High Performance Wireless Research and Education Network

http://hpwren.ucsd.edu/

National Science Foundation awards 0087344, 0426879 and 0944131

HPWREN

UCSD

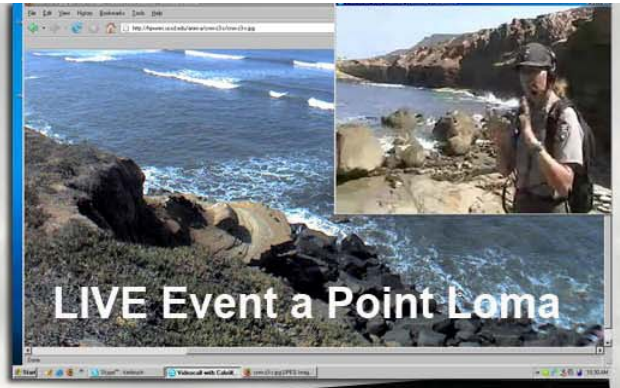
SDSC
SAN DIEGO SUPERCOMPUTER CENTER

it²

SAN DIEGO STATE UNIVERSITY

NATIONAL SCIENCE FOUNDATION

Michael

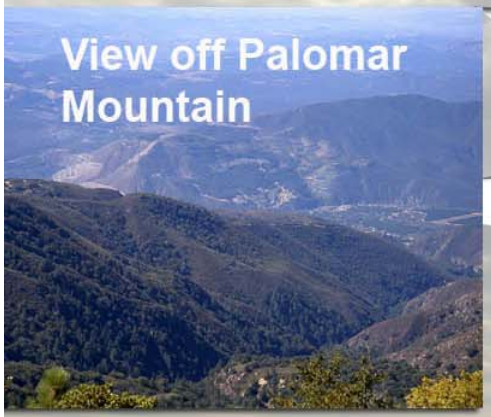

LIVE Event a Point Loma

NPS Workshop

TDVnet site

LIVE at the Science Center

