High-Speed Multi-Media Mesh Network

Keep your data moving when the lights go out
How many of you have used microwave radios to send data?
I would have figured most of you...
Introduction

What is it?
Why AREDN?
What can I do with it?
What is an AREDN Mesh Network?

Radio links replace wires between locations.

An AREDN mesh network uses standard, proven Internet protocols to connect devices.
Standard WiFi Access Point
AREDN Mesh Network

EOC - Similar Setup in Hospital, Shelter, POD, etc.

User / Services
LAN Domain
- Chat
- File Sharing/FTP
- VoIP
- Email
- Video

External WAN Domain
- Internet
- WebEOC

MESH RF Domain

25km miles

Hospital

Shelter site
## What is AREDN?

### Software
- Open Source
- Agile, flexible dev model
- Highly active forums
- Developers also implement
- Focused on EmComm
- Nightly Builds available

### Wireless Mesh
- Repurposed WISP routers (radios)
- In the Ham Bands
- Up to 144 Mbps IP Network (802.11n)
- Part 97 (Tech, General, Extra)

### The Team
- Randy, WU2S
- Andre, K6AH
- Joe, AE6XE
- Darryl, K5DLQ
- Trevor, K7FPV
- New Contributors
  - KG6WXG, KK4ZUZ, KF5DEB, KC0EUW, KK6RAY
# How Do I Build a Mesh Network?

## Backbone
- Mountains, water towers, buildings, antenna towers
- 24-30dB Dish
- Rocket M2/M3/M5

## Relay Nodes
- Hills, tall masts, buildings
- RadioMobile to determine location
- NanoBeam, PowerBeam, NanoStation, Rocket

## Deployed Nodes
- NanoBeam, Nanostation, Powerbeam
- WIFI Access Point
- 10-20’ mast
- Suction cup window mount
- Solar panel
- 12VDC Battery
Ham Deployed to Shelter, Temporary CP, Monitored Location

Fixed Backbone Node

Fixed or Deployed Relay Node

3 GHz

5 GHz or 2 GHz

Hospital, Shelter, POD, EOC

3 GHz

Fixed or Deployed Relay Node

5 GHz or 2 GHz

Ham Deployed to Shelter, Temporary CP, Monitored Location
Why AREDN?

Actively Supported
Low Cost
Easily Deployed
Easily Maintained
Why AREDN? - Actively Supported

• By the AREDN project team and hundreds of hams who have deployed AREDN mesh networks.
• Active community Forum is averaging 90 posts weekly.
• Frequent software updates address bug fixes, feature enhancements and support for new hardware. Since 9/23/2108, there have been 77 changes put into the code.
• The documentation is on Read The Docs. It is up to 112 pages and growing. Available as a PDF and open-source too.
Ubiquiti airMAX M-series
- AirGrid ($65)
- AirRouter ($35 and $60)
- Bullet ($79) (+ antenna)
- NanoBridge ($100)
- NanoStation ($85)
- PicoStation
- PowerBeam ($79 - $200)
- Rocket ($80) (+ antenna)
- (and TP-Link equivalents)

Mikrotik
- BaseBox 2 & 5 ($89)
- hAP ac lite ($54)
- Lite Head Grid ($53)
- LHG HP XL ($75)
- Lite Dish Feed ($39)

Why AREDN? - Low Cost
Why AREDN? - Easily Deployed

- Power and data go to each unit via one cable (PoE).
- Able to power devices with 12 VDC from batteries and solar panels.
- Devices are lightweight and rugged.
Why AREDN? - Easily Maintained

- Supported hardware is commercial WISP gear designed to be outside in the weather for years.
- Software updates are select and click.
- Software updates can be done over-the-air.
- Tools are available to monitor SNR, network performance and other device characteristics.
What Can I Do With It?

Applications
Services
Get Through the First 49 Hours
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<th>Chat</th>
<th>Email</th>
<th>CAD and Web</th>
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<td>TicketsCAD</td>
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What Can I Do With It? - Services

**VoIP**
- Asterisk
- FreePBX
- Linphone
- TeamTalk
- Zoiper
- CSipSimple

**Video**
- PTZ and Fixed Cameras
- BlueIris
- iSpy
- MotionEye
- ZoneMinder
- Shinobi
Mobile Command Center
San Juan Capistrano, CA
“This mesh camera system provided by RACES members was a valuable tool for our command staff. The parade was the safest in years. As we were taking the calls, we could see the activity occurring in realtime. Incredibly, there was only one arrest for fighting, which just happened to take place in the camera’s view.

Sgt. Joseph Cope - Orange County Sheriff’s Administrator

Streaming Video Services
Installing a Permanent PTZ Camera

Orv Beach, W6BI
Cameras are a valuable part of our growing ham network. But they come with their own set of challenges: configuration, management, bandwidth consumption, etc. But there's another challenge with cameras that have zoom capabilities.

Orv Beach, W6BI, January 22, 2019
The flexibility of a mesh network makes it ideal for public service. Even in the worst disasters, there will still be a point outside the affected area where internet access is still available. With a mesh network, amateurs can quickly deploy wireless nodes from the point of access all the way into the disaster area.

Steve Ford, WB8IMY, QST February 2019
Summary

Features and Benefits
New Release September 2018
Frequent Improvements
Features & Benefits

- Exclusive Part 97 Channels
- Over-the-Air firmware upgrades
- Maximum data rate of 144 Mbps
- Low investment entry
- Rapid deployment and implementation
- Multiple antenna choices
- Interfaces easily with other Internet capable devices
New Features September 2018

• OpenWRT 18.06.1 released in August 2018
• Can be loaded onto any supported Ubiquiti device by using the TFTP method
• Supports many of new Ubiquiti XW devices
• Available for specific Mikrotik Basebox models
• SSID, Channel and Bandwidth are now displayed on the main page
New Features September 2018

• Reduced code size for better performance and more memory
• SNR displays above the real-time chart to aid aiming
• Pages are now accessible via HTTP port 80
• Show the OLSR routing table size
• Node description on the Mesh Status page
• Display node’s Latitude and Longitude on the main page
At the Center of Emergency PrepAREDNess
Thank You from the AREDN Project Team

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Semper Certus, Saepe Falsus