

E²OC

Wireless Interoperability

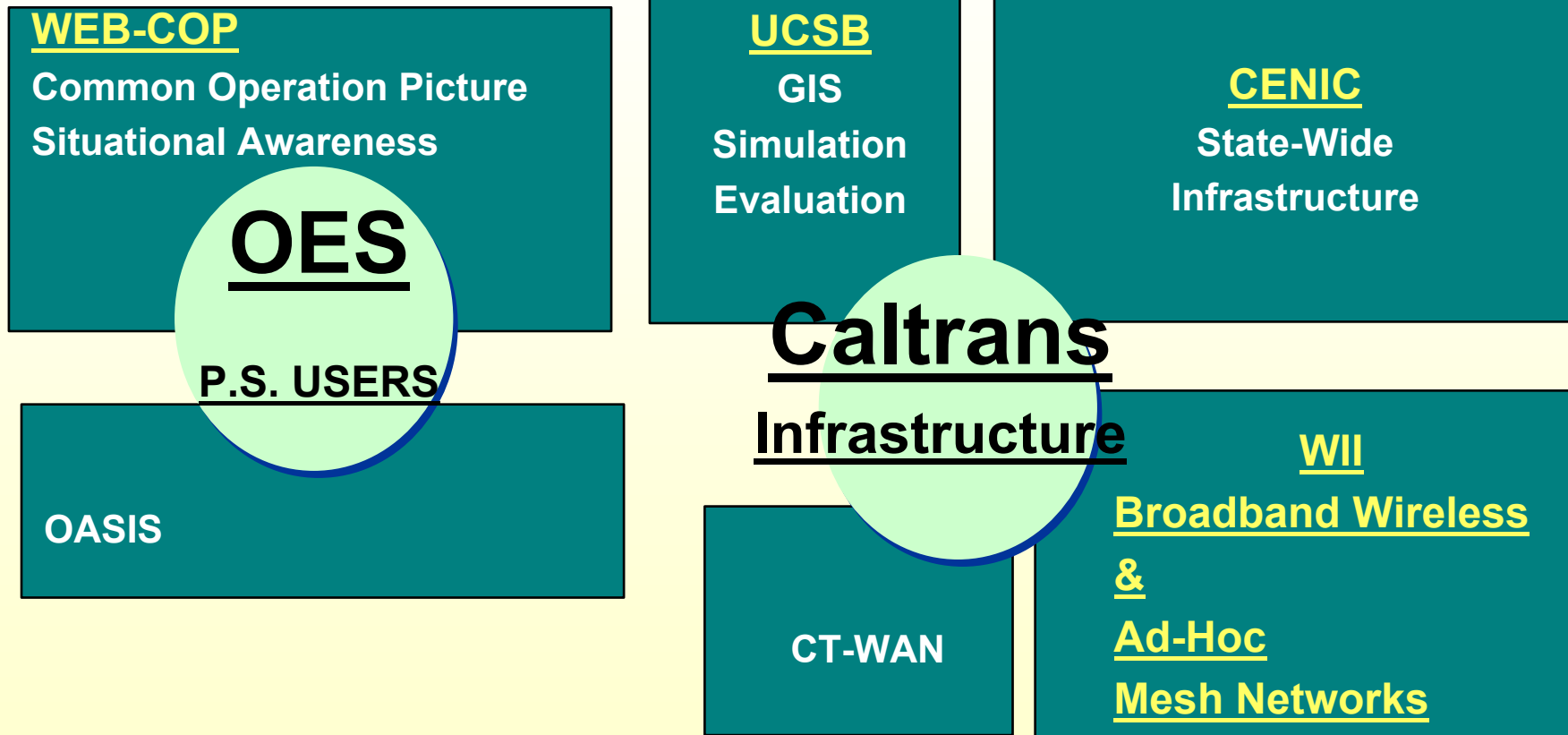
“Using Wireless Interoperability for First Responders to Create the Extensible Emergency Operations Center”

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Principal ITS Engineer

Caltrans- HQIT

E²OC Proposal 2005



Intelligent Transportation Systems (ITS)

