

## CCN Interesting Facts

1. Pierce Transit in 2008 built the first Puget Sound Next Generation P-25 Phase 1 FDMA Voice and Data network in the Puget Sound Region, investing over \$35 million.
2. In 2010 Pierce County entered into a MOU with Pierce Transit to:
  - a. Assure that the residents of Pierce County in need of help have their immediate needs met and receive cost efficient services from both Public Safety and Public Transportation services.
  - b. Create, deliver and maintain a high quality communication system for the region by cooperating with one another to deliver next generation communications for Public Safety and Public Transportation.
  - c. Work together to support a single county wide communication system (SCWCS) in the Pierce County Region for the purpose of improving effectiveness, efficiency, and overall service delivery, thereby avoiding duplication of networks and supporting services.
3. In 2011 Pierce Transit and Pierce County completed an Interlocal Agreement which was the first step toward establishing the Combined Communication Network (CCN) Enterprise Joint Venture and established the basis to:
  - a. Design, develop, finance, acquire, install, operate maintain, repair, and replace as necessary a uniform high quality, public safety and public transportation communication system.
  - b. Share a single county wide communication system's microwave, mobile radios, data radios, communication sites, towers, etc. to reduce costs and provide a lean approach toward an integrated public safety and public transportation communication network.
  - c. Work together concurrently to meet FCC Narrowband requirements, NIMS compliance, and certified design requirements including redundant and resilient capabilities with 99.999 system reliability.
4. In 2011 Pierce Transit and Pierce County completed Phase I of the SCWCS upgrading the P-25 700 MHz Motorola System from version 7.2 to 7.7. In 2012, Pierce Transit and Pierce County sourced funding from grants, Pierce County, Pierce Transit and SS911 to implement a P-25 Phase II TDMA 700 MHz system.

5. In 2013-2015 Pierce Transit funded over \$8 million for TDMA subscribers which increased SCWCS capacity to allow access for SS 911 agencies and future customers to drive down costs for everyone.
6. In 2014 Pierce Transit and Pierce County invested over \$2 Million to upgrade and provide improved microwave loop protection and capacity for the SCWCS backhaul network.
7. In 2014 SS-911 funded a 4-channel 3-site VHF 410 corridor system, and in 2017 a 4-channel 11-site VHF overlay network for station alerting, paging, and mutual aid.
8. In 2015, Pierce Transit Board and Pierce County Counsel voted unanimously approved a Cooperative Governance Agreement establishing the Joint Venture partnership known as the CCN.
9. In 2017 Pierce Transit expanded the coverage of the UHF data network meet operational requirement and funds all for he O&M and Replacement costs within the CCN budget.
10. Pierce County lobbied Congress over and 3-year period to improve and execute a Next Generation Integrated Lahar Warning System providing community protection for about 1.8 million throughout the Puget Sound region.
  - a. Pierce County also negotiated for USGS to cover total cost of ownership costs for the system into the future.
  - b. The CCN provides a unique partnership by completing the integration by using the SCWCS 700 MHz and Microwave to provide seamless connectivity which never existed in the past.
11. In 2018, the CCN shall add an already funded site to the Pierce County Jail Distributed Antennae System to increase critical voice and data coverage within the jail and provides capabilities to increase return-on-investment by leveraging without duplication the DAS back office network and SCWCS resources providing potentially other Pierce County and Pierce Transit facilities with in building voice and data coverage.



# Single Countywide Communications System Overview

**Delivered By:**  
Lowell Porter  
CCN Executive Director  
July 12, 2017



CCNET



# Combined Communications Network (CCN) – Single County Wide Communications System (SCWCS) Overview



## **The following presentation provides a detailed overview of the CCN (Pierce Transit/Pierce County Joint Venture) SCWCS and the:**

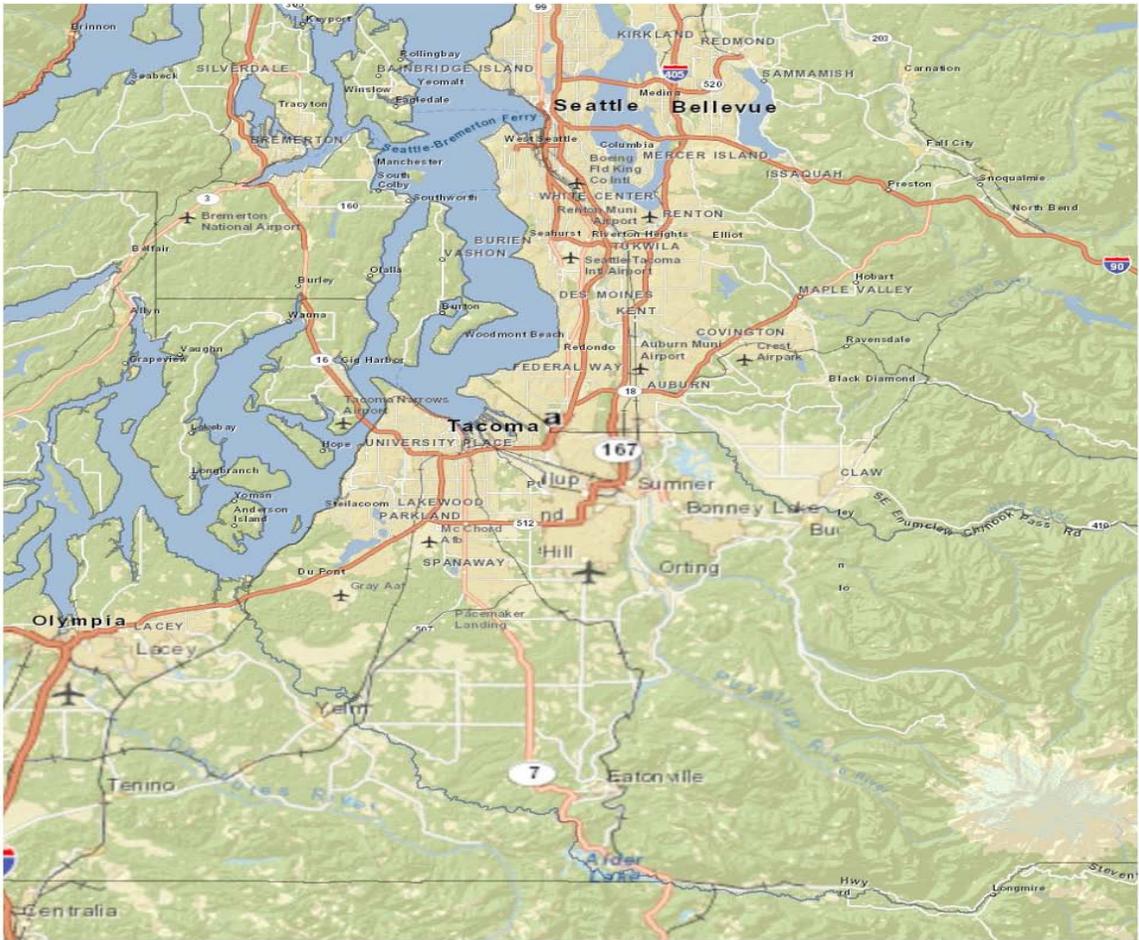
- Seven layers (Networks and Systems) that comprise this Public Safety and Public Transportation voice and data communications network;
- Infrastructure design and coverage of each network/system;
- A profile of the diverse agencies operating on these networks;
- An overview of the funding sources that supported the implementation of the infrastructure for these networks; and
- Summary of the outcomes achieved as a result of the SCWCS.



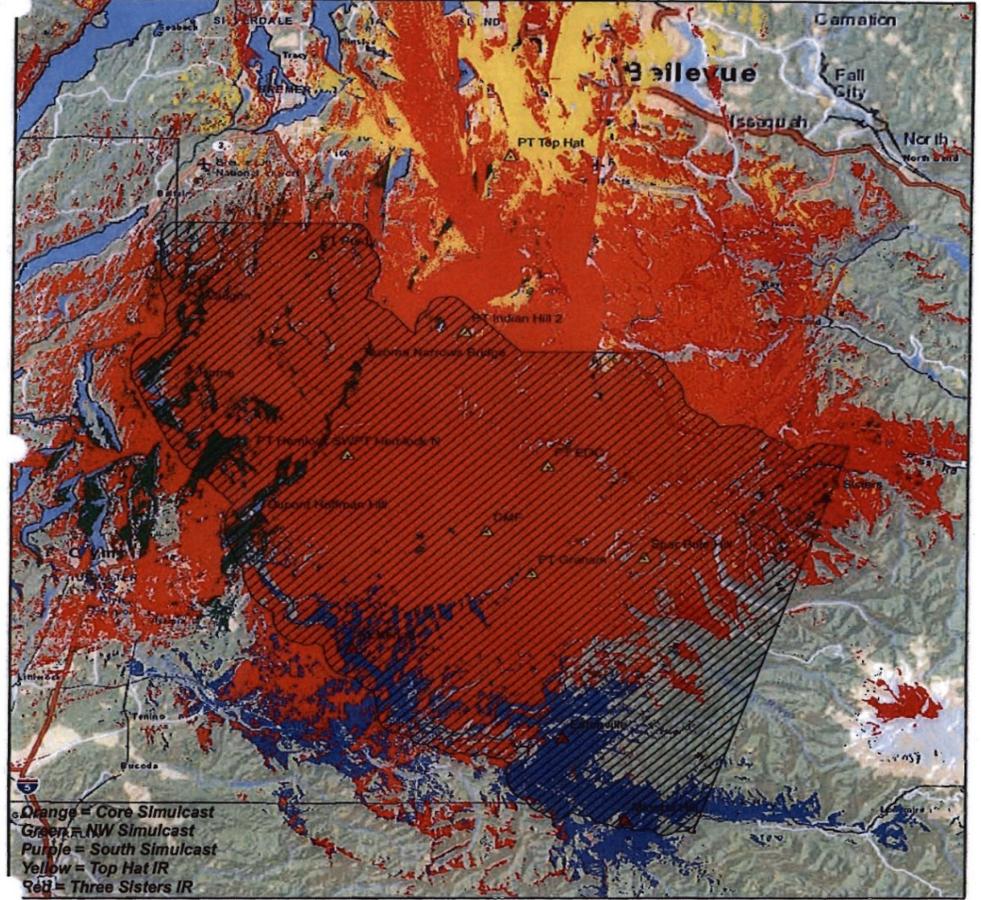
# Combined Communications Network (CCN) – Single County Wide Communications System (SCWCS) Overview



Puget Sound Regional Map



**Pierce County 97% Covered Area Reliability DAQ 3.4**  
**MOTOROLA 700 MHz P25 Phase 2 Trunking System Layered Map for Comparison**



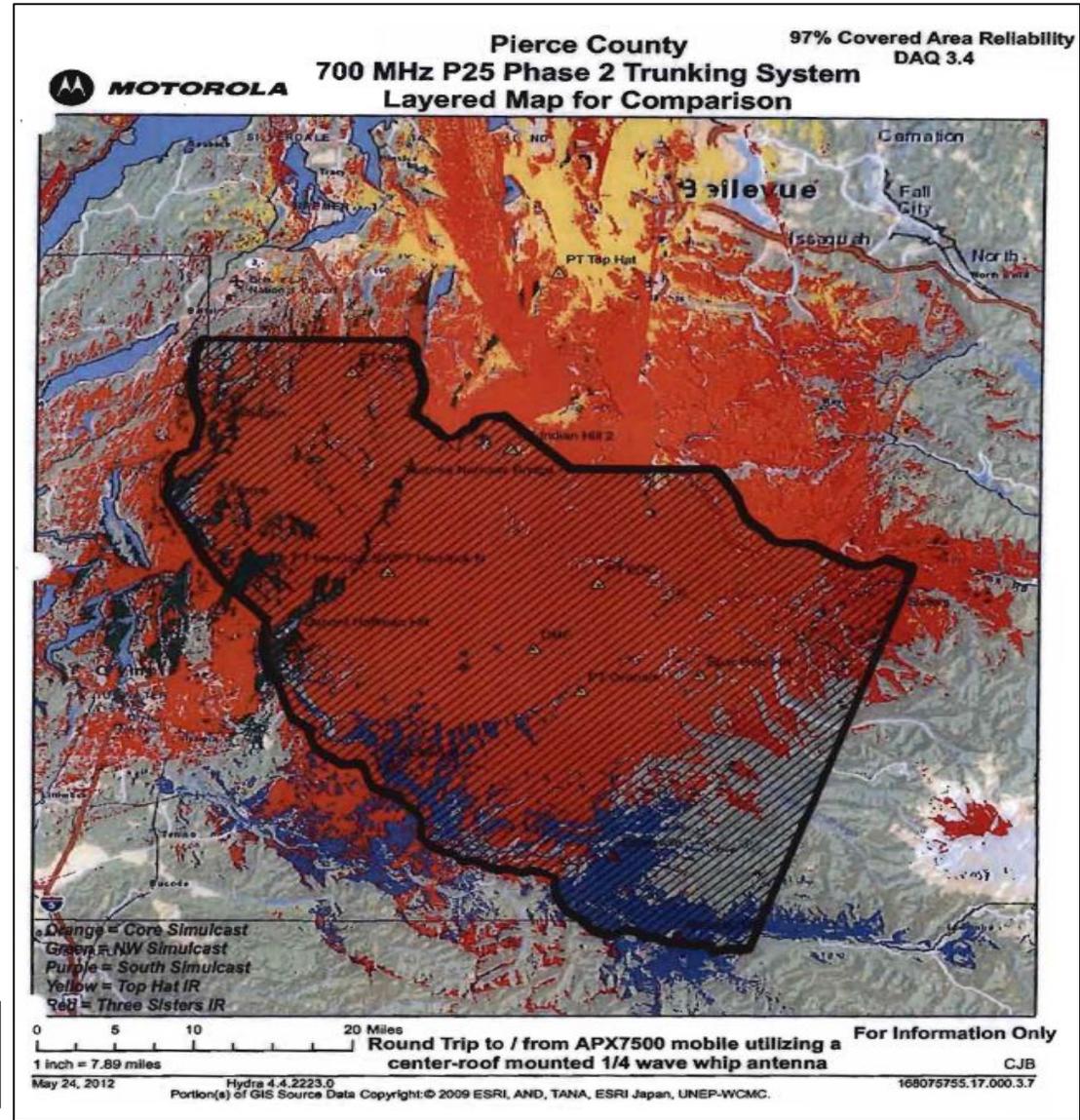
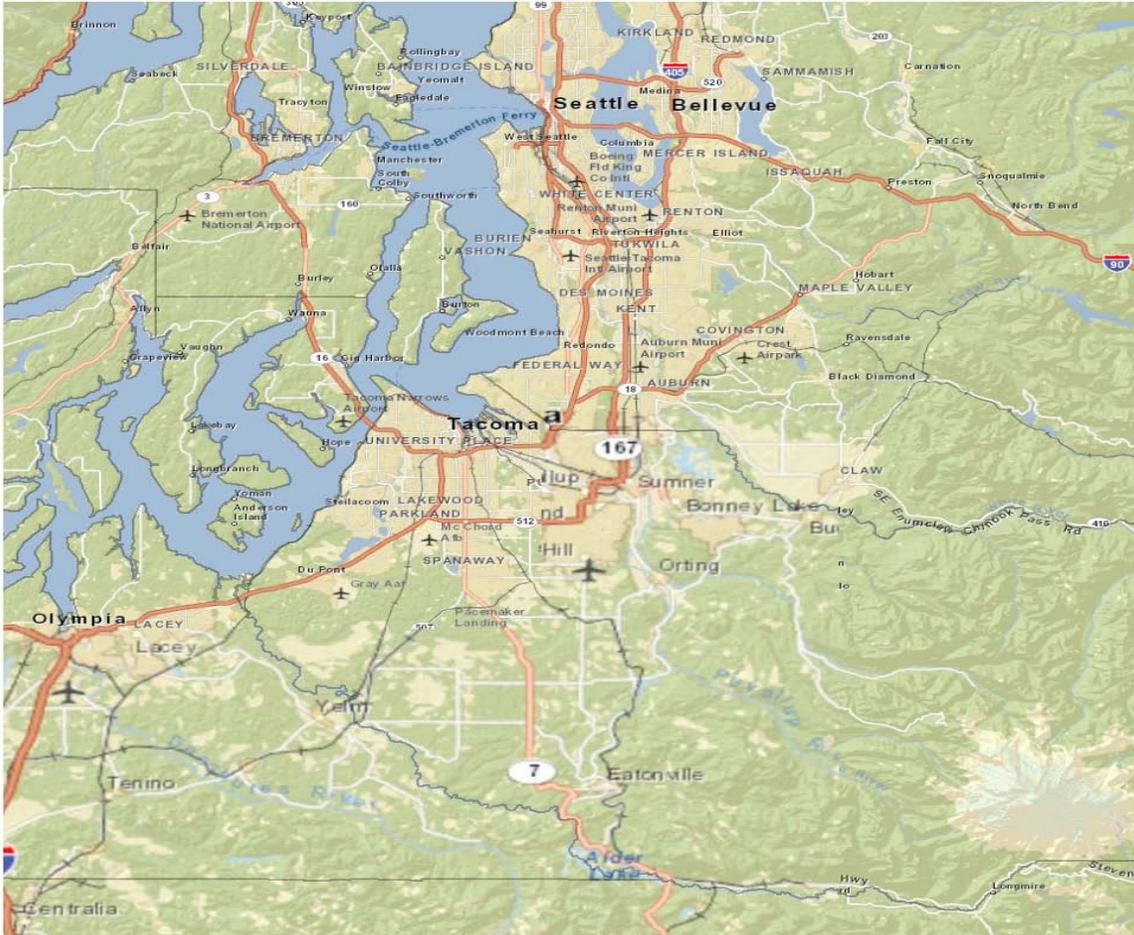
0 5 10 20 Miles  
 1 inch = 7.89 miles  
 Round Trip to / from APX7500 mobile utilizing a center-roof mounted 1/4 wave whip antenna  
 For Information Only  
 CJB  
 May 24, 2012  
 Hydra 4.4.2223.0  
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# Combined Communications Network (CCN) – Single County Wide Communications System (SCWCS) Overview



Puget Sound Regional Map



# Combined Communications Network: Single Countywide Communications System (SCWCS) Network



The SCWCS is a regional, multi-layered, Public Safety and Public Transportation voice and data communications network which covers a significant amount of the Puget Sound region. This network is owned and operated by Pierce Transit and Pierce County – under the CCN.

