

What is AREDN & What Can We Do With It?

Billerica Amateur Radio Society

Jay Taft K1EHZ

March 5, 2025

Acknowledgements

Merrimack Valley Digital Network

a project of

Merrimack Valley Amateur Radio Association

supported by

- **Amateur Radio Digital Communications (ARDC) Grant**
- **Collaborations with**
 - **New England Digital Emergency Communications Network (NEDECN)**
 - 90+ DMR repeater sites in New England
 - **Central New Hampshire Amateur Radio Club**
 - **Capital Area Repeater Society**
 - **Manchester, NH area agencies and hospitals**
- **Organizations and individual hams** who provide time, money, equipment, expertise, and site access

Why get involved with AREDN?

- Have fun learning something new in ham radio
- Relatively low cost of entry
- Combines computer network technology with microwave radio technology
- Wide range of supported microwave equipment
- Use high-speed data applications within bandwidth constraints
- Fixed stations and portable / mobile operations
- Deploy for personal enrichment, event support, EmComm
- Participate in New England-wide networking
- Defend amateur microwave spectrum under commercial pressure
- You will think of many other possibilities

Topics

- AREDN IP-based Part 97 system
- Network Services you can use
- How you can participate



Amateur Radio Emergency Data Network

Login | Register

HOME

SOFTWARE ▾

DOCS ▾

FORUM

MAPS ▾

ABOUT US ▾

CODE ▾

SHOP

DONATE

1 2 3 4 5 6 7 8 9 10 11 12 13



arednmesh.org

Our Mission

The primary goal of the AREDN® project is to empower licensed amateur radio operators to quickly and easily deploy high-speed data networks when and where they are needed.

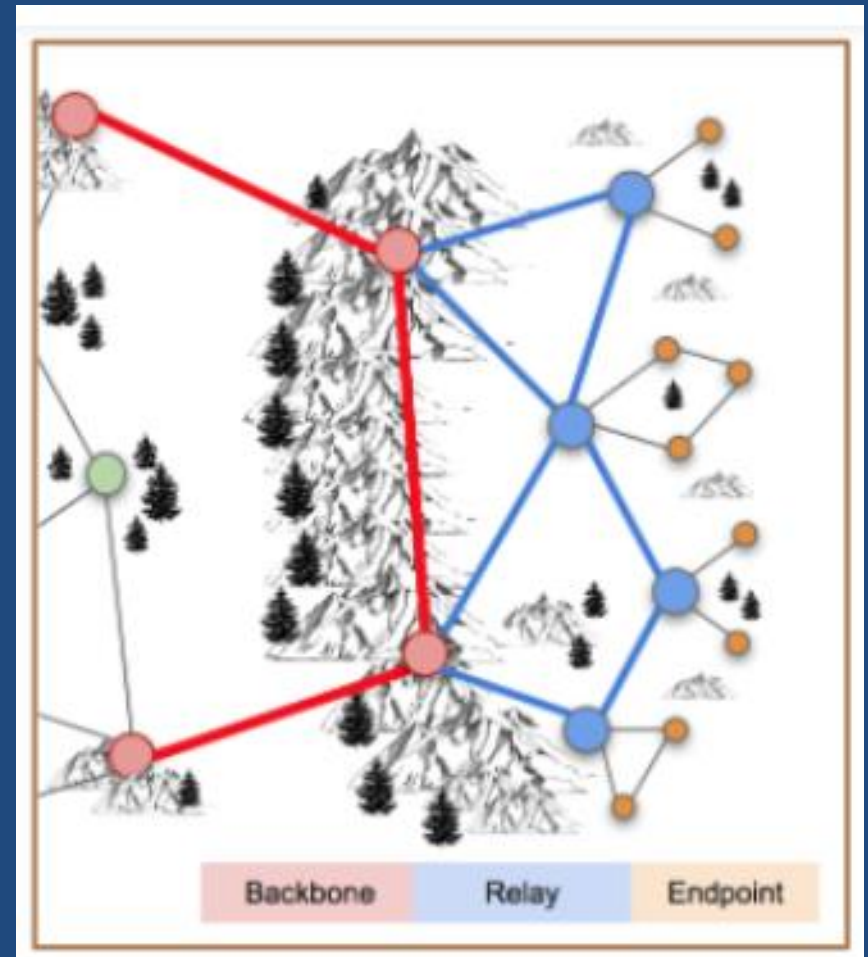
Don't need to be an IP network or microwave expert!

Radios & Frequencies

- Uses inexpensive *off-the-shelf* wifi radios
- Rugged & weatherproof for outdoor deployment
- Single *Power-over-Ethernet* cable (*data + power*)
- High gain antenna options (*some integrated w/ radio*)
- AREDN® firmware opens ham freqs (*some non-shared*)
(for example 400mw at 20dB gain = 45w EIRP)
- Bands: 900MHz (33cm), 2.4GHz (13cm), 5.8GHz (5cm)
- Line of sight required for microwave freqs
- Distance: ¼ mile to >30 miles

(our longest 5GHz link is 48 miles)

