25.org

P25 Frequently Asked Questions

Updated in 2016. Written to officer, firefighter (non technologist) level

P25 Updated Capability Guide

Remains the best tool for managing P25 features and capabilities for system planning and RFP development


Project 25 Technology Interest Group, Capabilities Guide, v1.4

A Guide to Project 25
Subscriber and Infrastructure
Equipment Capabilities as
Standardized in the TIA-102 Series

Prepared by the
Project 25 Technology Interest Group
Version 1.6
September 2014

P25 Standards Update Summary

Summary of the latest TIA TR-8 P25 Standards Meetings with user benefits defined

P25 Steering Committee Approved List of Standards

Updated from the most recent P25 Standards meeting

P25 Feature Translator

link to NPSTC PAM tool

Project 25 Technology Interest Group (PTIG)

New Documents available at www.Project25.org

New White paper: Now is a good time to revisit the use of P25 Technologies on the Fire ground.

During the past few years there have been updates to the P25 standards, improvements to the P25 vocoder and new P25 products incorporating these improvements that deliver improved performance on the fire ground.

P25 System of the Month

Each month a new Project 25 system is featured describing the system, coverage, agencies served, interoperability achieved and other unique details of this application of Project 25 technology.

New White Paper: Technology Benefits of Project 25

This article has been recently updated to include the new wireline interfaces (ISSI, CSSI, FSI) and new operational capabilities recently added to the P25 suite of standards.

The Whitepaper covers the background and history of the P25 Standard, original goals and objectives, a summary overview of the standards and how they translate into benefits for the Public Safety community.

Project 25 Technology Interest Group (PTIG)

P25 List of Systems

PTIG has published a Two lists of known P25 Systems in the USA, Australia, Canada, New Zealand, and the UK.

Both P25 systems lists are organized by state, and territory. The Information for each system includes: System name, System user type (Federal, Tribal, Public Safety, Utility, Campus Police etc.), and Frequency band.

List of P25 Conventional Systems: 1299

The P25 Conventional systems total is 1299.. P25 Conventional systems are identified as digital only or mixed mode analog and digital.

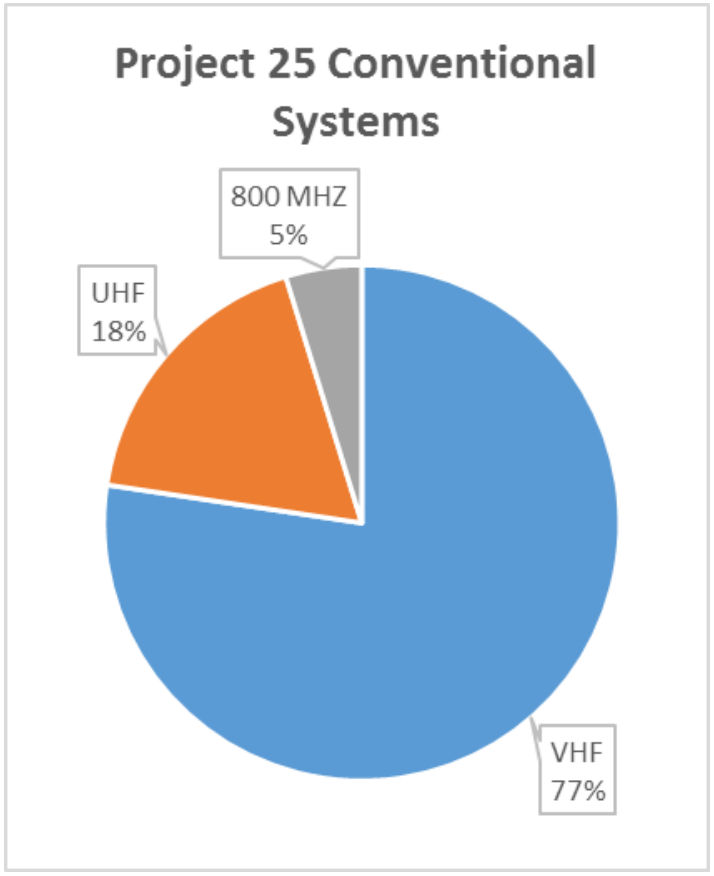
List of P25 Trunking Systems: 842

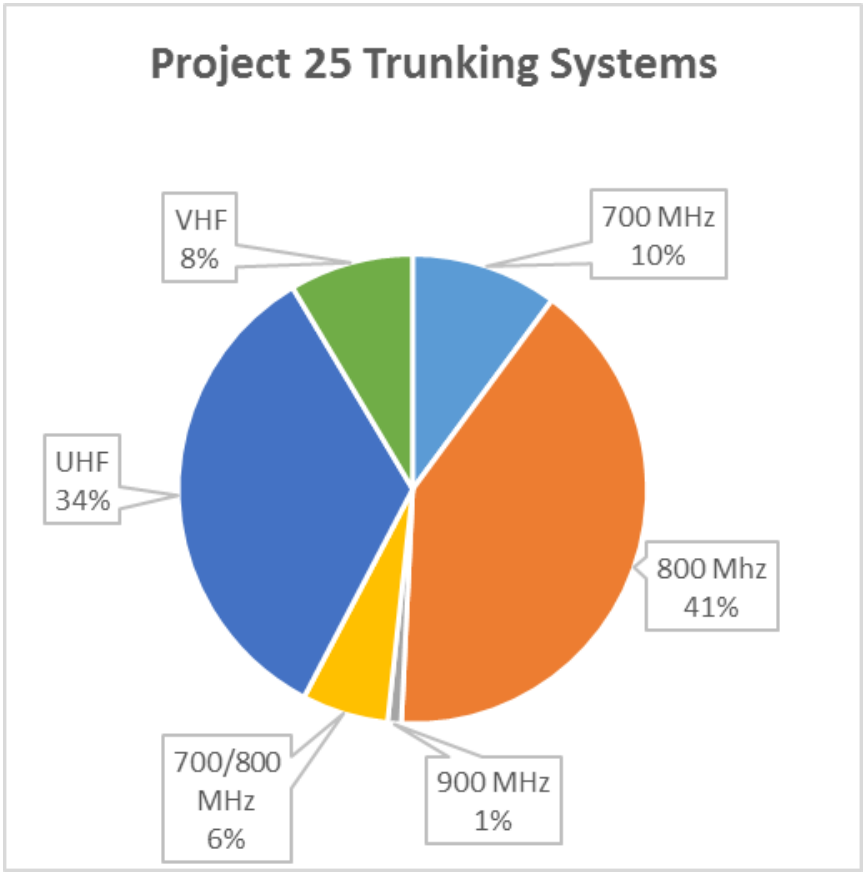
The P25 Trunking system list has grown from 711 systems November 2015 to 842 systems today. P25 Trunking systems are identified as P25 Phase1 or P25 Phase 2.

The grand total is **2141 Project 25 Systems**

Project 25 Technology Interest Group (PTIG)

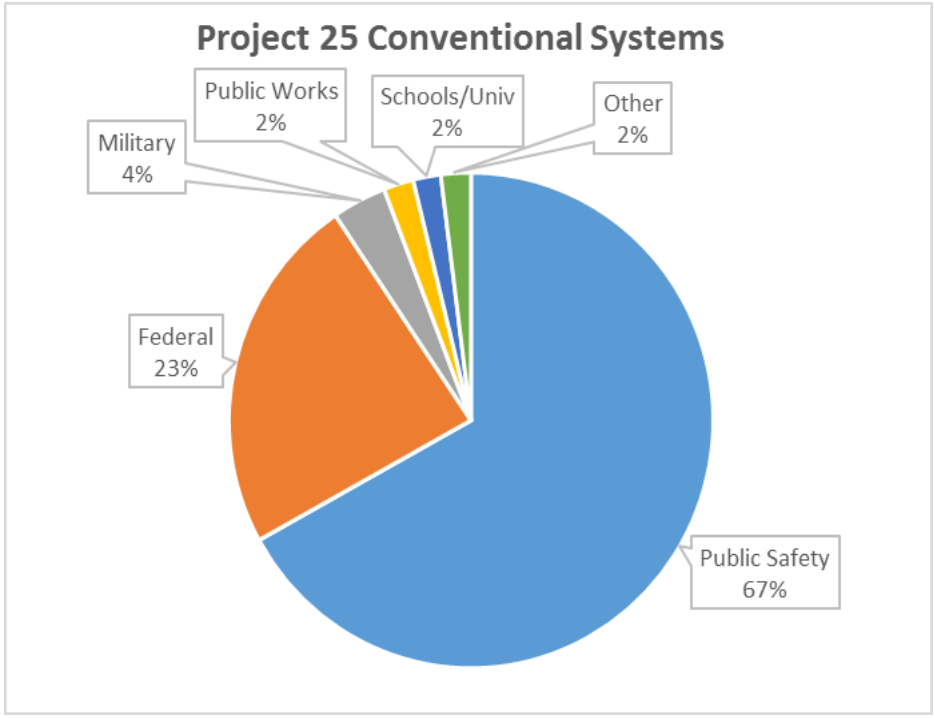
P25 Systems by Frequency Band

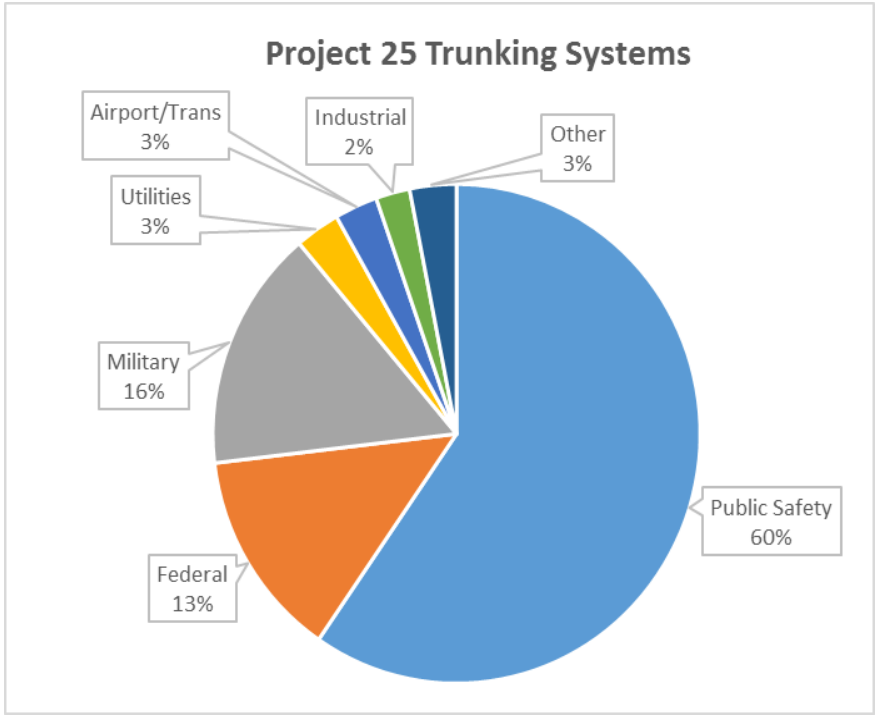




Project 25 Technology Interest Group (PTIG)

P25 Systems by Type of User Agency





Why Project 25….

Multiple Air Interfaces: P25 offers interoperable FDMA and TDMA air protocols that are backward compatible to legacy analog technology

Multiple Wireline Interfaces: P25 has well defined wireline interfaces to link P25 Systems (ISSI), Consoles (CSSI) and RF sub systems (FSI)

Frequency Agnostic Operation in Multiple Bands: VHF 136-174 MHz, UHF 380-512 MHz, 700/800/900 MHz

Trunked and Conventional Operation: Including direct modes for unit to unit communications

Multiple System Configurations: P25 offers: direct mode, repeated, single site, multi-site, voting, multicast, and simulcast configurations

"Public Safety Grade" Products and Services Offerings from 41 P25 Vendors

Established Base of over 2100 P25 Systems on the Air Today

PROJECT 25 Technology Interest Group MEMBERS EXHIBITING	Booth Number
• AVTEC	635
• BLACK AND VEATCH	262
• CATALYST COMMUNICATIONS	1445
• **COBHAM**	**1335**
• **CODAN RADIO COMMUNICATIONS**	**1055**
• **EFJOHNSON TECHNOLOGIES**	**617**
• ETHERSTACK	1649
• FUTURECOM SYSTEMS	1249
• GENESIS GROUP	1347
• **HARRIS CORPORATION**	**1329**
• **ICOM AMERICA**	**1023**
• INTER TALK SYSTEMS (PanTel)	2904
• **JVC KENWOOD**	**617**
• LOCUS USA	867
• **MOTOROLA SOLUTIONS**	**1317**
• POWERTRUNK	1735
• **PROJECT 25 TECHNOLOGY INTEREST GROUP (PTIG)**	**746**
• **RELM WIRELESS CORP**	**1035**
• RFTECHNOLOGY	655
• SIMOCO	1646
• **TAIT COMMUNICATIONS**	**1527**
• TELEX	1531
• TIMCO ENGINEERING	1742
• UNICATION	3118
• **VERTEX STANDARD**	**1223**
• **ZETRON**	**1017**
SUSTAINING MEMBERS	
FOUNDING MEMBERS	

PROJECT 25 TECHNOLOGY INTEREST GROUP

Visit PTIG
Booth # 746
IWCE 2017

OUR MEMBER ORGANIZATIONS AS EXHIBITORS ALSO SAY

THANK YOU

Homeland Security

Project 25 User's Perspective and Customer Applications Update for 2017

International Wireless Communications Expo
College of Technology
Monday, March 27, 2017
8:30 – 11:30 a.m.

James Downes
Federal Emergency Communications Section Chief
Department of Homeland Security (DHS)
Office of Emergency Communications (OEC)

DHS Continues to Support Project 25

- Mission-critical voice Land Mobile Radio (LMR) is going to be around for a long time
- Project 25 (P25) is the best choice for interoperability
- DHS continues to be committed to P25
  - P25 is the recommended technology for interoperability in the SAFECOM Grant Guidance
  - P25 is a significant part of the National Emergency Communications Plan (NECP)
  - DHS actively participates in the P25 development process and currently chairs the P25 Steering Committee

Importance of LMR Sustainment and Continued P25 Support

- The sustainment of resources and operational capability supporting LMR is vital to public safety mission-critical communications
- OEC is working closely with SAFECOM – National Council of Statewide Interoperability Coordinators (NCSWIC) to address LMR issues at all levels of public safety that include technology, funding, governance, and others
- Communications operability is the key to enhanced interoperability
- The P25 standard ensures mission-critical communications and remains robust, interoperability, and sustainable

Project 25 Compliance Assessment

- DHS strongly supports the P25 Compliance Assessment Project (CAP) process
- It is critical that P25 equipment and systems are compliant with the published standards and confirmed through an open and coordinated process
- It is important to note that both the P25 Steering Committee and the Telecommunications Industry Association (TIA) TR-8 Engineering Committee support the CAP process by forwarding jointly developed P25 Recommended Compliance Assessment Tests (RCATs) for CAP consideration

Project 25 and the User

- Project 25's influence continues to expand worldwide
- Project 25 continues to develop updated standards and address new technologies as required
- User participation is critical to the development of effective standards that address user requirements
- Important to use CAP Compliance Assessment Bulletins (CABs) and P25/TIA Standards and Bulletins when procuring systems to ensure compliance.