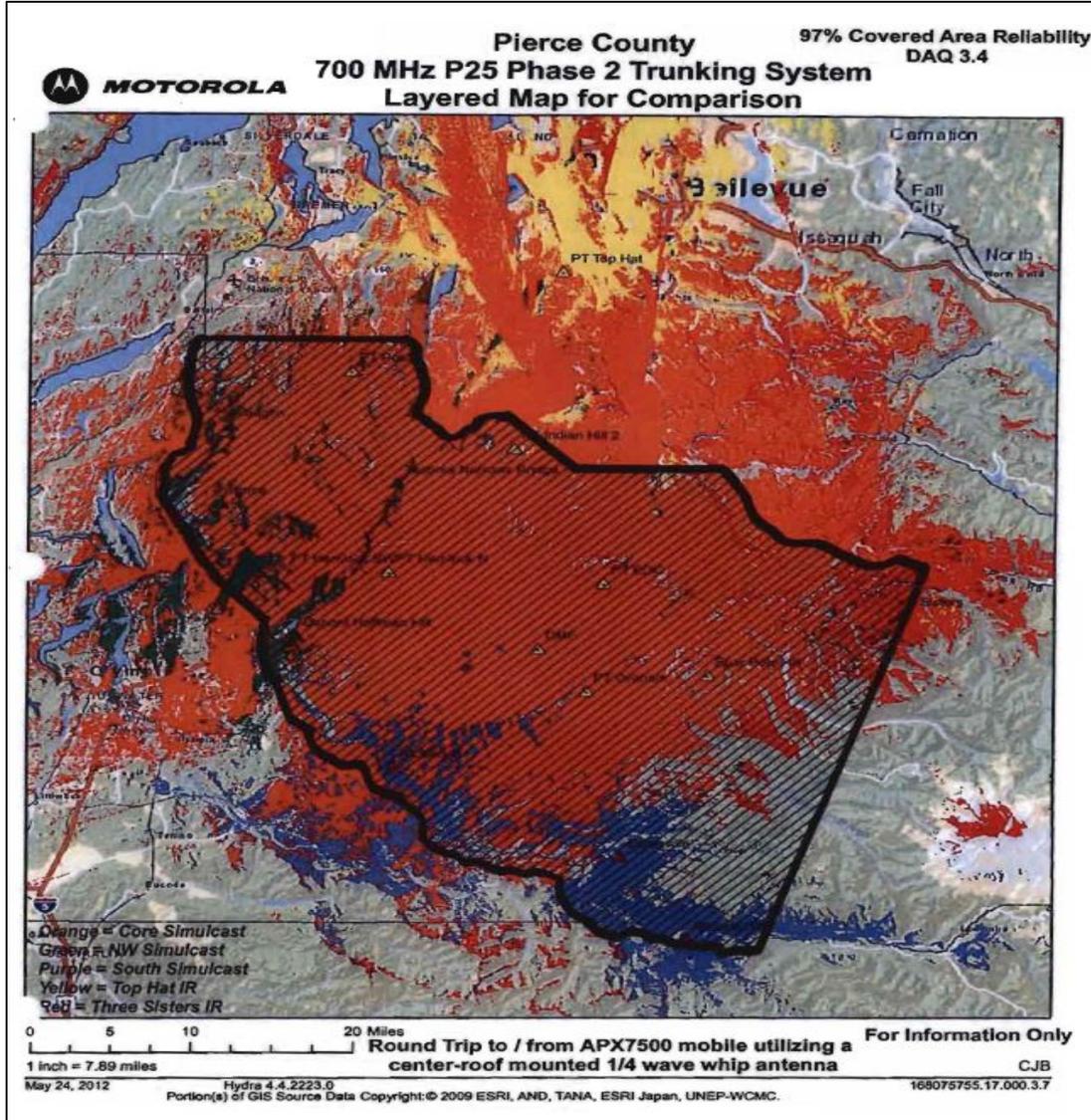
- ### SCWCS Infrastructure Categories Summary:
- Next Gen. P-25 Master Site (M3 Core)
  - 21 Comm. Sites
    - Three Simulcasts
    - Two Independent Repeaters
  - 96 Microwaves
  - Seismic hardened towers and facilities.
  - 24/7/365 network and security monitoring
  - Tier 3/4 back-up power systems
    - Generators
    - DC Power

CCN Cooperative Governance Agreement (CGA) signed by Pierce Transit and Pierce County

2015

Single County Wide Communication System

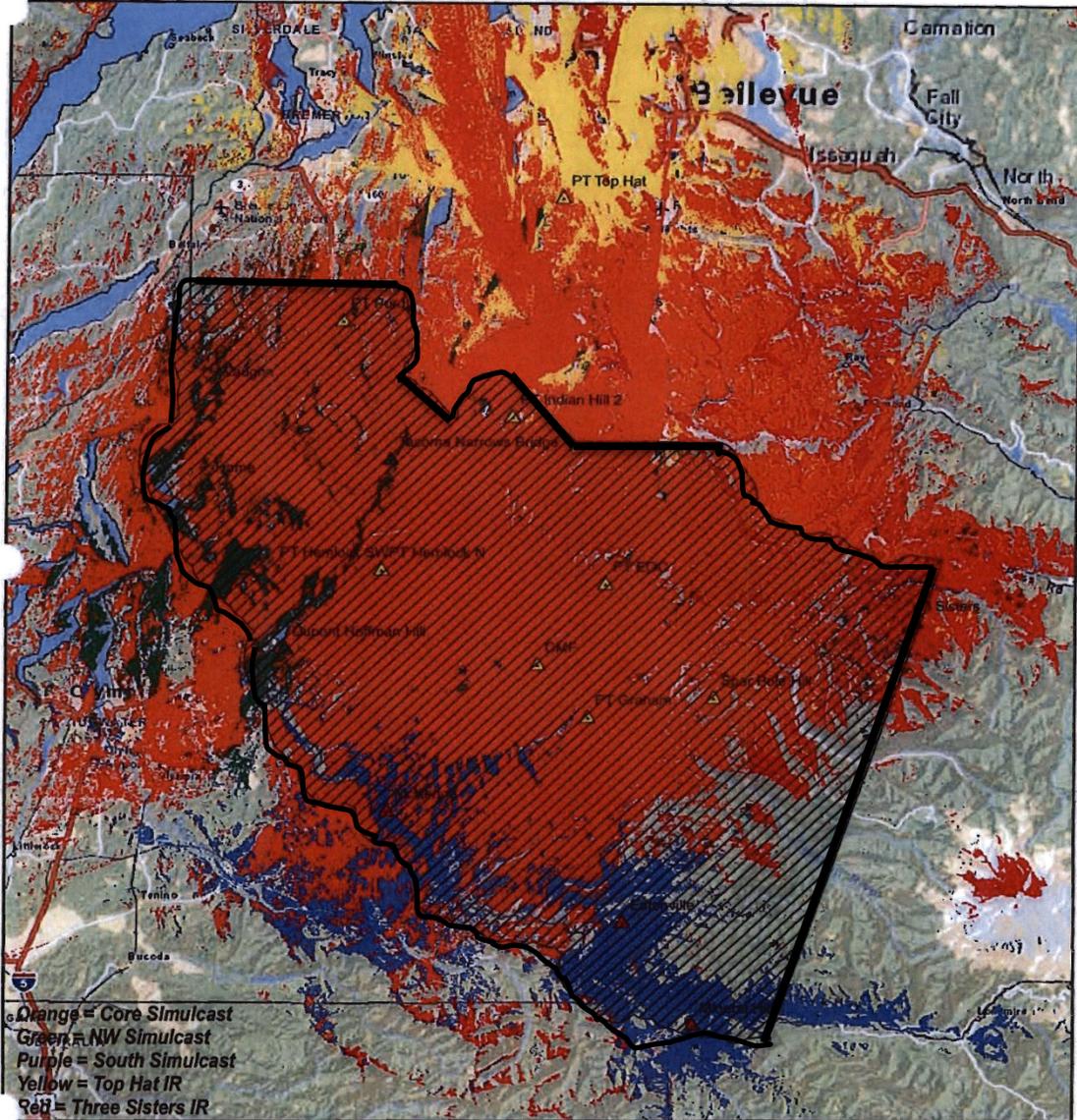
# Combined Communications Network (CCN) – Single County Wide Communications System (SCWCS) Overview





**Pierce County**  
**700 MHz P25 Phase 2 Trunking System**  
**Layered Map for Comparison**

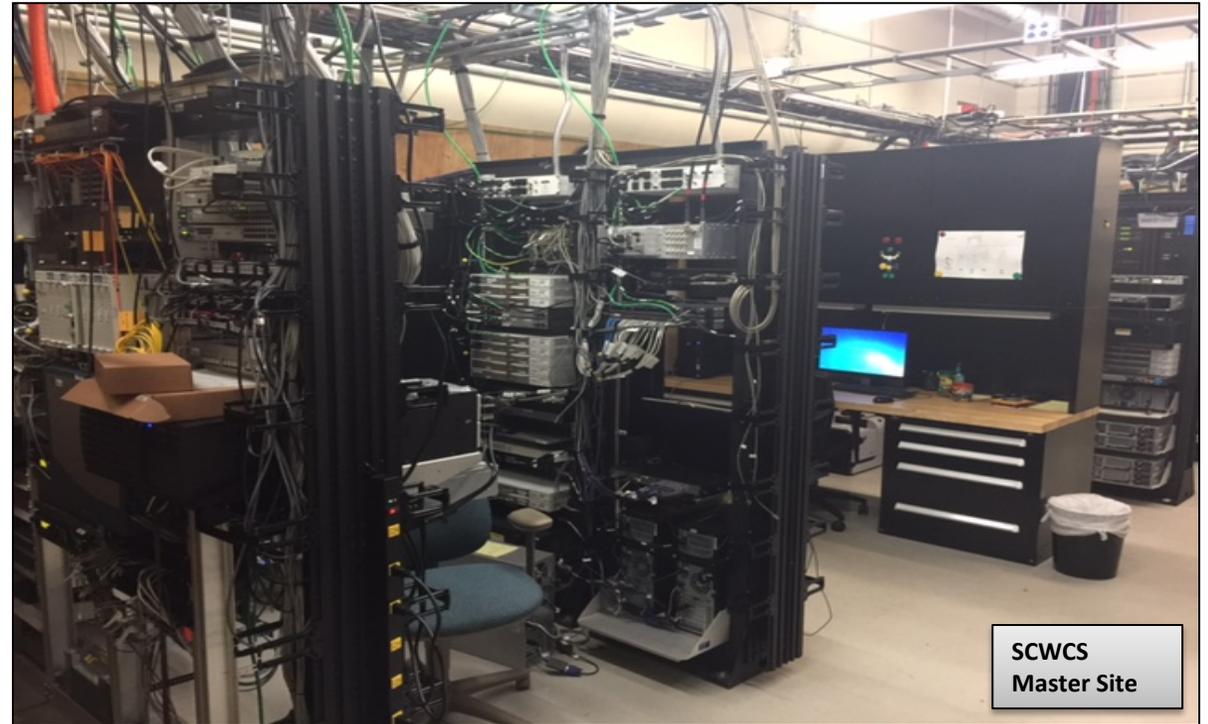
97% Covered Area Reliability  
 DAQ 3.4



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 Portion(s) of GIS Source Data Copyright: © 2009 ESRI, AND, TANA, ESRI Japan, UNEP-WCMC.

**Round Trip to / from APX7500 mobile utilizing a center-roof mounted 1/4 wave whip antenna**

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SCWCS  
 Master Site



Master Site  
 DC Power System



# Combined Communications Network: Single Countywide Communications System (SCWCS) Network



The Microwave Network is a 21 site, 96 microwave network, which provides the backbone and connectivity for the entire SCWCS infrastructure and all 7 layers of this regional Public Safety and Public Transportation voice and data communications network.

The SCWCS Microwave Network also provides connectivity support to the following communications networks:

- City of Tacoma 800 MHz
- City of Puyallup 700/800 MHz
- Washington State Patrol
- WA Dept. of Transportation

2014

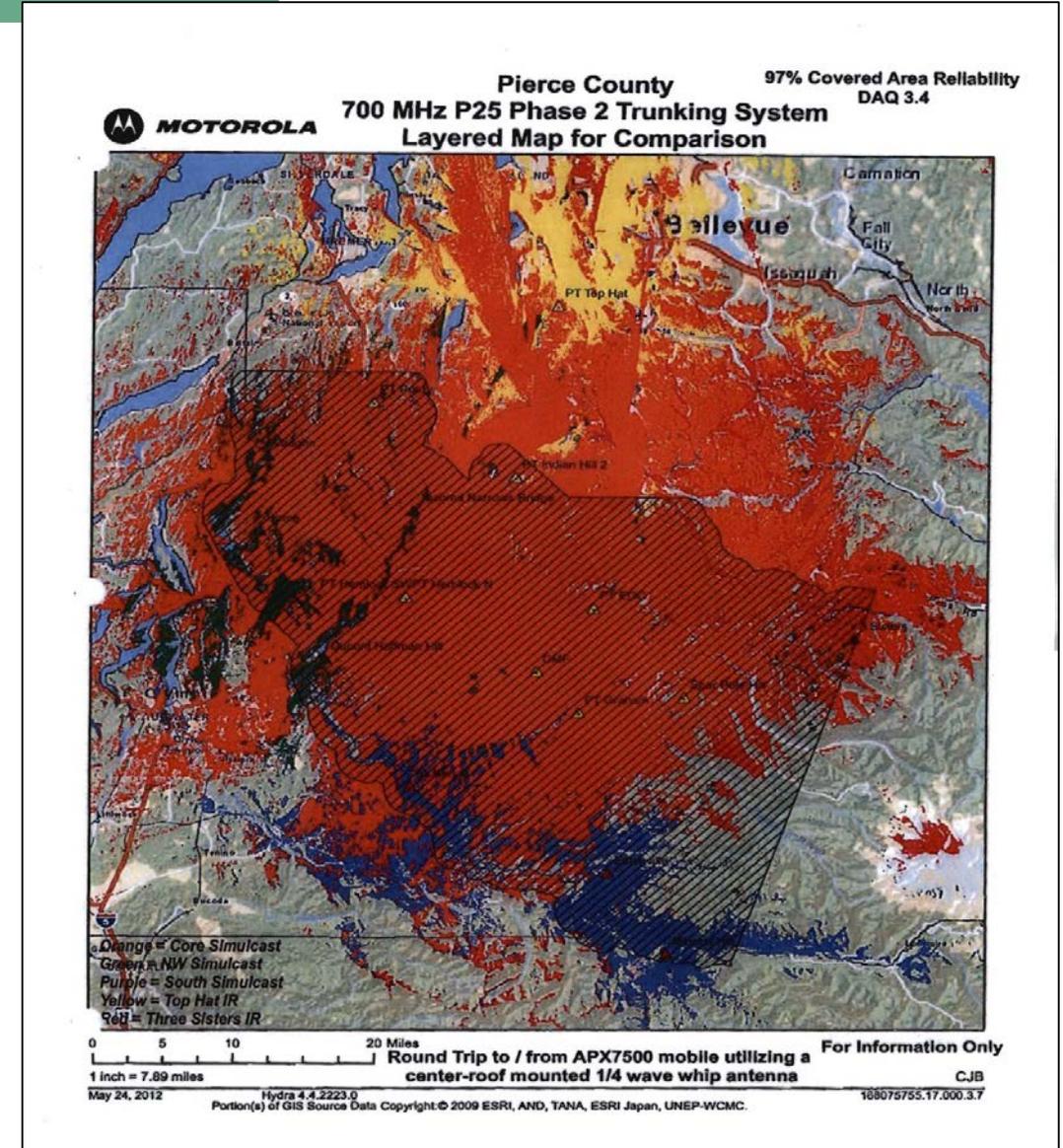
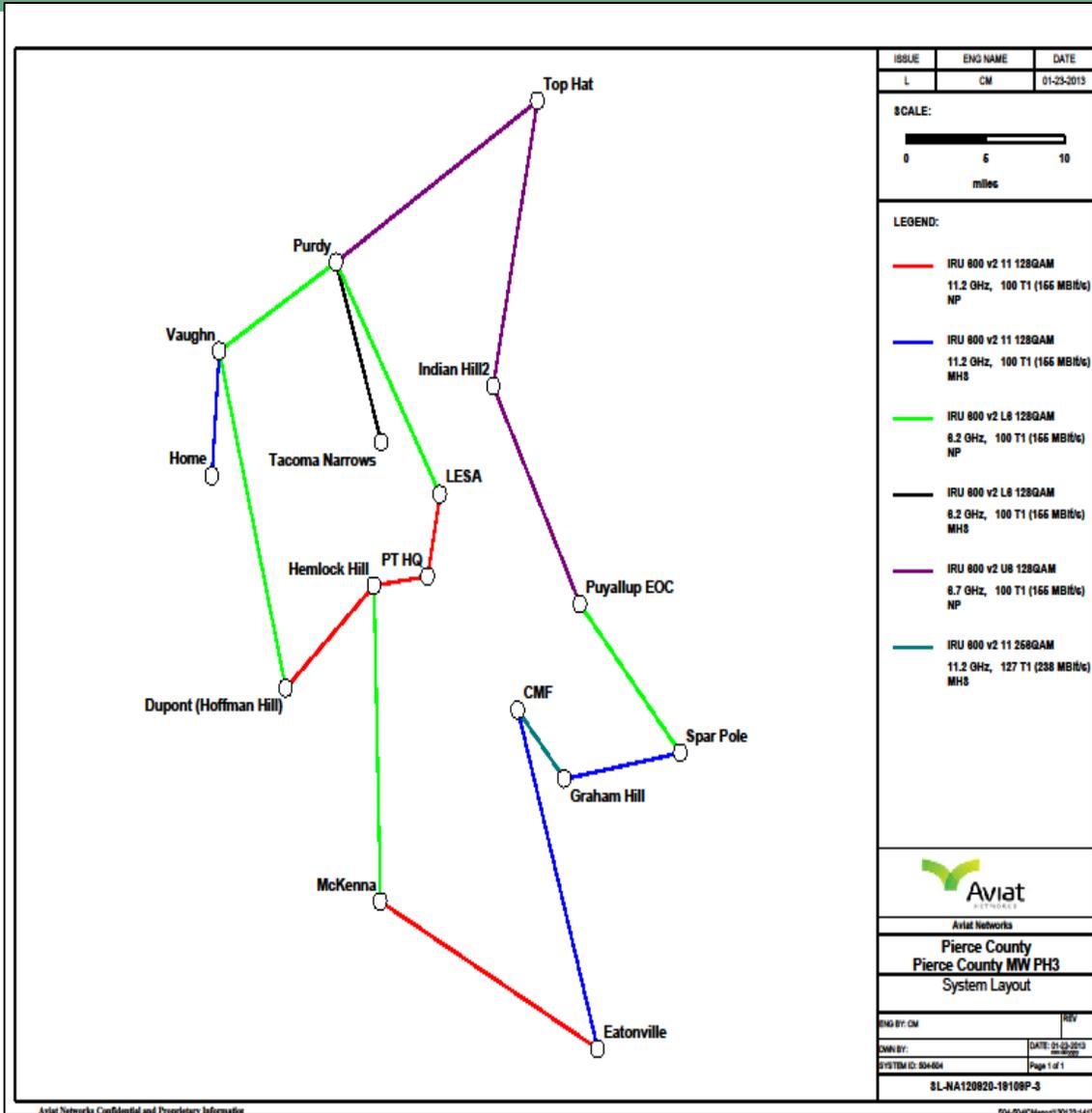


