

**2012 HPWREN Annual Users Workshop  
December 13, 2012 at SDG&E Mission Control**

**Meeting agenda**

**10:00 Welcome**

**Introductions**

**SDG&E presentation (Mike Calcagno)**

**Recharge and HPWREN status discussions**

- **HWB presentation**
- **Ron Hawkins presentation**
- **open discussions**

**11:40 lunch**

**12:10 tours**

**12:40 User presentations**

- **Frank Vernon**
- **Patrick Shopbell**
- **Ronald Serabia**
- **Kimberly Mann Bruch**

**Collaboration discussions**

**Applied Network Research (ANR)**

**High Performance Wireless  
Research & Education Network**



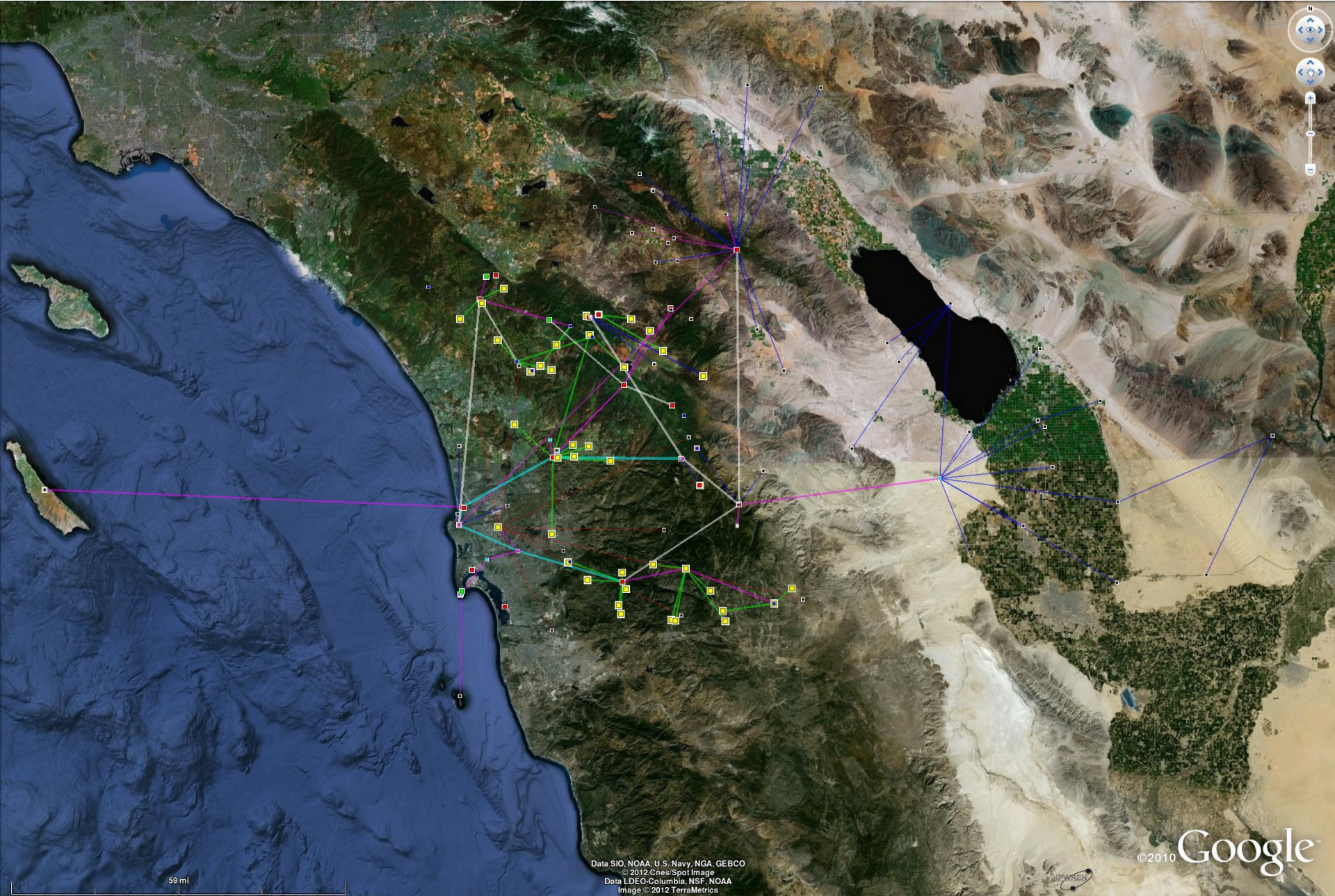


**2012 HPWREN Annual Users Workshop**

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**SDG&E Mission Control**





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# HPWREN participation

Current Year 2 budget: \$364,026

Tier-1 (\$277,045, or 76.1%):

- Cal Fire
- Caltech - Palomar Observatory
- Institute of Geophysics and Planetary Physics (UCSD)
- San Diego Gas & Electric

Tier-2 (\$71,597, or 19.7%):

- Earth Research Institute (UCSB)
- Field Stations Program (SDSU)
- Mount Laguna Observatory (SDSU)