- ◆ Road pricing / Toll Collection
- ◆ In-vehicle signing
- ◆ Probe vehicle
- ◆ Work zone warning
- ◆ Highway-rail intersection warning/Intersection collision avoidance
- ◆ Road condition warning/ Stopped Vehicle warning
- ◆ CVO- border clearance
- ◆ On-board safety data transfer/Vehicle safety inspection
- ◆ Transit vehicle signal priority/Emergency vehicle signal preemption
- ◆ Disaster Recovery/Emergency Response video relay

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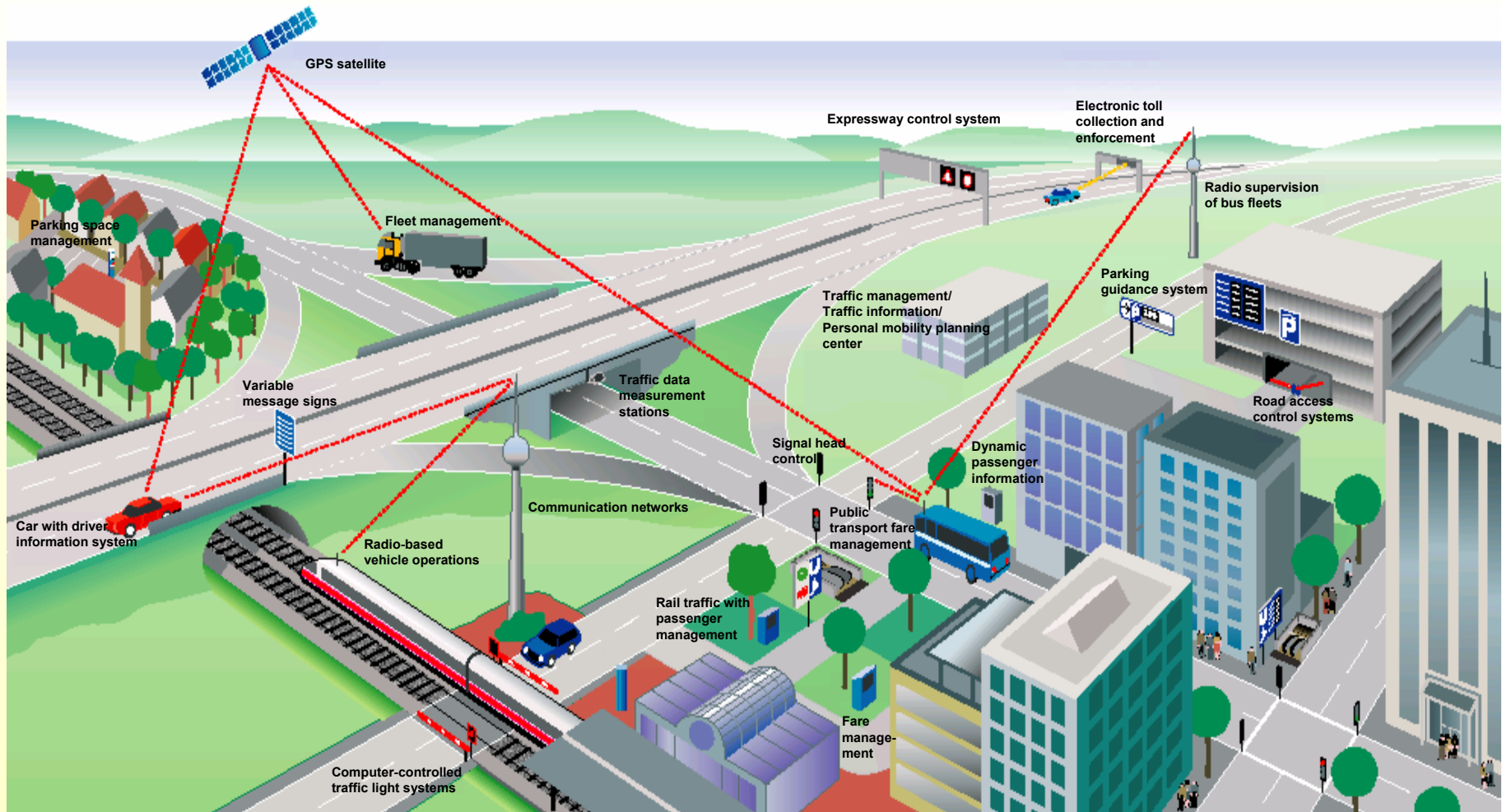
Homeland Security



