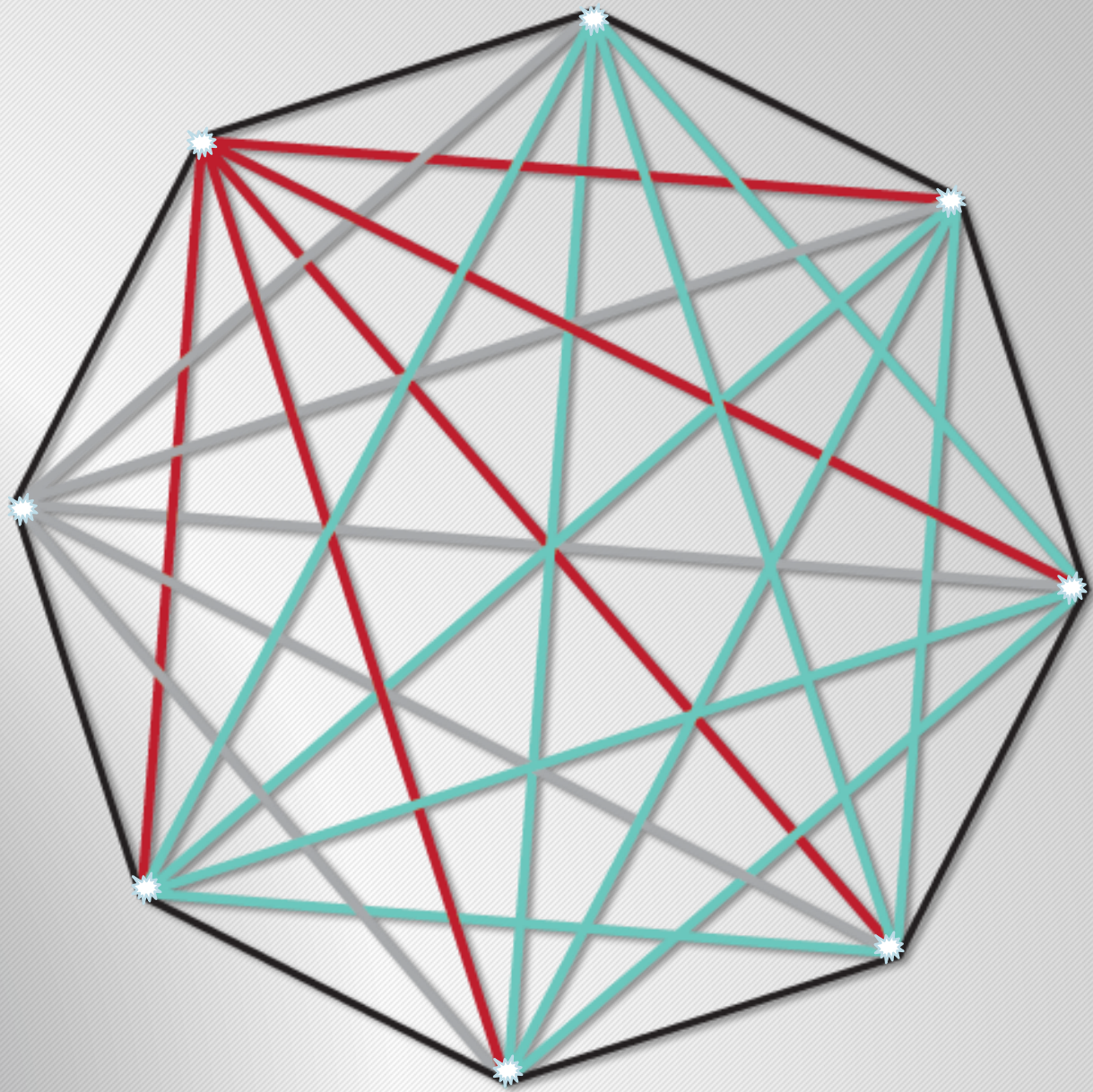

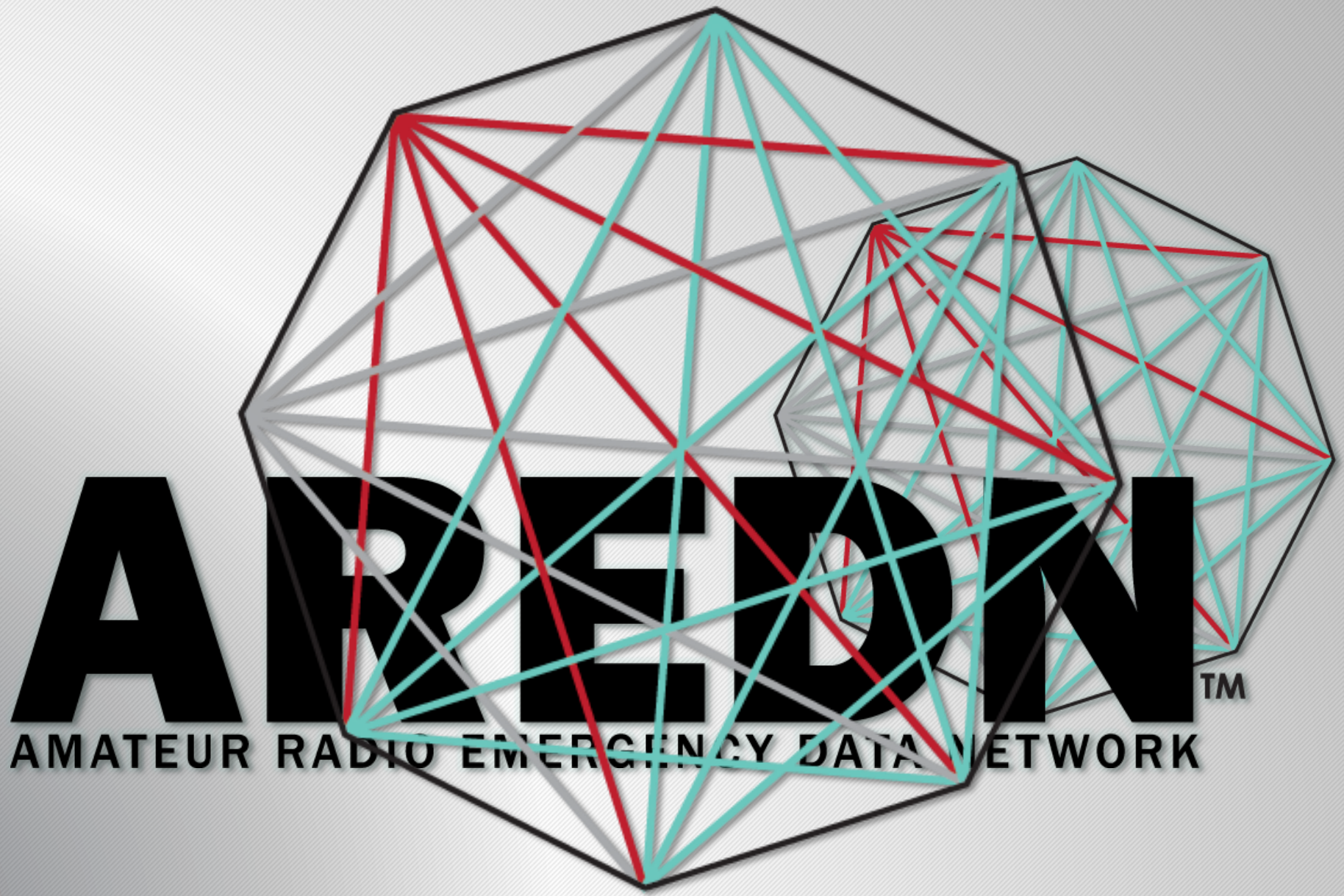
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Ham Radio For a New Generation

Andre, Hansen, K6AH

Hamvention 2019
Greene County Fairgrounds, Xenia, OH
May 17 - 19, 2019

AT THE CENTER OF EMERGENCY PREPAREDNESS

- Appealing to younger hams
- IBM's Call For Code
- New Development
  - New Features
  - Updated Documentation
  - Support for More Devices/Manufacturers
- User Applications
- Network Growth

Presentation Overview

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Appealing to Younger Hams

A white-haired, retiree, with 50 years of ham radio experience is about to tell you this can appeal to younger hams.

…the irony is not lost on me.

Appealing to Younger Hams

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Linux Opensource Developers Conference

SCALE 17x

… a new interest area for OpenSource Developers

Joe Ayers

Presentation: AREDN: The technology and considerations to build adhoc wireless networks

Developer
AREDN Inc.

Professionally Joe has worked in Product Development for over 30 years starting out at Texas Instruments in the 1980s and now works for Schnieder Electric in the Industrial Automation R&D group creating control systems to automate Industrial facilities including Oil Refineries, Nuclear, and Coal Power Plants.

Joe began his Open Source contributions bringing mesh wireless networking to to the Amateur Radio community. In 2013, he established the first wireless hub site in Orange...

