

AREDN Mesh in SoCal

Justifying the Challenge to Realize Its Full Potential

By Mark Warrick, KM6ZPO

The background is a complex, abstract composition. It features a network of interconnected nodes and lines, resembling a data or communication network. Overlaid on this are various geometric elements: a grid with axes in the top left, a series of binary digits (0s and 1s) arranged in a pattern, and a large, faint dollar sign in the bottom right. The color palette is dominated by shades of blue and purple, with some white and light blue highlights.

THE JUSTIFICATION

- AREDN provides a **data network** when other data networks are down or overloaded.
- (For example, the Internet, cell phone networks, etc.)

Who Uses AREDN?

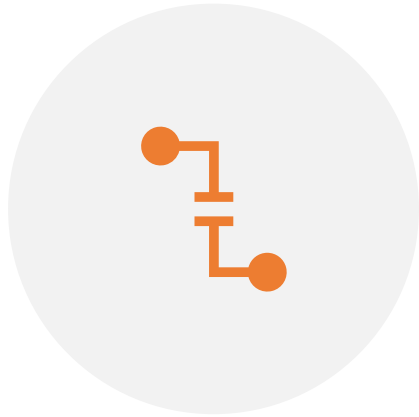
City of Irvine IDEC – all high schools (disaster shelters) are interconnected with one another and the police station where ham operators can monitor situations throughout the city and communicate back and forth over the data network.

Tri-Cities RACES has field-deployable kits that provide a similar level of functionality and connectivity as IDEC.

Costa Mesa RACES / CERT teams are using AREDN to provide a video feed to the fire department during the OC Marathon.

Dozens of RACES / ARES / AUXCOMM orgs and hams across the nation for every type of digital communication.

THE CHALLENGE



LIMITED NUMBER OF
HIGH POINT NODES



FREQUENCIES SHARED
WITH CONSUMER AND
COMMERCIAL DEVICES



BUILDINGS AND HILLS.

Amateur Frequency Allocations for AREDN – 2GHz

900 MHz	Channel	4	5	6	7
	Ctr Freq	907	912	917	922
	Status	Shared with US unlicensed			

You are responsible for using frequencies, channels, bandwidths, and power levels that comply with your country's amateur radio license requirements.

2.4 GHz	Channel	-2	-1	0	1	2	3	4	5	6	7	8 *
	Ctr Freq	2.397	2.402	2.407	2.412	2.417	2.422	2.427	2.432	2.437	2.442	2.447
	Status	Unshared		Cannot Use	Shared with US unlicensed							

* Only 5 MHz channel width is available on channel 8

- NOTE: 900 MHz nodes are rare

Amateur Frequency Allocations for AREDN – 3GHz

3.4 GHz	Channel	76	77	78	79	80	81	82	83	84	85	86	87	88	89
	Ctr Freq	3.380	3.385	3.390	3.395	3.400	3.405	3.410	3.415	3.420	3.425	3.430	3.435	3.440	3.445
	Status	Shared with US non-Amateur users													

90	91	92	93	94	95	96	97	98	99
3.450	3.455	3.460	3.465	3.470	3.475	3.480	3.485	3.490	3.495
~~ Elimination in US by 14 April 2022 ~~									

- The FCC did not ban all 3 GHz use! 3 GHz works well in our area for long-range links.

Amateur Frequency Allocations for AREDN – 5GHz

5.8 GHz	Channel	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148
	Ctr Freq	5.655	5.660	5.665	5.670	5.675	5.680	5.685	5.690	5.695	5.700	5.705	5.710	5.715	5.720	5.725	5.730	5.735	5.740
	Status	Shared with US unlicensed indoor/outdoor DFS & Radar Avoidance (max EIRP 1000mW)															Shared with Unlicensed...		
		149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166
		5.745	5.750	5.755	5.760	5.765	5.770	5.775	5.780	5.785	5.790	5.795	5.800	5.805	5.810	5.815	5.820	5.825	5.830
		Shared with US unlicensed indoor/outdoor (max EIRP 200W)																	
		167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184
		5.835	5.840	5.845	5.850	5.855	5.860	5.865	5.870	5.875	5.880	5.885	5.890	5.895	5.900	5.905	5.910	5.915	5.920
		...Shared with Unlicensed			Shared with US unlicensed mainly indoor (max EIRP 200W)										Shared with Intelligent Transportation System				

Power limits shown are for non-Amateur services which share the specified channels.