- National Park Service CABR
- UNAVCO

Tier-3 (\$15,384, or 4.2%):

- California Wolf Center
- Climate, Atmosph. Sci, and Physical Oceanogr. Rsrch Division (UCSD/SIO)
- Coastal Observing R&D Center (UCSD/SIO)
- Frieder Seible
- NASA on Mt. Laguna
- NPS SD Maritime Museum
- UCSD Biomed (EFS)

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# Fixed and mobile HPWREN Public Safety deployments: ~mid-2012

## 15 Fixed installations

### *Air bases:*

- Fallbrook Helitac Base
- Gillespie Field Helitac Base
- Ramona Air Attack Base

### *Conservation Camps:*

- La Cima
- Puerta La Cruz
- Rainbow

### *Cal Fire Stations:*

- Mount Woodson
- Red Mountain
- Rincon
- Valley Center
- Warner Springs

### *SDCFA stations:*

- Palomar
- Ranchita

### *USFS:*

- Palomar

### *County:*

- PSC/EOC

## 9 Ad-hoc Incident Command Post deployments

- 2003 Coyote Fire
- 2004 Eagle Fire
- 2004 Mataguay Fire
- 2005 Volcan Fire
- 2005 Border50 Fire
- 2006 Horse Fire
- 2010 Cowboy fire
- 2011 Eagle Fire
- 2012 Border Fire

## Other fire-related activities

- Environmental camera/animations information
- Other sensor data
- Fire drill events