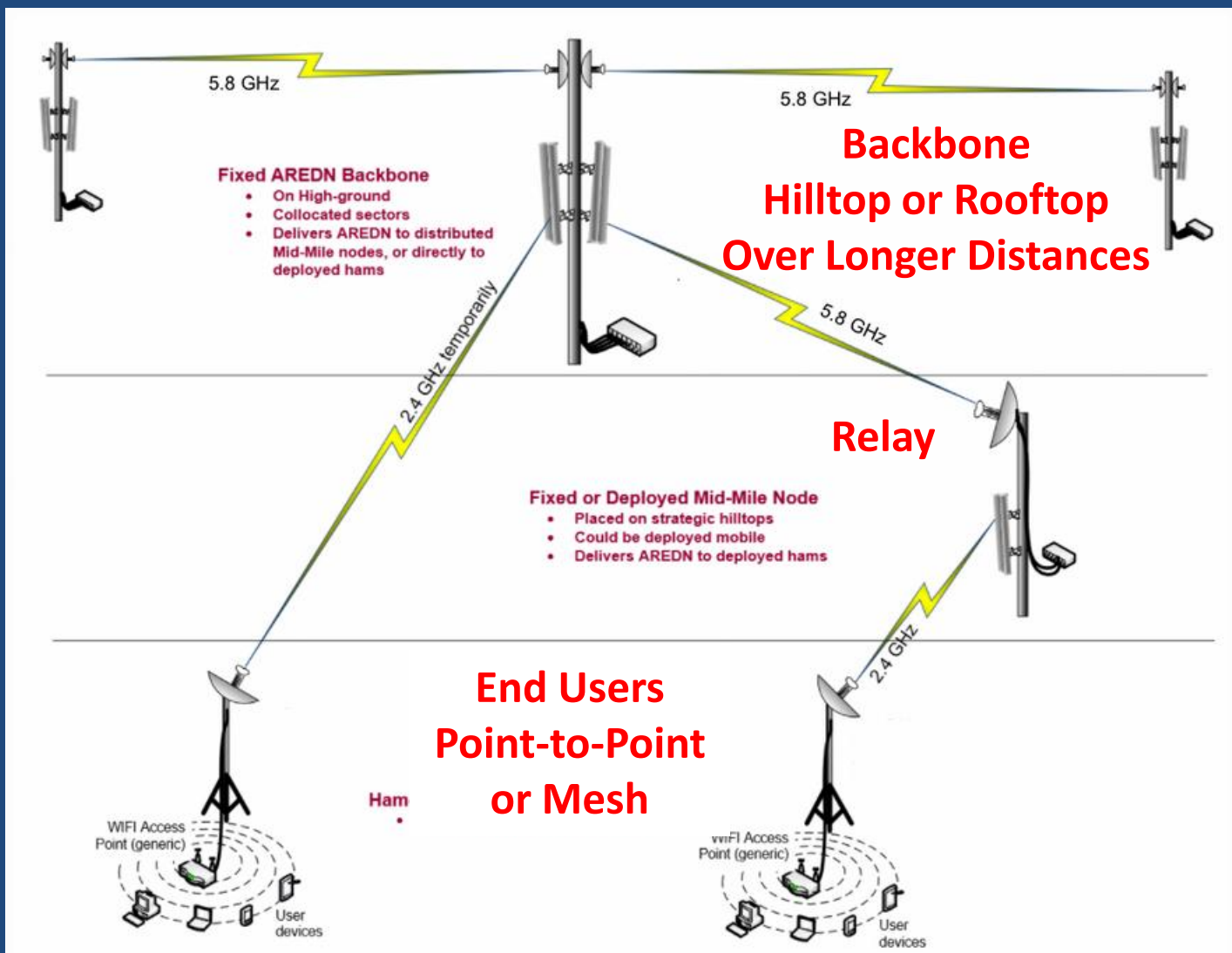




AREDN Configurations

AREDN Configurations

From AREDN Documentation



Example Backbone Nodes at DMR Repeater

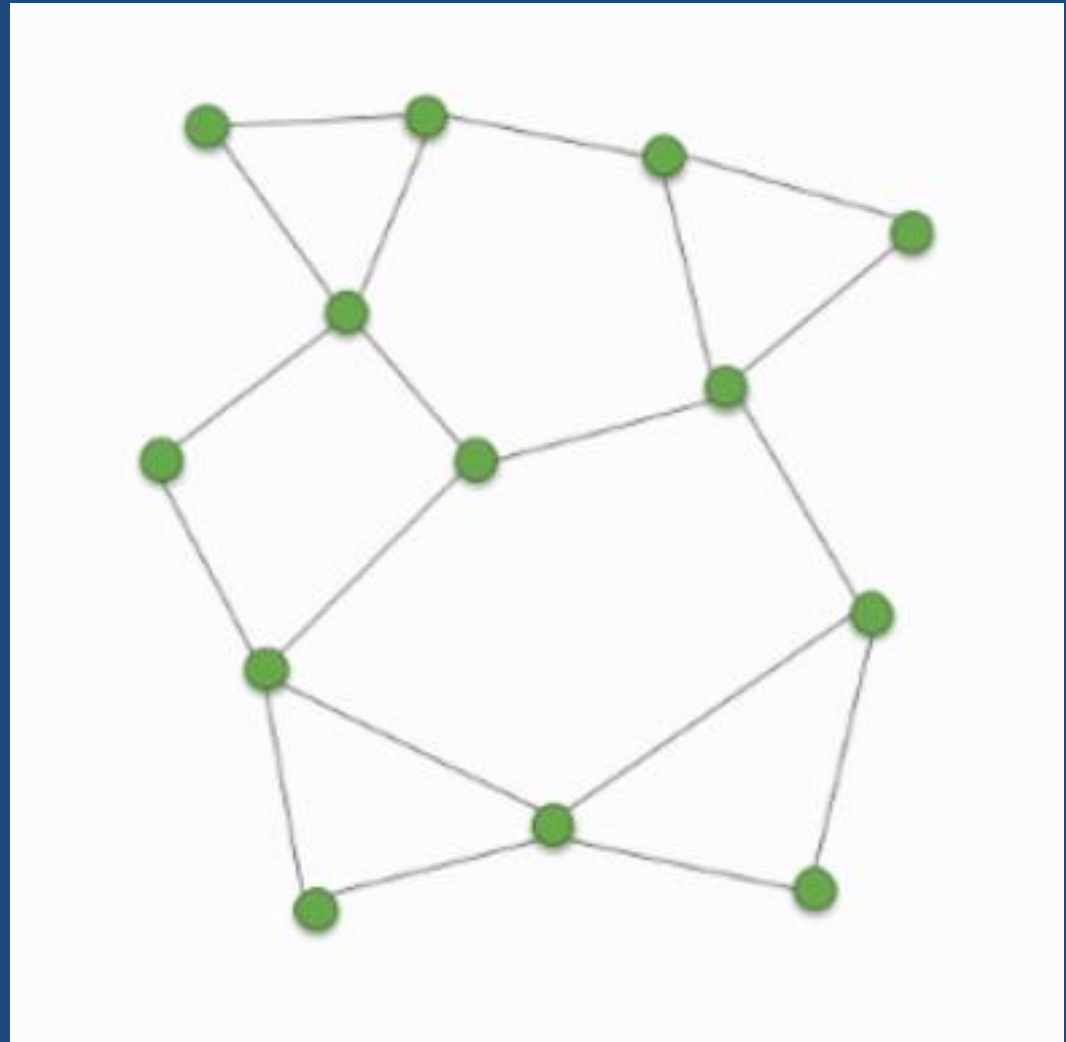
AREDN increases DMR resilience with multiple paths to the c-Bridge