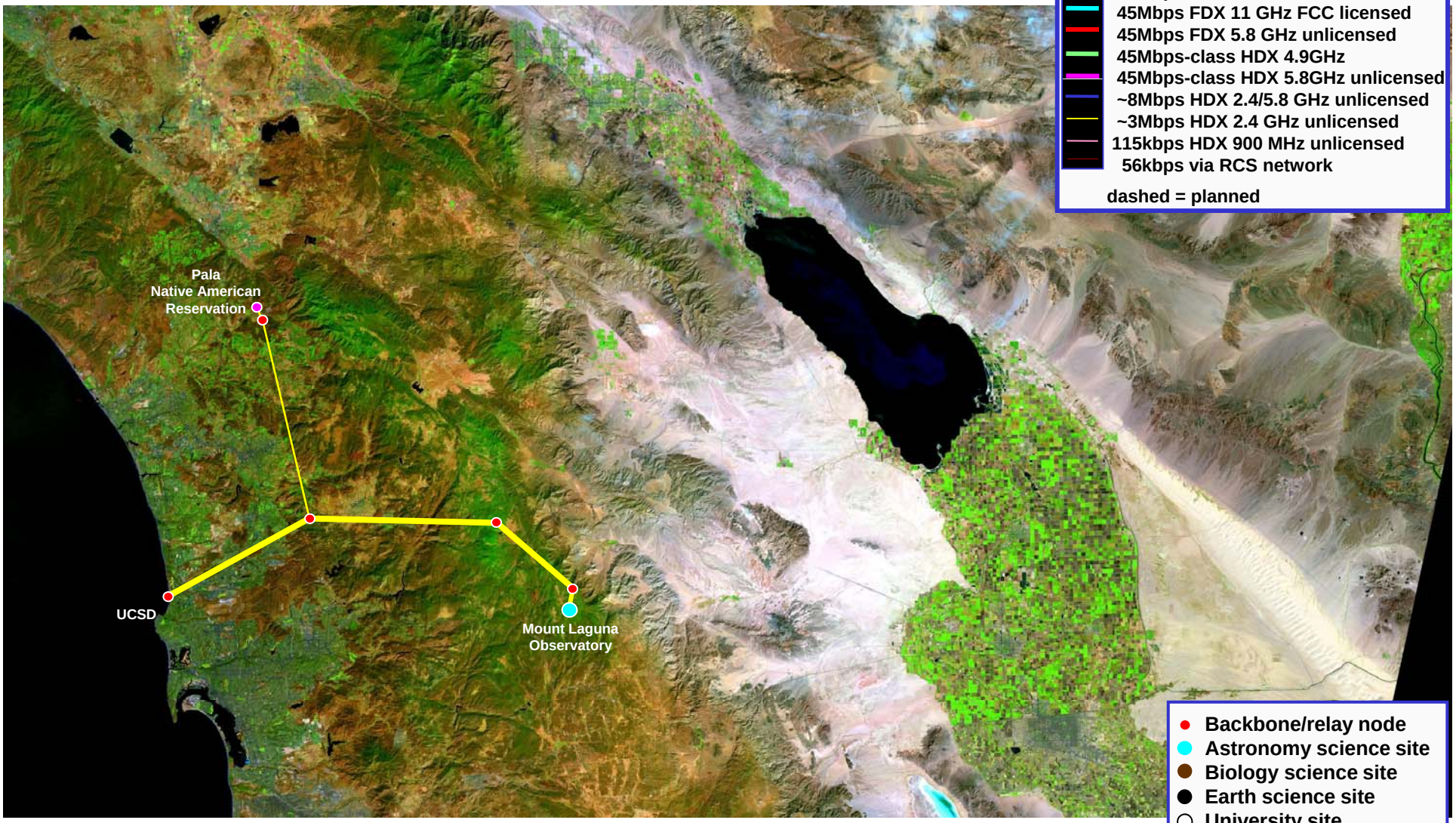
Pala Learning Center


View off Palomar Mountain

Outreach

LIVE at Pala

HPWREN topology, December 2000



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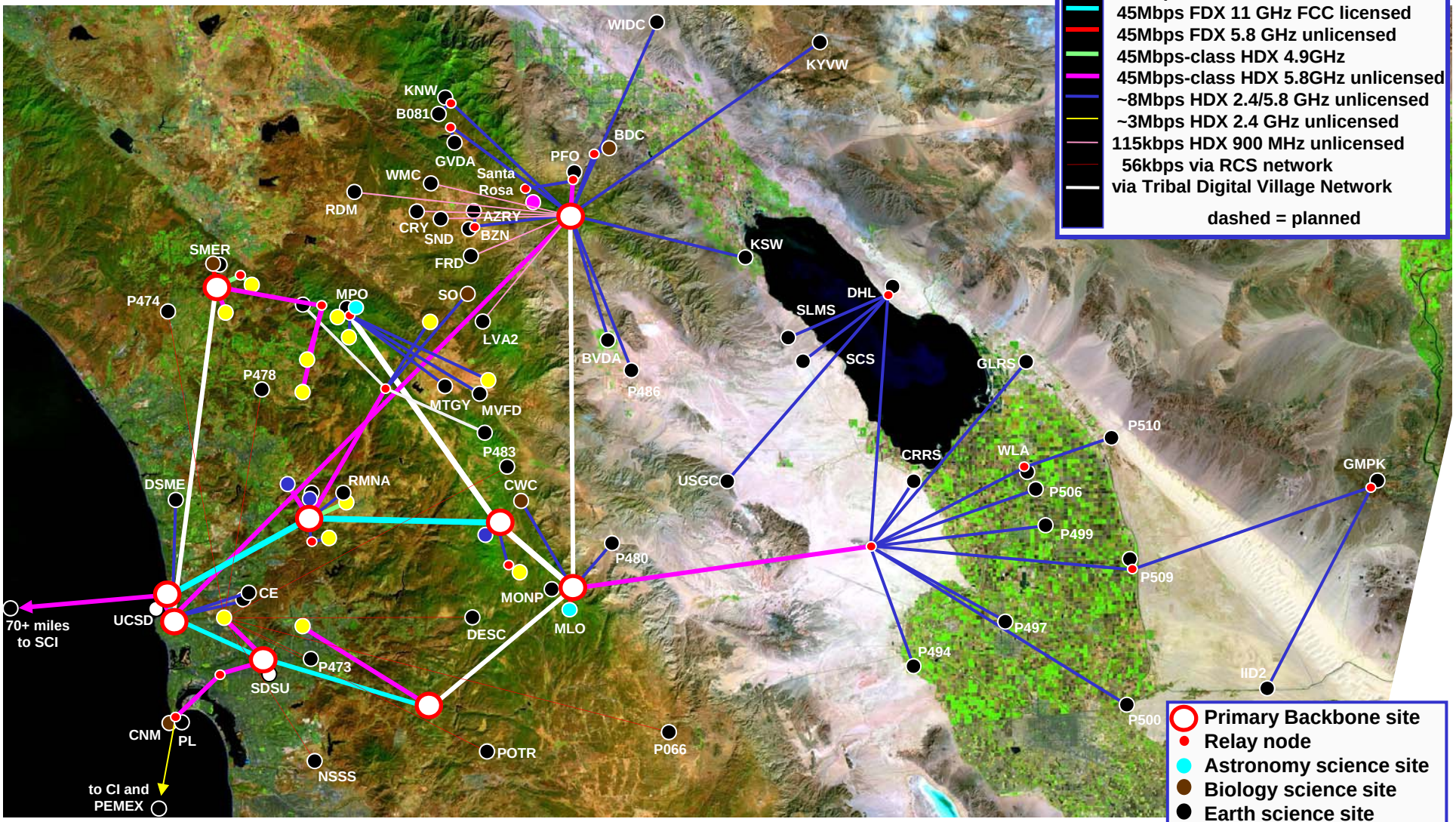
HPWREN topology -- August 2011



approximately 50 miles:

Note: locations are approximate

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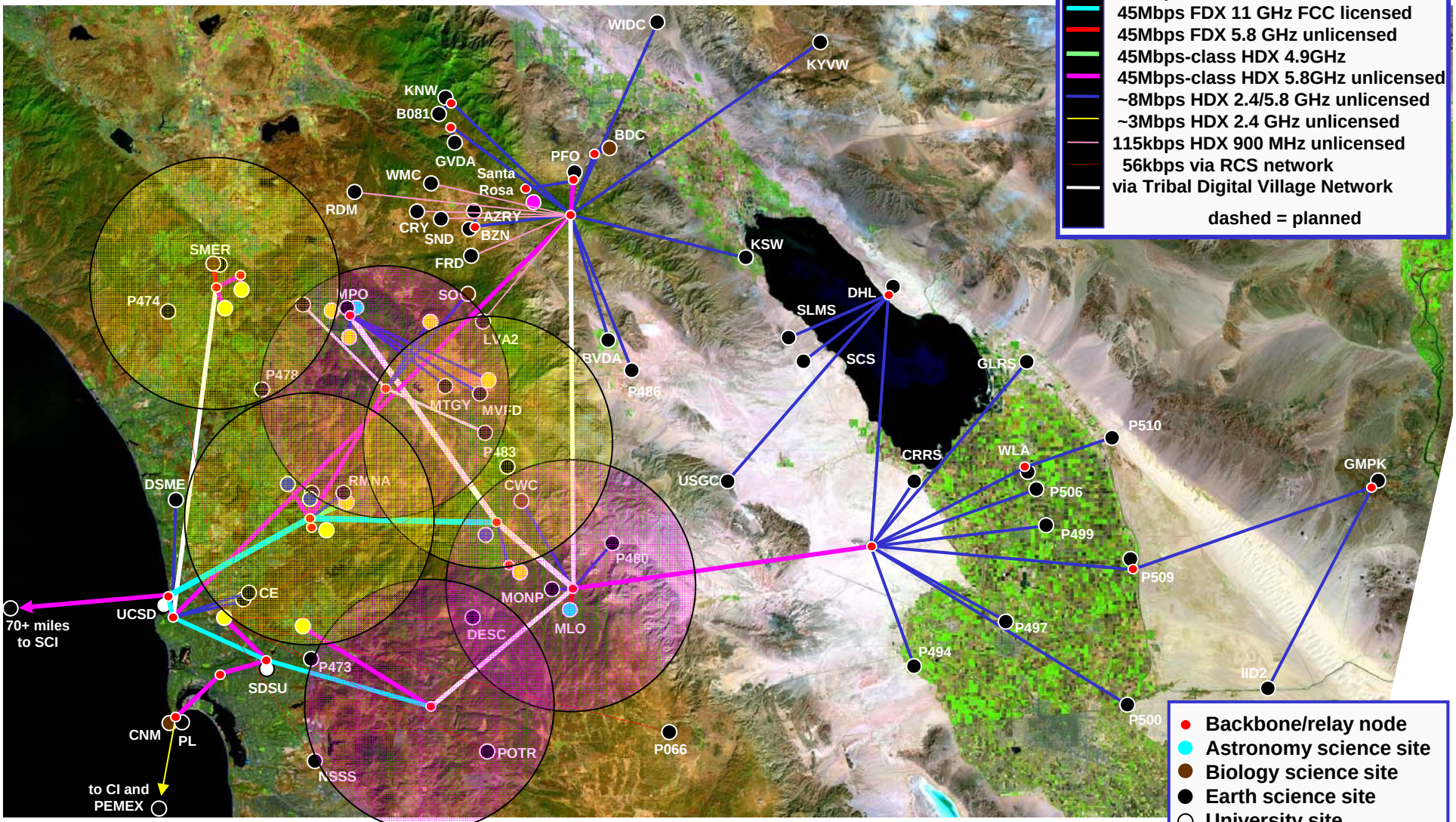
HPWREN topology, 360 degree cameras



