

LOS ANGELES COUNTY 4.9 GHz SYSTEMS



Los Angeles County Sheriff's Department
Lieutenant Mark Wilkins

History of using 4.9 GHz

- County of Los Angeles used 2.4 GHz for various operations including downlink video
- It proved to be a valuable, live situation awareness, resource during man-made situations and natural disasters i.e., wildfires, vehicle pursuits
- Unfortunately, it conflicted with local broadcasters in terms of coordinating and maintaining control of the spectrum
- It is a noisy and congested spectrum
- 4.9 GHz spectrum resolves several of the 2.4 GHz issues

History of using 4.9 GHz Continued

- Within the County of Los Angeles, there are approximately 10 public safety agencies that have licensed the use of 4.9 GHz for applications such as:
 - Downlink Video
 - Video Surveillance
 - Backhaul operations

Implementation of 4.9 GHz

- Los Angeles County has five entities that currently use 4.9 GHz:
- Los Angeles County Internal Services Department
- Los Angeles City Fire and Police Departments
- Long Beach Police Department
- Los Angeles County Fire Department
- Los Angeles County Sheriff's Department

Los Angeles County Internal Services Department

- Coordinates point-to-multipoint equipment for back-haul operations. The hub is in East Los Angeles and connects to four locations:
 - East L.A. Courthouse
 - District Attorney Office
 - Child Support Services
 - Alhambra Courthouse
- Equipment: Alvarion BreezeMAX Extreme 5000

Los Angeles City Fire and Police Departments

- Using 4.9 GHz spectrum for downlink of airborne video signals
- Police video surveillance system at Los Angeles International Airport (LAX)

Long Beach Police Department

- Police Video surveillance system
- 13 fixed monitoring sites throughout the city

Los Angeles County Fire Department

- Plans to use 4.9 GHz spectrum for downlink of airborne video signals and will likely use the same type of equipment used by the Sheriff's Department for both tactical and back-haul video operations to SCC, Fire Headquarters and EOC.
- Plans to use 4.9 GHz to back-haul Life Saver information for the lifeguards near the Venice Beach area (6 locations). Based on the Back-haul's performance the Fire Department may implement the system throughout the entire coast line of LA County. Implementation plans indicate the use of Fire Tide Mesh Radios.