THE POTENTIAL

IP Phones

Audio & Video
Conferencing

Video
Surveillance

Chat

File Sharing

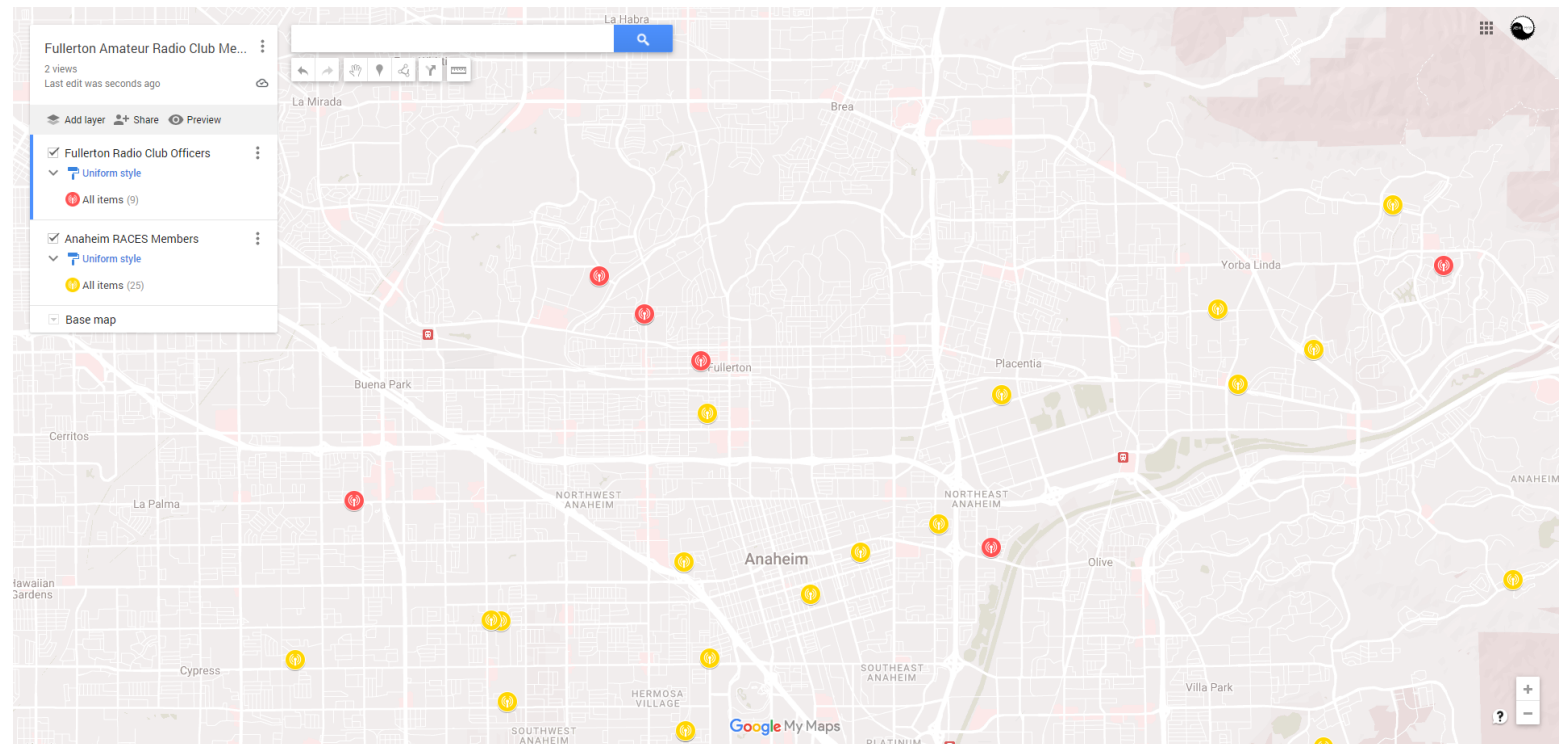
Email

Winlink

And more...

What Can You Do to Help? Build the Infrastructure

- Use short range nodes to connect house to house.
- Use sector nodes on buildings, existing towers, etc.
- Use dish nodes to connect cities to the [greater MESH](#).
- Use internet tunnels where RF won't work. *



* Internet tunnels may not work during power and/or internet outages.

What Do *WE* Need to Build *OUR* MESH?