Red circles: HPWREN supplied cameras

Yellow circles: SD County supplied cameras

approximately 50 miles:

Note: locations are approximate

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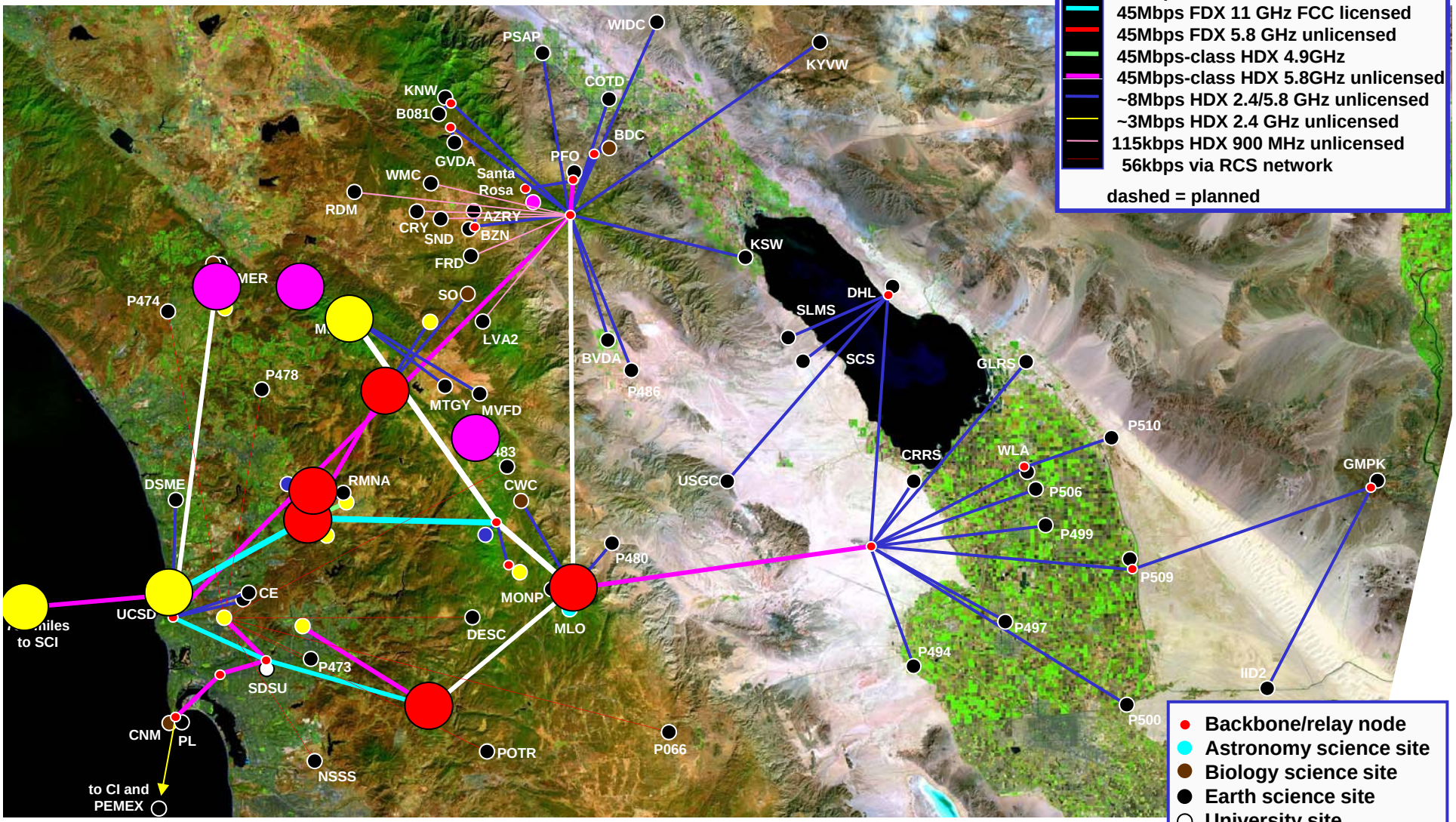
HPWREN topology, real-time met sensors



Red circles: 1/sec wind data

Purple circles: 1/second wind data (SD County supplied sensor)

Yellow circles: 1/minute wind data

approximately 50 miles:

Note: locations are approximate

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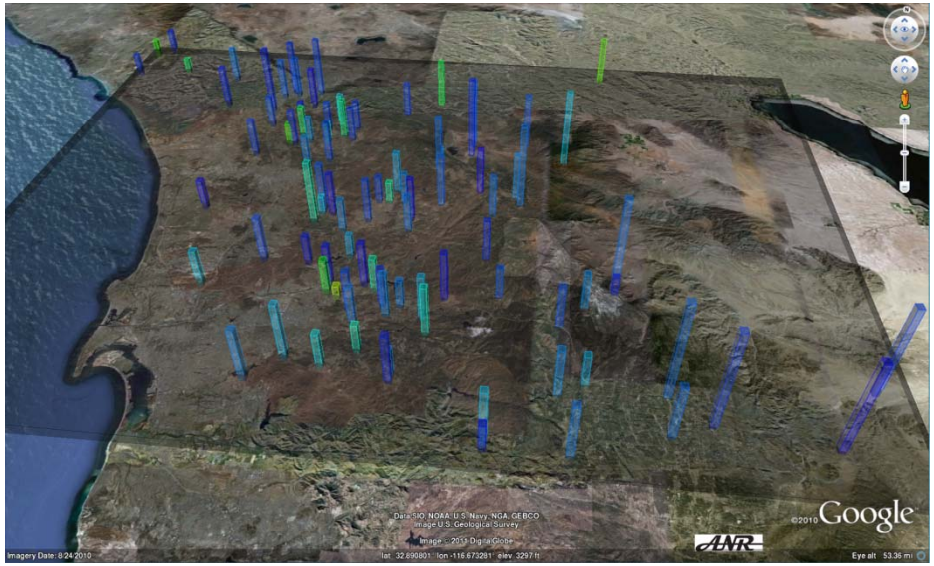
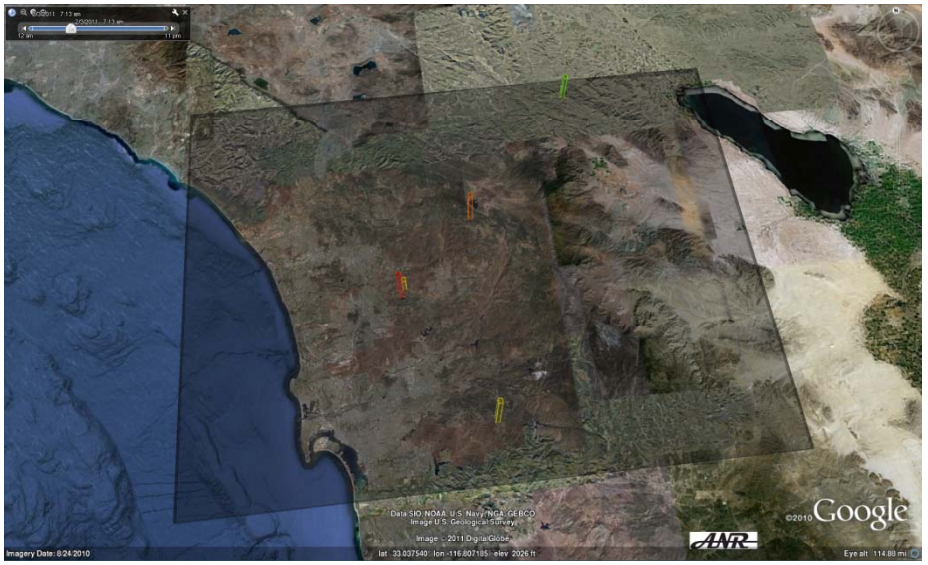
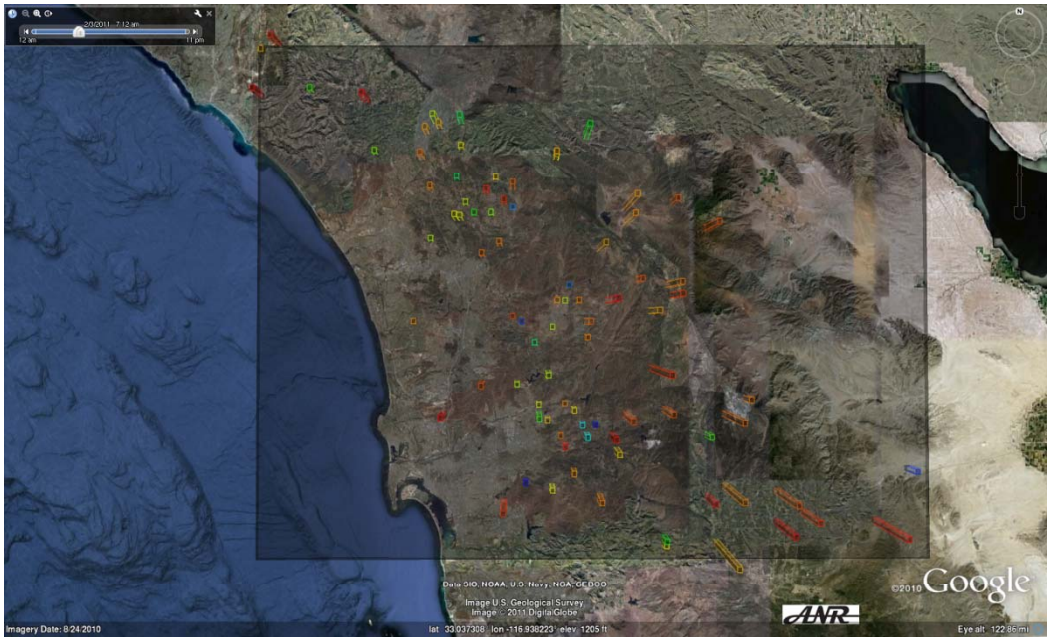
SDG&E and HPWREN met sensor data visualization, Santa Ana focus







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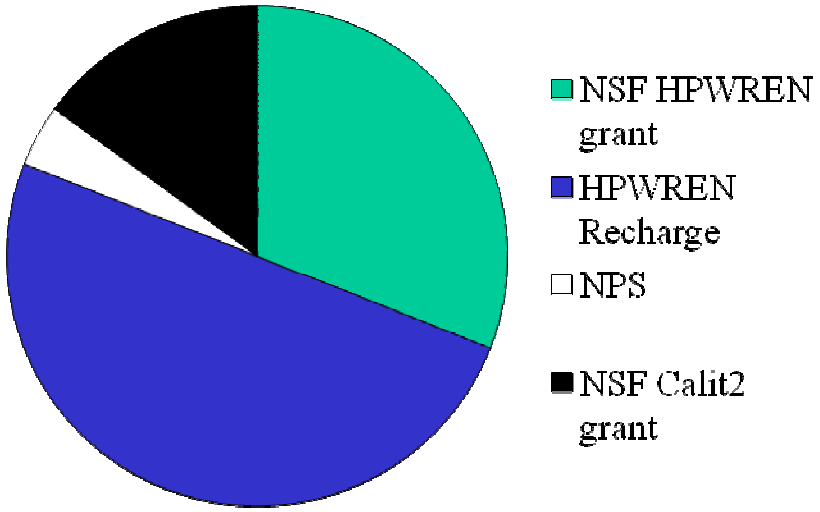
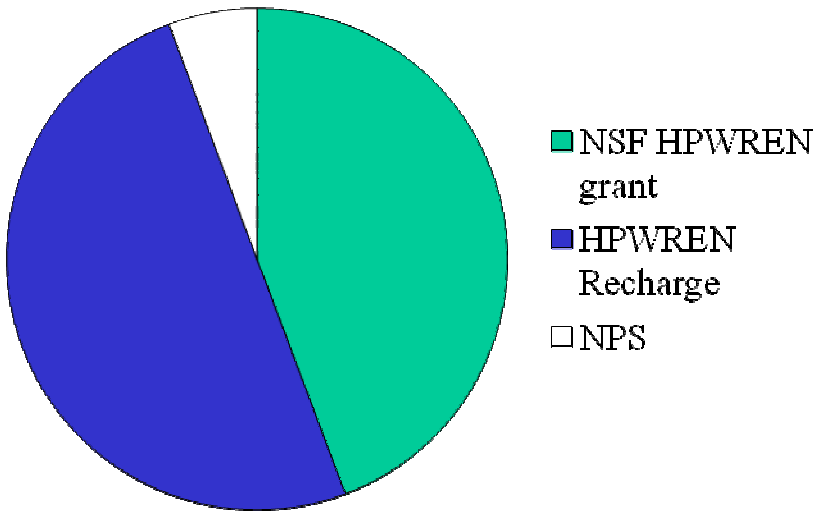
ANR salaried staff