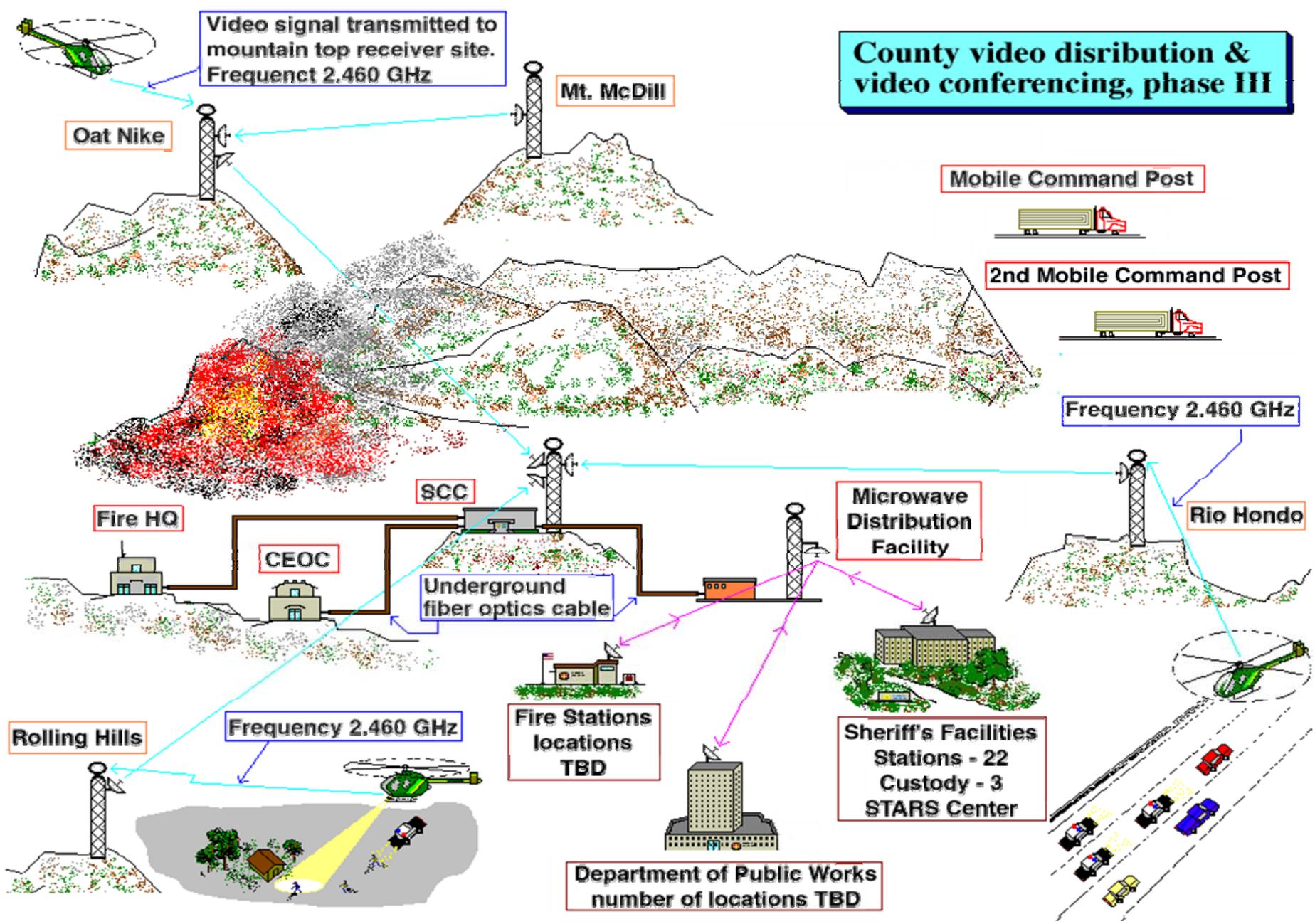
Los Angeles County Sheriff's Department

- Plans to use 4.9 GHz spectrum for downlink of airborne video signals. Release of a Request For Proposal to select a vendor is anticipated by April 2011.
- We currently use the spectrum for a Department program called Communication Resources Emergency Workaround (CREW). It utilizes Harris Corporation RF-7800W High Capacity Line-of-Sight (HCLOS) radios to provide quick-to-deploy, point-to-point or point-to-multipoint wireless IP infrastructure, enabling high-bandwidth data communication between mobile or fixed operations centers.

Sheriff's Department Downlink Video System

- Intends to use 4.9 GHz for downlink of airborne video to tactical command centers on the ground. The initial implementation plan calls for equipping up to fifteen airborne platforms with omnidirectional downward looking antennas. Equipment may be from Helinet Technologies.
- Countywide distribution of the downlink video to Sheriff's Department facilities by using directional antennas to link the signals back to the Sheriff's Communications Center (SCC) and the Emergency Operations Center (EOC), both located 3-miles East of Downtown Los Angeles.

County video distribution & video conferencing, phase III



Description of 4.9 GHz Network

- Los Angeles County covers an area of 4,084 square miles. It is comprised of 1,741 square miles of flat land, 1,875 square miles of mountains, 246 square miles of hilly land, 59 square miles of mountain valleys, 28 square miles of marsh land, and 75 miles of coast mainland.

Description of 4.9 GHz Network Continued

- It is anticipated that eventually both County Sheriff and County Fire 4.9 GHz networks will encompass much of the County of Los Angeles by air and/or ground systems
- County of Los Angeles Internal Services Department (ISD) manages the sites for both County Sheriff and County Fire. Combined, they number over 100 strategically located sites in all types of terrain within the County's jurisdictional boundaries.