SCWCS  
Microwave  
Dishes

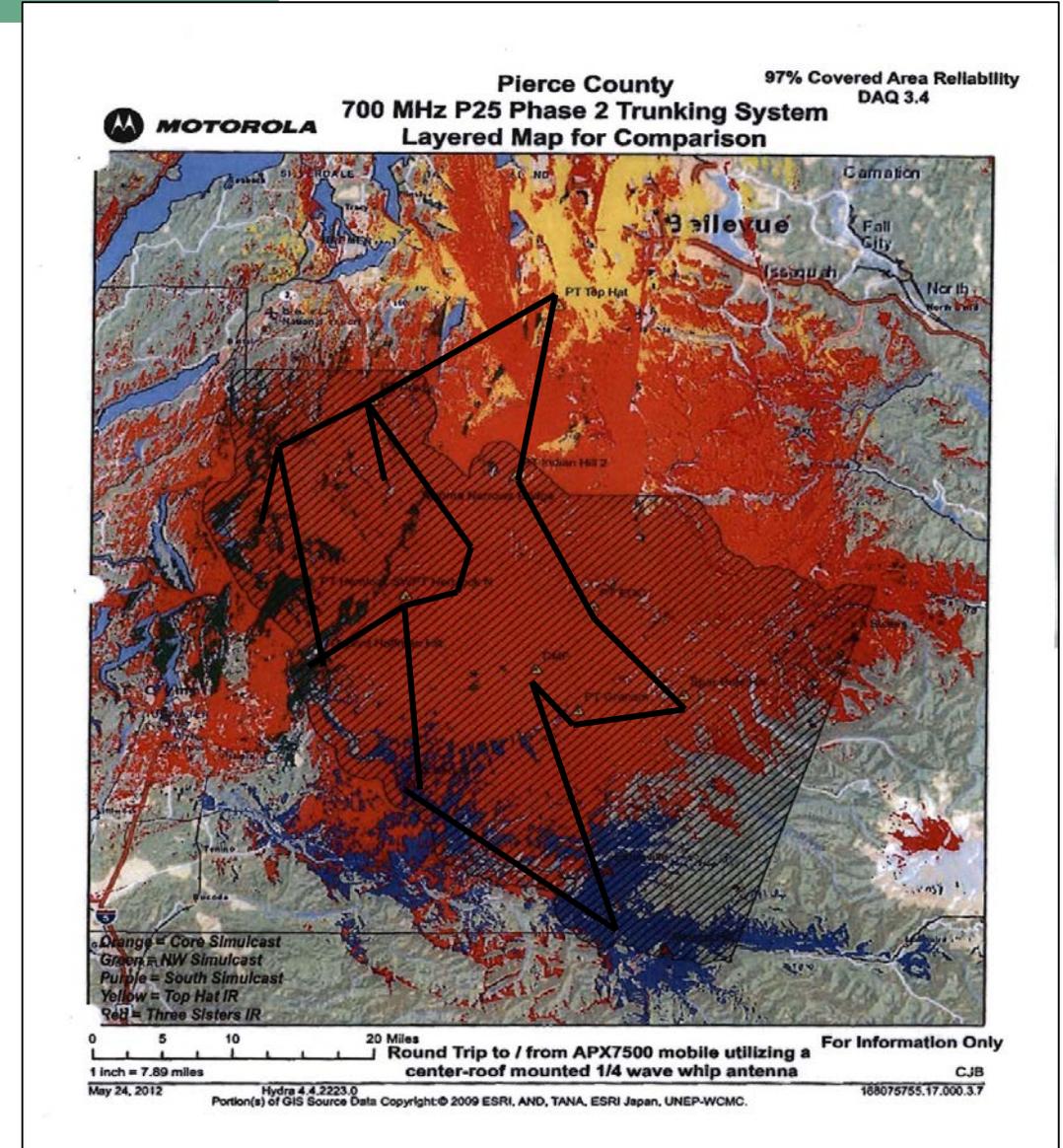
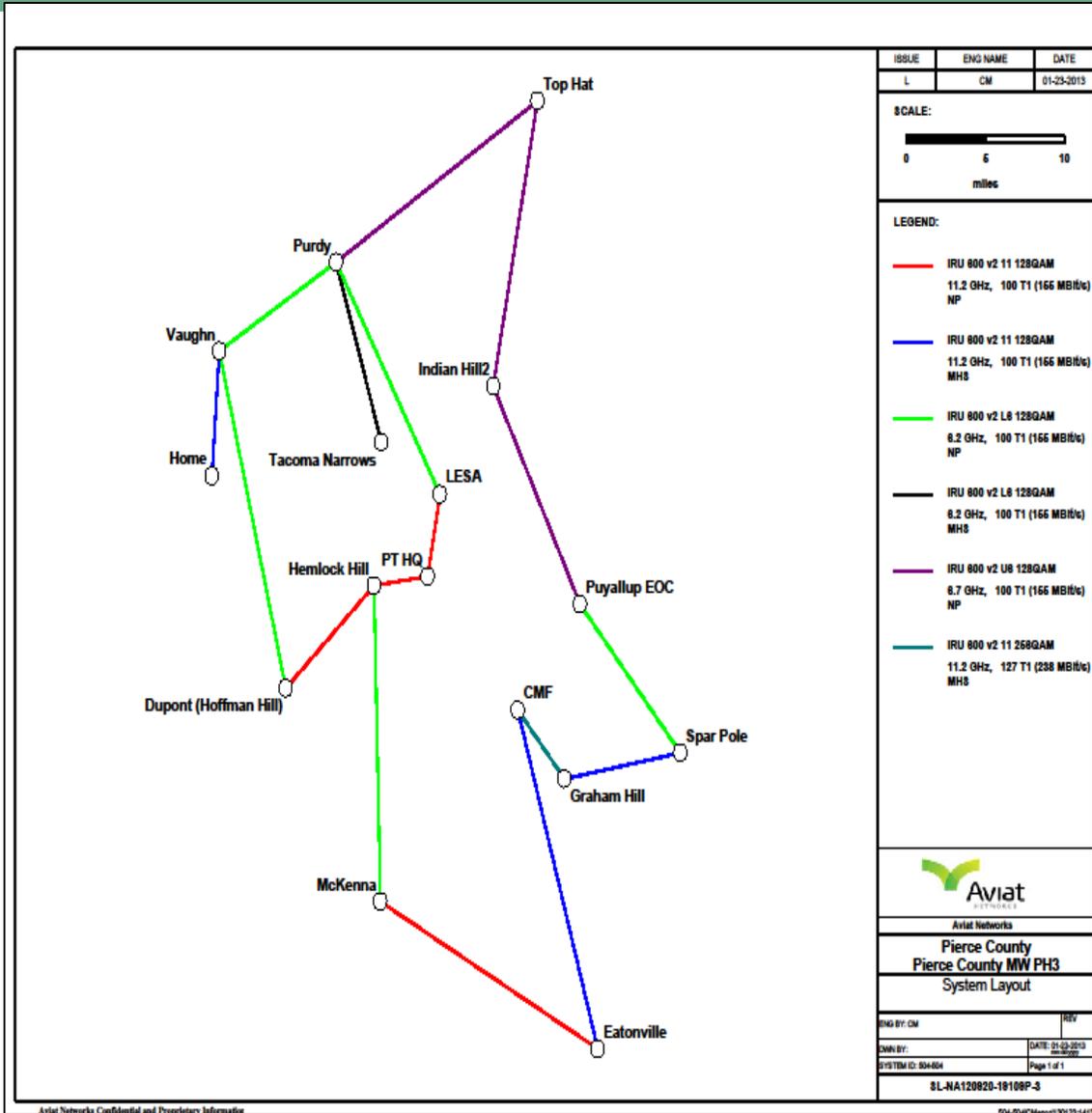
Microwave Network

Single County Wide Communication System

# Microwave Network and Coverage Maps



# Microwave Network and Coverage Maps



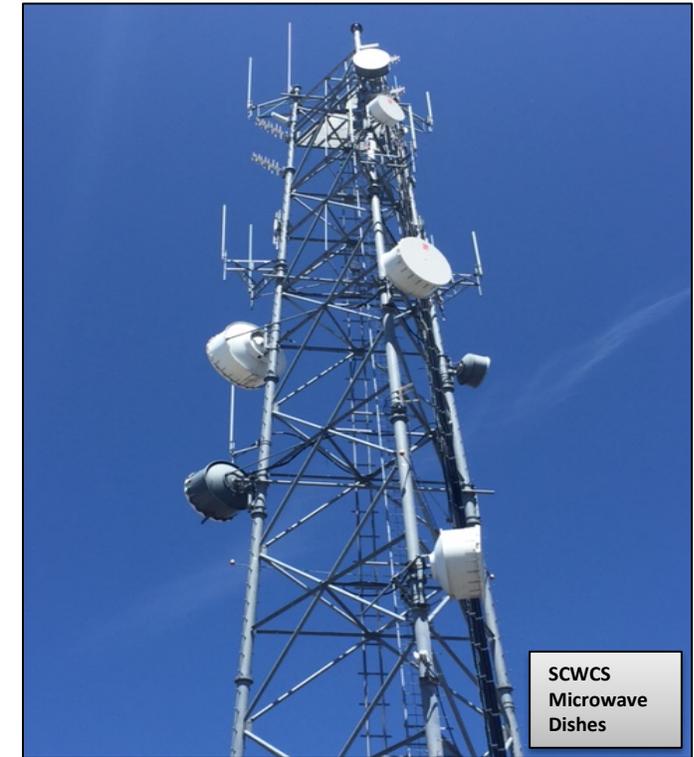
# Microwave Network Public Safety Support



The following User Agencies depend on the Microwave Network for varying operational communications needs:

- All Fire Departments – VHF Overlay for Station Alerting and Mutual Aid
- All Law Enforcement – VHF Overlay for LERN/Mutual Aid operations
- South Sound 911 – all dispatch on 700 MHz and VHF Overlay
- Pierce Transit – all 700 MHz and UHF CAD/AVL
- Schools
- Search & Rescue
- Pierce County Sheriff Department Channel
- Dept. Of Emergency Management
- Kitsap County (Southeast County) Fire Departments Law Enforcement

VHF Overlay & DEM



SCWCS  
Microwave  
Dishes

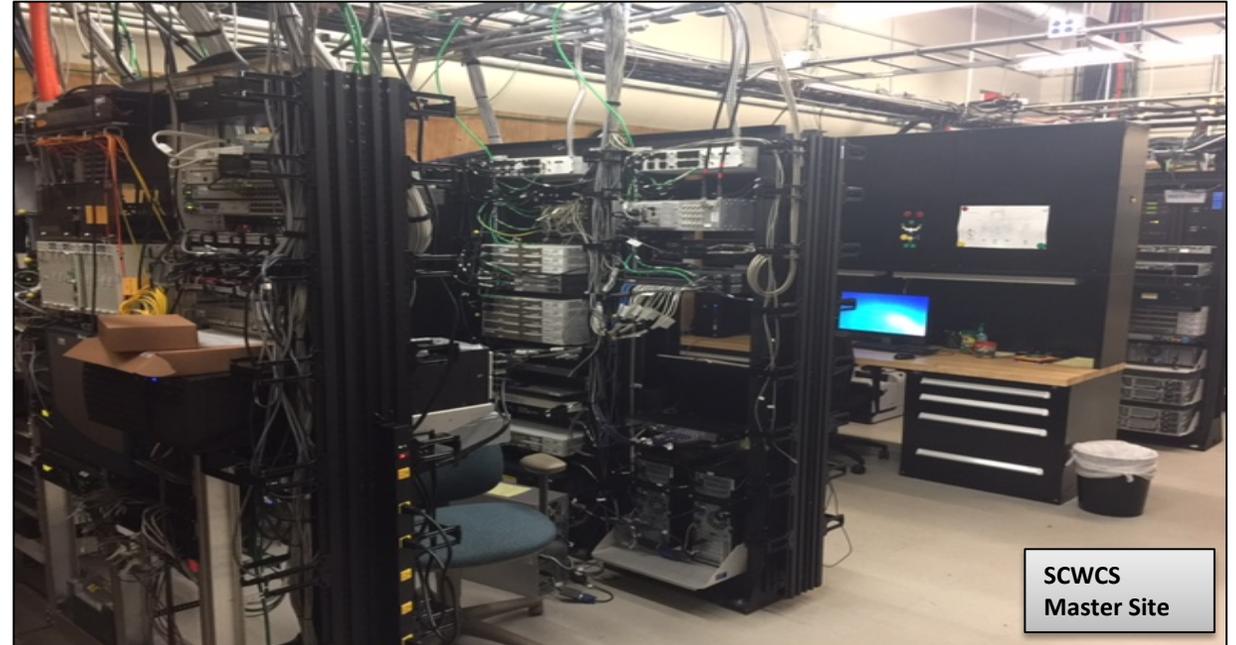
Microwave Network

Single County Wide Communication System

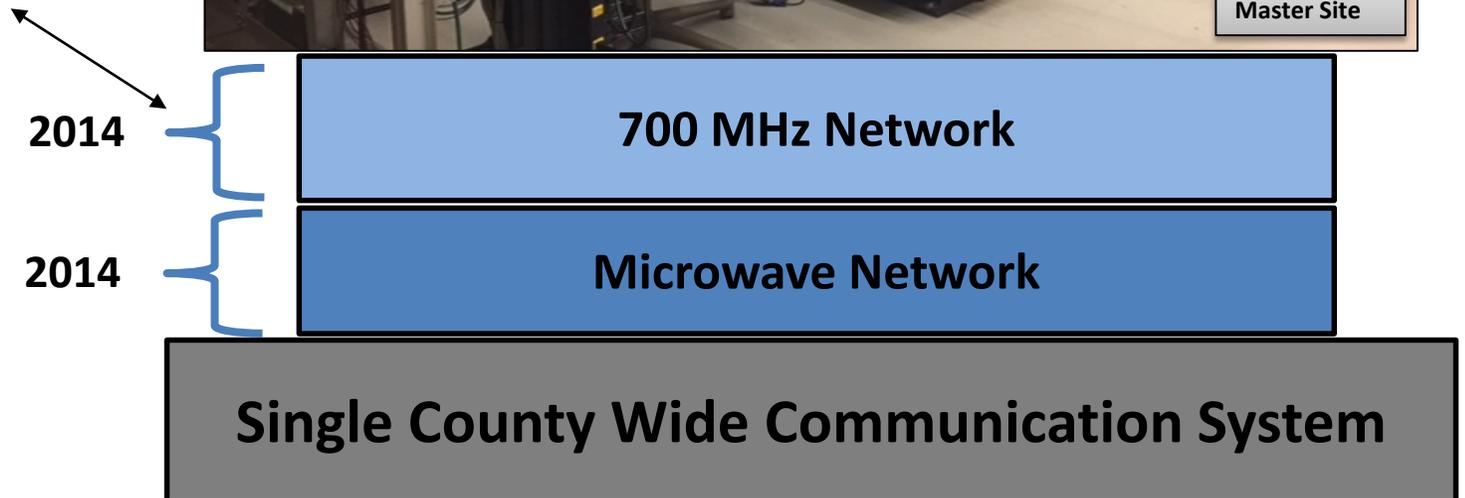
# Combined Communications Network: Single Countywide Communications System (SCWCS) Network



The 700 MHz Network is a 21 site, 38 channel/74 talk path system that comprises one of the largest Public Safety and Public Transportation voice and data communications networks in the Western U.S. and is the largest layer of the SCWCS. The system was designed to the highest industry standards of 97% covered area reliability and Delivered Audio Quality (DAQ) of 3.4. Additionally the network was engineered at 99.999 of reliability.



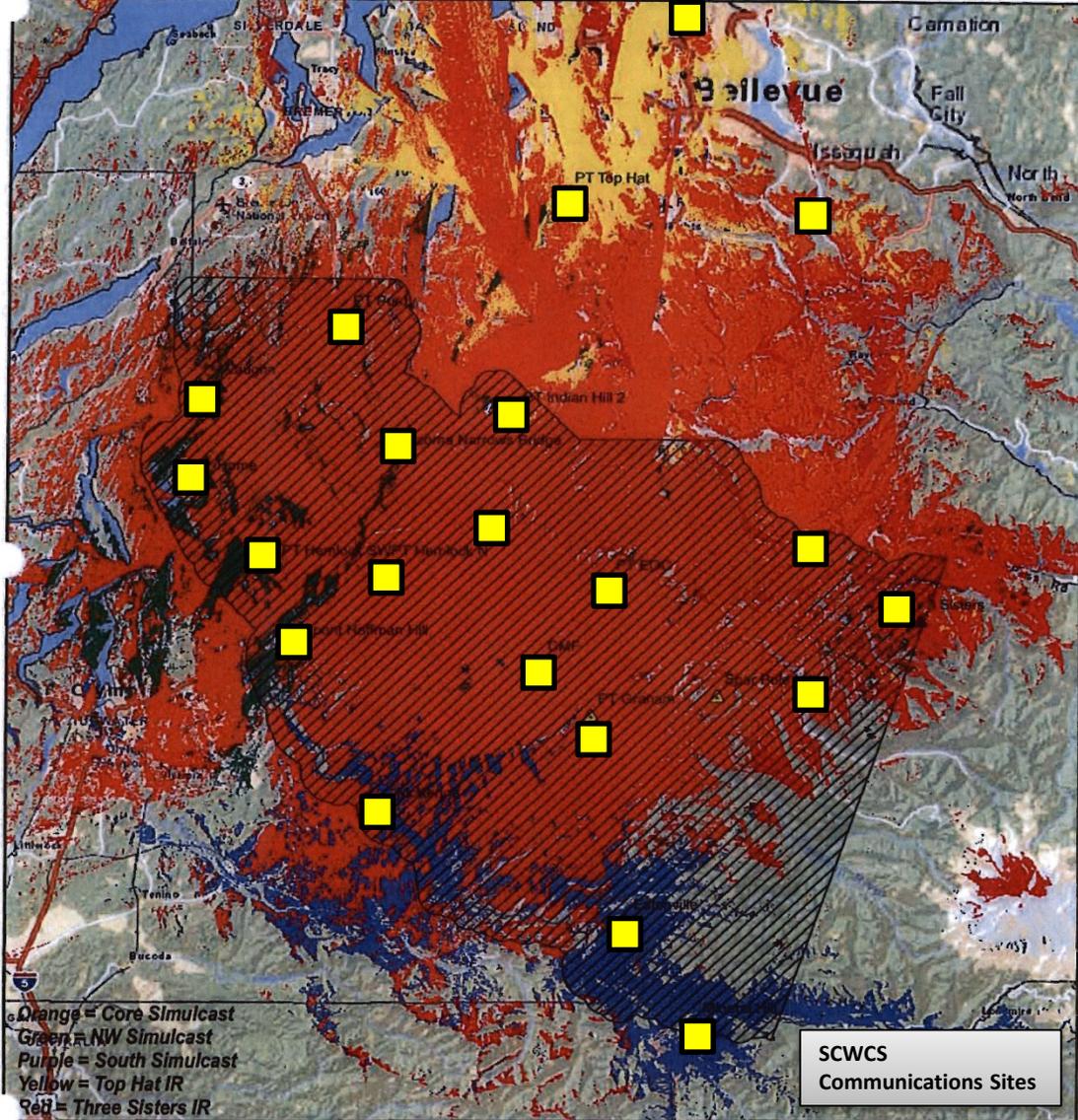
SCWCS  
Master Site





Pierce County  
700 MHz P25 Phase 2 Trunking System  
Layered Map for Comparison

97% Covered Area Reliability  
DAQ 3.4



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Round Trip to / from APX7500 mobile utilizing a center-roof mounted 1/4 wave whip antenna  
For Information Only  
CJB  
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SCWCS  
Communications  
Site