Questions?

- Please direct any questions regarding DHS OEC's activities in the Project 25 environment to:

Jim Downes
US Department of Homeland Security
Office of Emergency Communications
james.downes@dhs.gov

Homeland Security

Project 25 User's Perspective

Greater Austin-Travis County Regional Radio System (GATRRS)

Chuck Brotherton,
Wireless Manager, GATRRS Program Manager
City of Austin, Texas

GATRRS Overview

Went live in 2003 serving a coalition of six area partners. Today, four partners remain:

- City of Austin, Travis County, Austin Independent School District, and UT-Austin.
- New partner, Tx Dept. of Transportation, status pending.

Replaced a collection of legacy, aging, local systems of various bands and technologies.

- December 2000 contract was competitively awarded to Motorola.
- Implementation cost: $36M for infrastructure; $38M for subscriber equipment; total $74M.

GATRRS Overview

- **System as conceived:**
  - 800 MHz (NPSPAC) trunked, simulcast, P25 Phase 1.
  - 95% coverage countywide to portable radio on hip with speaker mic inside a wood-frame structure (house).
  - 17 subsites, 24 channels each; 7 ISR sites, 4 channels each.
  - 12,000 subscriber units.
- **System as built:**
  - 2 overlapping simulcast layers, one 10-site w/24-channels each, one 8-site w/20-channels each; 7 4-ch ISR sites.
- **City of Austin is contracting agent and managing partner.**

GATRRS Overview

- **Today:**
  - 15,500 subscribers, 60+ agencies and departments.
  - 1.5 million active calls a month with “zero” busies.
  - Wide-area trunking up-time is 99.999%.
  - Vendor support:
    - Maintenance contract with on-site team and remote network monitoring.
    - Quarterly scorecard meetings.
    - Rolling 6-year technology roadmap.
  - Midway through a 6-year life-cycle capital ($32M) project started in FY13.

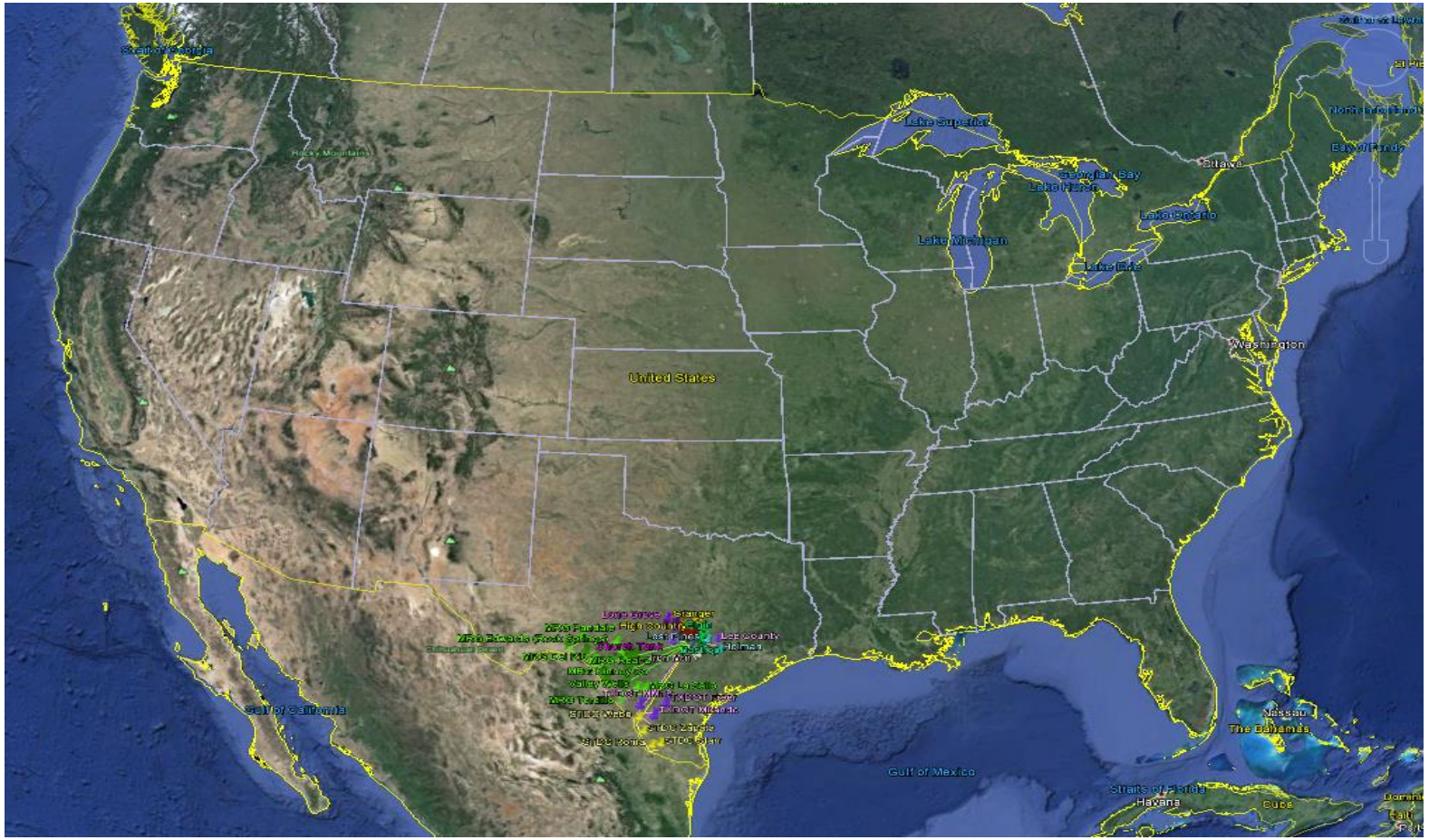
GATRRS Overview

- **Technology (upon completion of capital project in 2018):**
  - Aviat MPLS microwave network with loop protection.
  - Motorola Astro 7.17.
  - 1 simulcast layer, 12 subsites, 30 channels; 5 ISR sites (3 with 12 channels, 2 with 4 channels).
  - Dual hot prime sites.
  - MCC-7500 console network.
  - APX subscribers.
  - P25 Phase 1.

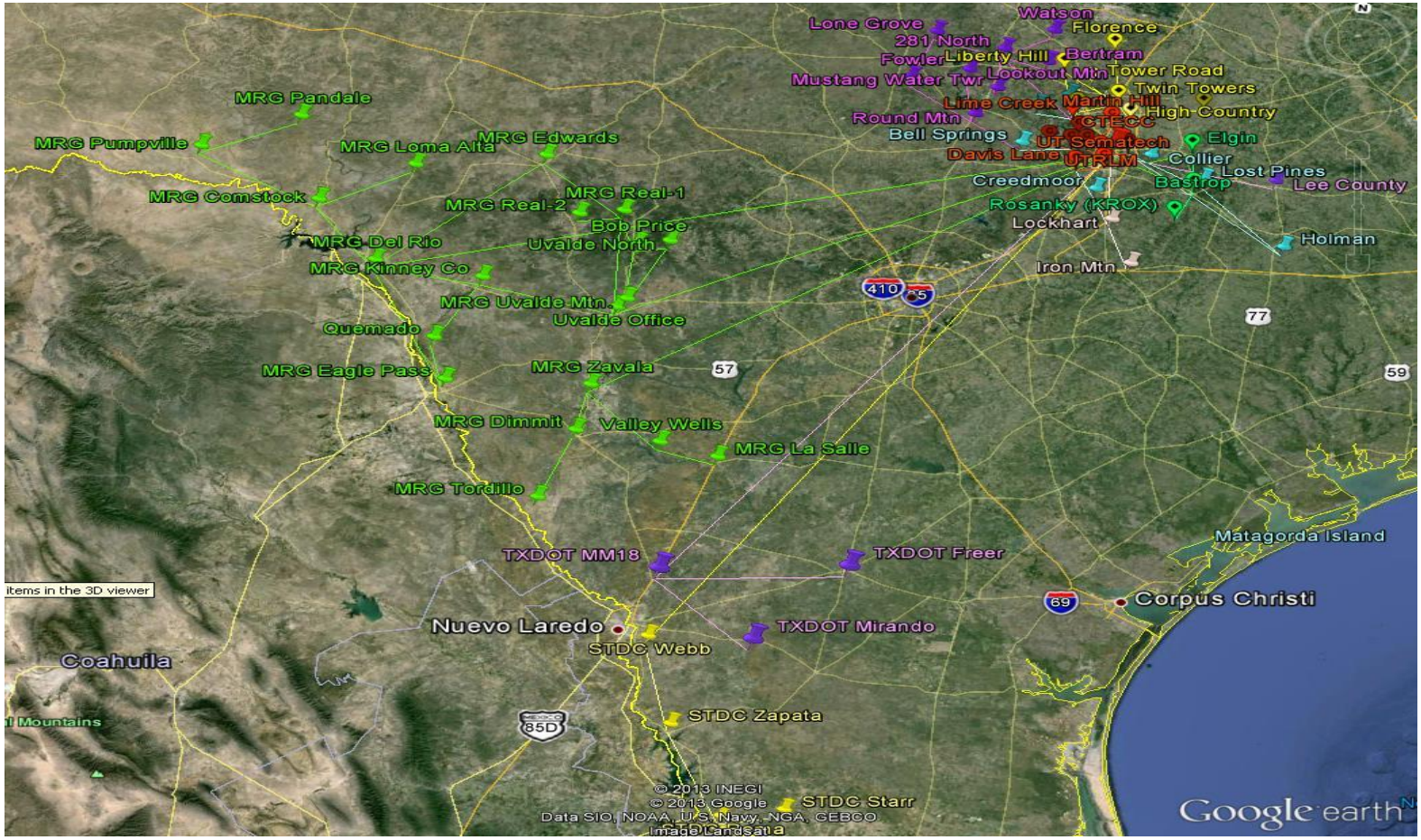
GATRRS Overview

- **P25 Interoperability:**
  - 2005: First P25 subsystem joined GATRRS core in Austin.
    - Middle Rio Grande Development Council (9 counties, 16 ISR sites).
  - 2006-2014:
    - 7 separate county systems contiguous to Austin-Travis County.
    - Texas DPS.
    - Texas DOT.
    - South Texas Development Council (4 counties, 5 ISR sites).
  - 2017: GATRRS serves 21 Texas counties, several state agencies, hundreds of local public safety and public service departments.
    - Total subscriber count > 20,000.

GATRRS Overview



GATRRS Overview



GATRRS Overview

- **P25 Interoperability:**
  - No recurring fee due Austin for connecting to GATRRS core but certain requirements must be met.
    - Motorola “SUA-II” for same Astro version systemwide.
    - Ethernet connectivity with redundant paths to core.
  - All who join must adopt GATRRS interoperability plan.
    - Standardized talkgroup naming.
    - Regional interoperability talkgroups in labeled zones, same place in every radio according to discipline.

CH#	G1 R OP 1-15
1	G1 R OP 01
2	G1 R OP 02
3	G1 R OP 03
4	G1 R OP 04
5	G1 R OP 05
16	G1 8TAC95D

CH#	E1 R PS 1-15
1	E1 R PS 01
2	E1 R PS 02
3	E1 R PS 03
4	E1 R PS 04
5	E1 R PS 05
16	E1 8TAC95D

CH#	A1 R LE 1-15
1	A1 R LE 01
2	A1 R LE 02
3	A1 R LE 03
4	A1 R LE 04
5	A1 R LE 05
16	A1 8TAC95D

CH#	ZONE 5
1	5 AT AP ADM
2	5 AT AP BKR
3	5 AT AP CHR
4	5 AT AP DVD
5	5 AT AP EDW
16	5 8TAC95D

GATRRS Overview

- **P25 Interoperability:**

GATRRS Overview

- **P25 Interoperability:**

GATRRS Overview

- **P25 Interoperability:**

GATRRS Overview

- Governance

Local

GATRRS Governing Board

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GATRRS Operating Board

↑

GATRRS Advisory Team

Regional

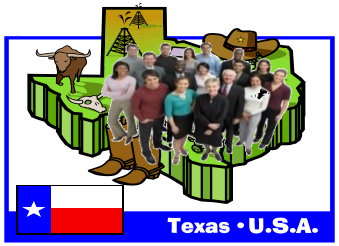
CAPCOG Exec Committee

↑

CAPCOG Homeland Security Task Force

↑

CAPCOG Long-Term Interop Committee



Statewide

Governor, DPS Director

↑

Statewide Interop Coordinator

↑

SCIP Executive Council

↑

SCIP Steering Committee

GATRRS Overview

- **Ongoing Challenges:**
  - Fixed-network and subscriber equipment costs.
  - Sustainment funding for grant-funded systems.
  - SOP's.
  - End-user training and exercises.
  - Use of encryption (AES, DES, ADP) and interoperability.
  - Interoperability with non-P25 regional system(s).
  - "Soft" costs of maintaining a system of systems.

Questions?

Project 25 User's Perspective

Thank You

Chuck Brotherton,
Wireless Manager, GATRRS Program Manager
City of Austin, Texas

Charles.brotherton@austintexas.gov

State of Ohio MARCS
Multi-Agency Radio Communications System

Rick Schmahl
MARCS Program Director, Ohio SWIC and Co-SPOC

Tom Bretthauer
MARCS Data Systems Manager

Catalysts

Events bringing awareness to the need of an interoperable First Responder communications system

- 1990 Shadyside Flood
- 1993 Lucasville prison riot on Easter Sunday
- Aging Ohio Highway Patrol radio system

Ohio's Vision

- Using the vision of Ohio's leadership - in particular we took state CIO Stu Davis' vision of shared IT services into the LMR world to drive interoperability and reduce costs with economies of scale, a "system of systems"
- Before we started there were around 1300 disparate radio systems
- P16 only had 48,000 IDs and we were using 10,000 of them for consoles

Forward Thinking Partners

Lake County, on the east side of Ohio on Lake Erie, stood up a P25 system.

At the same time, Ohio was awarded PSIC (Public Safety Interoperability Communications) and BIDBP (Border Interoperability Demonstration Project) grants.

Together we built out the northern part of Ohio along Lake Erie.

As the northern counties and their encompassing agencies needed new systems, they joined the MARCS system of systems.

Migration Challenges

- Could not build it fast enough
- Aging systems were failing
- Over 38,000 radios needed
  - Programmed
  - Aligned
  - Flashed
- Overhead of managing two systems – 3.5 and P25

Issues With Circuits

Could not get circuits to Southeast Ohio, considered Appalachia due to topography and population

AT&T published an article that it was not cost affective to build out their network

A startup, Agile Networks, was chosen to deliver connectivity

The Triple Constraints of Project Management

- Time, Cost, Quality
- Project was ahead of schedule and under budget
- Quality Suffered
  - Rushed into configuring zone controllers not in the quadrant of the state the customer is in
  - Lack of procedures and governance
  - Had to build the plane while flying it because of the previously mentioned aging systems

Moving from a Project to a Program

- Defined processes and documented them
- Invoked LEAN
- 3-month wait for IDs
- Vendor on-boarding processes defined
- Redefined MARCS responsibilities – we're a radio program, not IT

Moving from a Project to a Program

Began utilizing

- OIT storage
- Virtual environment
- Backup
- On-boarded to state's security for AV, patches and more
- Domain migration
- Cisco, VMWare, VoIP, ServiceNow maintenance savings

Moving from a Project to a Program

The personnel and dollar savings from utilizing shared services allowed us to dedicate our resources to focus on communications for Ohio's first responders.