Orv Beach

Presentation: The Ham Radio Internet - a Progress Report

System Administrator
Abbott Labs

Orv Beach is a long-time Linux user, and has been a ham radio operator for even longer (license callsign W6BI). He's an ARRL Technical Specialst, and the Training Chair for the Southern California Linux expo. He's deeply involved in the build-out of the local ham radio "Internet" using off-the-shelf wireless equipment.

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What we didn’t foresee

Ham Classes and VE Exam Sessions

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New Contributors

- Andrew, KK4ZUZ
- Peter, KK6RUH
- Patrick, KE0RSX

} New Device Support

- Steve, KC0EUW – Documentation
- Eric, KC6WXC – Various
- Ray, KK6RAY
- Ryan, KI4VMI

} New User Interface

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IBM's Call For Code 2019

IBM's Call For Code 2019

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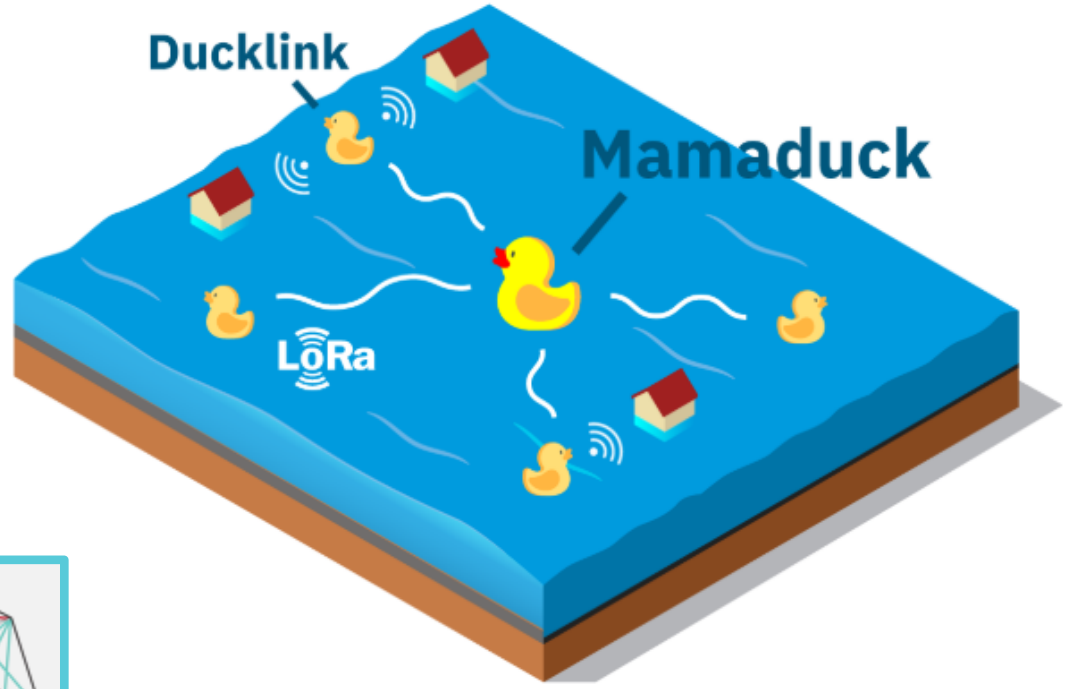
How to build an internet when it's gone



Long Distance connections brought to you by:

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IBM's Call For Code

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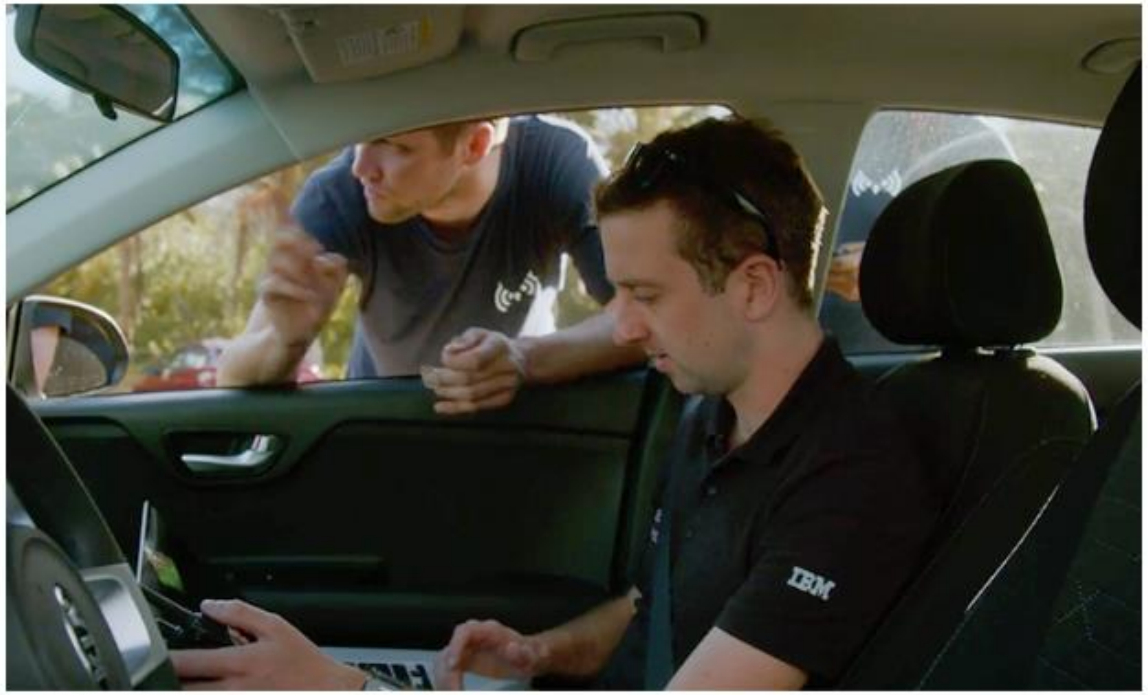
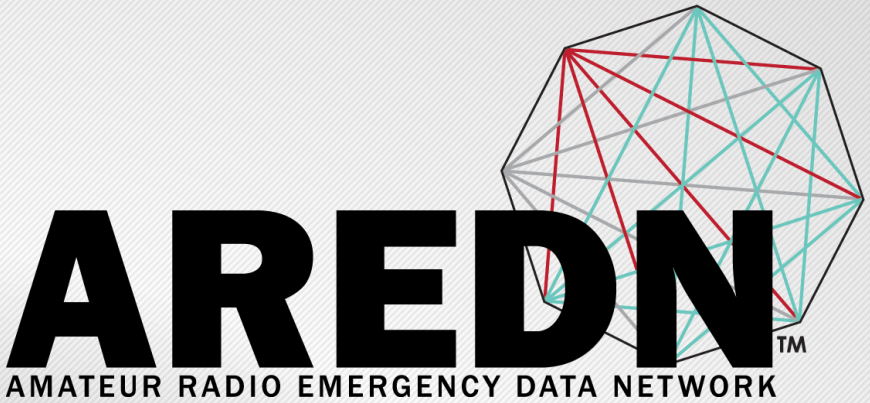
2018 Call for Code winner pilots mesh network in Puerto Rico

Following a natural disaster, first responders need an effective solution to prioritize relief efforts when connectivity is lost. Project Owl, the Call for Code 2018 winner, addresses this with a network of quickly deployed hotspots that can gather vital information from people in need.

See this feature on Project Owl's Puerto Rico deployment pilot →





Updated Documentation

Documentation

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Docs » AREDN Overview

Edit on GitHub

AREDN Overview

The AREDN™ acronyr
for *Amateur Radio* ope
service-oriented comr

For many years amate
transmissions for eme
involved conveying th
ICS-213 form. The me
or type it on another
delivered to the recipi
then be handled throu

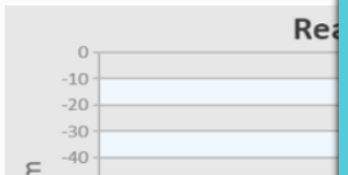
This tried-and-true so
emergency and event
of traditional methods
electronic form, with
Pactor, Fldigi, and oth

In today's high-tech s
accustomed to differe
communication needs
short messaging and

Most of the latest AREDN™ devices use dual polarity antennas and MIMO features in the radios that exploit multipath propagation. However, if you are using single polarity antennas with "single chain" radios, another way to achieve signal separation for collocated devices is to orient the site's antennas so that one is vertically polarized and the other is horizontally polarized. This can result in a signal separation of up to 20 dB. Vertical polarization is usually preferred because it tends to be less susceptible to reflections and
signal with clear line of sight. Note
the same way.

Aligning Link Nodes

The AREDN™ web interface provid
being installed to form a link. On th
Signal to Noise graph. Slowly turn a
you see the best signal, as shown b
focus on the antenna position with
Sound feature and align the antenn
Signal to Noise Ratio of 15 dB is ad



Using WinLink to Send Email

Although it is not typically used as a TCP/IP netw
familiar with WinLink 2000 for sending message
amateur radio frequencies. It is possible to config
P2P for sending email with attachments across a
Windows computer with plenty of memory to ru
information link below for details about the spec
maximum attachment size is currently 5MB per m
HF and Packet RMS stations. For additional infor
on Winlink located here: Winlink Forum

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Recent Development

Recent Development

- 3.19.3.0 Released on March 23rd.
- Continue to add new devices. Check out the Supported Platform Matrix.
- Expect to add support for new “AC” devices. Benefit of AC is not yet understood in AREDN environments.
- In the Nightly Build: Max Link Distance parameter can now be calculated by the node. The result is dynamic and optimized. Seeing as much as 40% increase in link throughput.