ITS & Telematics

- ◆ **The term telematics was originally created to describe systems that combined computer and telecommunications systems, to provide a means of acquiring, processing and delivering data.**
- ◆ **Automotive telematics is wireless voice and data optimized for delivery to a vehicle, a driver, or a passenger for the purpose of:**
 - ◆ **Enabling personal calling**
 - ◆ **Enhancing vehicle and occupant safety and security**
 - ◆ **Offering productivity or convenience services systems**
 - ◆ **Providing entertainment and information**
- ◆ **ITS is the total system: vehicle and infrastructure**
- ◆ **In the U.S. Telematics = Automotive telematics**

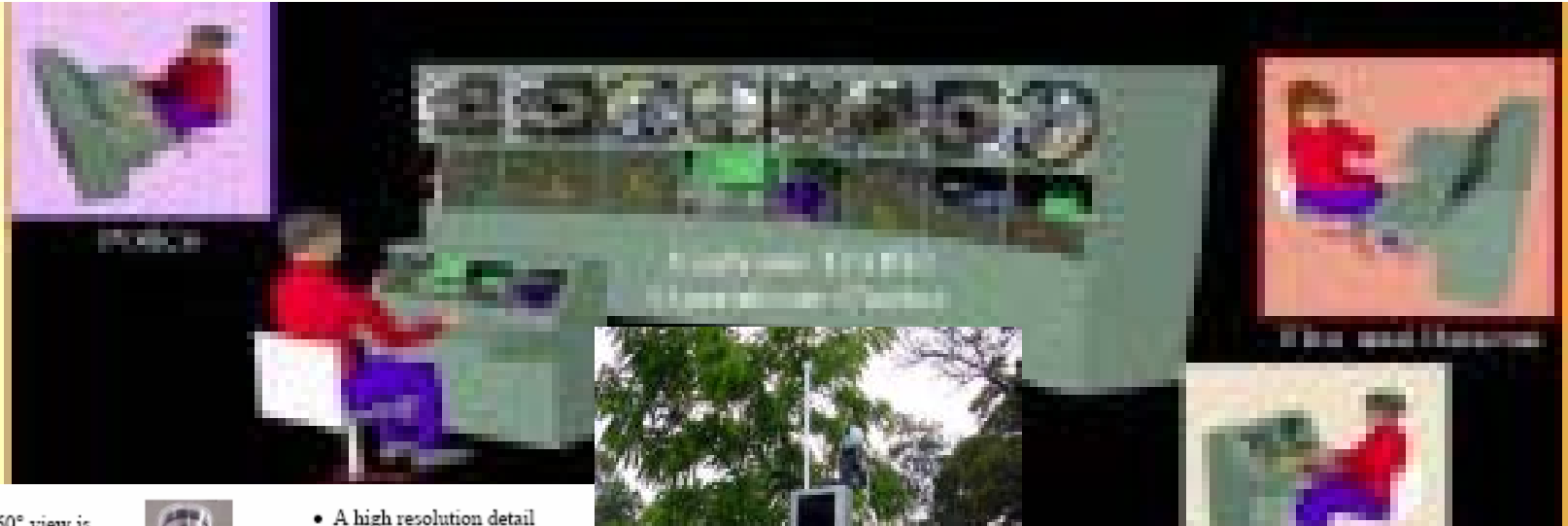
Intelligent Transportation Systems (ITS)



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ATON Demonstration – 2001

TCFI-UCSB-UCSD (CENIC)



• A 360° view is taken with the omni-directional camera



• A high resolution detail view is taken with a rectilinear camera



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Extensible Emergency Operations Center

“Using Wireless Interoperability for First Responders to Create the Extensible Emergency Operations Center”

- **Main Elements:**
 - **Implement a web based Common Operational Picture (Web COP)**
 - **Demonstrate interoperability of high speed mobile ad-hoc (mesh) wireless communications**
 - **Demonstrate IP interoperability between the new wireless network and other state-wide networks such as CT-WAN and CENIC**