Mesh Configuration at End Users

From AREDN Documentation

**All nodes on
same SSID, RF
channel and
bandwidth**

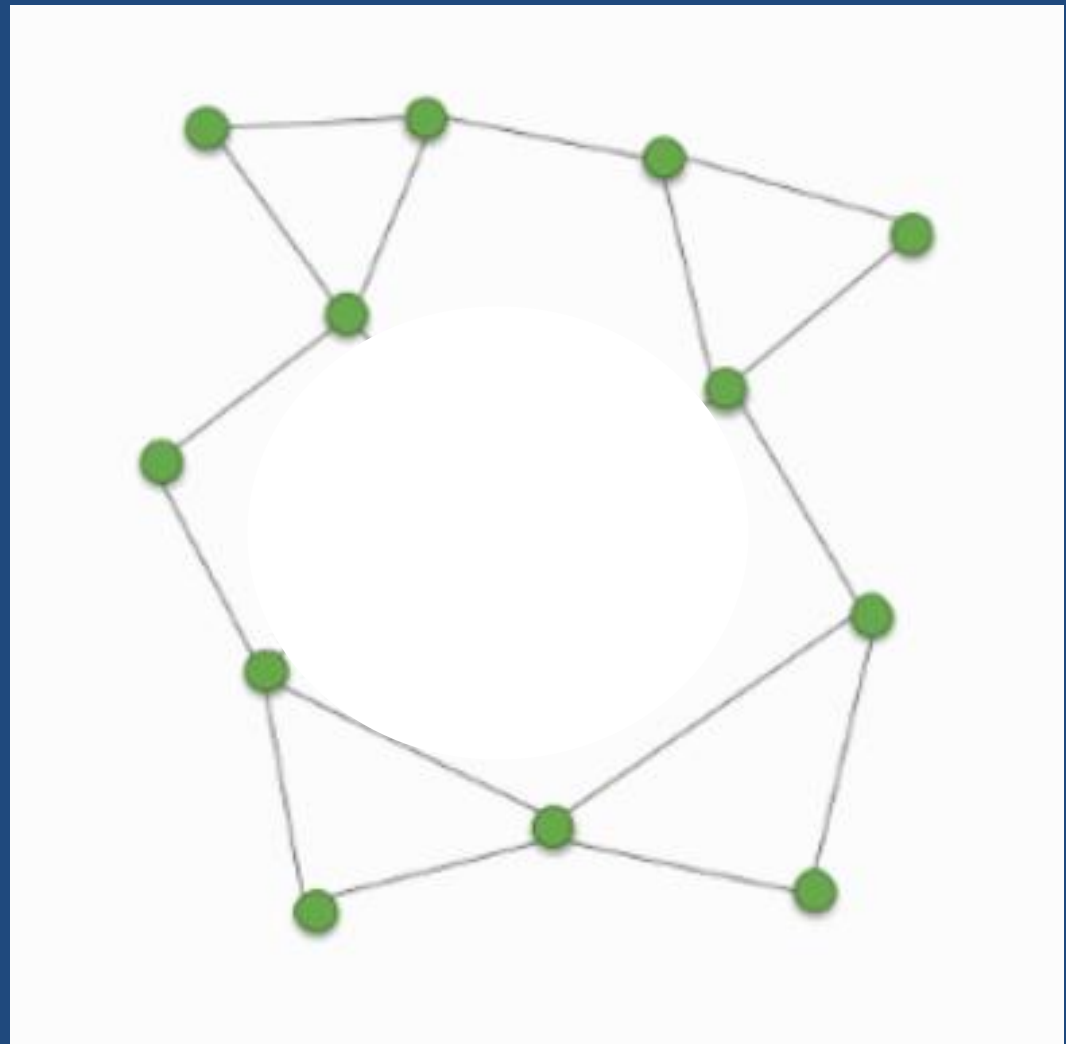


Mesh Configuration at End Users

From AREDN Documentation

Self-Healing

**Alternate
paths remain
if one node
drops out**

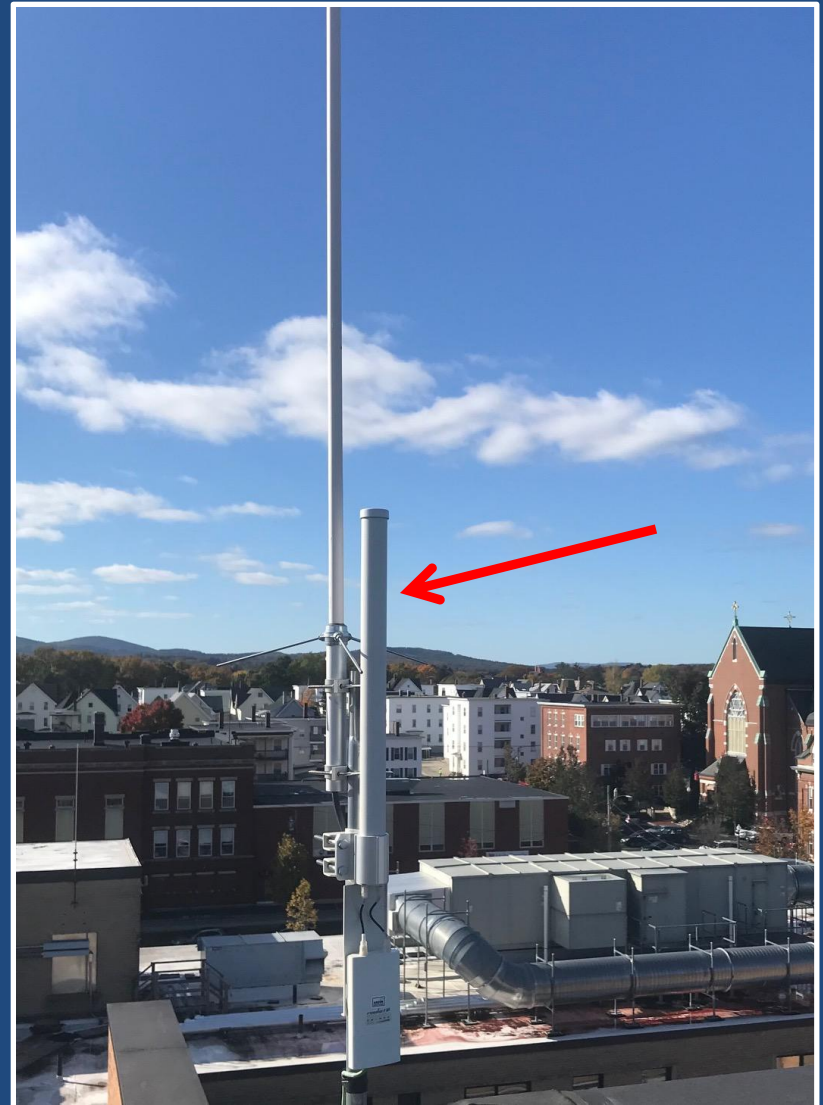


Mesh Nodes – Omni Antennas

Elliot Hospital



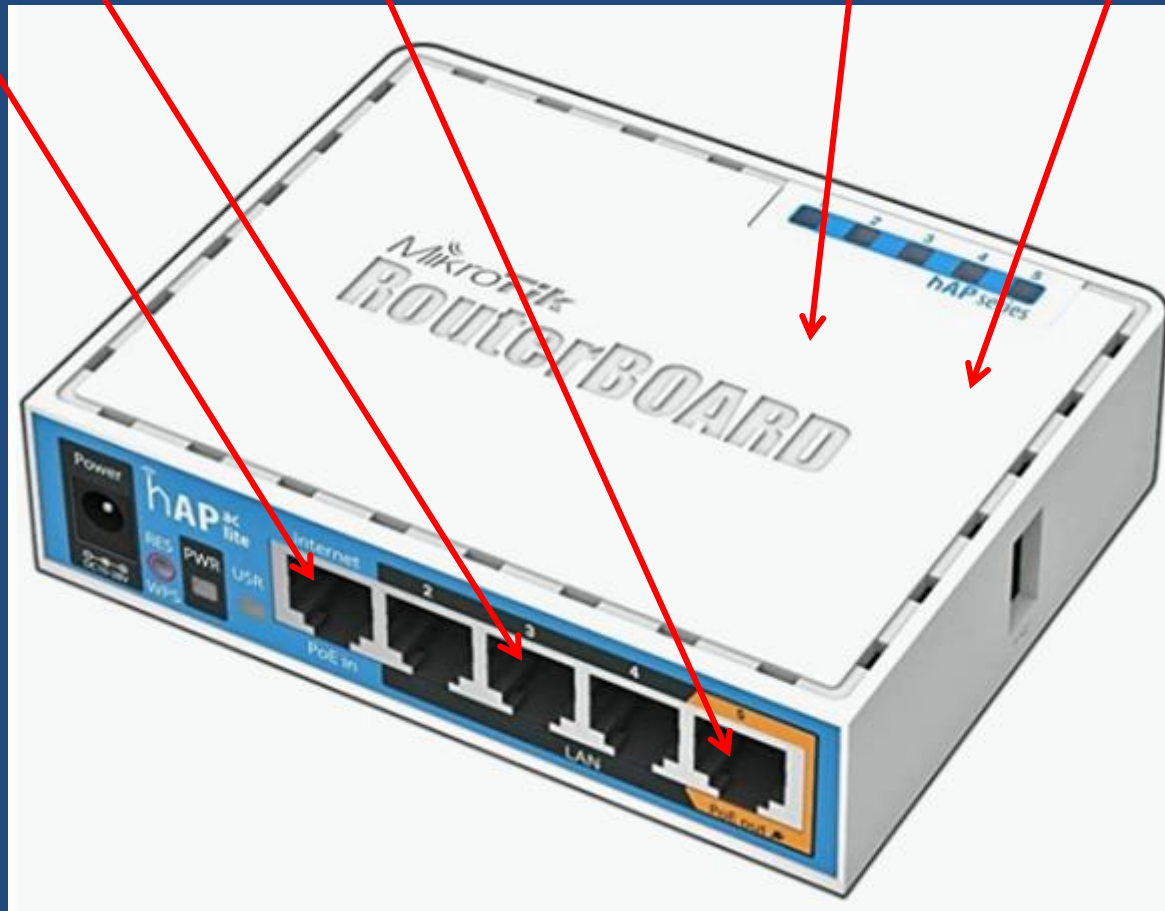
Catholic Medical Center



What can we do with AREDN?

MikroTik 2.4 / 5.8GHz Router & Access Point (~\$60)

WAN, LAN, Device-to-Device*, WiFi AP, AREDN Node



* Wire connection between AREDN routers

What can we do with AREDN?

WiFi Access with Browser and IP Phone

**Password Protected
WiFi Browser
VOIP
Smart Phone Apps
DMR HotSpot**



What can we do with AREDN?

Internet WAN, LAN, and Device-to-Device Ports



What can we do with AREDN?

Add Computers to LAN Ports



Computer with NoMachine Remote Access Software

- Free
- Supports various computer platforms
- No central internet server required

What can we do with AREDN?

Add a Spectrum Analyzer to Computer



**WebSDR / Spectrum Analyzer
At Repeater Sites**

What can we do with AREDN?

Remote VHF / UHF Radio Operation via Computer



What can we do with AREDN?

Remote HF Radio Operation



What can we do with AREDN?

DMR Repeater Link to c-Bridge



How You Can Participate

AREDN 2.4GHz RF Node & Tunnel Router
HamXpo 2023 Workshop by Jim Garner KC1BHD
Great Club Project or Individual Training

Purchased Sep 2023



GL.iNet

GL-AR300M16-Ext Portable Mini
Travel Wireless Pocket Router - WiFi
Router | OpenWrt | 2 x Ethernet...