# Firestation buildout participants

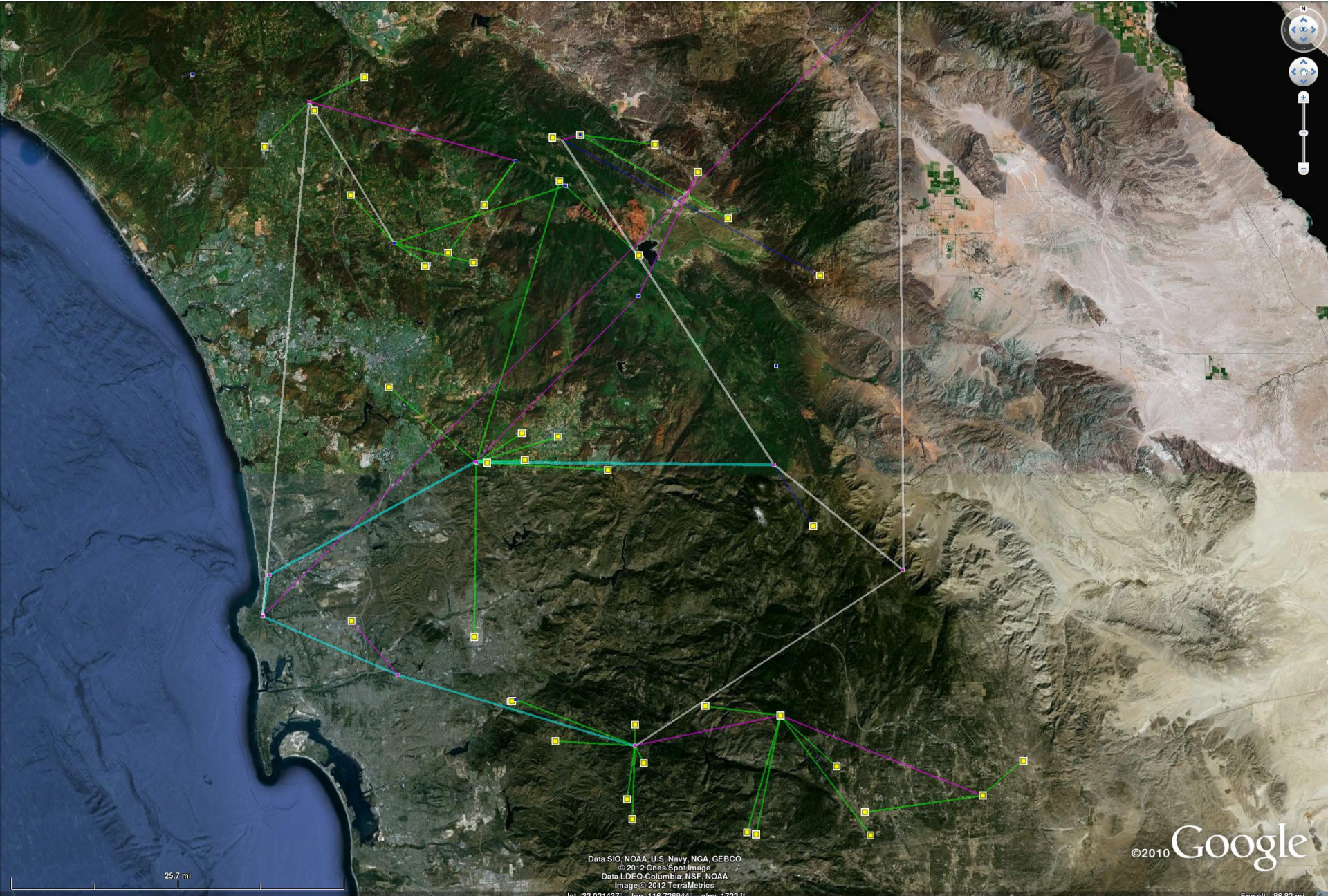
- **Cal Fire (State)**
- **County of San Diego (County)**
  - **San Diego County Fire Authority**
  - **San Diego Sheriffs Department (WSD, 3C)**
- **San Diego Gas & Electric**
- **San Diego State University**
  - **College of Sciences**
- **United States Forest Service (Federal)**
- **University of California San Diego**
  - **California Institute for Telecommunications and Information Technology**
  - **San Diego Supercomputer Center**

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25.7 mi

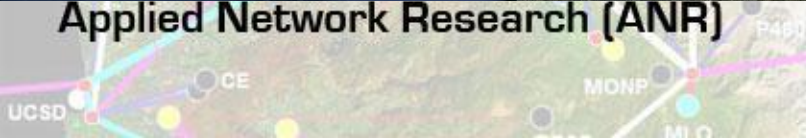
Data SIO, NOAA, U.S. Navy, NGA, GEBCO  
© 2012 Cnes/SpotImage  
Data LDEO-Columbia, NSF, NOAA  
Image © 2012 TerraMetrics  
lat: 33.021437° lon: -116.726944° elev: 1722 ft