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New Device Support

Ubiquiti

Wide variety of devices for all topologies

MikroTik

Wide variety of devices for all topologies

TP-Link

Ubiquiti look-alikes

GL-iNet

MikroTik – Device Focus

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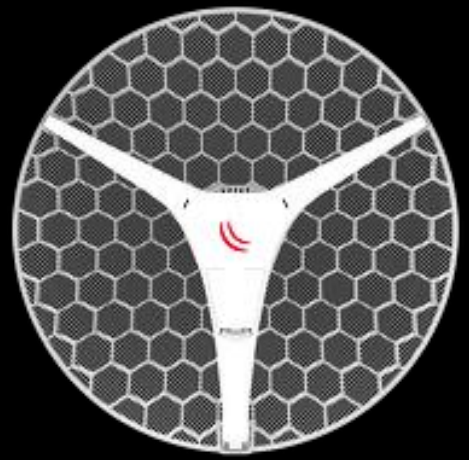
LDF



LHG & LHG-XL

Economical Antennas

hAP AC Lite

Spec Comparisons for Long 5 GHz links

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Manuf	Model	Antenna	Power	Ant Gain	IERP
MikroTik	BaseBox5	Rocket Dish	30	30	60
Ubiquiti	Rocket M5	Rocket Dish	27	30	57
MikroTik	LHG-5nD XL	Dish Included	25	27	52
Ubiquiti	Rocket M5	120° Sector	27	19	46
MikroTik	LDF-5nD	Satellite Dish	25	20	45

GL-iNet – Device Focus

AR150 Mini

AR150 USB Microuter

AR150 USB Use Case

A triage is setup in a public park. You've pre-loaded a dozen or more AR150 USB's.

Sign them out to those needing access to the network via their own/company laptops.

Each laptop becomes an AREDN mesh node.

Network coverage expands with every laptop added.

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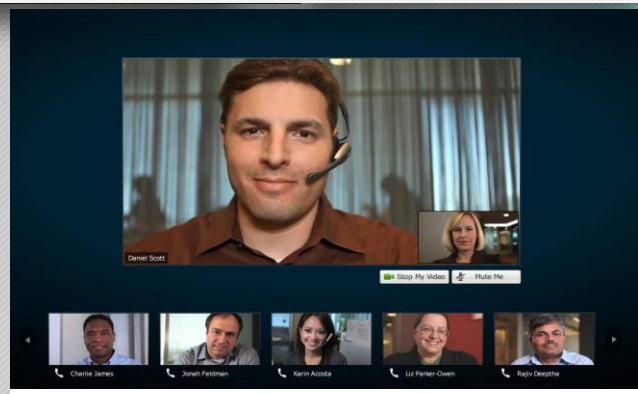
Applications for AREDN

How will you use AREDN ?

- Public Service / Public Safety
- Red Cross Disaster Services Technology
- Community Emergency Response Team
- Support MOUs with your municipal EOC
- Deliver paradigm changing services
  - VoIP & Chat with other sites
  - Cell Service Restoration – BYO
  - Access to cloud-based systems
  - Augment Winlink services



Administrative

Advanced config

iperf Speed Test

Network monitoring

NNTP Time services

Antenna pointing/peaking

User Applications

Air Traffic Control

EmComMap / Tickets

CERT Damage Assessment

MeshChat

Weather Stations

Remote cameras

VoIP telephony (226 assigned numbers)

Winlink

DMR linking

Web-based Email

Mattermost

FTP / fileshare

Website with network/node info

Applications Running on AREDN Networks

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PBX Configuration for VoIP Phones

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MeshChat

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CHAT FILES STATUS LOGOUT

Mesh Chat v1.0

Zone: MeshChat
Call Sign: K6AH
Node: kd7vea-rocketdish-to-westmountain
Updated: 86 seconds ago

Send a Message

New Message

Enter message here

Channel:

Everything

Mesh Chat Users 2

Call Sign	Node	Last Seen
K6AH	kd7vea-rocketdish-to-westmountain	2/14/19 9:33 AM
[illegible]	[illegible]	2/14/19

Messages

Search: Enter search

Channel: Everything

Time	Message	Call Sign	Channel	Node
2/13/19 6:02 PM	Testing...	W6BI		ai6bx-2-chatpi
2/13/19 6:01 PM	Just checking in	W6BI		ai6bx-2-chatpi

Node Management thru Smart Switches

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TOUGHSwitch PoE PRO

STATUS | DEVICE | PORTS | VLANS | ALERTS

Tools: ▼ Logout

Status

Device Name:	K6AH-Elsinore-ToughSwitch	Date:	2015-07-17 22:51:24
Device Location:		Uptime:	1 day 19:18:30
Firmware:	SW.v1.3.2	Device MAC:	80:2A:A8:DF:8F:23

Port Status

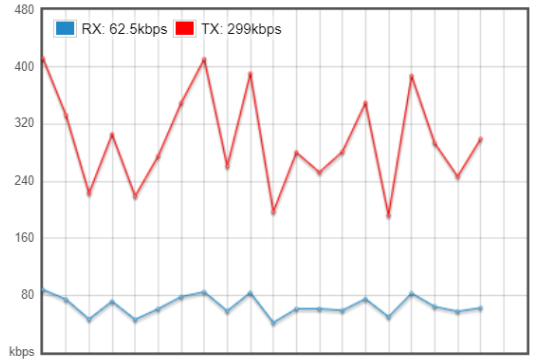
Port	Name	Port Status	Link Status	PoE	STP State	MTU	Alerts
1	5GHz Backbone to Redlands	Enabled	100Mbps-Full	24V	Forwarding	1518	Off
2	3GHz Downlink to N Riverside	Enabled	100Mbps-Full	24V	Forwarding	1518	Off
3	2GHz Downlink to S Riverside	Enabled	100Mbps-Full	24V	Forwarding	1518	Off
4	2GHz Downlink to N Riverside	Enabled	100Mbps-Full	24V	Forwarding	1518	Off
5	3Ghz Downlink S Riverside	Enabled	100Mbps-Full	24V	Forwarding	1518	Off
6	5GHz Backbone to Sleeping Indian	Enabled	100Mbps-Half	24V	Forwarding	1518	Off
7	Camera	Enabled	100Mbps-Full	Off	Forwarding	1518	Off
8	Management	Enabled	Down	Off	Blocking	1518	Off

Port Statistics

Port	Name	RX Data	RX Packets	RX Errors	TX Data	TX Packets	TX Errors
1	5GHz Backbone to Redlands	1375945217	1234806	0	230703932	979975	0
2	3GHz Downlink to N Riverside	32296798	140863	0	1100714639	1132231	0
3	2GHz Downlink to S Riverside	86482703	439282	0	1472374475	1447618	0
4	2GHz Downlink to N Riverside	39250492	142563	0	1095815961	1134112	0
5	3Ghz Downlink S Riverside	37242938	145915	0	1096856328	1137787	0
6	5GHz Backbone to Sleeping Indian	121095258	281768	0	1056993576	1290701	151
7	Camera	1099545	15940	0	5044910	78361	0
8	Management	0	0	0	0	0	0