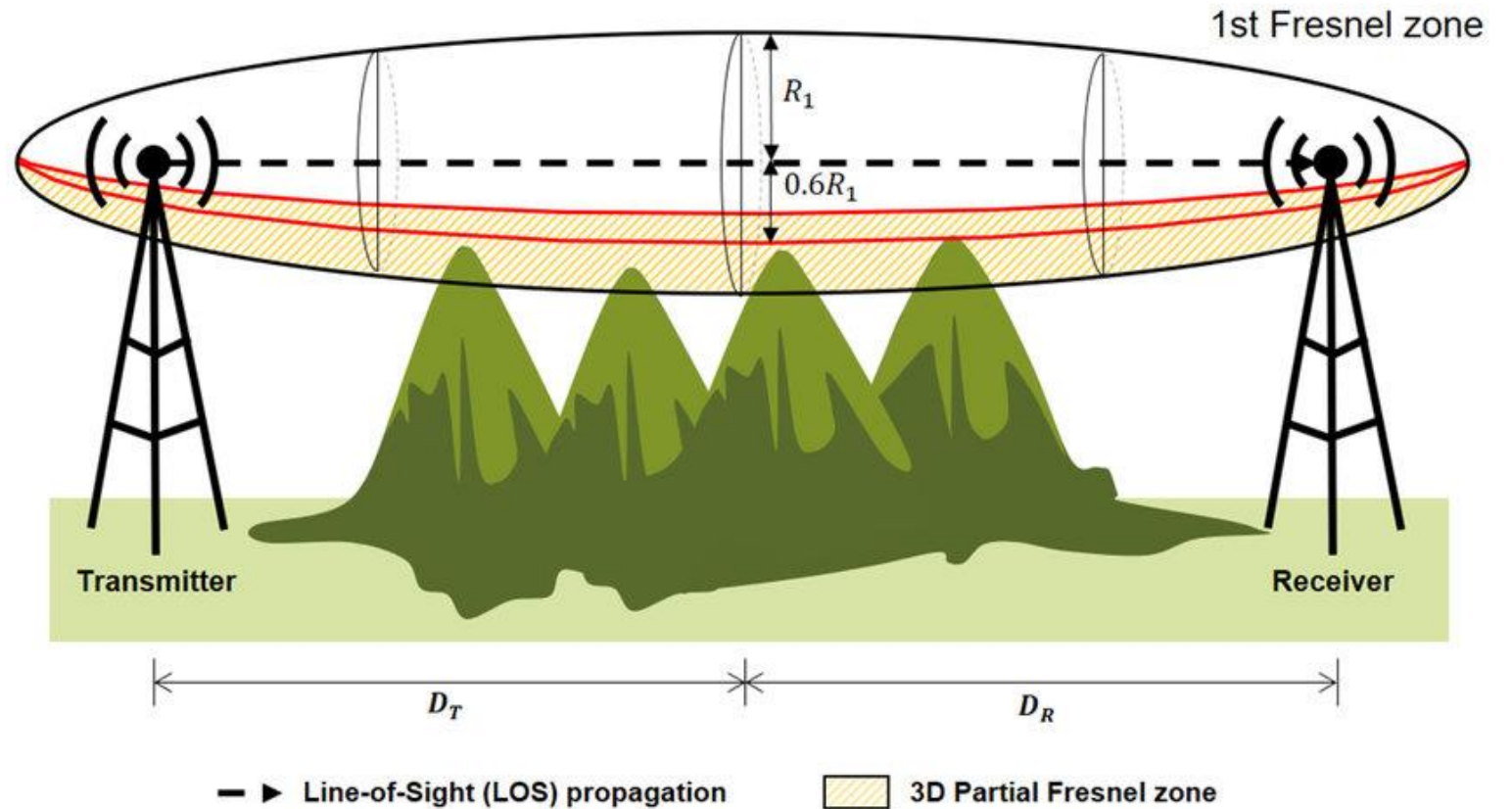
- Technician or better amateur operator license
- Line-of-Site (LOS) free of obstructions.
- A suitable node for the distance.
 - TP-Link CPE-210 (2 GHz) – Amazon \$39.99
 - TP-Link CPE-510 (5 GHz) – Amazon \$44.99
 - Supported Platform Matrix
- Microtik hAP ac lite Router – Amazon \$47.96
- Somebody to configure the equipment

How to we connect to the greater MESH with RF?

- A node (i.e. dish) with sufficient gain and a **clear line of site** to the high point nodes. See [Supported Platform Matrix](#)
- Line-of-Site (LOS) free of obstructions.
- Advanced knowledge of TCP/IP networking or somebody to configure the equipment.
- Recommended: [Microtik hAP ac lite Router](#) – [Amazon \\$47.96](#) for internal routing.
- A really good reason - if everyone connects to high point nodes full-time, those important links will become overloaded.