# 700 MHz Network Users



## Law Enforcement:

Buckley Police Department  
Eatonville Police Department  
Fircrest Police Department  
Gig Harbor Police Department  
Orting Police Department  
Pierce County Corrections  
Pierce County Sheriff Office  
Pierce Transit Public Safety  
Roy Police Department  
South Sound Dispatch  
35th Street  
South Sound Records

## Fire:

Fire Marshal  
PCFD # 22 East Pierce Fire and Rescue  
PCFD #16 (Key Penn)  
PCFD #17 (South Pierce Fire and Rescue )  
PCFD #18 (Orting)  
PCFD #21 (Graham)  
PCFD #23 (Ashford/Elbe)  
PCFD #43 (Eatonville)  
PCFD #5 (Gig Harbor)  
South Sound Dispatch  
Puyallup

## Partners:

WA. Dept. of Transportation  
Washington State Patrol

## Transit:

Pierce Transit  
Sound Transit  
First Transit

## General Government:

Airport and Ferry Admin  
Auditor  
Emergency Management  
Medical Examiner  
Road Operations  
Sewer Utility  
Surface Water  
Traffic Ops/Engineering

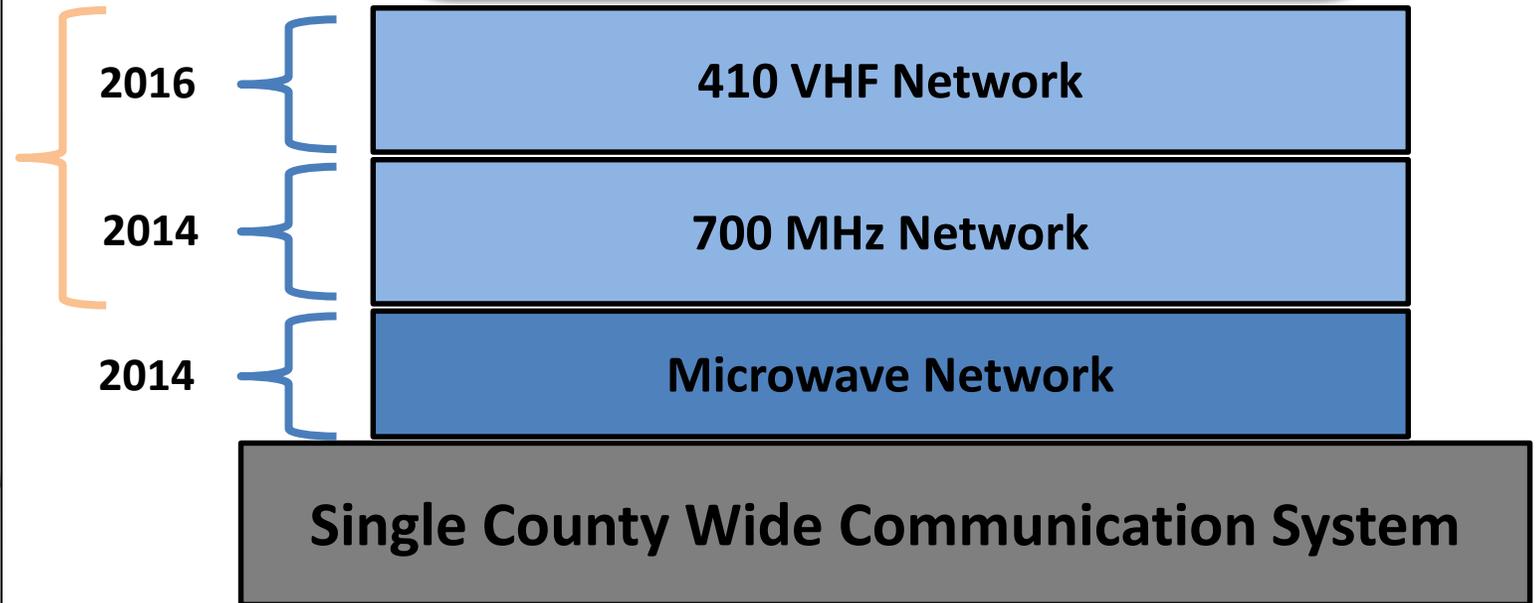
## Mutual Aid:

ATF  
Boeing Frederickson  
Bonney Lake Police Department  
Buckley Fire Department  
Central Pierce Fire & Rescue  
DEA  
Federal Bureau of Investigations  
Fife Police Department  
Immigration and Customs Enforcement  
JBLM  
King County Sheriff  
Lakewood Police Department  
Milton Police Department  
National Parks  
Port of Tacoma  
Puyallup Police Department  
Regional Aviation  
Ruston Police Department  
Seattle Police Department  
Snohomish County Sheriff  
Special Offenders Unit (WA DSHS)  
Sumner Police Department  
Tacoma Fire Department  
Tacoma Police Department  
WA State Dept. of Corrections  
WA State Fish and Wildlife  
WA State Gambling Commission  
WADOC  
West Pierce Fire & Rescue

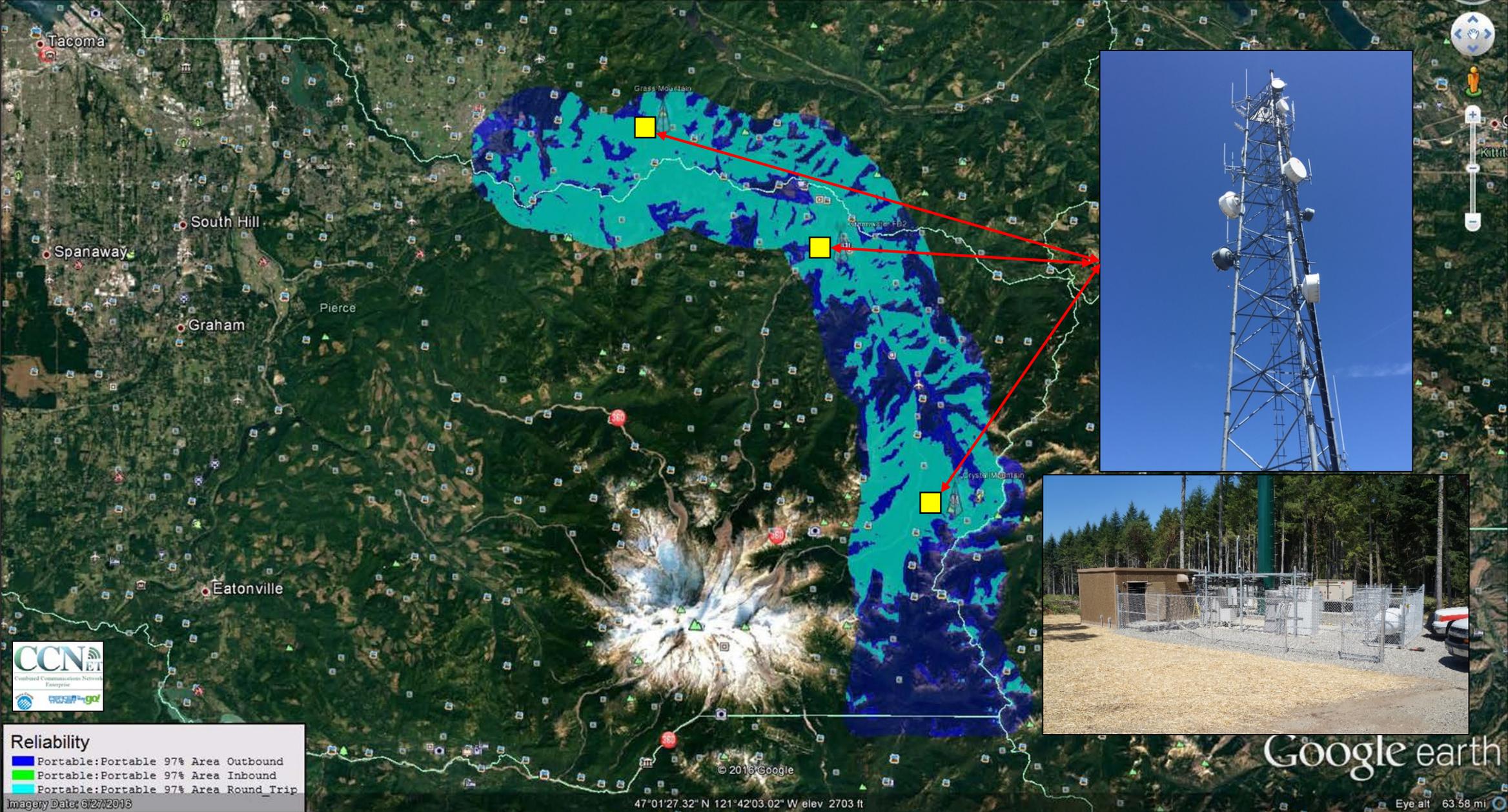
# Combined Communications Network: Single Countywide Communications System (SCWCS) Network



The 410 VHF Network is an 3 Site, 4 Channel system that completes the SCWCS voice network and provides communications coverage from Enumclaw to Crystal Mountain. Until the implementation of the 410 VHF, voice communications in this corridor were limited at best. The 700 MHz and 410 VHF Networks comprise the major elements of the SCWCS System and its user capacity.



# 410 VHF Coverage Map



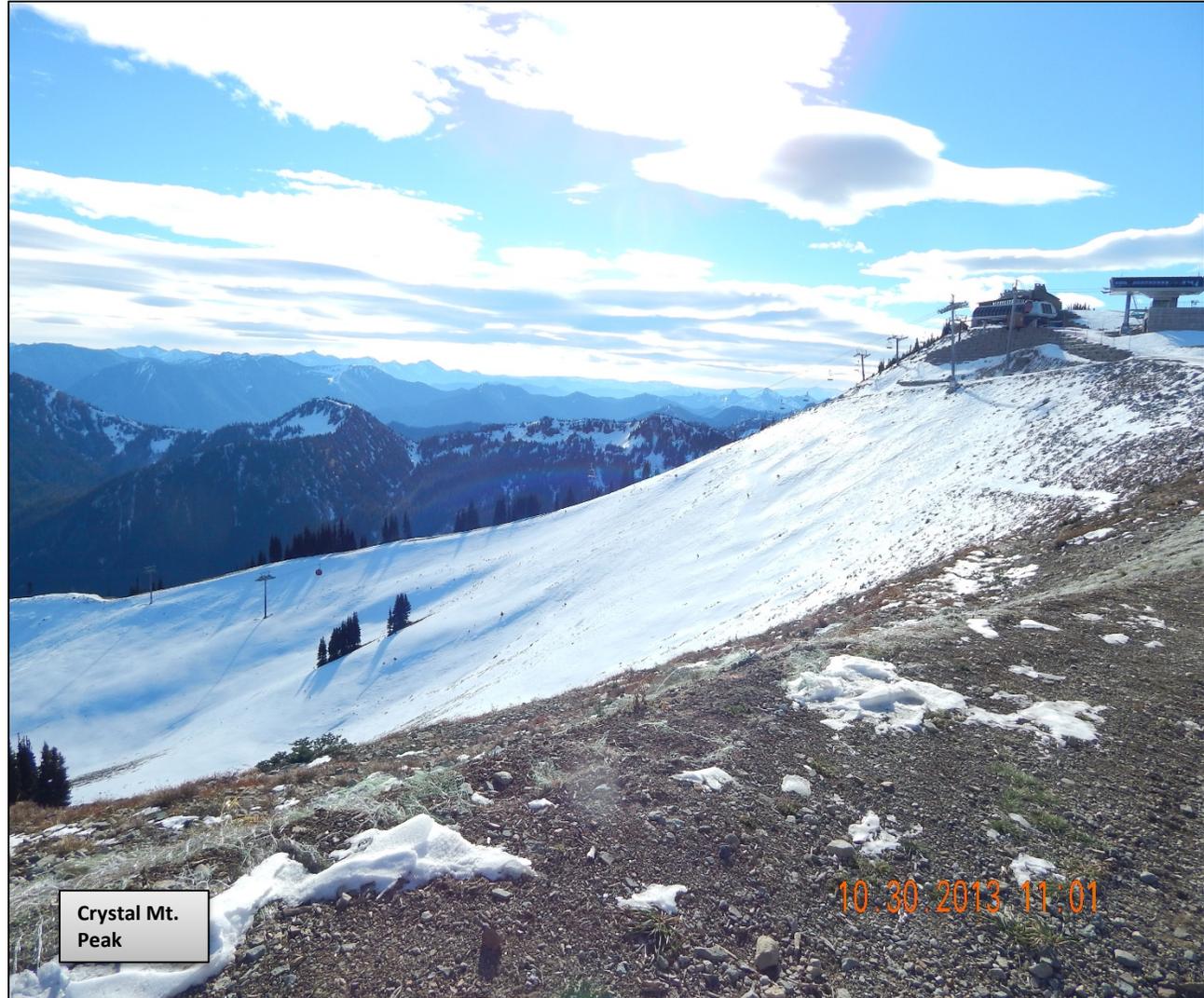
**Reliability**  
■ Portable:Portable 97% Area Outbound  
■ Portable:Portable 97% Area Inbound  
■ Portable:Portable 97% Area Round\_Trip  
Imagery Date: 6/27/2016

# 410 VHF Crystal Mountain Site



Crystal Mt.  
Comm. Site

10.30.2013 11:06



Crystal Mt.  
Peak

10.30.2013 11:01

# 410 VHF Network Users



## Law Enforcement:

Pierce County Sheriff  
Office  
South Sound Dispatch  
35th Street  
South Sound Records

## General Government:

Auditor  
Emergency  
Management  
Medical Examiner

## Partners:

Washington State  
Patrol

## Mutual Aid:

Bonney Lake Police Department  
Buckley Police Department  
Central Pierce Fire & Rescue  
East Pierce Fire and Rescue  
Eatonville Police Department  
Federal Bureau of Investigations  
King County Sheriff  
National Parks  
Orting Police Department  
PCFD #18 (Orting)  
PCFD #21 (Graham)  
PCFD #43 (Eatonville)  
Pierce Transit Public Safety  
Puyallup Police Department  
Regional Aviation  
South Pierce Fire and Rescue  
Sumner Police Department  
WA State Fish and Wildlife



# Combined Communications Network: Single Countywide Communications System (SCWCS) Network



The UHF Data Network provides the infrastructure and backbone for Pierce Transit Operations and Business processes.

These transit services are a cornerstone for the quality of life and economies in communities located throughout the Puget Sound region.

This network enables the following Pierce Transit levels of service:

- Pierce Transit provides contracted services for Sound Transit and supports First Transit operations;
- Transit services in Thurston, Pierce, King and Snohomish Counties;
- Transit vehicles – 626;
- Ridership – 9,765,412; and
- Passenger Miles – 60,579,960

