



# AREDN Mesh Network:



## What is AREDN?

- Amateur Radio Emergency Data Network
- It is a high speed data network, using internet protocols.
- It is a private Intranet, not part of the public internet.



# AREDN Mesh Network:



## What is AREDN?

- Many application can run without any connection to the internet. (Repeater linking, Remote Rig Control, Flight Aware, Winlink, PBX, etc.)
- The AREDN Mesh needs a “Gateway” configured if a connection to the internet is desired. (Example: Brandmeister DMR)



# AREDN Mesh Network:



## What is AREDN?

- A private data network. Each station controls their own equipment.
- Our links share each others traffic.
- Uses low power, low cost equipment.
- Transmitters run under FCC, Part 97



# AREDN Mesh Network:



- Part 97 traffic can route over Internet, but internet traffic cannot route over the Part 97 RF network.
- Equipment:
  - Mikrotik ([www.mikrotik.com](http://www.mikrotik.com))
  - Ubiquiti Networks ([www.ubnt.com](http://www.ubnt.com))

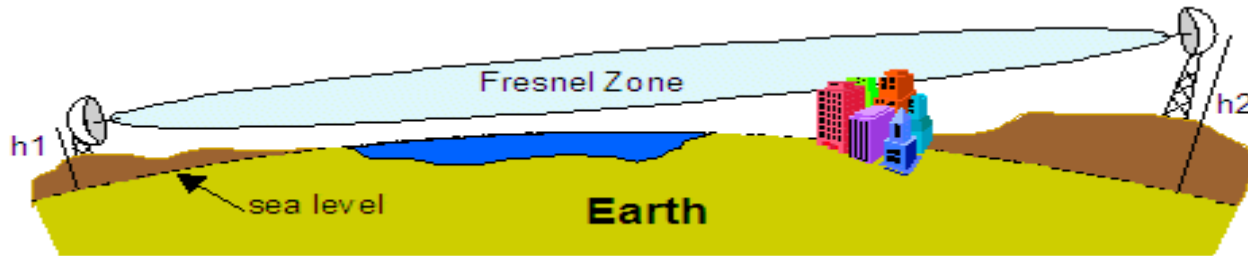
# AREDN Mesh Network:



Equipment: (Continued)

- TP-Link ([www.tp-link.com](http://www.tp-link.com))
- GL.iNET ([www.gl-inet.com](http://www.gl-inet.com))
- Others

# How does it work?



- Transmitters typically operate on 900 MHz, 2.4 GHz, 3.3 GHz, and 5.8 GHz.
- Transmitter Power is Typically  $< 1$  Watt.
- Requires line of site with clear Fresnel Zone.
- The network is self healing, if a station goes down it routes around it.

# How does it work?

- **Antennas:**
  - Omnidirectional (short distance)
  - Sector Antennas
  - Dish Antennas
  - Others / Experimental
- **Routing: (OSPF)**
  - Data travels on the best operational pathway.
  - Transmitters use a “ping” signal to measure signal quality.
  - A mobile station will automatically stay connected to the transmitter with the best signal, similar to a cell network.

# Antenna: (Dish)

- Antenna: (Example)
  - MikroTik SXTsq-2nD (Approx. \$61)
    - Dual polarization 2GHz antenna
    - 10dBi, -18 dB port to port isolation
    - Beam-Width: H-Plane, E-Plane typ. 60°
    - Dimensions: 140x140x56mm
    - 32dBm / -96dBm (SXT 2: TX/RX at 6Mbit)
    - 29dBm / -80dBm (SXT 2: TX/RX at 54Mbit)
  - Point to Point or Point to Multi-point models

