



South County ARES
Bay Area Mesh

Agenda

- History of Mesh Networking at SCARES
- What is a Mesh Network
 - Wifi on steroids
 - Uses least “cost” routing
 - Self-healing
- Plugging in and Connecting Your Mesh Node
- San Francisco Wireless Emergency Mesh / Bay Area Mesh
- Installing Nodes on Kings Mountain
- Setting Up Your Mesh Node
- Services on the Mesh
 - Mesh Map

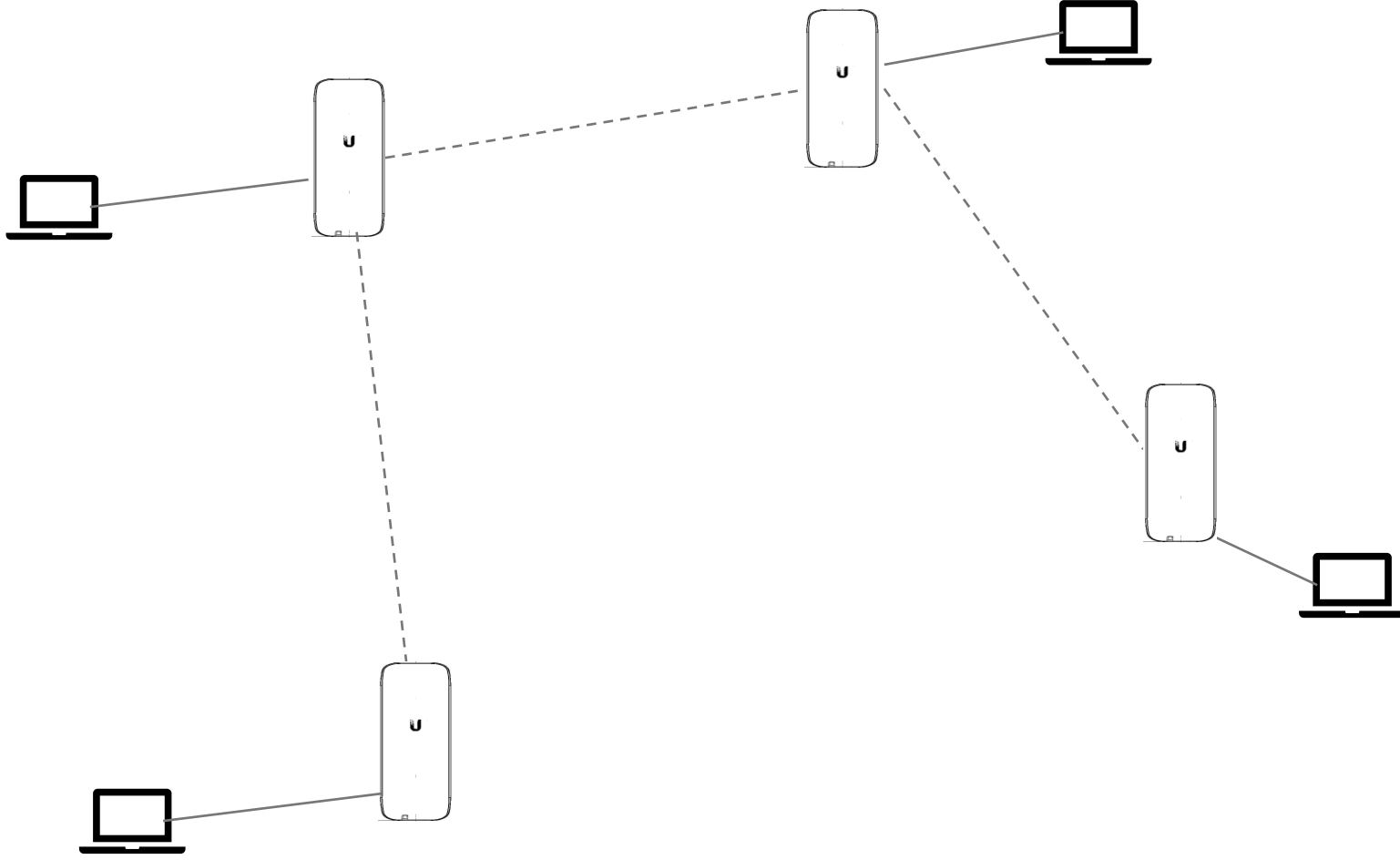
History of SCARES Mesh

- SCARES was an early adopter of mesh networking (back when it was still called Broadband Hamnet)
- Built out a “Proof of Concept” 2.4ghz mesh network
- At the peak we had a dozen or more nodes throughout San Mateo county
- New tall buildings going up and members moving out of the area added new challenges
- Began working with the SFWEM / BAM organization in 2020
- Wrote a grant proposal to acquire new mesh equipment for SCARES members and our served agencies
- Moved from 2.4ghz to 5ghz nodes
- Worked with the Kings Mountain Radio Club to install mesh nodes on their radio tower
- Began deploying 5ghz mesh nodes and equipment to our members and served agencies

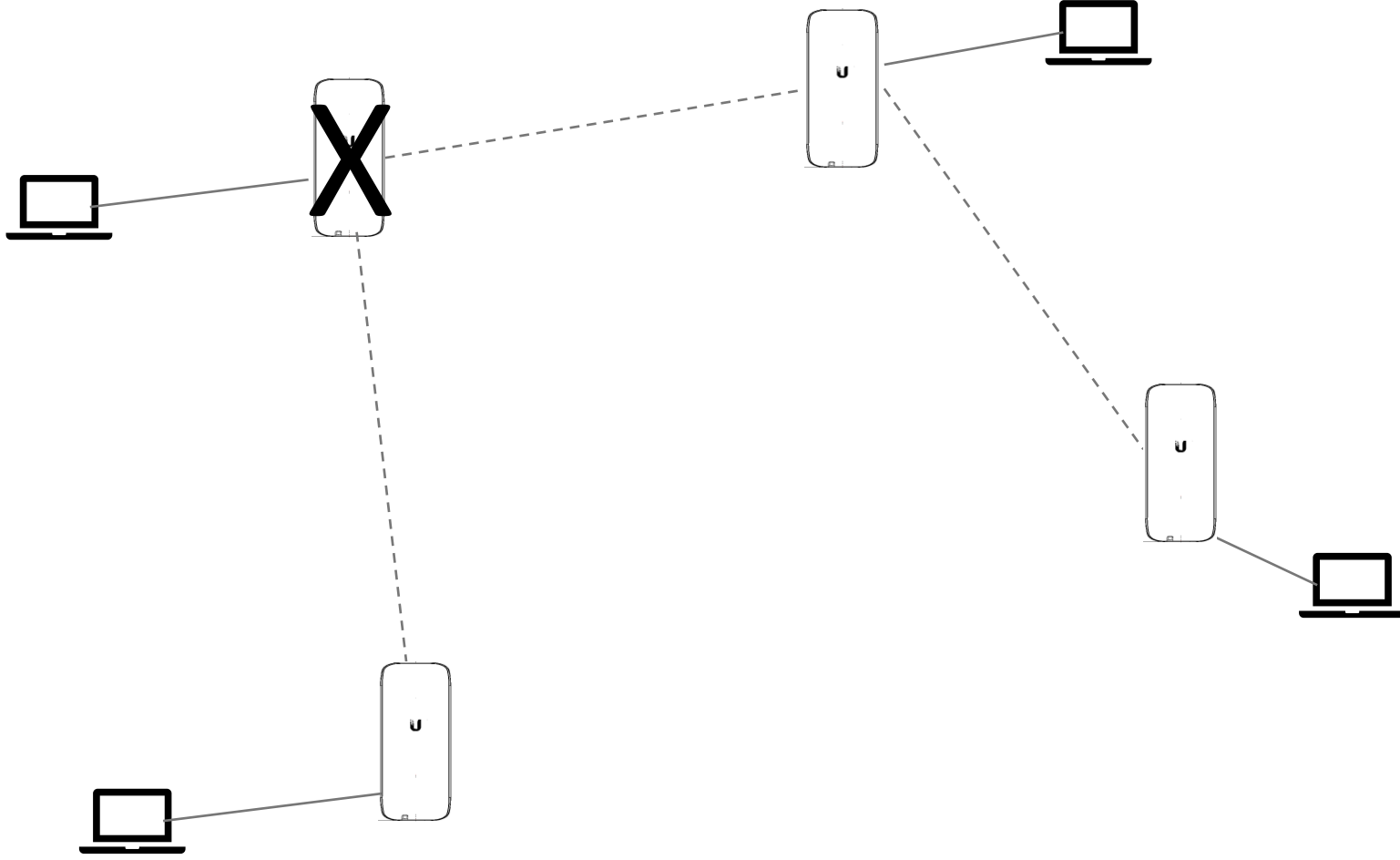
What is the AREDN Mesh Network

- Amateur Radio Emergency Data Network
- TCP / IP based network
- Uses off the shelf networking equipment
- AREDN uses the open source OpenWRT software as a base
- Each Mesh Node (e.g. Ubiquiti Nanostation, MicroTik hAP, etc) is a self-contained single-board computer that runs the AREDN software
- The AREDN software is composed of three layers:
 - Linux – Base Operating System
 - OpenWRT – Open source project for network routers
 - AREDN – The various components used to connect multiple nodes together

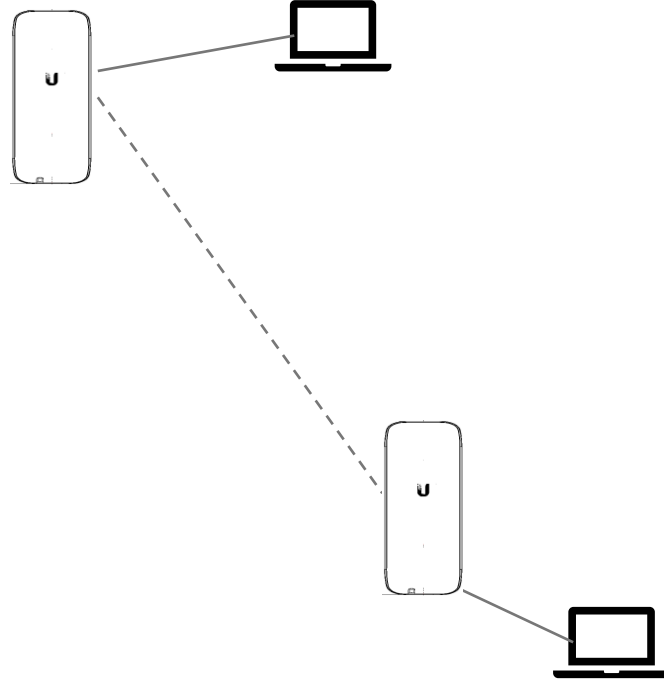
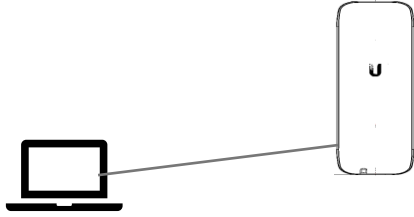
What is Mesh Networking