2017

2016

2014

2014

UHF Data Network

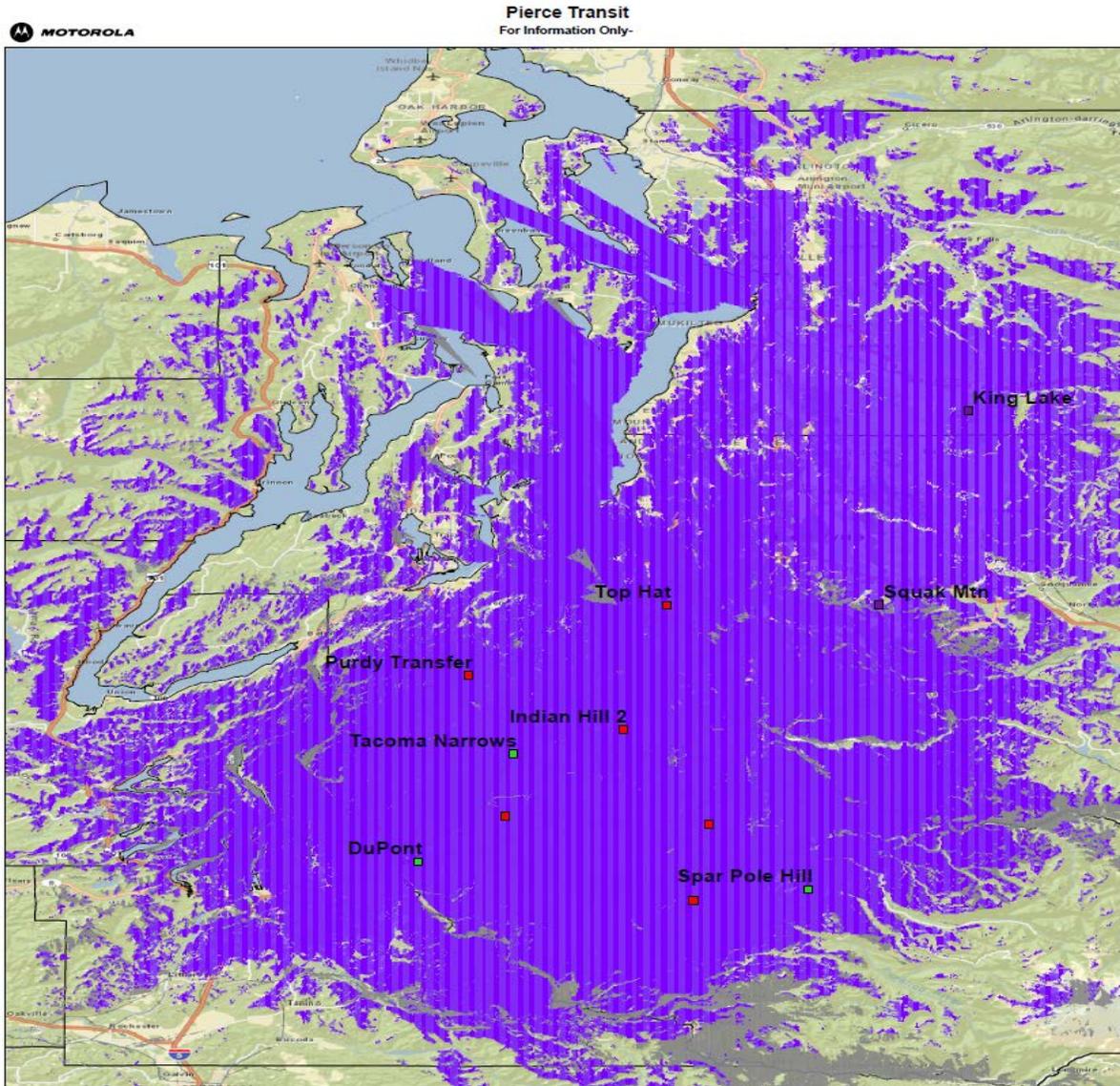
410 VHF Network

700 MHz Network

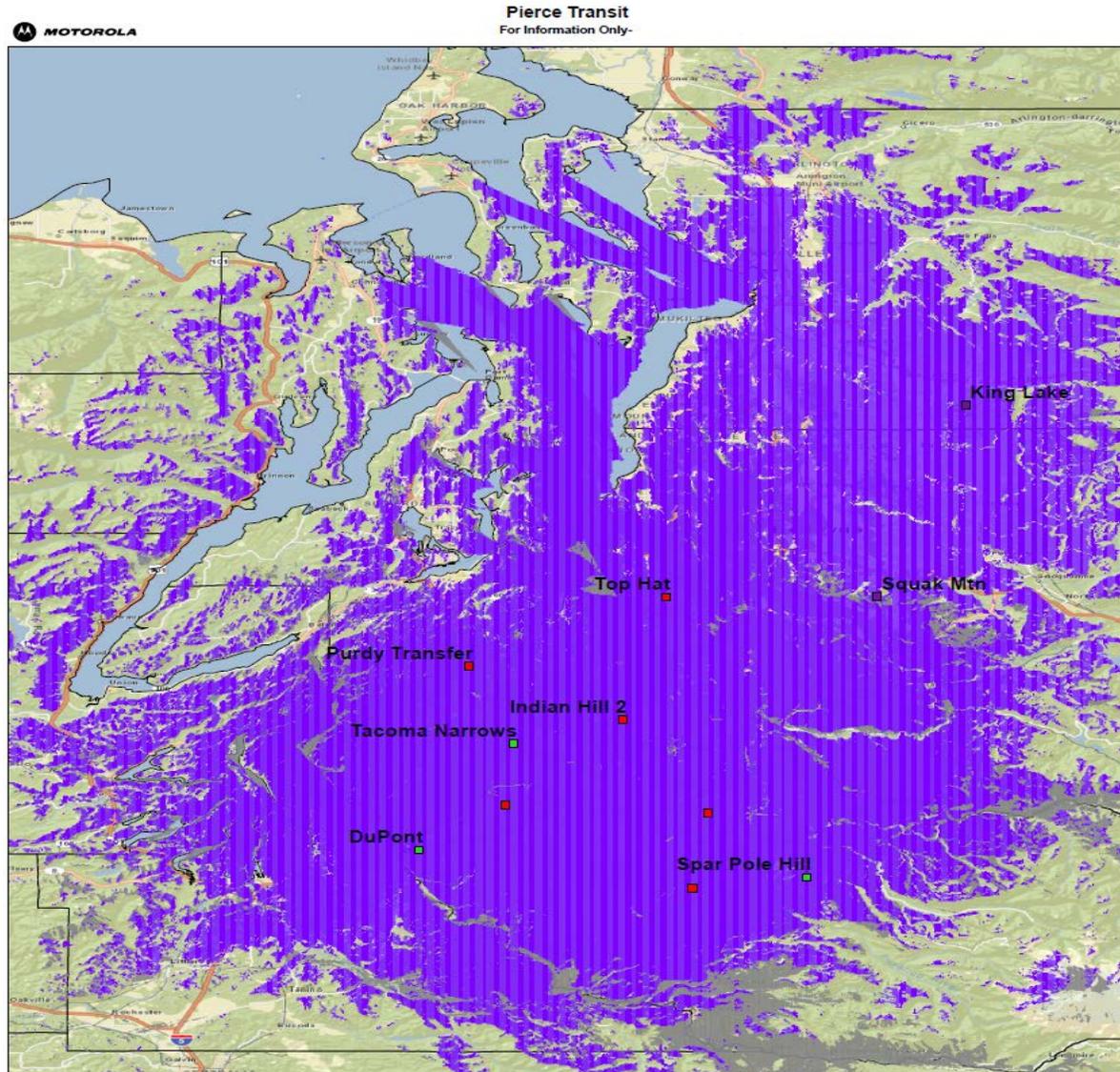
Microwave Network

Single County Wide Communication System

# UHF Data Network Coverage Map



# UHF Data Network

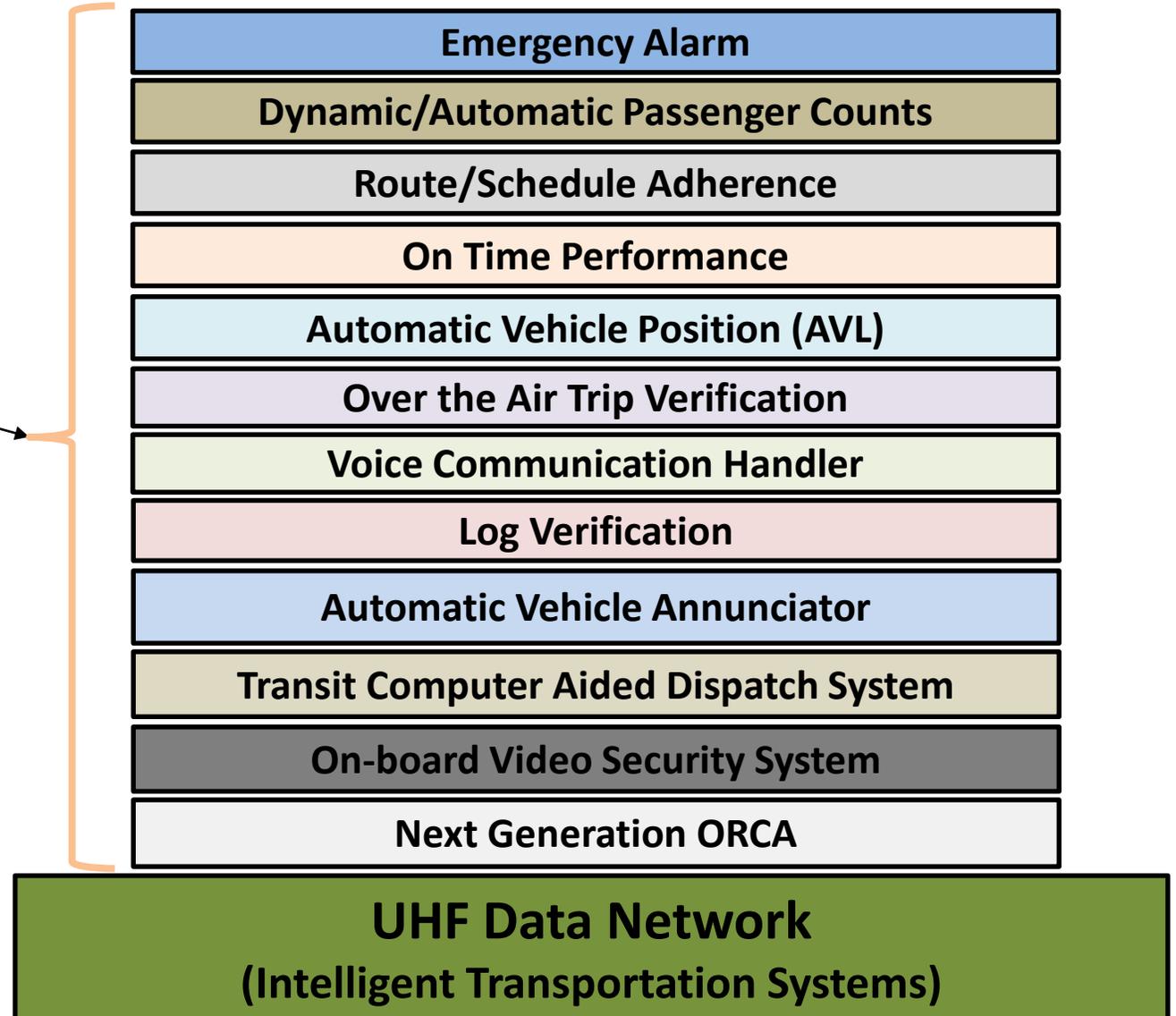


# Pierce Transit TRAX System: Intelligent Transportation Systems

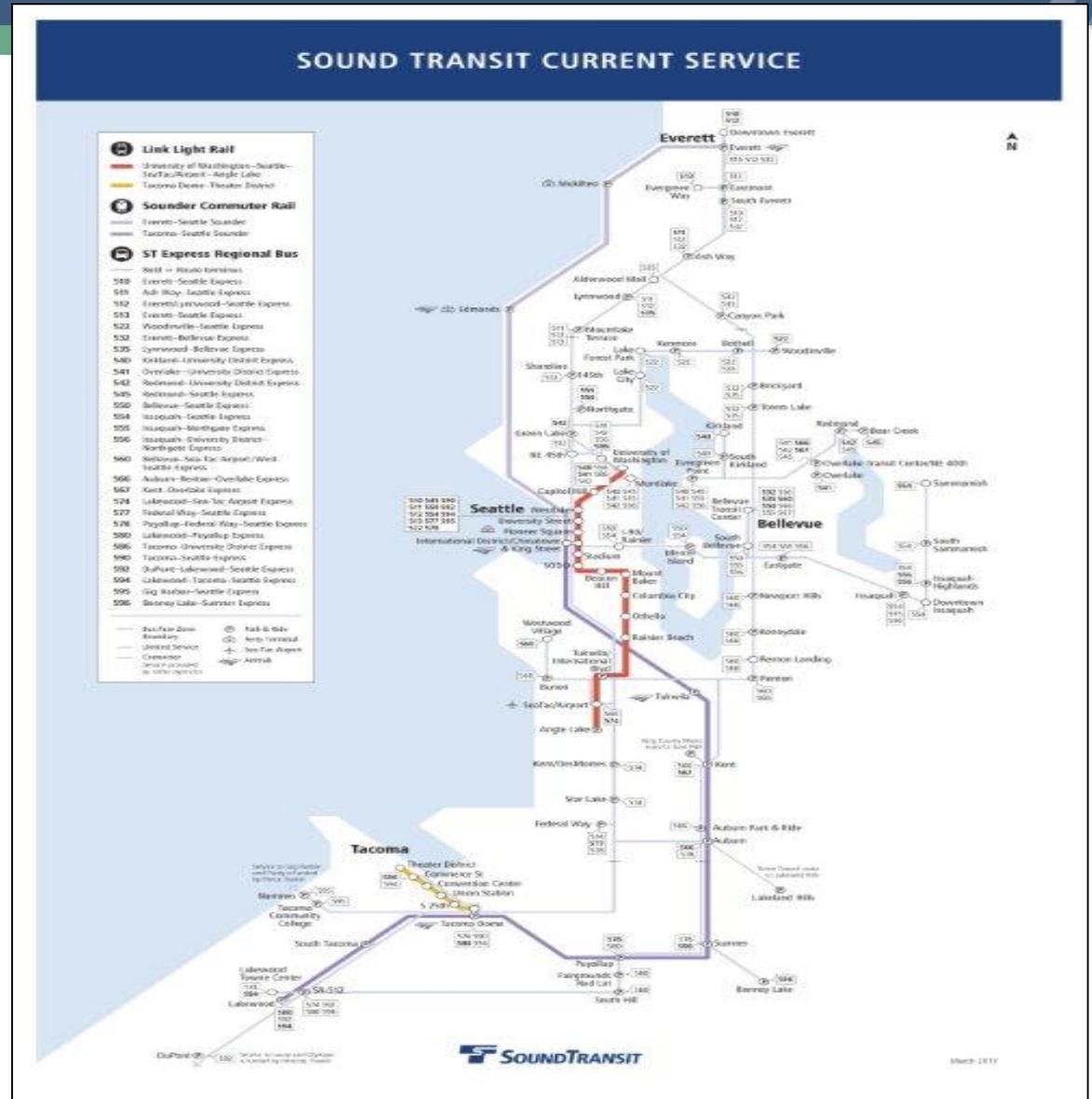
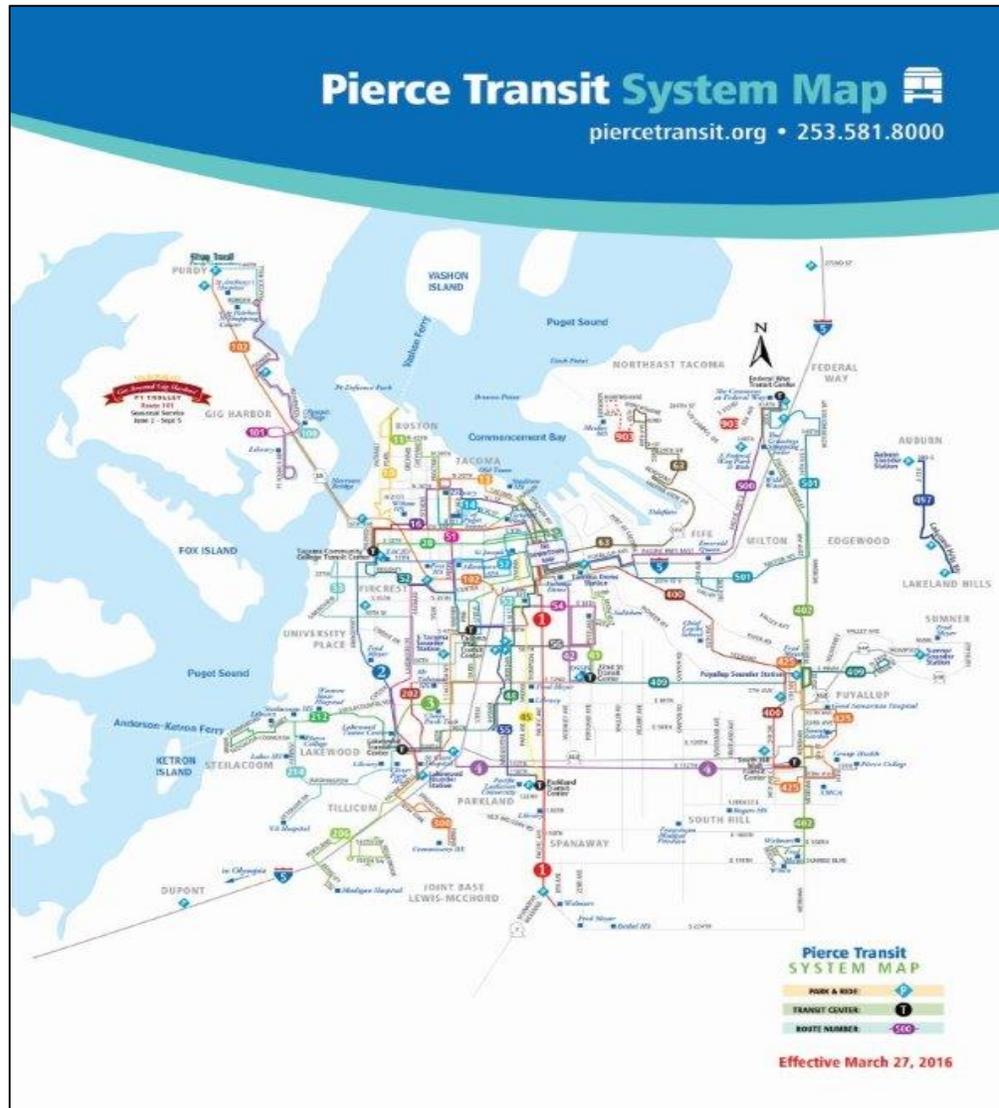


Pierce Transit TRAX - Intelligent Transportation System includes 14 separate systems that operate on the UHF Data Network.

TRAX's functions are dependent on the UHF Data Network to maintain a data stream between the Pierce Transit fleet and the TRAX system. The TRAX system provides important visibility and status of all the vehicles in the field which gives the Pierce Transit's Communication Center the needed information to monitor vehicle activity and provide safe operations in Thurston, Pierce, King and Snohomish Counties.



# Pierce Transit & Sound Transit System Maps:



# Pierce Transit TRAX System: Intelligent Transportation Systems



The UHF Data Network provides the operational, business and administrative capabilities and capacity which enables Pierce Transit to deliver the following transportation services daily throughout the Puget Sound region:

The UHF Data Network enables and supports a safe operating environment for the following Pierce Transit services:

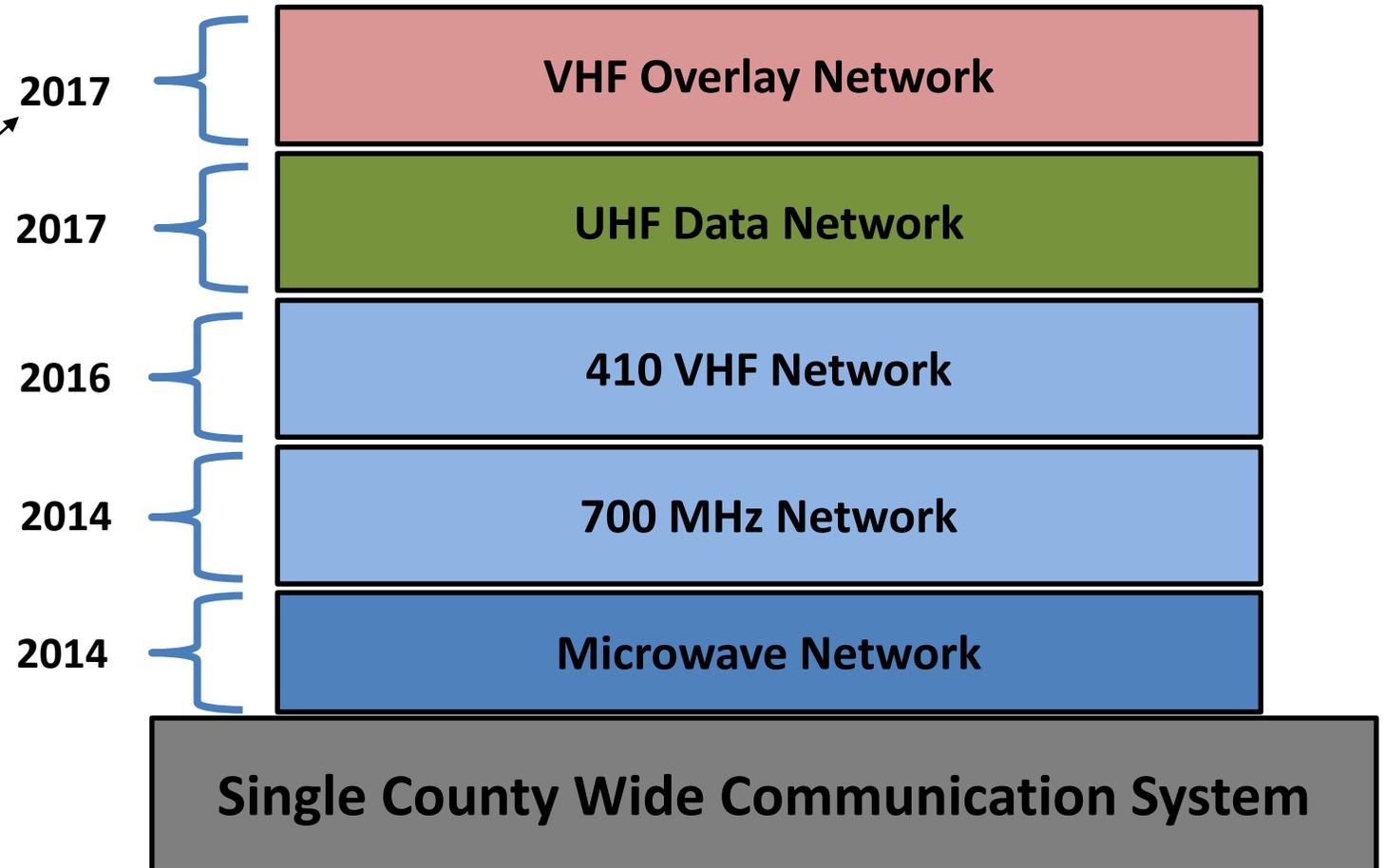
- Pierce Transit provides contracted services for Sound Transit and First Transit services in Thurston, Pierce, King and Snohomish Counties;
- Operation of full array of transit vehicles – 626;
- Annual Ridership – 9,765,412;
- Annual Passenger Miles – 60,579,960; and
- Bus Bridge support to Sound Transit Rail and AMTRAK services.