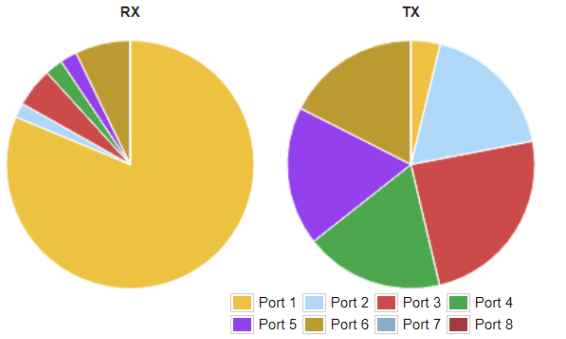
Reset Statistics

Total Throughput



Data Distribution

All | Last 20 sec



GENUINE PRODUCT

Network Management with SNMP

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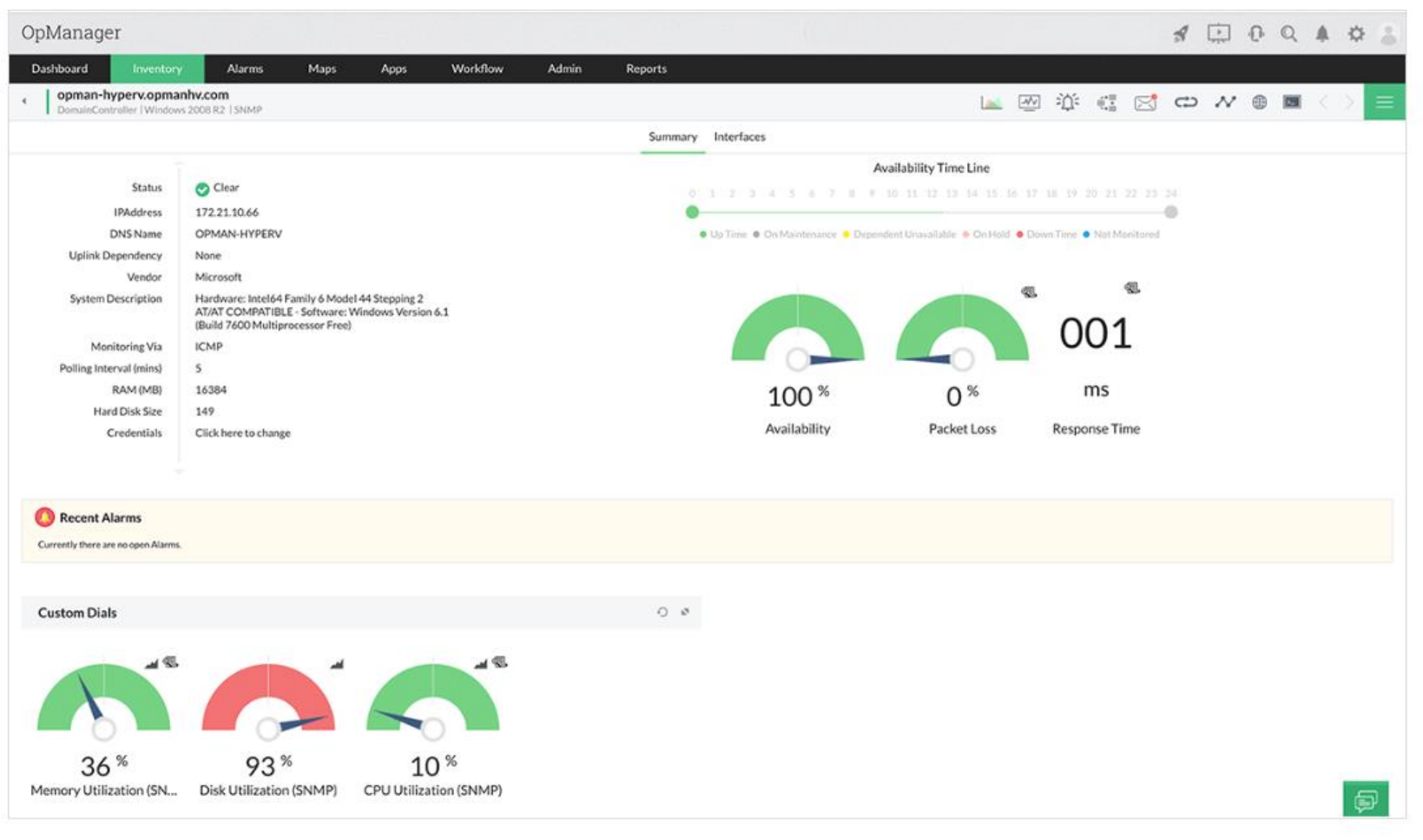

Team Collaboration Systems

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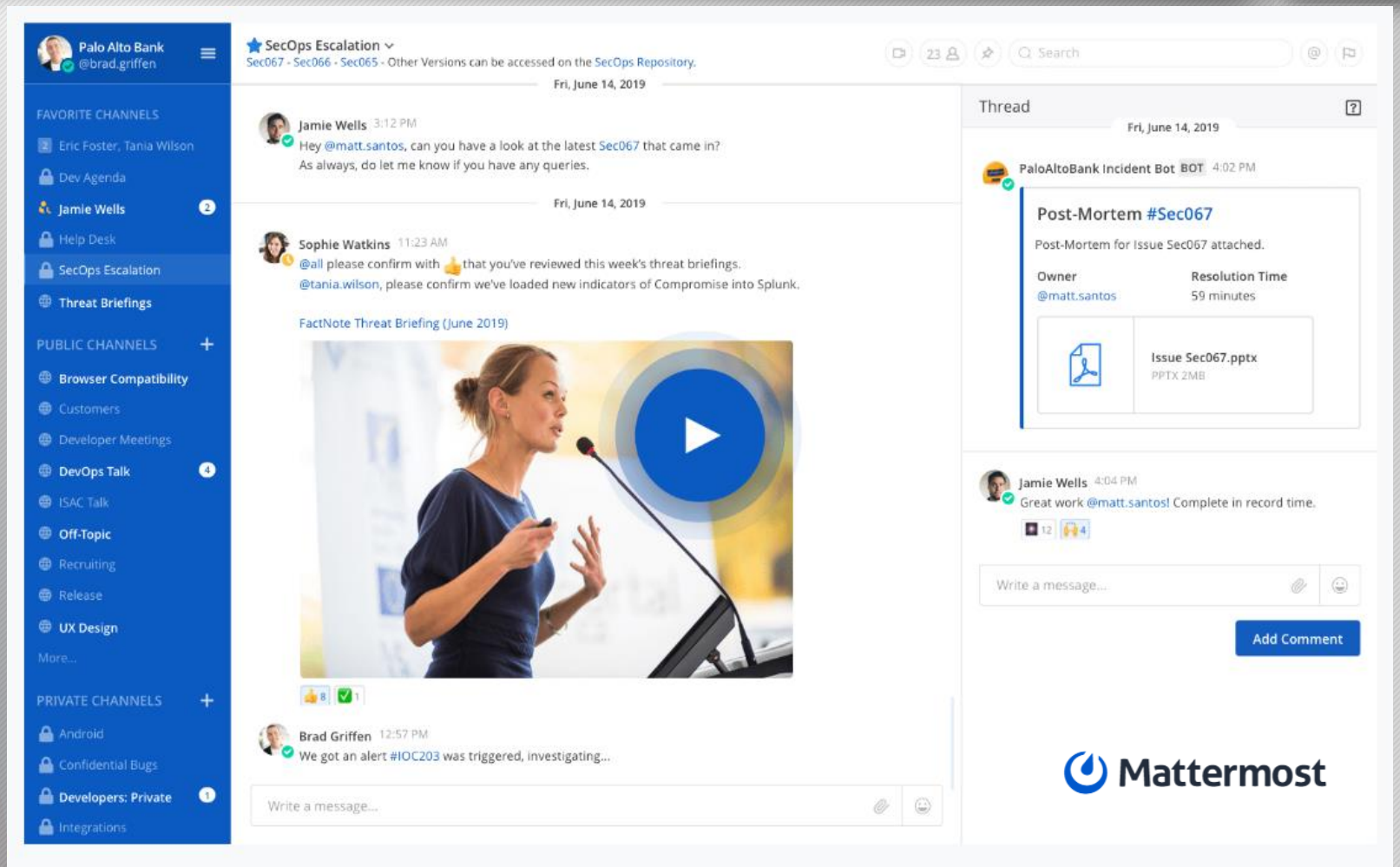

EmComMap

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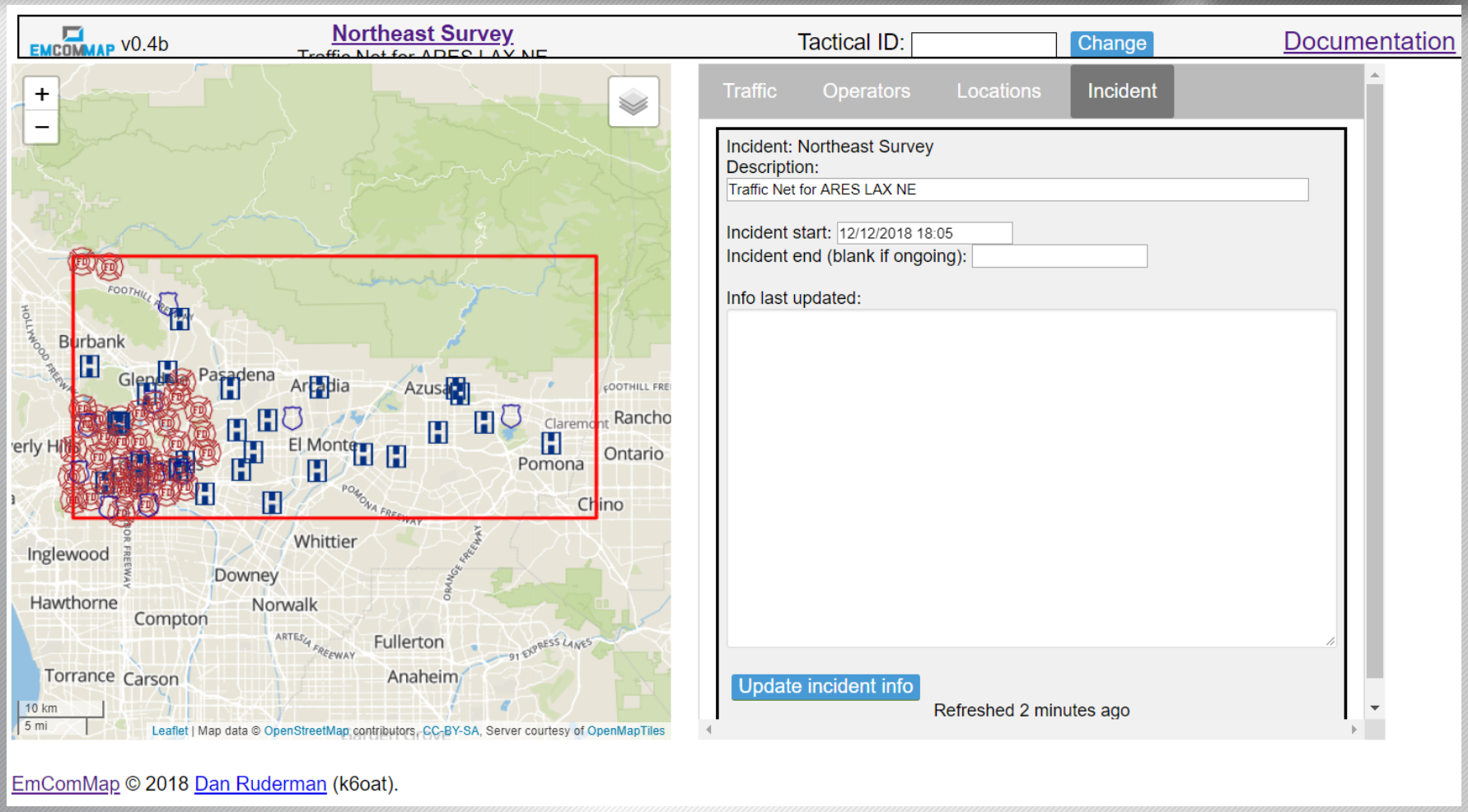