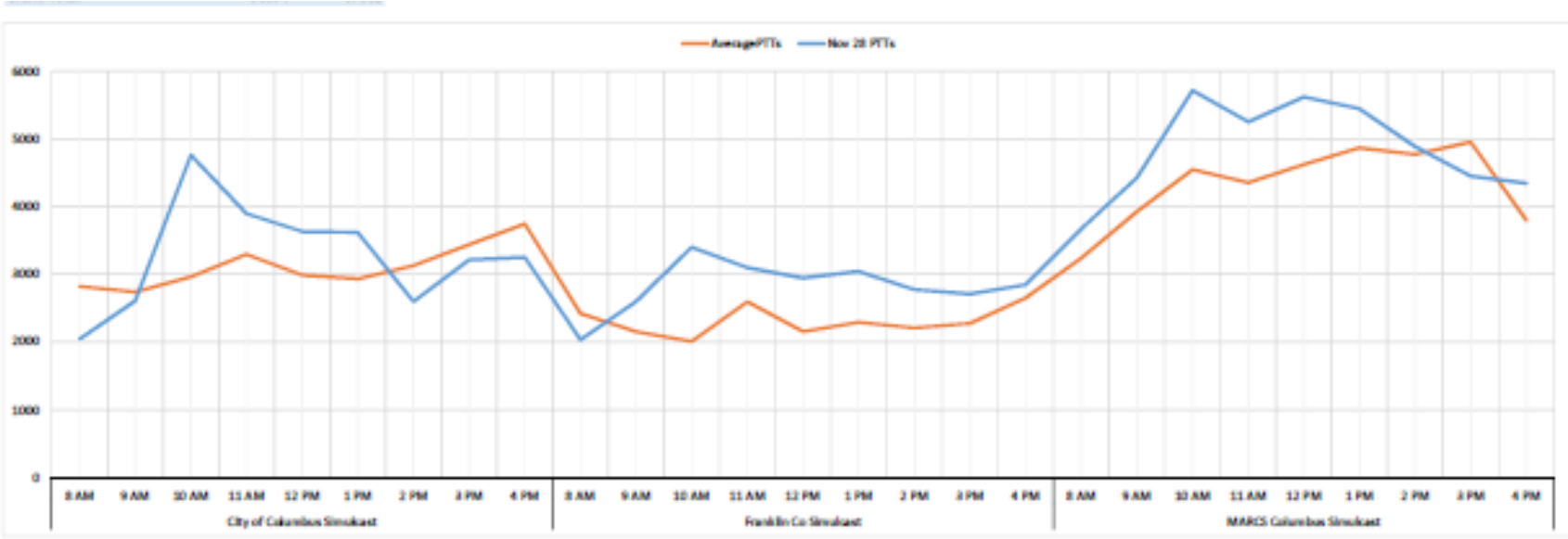
It also took away being viewed as hypocrites and the red-headed step child. We were preaching being a shared service yet we weren't utilizing any of the state's shared services!

Moving from a Project to a Program

- Assessment study
- Need to evaluate ROI for extending services (County level CAD/RMS for example)
- Planning from the SIEC delivers at 3 recent events:
  - Republican National Convention
    - 660,043 total PTT
    - 150 busies
    - 809 talkgroups
    - 8,646 radios

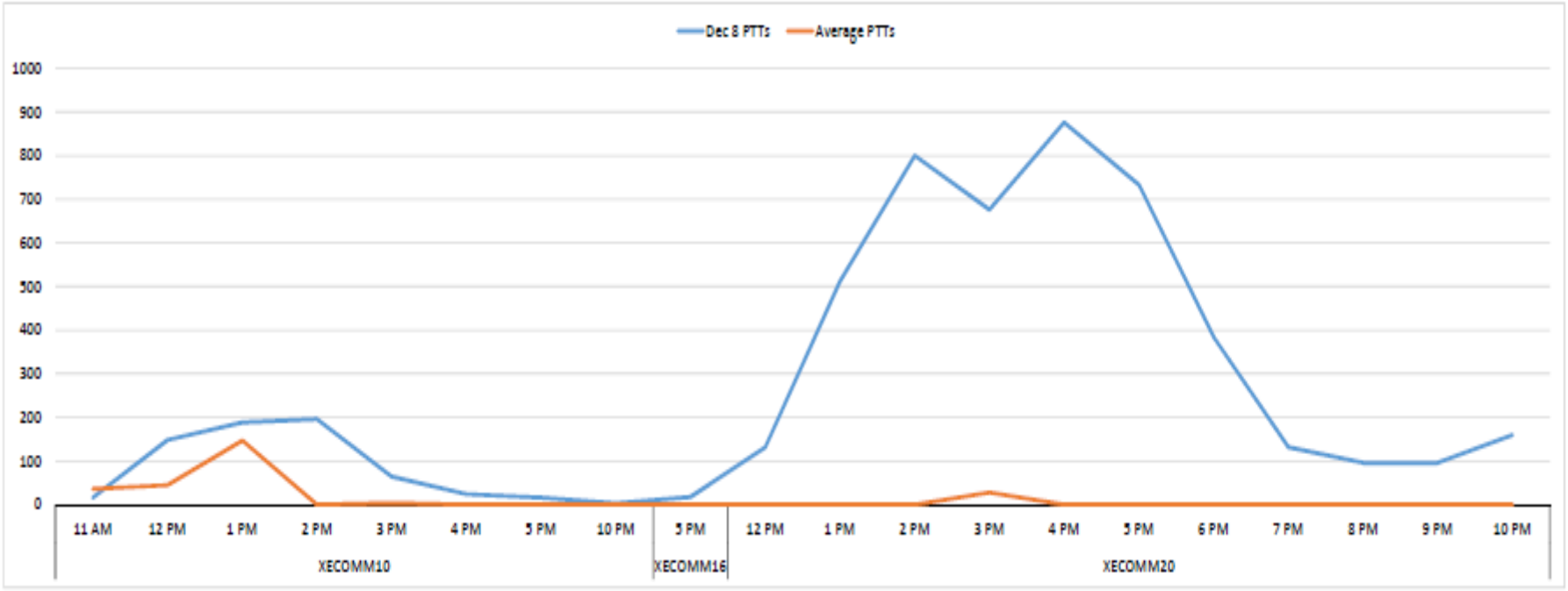
Ohio State University Incident

Monday, November 28, 2016



Hocking Hills State Park Fire

Thursday, December 8, 2016

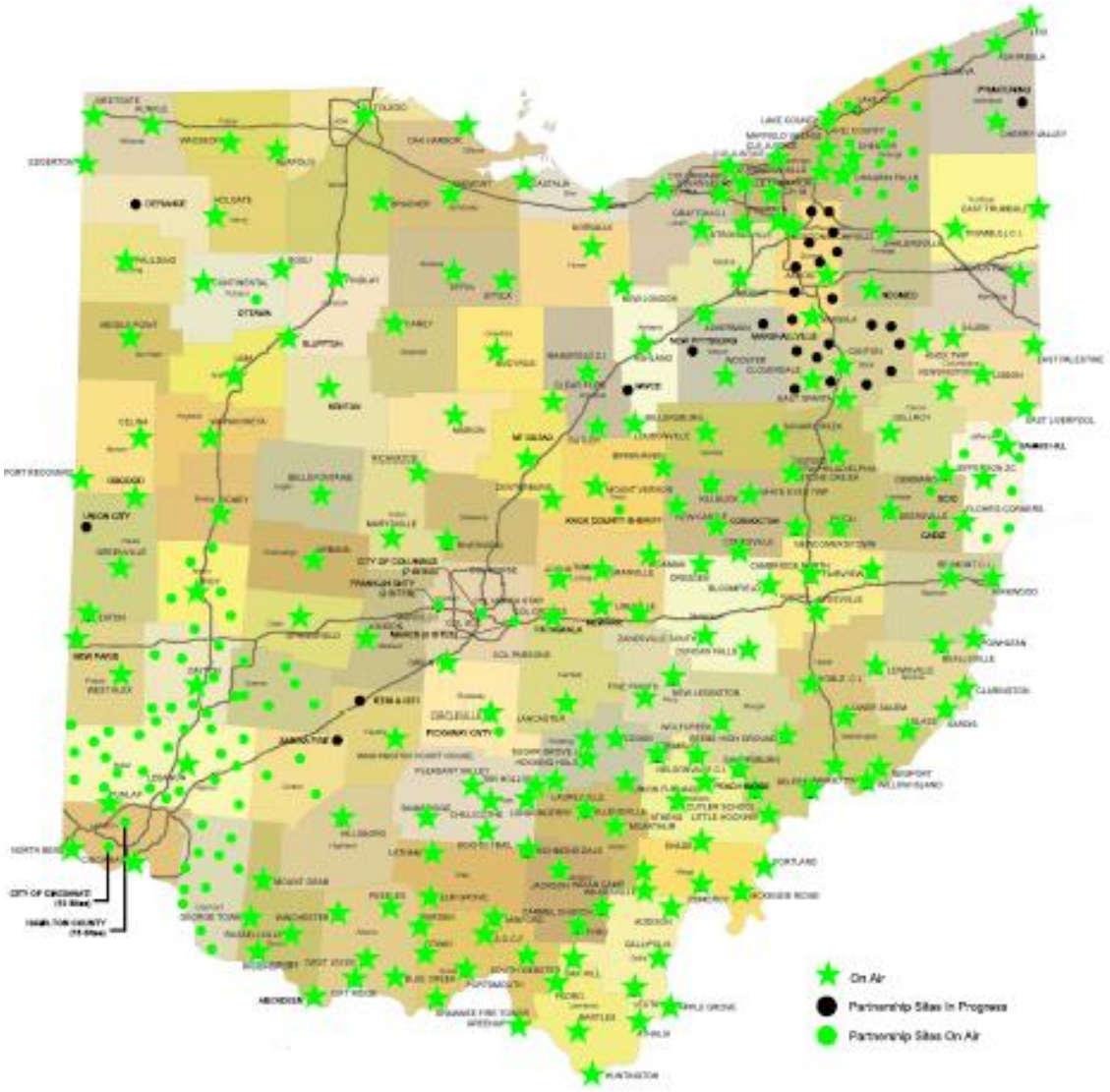


Local User Adoption Methods

Five Tiers/classifications of customers

- Tier 1- $20 month user fee
- Tier 2- Add Infrastructure, MARCS Adapts
- Tier 3- Connect to Existing Zone Controller
- Tier 4- Share Zone Controller and Tower Farms
- Tier 5- Locate Geographically Diverse New Zone Controller

MARCS SITES


On Air
Partnership Sites In Progress
Partnership Sites On Air

Local User Adoption Methods

- Developed a customer on-boarding process
- Diverse and redundant circuits can be used for more than P25 backhaul
  - State-wide consolidation efforts
  - Master Services Agreements, VoIP, Software

Success!

During hotwash from events, planned or real events, communications (read MARCS) used to be the number one problem. Today, it is not even listed!

Thank You

Rick Schmahl

MARCS Program Director, Ohio SWIC and Co-SPOC

Richard.schmahl@das.ohio.gov

Tom Bretthauer

MARCS Data Systems Manager

Tom.bretthauer@das.ohio.gov

State of Connecticut

P25 Radio System

Scott Wright
Telecommunications Engineer I

State of Connecticut - Demographics

Land area: 5543 sq miles (48th)

Population: 3,590,886 (29th)

Median Income: $72,889 (4th)

Rail Transportation:

- Metro North - #3 commuter railroad
- Amtrak – NEC

CREDIT FLICKR.COM

Home to:

- Yale, CT College, University of New Haven, and many others
- Sub Base New London and General Dynamics/Electric Boat Shipyard
- Coast Guard Sector Long Island Sound
- Dominion/Millstone Nuclear Power Station
- CT Yankee decommissioned Nuclear Power Station
- 2nd and 3rd largest casino's in the US by gaming square footage
- United Technologies: (Pratt & Whitney, UTC Aerospace, Otis Elevator, UTC Climate Controls and Security)
- Lockheed Martin/Sikorsky Aircraft
- Boehringer Ingelheim
- Colt, Ruger firearm manufacturers

State of Connecticut – P25 System Statistics

Sites: 65

Sub-systems: 20

(11 simulcast systems/9 single site systems)

Frequencies: 135

IP Consoles: 137

Subscriber units: approximately 12,500

2016 Statistics:

- PTT's: 8,782,024
- Seconds: 45,729,233.4

Been using P25 since 2011

- 3 major software revisions since that time

Connectivity:

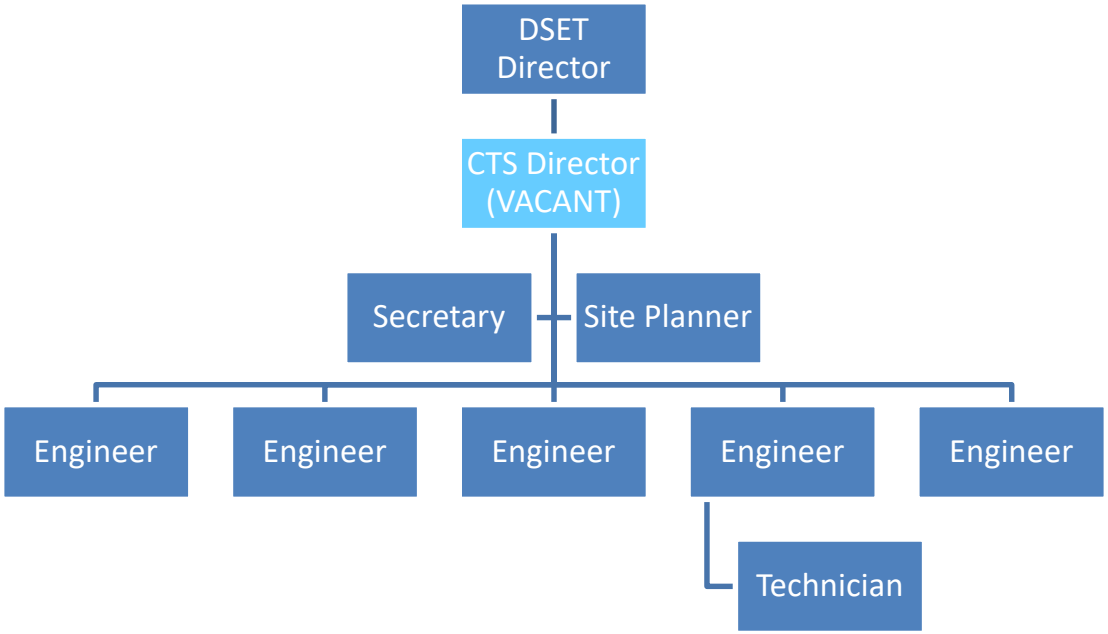
- Private Microwave
- Shared Microwave
- State Fiber Optic
- Leased circuits