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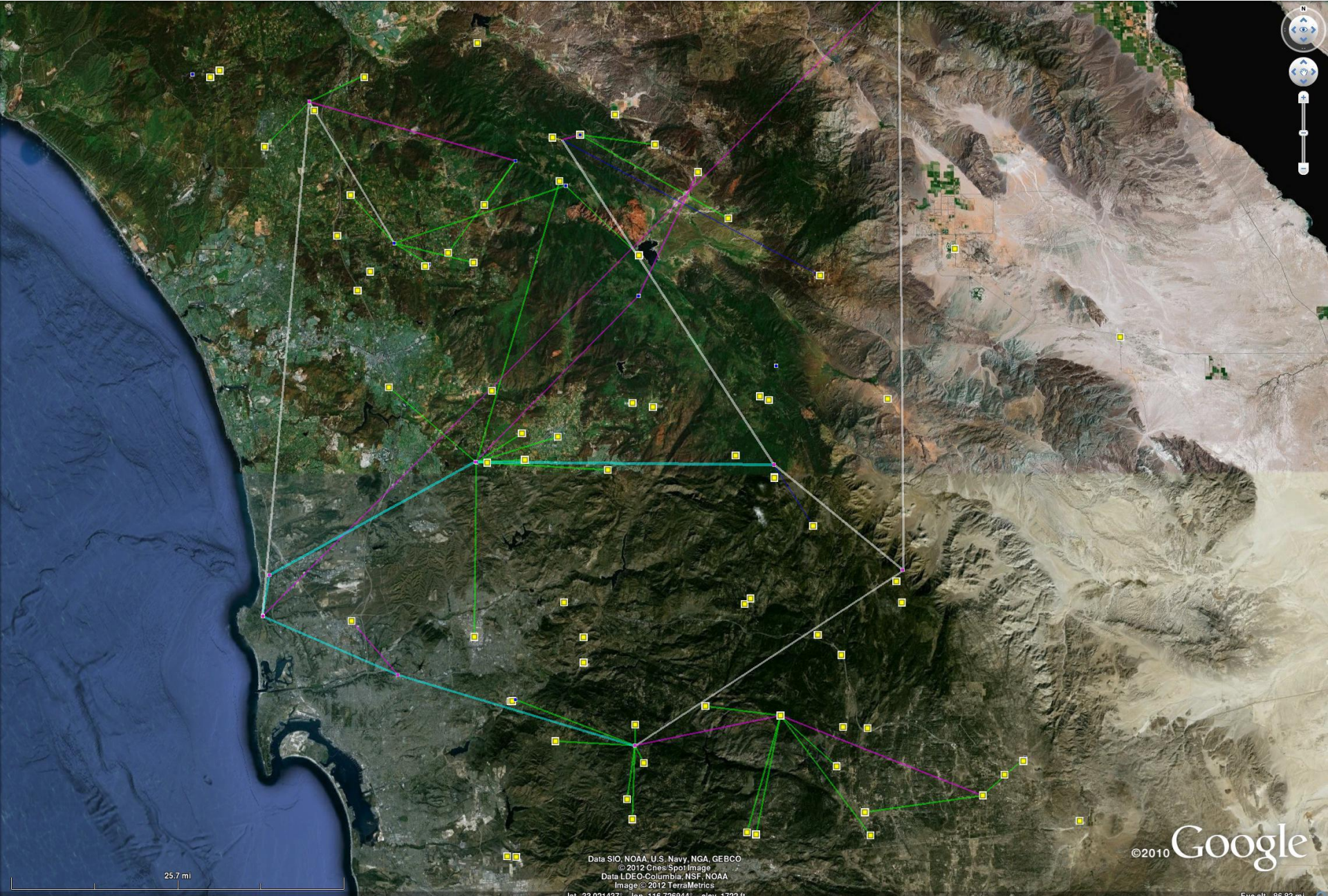
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