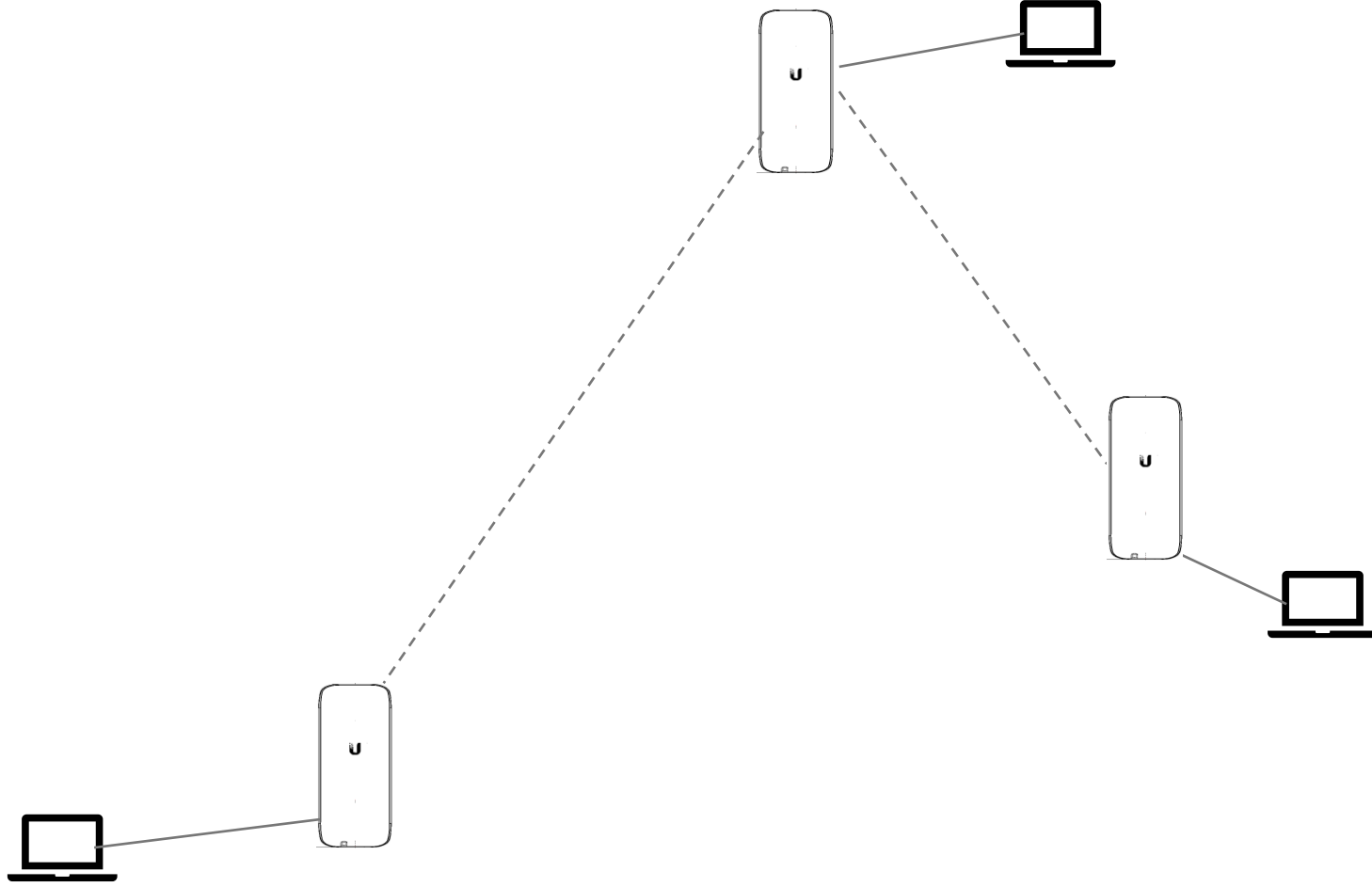
What is Mesh Networking



What is Mesh Networking



What is Mesh Networking



Connecting Your Mesh Node

- Power Over Ethernet
- Using the Supplied POE Adapter
- Using Battery and Solar

Plugging in Your Node

LAN = Local Area Network

POE = Power Over Ethernet



The POE Adapter is essentially a two port network switch

Plugging in Your Node

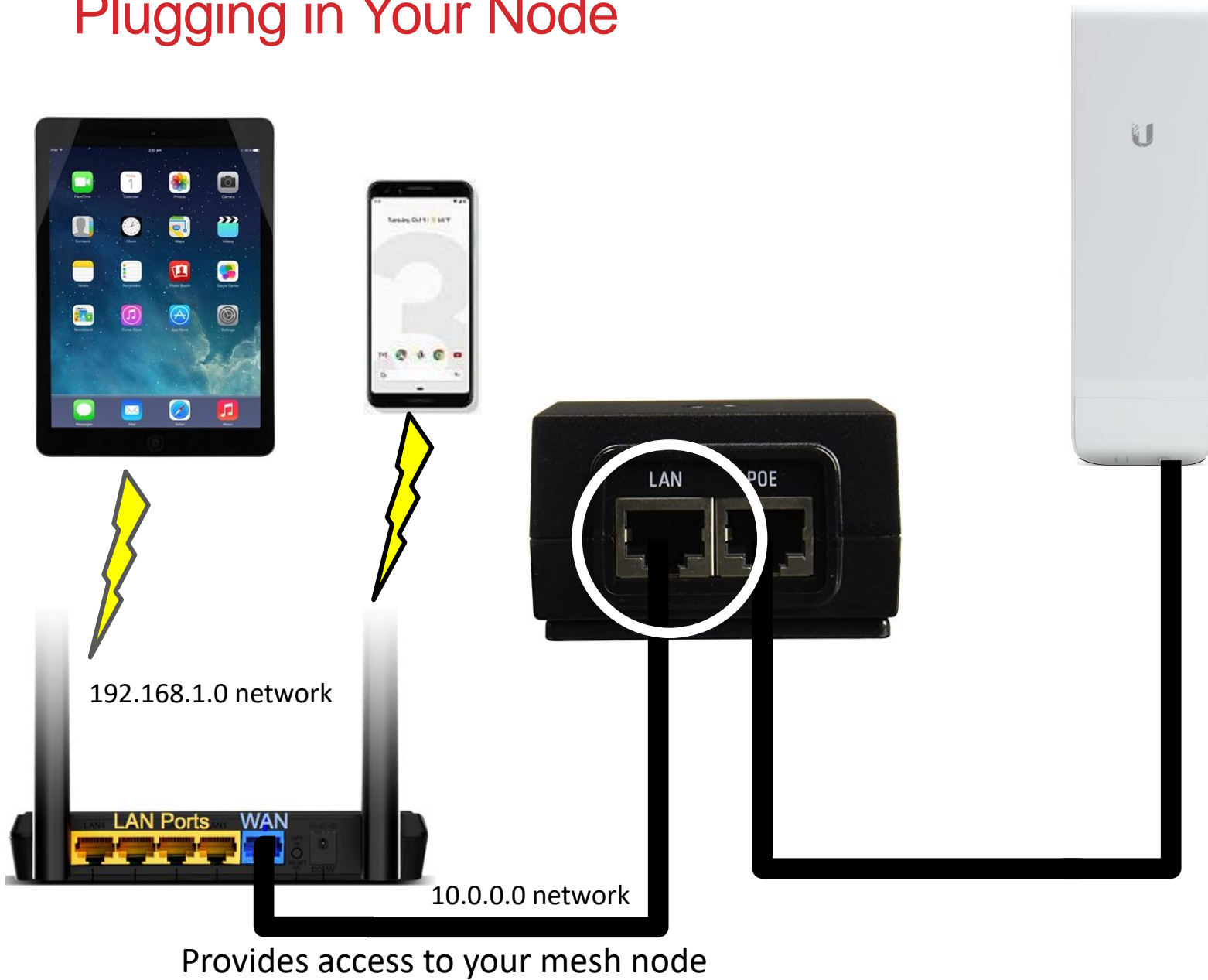


Supplies both power to the Nanostation
and Ethernet Connection

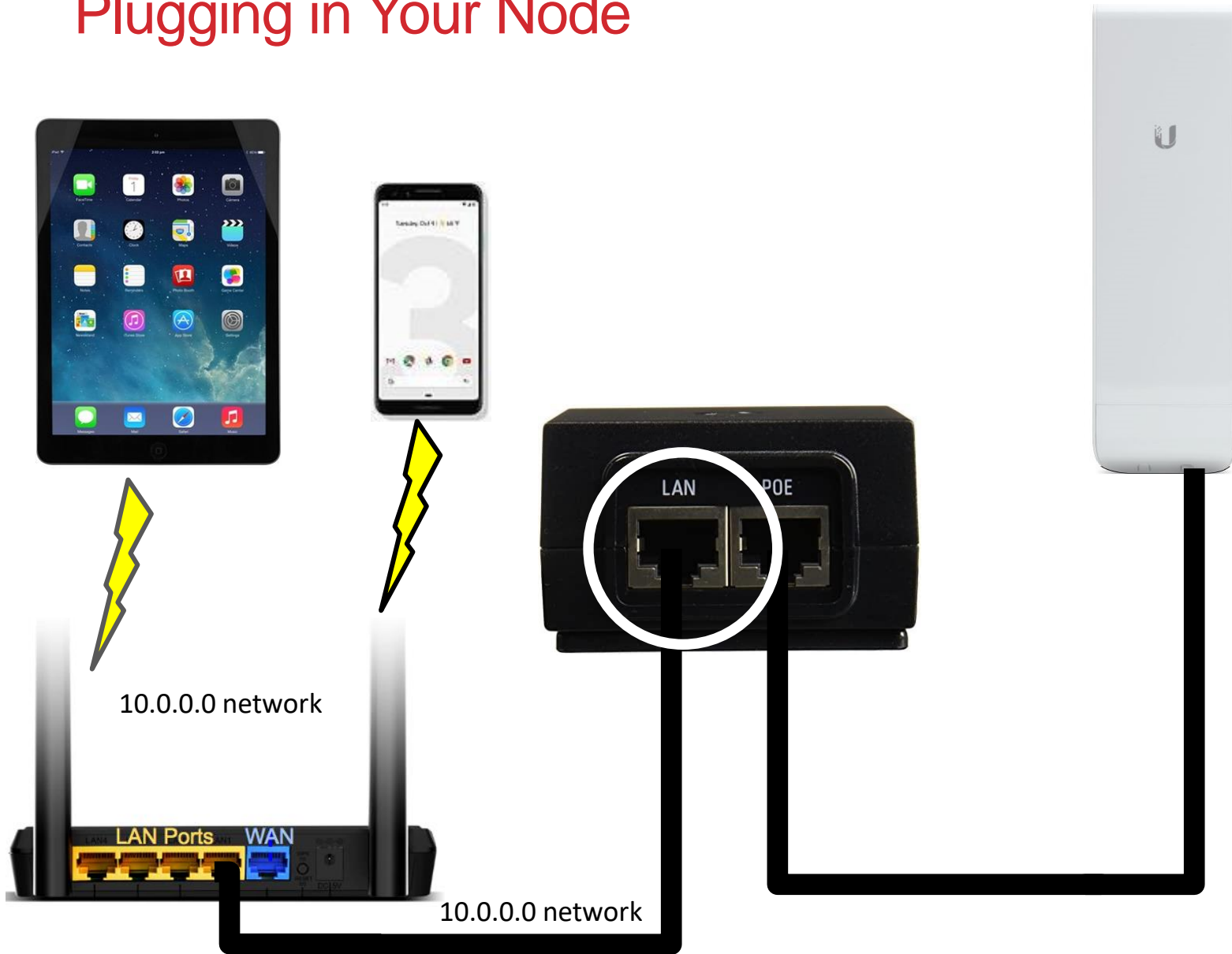
Plugging in Your Node



Plugging in Your Node



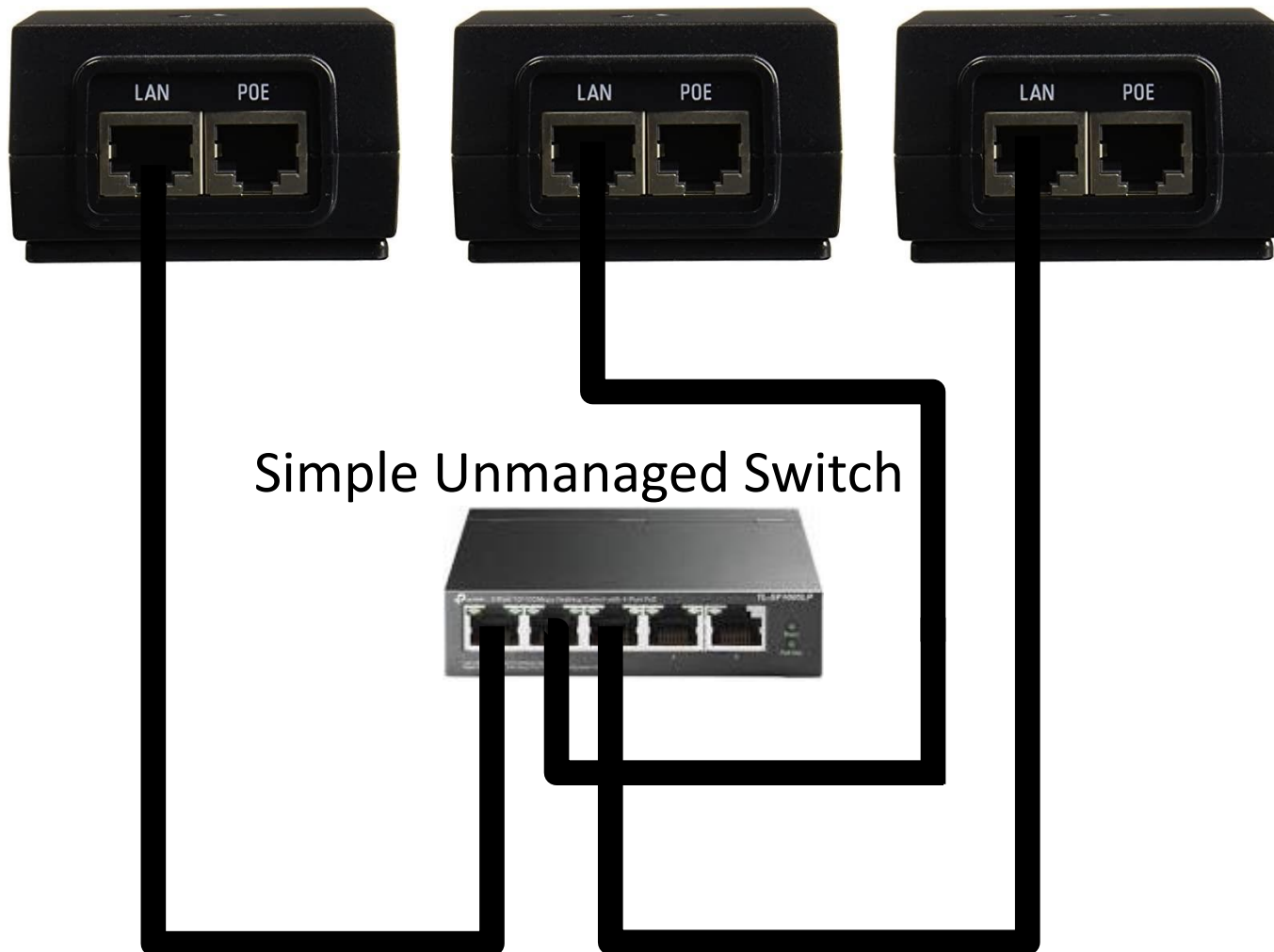
Plugging in Your Node



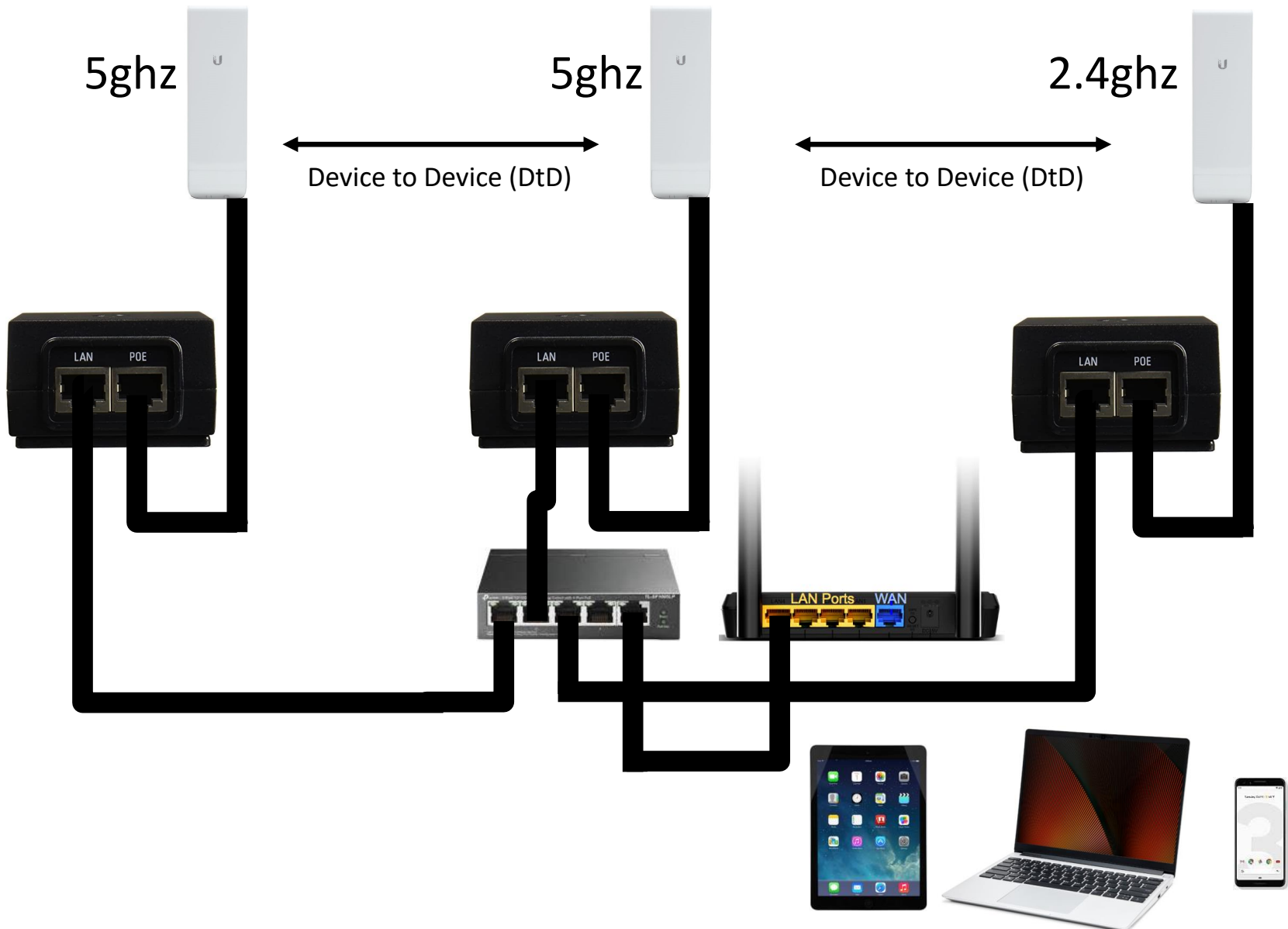
Alternatively disable DHCP at your Wifi Router
and the mesh node will provide DHCP

Plugging in Your Node

Connecting multiple nodes via Device to Device (DtD)

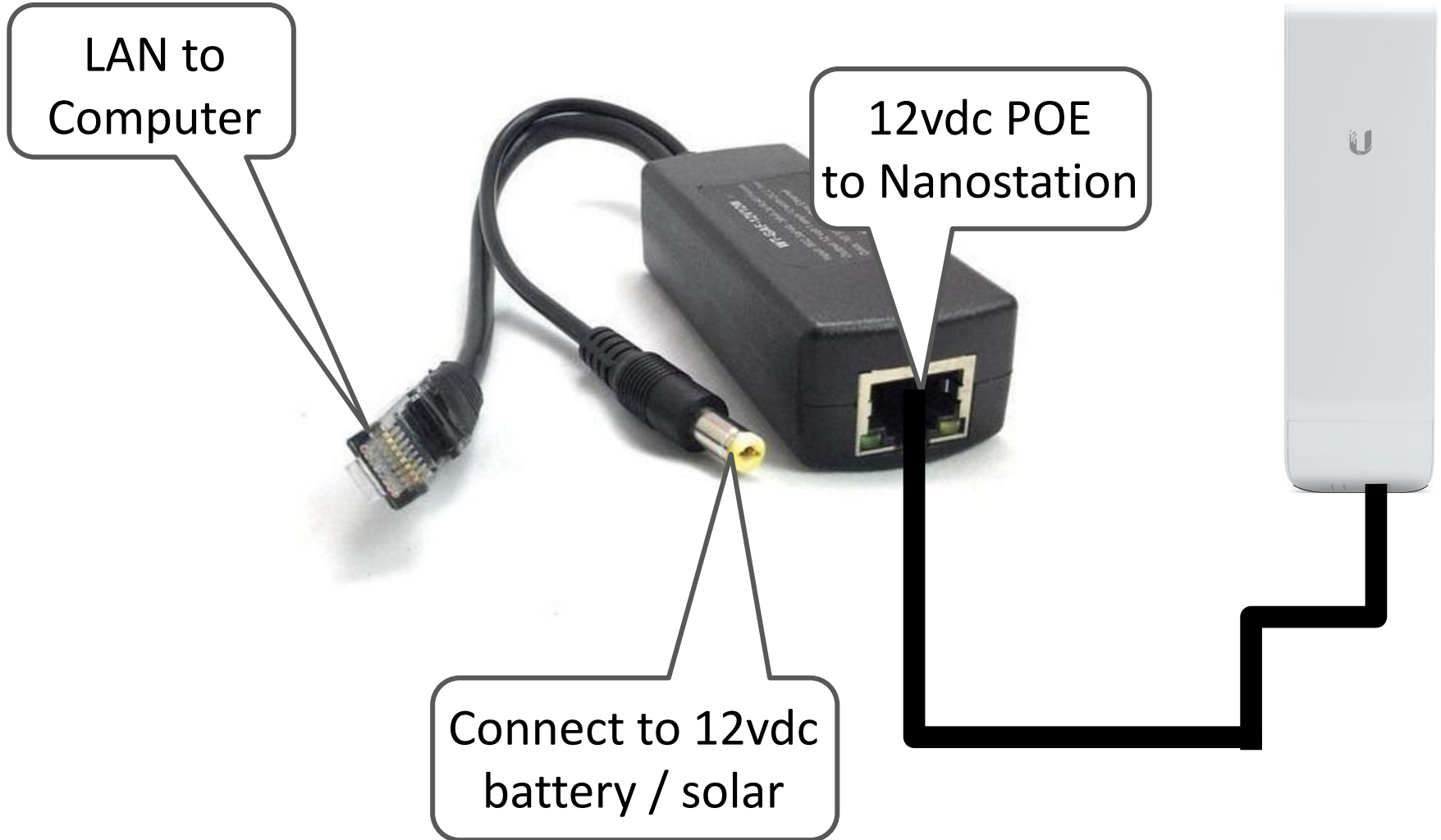


Plugging in Your Node



Plugging in Your Node

Most Ubiquiti equipment
can be powered with 9vdc
to 24vdc



SF Wireless Emergency Mesh / Bay Area Mesh

- SFWEM (now BAM) received a grant from the Amateur Radio Digital Communications (ARDC) to build out the Bay Area Mesh
- SCARES applied for a grant from SFWEM for mesh nodes, cameras, outdoor UV resistant CAT 6 ethernet cable, RJ-45 connectors, etc
- Two Ubiquiti Rockets and 120-degree sector antennas and a PTZ camera have been installed on the Kings Mountain Radio Tower
- 40 Nanostations have been distributed to our members and EOCs
- Ethernet cables have been built and distributed
- Currently, due to supply chain issues, Ubiquiti equipment has become hard to find and the prices have doubled

K6MPN-Kings-Mtn-North and South



Ubiquiti Rocket M5 attached to a Ubiquiti 120-degree sector antenna. North uses channel 179

Ubiquiti Rocket M5 attached to a Ubiquiti 120-degree sector antenna. South uses channel 175