Wi-Fi, USB, Ethernet

4.2 ★★★★★ (1,626)

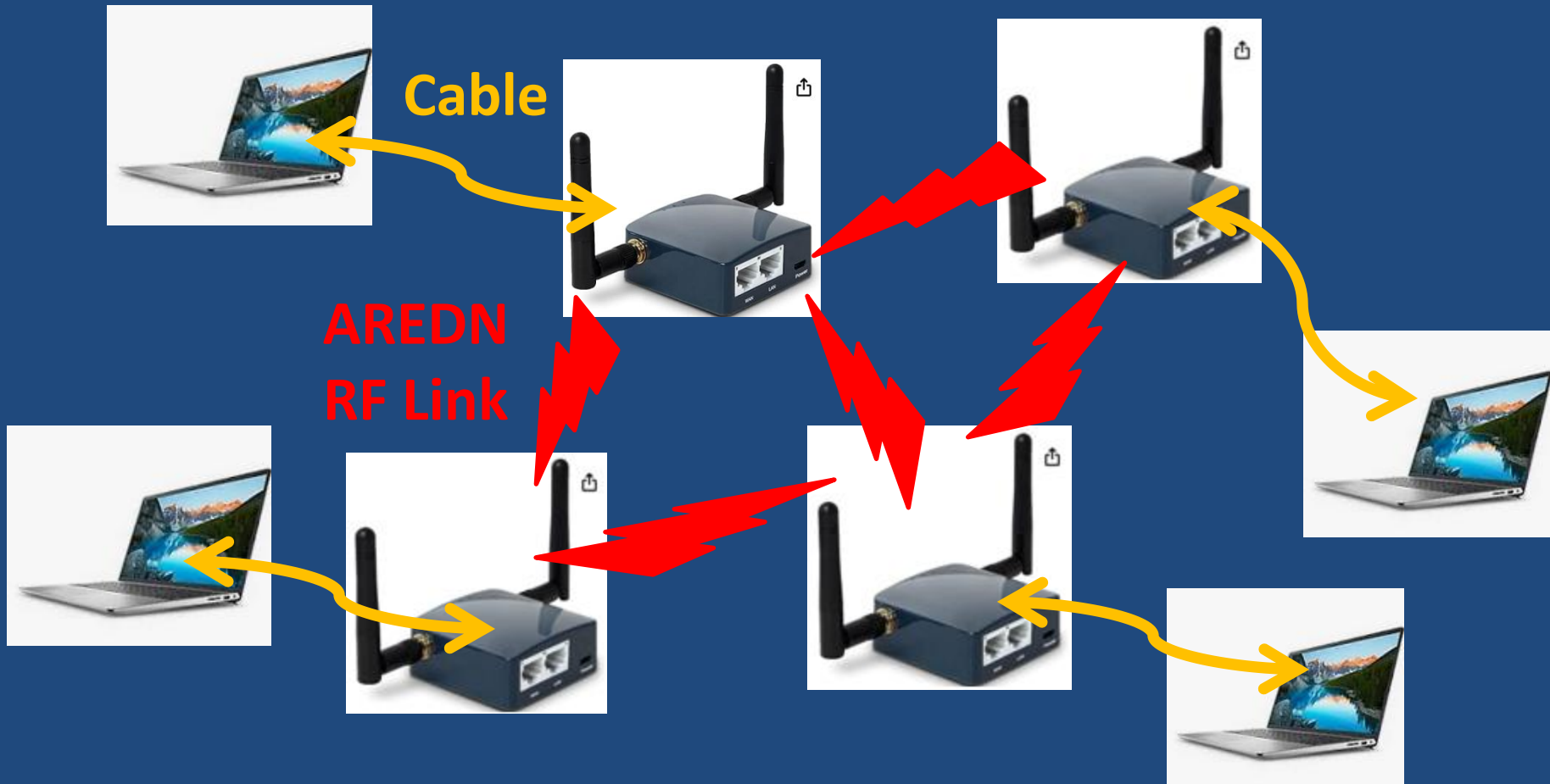
200+ bought in past month

\$31⁹⁰ List: ~~\$36.90~~

✓prime Overnight

FREE delivery **Overnight 4 AM - 8 AM**

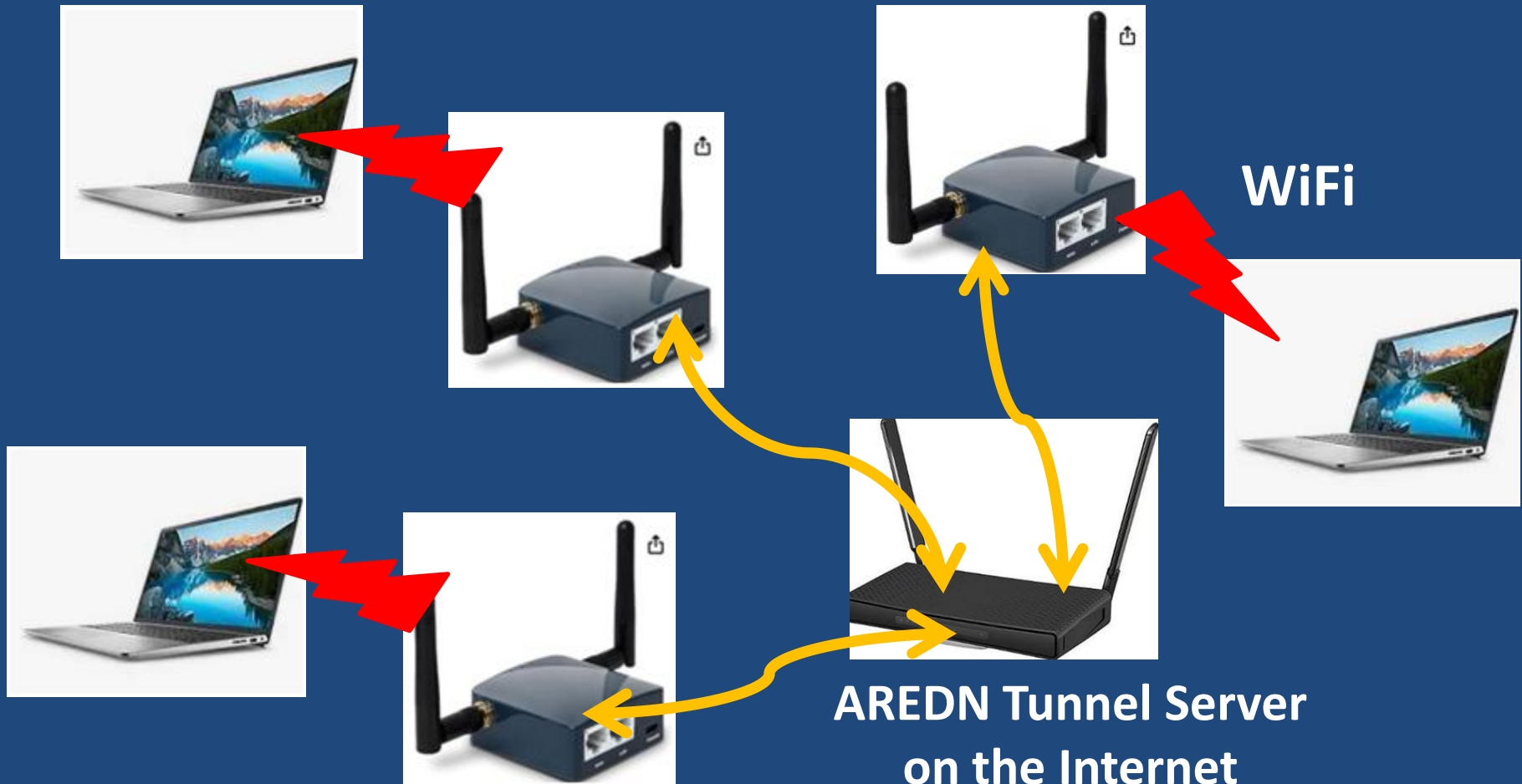
Ways To Use GL.iNet AR300M16 Mesh Network Router – WiFi Distances