4.9 GHz Network Performance

- ISD's Alvarion BreezeMAX Extreme 5000 has throughputs between 13 to 14 Mbits per second for downlink and between 4 to 6 Mbits per second on the uplink.
- The Sheriff's CREW radio, Harris RF-7800 High Capacity Line-of-Sight (HCLOS), has robust connectivity at Ethernet data rates greater than 80 Mbits per second.
- Both of these installations are first-time operations and are no comparisons to similar systems operating in 2.4 GHz. 4.9 GHz performance is vastly superior

4.9 GHz Issues

- There are two very important issues pertaining to the use of 4.9 GHz spectrum:
 - 1) Potential interference with neighboring public safety agencies. No organized coordination exists
 - 2) Cataloguing the use of 4.9 GHz spectrum by public safety agencies as they become operational

4.9 GHz Issues, Continued

- The County of Los Angeles took the lead in having the FCC reconsider its original decision to prohibit the use of 4.9 GHz spectrum for airborne video operations. The Commission agreed to reconsider its decision and allocate waivers for use of this spectrum for airborne video operations on a case-by case basis.

4.9 GHz Issues, Continued

- FCC's Region 5 develop a band plan that would include 4.9 GHz ground and airborne operations. In November 2010, FCC Region 5 reviewed the latest draft of this document and agreed to submit it for final review and approval. The plan calls for 10 MHz for the exclusive use of airborne video, with the remaining spectrum (40 MHz) for fixed and mobile ground operations.

4.9 GHz Issues, Continued

- A public safety aerial working group was formed in 2009 to address the concerns by these agencies and the growing number of others who operate or expect to operate airborne video soon. In a meeting held by this group in November 2010, three major milestones were agreed upon.

4.9 GHz Issues, Continued

- That a survey of all agencies in the area will be conducted to determine which agencies are currently using, or intend to operate systems using 4.9 GHz spectrum, and in what capacity
- That all survey data collected will be catalogued in the FCC's Computer Assisted Pre-Coordination Resource and Database (CAPRAD).
- CAPRAD data will be used by the Los Angeles City/County Law Enforcement And Recovery Program to coordinate the use at any time by both ground and aerial users of 4.9 GHz spectrum.

Incident Response Communications “Operation Shake Out”

- In 2008, Millions of Southern Californians Public Safety agencies and citizens were involved in the Shake Out Drill. This was the largest earthquake preparedness activity in U.S. history! The 7.8 epicenter of this drill was located in Riverside County.
- Catastrophic earthquake along the southern San Andreas Fault in Los Angeles Basin Area, lasting 90 seconds
- Extensive mutual aid from local, County and State agencies
- Requiring substantial Federal and DOD response.

Golden Guardian 2008 Scope of Activity Within California

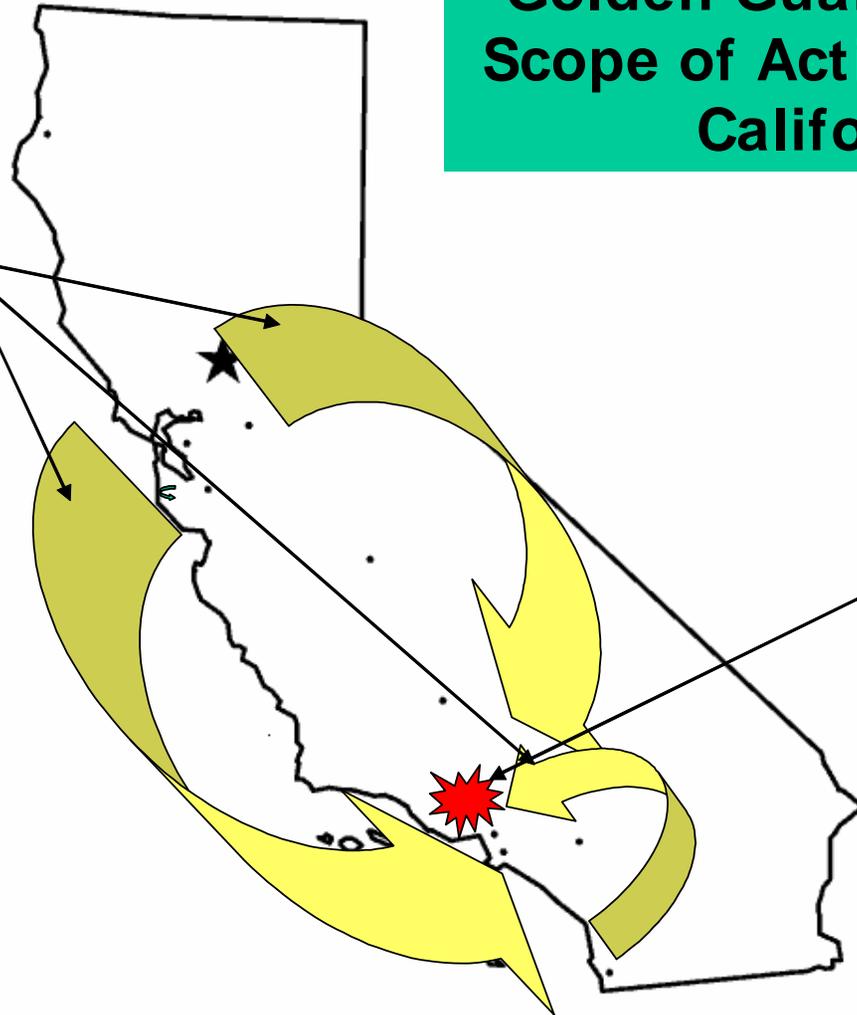
Statewide:

Multiple Mutual Aid
activations
throughout State

Overwhelms State
assets

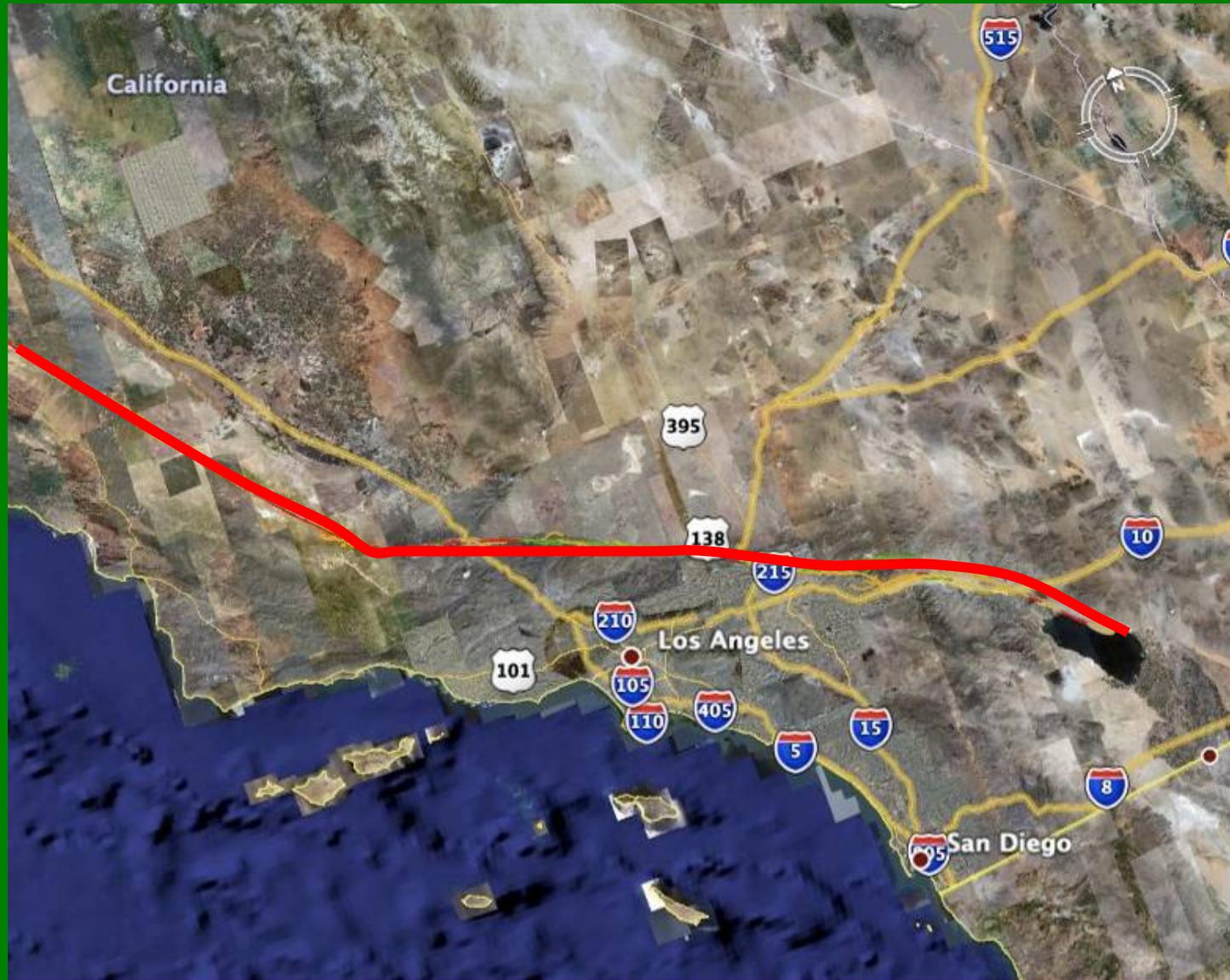
Federal & DoD
response

Southern Region:
Catastrophic
earthquake along
San Andreas Fault



FOUO

Earthquake zone as modeled by USGS



Situation

- All normal communications infrastructures were taxed and had partially or completely failed
- Obtaining field disaster assessment information was none existent
- Normal methods of transportation were not possible due to destruction
- Command and Control required field damage intelligence
- Command and Control deployed the Communication Resources Emergency Workaround (CREW) team
- CREW used air ships and 4X4 vehicles for transportation to destination points

CREW Mission

- Establish voice communications and data at two disasters points, Malibu and Lancaster
Equipment: Harris 5800 High Frequency manpack and Harris 1033M radio, Tactical Chat software
- Establish voice communications, data, VoIP phone (conference calls), and live streaming video at multi-agency staging area
Equipment: Harris 5800 High Frequency manpack radio, Tactical Chat software and Harris RF-7800 Broadband Radio using 4.9 GHz spectrum
Distance from staging area to Command Post: 33 miles
- Establish mobile voice communications and live streaming video using Harris 5800 HF and RF-7800

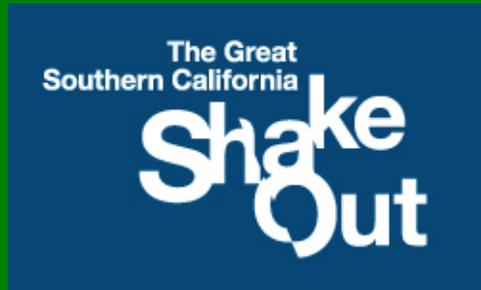
CREW Mission Successful

- Established voice communications and data at two disasters points
- Established simultaneously voice communications, data, VoIP phone (conference calls), and live streaming video at a multi-agency staging area
- Established mobile voice communications and live streaming video

CREW Lessons Learned

- The need to establish a recurring training program