State of Connecticut – CTS System

*C*onnecticut *T*elecommunications *S*ystem

Until 2015, a division of the State Police

11/2015 transferred to Division of Statewide Emergency Telecommunications (DSET)



State of Connecticut – CTS System

Oversees contractor support

G4S

Microwave/Network

Network Control Center

Motorola

P25 system rollout

System maintenance

Subscriber maintenance

State of Connecticut – CTS System

Microwave Map

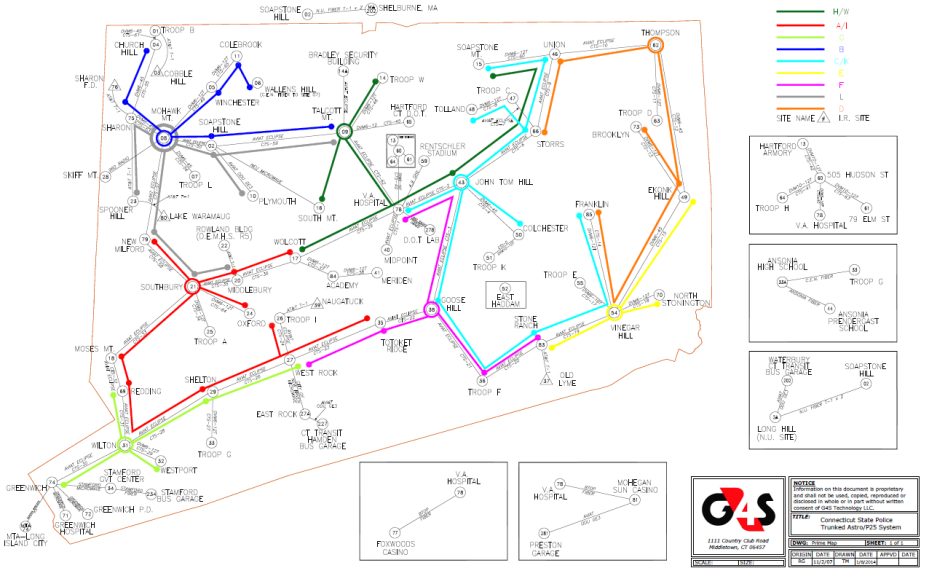
Recently replaced legacy TDM microwave with IP

supports network migration

significantly smaller footprint

currently 3 rings, soon to be 4

typical protocol transition pains



State of Connecticut – CTS System

Network Control Center

Staffed 24 x 7 x 365

One stop for problem reporting

Radio, phone, email, alarms

Alarms

Network Management System

- Contact closure
- SNMP trap
- Moscad

State of Connecticut – CTS System

USERS

Amtrak
CAA – Bradley Fire
Capitol Police
14th Civil Support Team
Connecticut Yankee
DEEP
DEEP/Aquarion Water
DEEP/Candlewood Lake
DESPP/Ct State Police
DESPP/DSET
DESPP/DEMHS
Dept of Motor Vehicles
Dept of Correction
Dept of Public Health
Dept of Social Services
Dept of Taxation
Dept of Transp./CTT
Judicial Marshal's
MDC Water
Millstone NPS
MTA Police
Region 1 UASI
Region 2 UASI
University of CT
US – ATF
US – Coast Guard
US – DEA
US – FBI
US – FEMA
US - IRS
All PSAPs (100+)
All municipal PS agencies
Town of Madison
Town of Darien

State of Connecticut – CTS System

INTEROPERABILITY

41 Mutual Aid Sites

- 8CALL simulcast
- "CSPERN" simulcast
- Frequency Agile Repeater
- Metro North Talkgroup – along the Metro North RoW

Each PSAP has:

- Trunked control station - Access to 8CALL/TAC, common talk groups
- Conventional Channel GateWay (CCGW) – Access to Core

Conventional Portable Radios

- Issued to each police, fire, ems, and emergency management chief
- Starting to be replaced with trunking capable radios

P25 Inter Sub System Interface (ISSI)

- Currently connected to one "foreign" system, scheduled for more

State of Connecticut – CTS System

INTEROPERABILITY

Metro North

VERY busy commuter railroad (#3 commuter railroad)

GOAL: Improve interoperability with Metro North during emergencies

Born out of need: stalled trains, medical emergencies, etc.

PSAP:

Dedicated Trunked control station

Responders:

Trunked portable radios issued each emergency discipline: Police, Fire, EMS, and Emergency Management

Monitored at the MTA Police Communications Center

State of Connecticut – CTS System

INTEROPERABILITY

Standards:

- Statewide P25 ID schema
  - Avoids duplication of ID's statewide
  - Allows use of State trunked Core
  - Eases programming
- Minimum P25 Shared Controller Trunked Subscriber

Requirements:

- Interoperable Conventional Channel Gateway
- Interoperable Encryption

State of Connecticut – CTS System

ENCRYPTION

- Redundant KMF's
- Participants in FPIC/NLECC encryption plan
- Distribution point for interoperable encryption in CT
- SLN's 1-20
- Coordination of SLN and KID assignments in CT
- Based on assignment from NLECC
- No SLN or KID conflicts

SLN	Algorithm	Use	SLN Name	Crypto Period
1	DES	Public Safety Interoperable	ALL IO D	Annual
2	DES	Federal Interoperable	FED IO D	Annual
3	AES	Public Safety Interoperable	ALL IO A	Annual
4	AES	Federal Interoperable	FED IO A	Annual
5	DES	National Law Enforcement State and Local Interoperable DES	NLE IO D	Static
6	AES	National Law Enforcement State and Local Interoperable AES	NLE IO A	Static
7	AES	US – Canadian Fed Law Enforcement Interoperability	FED CAN	Static
8	AES	US – Canadian PS Interoperability	USCAN PS	Static
9	DES	National Tactical Event	NTAC D	Single Event Use – Not to exceed 30 Days
10	AES	National Tactical Event	NTAC A	Single Event Use – Not to exceed 30 Days
11	DES	Multiple Public Safety Disciplines	PS IO D	Static
12	AES	Multiple Public Safety Disciplines	PS IO A	Static
13	DES	National Fire/EMS/Rescue	NFER D	Static
14	AES	National Fire/EMS/Rescue	NFER A	Static
15	DES	National Task Force Operations	FED TF D	One time use as needed for Special OPS
16	AES	National Task Force Operations	FED TF A	One time use as needed for Special OPS
17	DES	National Law Enforcement Task Force (one time only operation)	NLE TF D	One time use as needed for Special OPS
18	AES	National Law Enforcement Task Force (one time only operation)	NLE TF A	One time use as needed for Special OPS
19	AES	Federal – International Law Enforcement Interoperability	FED INTL	When needed by operational requirement
20	AES	Public Safety – International Law Enforcement Interoperability	PS INTL	When needed by operational requirement

State of Connecticut – CTS System

DEPLOYABLE EQUIPMENT

Emergency Restoration Vehicle (ERV) – Site on Wheels

- P25 6 channel site
- SZ 5 channel site
- Conventional Base/Repeaters (33-862)

Mobile Communications Vehicle

Command Post

Tactical Console System

- 14 Laptop based consoles – either on or off network
- 6 RF cases
- 3 Dual band (V/7-800, U1/7-800, U2/7-800)

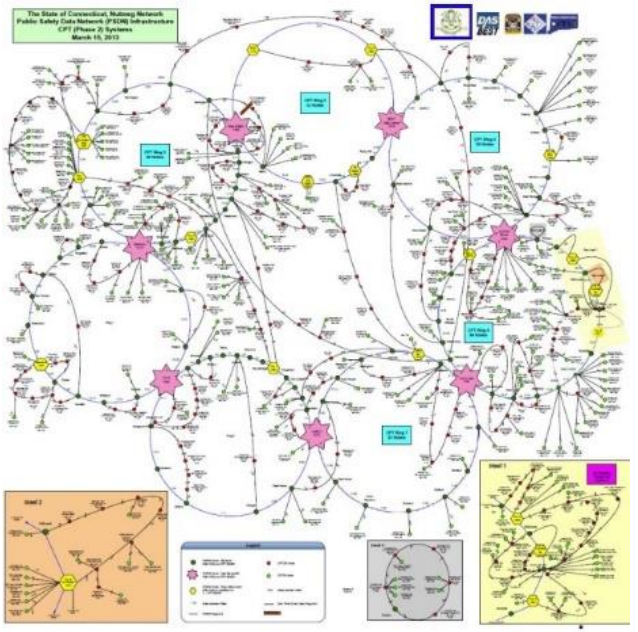
CACHE portables (single and tri-band)

All can be connected via microwave, state fiber, or public network

State of Connecticut – P25 Advantages

"Standards" based equipment

- Multiple manufacturers equipment can be used on the network
- Can "tailor" subscriber equipment to the user
- Standard encryption – AES256
- OTAR across multiple manufacturers equipment
- IP based equipment
- Significantly increased possible pathways for connectivity: Microwave, fiber, public internet
- Interoperability Gateways
- P25 ISSI
- P25 CSSI



State of Connecticut – P25 Challenges

"Standards" can mean different things to different manufacturers

Our first ISSI connection did NOT go well

NOT a single vendor issue – both vendors had issues to resolve-and we've found more issues!

Use of "non-standard" encryption

State of Connecticut – Radio Challenges

Sustainment:

Costs to maintain systems have increased

Personnel:

Finding qualified technicians and engineers has become very difficult

Breaking down barriers:

In the Northeast (in general), we aren't used to sharing and trusting others

Impact of commercial wireless:

- Think prior to rebanding
- Commercial wireless carriers appear to be within their emission mask
- Answer appears to be in LMR subscriber unit filtering
- Why does the LMR subscriber unit need to have filters allowing frequencies >= 862.5 MHz?

Thank You

Scott Wright

Telecommunications Engineer, CONNECTICUT DEPARTMENT OF EMERGENCY SERVICE AND PUBLIC PROTECTION

Scott.wright@ct.gov

Project 25 User's Perspective

Federal Agency Use of P25

Federal Partnership for Interoperable Communications (FPIC)

Jim Downes

Chairman, Federal Partnership for Interoperable Communications (FPIC)

Chairman, P25 Steering Committee

Project 25 Background

Project 25 (P25) was created as a joint project between the Association of Public-Safety Communications Officials (APCO), the National Association of State Telecommunications Directors (NASTD) and the Federal Government in 1989

P25 set out to address—

- Spectral efficiency
- Backwards compatibility
- Enhanced interoperability
- Ease of migration and scalability
- Increased vendor competition

Formed partnership with the Telecommunications Industry Association (TIA) in 1992 to create the P25 Suite of Standards

Federal Government and P25

The Federal Government has been an active participant in the Project 25 Standards creation since the beginning of the program

- Initiated in part by the National Telecommunications and Information Administration (NTIA) narrowband mandate
- Federal requirements for secure communications forced a migration to digital technologies with advanced encryption capabilities

Most Federal Agencies have adopted Project 25 for tactical voice communications starting in the mid-1990's

- Most agencies are operating narrowband, conventional, encrypted systems
- Major federal agencies who have installed P25 conventional systems include FBI, ATF, CBP, DEA, ICE, BLM, NPS, F&WS, USCG, USFS, TSA, TIGTA, FEMA, APHIS, USMS, USSS, DOE
- A number of Federal Agencies participate in P25 statewide or regional trunked systems, including Wyoming, Missouri, Michigan and others

Federal Government and P25 (cont'd)

As PS Broadband moves forward, most federal agencies continue to promote P25 as the best solution to provide interoperable, digital, mission critical communications for the foreseeable future

Reduced Federal budgets force agencies to seek opportunities to achieve cost effective solutions and operational efficiencies by securing partnerships with statewide and regional public safety systems

- Enhanced coverage
- Better interoperability with state and local agencies
- Typically provides a multi-vendor environment
- Resource sharing

Federal Government and P25 (cont'd)

- The P25 standards provide a capability to take advantage of a competitive market and the introduction of multi-band subscribers further enhances the ability to operate on different P25 Systems
- Through coordination and collaboration with the FPIC and NCSWIC, a number of partnerships have evolved and P25 has been critical to provide an opportunity for the Federal Government to form partnerships, such as the initial programs in Alaska and Wyoming
- Partnerships have been developed in other states, including Connecticut, Missouri, South Carolina, and Washington – all utilizing P25

Cooperative Partnerships:
Improving Operability and Interoperability

- A primary recommendation of the NECP is to "Promote opportunities to share Federal emergency communications infrastructure and resources"
- That objective includes establishing *Cooperative Partnerships* and *Shared Infrastructure Initiatives* to improve operability and interoperability
- Benefits include improved interoperability, increased coverage, decreased cost, and shared resources (spectrum, land, infrastructure)
- The FPIC has promoted these initiatives for many years and has embarked on this initiative with the NCSWIC to identify assets for potential additional partnerships

Importance of LMR Sustainment and Continued Interoperability Efforts

- The sustainment of resources and operational capability supporting LMR is vital to public safety mission-critical communications
- It is important that government leaders and public safety managers recognize sustained funding is critical to keep LMR systems functional
- The Federal Partnership for Interoperable Communications (FPIC), in coordination with OEC, is working closely with SAFECOM – NCSWIC to address LMR issues at all levels of public safety that include technology, funding, governance and others

LMR Sustainment and Interoperability Efforts (cont'd)

- Communications operability is the key to enhanced interoperability
- Sustainment is not limited to funding
  - Governance within and between disciplines/jurisdictions can impact sustainment
  - Resource sharing can provide "cost avoidance"
- The implementation and sustainment of P25 compliant systems and equipment is critical to resource sharing and partnerships among public safety agencies

LMR Sustainment and Interoperability Efforts (cont'd)