Foscam PTZ Camera

K6MPN-Kings-Mtn-North and South



K6MPN-Kings-Mtn-North and South



K6MPN-Kings-Mtn-North and South



K6MPN-Kings-Mtn-North and South



Image courtesy of Frank Adams

K6MPN-Kings-Mtn-North and South

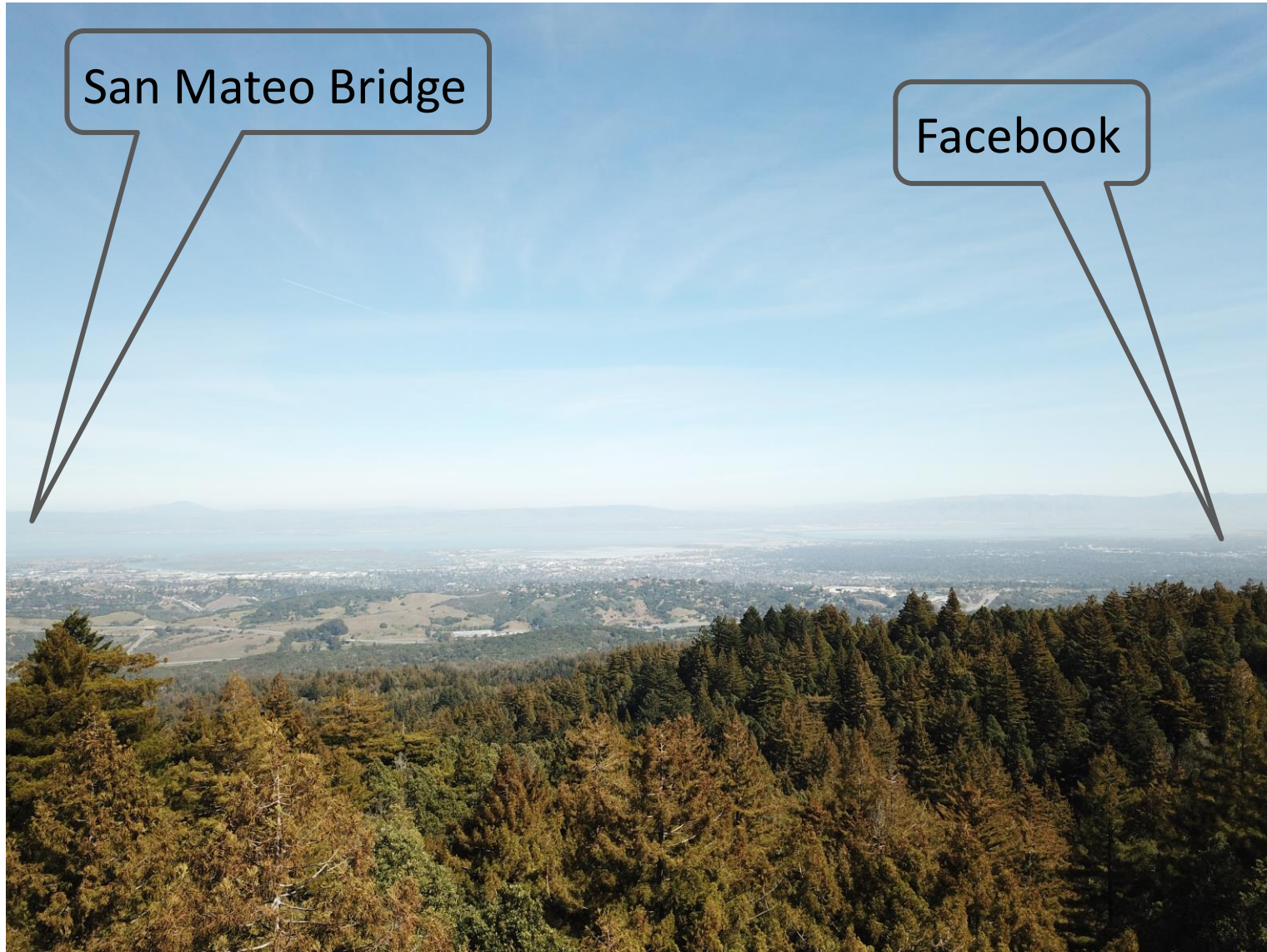
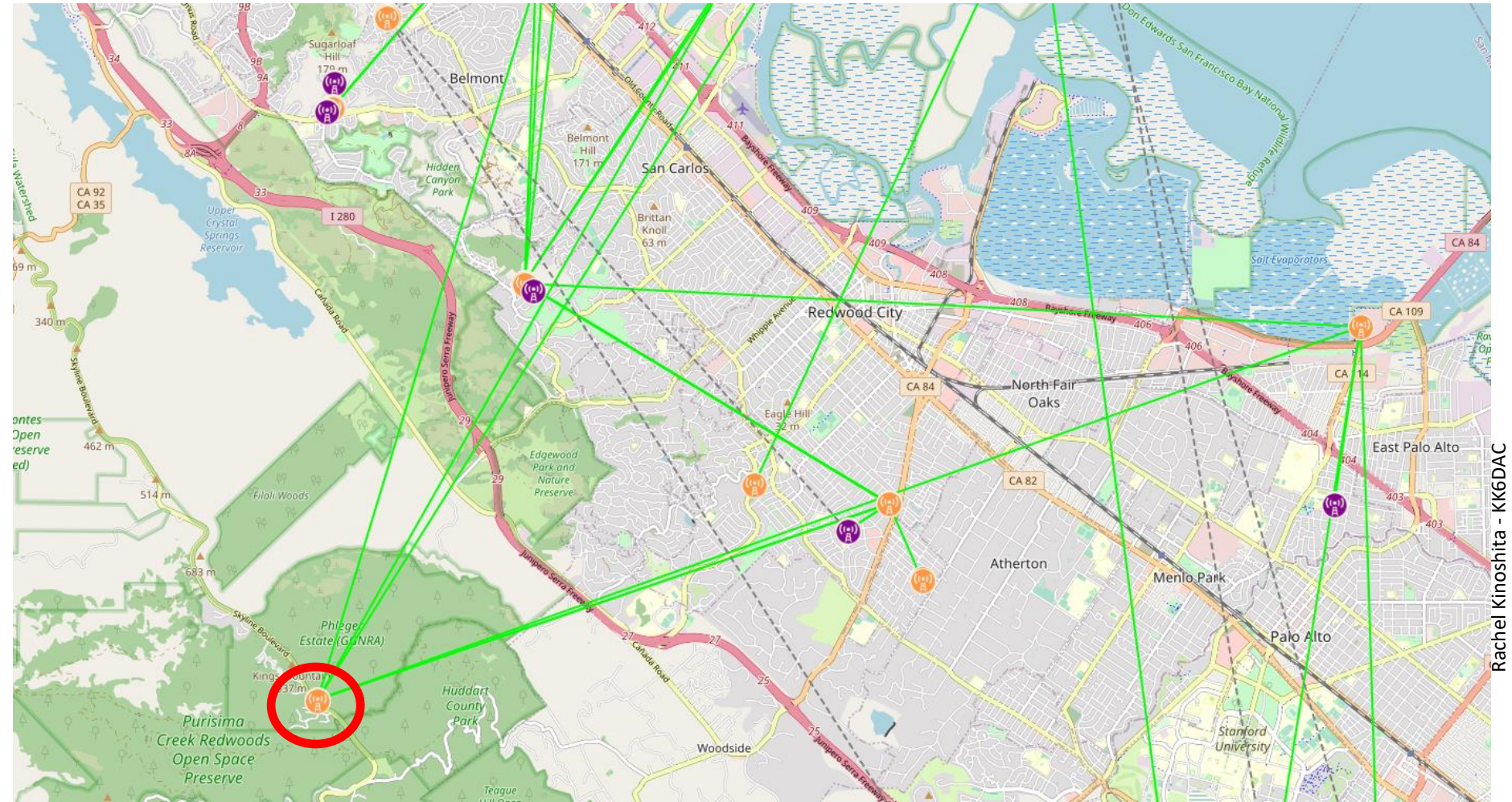
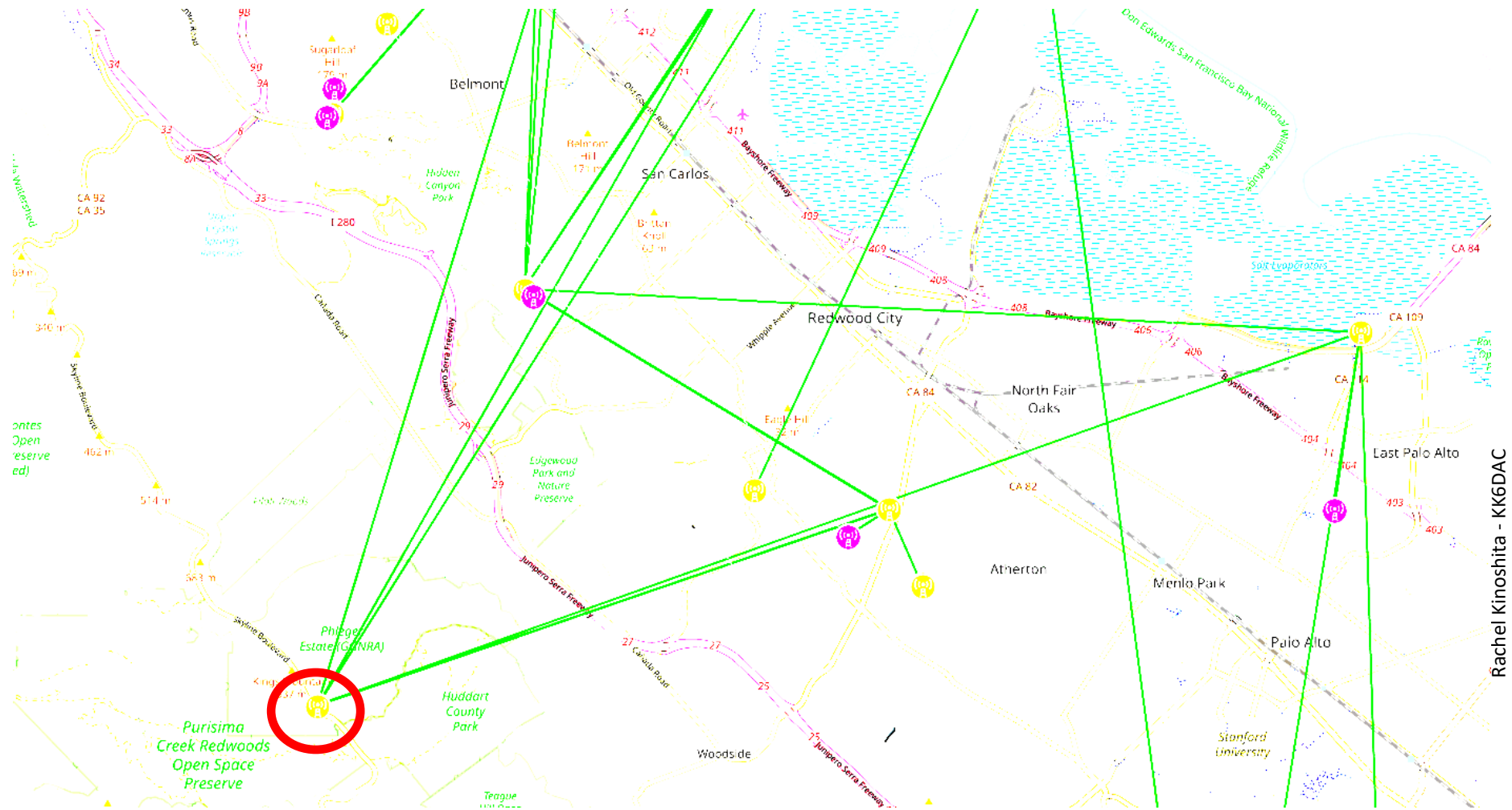