Ways To Use GL.iNet AR300M16

Internet Tunnel Client Built-in to AREDN

(Of course, don't rely on internet for EmComm)

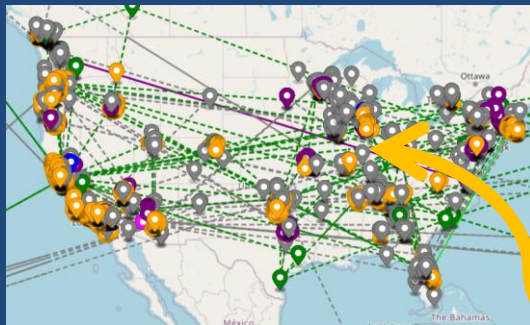


Ways To Use GL.iNet AR300M16

Internet Tunnel Client Built-in to AREDN

(Of course, don't rely on internet for EmComm)

AREDN Global System



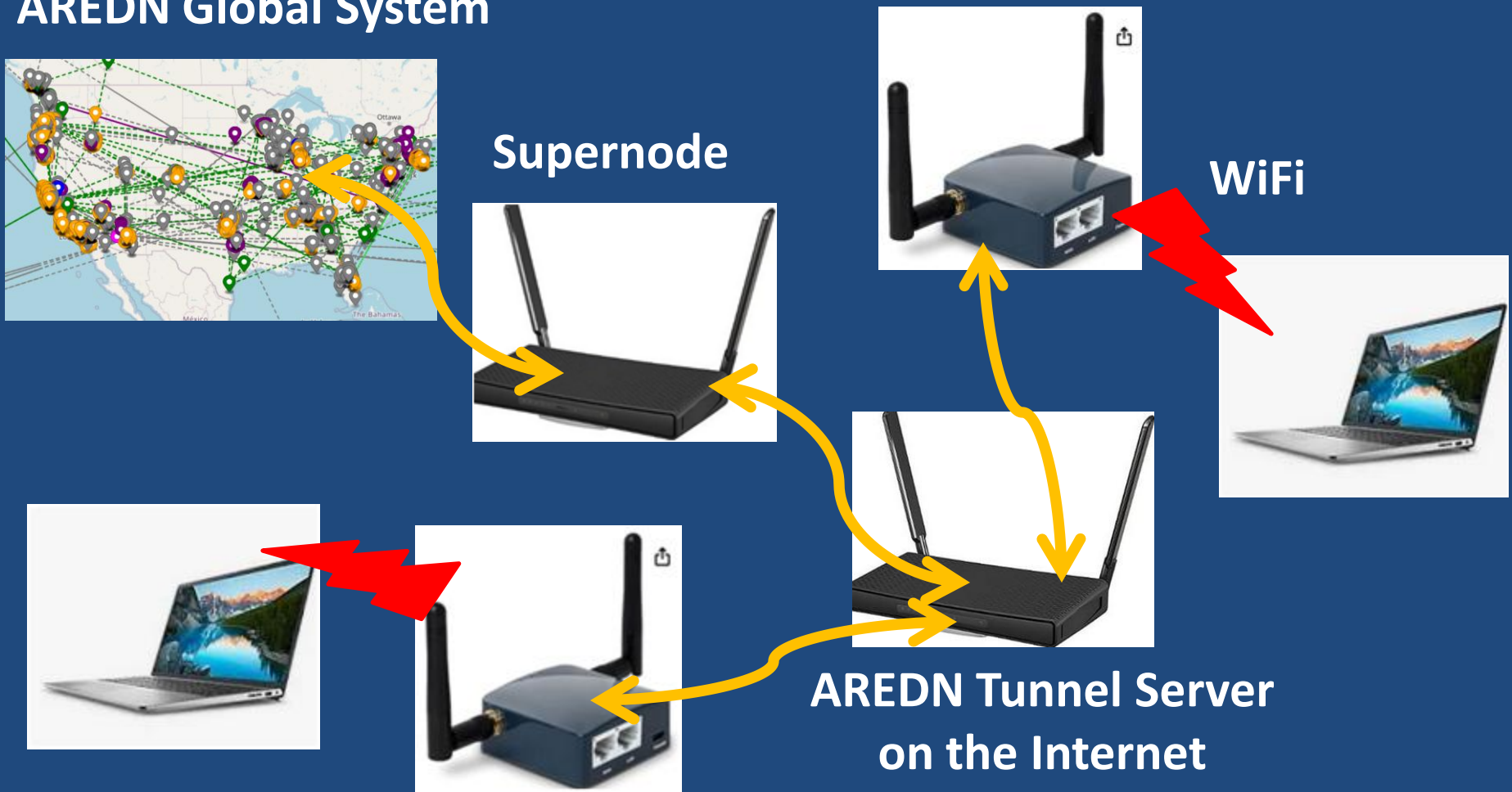
Supernode



WiFi



**AREDN Tunnel Server
on the Internet**



MikroTik hAP ac3 Tunnel Server (~\$110)

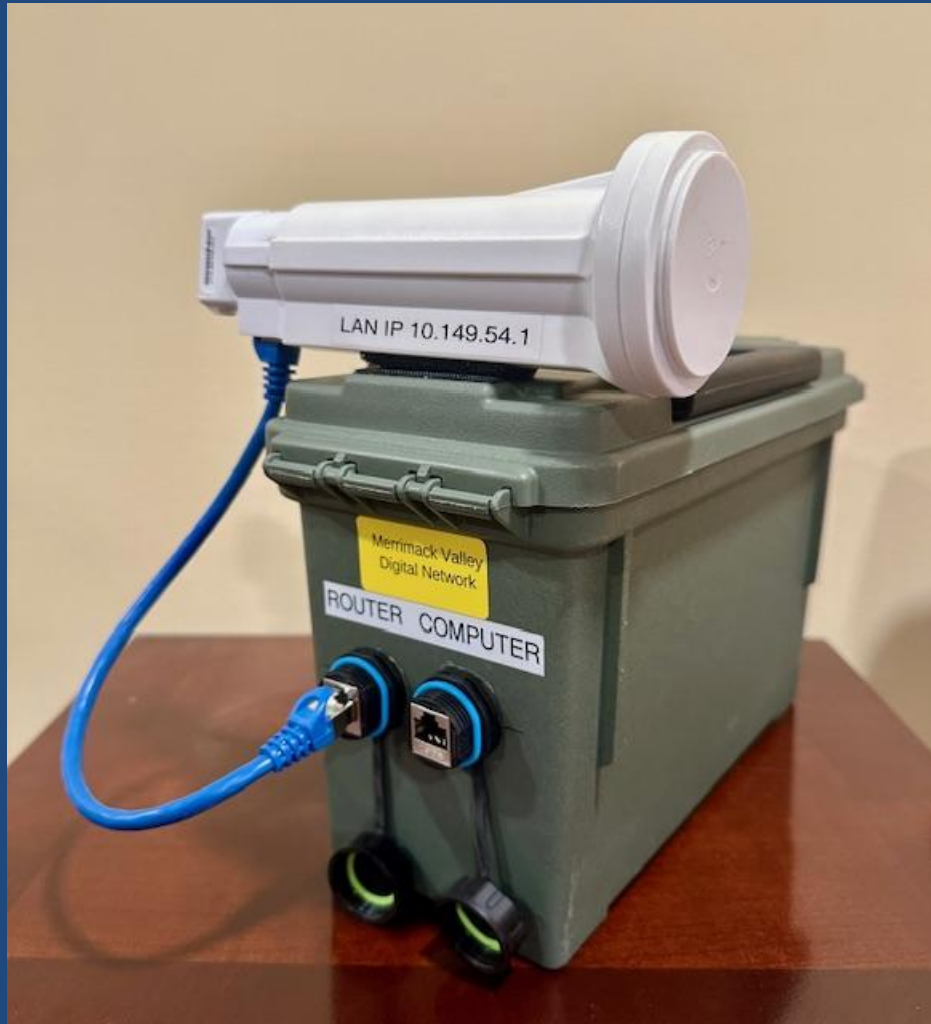


- Free DDNS from NoIP.com aimed at your home router IP
- Static IP address on home router for tunnel server
- Forward port 5525 from home router to tunnel server

Portable AREDN RF Network Router

Training up to ~500 feet with just a feedhorn

Add parabolic reflector to increase distance up to ~15 miles



Portable AREDN RF Network Router Components


Most from Amazon

Visit the Plano Store 4.7 ★★★★★ (5,339)
Plano 131250 1312 Ammo Box, OD Green 131250,4.80 x 7.40 x 11.60 inches
500+ bought in past month



\$11⁹⁹

ANMBEST 10PCS Panel Mounting Shielded CAT6 RJ45 Waterproof Connector Cat5/5e/6 8P8C Ethernet LAN Cable Coupler Double...
Purchased 1 time Last purchased Nov 15, 2024
4.5 ★★★★★ (143)



Length: 10PCS

\$38⁹⁹ (\$3.90 / count)

Purchased Nov 2024


CYCLENBATT
12V 10Ah Lithium Battery, 5000+ Cycles LiFePO4 12V 10Ah Battery Built-in 10A BMS, 12V Lithium...