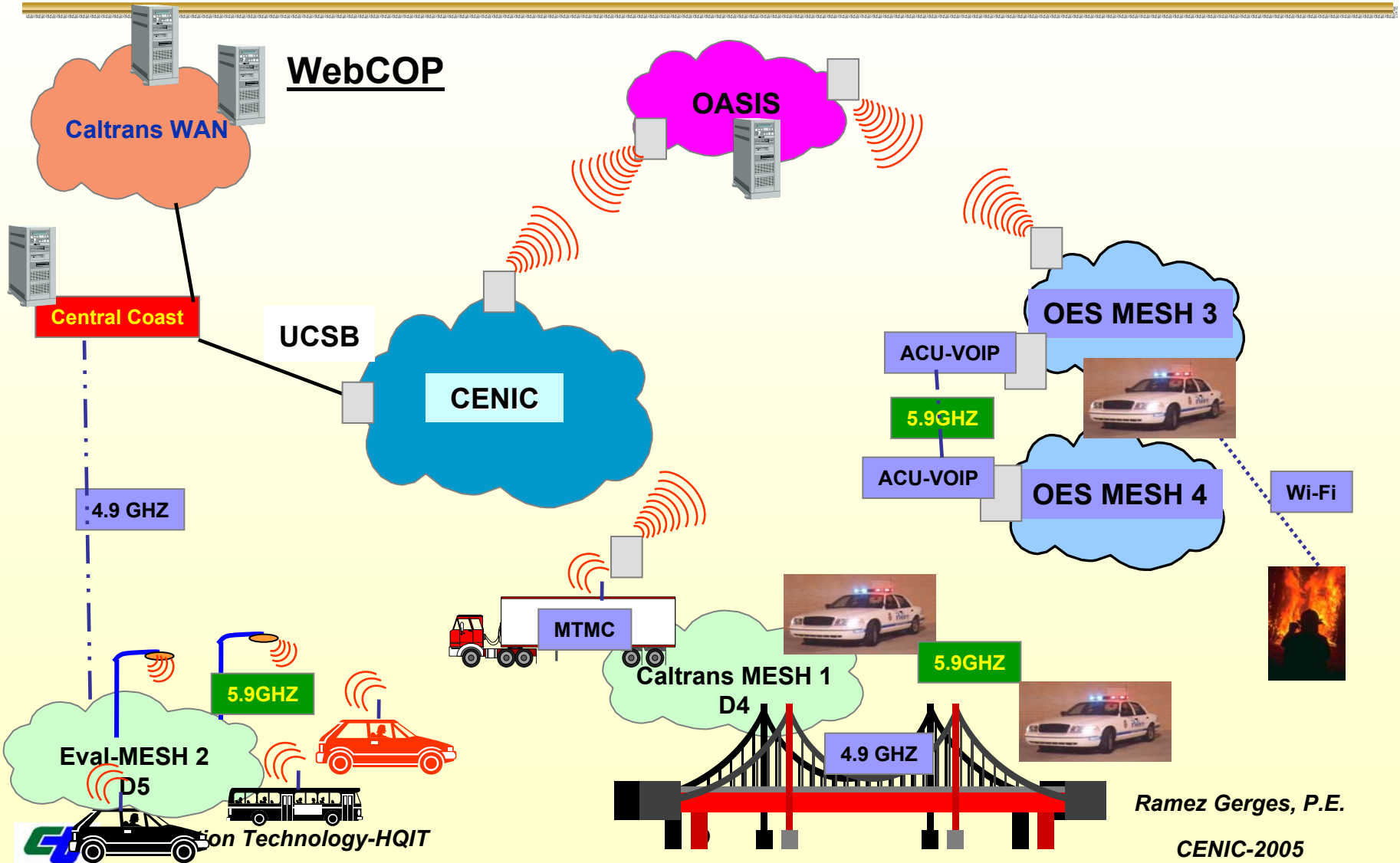
DHS-ITEP E²OC Proposal

Caltrans View

- **Interoperability as proposed**
 - “State of the Market”
 - System Integration Pilot
- **Open = Standard based demonstration**
 - Multiband radios: Public Safety, ITS-RS, Wi-Fi
 - Ad-Hoc & Mesh networks: multiple platforms
 - Video streaming /VOIP at mobility
 - Main Challenge:
 - Different Standards at different maturity levels (IETF, IEEE)