Image courtesy of Frank Adams

K6MPN-Kings-Mtn-North and South



K6MPN-Kings-Mtn-North and South



Traversing the Mesh

K6MPN-Kings-Mntn-North

Location: 37.4360027 -122.3202621

[Help](#)


Refresh

Mesh Status

Neighbor Status

WiFi Scan

Setup

Select a theme 

Wifi address 10.122.175.163 / 8

Signal/Noise/Ratio -82 / -95 / 13 dB

Charts

LAN address 10.213.125.25 / 29

firmware version 3.22.8.0

WAN address none

model Ubiquiti Rocket M5 XW

default gateway 10.48.2.50
N6IMY-Nano1

system time Mon Oct 10 2022 04:11:09 UTC

uptime 7 days, 9:32

SSID AREDN-10-v3

load average 0.13, 0.08, 0.08

free space flash = 2428 KB
/tmp = 29620 KB
memory = 28728 KB

Channel 179

Bandwidth 10 MHz

OLSR Entries Total = 925
Nodes = 276

Part of the AREDN™ Project. For more details please [see here](#)

Traversing the Mesh

K6MPN-Kings-Mntn-North mesh status

Location: 37.4360027 -122.3202621

Refresh

Auto

Quit

Local Hosts	Services	Current Neighbors	LQ	NLQ	TxBps	Services
K6MPN-Kings-Mntn-North		K6GDA-NS-Home2	85%	87%	8.7	
		K6KBL-SL-NSM5	77%	93%	21.2	
		K6MPN-Kings-Mntn-South (dtd)	100%	100%		
		● firecam				PTZ Cam
		N6IMY-Nano1	71%	90%	21.6	
Remote Nodes	ETX	Services	Previous Neighbors	When		
N6IMY-hAP1 (wan)	1.66		KD8DRX-CHABOT-5G	1.1 hours ago		
N6AMQ-SP1	1.82		● chabot-cam.local.mesh			
● n6amq-sp-host			OLSR Entries			
N6AMQ-SP3	1.92		Total	925		
N6AMQ-SP4	1.92		Nodes	276		
K6GDA-NS-Home	2.35					
AJ6VV-SC-90Sect-345	2.47					
AJ6VV-SC-LHG300-91	2.57					
AJ6VV-SC-90Sect-86	2.57					
AJ6VV-SC-hAP1	2.57					
● AJ6VV-SC-EdgeRouterX-SFP		ER-X-SFP				
● AJ6VV-SC-EP24		EP24				
● San-Carlos-to-San-Bruno		AF-to-Bruno				
AJ6VV-SC-90Sect-26-175 / 10.local.mesh	2.57					
AJ6VV-SC-LHG-XL-1-003	2.57					
WB6WGM-PB400-North	2.69					
W6TEO-RWC-NS5-53	3.14					
W6TEO-RWC-hAP1 (tun*1,wan)	3.24					

Rachel Kinoshita - KK6DAC

Traversing the Mesh

K6MPN-Kings-Mntn-South mesh status

Location: 37.4360027 -122.3202621

Refresh Auto Quit

Local Hosts	Services	Current Neighbors	LQ	NLQ	TxMbps	Services
K6MPN-Kings-Mntn-South		K6MPN-Kings-Mntn-North (dtd)	100%	100%		
● firecam	PTZ Cam	N6AMQ-SP1	77%	85%	9.5	
		● n6amq-sp-host				
		W2GMD-MENLOPARK-5G-OMNI-175	67%	45%		
Remote Nodes	ETX	Services	Previous Neighbors	When		
N6AMQ-SP4	1.61		K6ORI-LPD-TABLETOP-OMNI	9.4 hours ago		
N6AMQ-SP3	1.61		KN6PLV-BrkOxFLA-Ryle	22.3 hours ago		
K6KBL-SL-NSM5	1.80					
N6IMY-Nano1	1.84					
N6IMY-hAP1 (wan)	1.94					
K6GDA-NS-Home2	2.22					
W6TEO-RWC-NS5-53	2.87					
AJ6VV-SC-90Sect-26-175 / 10.local.mesh	2.93					
W6TEO-RWC-hAP1 (tun*1,wan)	2.97					
AJ6VV-SC-90Sect-345	3.03					
AJ6VV-SC-hAP1	3.03					
● AJ6VV-SC-EdgeRouterX-SFP		ER-X-SFP				
● AJ6VV-SC-EP24		EP24				
● San-Carlos-to-San-Bruno		AF-to-Bruno				
AJ6VV-SC-LHG300-91	3.03					
AJ6VV-SC-90Sect-86	3.03					
AJ6VV-SC-LHG-XL-1-003	3.03					
K0DYY-SM-hAP-2 (tun*7,wan)	3.07					
● x6399						

Traversing the Mesh

W2GMD-MENLOPARK-5G-OMNI-175

Location: 37.48437 -122.15015

Ubiquiti Rocket M5 + AMO-5G10 10 dBi Omni ch 175 10mhz in Menlo Park, CA. Part of SFWEM.net. MAC: 68:72:51:5:c5:cf

[Help](#)

Refresh

Mesh Status

Neighbor Status

WiFi Scan

Setup

Select a theme ▾

Wifi address	10.4.197.207 / 8	Signal/Noise/Ratio	-75 / -95 / 20 dB	<input type="button" value="Charts"/>
LAN address	10.38.46.121 / 29	firmware version	3.22.8.0	
WAN address	none	model	Ubiquiti Rocket M5	
default gateway	10.182.101.112 N9JIM-PBE2	system time	Sat Oct 1 2022 21:13:29 PDT	
SSID	AREDN-10-v3	uptime	36 days, 2:14	
Channel	175	load average	0.37, 0.18, 0.12	
Bandwidth	10 MHz	free space	flash = 2568 KB /tmp = 29072 KB memory = 24364 KB	
		OLSR Entries	Total = 901 Nodes = 267	

Part of the AREDN™ Project. For more details please [see here](#)

Traversing the Mesh

W2GMD-MENLOPARK-5G-OMNI-175 mesh status

Location: 37.48437 -122.15015

Ubiquiti Rocket M5 + AMO-5G10 10 dBi Omni ch 175 10mhz in Menlo Park, CA. Part of SFWEM.net. MAC: 68:72:51:5:c5:cf

Refresh

Auto

Quit

Local Hosts

W2GMD-MENLOPARK-5G-OMNI-175

Remote Nodes

- [N9JIM-HAP1](#) (tun*3)
- [N9JIM-BlackMtn](#)
- [KI6ZHD-HAP1](#) (tun*1)
- [KN6PLV-BrkOxFLA-Merlin](#) (tun*2,wan)
 - kn6plv-backbone
 - KN6PLV-cam360
 - kn6plv-antennas
 - kn6plv-cam1
 - KN6PLV-ntp
- [K0DYY-SM-hAP-2](#) (tun*7,wan)
 - x6399
- [W6EI-FS8-SFWEM-LINK](#)
- [W6EI-FS8-DoC](#)
 - w6ei-fs8-powermon
 - w6ei-fs8-edgeswitch
- [KN6PLV-BrkOxFLA-Arecibo](#) (wan)
- [K0DYY-SM-hAP-1](#) (tun*1,wan)
 - K0DYY-Cam1--326--36
- [KN6PLV-BrkOxFLA-Ryle](#)
- [KN6PLV-Services](#)
 - KN6PLV-wiki
 - KN6PLV-links
 - KN6PLV-tiles
 - KN6PLV-search
 - KN6PLV-website
 - KN6PLV-helicorder

Services

ETX Services

- 1.40
- 1.40
- 1.50
- 1.50 [Cam](#)
 - [Backbone](#)
 - [Cam360](#)
- 1.50 [NTP](#)
- 1.55 [IperfSpeed](#)
- 1.55 [IperfSpeed](#)
 - [PowerMonitor](#)
 - [EdgeSwitch](#)
- 1.60 [Radio Waterfall](#)
- 1.60 [SM-Cam](#)
 - [Cam-Admin](#)
- 1.60 [Wiki](#)
- [OLSR Traffic Monitor](#)
- [Live Mesh Map \(Internet\)](#)
- [GitHub Projects](#)
- [OpenStreetMap Tiles \(West Coast\)](#)
- [Mesh Search](#)
- [AREDN Bandwidth, where did it go \(PDF\)](#)
- [AREDN Supermodes \(PDF\)](#)
- [Network Storms \(PDF\)](#)
- [Yealink Phones, LDAP setup](#)
- [Live Mesh Map](#)
- [Helicorder / Earthquakes](#)

Current Neighbors

	LQ	NLQ	TxMbps	Services
AJ6VV-SC-LHG300-91	87%	51%	18.3	
K6MPN-Kings-Mntn-South	68%	54%		
KK6DAC-NanoM5-01	16%	93%		
N9JIM-PBE2	89%	85%	13.0	
W6EI-FS8-Spr-East	80%	85%		

Previous Neighbors

	When
AJ6VV-SC-90Sect-86	15.3 hours ago
N9JIM-BlackMtn	16.4 hours ago
AJ6VV-SC-90Sect-26-175 / 10	23.4 hours ago

OLSR Entries

Total	889
Nodes	263

Traversing the Mesh

Current Neighbors

	LQ	NLQ	TxMbps	Services
AJ6VV-SC-LHG300-91	87%	51%	18.3	
K6MPN-Kings-Mntn-South	68%	54%		
KK6DAC-NanoM5-01	16%	93%		
N9JIM-PBE2	89%	85%	13.0	
W6EI-F58-Sector-East	80%	85%		



Previous Neighbors

	When
AJ6VV-SC-90Sect-86	15.3 hours ago
N9JIM-BlackMtn	16.4 hours ago
AJ6VV-SC-90Sect-26-175 / 10	23.4 hours ago

OLSR Entries

Total	889
Nodes	263

Traversing the Mesh

KK6DAC-NanoM5-01 mesh status

Location: 37.46130788972225 -122.15433183615541
Nanostation M5

Local Hosts

KK6DAC-NanoM5-01

Services

Remote Nodes

ETX Services

- [N9JIM-PBE2](#) 6.12
- [W6EI-FS8-Sector-East](#) 6.16
- [N9JIM-HAP1](#) (tun*3) 6.22
- [N9JIM-BlackMtn](#) 6.22
- [W6EI-FS8-SFWEM-LINK](#) 6.26
- [W6EI-FS8-DoC](#) 6.26
 - w6ei-fs8-powermon
 - w6ei-fs8-edgeswitch
- [K0DYY-SM-hAP-2](#) (tun*7,wan) 6.32
 - x6399
- [KN6PLV-BrkOxflA-Merlin](#) (tun*2,wan) 6.32
 - kn6plv-antennas
 - kn6plv-backbone
 - kn6plv-cam1
 - KN6PLV-cam360
 - KN6PLV-ntp
- [KI6ZHD-HAP1](#) (tun*1) 6.32
- [KM6PXH-hAP2](#) (tun*1) 6.42
 - VVX300
- [KN6PLV-BrkOxflA-Haystack](#) 6.42
- [KN6PLV-Services](#) 6.42
 - KN6PLV-wiki
 - KN6PLV-links

 - KN6PLV-tiles
 - KN6PLV-search
 - KN6PLV-website

 - KN6PLV-helicorder

- [IperfSpeed](#)
- [PowerMonitor](#)
- [EdgeSwitch](#)

- [Cam](#)

- [Backbone](#)

- [Cam360](#)
- [NTP](#)

- [Wiki](#)
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- [Network Storms \(PDF\)](#)
- [Yealink Phones, LDAP setup](#)
- [Live Mesh Map](#)
- [Helicorder / Earthquakes](#)

Current Neighbors

LQ NLQ TxMbps Services

- [KK6DAC-Nano-10](#) (dtd) 100% 100%
- mail10
- KK6DAC-WRT54GL-11
- irc10
- jabber10
- [W2GMD-MENLOPARK-5G-OMNI-175](#) 82% 28% 2.3