4.5 ★★★★★ (143)
400+ bought in past month


\$28⁹⁹
Save 10% with brand promotion
✓prime One-Day

Brand: SIOCEN 4.3 ★★★★★ (32)
2Pack 16AWG DC Plug Connector DC Power Pigtails Cable, 2.1mm x 5.5mm DC Male Plug to Bare Wire Open End, 12 Volt DC Barrel Supply Adapter Repair Cord for CCTV Security Camera, 12v LED Strip Light 3FT
200+ bought in past month




\$8⁹⁹

LUORNG POE Splitter Injector Kit 1Pair Power Over Ethernet Passive PoE Adapter Injector Splitter Cable with 5.5x2.1mm DC...
Purchased 4 times Last purchased Dec 7, 2024
4.7 ★★★★★ (8)



\$6⁹⁶
✓prime Two-Day
FREE delivery Tuesday, February 4

Ships from Amazon
Sold by zzwslsm



Elecan Cat 6 Flat Ethernet Cable 1 Ft/5 Pack, High Speed Slim Short Patch Cables Internet Cables, 30 AWG Pure Copper 10Gbps 500MHz, Thin Flexible for POE Cat6 Cat 5e Cat 5 Network Cable...

★★★★★ 98

\$8⁹⁹ (\$1.80/Count)
✓prime
FREE delivery Fri, Feb 7 on \$35 of items shipped by Amazon
Or fastest delivery Tomorrow, Feb 3

Add to cart



ebay 6 ♥

Ubiquiti Networks (LOT OF 10)
PowerBeam M5 PBE-M5-400
(Feed Horn Only) Bridge

wifistore powered by SWG Inc
(2577)
100% positive feedback

\$120.00
or Best Offer

Portable AREDN RF Node

Parts List	
1-Plastic Ammo Box	\$12
1-12v 10Ah LiFePO4 Battery	\$30
1-Ubiquiti 5GHz Feedhorn	\$12
1-Power Cable 2.1mm Plug	\$5
1-POE Injector	\$7
2-RJ45 Feedthrus	\$4
1-1ft Flat Ethernet Cable	\$1
1-1ft Ethernet Cable	\$2
1-5ft Ethernet Cable	\$3
Total	\$76

Services Added to Router Firmware

MeshChat for Chat

Zone: GMMeshChat-1751

Call Sign: K1EHZ

Node: K1EHZ-Bedford7-NH-TUN

Updated: 10 seconds ago

Send a Message

New Message

Enter message here

Channel: Everything

SEND

Mesh Chat Users

1

Call Sign	Node	Last Seen
K1EHZ	K1EHZ-Bedford7-NH-TUN	2/23/25 2:57 PM

Messages

Search: Enter search

Channel: Everything

Time	Message	Call Sign	Channel	Node
2/23/25 1:49 PM	Test NEMeshCHat Channel	K1EHZ	NEMeshChat	N1MVA-Chester2-NH-TUN
2/23/25 1:33 PM	Test group name.	K1EHZ		K1EHZ-Bedford7-NH-TUN
2/23/25 1:25 PM	GMMeshchat-1751 is a group established for Manchester NH area participants. It's fine to start a new group named NEMeshChat.	K1EHZ		K1EHZ-Bedford7-NH-TUN
2/20/25 12:07 PM	I propose we rename the zone to NEMeshChat instead of GMMeshChat-1751 as it's more descriptive.	KN00	GMMeshChat-1751	KN00-Rockville-ME

Services Added to Router Firmware

MeshChat for File Transfer

Mesh Chat v2.13

Zone: GMMeshChat-1751
Call Sign: K1EHZ

Node: K1EHZ-Bedford7-NH-TUN
Updated: 8 seconds ago

Upload a File

Upload File

Browse...

No file selected.

UPLOAD

File System

Total Storage: 512.0 KB
Free Storage: 512.0 KB

DOWNLOAD MESSAGES

Files Available

0 Files

File	Size	Node	Time
------	------	------	------

Mesh Chat v2.13 Copyright © 2025 [Trevor Paskett - K7FPV](#) (Lua by KN6PLV)

Services Added to Router Firmware

iPerf for Data Throughput – 48-mile Link - 2/16/2025 Storm

iperf3 test started

Client: N1MVA-Shapleigh2-ME-CHS

Server: N1MVA-Chester4-NH-SHP

[17] local 10.202.67.34 port 33536 connected to 10.202.67.39 port 5201

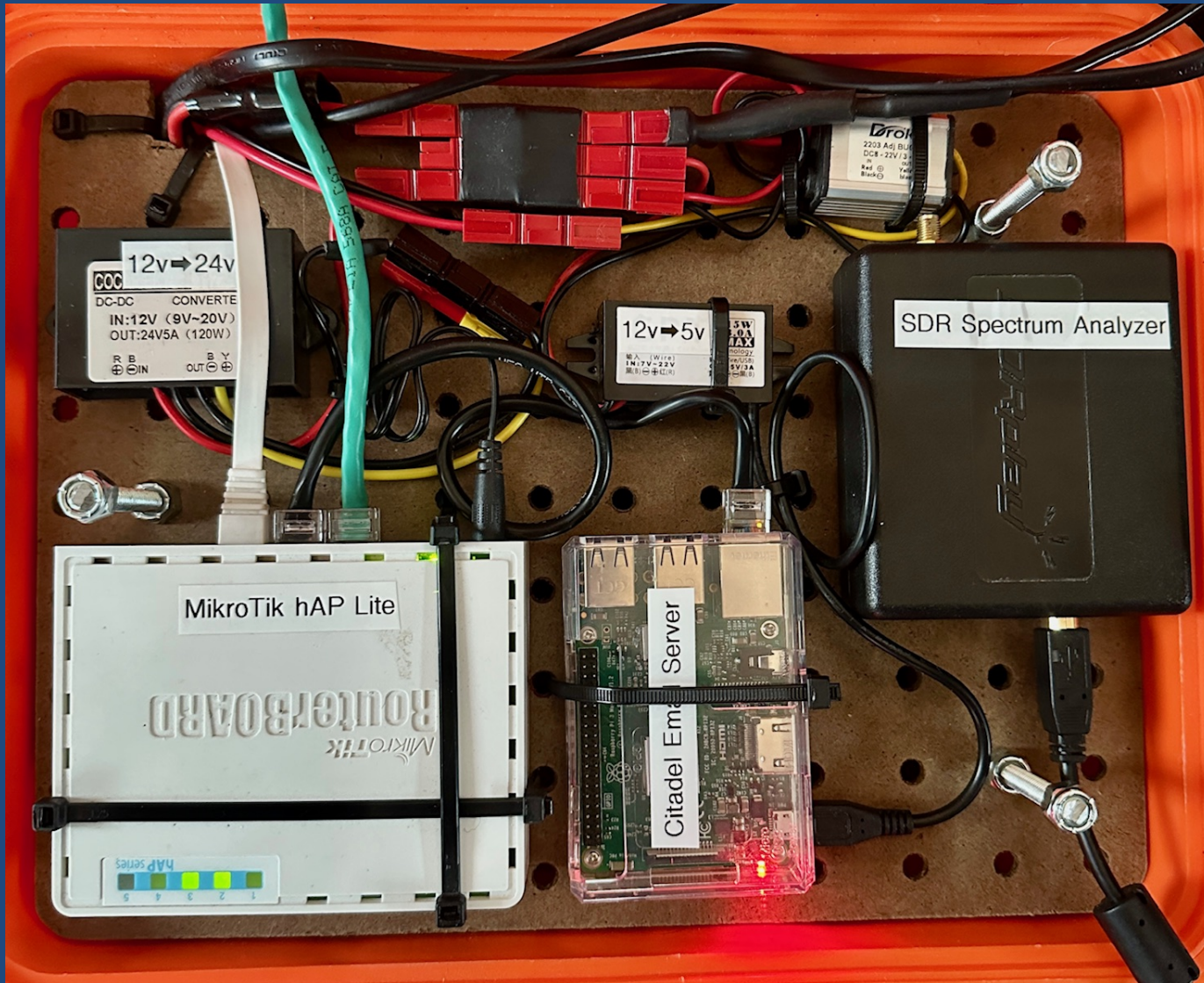
[ID]	Interval		Transfer	Bitrate	Retr	Cwnd	
[17]	0.00-1.00	sec	2.09 MBytes	17.5 Mbits/sec	0	253 KBytes	
[17]	1.00-2.00	sec	1.56 MBytes	13.1 Mbits/sec	0	253 KBytes	
[17]	2.00-3.00	sec	2.23 MBytes	18.7 Mbits/sec	0	272 KBytes	
[17]	3.00-4.00	sec	1.42 MBytes	11.9 Mbits/sec	0	287 KBytes	
[17]	4.00-5.00	sec	1.94 MBytes	16.3 Mbits/sec	0	287 KBytes	
[17]	5.00-6.00	sec	1.61 MBytes	13.5 Mbits/sec	0	315 KBytes	
[17]	6.00-7.00	sec	1.98 MBytes	16.7 Mbits/sec	0	324 KBytes	
[17]	7.00-8.00	sec	1.88 MBytes	15.7 Mbits/sec	0	324 KBytes	
[17]	8.00-9.00	sec	1.55 MBytes	13.0 Mbits/sec	0	324 KBytes	
[17]	9.00-10.00	sec	2.30 MBytes	19.3 Mbits/sec	0	643 KBytes	