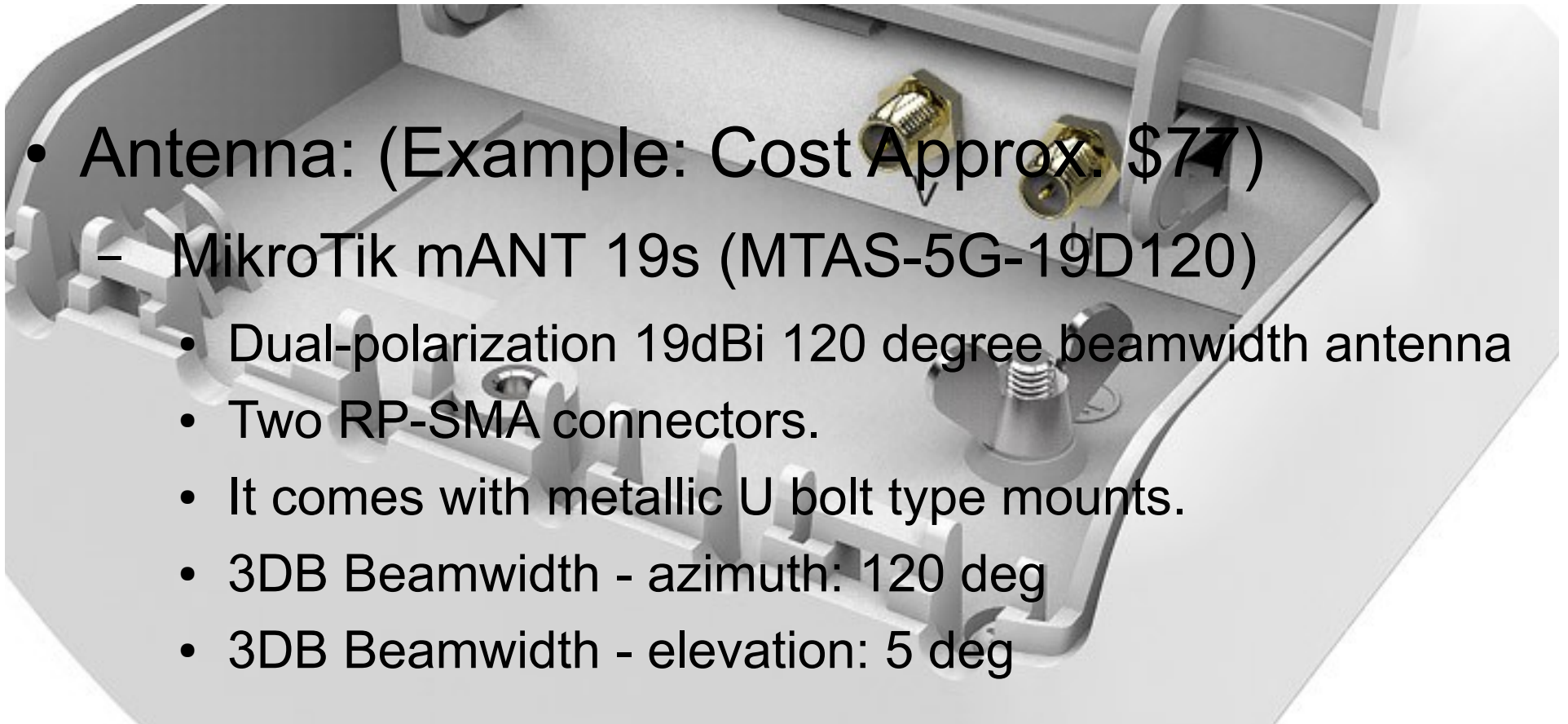




# Antennas: (Sector)



- Antenna: (Example: Cost Approx. \$77)
  - MikroTik mANT 19s (MTAS-5G-19D120)
    - Dual-polarization 19dBi 120 degree beamwidth antenna
    - Two RP-SMA connectors.
    - It comes with metallic U bolt type mounts.
    - 3DB Beamwidth - azimuth: 120 deg
    - 3DB Beamwidth - elevation: 5 deg



# Antennas: (Cont.)



- **Typically:**

- Transmitter & Antenna are sealed units for outdoor use.
- One ethernet cable is used to supply both data and power. (POE)
- These units are tiny, Linux computers, flashed with the AREDN Mesh software build.