Previous Neighbors

When

none

OLSR Entries

Total 892
Nodes 264

Setting Up Your Node

- The mesh nodes we provided to our members have already been pre-configured with your call sign, the most likely channel to connect to the mesh and the channel width
- However, there are changes you will need to make once you get your node operational
 - Set the Lat / Lon of your location
 - Possibly need to change change the channel of your node
- Will occasionally need to upgrade your AREDN firmware

Setting Up Your Node

KK6DAC-NanoM5-01

Location: Location Not Available
Nanostation M5

[Help](#)

Refresh

Mesh Status

Neighbor Status

WiFi Scan

Setup

Select a theme ▼

Wifi address	10.212.134.10 / 8	Signal/Noise/Ratio	-91 / -95 / 4 dB	Charts
LAN address	10.164.48.81 / 29	firmware version	3.22.8.0	
WAN address	none	model	Ubiquiti NanoStation M5 XW	
default gateway	none	system time	Sun Apr 17 2022 22:46:07 UTC	
SSID	AREDN-10-v3	uptime	0:20	
Channel	175	load average	0.13, 0.03, 0.01	
Bandwidth	10 MHz	free space	flash = 2616 KB /tmp = 29996 KB memory = 34720 KB	
		OLSR Entries	Total = 3 Nodes = 1	

Part of the AREDN™ Project. For more details please [see here](#)

Setting Up Your Node

Sign in

`http://localnode.local.mesh:8080`

Your connection to this site is not private

Username

Password

Setting Up Your Node

Node Name Password

Node Description (optional) Verify Password

Mesh RF	LAN	WAN
Enable <input checked="" type="checkbox"/>	LAN Mode <input type="text" value="5 host Direct"/> ?	Protocol <input type="text" value="DHCP"/>
IP Address <input type="text" value="10.212.134.10"/>	IP Address <input type="text" value="10.164.48.81"/>	DNS 1 <input type="text" value="8.8.8.8"/>
Netmask <input type="text" value="255.0.0.0"/>	Netmask <input type="text" value="255.255.255.248"/>	DNS 2 <input type="text" value="8.8.4.4"/>
SSID <input type="text" value="AREDN"/>	DHCP Server <input checked="" type="checkbox"/>	
Channel <input type="text" value="10-v3"/>	DHCP Start <input type="text" value="82"/>	
Channel Width <input type="text" value="10 MHz"/>	DHCP End <input type="text" value="86"/>	
Power & Link Quality		
Tx Power <input type="text" value="27 dBm"/> ?		
Max Distance <input type="text" value="50.0"/> miles ?		
Min SNR <input type="text" value="4"/>		
Min Quality <input type="text" value="50"/> %		
<input type="button" value="Apply"/>		

Optional Settings

Latitude

Longitude Grid Square

Timezone NTP Server

Setting Up Your Node

Node Name Password

Node Description (optional) Verify Password

Mesh RF	LAN	WAN
Enable <input checked="" type="checkbox"/>	LAN Mode <input type="text" value="5 host Direct"/>	Protocol <input type="text" value="DHCP"/>
IP Address <input type="text" value="10.212.134.10"/>	IP Address <input type="text" value="10.164.48.81"/>	DNS 1 <input type="text" value="8.8.8.8"/>
Netmask <input type="text" value="255.0.0.0"/>	Netmask <input type="text" value="255.255.255.248"/>	DNS 2 <input type="text" value="8.8.4.4"/>
SSID <input type="text" value="AREDN"/>	DHCP Server <input checked="" type="checkbox"/>	
Channel <input type="text" value="175 (5875)"/>	DHCP Start <input type="text" value="82"/>	
Channel Width <input type="text" value="10 MHz"/>	DHCP End <input type="text" value="86"/>	
Power & Link Quality		
Tx Power <input type="text" value="27 dBm"/>		
Max Distance <input type="text" value="50.0"/> miles		
Min SNR <input type="text" value="4"/>		
Min Quality <input type="text" value="50"/> %		
<input type="button" value="Apply"/>		

North of San Carlos use 179
South of San Carlos use 175

Optional Settings

Latitude

Longitude Grid Square

Timezone NTP Server

Setting Up Your Node

Setting Your Location – Must set to show up on the Mesh Map

Optional Settings

Latitude

Longitude Grid Square

Timezone NTP Server

- Go to Google Maps
- Enter the address
- Click on the location
- Right click and the Lat / Lon will pop up
- Click on the Lat / Lon and it will be copied to your clipboard

Setting Up Your Node

The screenshot shows the Mikrotik WinBox configuration interface for a NanoM5 node. The 'Basic Setup' tab is selected. The 'Node Name' field is filled with 'KK6DAC-NanoM5-01' and the 'Node Description (optional)' field is filled with 'Nanostation M5'. The 'Save Changes' button is circled with a black arrow pointing to it. Other buttons visible include 'Help', 'Reset Values', 'Default Values', and 'Reboot'. The 'Password' and 'Verify Password' fields are empty and have eye icons for visibility toggles.

Node Status	Basic Setup	Port Forwarding, DHCP, and Services	Tunnel Server	Tunnel Client	Administration	Advanced Configuration
Help	<input type="button" value="Save Changes"/>	<input type="button" value="Reset Values"/>	<input type="button" value="Default Values"/>	<input type="button" value="Reboot"/>		
Node Name	<input type="text" value="KK6DAC-NanoM5-01"/>				Password <input type="password"/>	<input type="checkbox"/>
Node Description (optional)	<input type="text" value="Nanostation M5"/>				Verify Password <input type="password"/>	<input type="checkbox"/>

Setting Up Your Node

[Help](#)

Save Changes

Reset Values

Default Values

Reboot



Configuration saved.

Reboot is required for changes to take effect

Setting Up Your Node

KK6DAC-NanoM5-01

Location: 37.46130788972225 -122.15433183615541

Nanostation M5

[Help](#)

Refresh

Mesh Status

Neighbor Status

WiFi Scan

Setup

Select a theme ▾

Wifi address	10.212.134.10 / 8	Signal/Noise/Ratio	-91 / -95 / 4 dB	Charts
LAN address	10.164.48.81 / 29	firmware version	3.22.8.0	
WAN address	none	model	Ubiquiti NanoStation M5 XW	
default gateway	none	system time	Sun Apr 17 2022 22:46:07 UTC	
SSID	AREDN-10-v3	uptime	0:20	
Channel	175	load average	0.13, 0.03, 0.01	
Bandwidth	10 MHz	free space	flash = 2616 KB /tmp = 29996 KB memory = 34720 KB	
		OLSR Entries	Total = 3 Nodes = 1	

Part of the AREDN™ Project. For more details please [see here](#)

SCARES Members on the Mesh

- K6MPN (Kings Mountain)
- K6GDA (Gary)
- WB6WGN / KD6JTU (Robert and Madeline)
- W6TEO (Tim)
- KK6ISP (Clark)
- AI6XM (David)
- KK6DAC (Rachel)

Services on the Mesh

- Remote Cameras
- Kiwix (offline Wikipedia)
- OwnCloud (like Dropbox)
- Team Talk (like Zoom)
- Mail Servers (Postfix, Dovecot, Roundcube)
- Chat Servers (Meshchat, Jabber, etc)
- VOIP Phones / PBX

Services on the Mesh – Remote Cameras



Services on the Mesh – Remote Cameras



Services on the Mesh – VOIP Phones



Grandstream PBX



Or a Raspberry Pi
running RasPBX



Services on the Mesh – Kiwix Offline Wikipedia

kk6dac-rp40.local.mesh:8081/wikipedia/A/User:Stephane_(Kiwix)_Landing.html



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Services on the Mesh – Kiwix Offline Wikipedia



ARRL Radiogram

An **ARRL radiogram** is an instance of formal written message traffic routed by a network of amateur radio operators through [traffic nets](#), called the [National Traffic System](#) (NTS).

It is a plaintext message, along with relevant [metadata](#) (headers), that is placed into a traffic net by an amateur radio operator. Each radiogram is relayed, possibly through one or more other amateur radio operators, to a radio operator who volunteers to deliver the radiogram content to its destination.

Form overview

Radiogram forms facilitate a standard protocol between amateur radio operators, allowing much faster relay of formal messages. They do this by always having the message headers in a certain order, allowing operators to read and understand the headers without explicit verbal labels. This is especially important in hectic and stressful environments such as during a disaster, when many parties call upon radio operators to quickly transfer messages in and out of the affected areas.

A typical form has a place for the plaintext message, as well as for several headers that are important for routing the message to its proper destination in a timely manner. These fields include the message's priority, the callsign of the station of origin (the amateur radio operator who placed the message onto the message net), the date and time of origin, contact information of the message's recipient, as well as the callsign of the station that delivered the message.

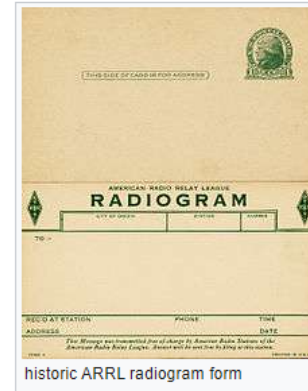
The headers' purpose and order is logical and intuitive enough that many amateur radio operators have memorized it and in extremis can transmit and receive radiograms without referring to the form.

Preamble part

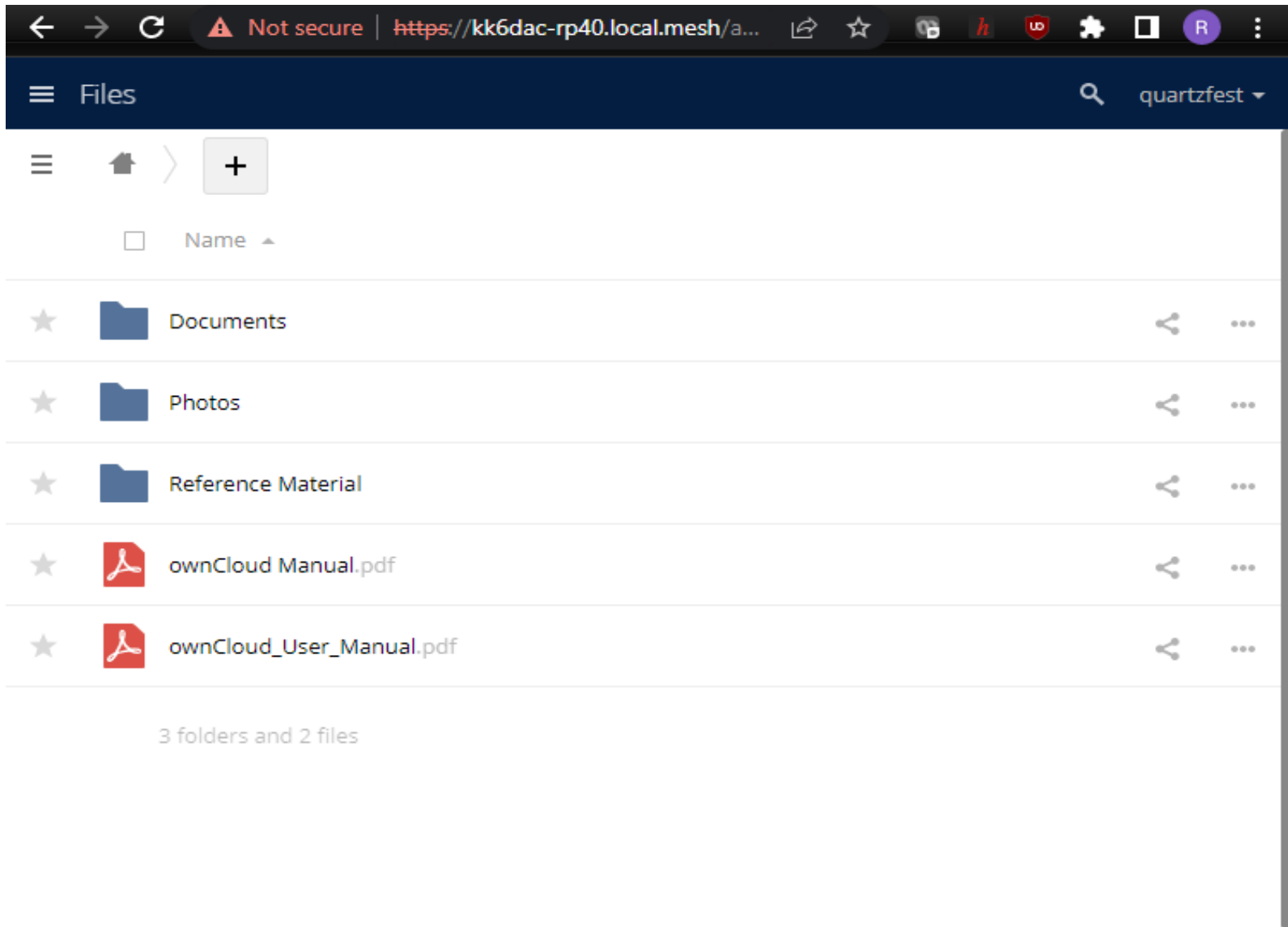
All messages must have a preamble. The preamble of the message contains information about the message necessary to keep track of it as it passes through the amateur system. The parts of the preamble, except for the check as noted later, are NOT changed by any station relaying or delivering the message. They are permanent parts of the message created by the station of origin and must remain with the message all the way to the delivery point. Preamble information is used to service undeliverable messages and to generate replies to specific handling instructions.