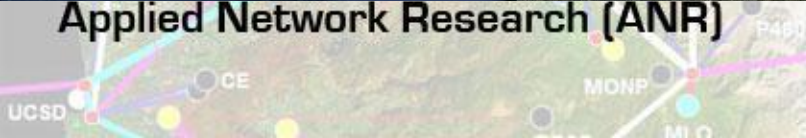
Data SIO, NOAA, U.S. Navy, NGA, GEBCO  
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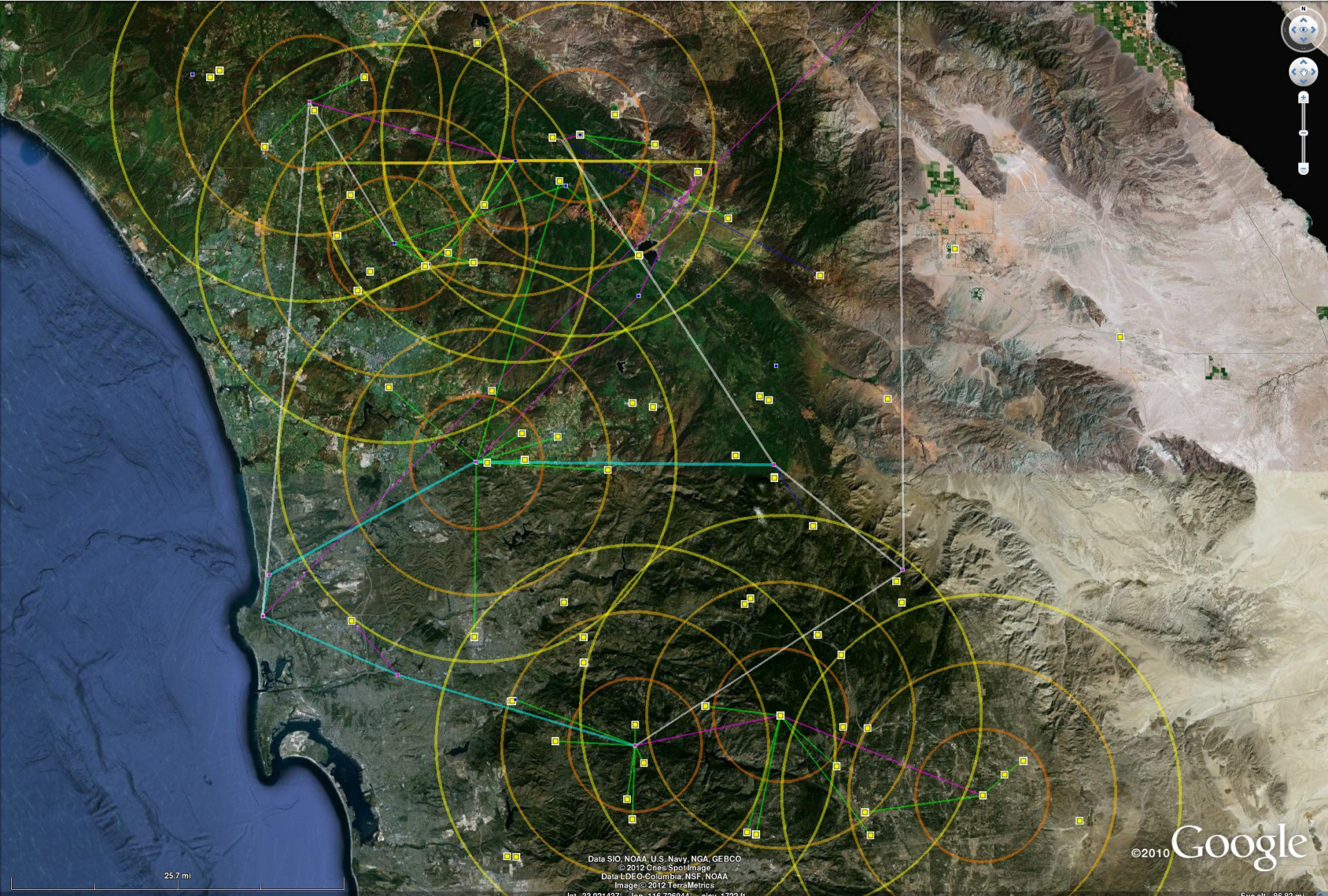