Hans-Werner Braun

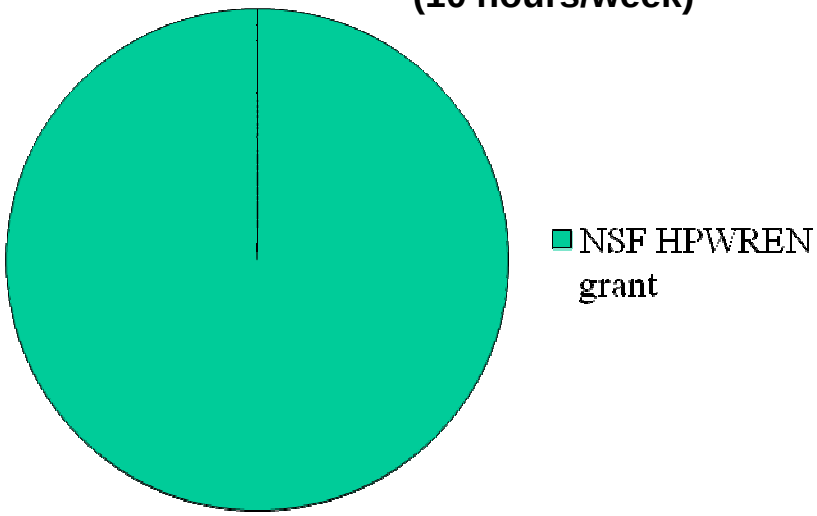


Jim Hale



Kimberly Mann Bruch

(10 hours/week)



Recharge contributors and QoS buffer allocations

Recharge per Tier group (based on 20110912 spreadsheet):
(not including UCSD fees)

Tier-1	**51784**	**81%**
Tier-2	**10529**	**16%**
Tier-3	**1748**	**3%**
	64061	

Recharge based on actual users (based on 20110912 spreadsheet):
(includes UCSD fees if applicable)

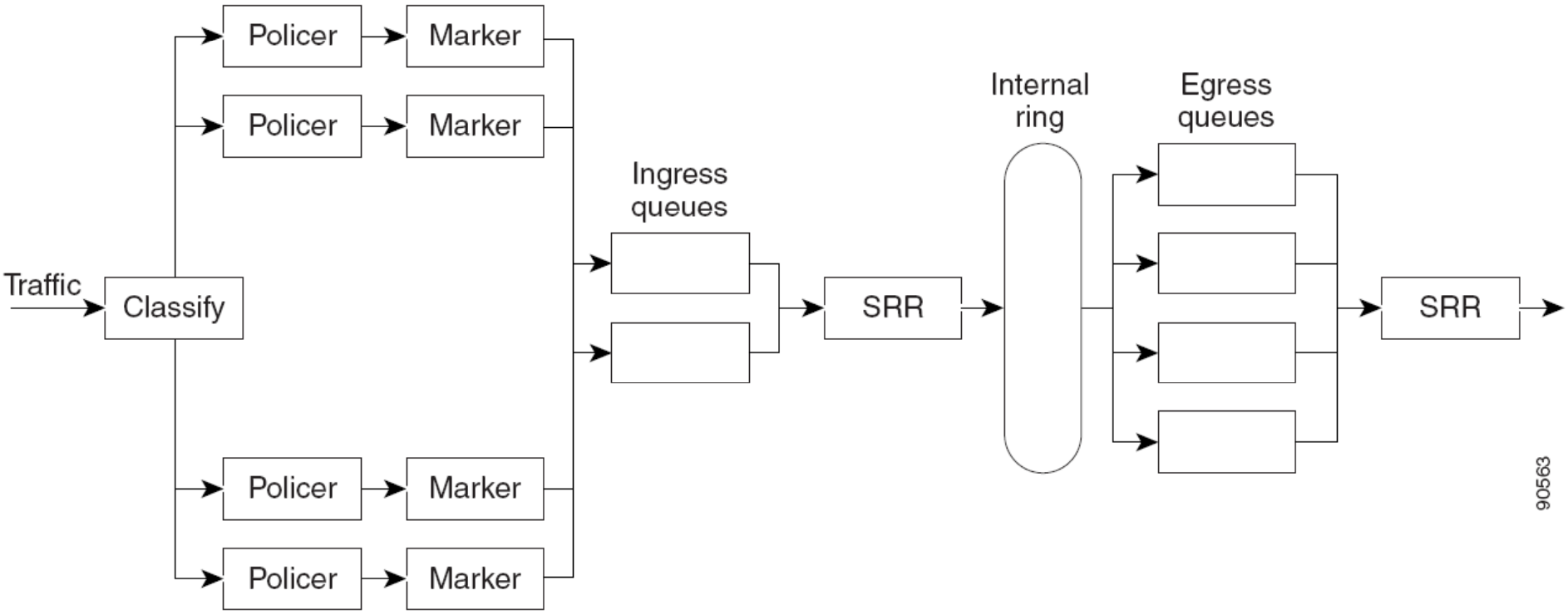
Tier-1	**201958**	**69%**
Tier-2	**78702**	**27%**
Tier-3	**12908**	**4%**
	293567	

QoS buffer allocations:

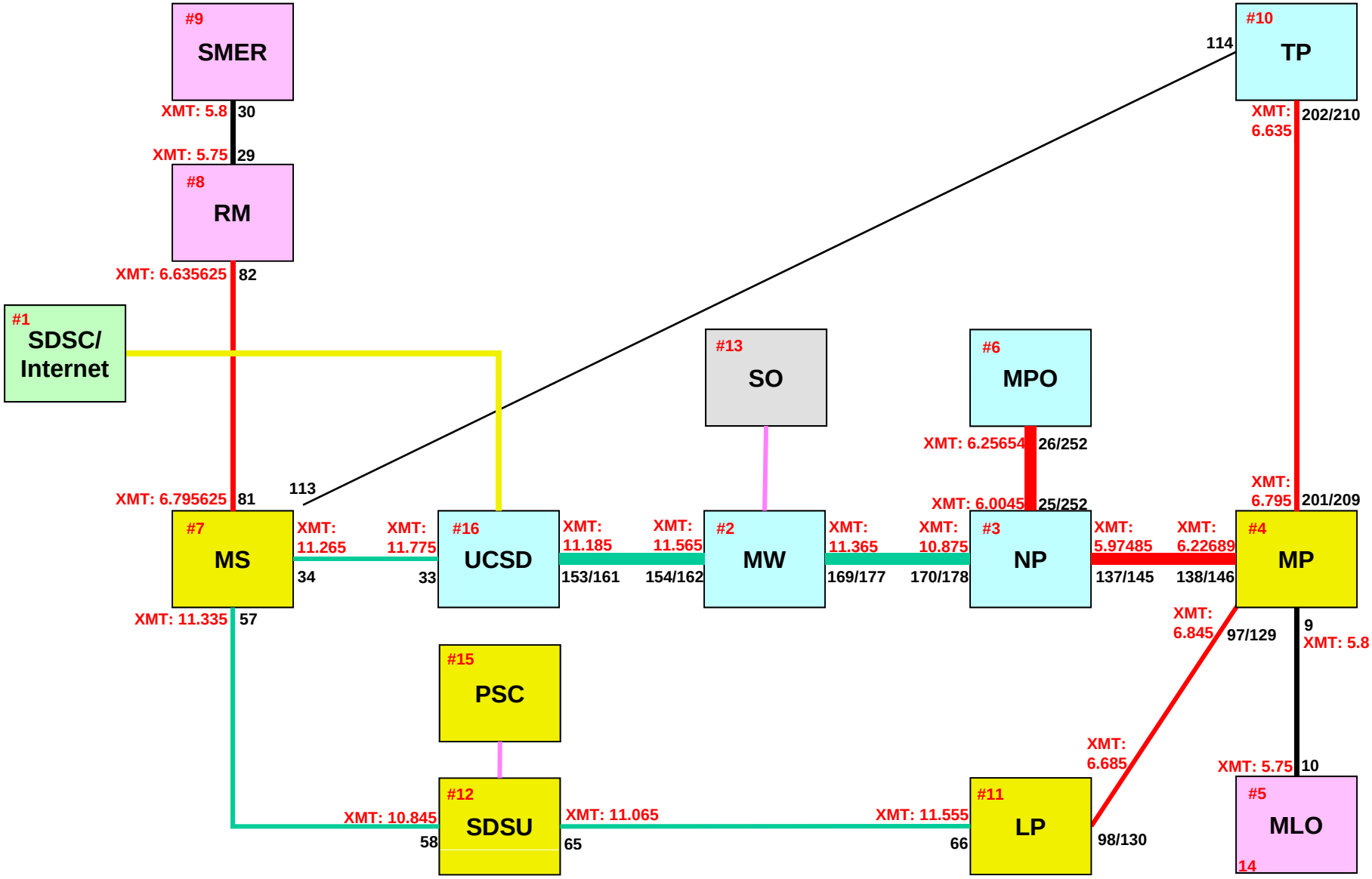
Tier-1E	**10%**
Tier-1B	**65%**
Tier-2	**20%**
Tier-3	**5%**

(Note: based on testing, a 3560 router needs 65% of the queues to achieve 100Mbps)

Router traffic queues (graphic from Cisco router QoS manual)



HPWREN backbone connectivity



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QoS buffer performance tests

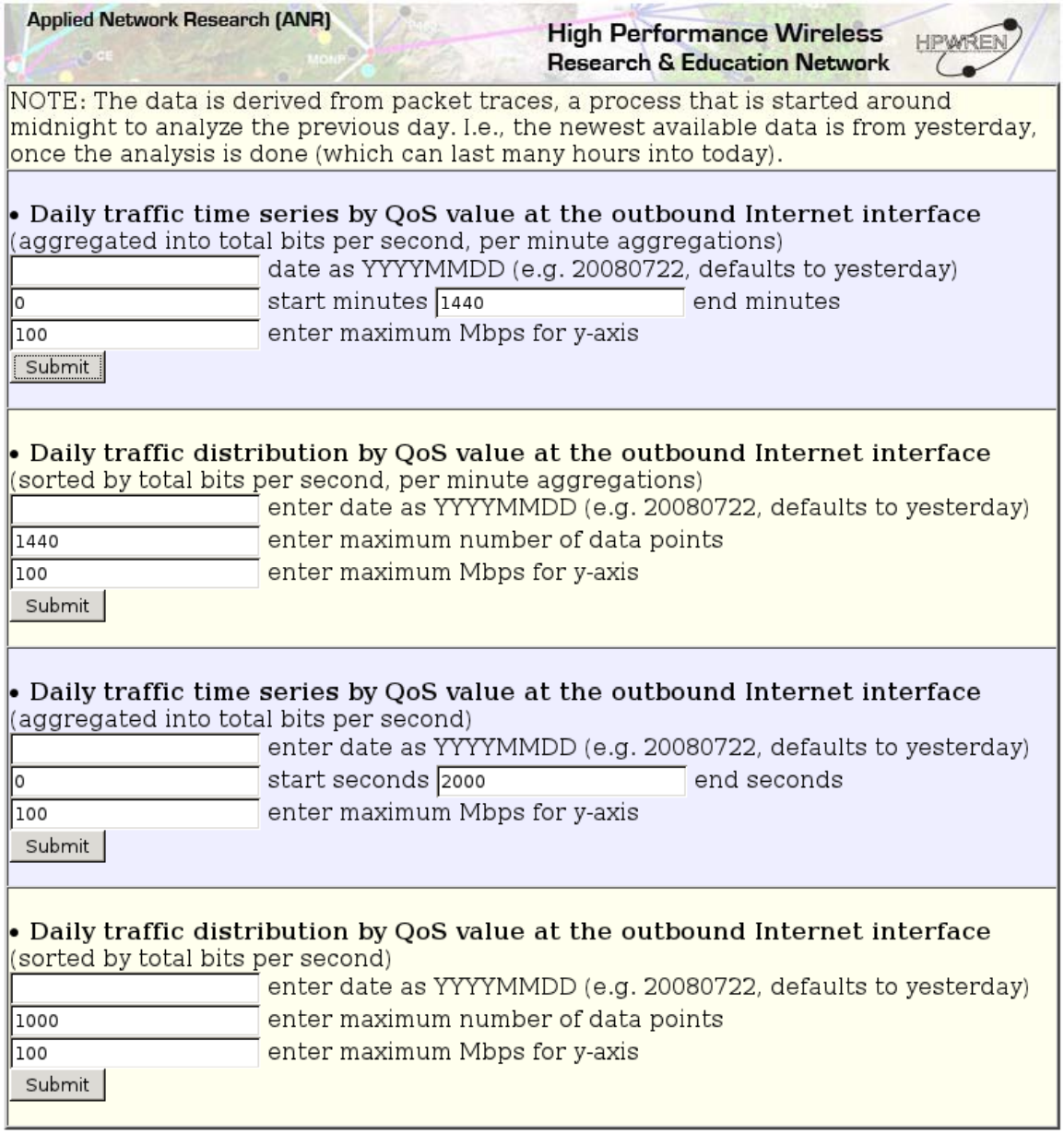
3560 testing with 95Mbps iperf UDP loads injected from a 1Gbps interface onto a 100Mbps substrate:

Tier	Alloc	Single	All	Partial	Partial	Partial	Partial
3	5	25	4.7	-	5.9	21	5.2
2	20	40	19	20	-	37	21
1B	65	96	63	66	78	-	70
1E	10	25	9.4	9.9	12	26	-

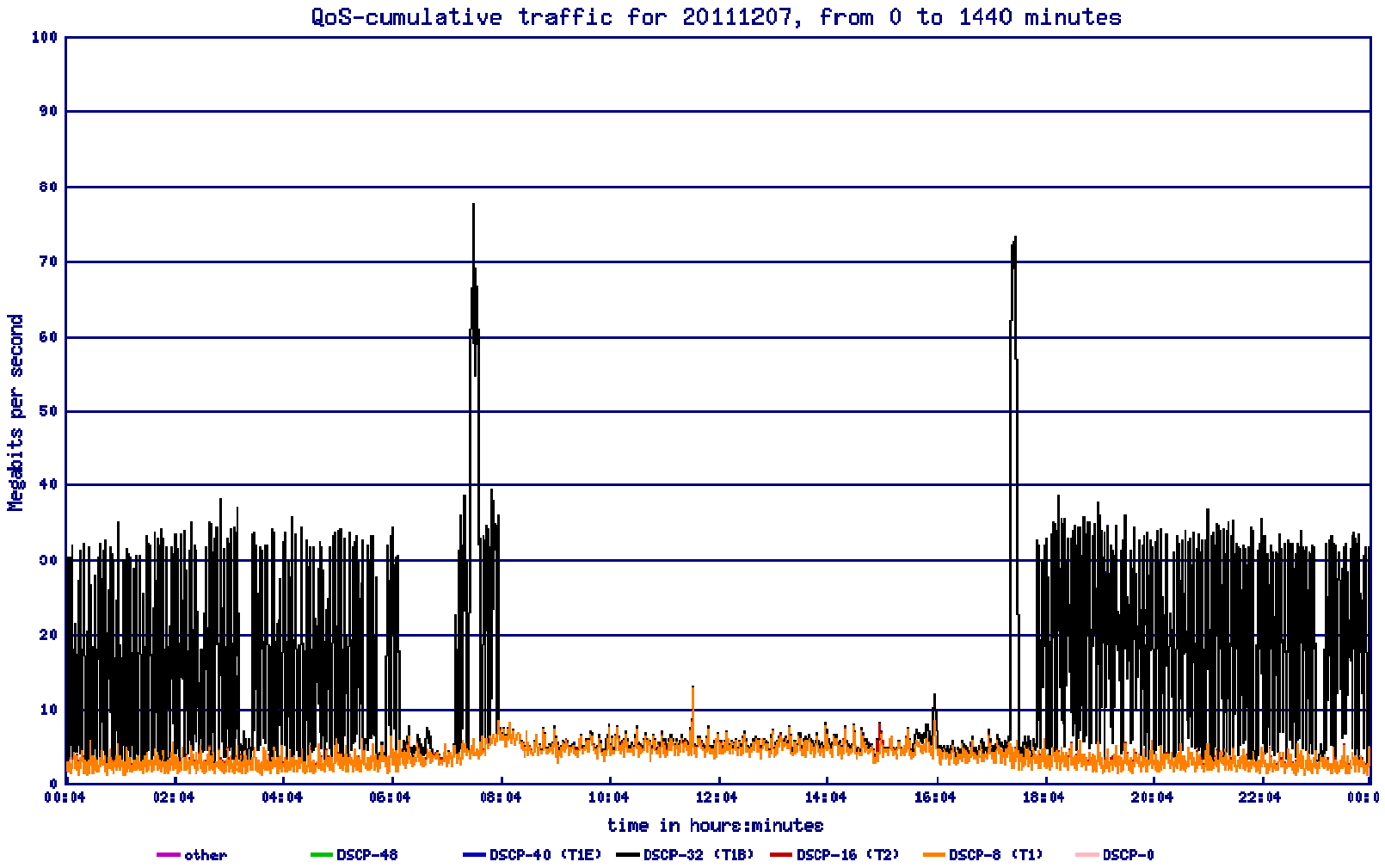
3550 testing with 20Mbps iperf UDP loads injected from a 100Mbps interface onto a 10Mbps substrate:

Tier	Alloc	Single	All	Partial	Partial	Partial	Partial
3	5	9.6	0.47	-	1.2	1.4	0.5
2	20	9.6	1.9	2	-	5.5	2.1
1B	65	9.6	6.3	6.6	7.8	-	6.9
1E	10	9.6	0.94	1	1.2	2.7	-