# MikroTik hAPs have been installed Statewide.



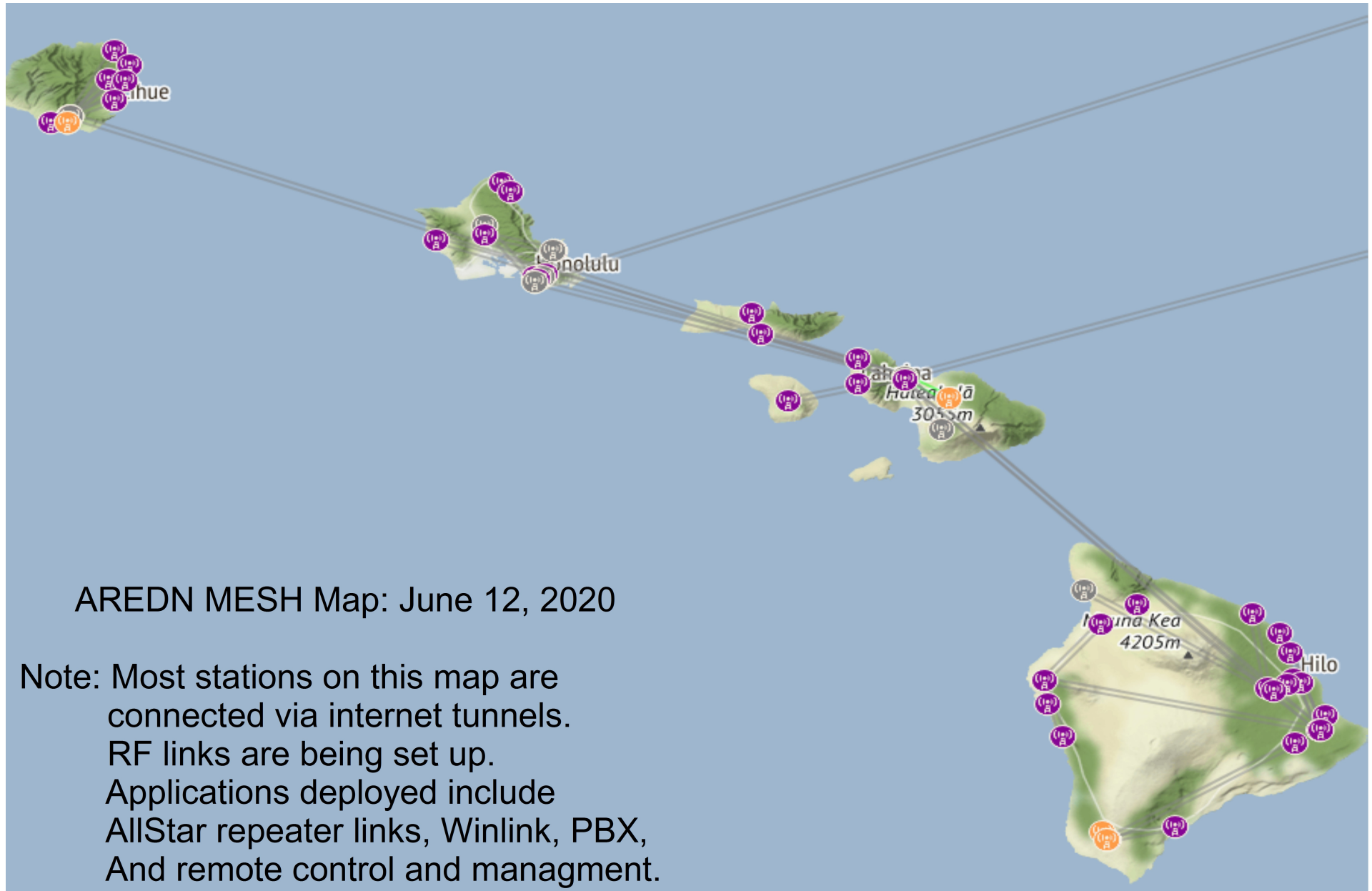
- The hAPs are being used at stations providing services on the network.
- Transmitters/computers plug into hAP via an ethernet cable.
- It supports 5.8 GHz for wireless device connection, like laptops, smartphones, IP phones, etc.