Message number

The message number is selected by the station originating the message and it must be on all messages. It stays with the message all the way to the point of delivery. The delivering station may need to reply to the station of origin and refer to this number. Use number digits only, no letters, leading zeros, or dashes. Numbers are usually begun with 1 at the start of a year or month at the pleasure of the originating station.



Services on the Mesh – OwnCloud Like Dropbox



Services on the Mesh – OwnCloud Like Dropbox

The screenshot shows a web browser window displaying the OwnCloud interface. The address bar shows the URL <https://kk6dac-rp40.local.mesh/apps/files/?dir=/Reference%20Material&fil...>. The page title is "Files" and the logo "ownCloud" is visible. The current directory is "Reference Material".

The left sidebar contains navigation options: All files, Favorites, Shared with you, Shared with others, Shared by link, and Tags.

The main content area displays a list of folders under the "Reference Material" directory. The table below summarizes the data shown in the screenshot.

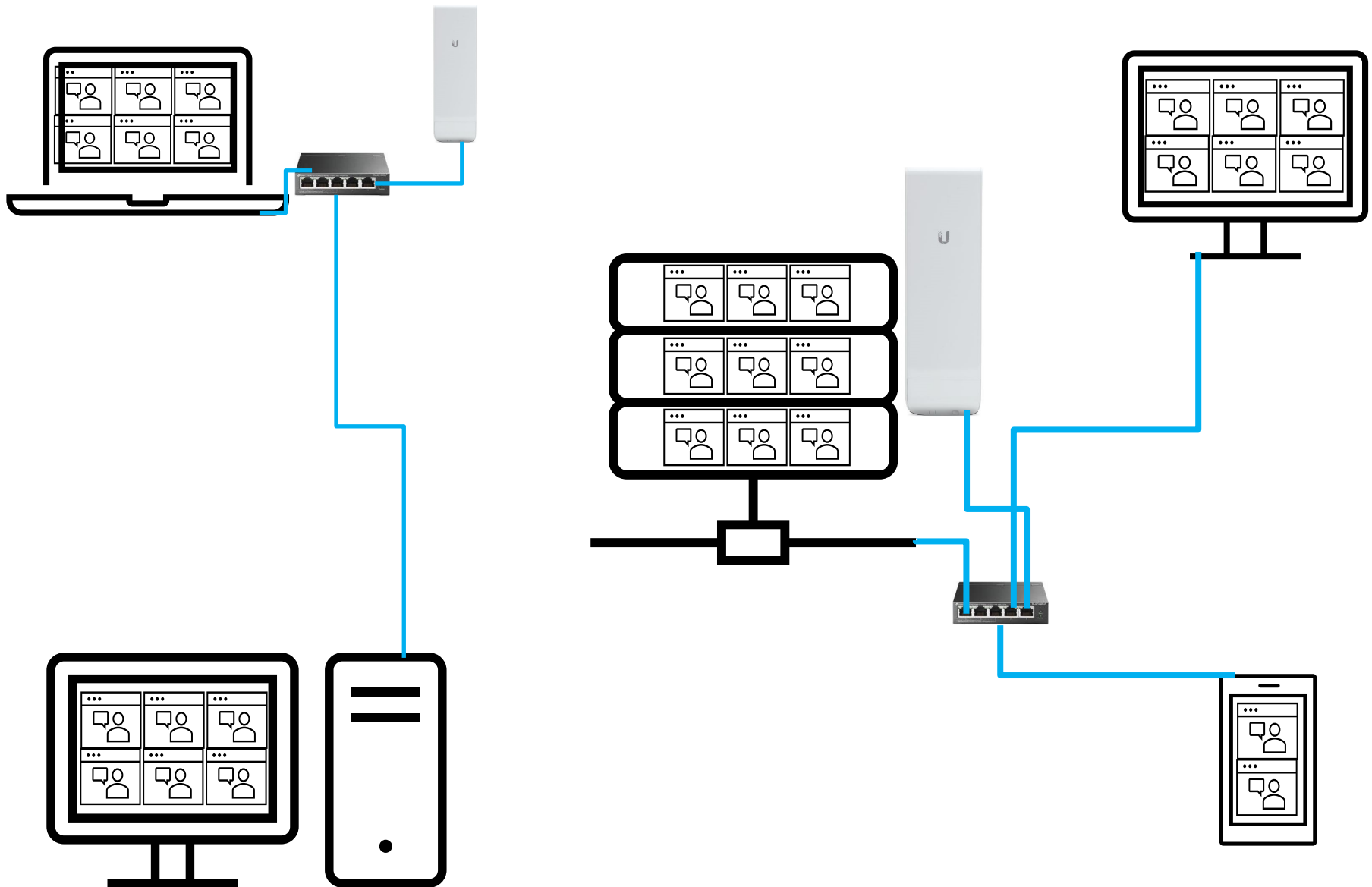
Name	Size	Modified
ARRL-ARES	824 KB	7 years ago
Baofeng	32.6 MB	7 years ago
CERT	74 MB	a year ago
Elecraft	10.7 MB	7 years ago
First Aid	7.6 MB	7 years ago
Honda Generators	8.7 MB	7 years ago
ICOM	166.2 MB	a year ago
Kenwood	142.5 MB	a year ago
Quick Start HT Programm	2.2 MB	a year ago

Services on the Mesh – OwnCloud Like Dropbox

The screenshot shows a web browser window displaying the OwnCloud interface. The address bar shows a local mesh URL: `https://kk6dac-rp40.local.mesh/apps/files/?dir=/Reference%20Material/Ya...`. The interface includes a navigation sidebar on the left with options like 'All files', 'Favorites', 'Shared with you', 'Shared with others', 'Shared by link', and 'Tags'. The main content area shows a folder structure: 'Reference Material' > 'Yaesu'. A list of PDF files is displayed, each with a red PDF icon, a share icon, a three-dot menu icon, the file name, size, and upload date.

File Name	Size	Upload Date
Yaesu Disabling WIRES.pdf	58 KB	7 years ago
Yaesu FT1DR_ENG.pdf	2.6 MB	7 years ago
Yaesu FT2DR_DE_OM_ENG_EH060M201.pdf	38.3 MB	7 years ago
Yaesu FT-60R_E_OM_USA_EXP_EU_ENG_EH017M209.pdf	1.9 MB	7 years ago
Yaesu FT-857D_OM_ENG_EH007M102_V2.pdf	4.4 MB	7 years ago
Yaesu FT-897_OpMan.pdf	3 MB	7 years ago
Yaesu FT-897D_OM_ENG_EH012M105.pdf	3.4 MB	7 years ago
Yaesu FT-991_OM_ENG_EH057M200.pdf	28.8 MB	7 years ago
Yaesu FT-7900R_OM_ENG_EH016M110.pdf	2.7 MB	7 years ago
Yaesu FT-8800R_USA_EXP_OM_ENG_EH018M100.pdf	1.8 MB	7 years ago
Yaesu FT-8900R_USA_EXP_OM_ENG_EH008M101.pdf	1.4 MB	7 years ago

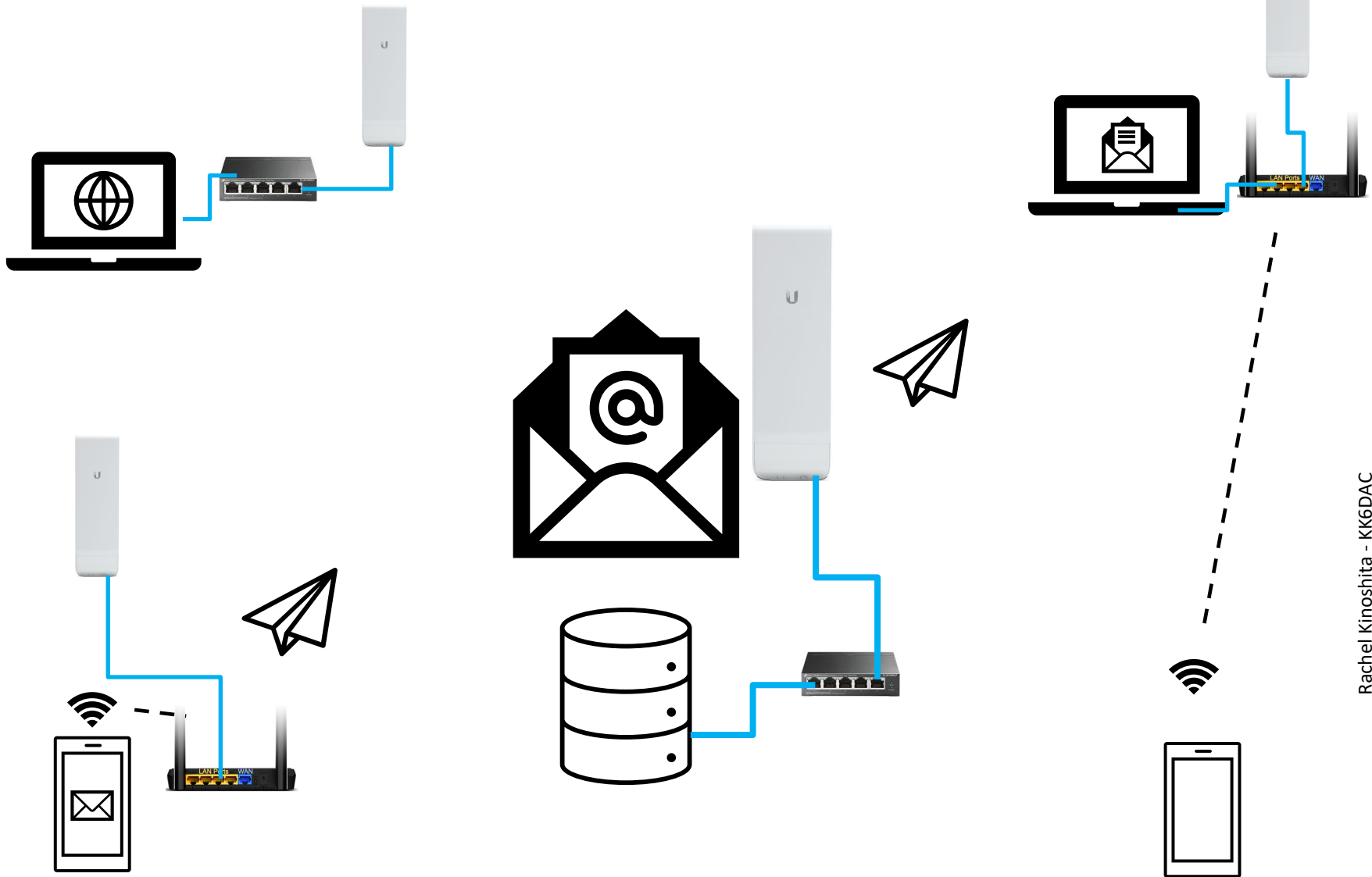
Services on the Mesh – TeamTalk Zoom like System



Services on the Mesh – Team Talk Zoom like System

The screenshot displays the TeamTalk v. 5.11 client interface. The title bar reads "SCARES - TeamTalk v. 5.11". The menu bar includes "Client", "Me", "Users", "Channels", "Server", and "Help". The main window is divided into two panes. The left pane shows a user list with "SCARES (1)" and a user named "Rachel" with five green status icons. The right pane has tabs for "Chat", "Video", "Desktops", and "Files". The "Chat" tab is active, displaying system messages: "* Using sound input: Microphone (2- High Definition Audio Device)", "Using sound output: Speakers (2- High Definition Audio Device)", "* Connecting to KK6DAC-RP41 TCP port 10333 UDP port 10333", and "* Connected to KK6DAC-RP41 TCP port 10333 UDP port 10333". Below these are "Server Name: SCARES" and "Message of the Day: Welcome". Further down, it says "Joined new channel", "Channel: /", "Topic:", and "Disk quota: 0 KBytes". At the bottom, there are audio level meters for RX and TX, and a status bar showing "RX: 0.00KB TX: 0.00KB".