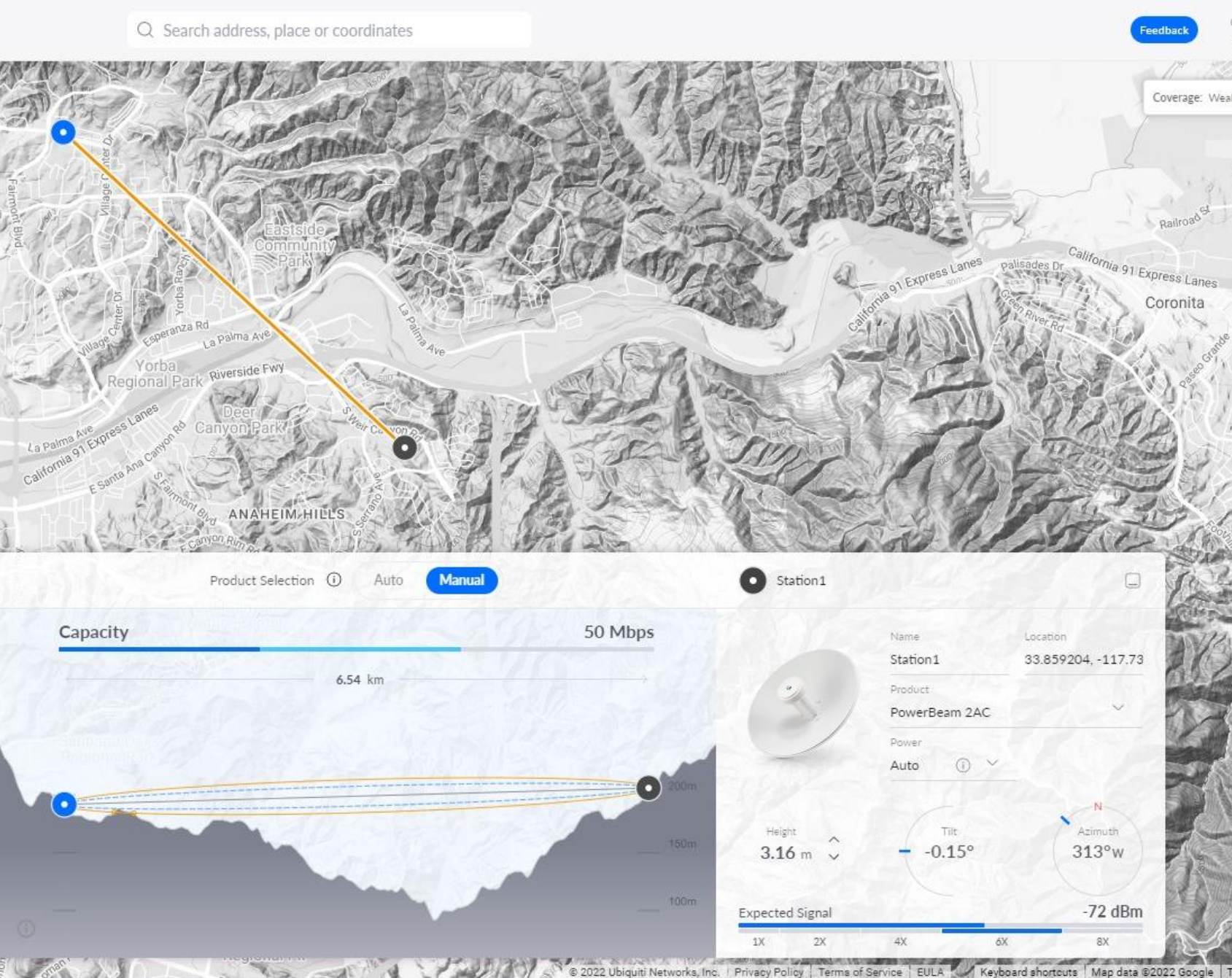


The Fresnel Zone



<https://ispdesign.ui.com>

<https://www.heywhatsthat.com>



2022 Field Day AREDN Connection

- 4 miles away
 - Fresnel interference
 - Solid connection
-
- IP Phones
 - IP Cameras
 - Winlink
 - MeshChat
 - Internet (via KN6RVU)

What Do I Need for IP Phones?

- Technician or better amateur operator license
- Internet connection **or a connected node**
 - (With home router that can port forward 5525)
- Microtik hAP ac lite Router – Amazon \$47.96 (for tunneled connections)
- An IP Phone (GrandStream GXP1610 Single Line - \$36.68)
- Somebody to configure the equipment
- NOTE: Soft phones (i.e. MicroSip) can be used



What Do I need for Everything Else?