EmComMap © 2018 Dan Ruderman (k6oat).

Tickets

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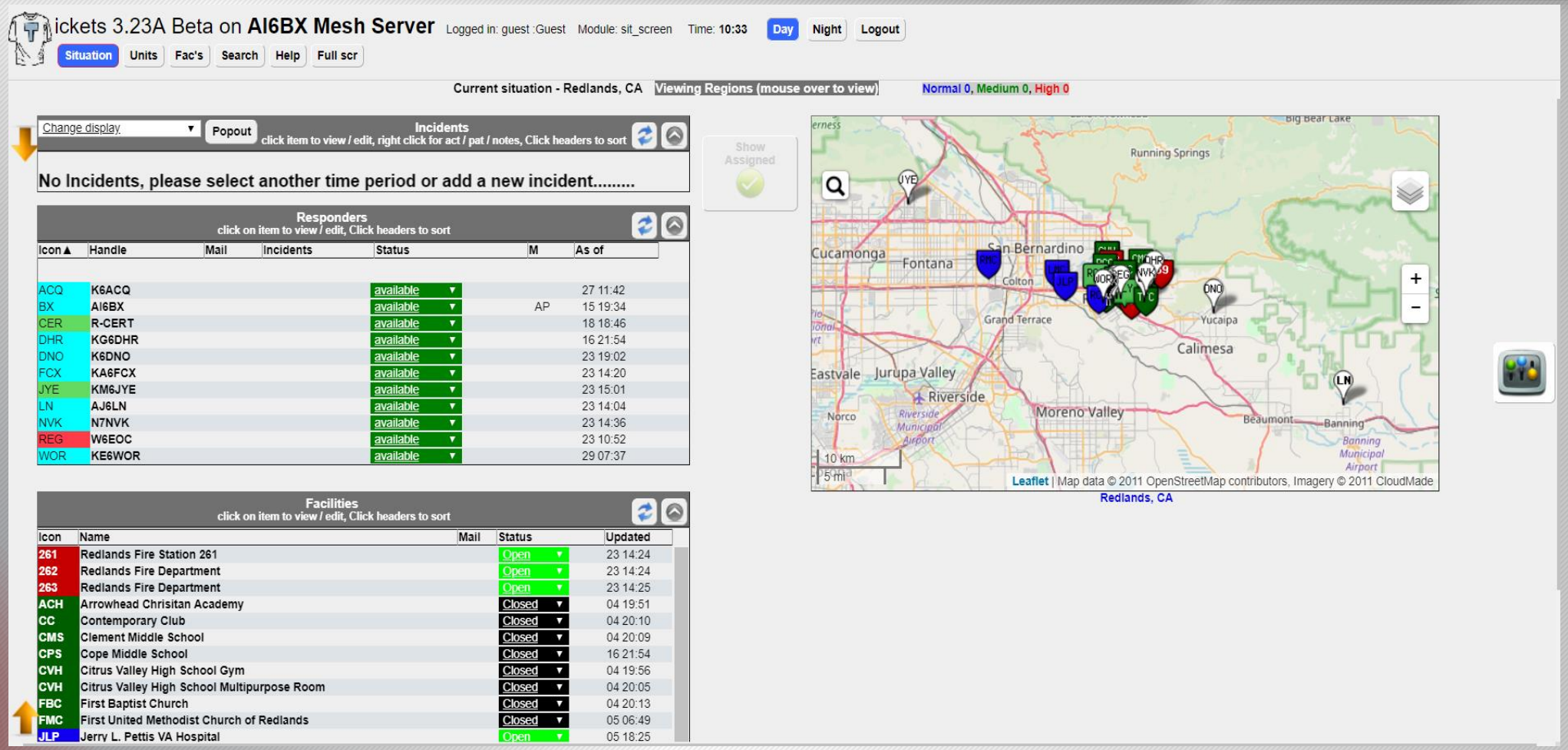

Allstar Management via Web GUI

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AMATEUR RADIO EMERGENCY DATA NETWORK

Status for K8BKT - Node 44098

Last update - 02/14/2019 11:40:15 My IP - 76.27.25.238

View this Node Graphically Search/Command another Node

Selected system state	0
Signal on input	NO
System	ENABLED
Parrot Mode	DISABLED
Scheduler	ENABLED
Tail Time	STANDARD
Time out timer	ENABLED
Incoming connections	ENABLED
Time out timer state	RESET
Time outs since system initialization	2
Identifier state	CLEAN
Kerchunks today	0
Kerchunks since system initialization	2662
Keyups today	61
Keyups since system initialization	26398
DTMF commands today	0
DTMF commands since system initialization	49
Last DTMF command executed	22256
TX time today	00:12:0675
TX time since system initialization	90:12:15148
Uptime	3211:51:54
Nodes currently connected to us	2256
Autopatch	ENABLED
Autopatch state	DOWN
Autopatch called number	N/A
Reverse patch/IAXRPT connected	DOWN
User linking commands	ENABLED
User functions	ENABLED

Node	Call	Description	Location
44098	K8BKT	449.775 -	Pleasant Grove, Utah
2256*	VE3RTR	444.975-	Cobourg, ON

Node	Peer	Reconnects	Direction	Connect Time	Connect State
2256	72.142.154.178	0	OUT	11:25:50.61	ESTABLISHED

Host	Node	State
44.98.254.145:4569	44098	Registered

Allstar via Pi-Star Application

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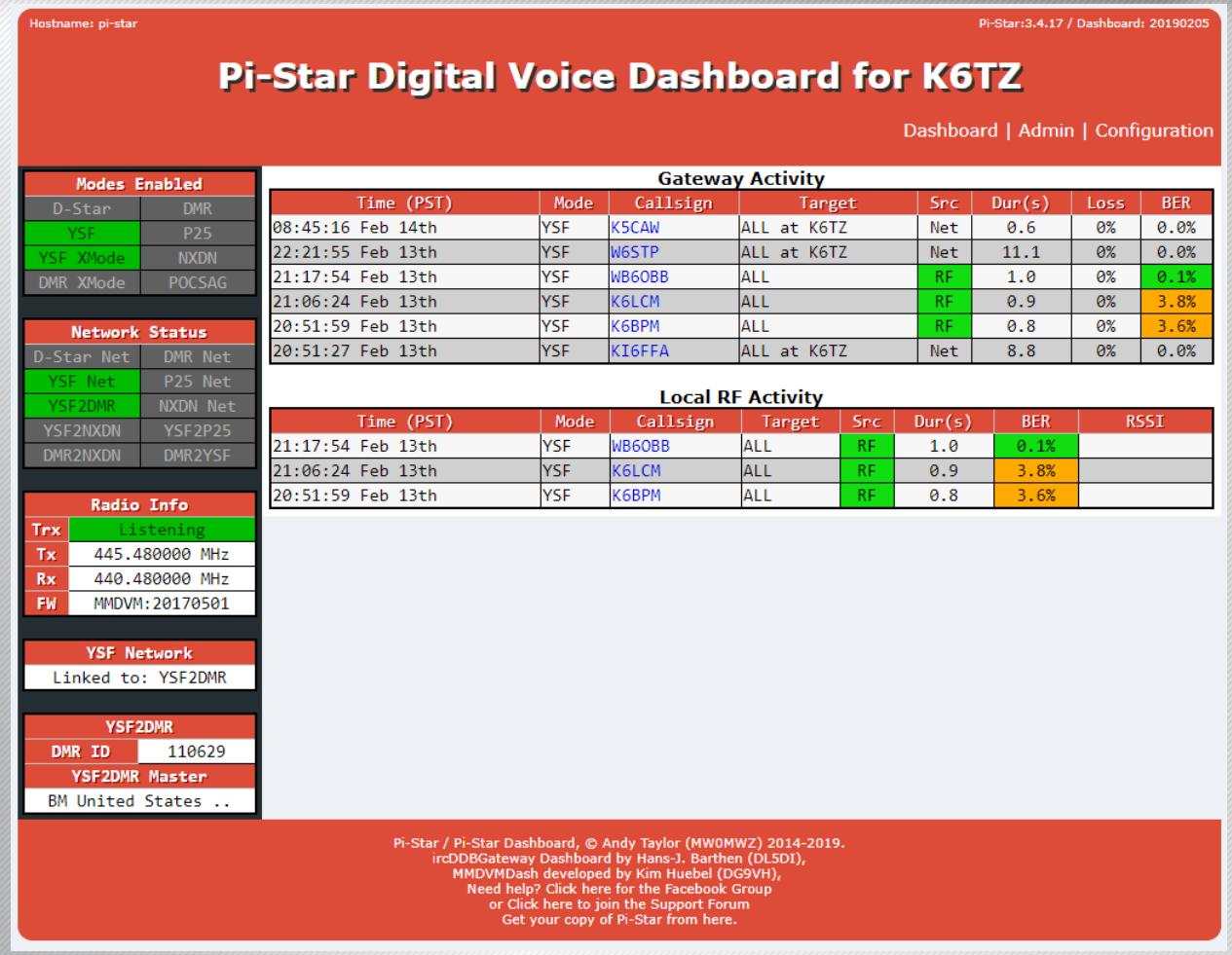