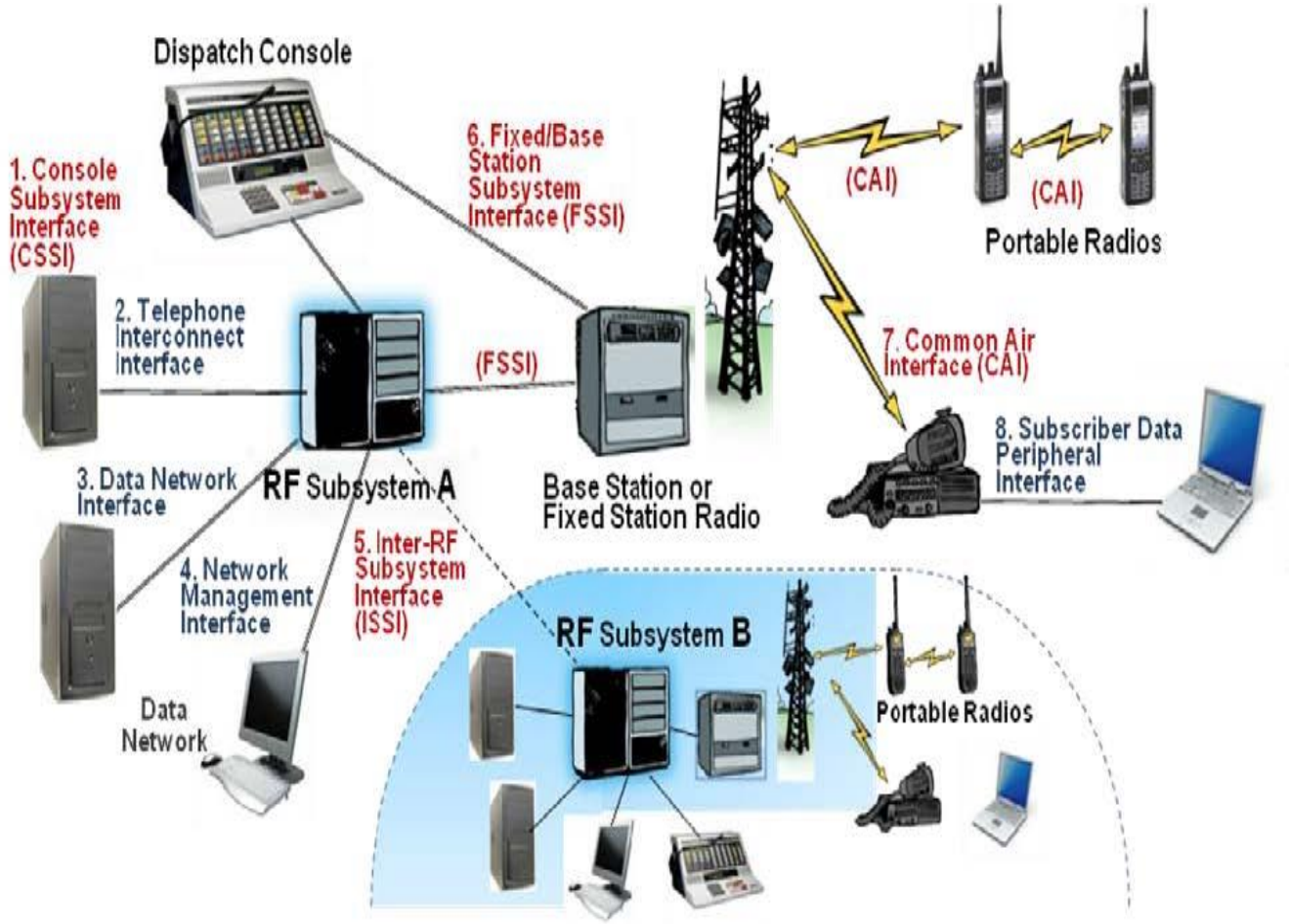
Significant interest in encryption has increased and is being implemented in LMR systems

The use of standards compliant encryption is essential to interoperability

- Common procedures and coordination are essential to cost effective interoperability
- The FPIC recently released the Recommended Storage Location Numbers Allocation List for Nationwide Encryption
- The FPIC Security Subcommittee continues to address encryption technology and best practices to improve encrypted communications interoperability

Project 25 Compliance Assessment

- The federal agencies and OEC strongly supports the P25 Compliance Assessment Program (CAP) process managed by DHS Office for Interoperability and Compatibility (OIC)
- It is critical that P25 equipment and systems are compliant with the *published standards* and confirmed through an open and coordinated process
- It is important to emphasize that both the Project 25 Steering Committee and the TIA TR-8 Engineering Committee support the CAP process and strive for coordination and collaboration.
- Participants are encouraged to attend other sessions this week focused on the P25 CAP



P25 standards ensure data can be passed across all levels of digital radio interfaces, as illustrated above.

P25 and the User

P25's influence continues to expand

- Deployed in over 83 countries
- There are currently 41 companies that provide a P25 product or service

P25 process still actively addresses the standards and specifications

- User input is critical to the success of the standards
- New technologies and capabilities are being addressed d
- User participation in the development of the standards, including test procedures is critical

Summary

- As stated many times, LMR will continue to support mission critical voice for some time.
- P25 continues to evolve to support public safety
- User participation is essential to the continued success of P25 for both operable and interoperable communications
- User participation is crucial to validate real-world requirements

Questions?

Please direct any questions regarding FPIC activities in the P25 environment to:

FPIC@hq.dhs.gov

Questions concerning DHS – OEC activities in P25 can be directed to:

Jim Downes

US Department of Homeland Security

Office of Emergency Communications

James.Downes@hq.dhs.gov

Project 25 User's Perspective

Thank You

Jim Downes

Chairman, Federal Partnership for Interoperable Communications (FPIC)

Chairman, P25 Steering Committee

James.downes@hq.dhs.gov

P25 in Alabama

P25 = Cooperation!

IWCE Project 25 User's Perspective, Interoperability and Customer Applications

Ernie Blair, CEO

Huntsville-Madison County 9-1-1 System

Huntsville, AL

March 27, 2017

Huntsville-Madison Co. 9-1-1 Center

Alabama's Largest

- 36 Operating Positions

Truly "Combined" 9-1-1 Center

- All Police, Fire, and EMS agencies
  in the Cities of Huntsville & Madison
  as well as Madison County
- All Calltaking and Dispatching Activities

Everyone is under one roof!

Huntsville-Madison Co. 9-1-1 Center Agencies

Madison County Fire

- 16 Independent Volunteer Departments

Madison County Sheriff

Huntsville Emergency Medical Services (HEMSI)

- Non-Profit Ambulance Agency Serves Entire County
- Also dispatches Rescue Squad & Coordinates Air Ambulance Traffic

City of Madison Police Department

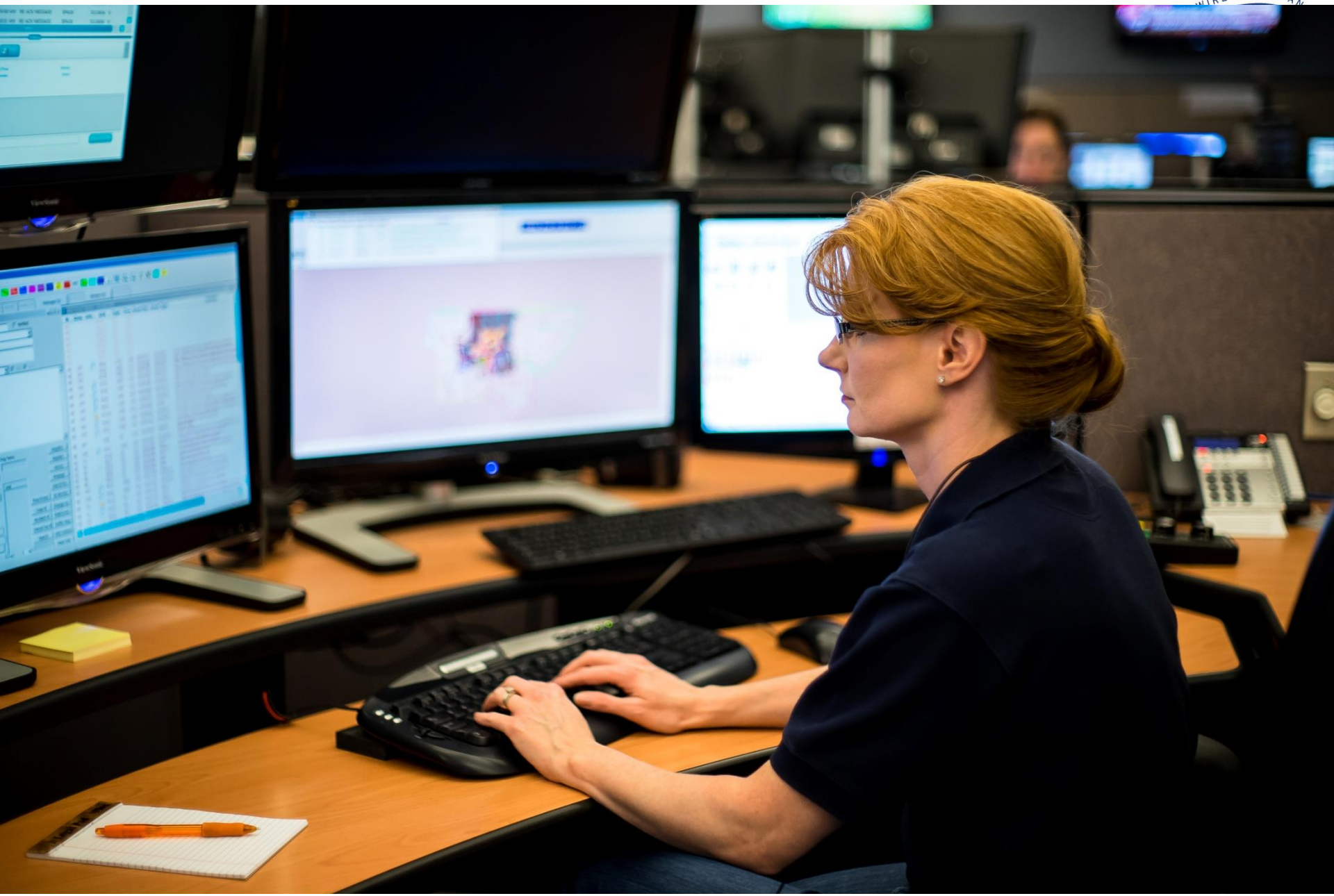
City of Madison Fire Department

City of Huntsville Fire and Rescue

City of Huntsville Police Department

9-1-1 Calltakers


HUNTSVILLE PD
BAKER (SOUTH)



Huntsville-Madison County 9-1-1 Center

Resident agencies/governments wholeheartedly support this “Combined” 9-1-1 Center concept

A proven model that saves lives, saves money, reduces crime, helps apprehend criminals, and protects property!

Operations Executive Committee (OEC), made up of senior agency supervisors at 9-1-1 Center is the “glue” that holds things together.

Advantages of a Combined 9-1-1 Center

Money goes further—We're not duplicating equipment and services

Built-in Interoperability, Cooperation, and Coordination on Multiple Agency Events

Response times and accuracies are greatly improved.

Legacy Public Safety Radio Systems

Until January 1, 2013 Madison County Public Safety agencies used separate radio systems

- Mix of UHF, VHF, 800MHz, trunked and conventional systems
- Absolutely no radio interoperability

All Interagency communications took place at 9-1-1

- Face-to-face and through computer system

Radio Interoperability Need Recognized by All!

New Radio System(s) Were Desperately Needed

About half of our agency radio systems were VHF or UHF and subject to 1/1/2013 narrowband date.

Remaining agencies were using obsolete and unsupported 800 MHz system.

It was determined that “combined” 9-1-1 model to fund, construct, and operate system was best.

Narrowband Mandate Jan 1, 2013

World to End December 21, 2012

Radio Advisory Committee (RAC) Formed to Oversee Radio Activities

Engineering Feasibility Study Conducted to determine user needs and initially define system

- Concluded we can build better, cheaper, and fully interoperable system together, not separately.

RAC involved in all phases of system feasibility, requirements definition, procurement, construction, operations and interoperations

RAC is “glue” that holds our P25 efforts together!

P25 Local System Governance

9-1-1 operates the P25 radio system exactly in the same manner as it operates the 9-1-1 system:

- The Radio Advisory Committee (RAC) represents the user agencies exactly like HMC 9-1-1's OEC.
- RAC participation keeps politics to absolute minimum!

Funding Model

Huntsville-Madison 9-1-1 pays for infrastructure along with maintenance/upgrades

- Funded entirely with 9-1-1 telephone fees

Individual agencies pay for subscriber units (radios) and subscriber maintenance

- Some grants were secured for subscribers by agencies

New HMC 9-1-1 P25 Radio System

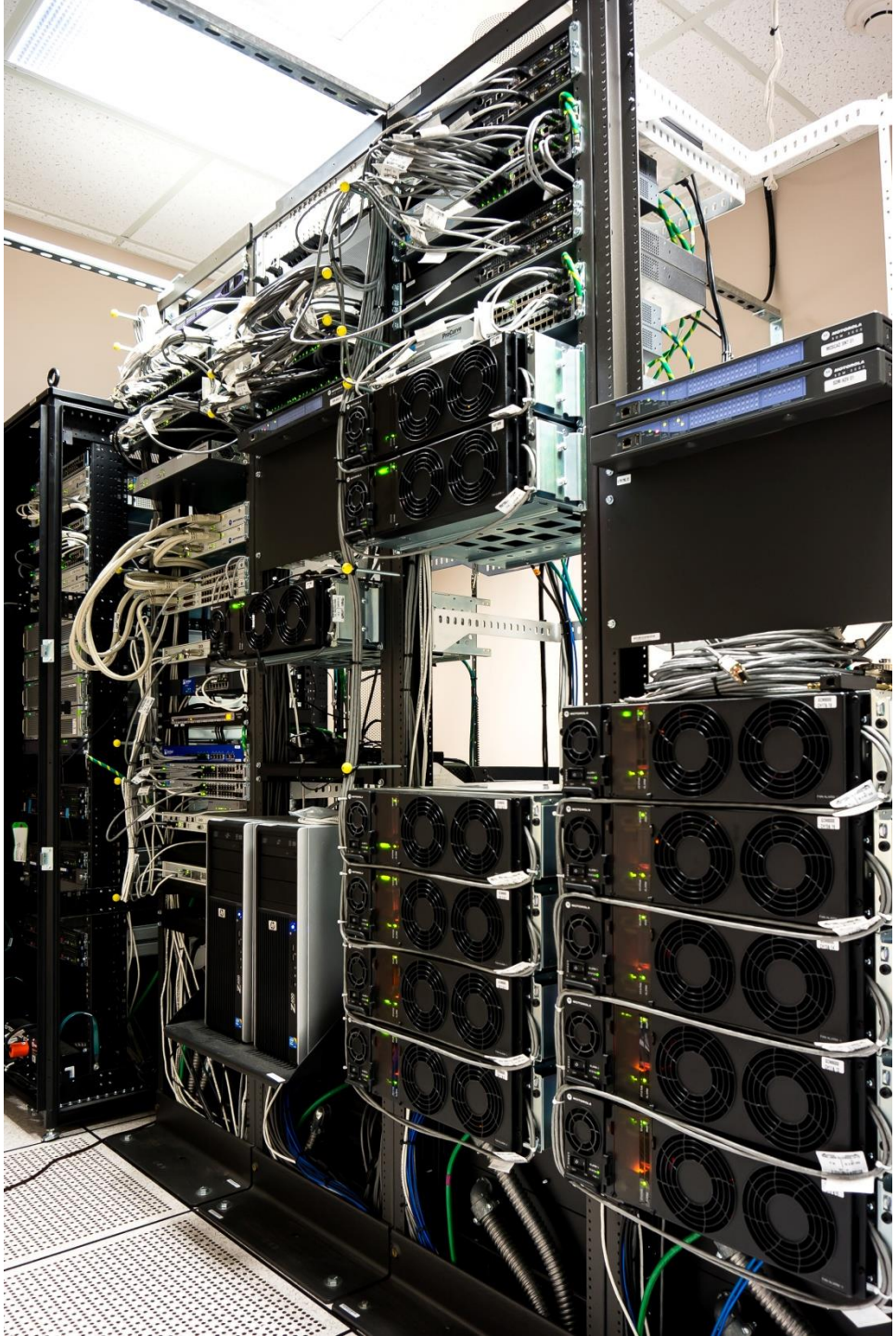
Fully Operational in August 2012

- Completed ahead of schedule
- Under budget
- Delivered greater capability than specified

Users are delighted with performance.