# Hawaii AREDN Applications on-line



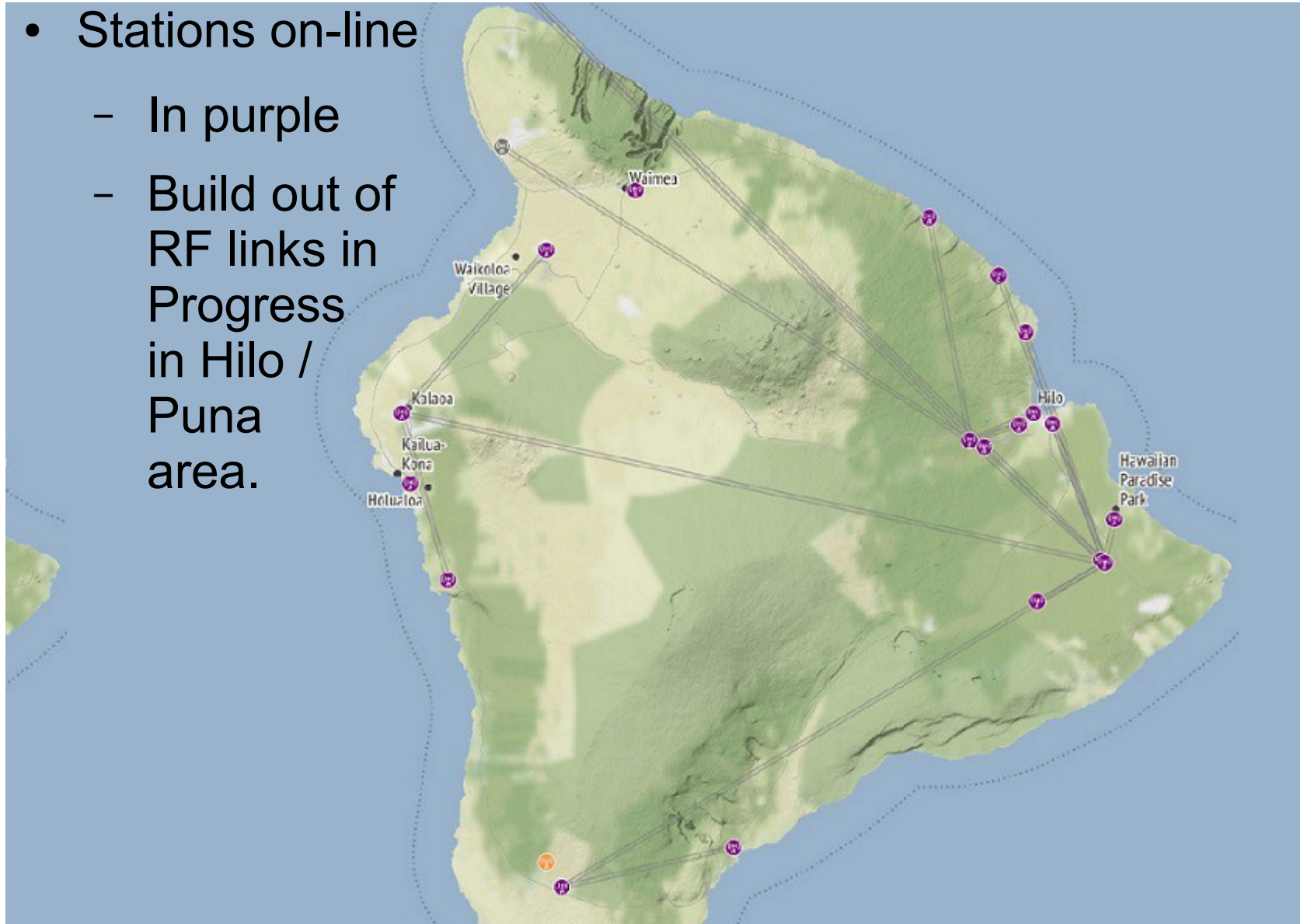
- Repeater linking, remote rig control, Flight Aware, etc.
- Winlink using the RMS Relay (9 stations connected)
- A Sophisticated Private IP phone system
  - Conference calling, help desk, & call forwarding
  - Single touch connection to conferences & repeater networks
  - Dial by call sign, as many extensions as we need.