Fileshare / FTP

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Index of /

Name	Size	Date Modified
3CXPhone6.msi	13.3 MB	8/21/16, 5:00:00 PM
AV.exe	6.0 MB	9/5/18, 5:00:00 PM
Camera Uploads/		1/28/19, 4:46:00 PM
DMR Software/		12/25/16, 4:00:00 PM
emergencycommplan.pdf	2.5 MB	10/14/18, 5:00:00 PM
ExtIO_RTL_TCP.zip	58.2 kB	10/11/16, 5:00:00 PM
HDSDR/		10/11/16, 5:00:00 PM
ipscan-3.5.2-setup (1).exe	3.1 MB	7/23/18, 5:00:00 PM
js8call-0.7.3-devel-win32.exe	18.3 MB	10/10/18, 5:00:00 PM
KD7BKO Shared Docs/		3/19/17, 5:00:00 PM
My radio software/		6/14/17, 5:00:00 PM
P2P ID Finder Software/		9/30/16, 5:00:00 PM
Packages/		10/23/16, 5:00:00 PM
phpsysinfo/		11/5/16, 5:00:00 PM
sdrsharp-x86/		11/10/16, 4:00:00 PM
South-Tower-Camera/		4/18/17, 5:00:00 PM

TeamTalk Video Conferencing / Fileshare

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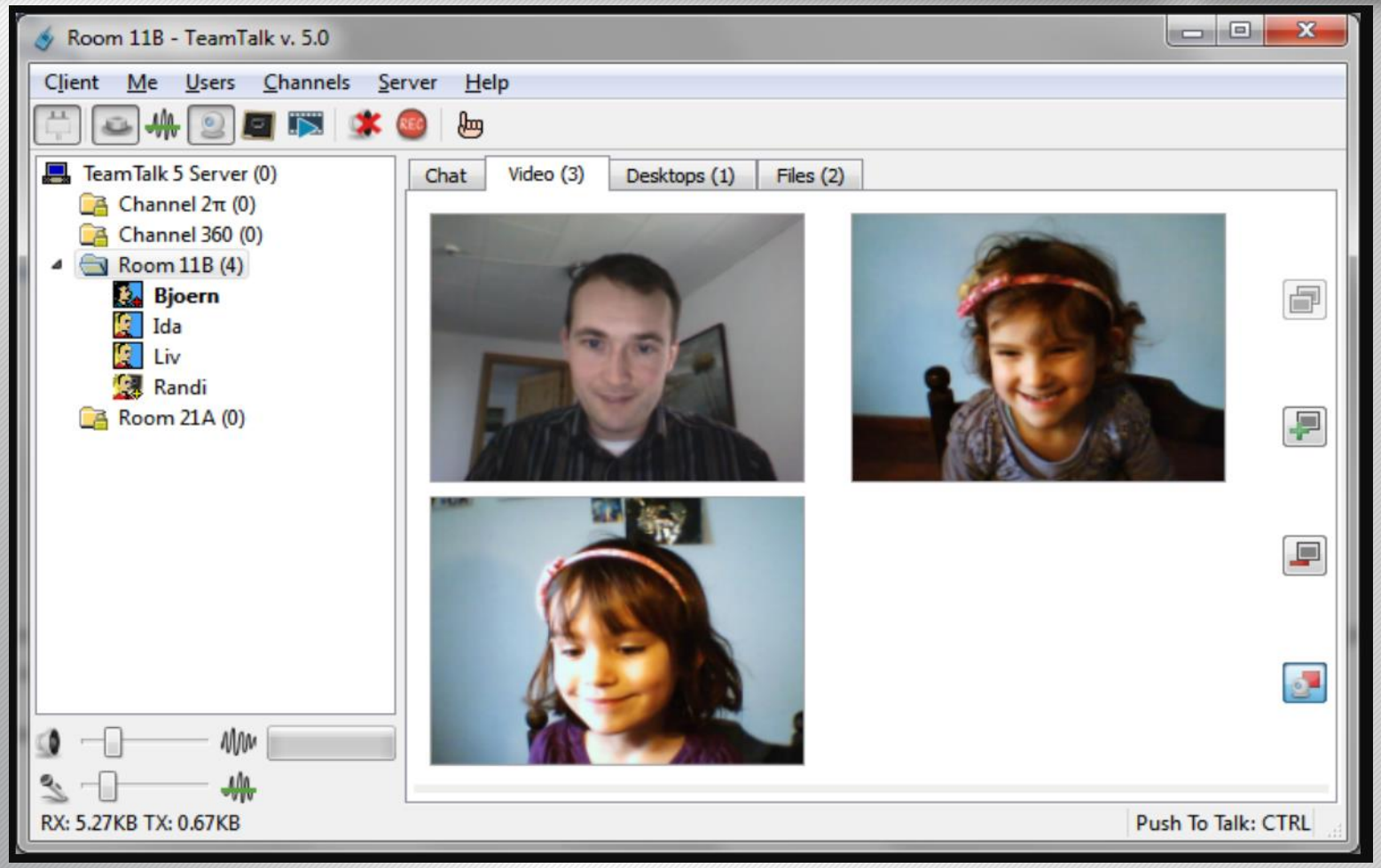

http://boothoverheadcamera.local.mesh/browse/index.asp?id=1558185023384

Air Traffic ADS-B / SDR Dongle

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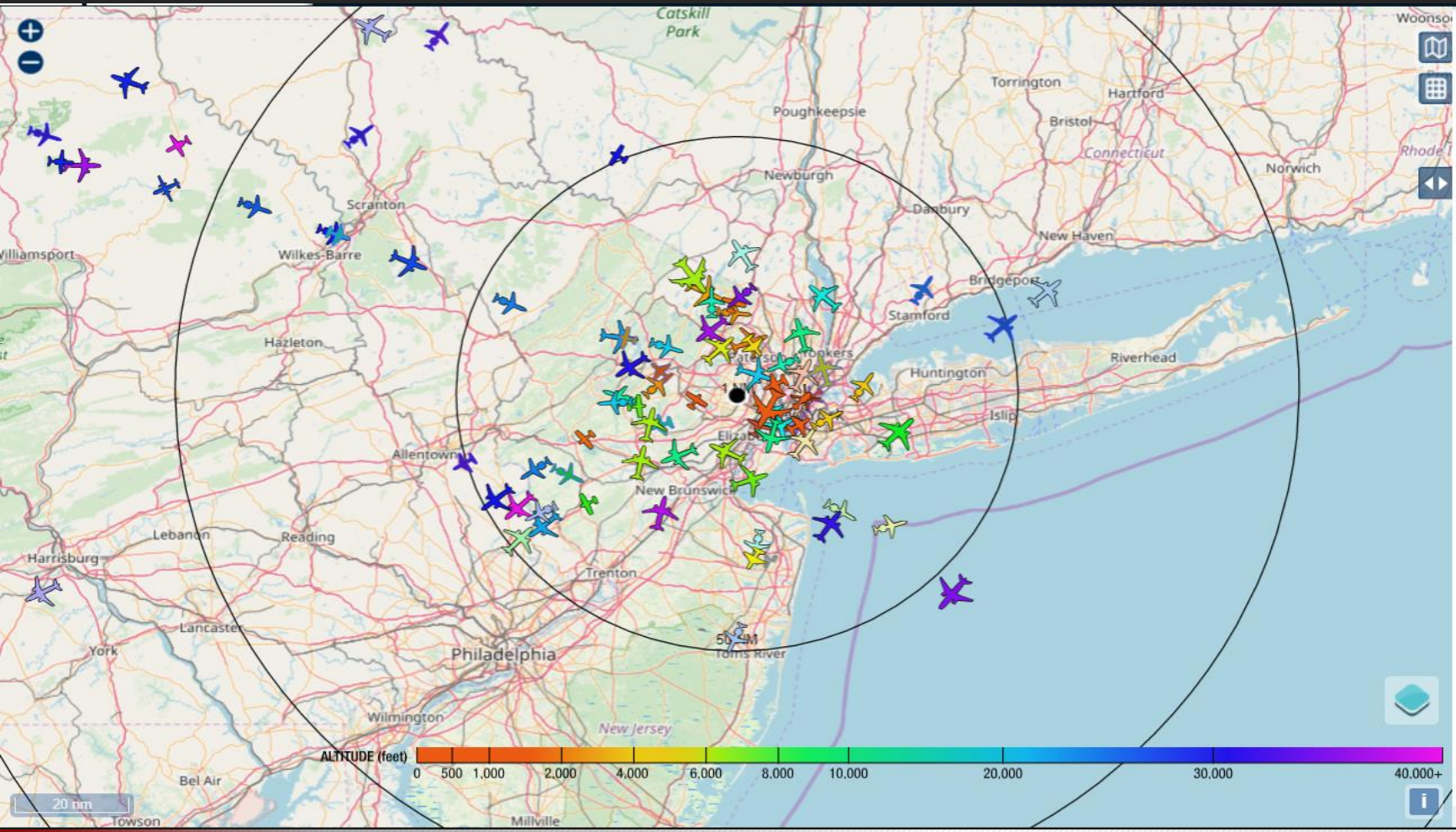