Madison County P25 Infrastructure System Description

- Motorola P25 Digital System
- $12M investment in Madison County
- Five tower sites in Madison County
- 97 1/2% Coverage of our Jurisdiction
- Hybrid Simulcast/Multicast system
- Serves all HMC 9-1-1 Agencies
- True interoperability among users
- Other agencies/jurisdictions joining in.




Interoperability Continuum
TENNESSEEINTEROPERABILITY.COM
It's all about RELATIONSHIPS!
06/29/2012

P25 Radio System Advantages

- True Interoperability among agencies
- On a day-to-day basis, each agency operates on their own "talk groups" and are not even aware they share a system
  - During widespread events, agencies go to predetermined mutual aid talk groups and operate seamlessly with each other
- 97 1/2% of entire jurisdiction (Madison County and those portions of Huntsville and Madison in Limestone County).
- Digital audio……**Rocks**!

Interoperability

Plane crash at Huntsville International in 2013

- All responding agencies except Airport Authority had P25 radios for interoperability
- Huntsville Fire had both P25 radios and Airport Authority radio to provide voice relay
- Airport Authority immediately bought P25 radios for response vehicles
- Airport recently purchased full complement of P25 radios for their entire response team.

Day-to-Day Interoperability

- Interoperability capability among local first responder agencies is used daily
- Outside agencies such as Alabama State Troopers are replacing aging VHF radios with dual band VHF/7-800 radios so they can have unit-to-unit interop with local agencies.
- Special events such as music/art fests depend on interoperable capabilities for coordination.

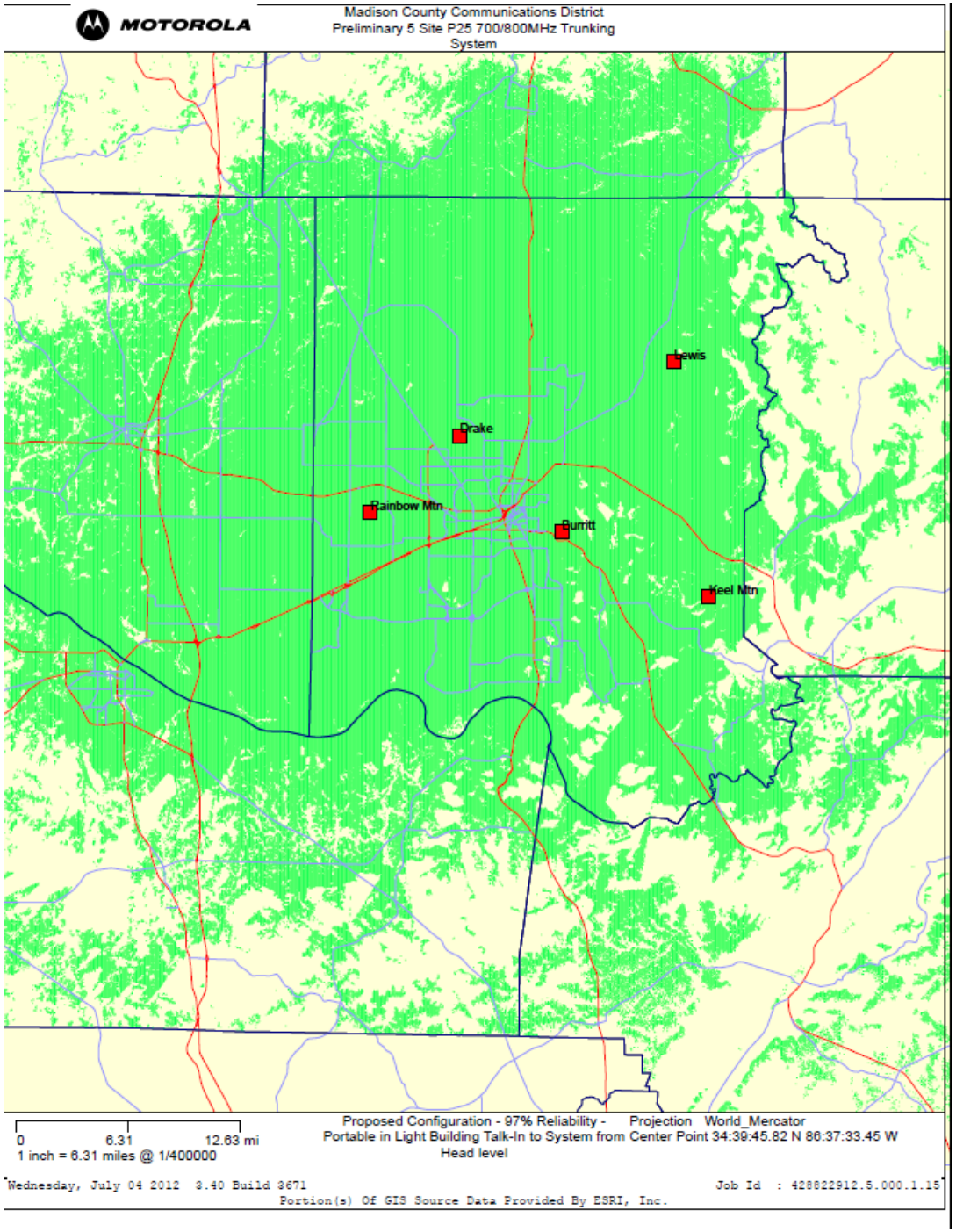
Fully Redundant Backhaul

Fiber connections link towers to master site

Separate Microwave “figure 8” provides multiple paths to each tower.

Voice Back-up Capability

- Each agency has one or more independent analog repeaters (700/800 MHz)
- Analog voice channels programmed in existing P25 radios
- Available for P25 system back-up
- Primarily used briefly during P25 upgrades
- Back-up repeaters tested regularly by each agency
- Procedures in-place for rapid back-up transition.


MOTOROLA
Madison County Communications District
Preliminary 5 Site P25 700/800MHz Trunking
System
Lewis
Drake
Rainbow Mtn
Burritt
Keel Mtn
0
6.31
12.63 mi
1 inch = 6.31 miles @ 1/400000
Proposed Configuration - 97% Reliability - Projection World_Mercator
Portable in Light Building Talk-In to System from Center Point 34:39:45.82 N 86:37:33.45 W
Head level
Wednesday, July 04 2012 3.40 Build 3671
Job Id : 428822912.5.000.1.15
Portion(s) Of GIS Source Data Provided By ESRI, Inc.

Madison Co. P25 System Summary

- A single P25 Radio Infrastructure System for HMC 9-1-1 Agencies
- System designed, constructed, operated, maintained, and upgraded using the successful HMC “Combined 9-1-1 Center” model
- P25 system being expanded to serve neighboring jurisdictions and agencies
- System envisioned as part of a “system of systems” throughout State and beyond
- Cooperation leading to a statewide P25 system

System Summary

- 700/800 MHz system
- Three simulcast sites (18 channels) surround the City of Huntsville (most of population)
- Two multicast sites (8 channels) are in the County (New Market and Keel Mountain)
- Four new tower sites from ground up
- One 400 foot tower already existed
- “Switch” is located at 9-1-1 in underground bunker with independent utility feeds/dual generators.

Partnerships with Neighboring Jurisdictions

- Morgan(adjacent county) joined Madison Co. system adding four towers in their county
- Etawah County updated aging P25 system utilizing Madison Co. core
- Additional jurisdictions interested in joining-in.
- Special **regional interoperability talk groups** set up for multi-jurisdictional events.

Roaming, increased coverage, and interoperability for all!

Historic Tornado Outbreak
April 27, 2011

Tornadoes are numbered chronologically by time of touchdown beginning on the morning of April 27th.
*Tornadoes 2, 41, and 54 were ranked EF-2, EF-5, and EF-4 in MS.

EF-Rating

- EF-5
- EF-4
- EF-3
- EF-2
- EF-1
- EF-0

N W E S

0 5 10 20 30 40 Miles

Lauderdale, Colbert, Franklin, Lawrence, Limestone, Madison, Jackson, Morgan, DeKalb, Marshall, Cherokee, Etowah, Blount, Cullman, Winston, Marion, Lamar, Fayette, Walker, St. Clair, Calhoun, Cleburne, Jefferson, Talladega, Clay, Randolph, Shelby, Tuscaloosa, Pickens, Greene, Hale, Bibb, Coosa, Tallapoosa, Chambers, Chilton, Perry, Autauga, Elmore, Lee, Sumter, Marengo, Dallas, Lowndes, Choctaw, Wilcox

Projection Information:
Datum: North American Datum 1983
Projection: UTM Zone 16N
Map Compiled by: NWS Birmingham, AL

State of Alabama Contribution

Alabama Department of Homeland Security funded additional P25 equipment in 2013

- 4-channel TMDA site in Montgomery (state capital)
- 4-channel TDMA site in Clanton (location of state EMA)
- Trailer mounted transportable P25 site

All operate on Madison County's core

Provide additional geographical coverage, roaming, and interoperability

Partnerships with other Alabama Core Owners (AIRS)

Alabama Interoperable Radio System (AIRS) formed among five Core Owners in Alabama

MOU established for governance, including commitment to preplanned upgrades for 10 yrs

Statewide interzone talk groups establishes statewide interoperability/roaming

Over 50% of AL population and land covered

Cooperation is key! It works!

AIRS Vision for Growth

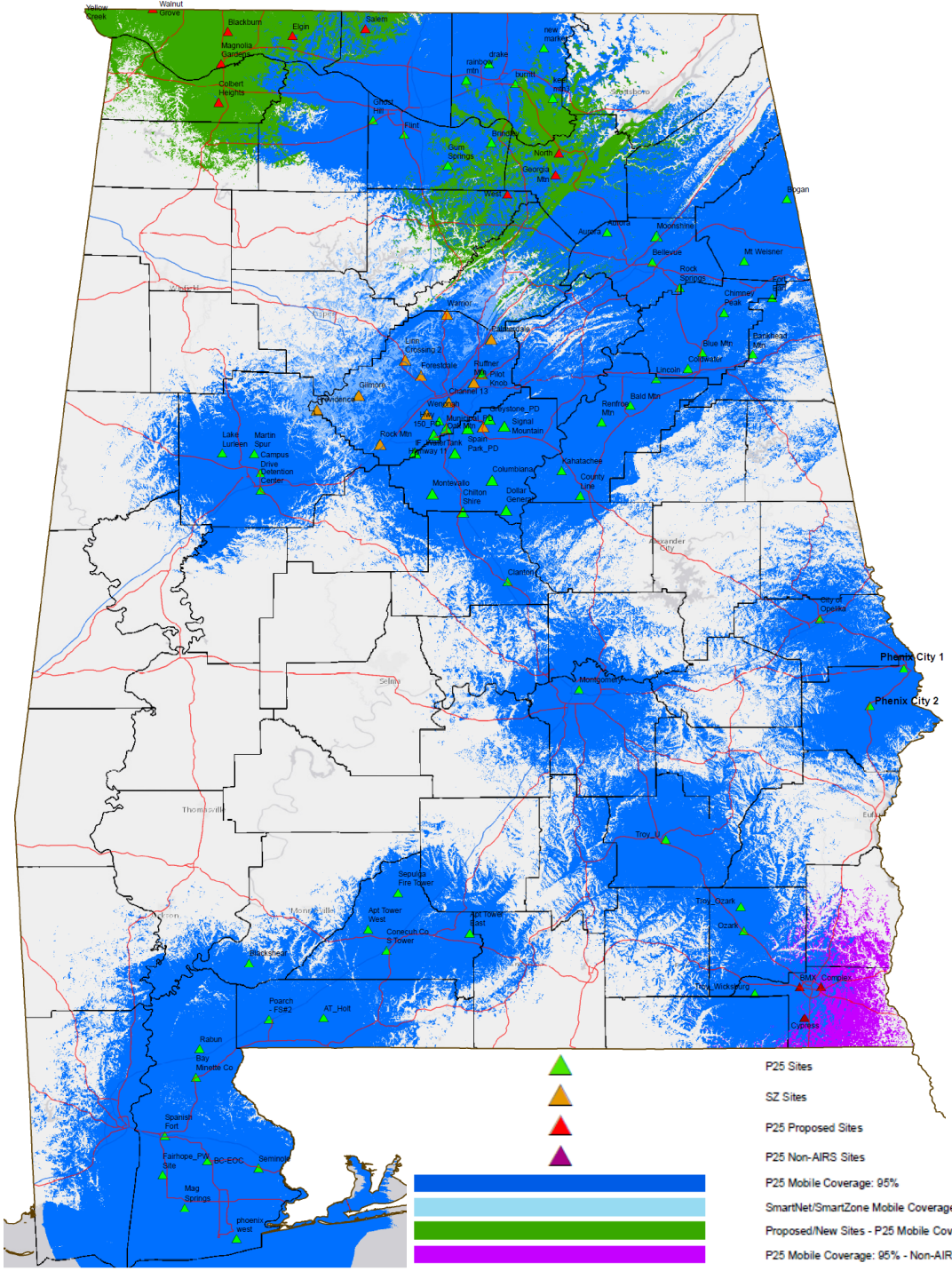
- Each “Core Owner” is recruiting neighboring jurisdictions/agencies for increased coverage and additional interoperability
- Discussions are underway with a potential sixth core owner to expand into Southeast Alabama
- AIRS MOU prevents “bidding wars” among core owners for new agencies/jurisdictions

A System of Local Systems!