# Combined Communications Network: Single Countywide Communications System (SCWCS) Network



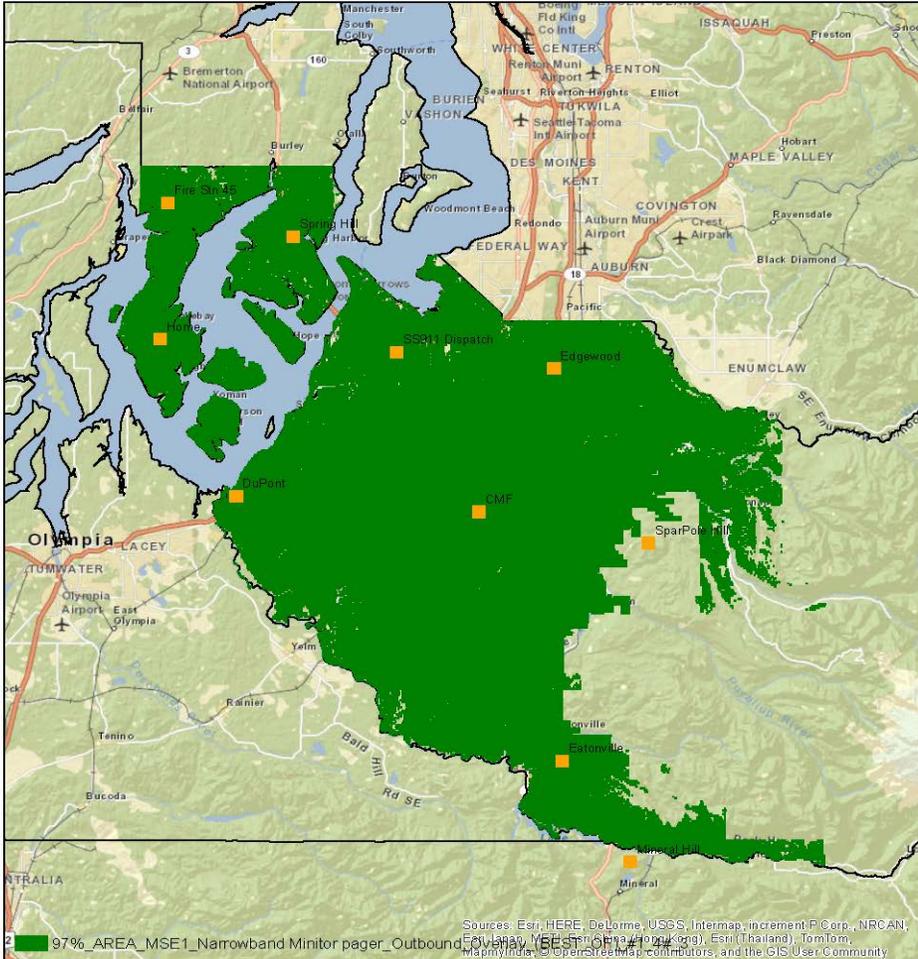
The VHF Overlay is an 11 site, 4 channel network that provides station alerting and paging for 16 Fire Departments; Mutual Aid interoperability for 21 Police Departments; and Search and Rescue and Emergency Management response and recovery communications in Pierce County.



# VHF Overlay Coverage Map



Pierce Co Fire Paging Channel



INFORMATION ONLY Pager Outbound map

1 inch = 7 miles

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## Station Alerting and Paging



## Mutual Aid



## Search and Rescue



# VHF Overlay Network Users



## **Law Enforcement:**

Bonney Lake Police Department  
Buckley Police Department  
Eatonville Police Department  
Fife Police Department  
Fircrest Police Department  
Gig Harbor Police Department  
Lakewood Police Department  
Milton Police Department  
Orting Police Department  
Pierce County Corrections  
Pierce County Sheriff Office  
Pierce Transit Public Safety  
Port of Tacoma  
Puyallup Police Department  
Regional Aviation  
Roy Police Department  
Ruston Police Department  
South Sound Dispatch 35th Street  
South Sound Records  
Sumner Police Department  
Tacoma Police Department

## **Mutual Aid:**

All Public Schools in Pierce  
County  
Boeing Frederickson  
Federal Bureau of  
Investigations  
JBLM  
King County Sheriff  
National Parks  
Regional Aviation  
Schools  
Search and Rescue  
Seattle Police Department  
Snohomish County Sheriff  
WA State Dept. of  
Corrections  
WA State Fish and Wildlife  
WA State Gambling  
Commission

## **General Government:**

Emergency  
Management

## **Partners:**

Washington State  
Patrol

## **Fire:**

Buckley Fire Department  
Fire Marshal  
PCFD #13 (Browns Point)  
PCFD #16 (Key Penn)  
PCFD #17 (South Pierce Fire  
and Rescue )  
PCFD #18 (Orting)  
PCFD #21 (Graham)  
PCFD #22 (East Pierce Fire and  
Rescue )  
PCFD #23 (Ashford/Elbe)  
PCFD #27 (Anderson Island)  
PCFD #3 (West Pierce Fire &  
Rescue)  
PCFD #43 (Eatonville)  
PCFD #5 (Gig Harbor)  
PCFD #6 (Central Pierce Fire &  
Rescue)  
South Sound Dispatch Puyallup  
Tacoma Fire Department

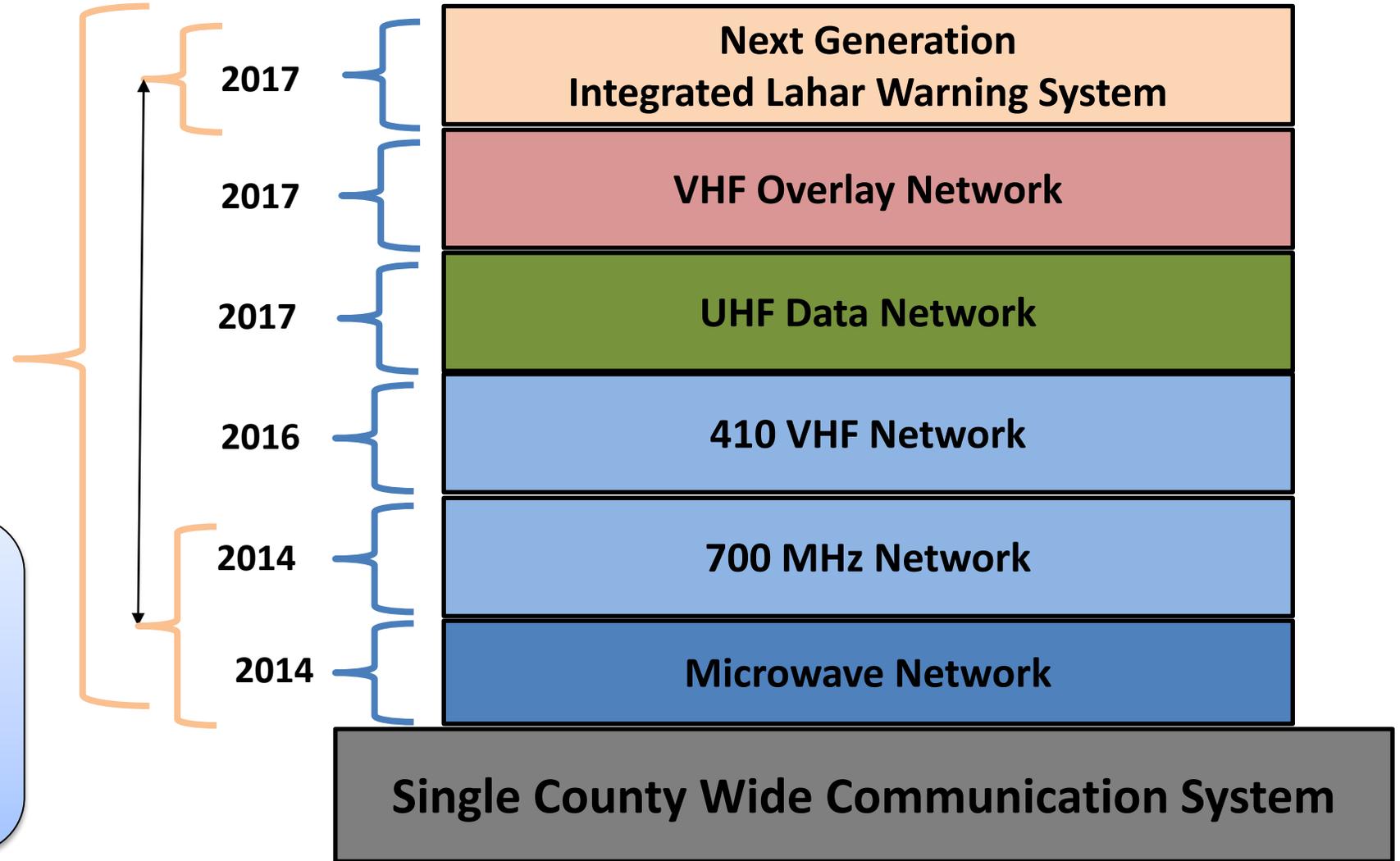


# Combined Communications Network: Single Countywide Communications System (SCWCS) Network



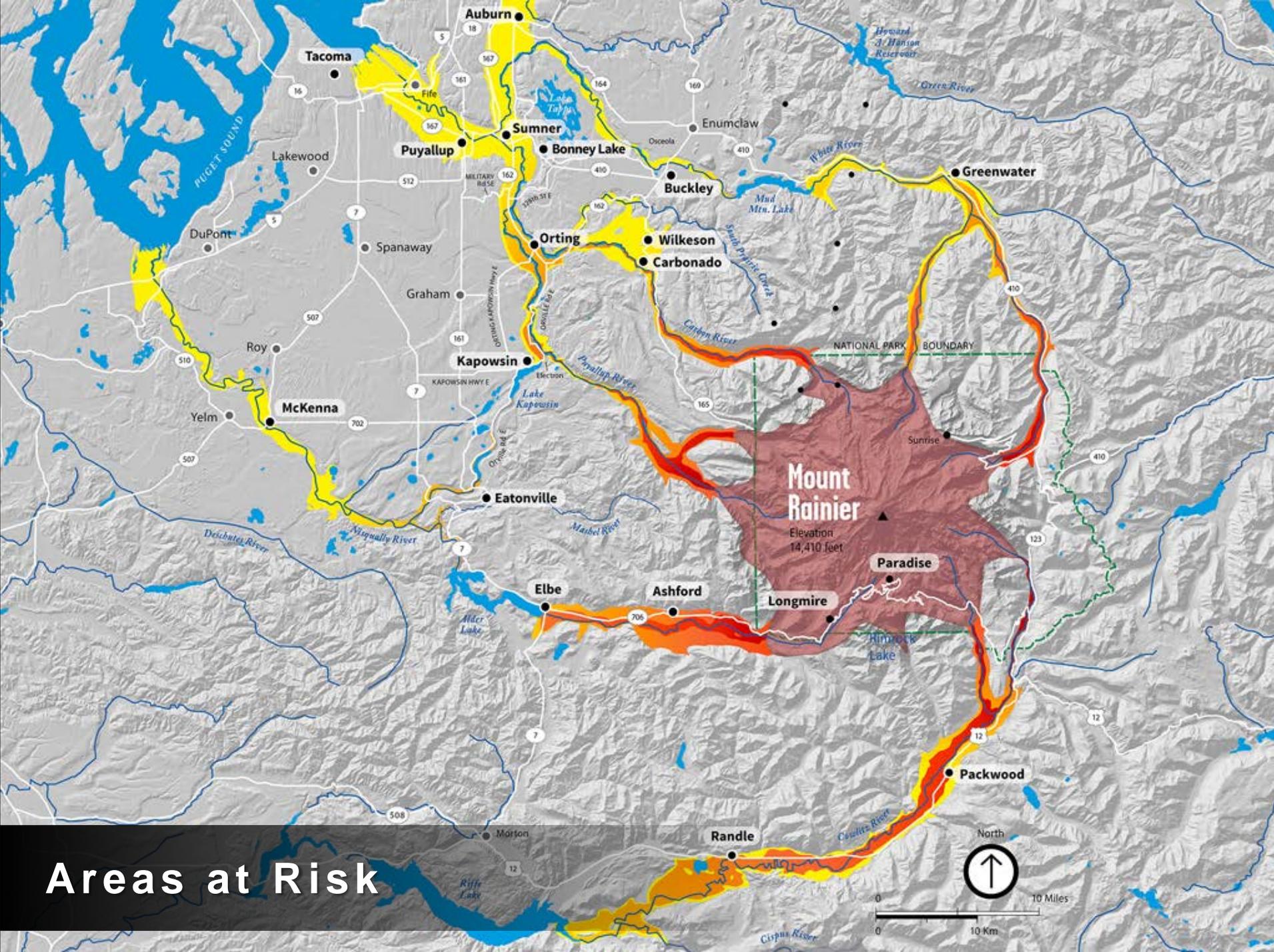
**The Next Generation Lahar Warning System (NG-ILWS) provides monitoring of Mt. Rainer hazards; detection of impending lahars; initiation of the Lahar Warning System Alert and Warning and delivery of volcano monitoring data for researchers both nationally and internationally.**

**This public safety network provides emergency management and alert and warning resources to approximately 1.8 million citizens living in this region and is the only one of its kind in North America.**





**Puget Sound communities protected by the  
Next Generation Integrated Lahar Warning System**



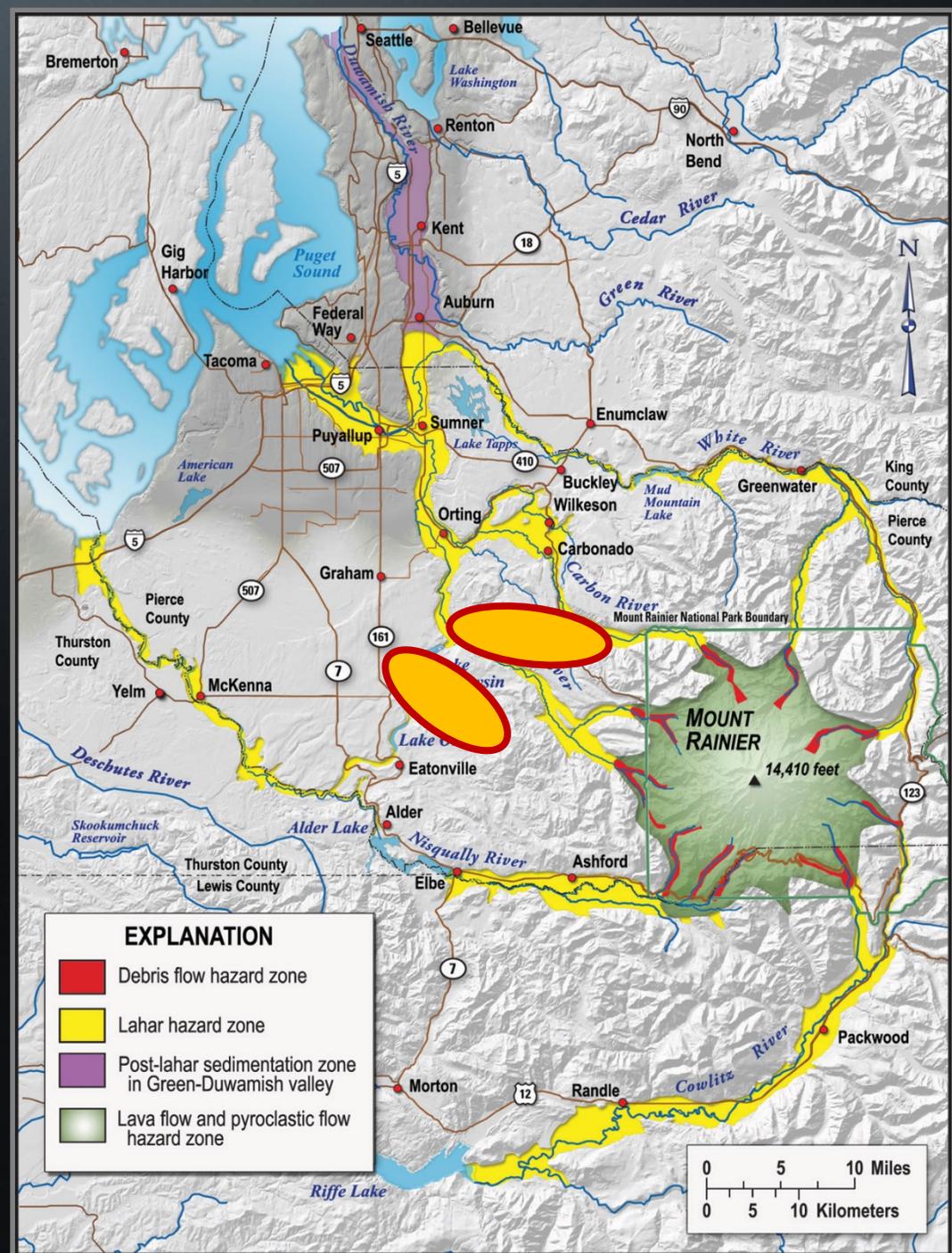
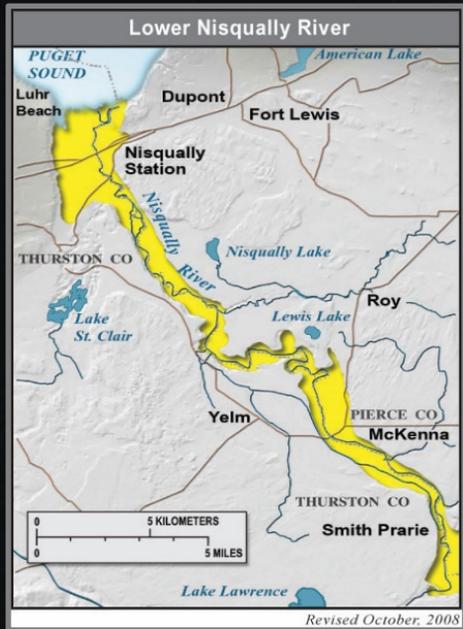
# Areas at Risk