- Personnel need to have an FCC General Class License for the Harris 5800 High Frequency Radio
- Additional equipment:
 - Compass/GPS device to help establish line of sight direction
 - Rope and carabineers to haul RF-7800 equipment onto roofs
 - Future plans to test Harris Closed Loop Antenna alignment System for RF-7800 radios. This unit can complete antenna aiming in less than one minute

Demonstration Scenarios



HF & High Capacity Line of Sight (HCLOS) systems to be deployed from the LASD SCC

- The SCC is the focal point of the demonstration with the installation of a Harris 150W HF System and a High Capacity Line of Sight (HCLOS) System.

- **HF Links**

- **LASD SCC to Malibu and Lancaster.**
- The deployment of Harris HF radio systems to provide remote site situation reporting to the SCC. This includes voice communications, data messaging using the Harris wireless e-mail, and GPS positioning using the C2PC situational awareness application. The mobile units will be attached to a LASD Mobile Field Force (MFF). Requirement to track the MFF radio via C2PC.

- **HCLOS Links**

- **LASD SCC to Claremont and Deployed Vehicle**

Claremont HCLOS- Link. Deployment of a Harris High Capacity Line of Sight radio to Claremont to provide broadband data and voice communications. This unit will be a base unit deployed at a Command Post. The RF-7800W radio will be used to send data back to SCC; a distance of 27 miles. Live video to be sent to and from the SCC. VoIP phones provide voice communications between the sites.

Deployed Vehicle HCLOS-Link. Deployment of a Harris High Capacity Line of Sight radio from a LASD vehicle to provide broadband data and voice communications. Live video to be viewed from the SCC and the Command Post in Claremont. VoIP phones provide voice communications between the sites.