# Hawaii AREDN Work So far...



# Big Island AREDN Stations:

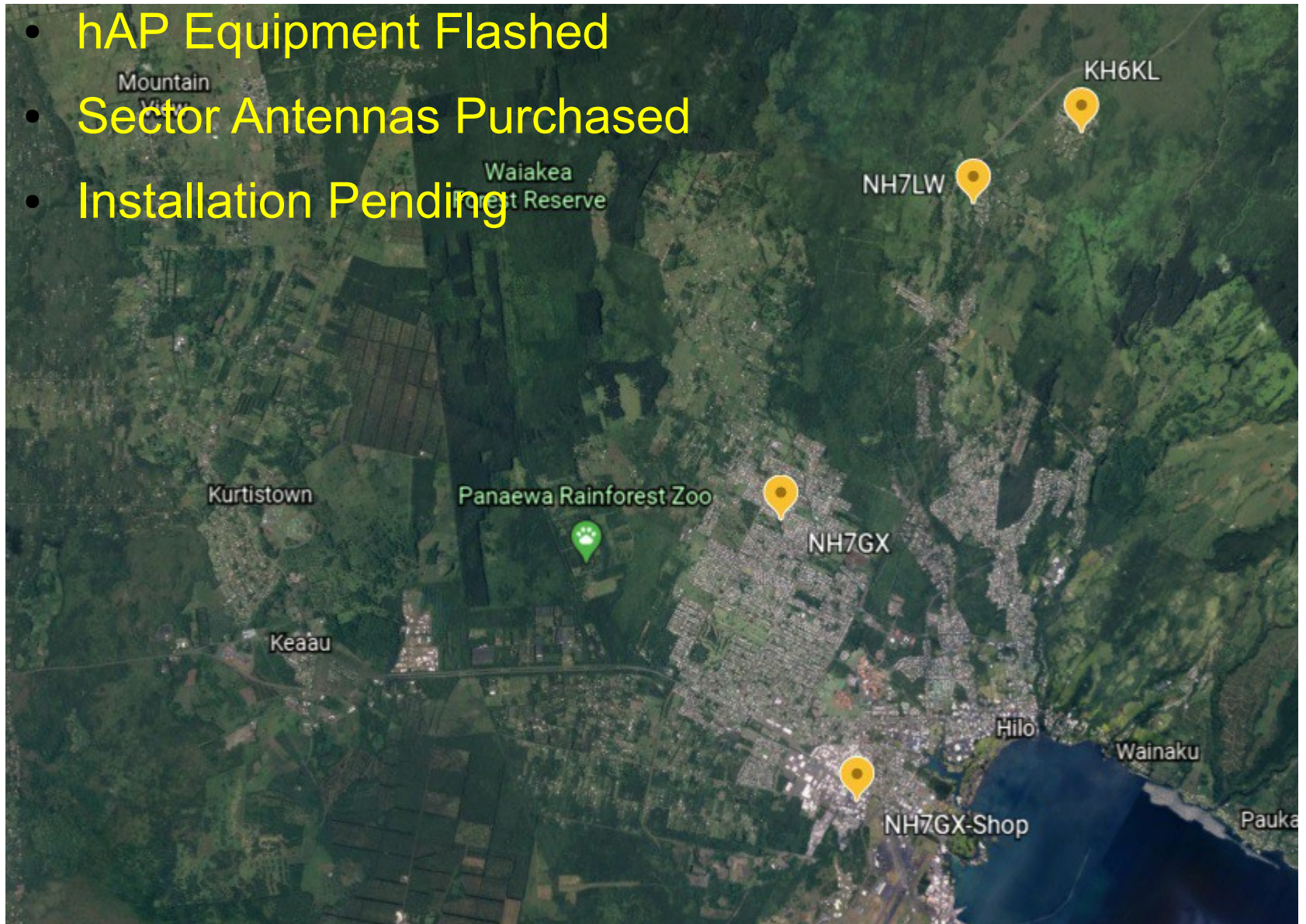
- Stations on-line
  - In purple
  - Build out of RF links in Progress in Hilo / Puna area.





# Hilo RF AREDN Build:

- hAP Equipment Flashed
- Sector Antennas Purchased
- Installation Pending



# WH6DVI-6-Ainaloa mesh status

Location: 19.52183 -154.987844  
WH6DVI HAPAC located in Ainaloa

Refresh

Auto

Quit

## Local Hosts

WH6DVI-6-Ainaloa (wan)  
● WH6DVI-AS1  
● WH6DVI-6010

## Services

[Allmon](#)  
[Supermon](#)

## Current Neighbors

[10.214.149.240](#) (?)  
[KH6KL-6-HILO-HAP](#) (C)  
● KH6KL-WL2K-GW  
● KH6KL-Workshop  
● KH6KL-Allstar