Services on the Mesh – Email Servers



Services on the Mesh – Email Servers

The screenshot displays an email composition window. The top toolbar includes icons for 'Options and ...', 'Save', 'Attach', 'Signature', 'Responses', and 'Spell'. The main composition area has fields for 'From' (kk6dac@local.mesh), 'To' (empty), and 'Subject' (empty), followed by a large text area. A 'Send' button is located at the bottom left. On the right, the 'Options and attachments' panel is open, showing a file size limit of 2.0 GB and an 'Attach a file' button. Below this, there are checkboxes for 'Return receipt' and 'Delivery status notification', a 'Priority' dropdown set to 'Normal', and a 'Save sent message in' dropdown set to 'Sent'.

Options and ... Save Attach Signature Responses Spell

Options and attachments

From
kk6dac@local.mesh

To

Subject

Maximum allowed file size is 2.0 GB

Attach a file

Return receipt

Delivery status notification

Priority
Normal

Save sent message in
Sent

Send

Services on the Mesh – Email Servers

The screenshot displays the Citadel Mail web interface. At the top left is the Citadel logo. The main header area includes the word "Mail" and a notification "1 new of 1 messages". On the right, there is a search bar and a "View as: Mail Folder" dropdown. Below the header is a toolbar with buttons for "Ungoto", "Refresh message list", "Delete", "Write mail", "Skip this room", and "Goto next room". The language is set to "en_US".

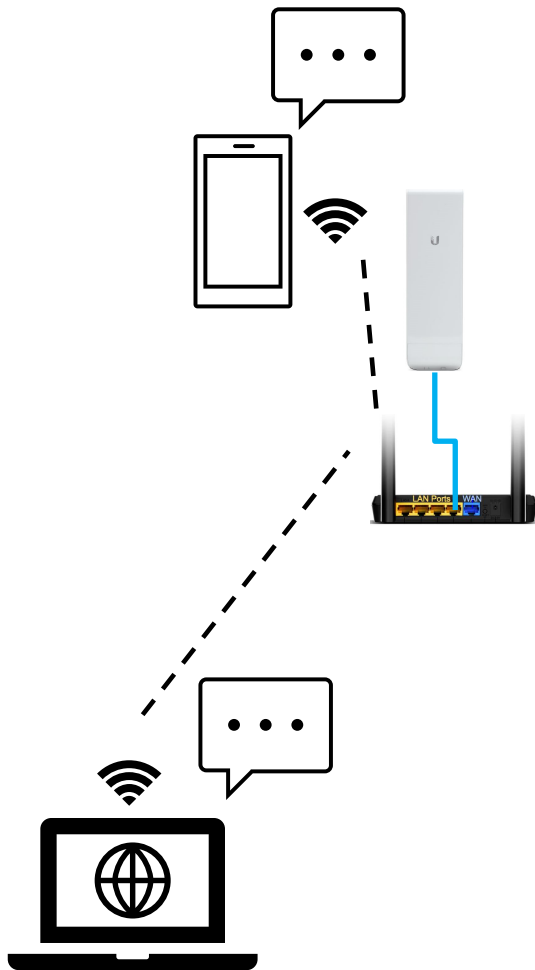
The message list shows one message with the following details:

Subject	Sender	Date
Test	KK6DAC	12:02

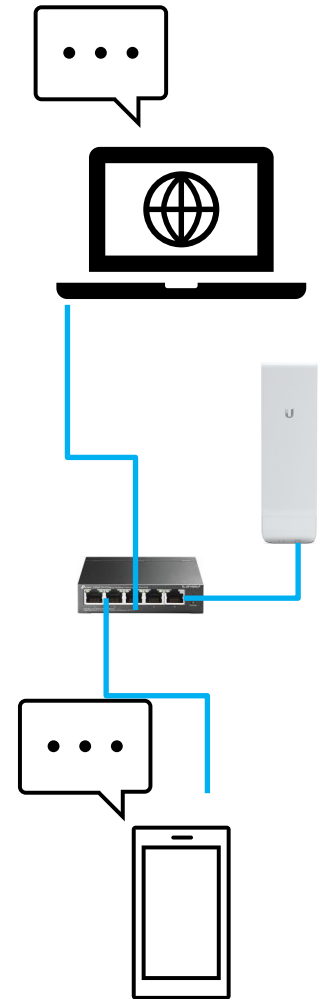
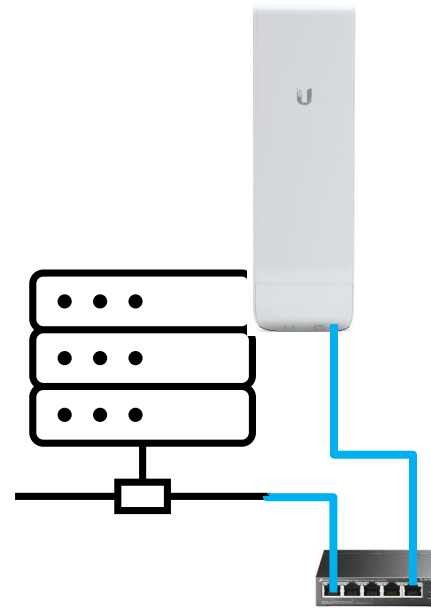
The left sidebar contains the following navigation options:

- Summary
- Mail
- Calendar
- Contacts
- Notes
- Tasks
- Rooms
- Online users
- Chat
- Advanced
- Log off
- customize this menu

Services on the Mesh – Chat / Instant Messaging



MeshChat
Jabber



Services on the Mesh – Chat / Instant Messaging

CHAT FILES STATUS

LOGOUT

Mesh Chat v1.02

Zone: MeshChat
Call Sign: KK6DAC

Node: kk6dac-rp41
Updated: 11 seconds ago

Send a Message

New Message

Enter message here

Channel: Everything

SEND

Mesh Chat Users

1

Call Sign	Node	Last Seen
KK6DAC	kk6dac-rp41	10/19/22 9:50 PM

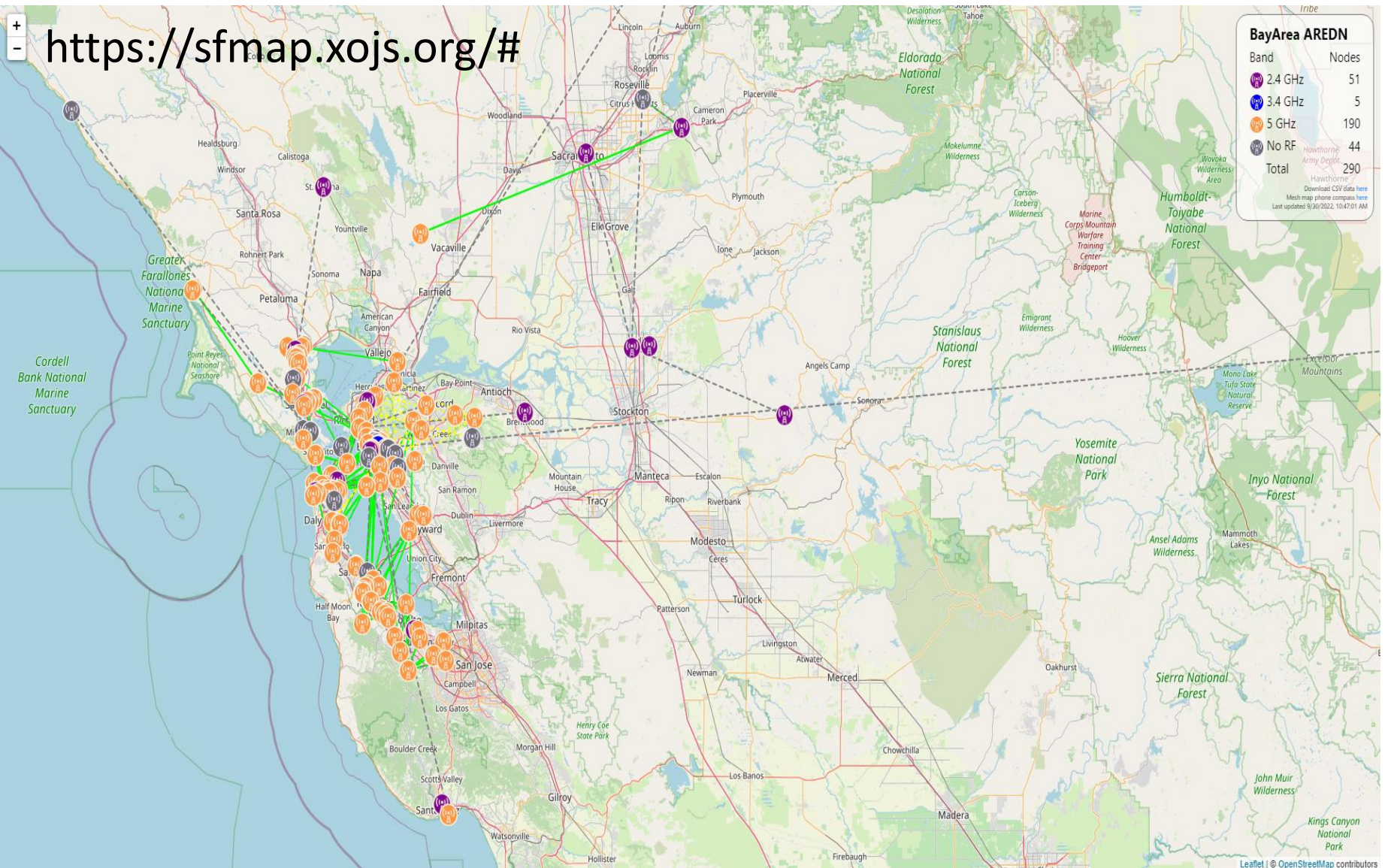
Messages

Search: Enter search

Channel: Everything

Time	Message	Call Sign	Channel	Node
10/19/22 9:50 PM	Did anyone else feel that? It felt like at least a 5.0. Is everyone OK?	KK6DAC		kk6dac-rp41
10/19/22 9:49 PM	I'm heading over to the Menlo Park EOC and will be online from that QTH for the next few hours	KK6DAC		kk6dac-rp41
10/19/22 9:48 PM	Hey, does anyone have an extra USB C cable I can borrow?	KK6DAC		kk6dac-rp41
10/18/22 9:56 PM	Test 3	KK6DAC		raspberrypi

Mesh Map Demo – Developed by Eric - KG6WXC



Questions



KK6DAC@arrl.net