# As of early December 2012: 41 public safety sites

CF Campo #40  
CF Del Dios #77  
CF Dulzura #30  
CF Emergency Command Center  
CF Fallbrook Helitack base  
CF Gillespie Field Helitac base  
CF La Cima CC  
CF Lyons Valley #32  
CF McCain CC  
CF Miller #15  
CF Monte Vista #20  
CF Mt Woodson #86  
CF Potrero #31  
CF Puerta La Cruz CC  
CF Rainbow CC  
CF Ramona Air Attack Base  
CF Red Mountain #10  
CF Rincon #70  
CF Valley Center #71  
CF Warner Springs #52  
CF White Star #41

CFRM Dye Road #82  
CFRM Ramona #80  
CFRM Ramona Estates #81  
CFSDR Jamul #36  
CFSDR Lake Morena #42  
CFVC Lake Wohlford #73  
CFVC Lilac Road #72  
County PSC and EOC  
USFS Henshaw  
USFS High Point Lookout  
USFS Japatul  
USFS Palomar  
USFS Los Pinos Lookout  
VFC Campo Volunteer #46  
VFC Ranchita #58  
VFC SDCFA Palomar Mountain #79  
VFC SDR Deerhorn Valley #37  
VFC SDR Dulzura #35  
VFC SDR Potrero #39  
VFC Sunshine Summit #59





25.7 mi

Data SIO, NOAA, U.S. Navy, NGA, GEBCO  
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UCSD

CE

MONP

MIO

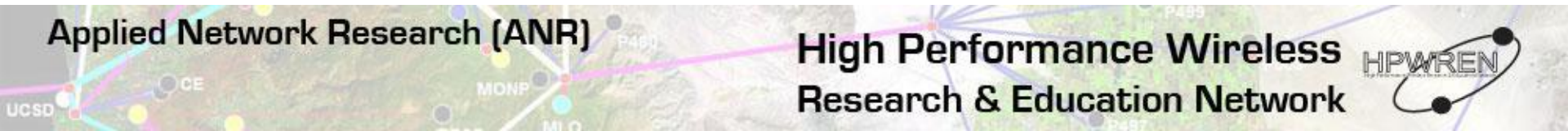
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Toro Peak [360 degree panorama](#)



Sky Oaks [360 degree panorama](#)



Red Mountain (near Fallbrook) [360 degree panorama](#)



Mesa Grande [360 degree panorama](#)



Volcan Mountain area [360 degree panorama](#)



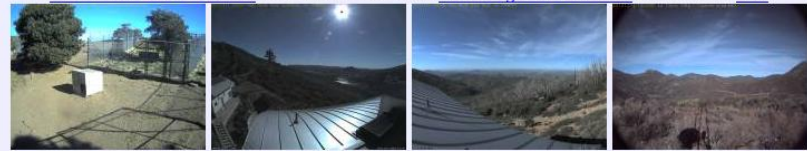
Mount Woodson [360 degree panorama](#)



Mount Woodson East -- Ramona CDF AAB SE --



California Wolf Center -- near North Peak 90+ degree cameras -- La Cima NW

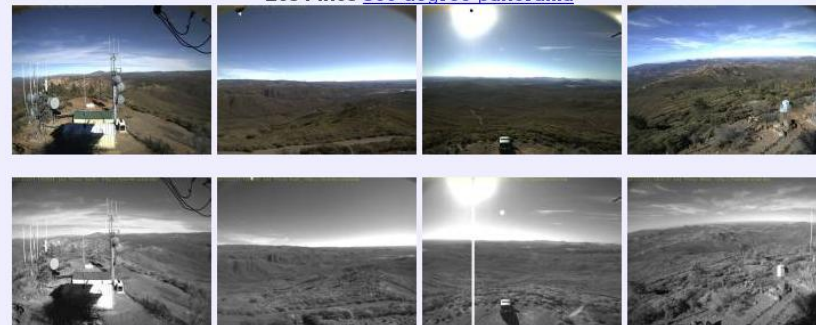




Mt. Laguna 360 degree panorama



Los Pinos 360 degree panorama



Lyons Peak 360 degree panorama



NPS Cabrillo National Monument 90+ degree cameras -- tidepools -- Visitor Center skyline -- Santa Monica Mountains Castro Peak



Santa Margarita river: #1, #2, #3+4 -- SMER highlands SW, NW, and NE



SDSC E -- Calit2 E -- La Jolla coast NW



Palomar Observatory 200"