## Remote Nodes

ETX

## Services

[WH6AV-3-LHG58-Wailuku](#)  
[NH7IT-5-Waikiki](#) (tun\*9)  
● NH7IT-ALLSTAR  
[KH6CED-5-LANAI-HAP](#) (tun\*1)  
● KH6CED-ALLSTAR  
[WH6AV-3-KEOKEA-HAP](#) (tun\*1)  
● WH6AV-PRODUCTION  
[NH7LY-6-HILO-HAP](#) (tun\*1)  
● grandstream  
● nh7ly-rpi3  
[WH6FSK-6-LAUPAHOEHOE](#) (tun\*1)  
● WH6FSK-Allstar  
[NH7LW-6-HILO-HAP](#) (tun\*2)  
[KD8GVO-6-HILO-HAP](#) (tun\*2)  
● KD8GVO-Brownwood

1.10  
2.00  
2.00  
2.00  
2.00  
2.00  
2.00  
2.00  
2.00

[NH7IT-Allmon](#)  
[WH6AV-40Meter-Net](#)  
[WH6AV-KARC-Net](#)  
[WH6FSK-Allmon](#)  
[Wh6FSK-Supermon](#)

[KH6SF-6-EDENROC](#) (C)  
[NH6M-6-Kona-HAPAC](#)  
● NH6M-VOIP  
● WH6DEW-WL2K-GV  
● NH6M-28377  
[NH6OV-6-KEAAU](#) (tun)  
● NH6OV-GXP1625  
● NH6OV-DESKTOP  
● NH6OV-27075  
[NH7GB-6-HONOMU-HA](#)  
[NH7GF-6-PEPEEKEO-H](#)  
● NH7GF-Allstar



# AllStar Monitor

Suppo x WH6D x WH6D x Allstar x AllStar x NH7G x WH6A x biarcn x Brons

← → ↻ ⓘ Not secure | wh6dvi-as1.local.mesh/cgi-bin/lsnodes\_web?node=48432

Apps Hotmail.com WH6AV.ORG | Supe... HTML Editor FEMA-EMI Tent Rentals | Roo... ARRL YouTube

## Status for WH6DVI - Node 48432

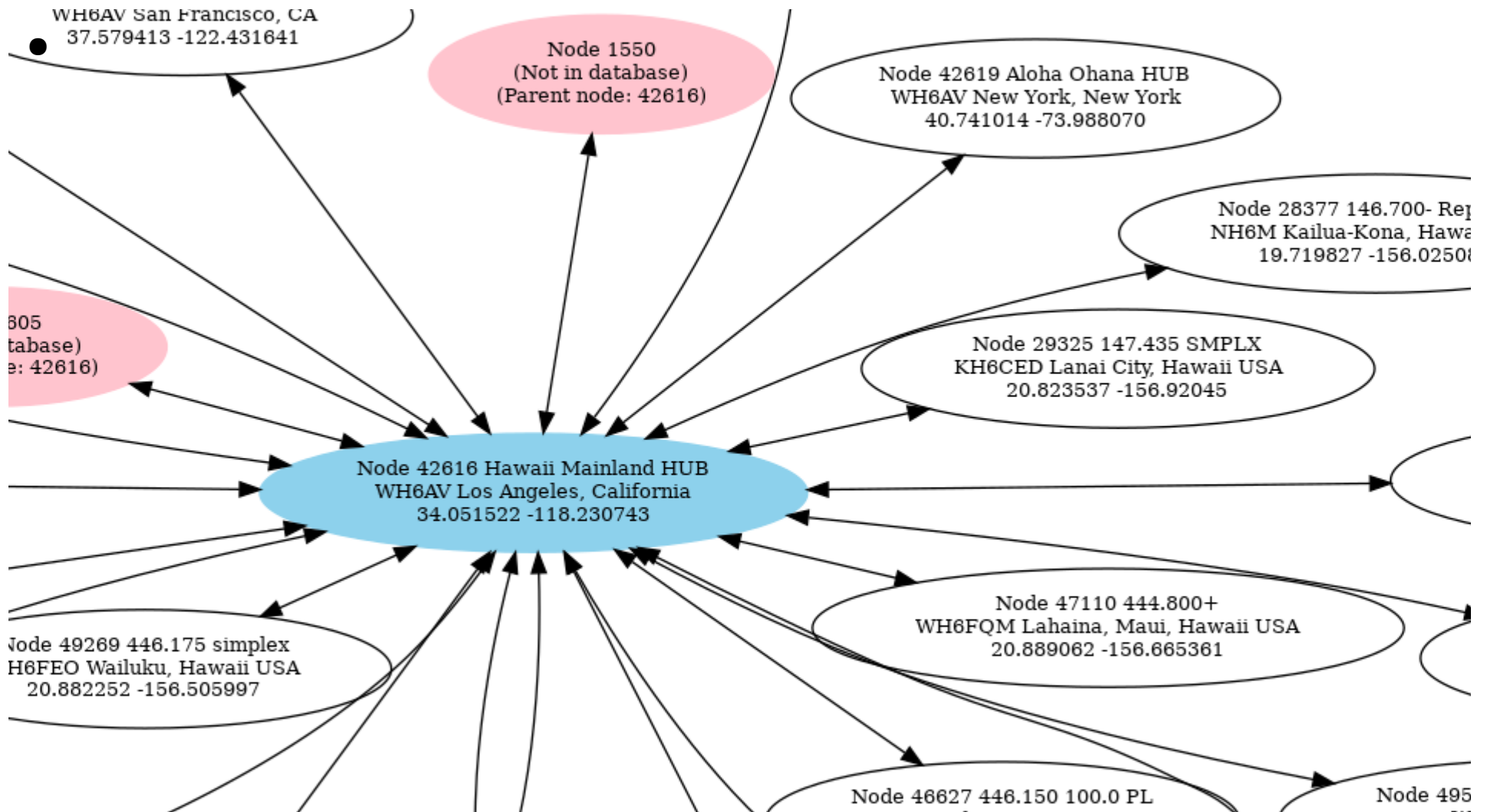
Last update - 06/12/2020 20:51:22 My IP - 98.155.5.140