[ID]	Interval		Transfer	Bitrate	Retr		
[17]	0.00-10.00	sec	18.6 MBytes	15.6 Mbits/sec	0		sender
[17]	0.00-10.07	sec	18.0 MBytes	15.0 Mbits/sec			receiver

iperf Done.

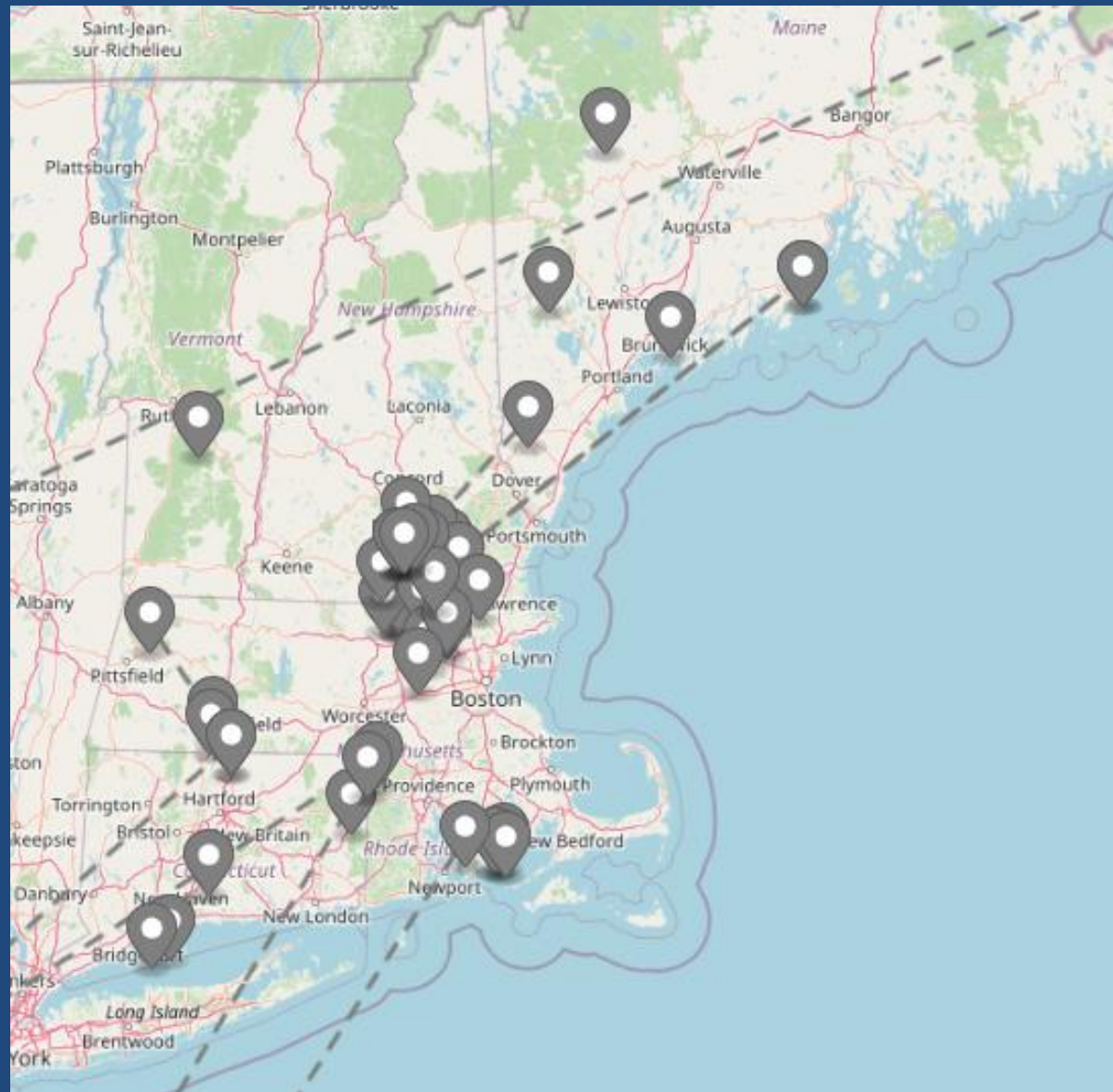
Sun Feb 16 2025 08:33:20 GMT-0500 (Eastern Standard Time)