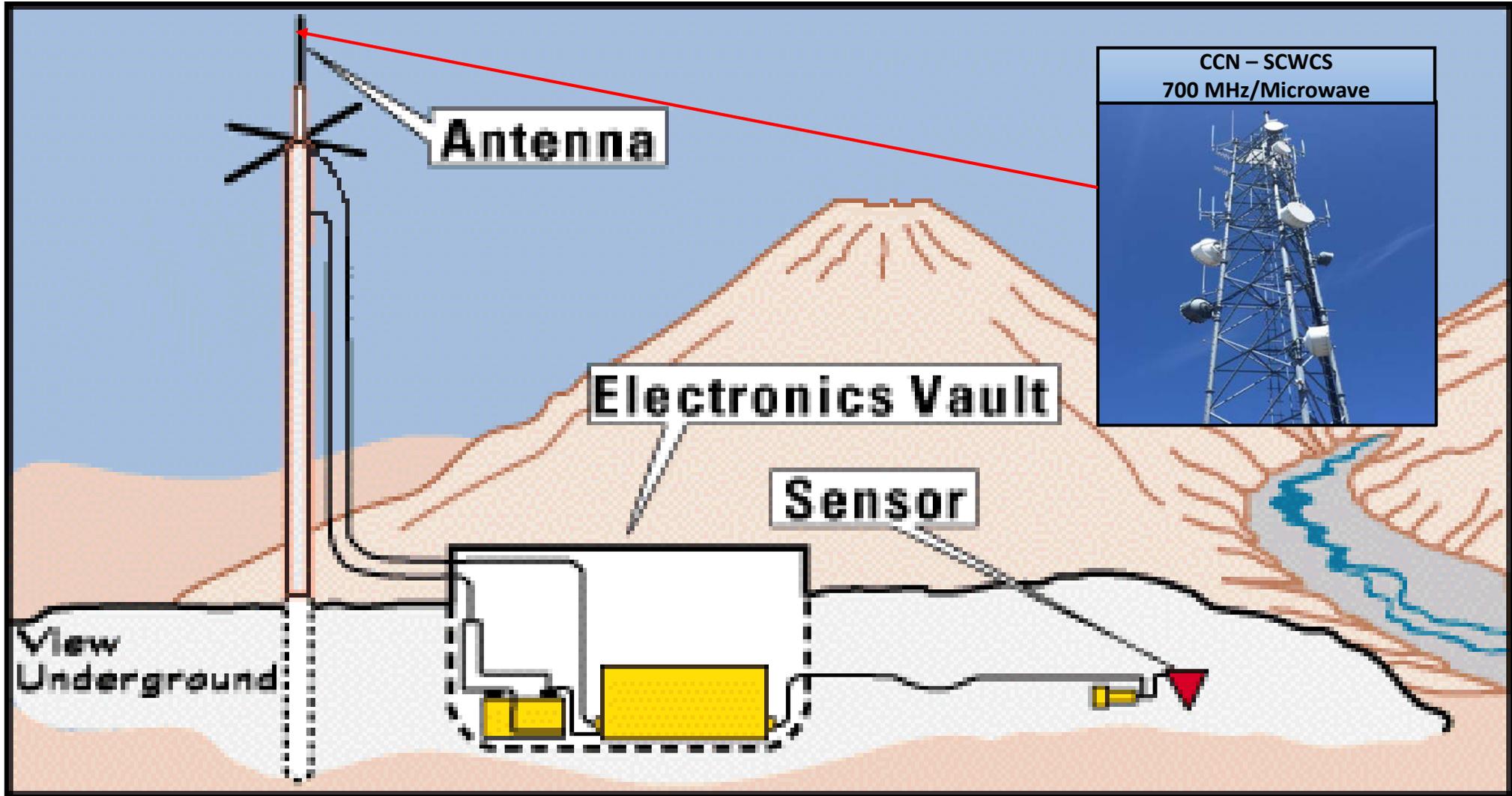


10 Miles

10 Km

# Areas most at risk from Mount Rainier lahars



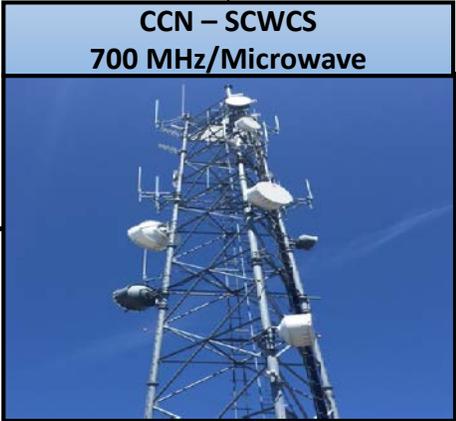


**Mt. Rainier Lahar Detection Instrumentation Package**

# Next Generation Integrated Lahar Warning System (NG-ILWS)



**Mt. Rainier  
Volcanic Hazards  
Monitoring System**



**NG-ILWS  
Research:**  
- USGS  
- U of W  
- Other Countries

**Lahar Detection  
Network:**  
- Carbon River  
- Puyallup River

**Lahar Alert and  
Warning System:**  
- Sirens  
- Everbridge  
- HAR



# Combined Communications Network: Single Countywide Communications System (SCWCS) Network



The PC Jail Distributed Antennae System (DAS) provides “In-building Voice and Data Coverage” required for PC Corrections staff as well as for all public safety agencies operating within the PC Jail (Fire and Law Enforcement). The DAS ensures that the same coverage, capacity and interoperability delivered in networks external to Jail are available within the facility. Additionally, the DAS will support radio communications for Court Escort and medical services transportation in the future.

2018

Pierce County Jail  
Distributed Antennae System

2017

Next Generation  
Integrated Lahar Warning System

2017

VHF Overlay Network

2017

UHF Data Network

2016

410 VHF Network

2014

700 MHz Network

2014

Microwave Network

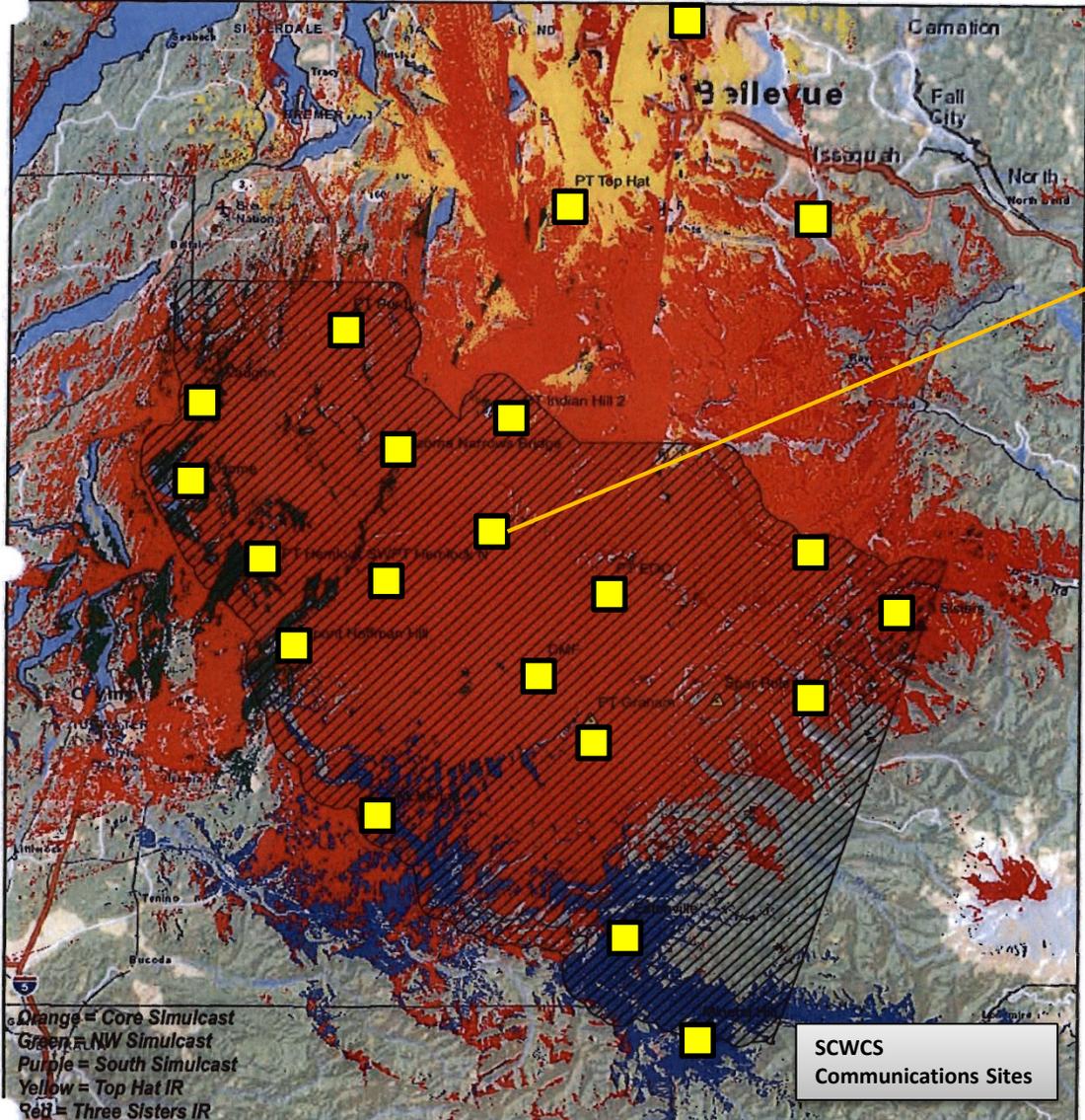
Single County Wide Communication System





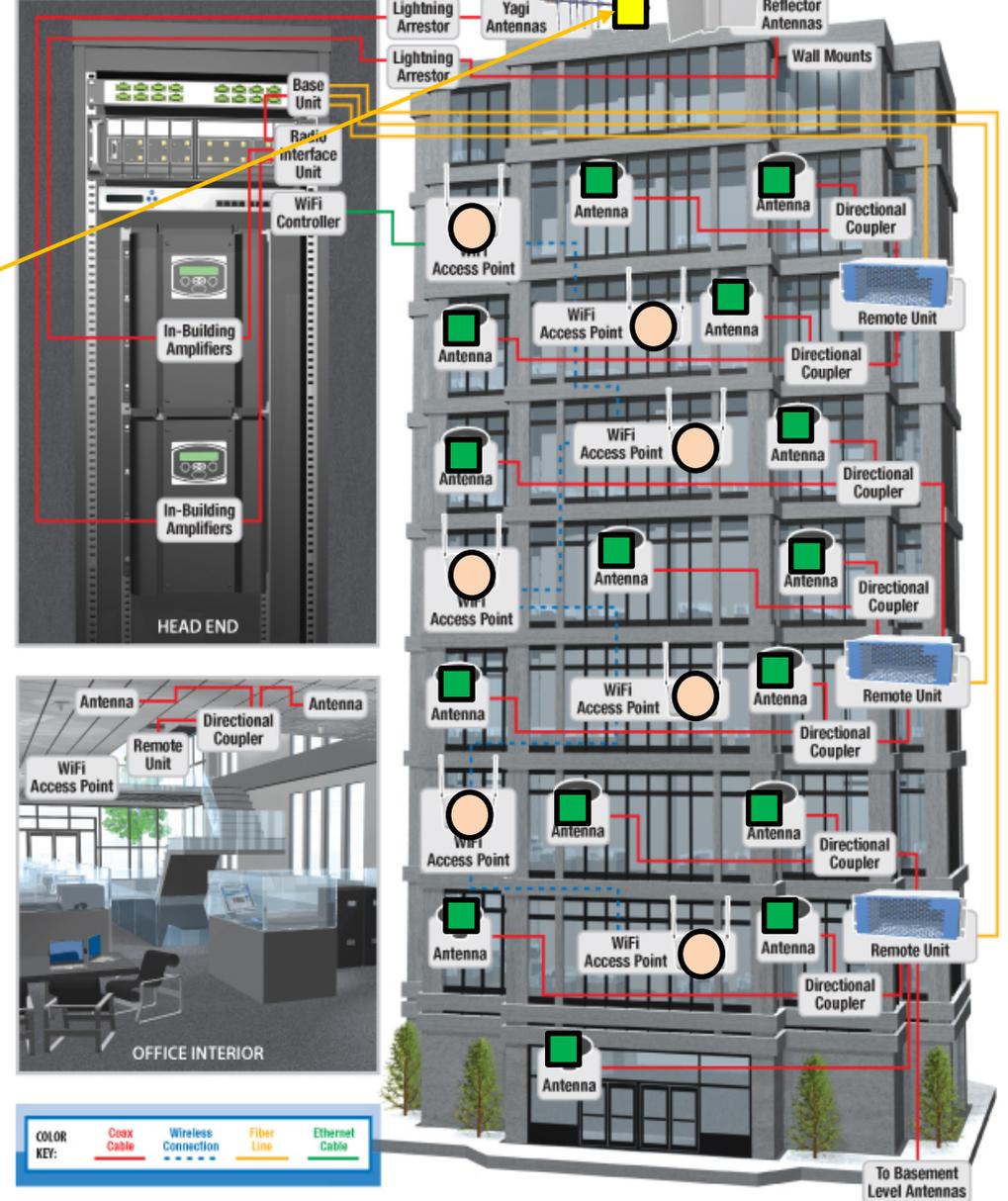
# Pierce County 700 MHz P25 Phase 2 Trunking System Layered Map for Comparison

97% Covered Area Reliability  
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## DAS Back-Office



# DAS Network Users



## Law Enforcement:

Bonney Lake Police Department  
Buckley Police Department  
Eatonville Police Department  
Fife Police Department  
Fircrest Police Department  
Gig Harbor Police Department  
Lakewood Police Department  
Milton Police Department  
Orting Police Department  
Pierce County Corrections  
Pierce County Sheriff Office  
Pierce Transit Public Safety  
Port of Tacoma  
Puyallup Police Department  
Roy Police Department  
Ruston Police Department  
South Sound Dispatch 35th Street  
South Sound Records  
Sumner Police Department  
Tacoma Police Department

## Fire:

Fire Marshal  
South Sound Dispatch  
Puyallup

## General Government:

Auditor  
Emergency Management  
Medical Examiner

## Partners:

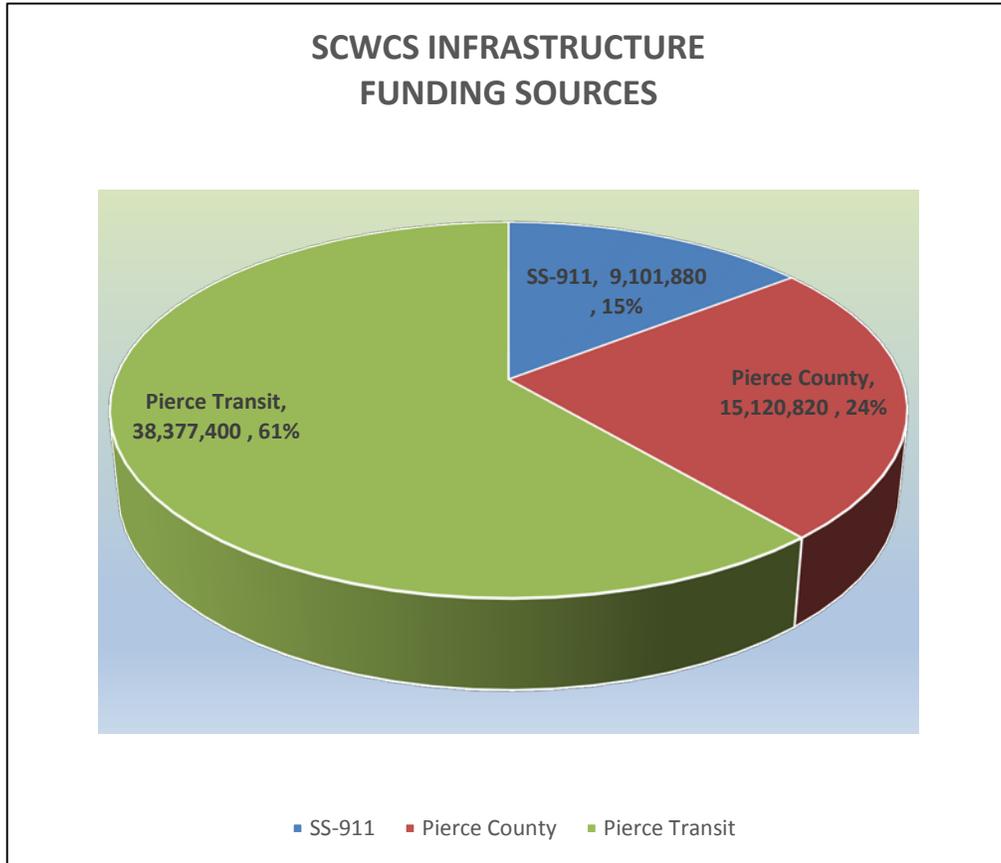
Washington State Patrol

## Mutual Aid:

ATF  
Boeing Frederickson  
DEA  
Federal Bureau of Investigations  
Immigration and Customs Enforcement  
JBLM  
King County Sheriff  
National Parks  
PCFD #3 (West Pierce Fire & Rescue)  
PCFD #5 (Gig Harbor)  
PCFD #6 (Central Pierce Fire & Rescue)  
PCFD #13 (Browns Point)  
PCFD #16 (Key Penn)  
PCFD #17 (South Pierce Fire and Rescue )  
PCFD #18 (Orting)  
PCFD #21 (Graham)  
PCFD #22 (East Pierce Fire and Rescue )  
PCFD #23 (Ashford/Elbe)  
PCFD #27 (Anderson Island)  
PCFD #43 (Eatonville)  
Buckley Fire Department  
Seattle Police Department  
Snohomish County Sheriff  
Special Offenders Unit (WA DSHS)  
Tacoma Fire Department  
WA State Dept. of Corrections  
WA State Fish and Wildlife  
WA State Gambling Commission  
WADOC