- **Multiband Handheld**

- Interoperate LASD vehicle in VHF.

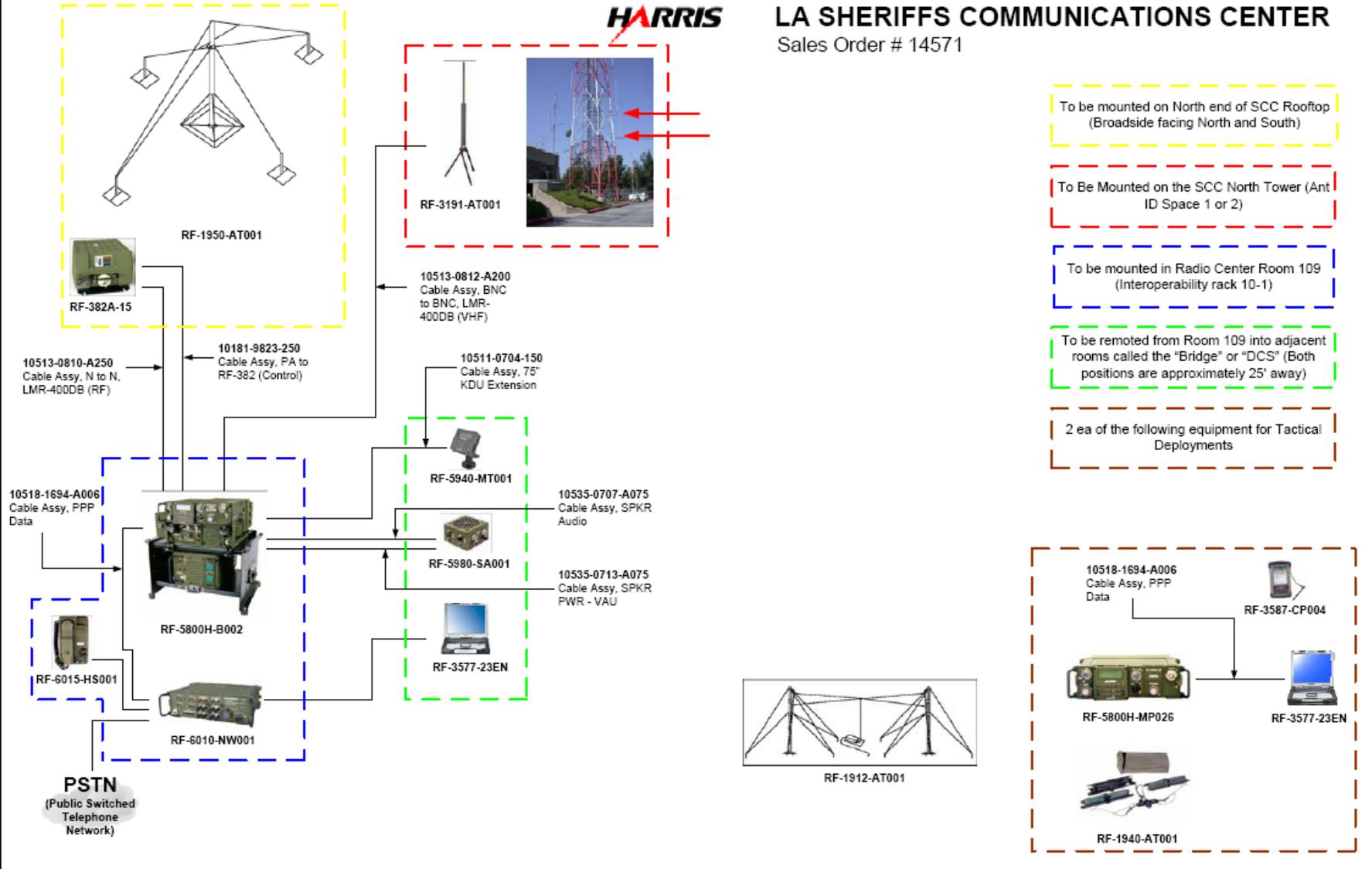
Harris RF-5800H HF and RF-7800 Links





LA SHERIFFS COMMUNICATIONS CENTER

Sales Order # 14571



25-Feb-11

Harris RF-5800 H High Frequency Radio



Initial Entry – 1033M



- **Key Characteristics**
 - **Multiband Frequency Coverage Including:**
 - VHF-low: 30-50 MHz
 - VHF-high: 136-174 MHz
 - UHF: 380-512 MHz
 - **Multimode Capability Including: P25, FM, AM**
 - **Secure Communications**
 - **Software Defined Radio**
 - **Most rugged LMR available**
 - **Standard 5-year Warranty**
- **Field Proven Multi-band Software Defined Radio**
 - **Over 10 years experience**
 - **Over 50,000 radios shipped**