Spanish Landing -- USFWS Sweetwater Marsh SW





# HPWREN traffic distribution example

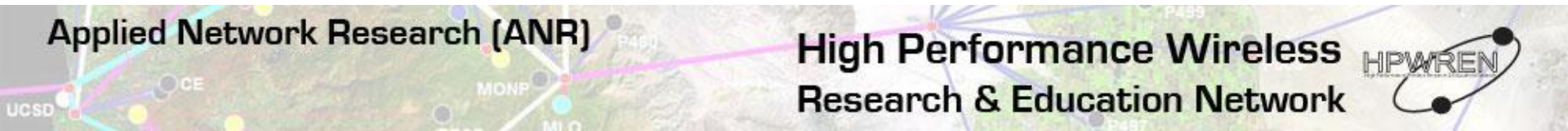
HPWREN user accounting for 20121209 (year=2012, month=12, day=09)

for traffic entering/exiting HPWREN  
Total explicitly assigned host addresses: 2000  
Accounting-categorized host addresses: 967  
Accounting-categorized DHCP addresses: 721

Total traffic with HPWREN addresses = 404.039860 gigabytes  
Total traffic from HPWREN addresses = 304.812028 gigabytes  
Total traffic to HPWREN addresses = 131.709231 gigabytes

Sorted by 'from+to' until 99.9% of traffic total  
(avgMbps based on a 24 hour period)

Megabytes	%	cum%	avgMbps	Designation
362135.441926	89.63	89.63	33.531	Caltech Palomar Observatory
13838.453451	3.43	93.05	1.281	UCSD/SIO Frank Vernon
11546.329840	2.86	95.91	1.069	Cal Fire
6635.351581	1.64	97.55	0.614	NEES@UCSB Jamison Steidl
4065.422734	1.01	98.56	0.376	UCSD/SIO Yehuda Bock
1306.036790	0.32	98.88	0.121	UCSD/SIO Kris Walker
654.195547	0.16	99.04	0.061	UCSD/SIO Clint Coon
569.201161	0.14	99.19	0.053	UNAVCO
503.917976	0.12	99.31	0.047	SDSU FSP Sky Oaks Field Station
437.982860	0.11	99.42	0.041	California Wolf Center
391.613214	0.10	99.52	0.036	UCSD/SIO Frank Wyatt
346.637051	0.09	99.60	0.032	SDSU Mount Laguna Observatory
342.232083	0.08	99.69	0.032	UCSD/SIO Mark Zumberge
277.566212	0.07	99.76	0.026	UCSD/SIO Dan Cayan
222.314015	0.06	99.81	0.021	UCSD/SIO David Chavez
132.281715	0.03	99.84	0.012	172.23.52.233
114.905194	0.03	99.87	0.011	172.23.52.214
112.055504	0.03	99.90	0.010	172.16.192.15