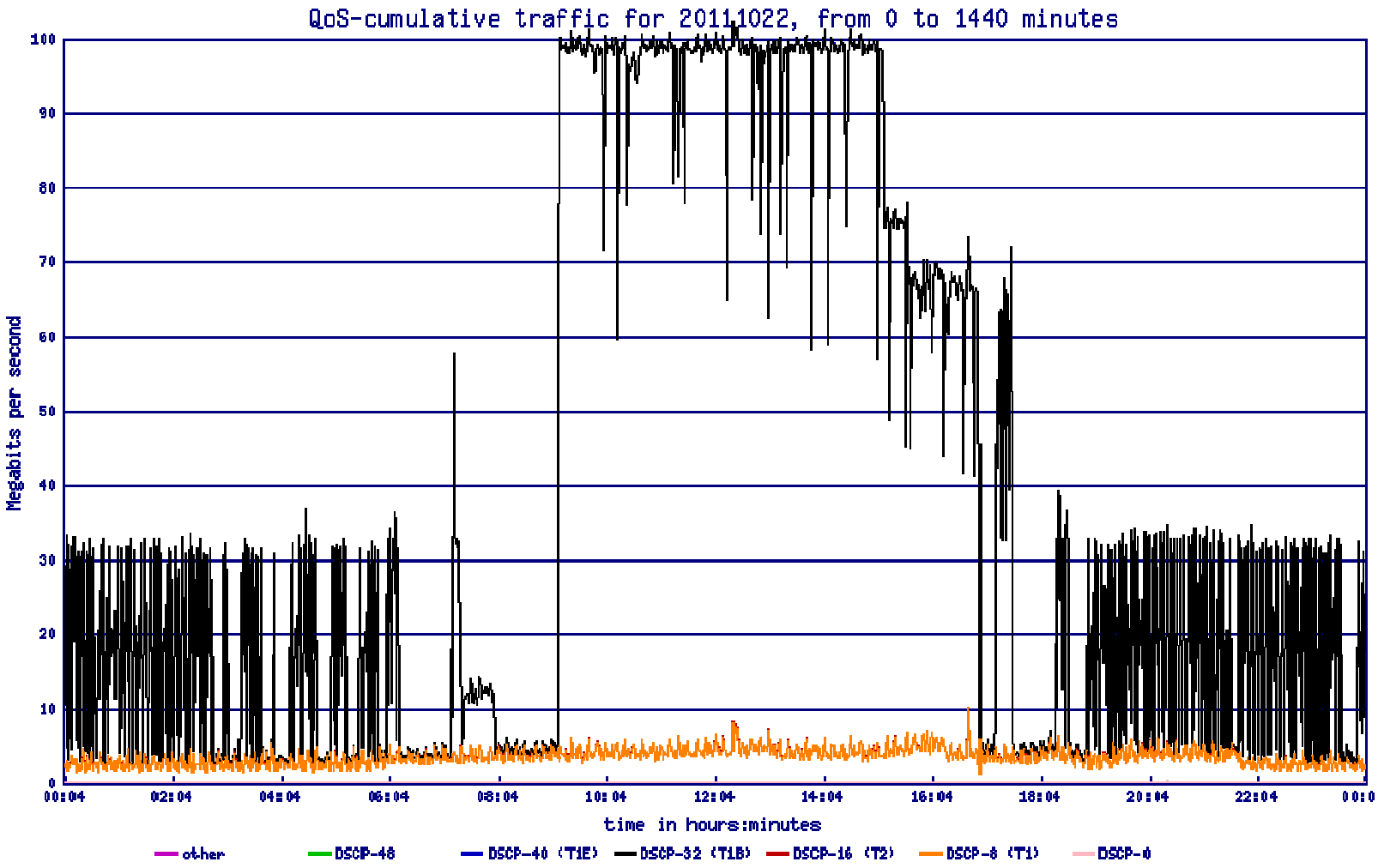
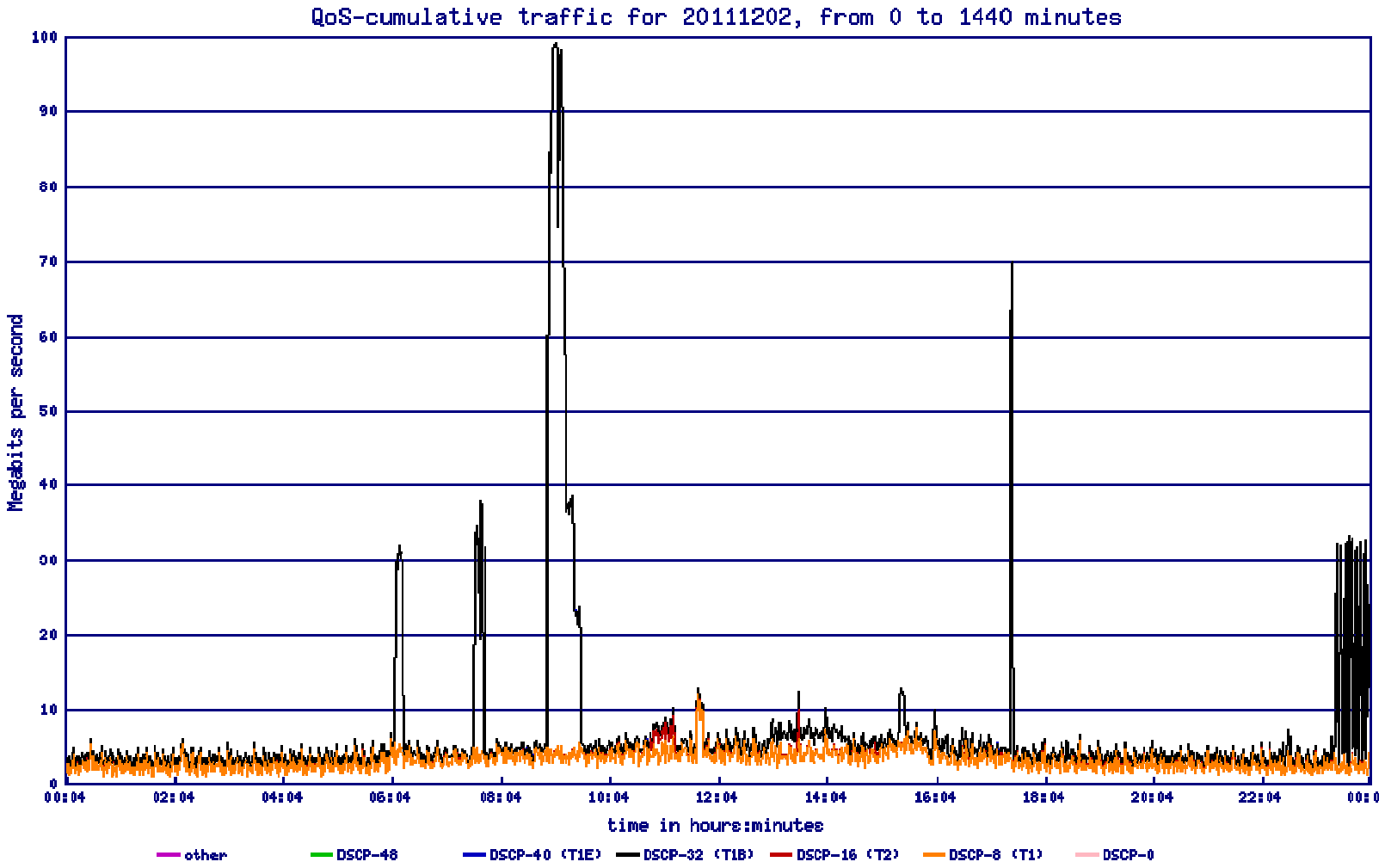
QoS data interface: http://hpwren.ucsd.edu/pstats/QoS/Packets



Example: December 7, 2011



Example: busy day (Palomar Observatory 377GB/86%)



Example: low volume day (during/after rain at the Palomar Observatory 29GB/31%)