Harris RF-7800

Broadband Ethernet Radio

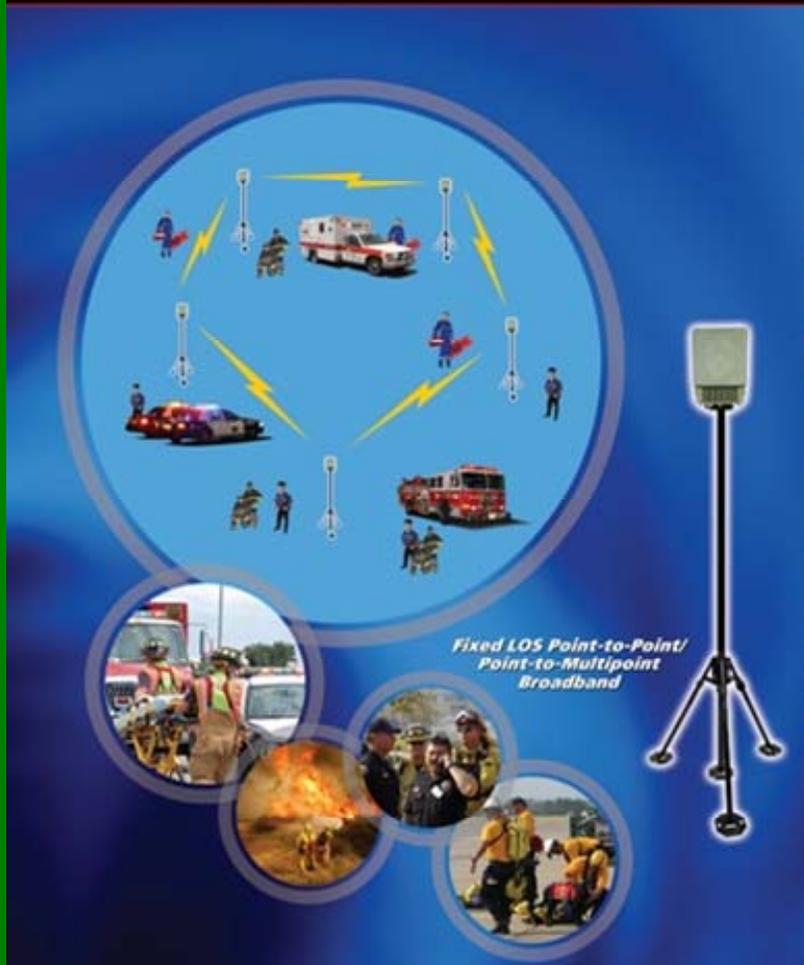


Why Harris RF-7800 System

- Under clear line-of-sight conditions, the RF-7800W provides robust, long-range connectivity at distances beyond 30 miles
- Easy to deploy, extremely rugged, low power consumption and small footprint make it an ideal media gateway solution for disaster relief. The radio can transmit data from phones, computers, and video coverage back to the command center for damage assessment.
- Delivers high-speed Ethernet throughput over wireless links. Its all-Internet Protocol (IP) design delivers a seamless extension of Ethernet LANs and WANs, at data rates over 80 Mbps.