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Conceptual Architecture



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CENIC-2005

E²OC Proposal Participants

- **Office of Emergency Services (OES)**
 - Responsible for the common operational picture (COP), the OASIS elements and the integration with the Homeland Security Information Network
- **Caltrans**
 - HQIT is the main interface to OES and is responsible for developing the mobile broadband Ad-Hoc Mesh wireless infrastructure and integration with the Caltrans WAN, OASIS, and the CENIC network
- **Corporation for Educational Network Initiatives in California (CENIC)**
 - Responsible for providing high speed IP transport and integration with Caltrans WAN and OASIS networks at the Central Coast and the Bay Area.
- **Local Agencies at the counties of Santa Barbara and San Francisco/Oakland Bay Area**
 - Represent the First Responder (fire, EMS, and police) user community where cooperation between and across jurisdictions
- **University of California at Santa Barbara (UCSB)**
 - Provide the collocation facility (Hollister) for the CENIC/Caltrans networks
 - Develop a GIS based modeling & simulation of the transportation network
 - Evaluate the Ad-Hoc / mesh network

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WebCOP

- **Assess Public Safety (Users) requirements for web based data sharing.**
- **Provide the right information to the right place at the right time**
- **Interoperability across jurisdictions will be achieved by providing access to location aware information resources using the same multimedia data format and structure**
- **Text, maps, images, and video streams will be presented in real time through a web interface to the mobile emergency field commander and at the emergency center**

Wireless Infrastructure Interoperability (WII)

- **Use of a new multiband reconfigurable radio operating in the licensed bands, as well as the unlicensed bands (Wi-Fi)**
- **FCC just recently validated our approach in:**
 - “ **leveraging technology already developed for adjacent bands, public safety licensees could use a single, low-cost device to access the 4.9 GHz band, the U-NII band, and the ITS band, allowing them to enjoy savings that are typically limited to the high-volume commercial market.**”
- **Use of Ad-Hoc (mesh) wireless technology that turns any node (client) into a router/repeater where data (including video) hop through neighboring nodes**
- **Hybrid Ad-Hoc Mesh network that uses both mobile and fixed nodes**

IP Interoperability

- **Interoperability between the new wireless network and other state-wide networks**
- **Assess interface issues between Caltrans WAN and the CENIC statewide educational network**
- **Leverage existing Caltrans high speed connectivity to the CENIC network at UCSB**
- **Demonstrate the potential benefit from interconnecting two backbone dissimilar networks**

E²OC Strategic Benefits

- **Enhance Public Agencies (Caltrans, OES, CHP, etc.) ability to obtain and share a common operational picture in case of emergencies.**
- **Understand the level of effort in connecting dissimilar networks in case of emergency (technology and process)**
- **Understand the level of response improvement when emergency responders (including Caltrans) have easier access to the latest broadband technology in support of public safety and homeland security missions.**
- **Assess and evaluate cultural, process and technology issues**
 - **Cultural:**
 - Level of cooperation, and degree of data sharing
 - **Process:**
 - Emergency dispatch operations
 - Emergency vehicular operations
 - **Technology:**
 - Wireless local area networks for incident scene management
 - Fast deployed Ad-Hoc networks

E²OC Tactical Benefits

- **Improve level of preparedness by increasing knowledge of partners' needs**
 - The common operational picture is a new tool that will level the field and enhance the way First Responders respond to emergencies.
 - The project will help Caltrans understand the potential new demands on the transportation system.
 - Allow OES and other public safety agencies to integrate Caltrans expertise in transportation management
 - Assess the field commander preparedness to handle and fuse the newly available real time information
- **Position Caltrans as an effective First Responder**
 - Add value to the traditional first responder teams (guns and hoses) by providing technical assistance in the areas of IT technologies and transportation management
 - Integration and validation of new processes and technologies that will enhance mobility (Caltrans core mission)
 - Day-to-Day use: Traffic management in construction areas
 - Advanced work zone safety
 - “Fast” deployment of Ad-Hoc wireless networks to support:
 - Incident scene management and clearance
 - Integrated vehicle infrastructure detection