With limited state support, AIRS is providing effective interoperability statewide

System continues to grow

State of Alabama remains on sidelines waiting for Firstnet mission critical voice communications


Phenix City 1
Phenix City 2
P25 Sites
SZ Sites
P25 Proposed Sites
P25 Non-AIRS Sites
P25 Mobile Coverage: 95%
SmartNet/SmartZone Mobile Coverage: 95%
Proposed/New Sites - P25 Mobile Coverage: 95%
P25 Mobile Coverage: 95% - Non-AIRS

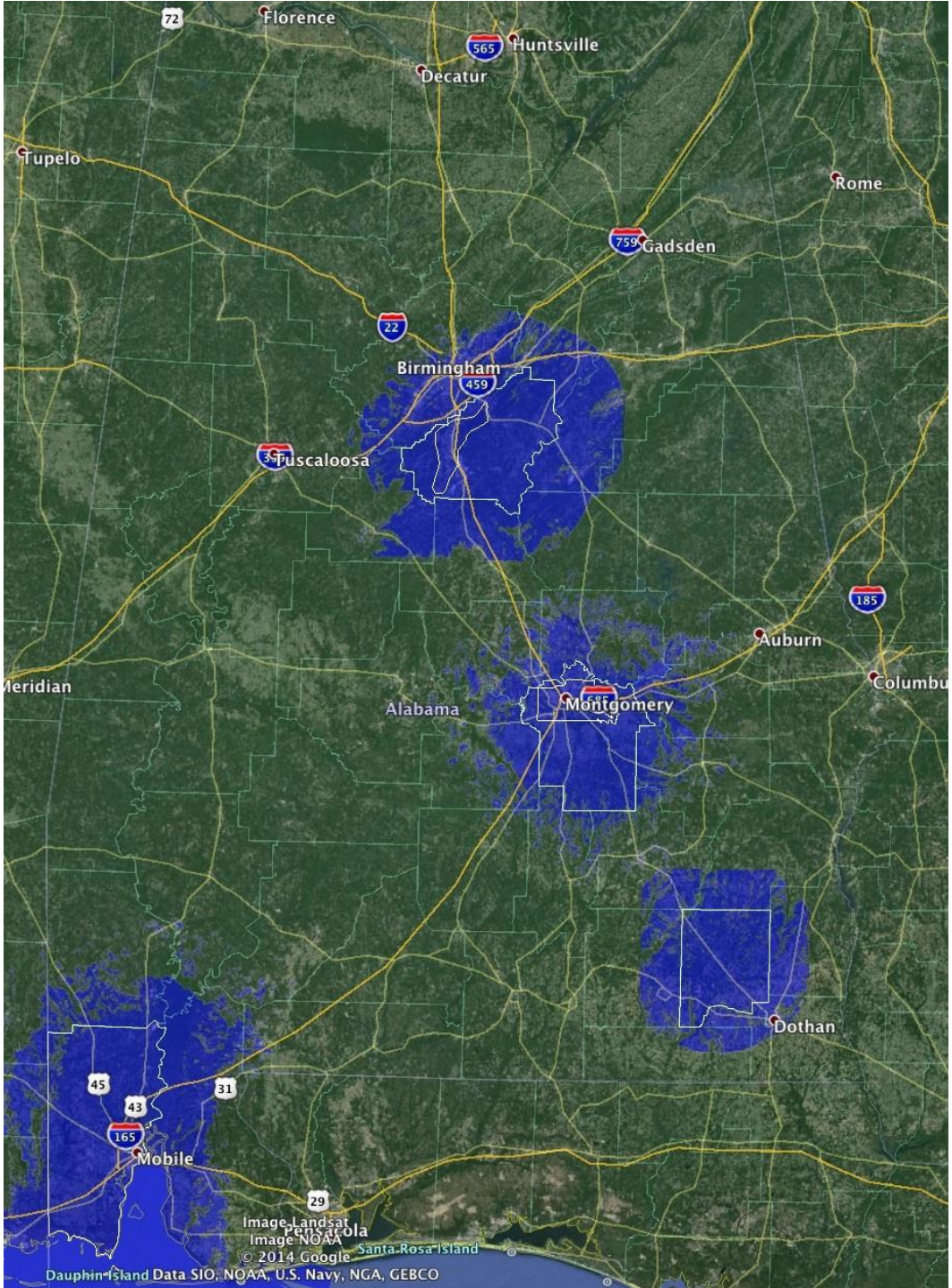
March 2017

Harris P25 Systems in Alabama

Harris P-25 systems growing in Alabama

AIRS envisions linking Harris P25 systems into Existing and Planned Motorola P25 systems.

Harris P25 Coverage In Alabama

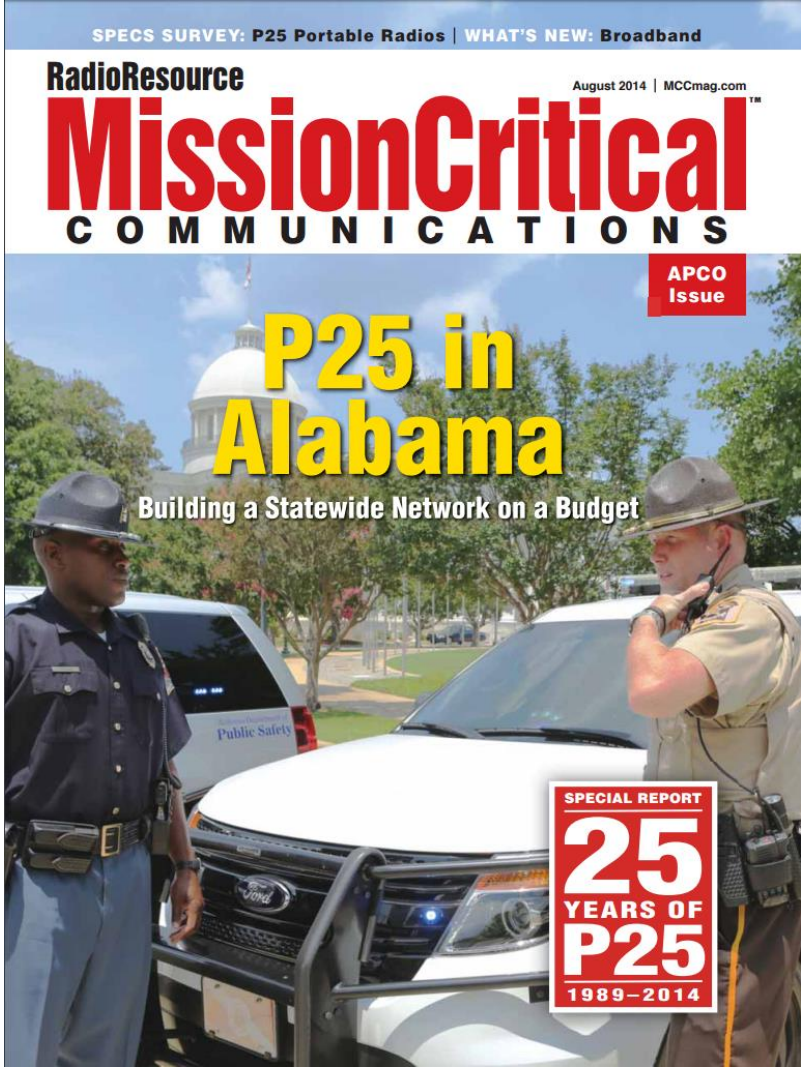


True Interoperability…Not Just Motorola Systems!

ISSI Technology will allow Motorola users to interoperate with Harris systems under construction!

- Mobile
- Montgomery

AEMA Harris radios have been tested on Motorola systems, and Motorola radios have been tested on a Harris system!



Entire Article Available at:
http://mccmag.com/repository/files/State-and-Local-low-res8-14.pdf

P25 Makes it All Possible!

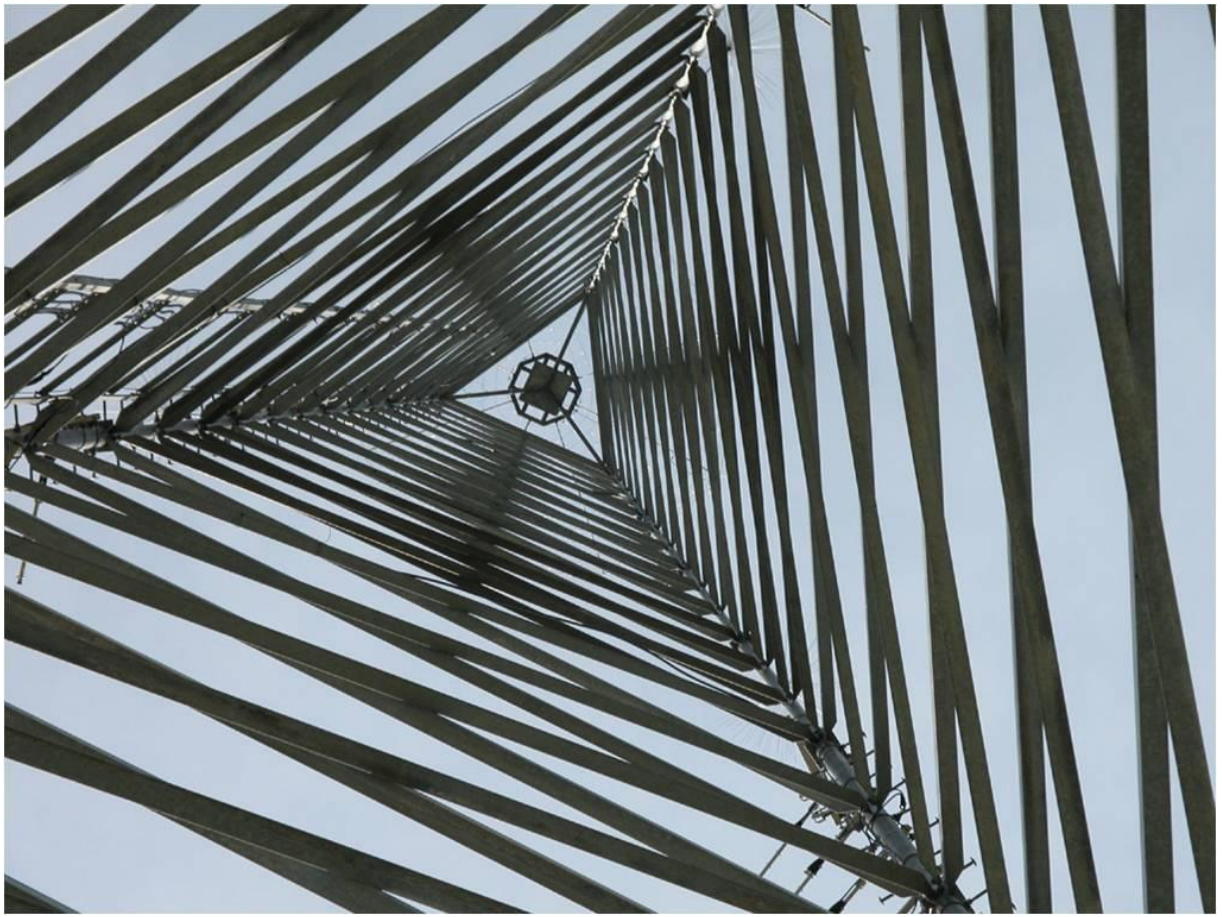
P25 = Cooperation!

P25 is the standard enabling a growing, successful statewide “system of systems.”

P25 ISSI is key to accomplish goal of true statewide roaming and interoperability

- Combining Motorola and Harris systems into single statewide system will benefit all users!

QUESTIONS?



Contact Information:

Ernie Blair, ENP

CEO, Madison County Communications District

Director, Radio Infrastructure

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Huntsville, AL 35806

(256) 722-7341

eblair@madco911.com

Link to Mission Critical Magazine “P25 in Alabama” Article:

http://mccmag.com/repository/files/State-and-Local-low-res8-14.pdf

Project 25 User's Perspective

P25 On A Budget

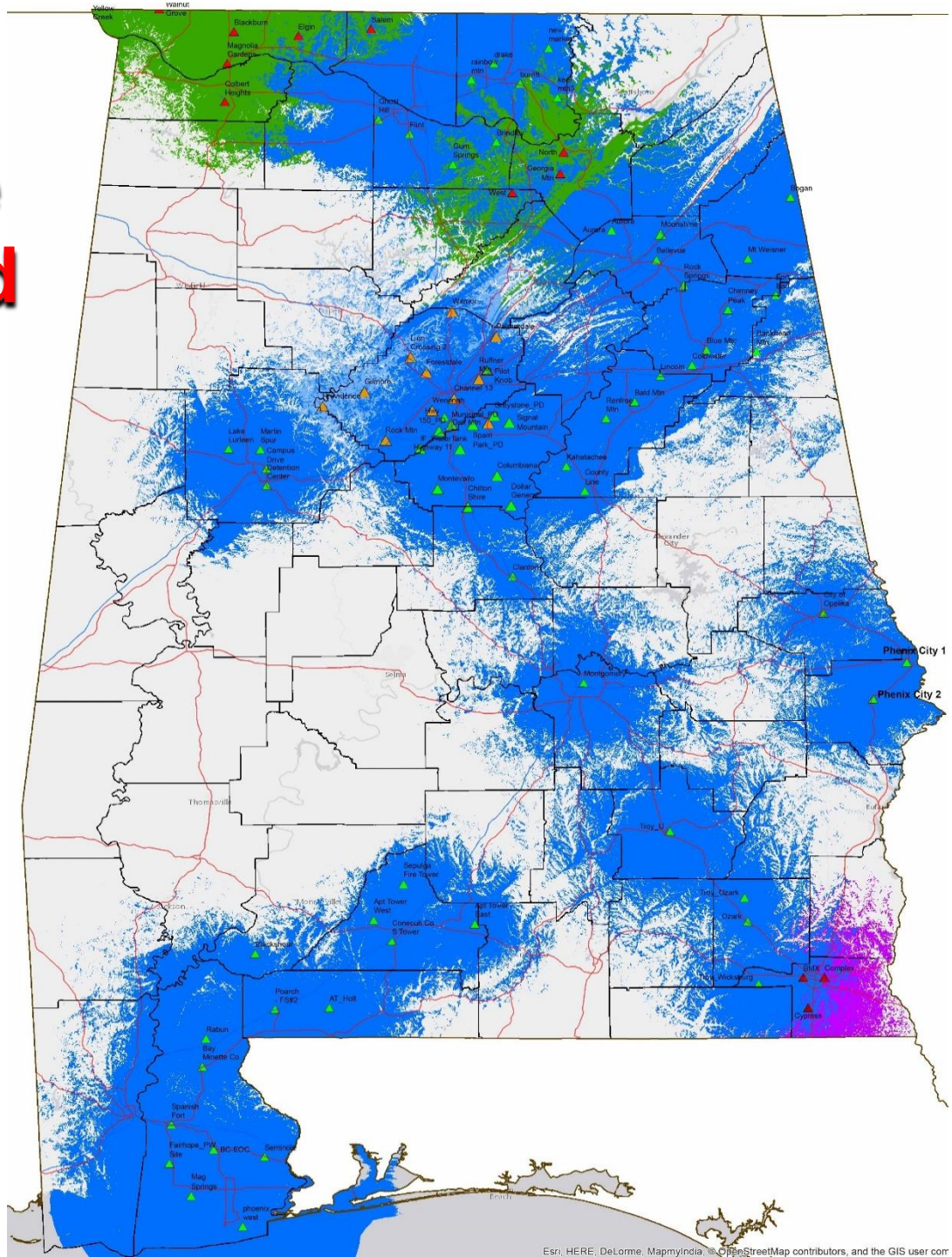
Calhoun County, Alabama

9-1-1 District

Kevin Jenkins,

Executive Director, CALHOUN COUNTY, AL 9-1-1 DISTRICT.