[View this Node Graphically](#)

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	1
Identifier state	CLEAN
Kerchunks today	6
Kerchunks since system initialization	58
Keyups today	228
Keyups since system initialization	1173
DTMF commands today	0
DTMF commands since system initialization	8
Last DTMF command executed	71601
TX time today	01:06:43388
TX time since system initialization	04:49:15645
Uptime	123:28:42
Nodes currently connected to us	601
Autopatch	ENABLED
Autopatch state	DOWN
Autopatch called number	N/A
Reverse patch/IAXRPT connected	DOWN
User linking commands	ENABLED
User functions	ENABLED

27075	NH6OV	Hawaiian Allstar HUB
27938	NH7QH	
28377	NH6M	146,700- Repeater
28508	AH6OD	HAWAIIAN Allstar HUB
29277	WH6FG	KAUAI HUB
29311	KH6S	147,000 mhz +
29323	KH6S	442,250 +
29325	KH6CED	147,425 SMLPX
29462	NH6OV	146,560 Smlpx
29715	KH6GQM	147,420 smlpx
29917	WH6CYD	147,140+Repeater
301	No-Info	Node not in database
40214	WH6FVC	444,350+
40564	KH6IN	HI-Mainland Network
40661	WB7DBJ	146,800 Simplex
40763	KH6IN	442,175 +
40896	KH6S	442,175 +
40927	KH6S	442,500
40928	KH6S	444,6 mhz
41057	KH6NS	Headless HUB
41451	KC6JLX	439,250 Simplex
41592	KH6KL	444,925+
41897	WH6TAT	145,750
42192	WH6YF	147,540 Simplex
42616	WH6AV	Hawaii Mainland HUB
42618	WH6AV	
42619	WH6AV	Aloha Ohana HUB
42675	WH6AV	AllStar EchoLink
43168	WH6WF	442,325 (+)
43903	WH6FEE	145,210 Simplex
44250	WH6CYB	145,740 simplex
45530	KH6IN	Hawaii Allstar Group
46205	KH6IN	KH6IN Hub
46523	AJOT	446,175 simplex
46627	WH7BR	446,150 100.0 PL
46731	WH6RS	147,420 Smlpx
46827	WH6CTX	442,150 +
47057	KH6BYU	145,290- Repeater
47110	WH6FQM	444,800+
48007	NH7ET	449,000 simplex
48275	KH6NS	146,74
49023	NH7GX	442,200+ Repeater
49153	KC6QQD	
49269	WH6FEO	446,175 simplex
495770	W0JAY	146,415 Local simple
49622	WH6FSK	442,550+