- Technician or better amateur operator license
- Internet connection
 - (With home router that can port forward 5525)
- Microtik hAP ac lite Router – Amazon \$47.96
(for tunneled connections)
- A fairly current laptop running Windows 7 (Windows 10 is better).
- Somebody to configure the equipment



How Can I Learn More?

- Join the AREDN community by visiting <https://arednmesh.org>



Amateur Radio Emergency Data Network

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Forums

View Forums Active topics Unanswered topics New & updated topics

Forums

	Forum	Topics	Posts	Last post
	General discussion	1043 15 new	6849	Compatibility... by VE3WZW 1 hour 41 min ago
	Deployment Strategies, tactics, tools and organization for mesh deployments Subforums: GoKits (100), Maps (42)	295	2174	MicroTik hAP ac... by KN6RVU 22 hours 10 min ago
	Hardware Subforums: Nodes (3664), Antennas (320), Network Switches (648), Cameras (39)	763 7 new	5778	Nanostation M2 XM... by AE6XE 03/21/2022 - 14:58
	Tunnels	104 1 new	751	VK3 Melbourne... by ZL2AQY 04/07/2022 - 17:10
	Ragchew This forum is for casual conversion and topics that aren't the primary mission of AREDN.	51	249	ICOM Announces... by AL0R 03/11/2022 - 19:35

AREDN Centers of Excellence (ACE)

How Can I Learn More?

- Visit the Orange County Mesh Organization
- <https://sites.google.com/site/orangecountymeshorganization/home>



Orange County Mesh Organization

Search this site

Navigation

Home

Orange County Major Nodes

Saddleback Nodes
Pleasants Peak
Laguna Woods Village Tower
Mission Viejo City Hall (EOC)
Toro Peak
Edom Hill
Anaheim Ham Radio Outlet
Red Cross – Santa Ana
San Juan Capistrano
Mt. Potosi

Bands, Channels, and Frequencies

Band Plans

More Maps

New SoCal Realtime MAP!
AREDN Node Map
World Map
Planning Map for Orange County
ATV Repeaters and AREDN Nodes
OC RACES
Red Cross Map
Long Beach Veterans Administration
S.A.T.E.R.N.
OCMESH.org Tunnels
Las Vegas Mesh
Baker to Vegas Backbone Nodes

The Orange County (Broadband-Hamnet/AREDN) Mesh Organization



Who is the Orange County (Broadband-Hamnet/AREDN) Mesh Organization?

The Orange County Broadband-Hamnet/AREDN Mesh Organization is a group of Amateur Radio Operators (HAMs) who are working together to establish a synergistic TCP/IP based mesh of nodes in the Orange County (California) area and neighboring counties using commercial hardware and open source software (firmware) developed by the Broadband-Hamnet and AREDN development teams.

Our Expanded Vision.

In addition to promoting **MESH Networking** in Orange County, ocmesh.org is working with **SAREDN** to help build a microwave backbone from "the Mexican boarder to the San Jose bay area". We are also working with meshers in surrounding counties (such as Los

In The News

Laguna Woods Village installs three mesh nodes on gate 14 tower:

[Building a safety net](#)

Mesh networking for the Swallows Day Parade in San Juan Capistrano.

[Read OC RACES Newsletter](#)

Keep up to date on the latest ocmesh.org news. Join our Google Group eMail list

What if I Don't Like to Read?

- Search YouTube for “AREDN”



AREDN

FILTERS

What is AREDN? Ham Radio Emergency Data Network?
17K views • Streamed 11 months ago
Ham Radio Crash Course
Music by Sonic D: Soundcloud.com/sncd Twitter.com/sncd Facebook.com/djsonicd.

AB7PA AREDN Overview 2020
3.8K views • 1 year ago
AREDN
Steve AB7PA introduces viewers to Amateur Radio Emergency Data Network (AREDN) high-speed multimedia mesh networking.

KH6ML Portable AREDN Mesh Backpack with PC / VOIP phone direct dial SXT - DEMO
1.9K views • 5 months ago
Michael KH6ML
Mahalo to all those who helped me get this setup and working!!!! AREDN® acronym stands for "Amateur Radio Emergency Data ...

AREDN Mesh portable LHG hAP mikrotik EMCOMM
221 views • 4 months ago
kh7o

Demos

<http://km6zpo-hap-lite.local.mesh/cgi-bin/mesh>

Questions?

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