Alabama Statewide Combined Motorola 700/800 MHz Existing and Planned Coverage



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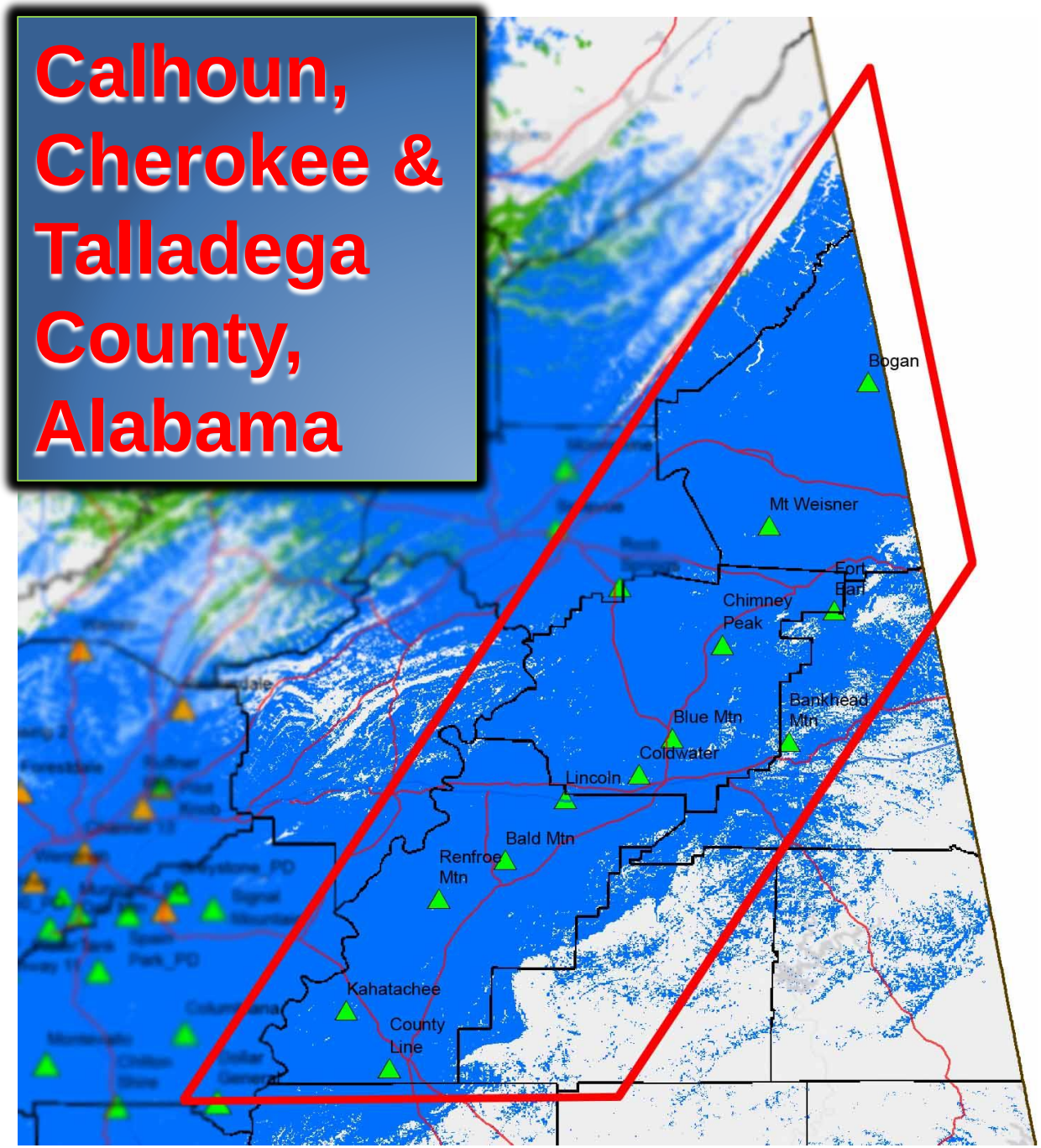
Calhoun, Cherokee & Talladega County, Alabama



A Grant-Funded P25 System in Crisis

- As of 2011, the total costs of the Calhoun-Talladega Regional Communications was estimated at approximately **$75,000,000**, funded by CSEPP since 1996
  - Communications system buildout with towers, buildings, generators, UPS, microwave, broadcast equipment, etc.
  - Subscribers
  - Operations and maintenance through 2011.
- Until March 31, 2011, CSEPP funded all maintenance of the communications system.
- CSEPP funded the last "system upgrade" in 2005.
- At the time of the handoff in 2011, the regional communications system needed an upgrade to system software that was installed and last updated in 2005. At the time, officials could only identify money for continued operation of the system as funding for upgrades was under consideration.

Alabama Regional Communications System

- In 2011, All users began paying a monthly user fee as $22.50 per two-way radio device and $50.00 monthly per dispatch console.
- The formula for determining the user fee was based on the total estimated annual costs to **operate and maintain** the communications system compared to the projected total number of users subscribing to the system.
- The current user fees were established based on 2,800 users with a annual cost of $760,000 to operate and maintain the system ($22.62 = determined user fee of $22.50 per subscriber per month).

Alabama Regional Communications System

- The recurring costs for necessary system software and infrastructure upgrades were not figured into the current user fee structure (determined in 2011).
- As a result, the USER FEE only generated enough revenue to operate and maintain the P25 system.
- ARCS was unable to afford the costs of upgrading the communications system. ARCS was unable to sustain the system on user fees alone.
- As of March 2013, ARCS was unsuccessful in numerous attempts to identify and secure alternative funding sources (grants, taxation, state resources, etc.)
- In April 2013, the Calhoun County Commission appointed an exploratory committee of public safety community leaders to explore alternatives.

Calhoun County 9-1-1 District

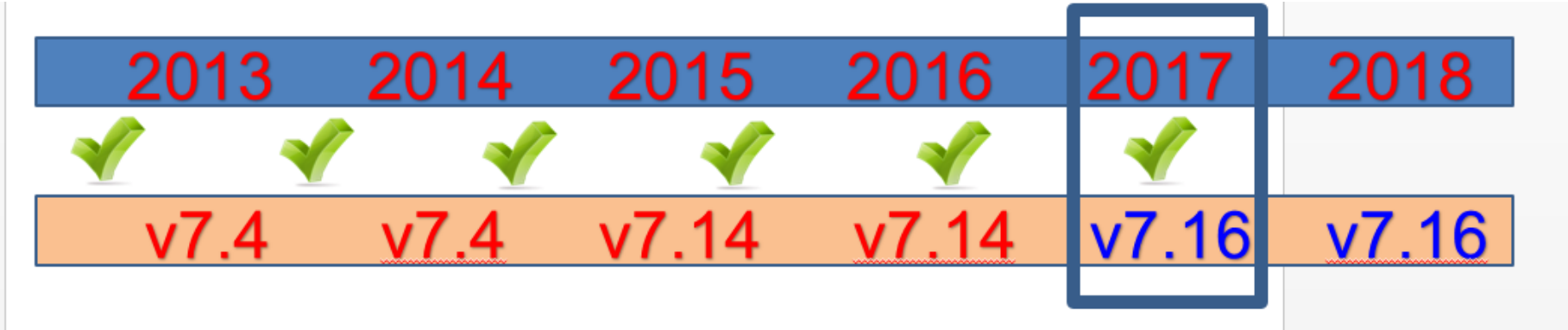
- CC911 adopted the same user fee for Calhoun County users as determined by ARCS.
- With the additional funding source of 9-1-1 telephone surcharges, CC911 was able to immediately fund the **most-pressing** upgrades:
  - **Communications System Upgrade – JUNE 2014**
    - Refresh OS software that was 10 years behind (v7.04 to v7.14)
    - Replace dispatch consoles
    - COSTS: $3,400,000
  - **Migration Assurance Plan/System Upgrade Agreement – DEC 2014**
    - Continually refresh OS software every two years through 2025
    - Replaces certain infrastructure
    - COSTS: $5,300,000.
- As of December 2014, CC911 has committed $8,700,000 to sustain and continually upgrade the communications system through 2025 (10 year debt).

KEY Components = Keep It Going

What are the necessary components to deploy, operate
and sustain a P25 communications system?

- **1. GOVERNANCE**
- **2. SKILLED MANAGEMENT AND SUPPORT STAFF**
- **3. INFRASTRUCTURE**
- **4. HIGH-AVAILABILITY NETWORK**
- **5. HAPPY USERS!!**
- **6. 24-7-365 MAINTENANCE AND OPERATIONS**
- **7. CURRENT AND FUTURE UPGRADES**
- **8. SUSTAINMENT PLANNING AND FUNDING**
- **9. CACHE OF SPARE PARTS**

TECHNOLOGY: THE UPGRADES WILL NEVER END!



…a continuum…

"A continuous sequence in which adjacent elements are not perceptibly different from each other, *although the extremes are quite distinct*."

Calhoun County 9-1-1 District

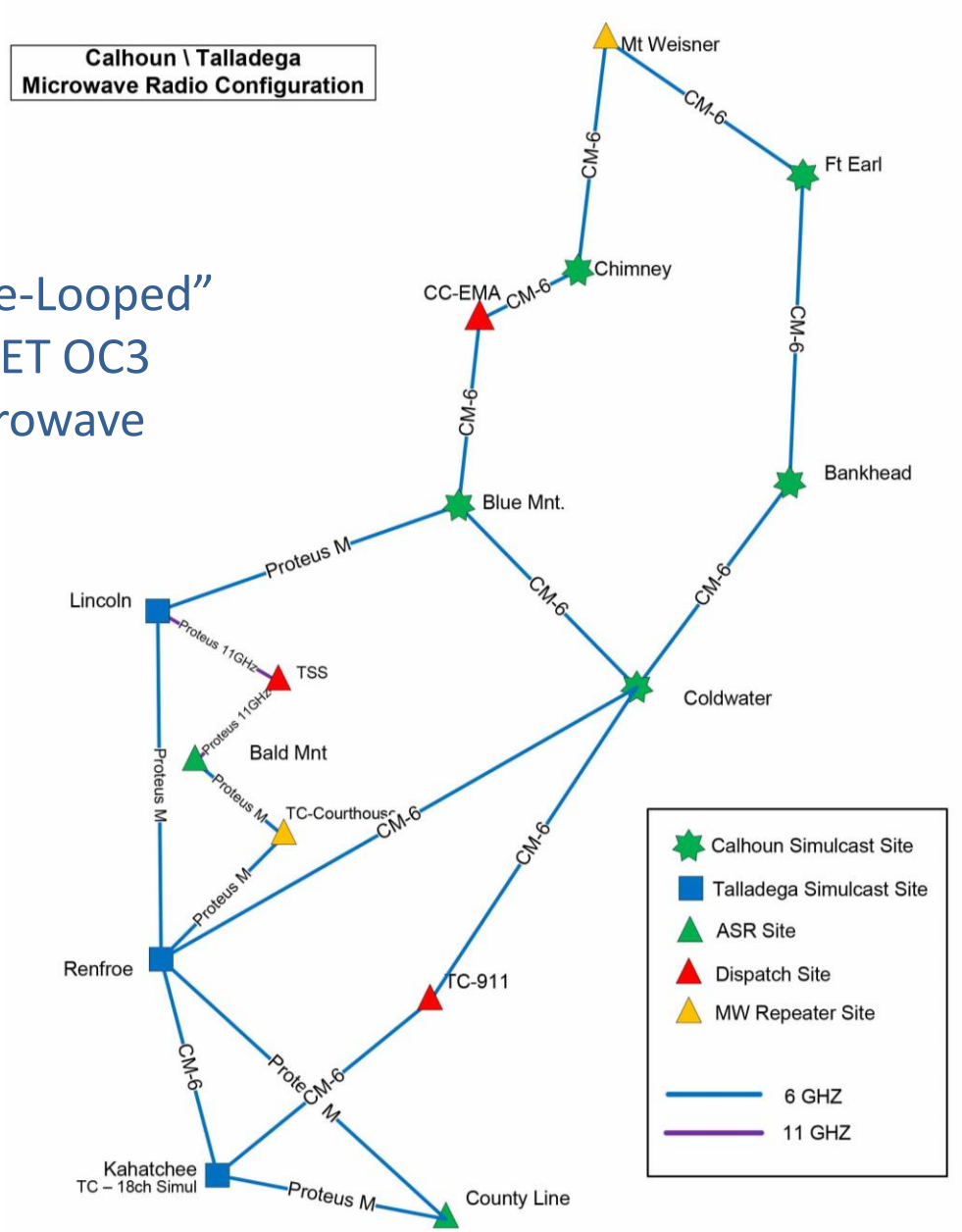
OUR LASTEST TECHNOLOGICAL HURDLE:

The microwave system MUST be replaced over the next two (2) years in order to sustain evolutionary changes for operation of Motorola Astro25 IP-based Simulcast. Calhoun County entirely depends on simulcast RF infrastructure.

- Motorola's support for legacy circuit-based simulcast ends with the next Motorola software upgrade from v7.14 to v7.16. This step is projected to occur within two years.
- The microwave network is the "foundation" of the communications system. It was installed in 2005 and has not been upgraded or replaced since CSEPP.
- Our current microwave system **will not** support the type of broadband communications (Ethernet) as required by Motorola's future operating platforms for IP-based Simulcast.
- After the replacement of the microwave system is completed, we must immediately transition from circuit-based (analog) simulcast to IP-based simulcast (digital) simulcast.

The Mission-Critical Network

"Double-Looped"
SONET OC3
Microwave



Calhoun County 9-1-1 Continuity Plan

- Motorola's proposal for replacement of the microwave system and upgrade to IP-based simulcast: **$3,200,000**.
- CC911 cannot afford to pay for it using supplemental funds from the Alabama 9-1-1 user surcharge.
- In order to sustain our interoperable communications system, we must:
  - Identify additional source(s) of revenue to fund microwave and IP-based simulcast infrastructure replacements
  - Project manage and complete roughly 90 percent of the work in-house using internal CC911 technical staff over the next two-years, without outsourcing to Motorola Solutions.
- CC911 estimates we can complete the necessary work by using internal technical personnel, competitive bidding processes and any available government procurement channels at an estimated **reduced overall costs of $1,260,000**.
- After five (5) years, user fees will be re-evaluated.

Current/Proposed User Fees *

FY	CALHOUN COUNTY: COMMUNICATIONS SYSTEM USER FEE PROJECTIONS ($1,260,000)						
	User Fee	Increase $	Increase %	# Users	Annual Revenue	Increase Prev YR	Year-to-Year Cume
2011	$22.50	$0.00	0.00%	2,155	$581,850.00	$0.00	**$0.00**
2012	$22.50	$0.00	0.00%	2,155	$581,850.00	$0.00	**$0.00**
2013	$22.50	$0.00	0.00%	2,155	$581,850.00	$0.00	**$0.00**
2014	$22.50	$0.00	0.00%	2,155	$581,850.00	$0.00	**$0.00**
2015	$22.50	$0.00	0.00%	2,155	$581,850.00	$0.00	**$0.00**
2016	$22.50	$0.00	0.00%	2,155	$581,850.00	$0.00	**$0.00**
2017	**$22.50**	**$0.00**	**0.00%**	**2,155**	**$581,850.00**	**$0.00**	**$0.00**
2018	**$28.69**	**$6.19**	**27.50%**	**2,155**	**$741,858.75**	**$160,008.75**	**$160,008.75**
2019	**$31.50**	**$2.81**	**12.50%**	**2,155**	**$814,590.00**	**$72,731.25**	**$232,740.00**
2020	**$33.19**	**$1.69**	**7.50%**	**2,155**	**$858,228.75**	**$43,638.75**	**$276,378.75**
2021	**$33.69**	**$0.51**	**2.25%**	**2,155**	**$871,320.38**	**$13,091.63**	**$289,470.38**
2022	**$34.14**	**$0.45**	**2.00%**	**2,155**	**$882,957.38**	**$11,637.00**	**$301,107.38**
CUMULATIVE TOTAL / ADDITIONAL REVENUE WITH INCREASED USER FEES							**$1,259,705.25**

**Calhoun County currently has 2,155 users paying $22.50 per month per user. This user fee was established in 2011 during ARCS administration when, at the time, Talladega County users were considered and the total number of users was approximately 2,800.*

THANK YOU for participating in OUR CONCERTED EFFORTS to continue spreading P25 Interoperability across the United States

Project 25 User's Perspective

Thank You

Kevin Jenkins,

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International Wireless and Communications Expo
College of Technology Las Vegas, Nevada
March 27, 2017

P25 User's Perspective
Interoperability, and Customer Applications Update for 2017