# AllStar Repeater Links:



# How things fit together with BIARC:

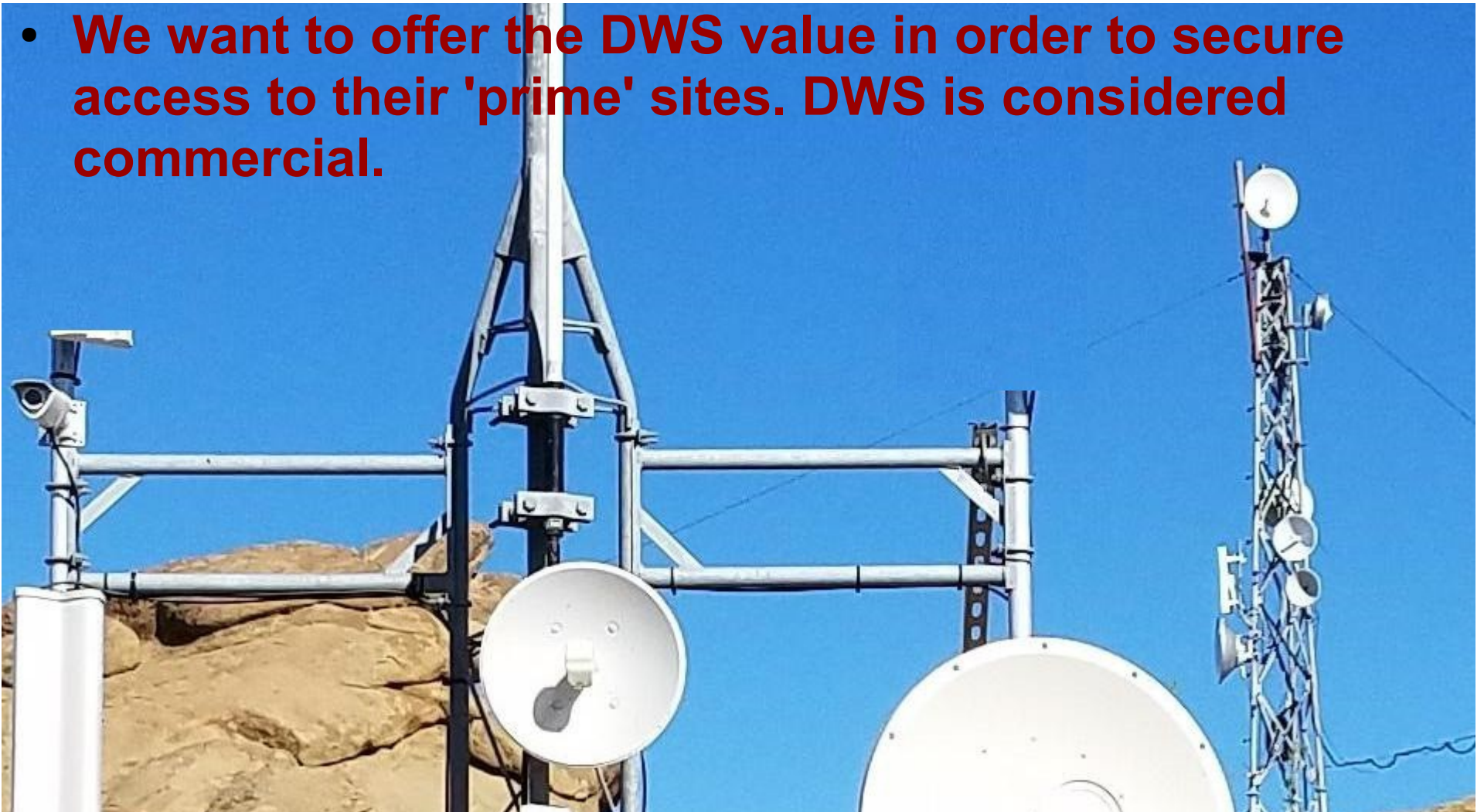
- **NH6ET has a complementary vision for backbone linking using a similar intranet network.**
- **AREDN Traffic must be non-commercial in nature.**





# How things fit together with BIARC:

- **We want to offer the DWS value in order to secure access to their 'prime' sites. DWS is considered commercial.**



# How things fit together with BIARC:

- **We also want to be ready to support hospital EmComm. Some links will need to use equipment operating outside of FCC, part 97. This network provides a backup to the Internet, if it goes dark.**





# How things fit together with BIARC:

**The AREDN traffic can run over any IP linking network, enabling maximum flexibility.**



# End of Presentation

# Thank you for watching!