RF-7800W Overview

RF-7800W Broadband Ethernet Radio

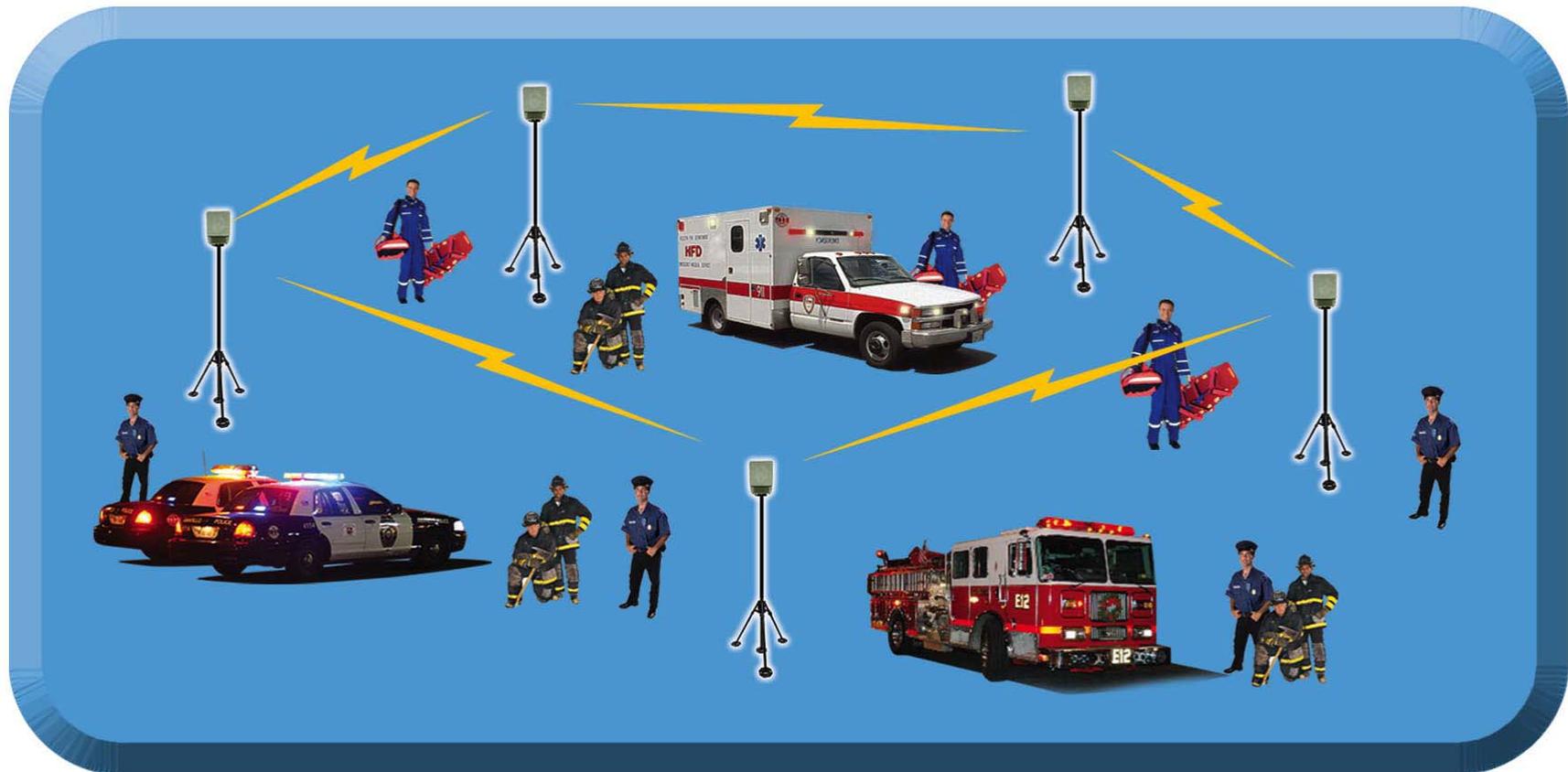


- IEEE 802.16-Based Technology
- 4.4 GHz – 5.0 GHz
- Point-to-point (PTP)
- Point-to-multipoint (PMP)
- Designed for IP traffic
- Outdoor transceiver is Powered via Power-Over-Ethernet (PoE)
- Adjustable TX power up to 100mW
- 1 MHz channel step size
- Low Latency: 4 ms PtP; 10 ms PMP
- Automatic adjustment of throughput based on link conditions
- Small size and weight
 - 2.5 kg (5.5 lbs)
 - 266.7 mm (10.5")L x 292.1mm (11.5")W x 55.88 (2.2")H
- Software defined for easy upgrade

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Harris RF-7800

Secure Area Communications System



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