3.6.3~bpo8+1

Total Aircraft: 102 **Messages:** 635.6/sec
With Positions: 85 **History:** 5757 positions

Filter by Altitude: ft to ft Filter Reset

ICAO		Ident	Squawk	Altitude (ft)	Speed (kt)	Distance (NM)	Headi
AD6884		AAL2287	4033	18,975	397	5.2	10
A8C4D8		UAL18	2465	1,100 ▼	135	6.2	20
C01EC5		POE130		ground	19	7.0	2
AAB37C			3042	1,375	202	7.0	24
A936FA		N693MM	1200	1,025 ▲	104	7.5	3
ADA227		JBU516	3223	16,400 ▼	321	9.3	16
ACB285		AAL1489	3567	4,875 ▲	229	9.5	4
A2CFA2		SKW3846	1735	12,175 ▲	261	10.0	19
478F43		SAS909	2451	4,375 ▼	282	10.0	14
A6F280		LXJ547	2643	14,925	298	10.0	24
A48438		EJA390	3656	2,625 ▼	241	10.6	6
ACBF73		N920PD				11.0	
A1AD1F		N207MH	0327	1,425 ▲	85	11.1	1
AC0A22		AAL1333	3035	5,850 ▲	225	11.2	29
A07CBB		N130RU	1200	1,400	97	11.8	4
A08095				200 ▼	123	12.1	7
A7D464		N603WM	3310	1,300	192	12.3	2
2AC772				*200 ▼*	*87*	*12.6*	*5*
A9BA85		N726H	0307	1,900	6	13.2	23

ARES Informational Site

AREDN™
AMATEUR RADIO EMERGENCY DATA NETWORK

LAECT
Los Angeles Emergency Communications Team

Los Angeles Emergency Communications Team

Home

Los Angeles Emergency Communications Team

The Los Angeles Emergency Communications Team ("LAECT") is a group of dedicated individuals committed to training and education in all aspects of emergency preparedness, management and response, with an emphasis on emergency communications.

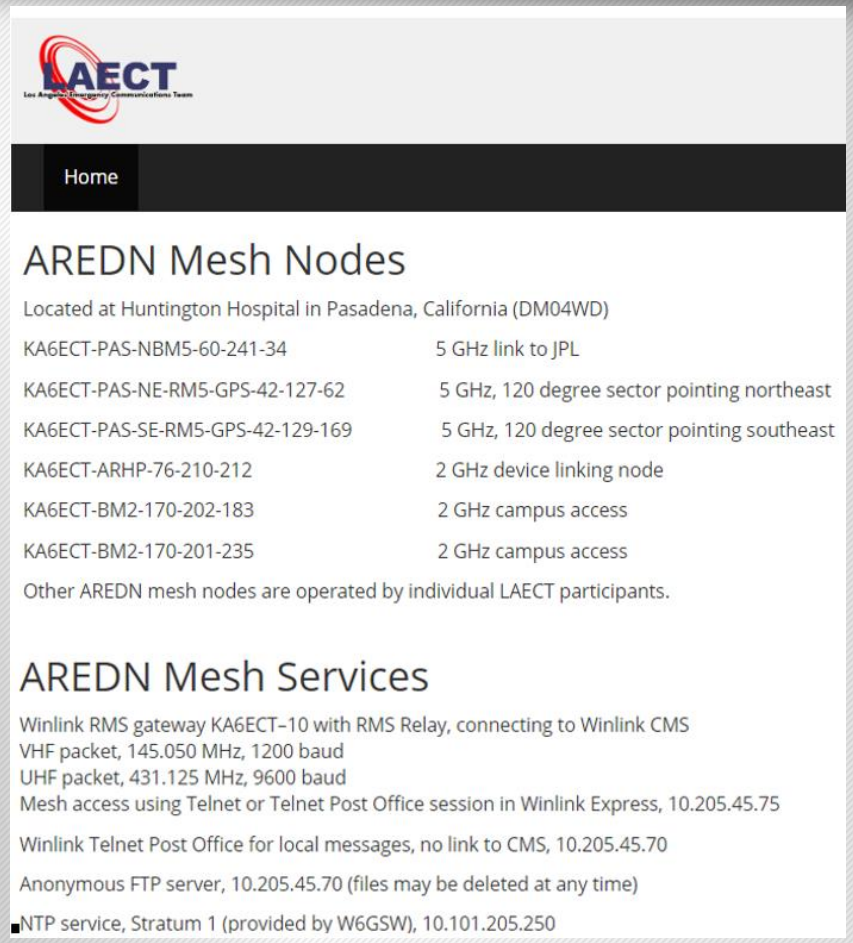
LAECT partners with cities, community groups and other preparedness organizations to coordinate and provide practical preparedness and communications training throughout Southern California. Its members have received specialized training related to emergency preparedness, including Community Emergency Response Team ("CERT"), and the federal Incident Management System and National Incident Management System, both used to manage response to disasters and emergency situations by all levels of government. They also actively participate in numerous preparedness exercises each year, including the California ShakeOut, the California Statewide Medical and Healthcare Exercise and various local and regional exercises.

LAECT also works cooperatively with the Los Angeles Section of Amateur Radio Emergency Service ("ARESLAX"). ARESLAX encompasses all of Los Angeles County, encompassing more than 4000 square miles, and its more than 10 million residents. ARESLAX is the largest ARES Section, and the only one com-prised of a single county. There are more than 22,000 Amateur Radio operators licensed in Los Angeles County.

As its primary mission, ARESLAX provides backup and emergency communications support to the Los Angeles County Medical Alert Center and almost 70 hospitals throughout the County, including virtually all “911 receiving” hospitals (those with emergency departments). ARESLAX is recognized as a formal component of the Los Angeles County Emergency Medical Services Agency Emergency Communications Plan.

FCC station license KA6ECT

Node and Service Info



LAECT

Home

AREDN Mesh Nodes

Located at Huntington Hospital in Pasadena, California (DM04WD)

KA6ECT-PAS-NBM5-60-241-34	5 GHz link to JPL
KA6ECT-PAS-NE-RM5-GPS-42-127-62	5 GHz, 120 degree sector pointing northeast
KA6ECT-PAS-SE-RM5-GPS-42-129-169	5 GHz, 120 degree sector pointing southeast
KA6ECT-ARHP-76-210-212	2 GHz device linking node
KA6ECT-BM2-170-202-183	2 GHz campus access
KA6ECT-BM2-170-201-235	2 GHz campus access

Other AREDN mesh nodes are operated by individual LAECT participants.