# Single Countywide Communications System (SCWCS) Network: Infrastructure Cost Information



Total infrastructure value \$ 62,600,100

**Pierce County Jail  
Distributed Antennae System**

**Next Generation  
Integrated Lahar Warning System**

**VHF Overlay Network**

**UHF Data Network**

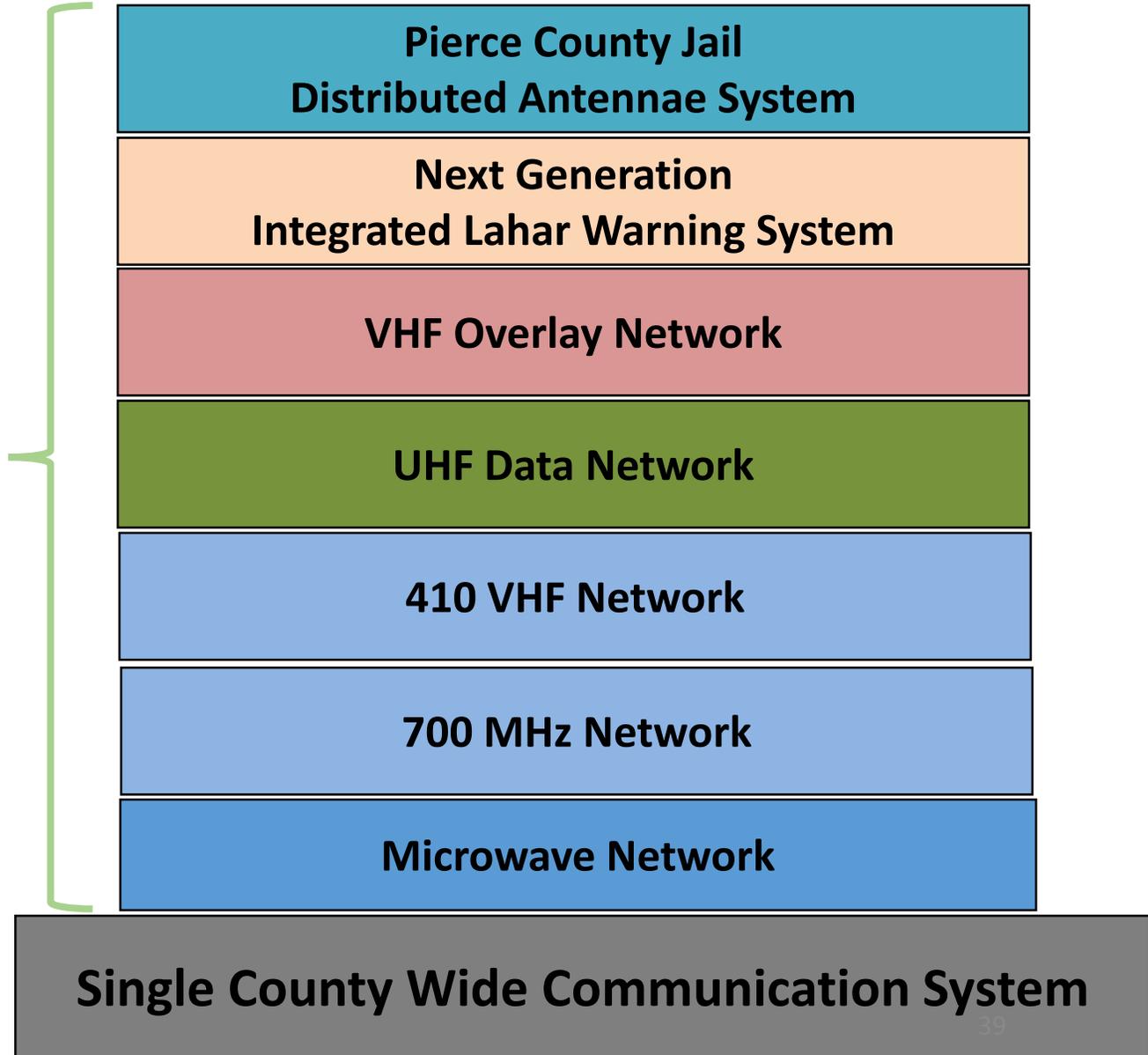
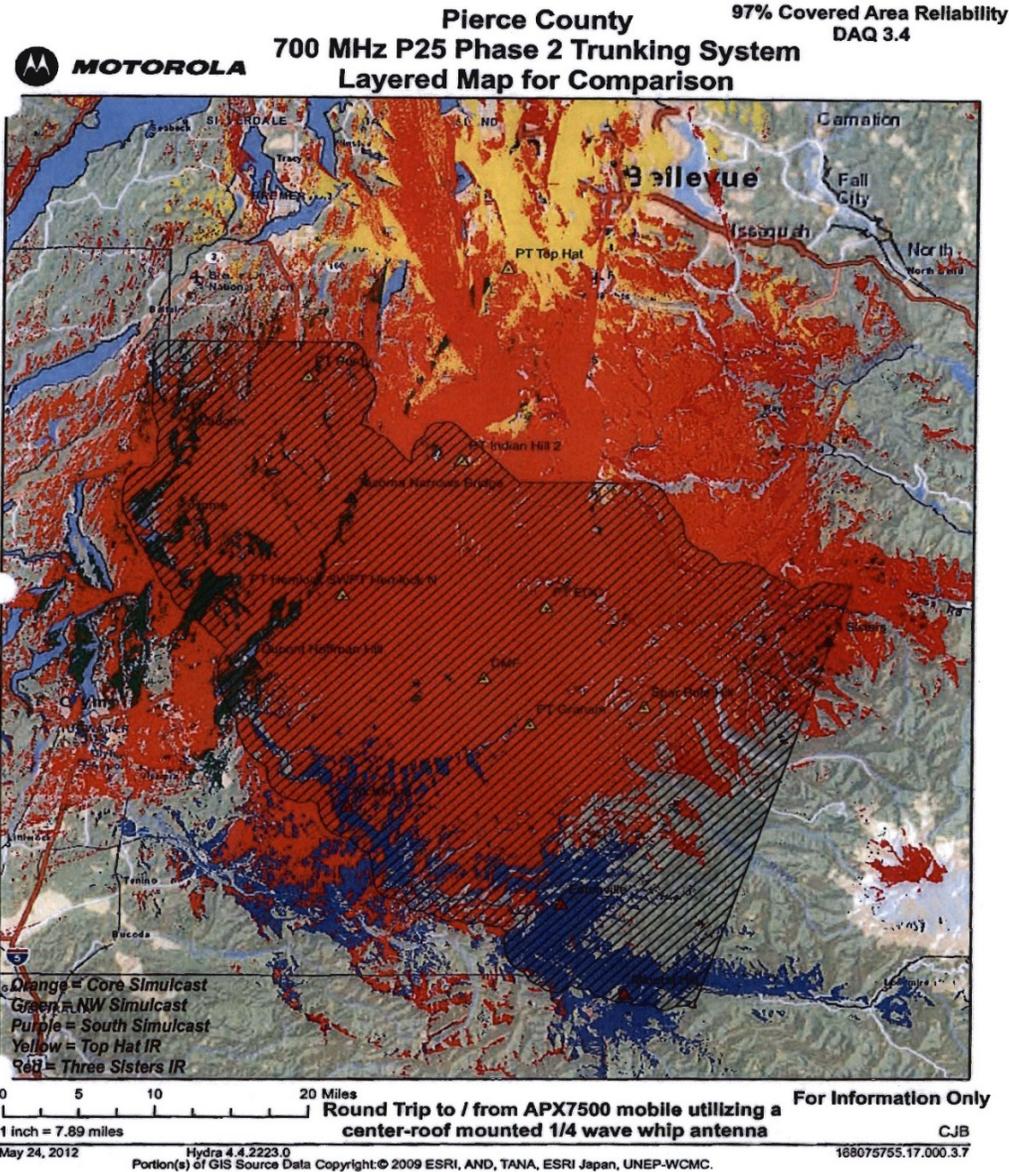
**410 VHF Network**

**700 MHz Network**

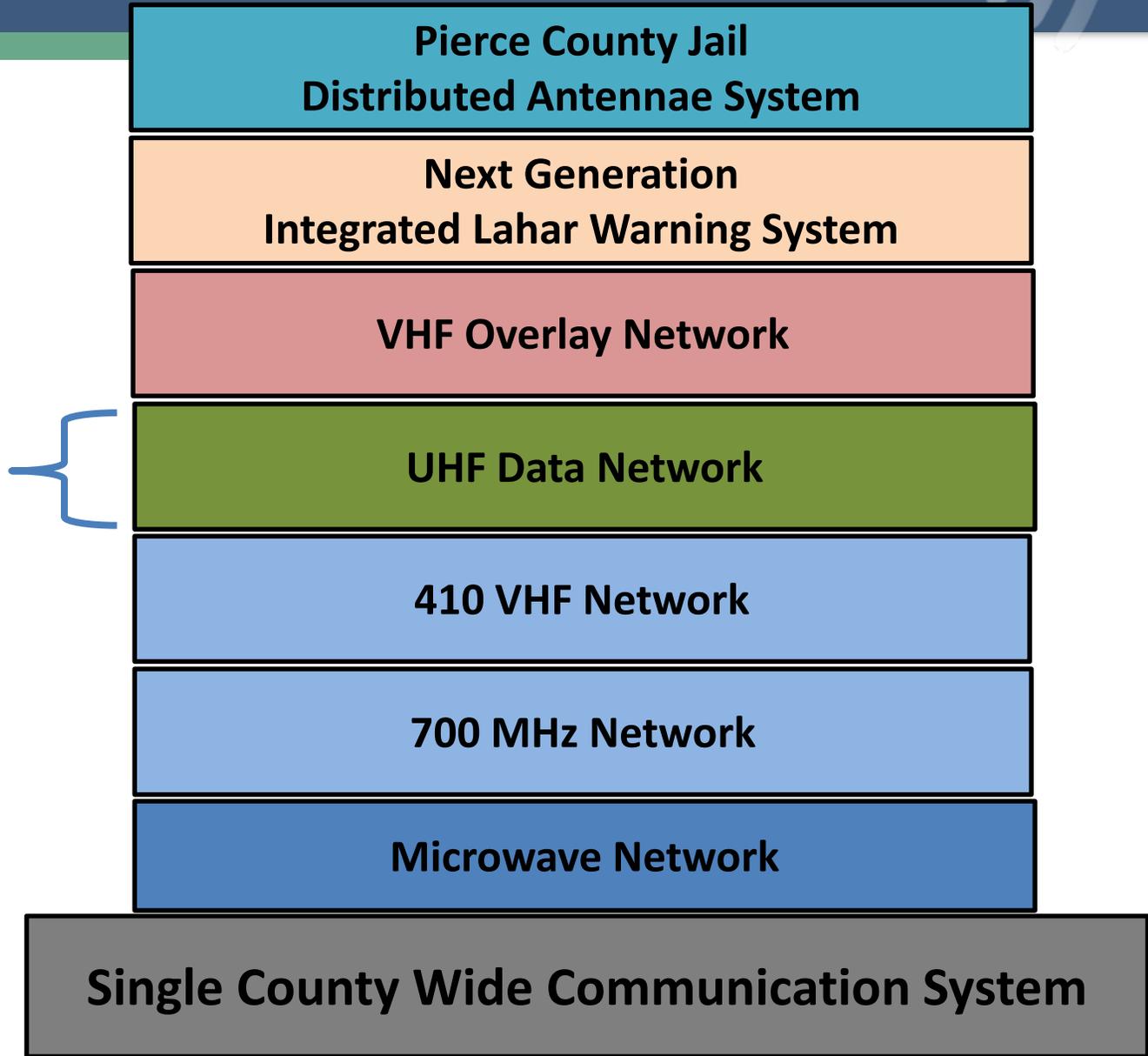
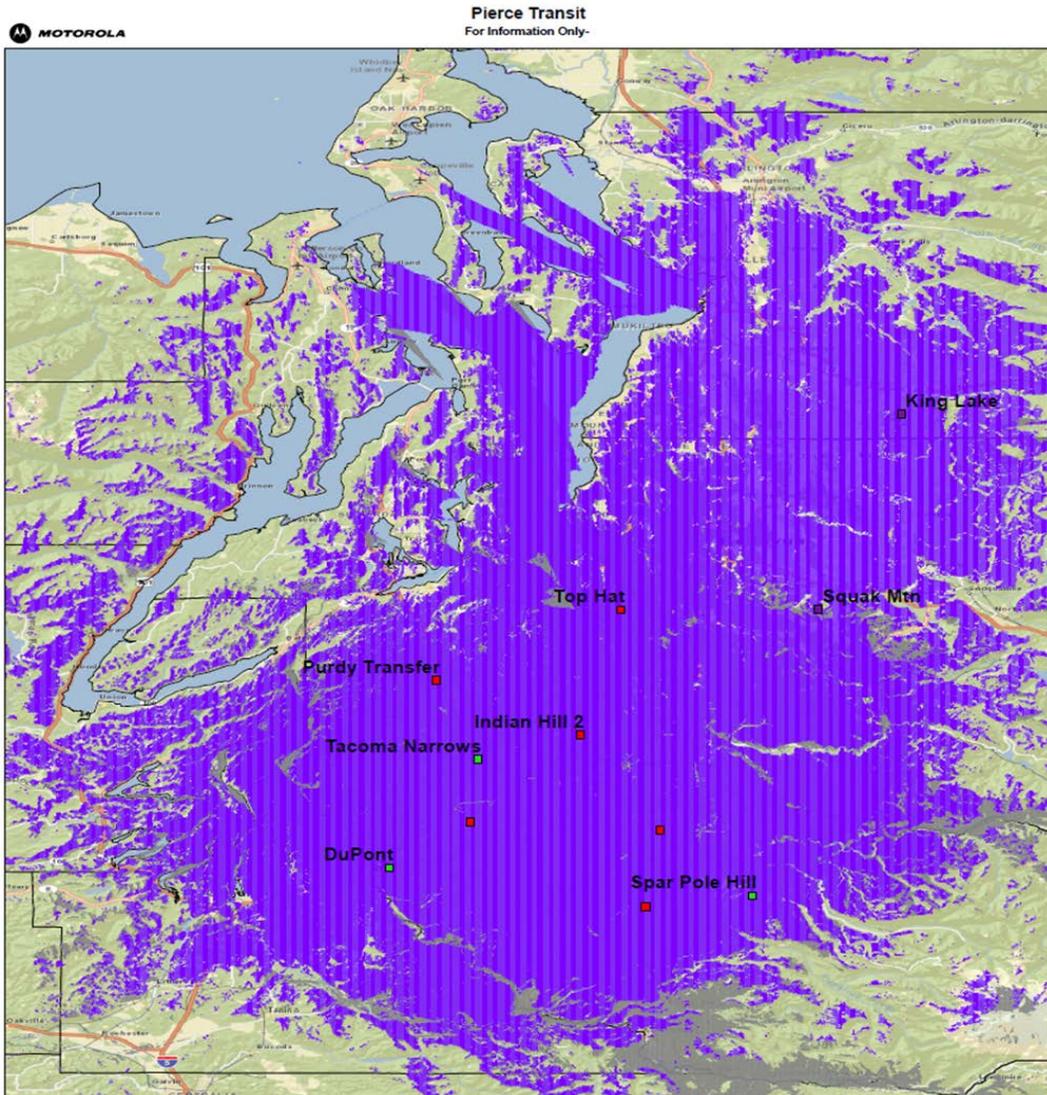
**Microwave Network**

**Single County Wide Communication System**

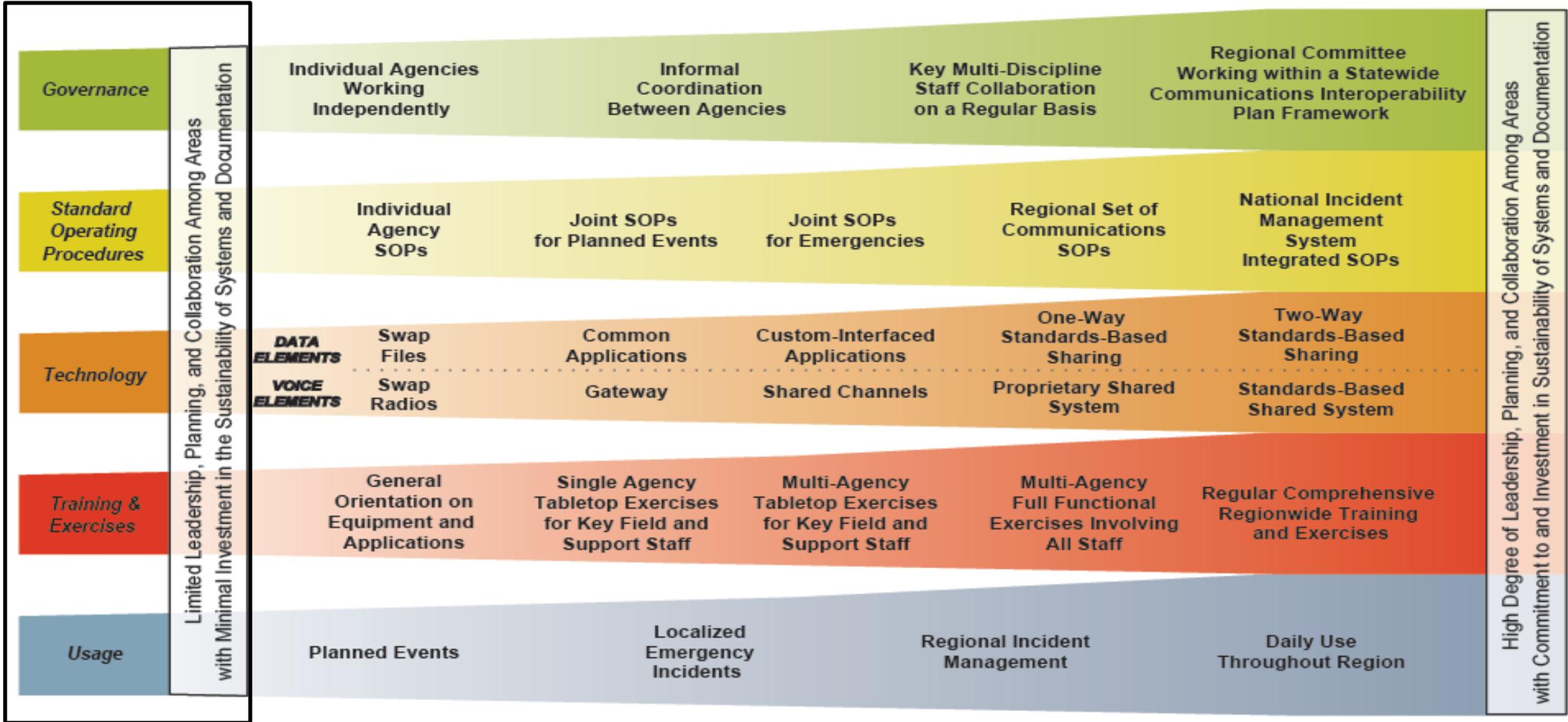
# Single Countywide Communications System (SCWCS) Network - Voice



# Single Countywide Communications System (SCWCS) Network – UHF Data



# SAFECOM Interoperability Continuum





# Questions?