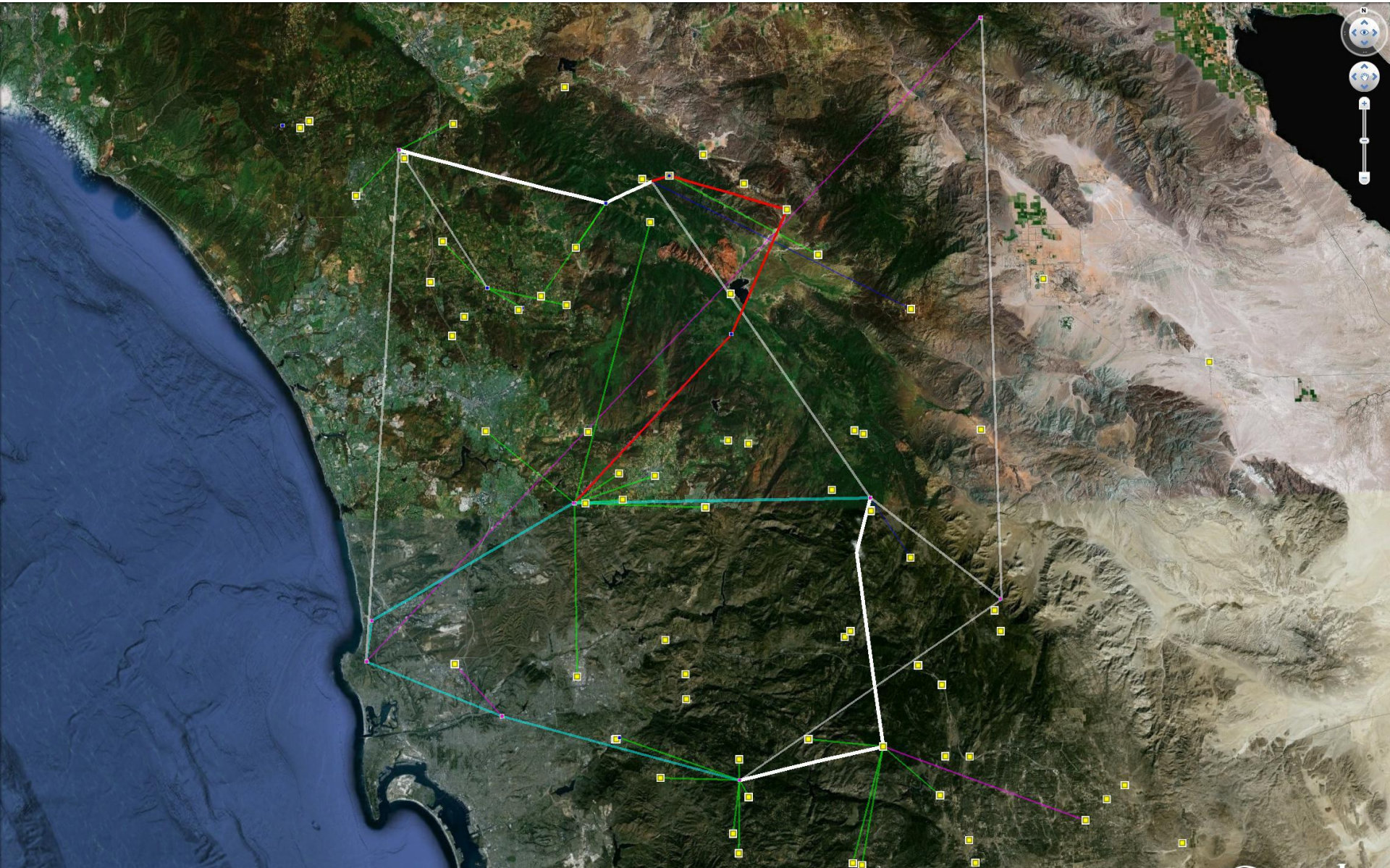
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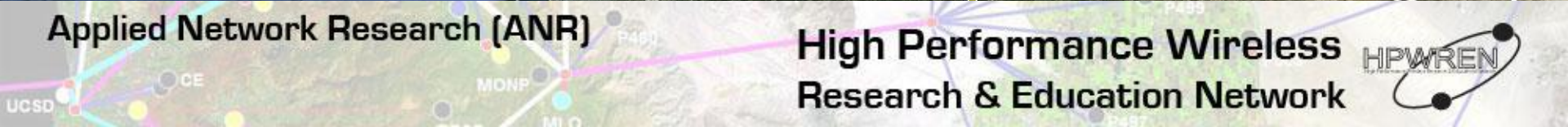


# Potential for robustness improvements



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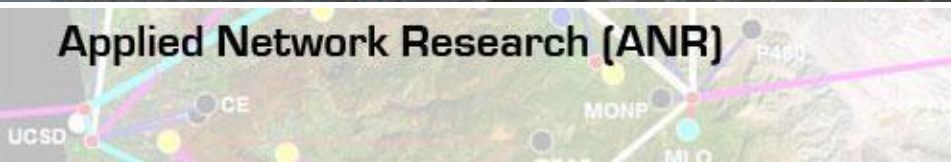
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# Concerns

- **Long-term continuity**
  - **Predictability of HPWREN participation**
  - **Predictability of HPWREN availability**
  - **Funding levels**
- **Low staffing levels**
  - **Two part-time staff allocations**
  - **Some users (e.g., Pablo Bryant (SDSU)) greatly contribute in-kind**
  - **Could benefit from more people with system-level knowledge**
- **Potential for major failure**
  - **Licensed link radio(s) or antenna(s)**
- **User expectations**
  - **Original budget assumed backbone-only support**
  - **Responsibilities for access link**
  - **Use equipment**
- **Frivolous/entertainment traffic**
  - **Traffic**
  - **Agency towers**
  - **Public safety pool radio spectrum**