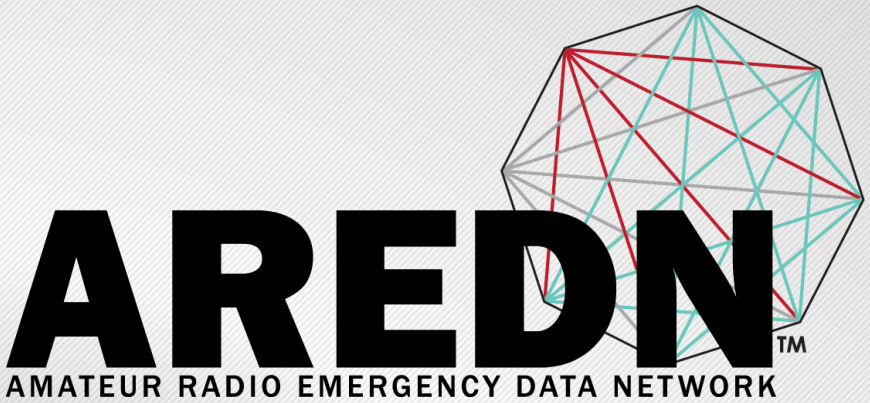
AREDN Mesh Services

Winlink RMS gateway KA6ECT–10 with RMS Relay, connecting to Winlink CMS
VHF packet, 145.050 MHz, 1200 baud
UHF packet, 431.125 MHz, 9600 baud
Mesh access using Telnet or Telnet Post Office session in Winlink Express, 10.205.45.75

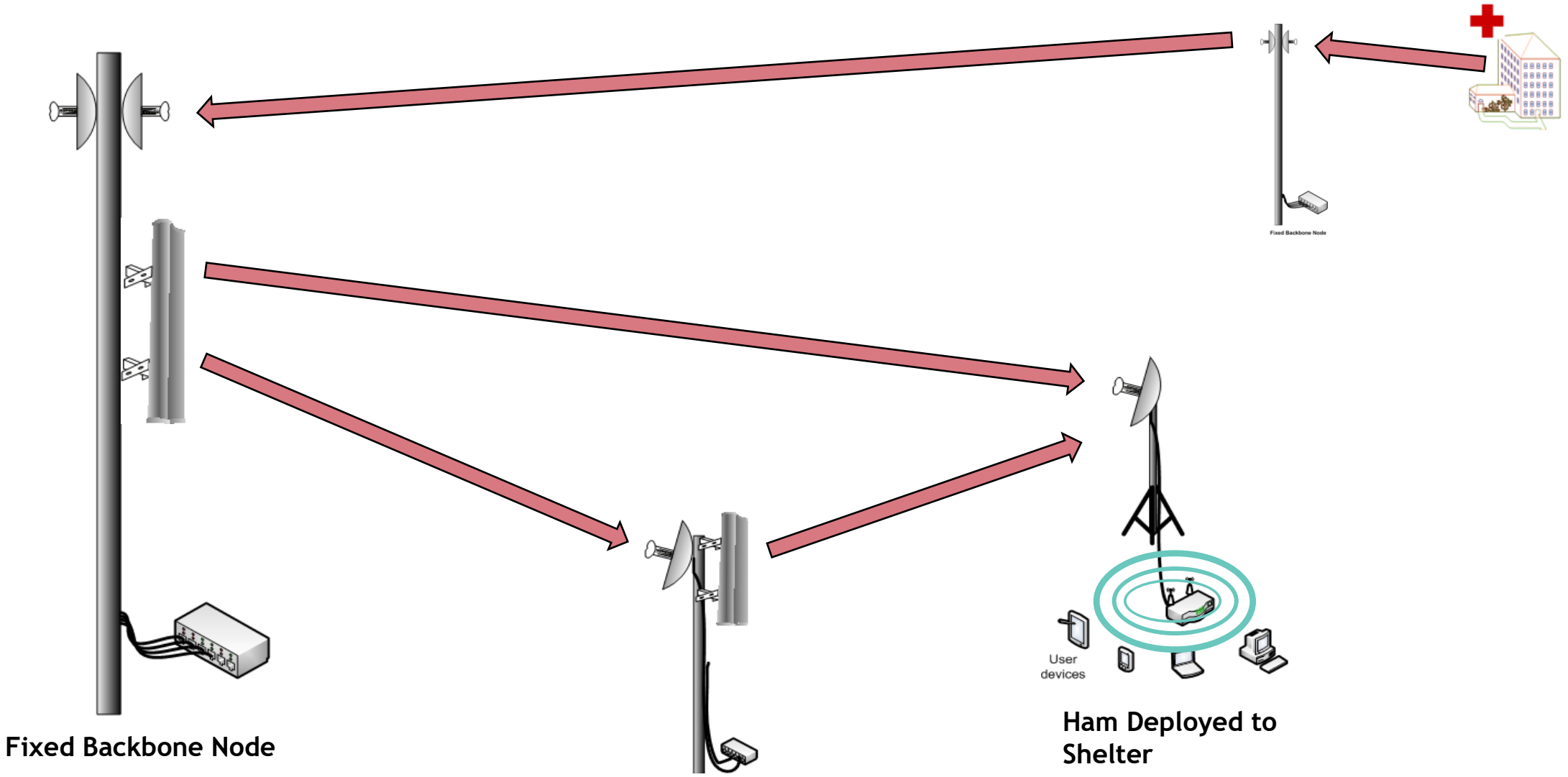
Winlink Telnet Post Office for local messages, no link to CMS, 10.205.45.70

Anonymous FTP server, 10.205.45.70 (files may be deleted at any time)

NTP service, Stratum 1 (provided by W6GSW), 10.101.205.250



AREDN in the SW Division


Fixed Backbone Node
User devices
Fixed Backbone Node
Fixed or Deployed Relay Node
Ham Deployed to Shelter

Southwestern Division

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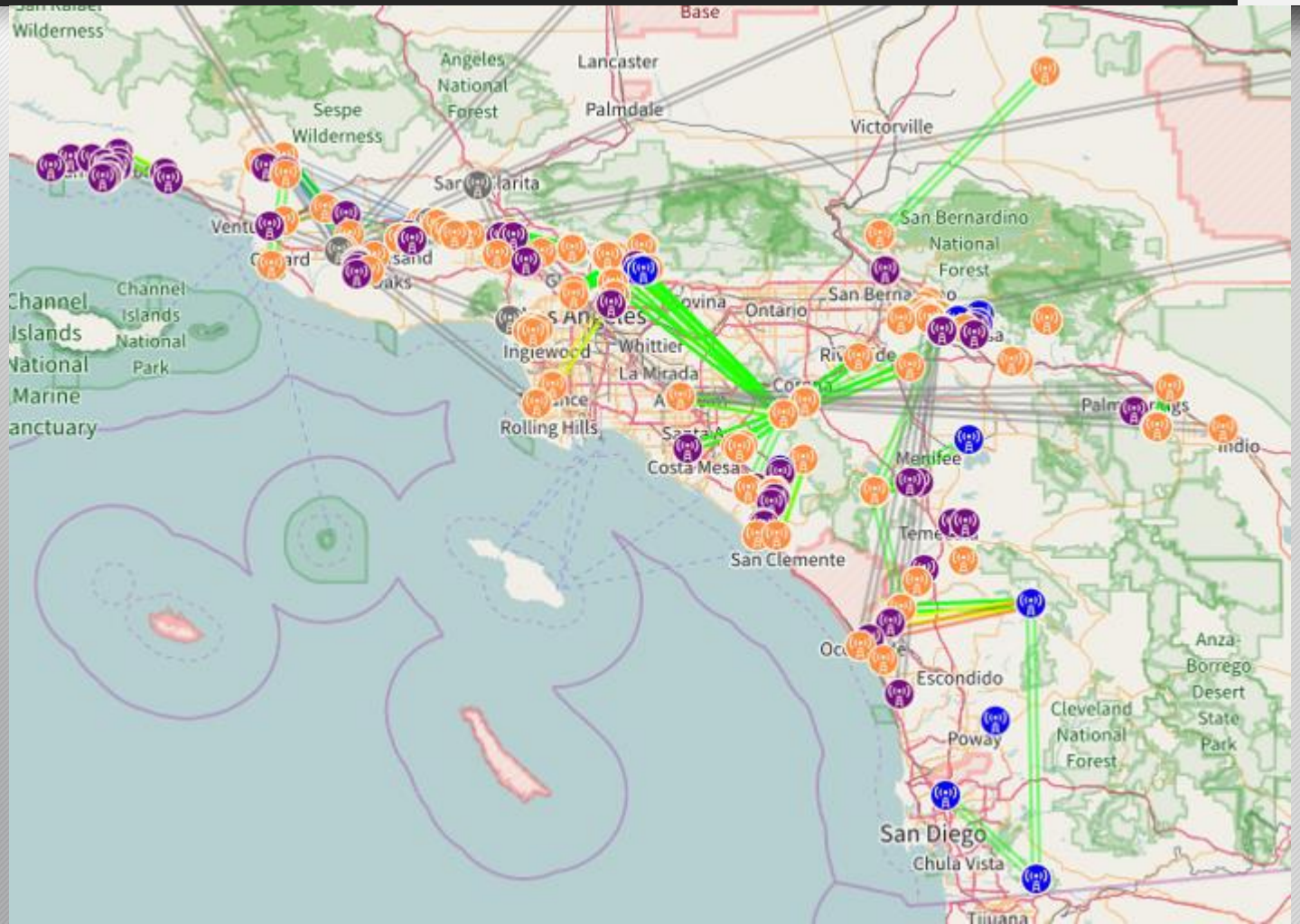

Nodes: 450+
OLSR Routes: 1200+

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For More Info

- WWW.AREDNMesh.ORG
- QST June 2017, “AREDN - A High-Speed Data Network”
- QST Feb 2019, ARRL, Steve Ford, WB8IMY, article
- Search YouTube, HamRadio 2.0, HamRadioNow videos

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- Andre, K6AH, Project Manager

Core Team

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