AREDN GoBox With Computers



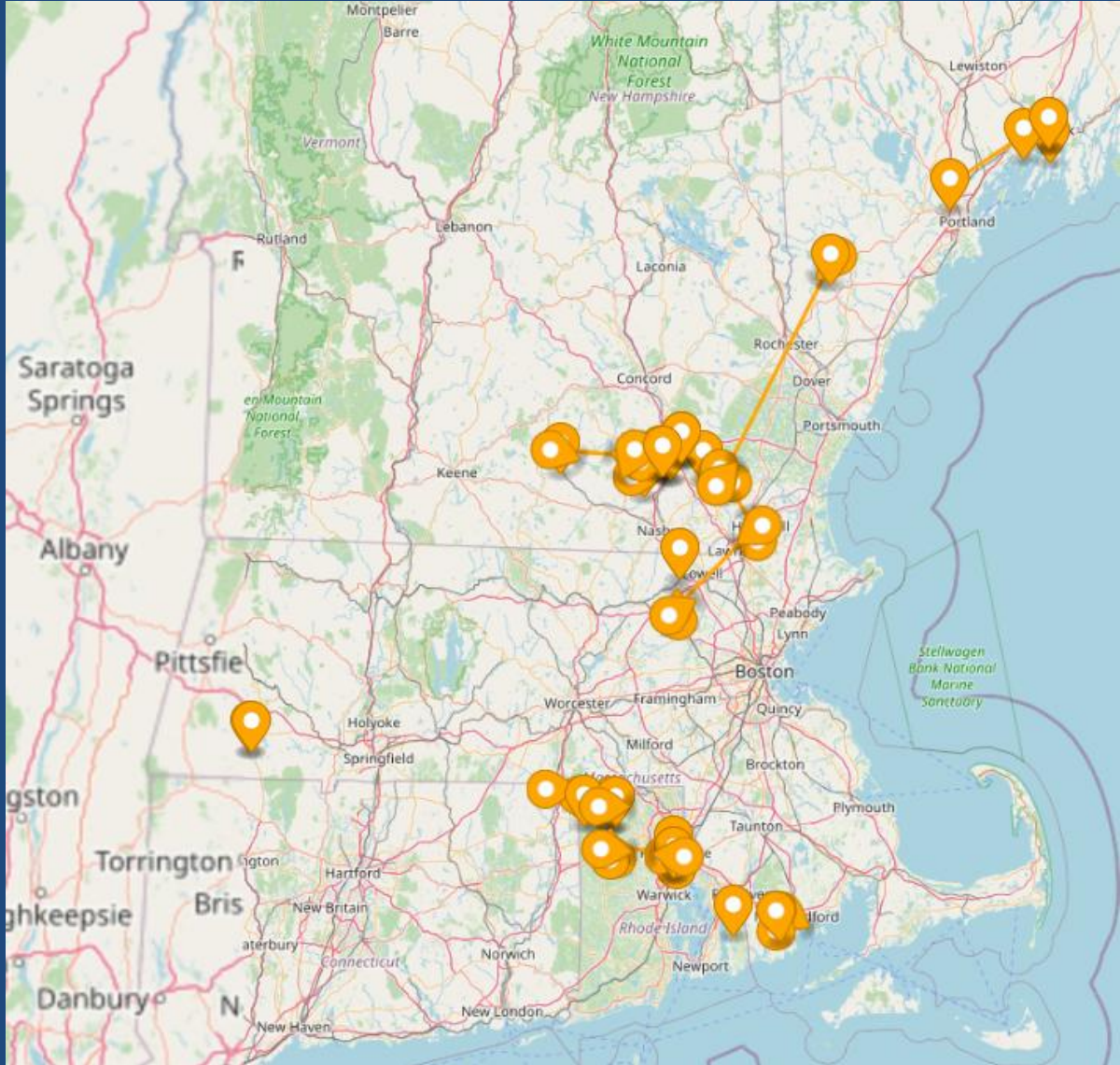
AREDN Map

Internet Tunnel Nodes in New England



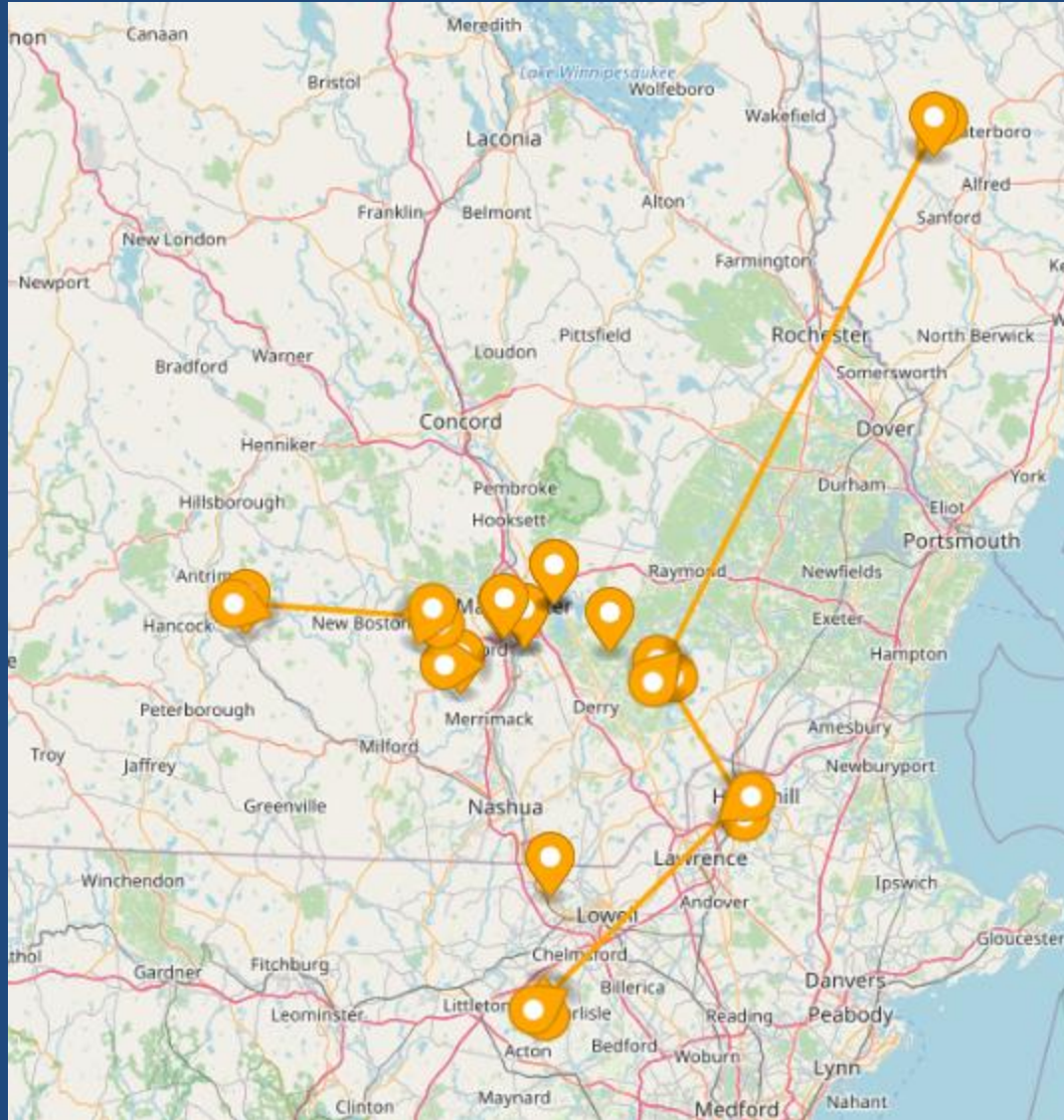
AREDN Map

5GHz RF Nodes in New England



AREDN Map

Merrimack Valley Digital Network 5GHz Nodes



Summary

- AREDN IP-based Part 97 System
 - Data network easily deployable by hams without much networking expertise
- Network Services
 - Many internet applications within available bandwidth
- You can participate with equipment beginning at \$35
 - Group nets on RF or over internet tunnel
 - Chat, file transfer, and data speed programs on nodes, no separate servers needed
 - Internet tunnel to global AREDN system from home

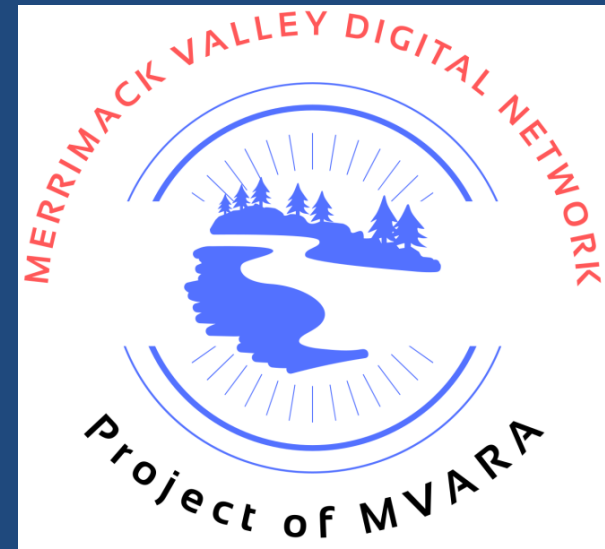
Merrimack Valley Amateur Radio Association

501(c)3 Nonprofit Corporation

We welcome members wherever you live



merrimackvalleyara.org



Discussion

merrimackvalleyara.org

