The ‘Amateur Radio’ Component of Emergency Communications

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The Amateur Radio Service

- **A service chartered under FCC Part 97**
  - Licenses granted to individuals
    - 650,000 in U.S.; 91,300 in California
    - Written test on technology, operating procedures
  - Special radio spectrum allocations
    - HF, VHF, UHF, Microwave
  - Digital (data) and voice modes
  - Fixed, mobile, portable, repeaters, satellites
  - Local, regional, worldwide communications

RACES

- **Radio Amateur Civil Emergency Services**
  - Special FCC-granted Part 97 authorization
- **The communications branch of the Federal Emergency Management System (FEMA)**
  - When a governmental entity (a representative of City, County, State, or Federal government) formally request Amateur Radio assistance, the response is through RACES
  - RACES personnel covered as Disaster Service Workers

ARES

- **Amateur Radio Emergency Services**
  - The field arm of the American Radio Relay League (ARRL)
  - ARES handles field communications, particularly during emergencies
    - Search and rescue
    - Forest fire communications support
    - Red Cross shelters
    - Community services
      - Parades, air shows, bike rides, large public gatherings
  - Providing communications for non-emergencies as a means for training in emergency-response skills
    - Helps maintain trained operators and ready equipment
  - On-air training networks are held weekly in Santa Clara County
    - 100 participants MV, LA, LAH, SV, PA (many are CERT/DSW certified)
    - 40 registered for Mutual Aid (NIMS, SIMS, ICS certified)

ARES/RACES Organization

- **Each city has an Emergency Coordinator**
  - Individuals are directed by the EC
  - Each city has an Emergency Operations Center (EOC)
- **Each county has a District Emergency Coordinator**
  - EC's are directed by the DEC
  - Each county has an Emergency Operations Center
- **DEC's report to county officials**

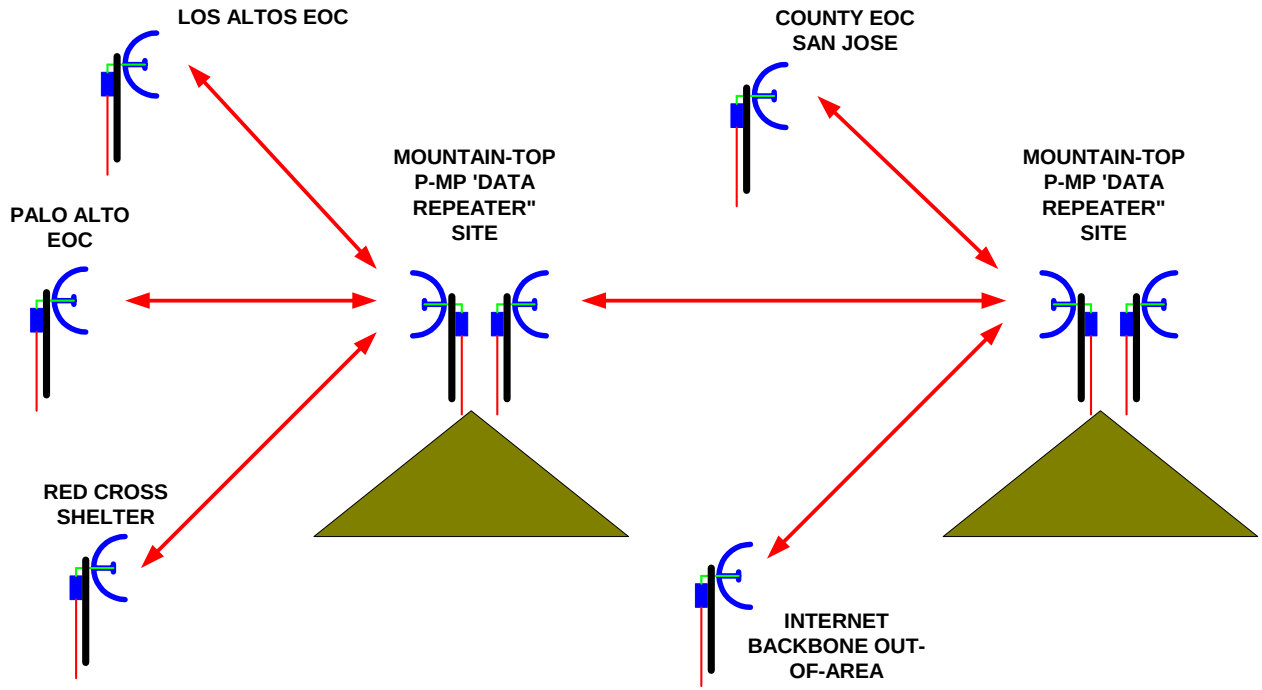
Current South Bay Infrastructure

- 32 mountain-top voice repeaters
  - Wide-area voice communications
    - Support use of handheld radios inside buildings
    - Predominantly 144 and 440 MHz bands
  - Emergency-powered for long periods
  - Used separately or cross-linked for
    - Command nets, resource nets, tactical nets, hospital nets
- Wide-area low-speed digital links
  - 144, 220, and 440 MHz packet radios
- All individuals and all cities own equipment

High-Speed Data Agenda

- Interconnected mountain-top point-multipoint systems
  - Virtual ‘satellites’ above the disaster
    - 24 – 100 Mb/sec IP data throughput, low-latency
    - Rapid deployment of portable nodes as a backbone, delivering reliable IP data in form of hot-spots at a shelter or EOC
    - Self-healing redundancy for mountain-top ‘access points’ and Internet backbone connections
  - Multiple hardened sites (emerg pwr, ruggedized)
  - Use licensed (restricted) Amateur Radio spectrum at 5.8 GHz
    - Dedicated for ‘dual use”: training/drills, emergencies
    - No interference or use conflicts during a disaster
    - Services same as Internet – handed off to local agencies or responders whenever and wherever needed (as WiFi hot spots)

High-Speed Data Backbone



- **Each node connects to any mountain-top (backbone) and supports local users (within 300 feet) using WiFi hotspot**
  - Fixed ‘client’ nodes at EOC’s
  - Portable nodes at shelters and responder support areas

Emergency Communications Preparedness Factors

- Multiple layers of communications resources protect against the unpredictable
  - Paid public services workers vulnerable to attending to their own families in a disaster
  - A ‘Volunteer Fire Department’ model as complement
    - Trained and certified personnel capable of equipment deployment and traffic handling
- Rapidly deployable battery-powered portable equipment is a crucial area-wide flexibility
- Controlled-access data and voice backbone infrastructure (frequently tested in drills)