WIRELESS MESH USING AMATEUR RADIO EMERGENCY DATA NETWORK

AREDN

AMATEUR RADIO EMERGENCY DATA NETWORK

SUMMARY

- Grant Approved/Equipment in hand

- Deployment Map

- Frequencies

- Hardware and Firmware (what's new)

- New Hampshire to Maine Connection

- How to get started

- Help needed

GRANT APPROVED EQUIPMENT ON HAND

- We asked for just over $41K in a grant proposal and was approved/awarded by (ARDC) Amateur Radio Digital Communications.

- (MARF) Maine Amateur Radio Foundation provided the (501c3) status and administration to make the grant possible. http://mar.foundation

- Funds will be used to build a MESH backbone from Portland to Down East Maine

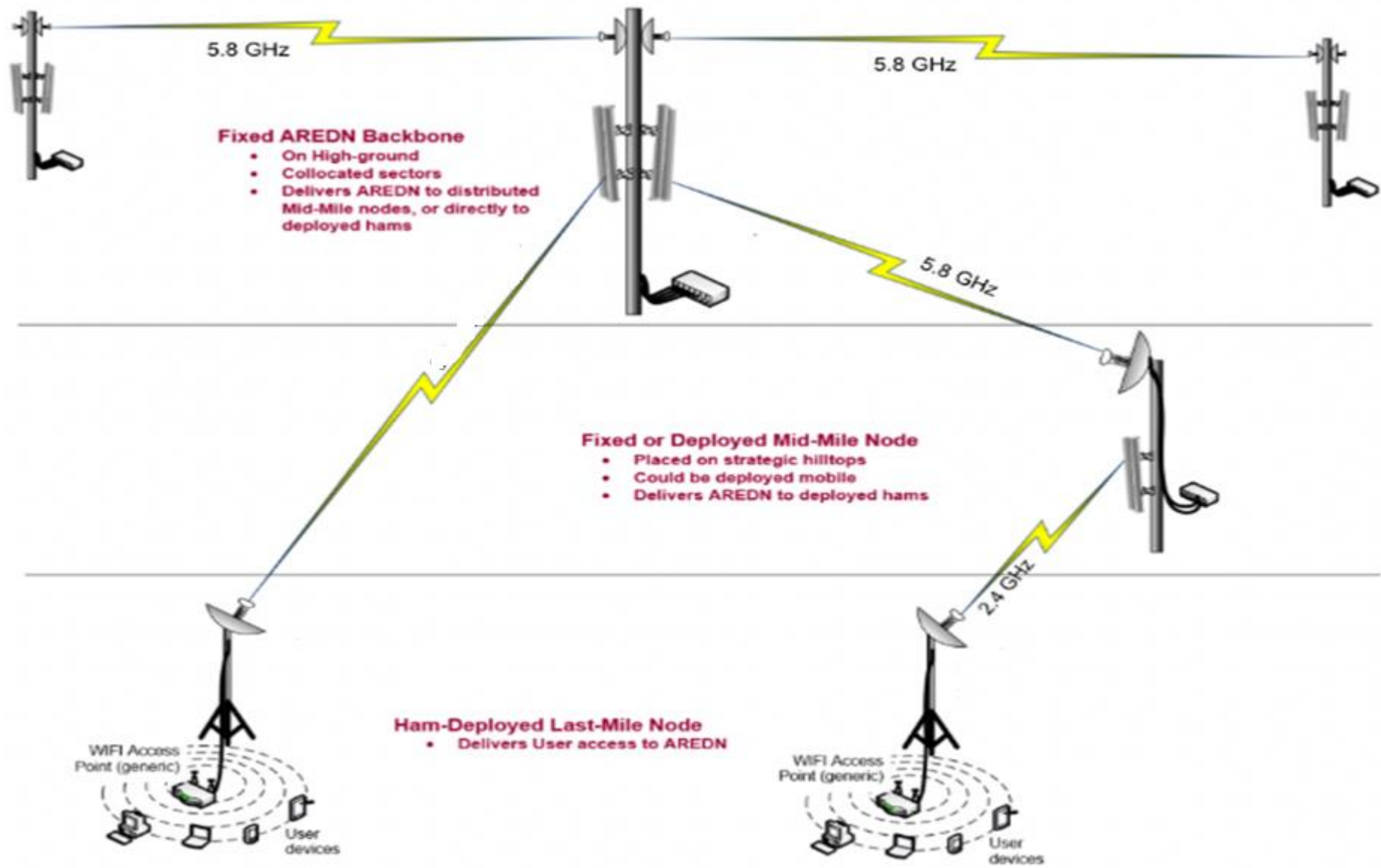- Team met in February 2024 and got all the equipment updated to the AREDN firmware.
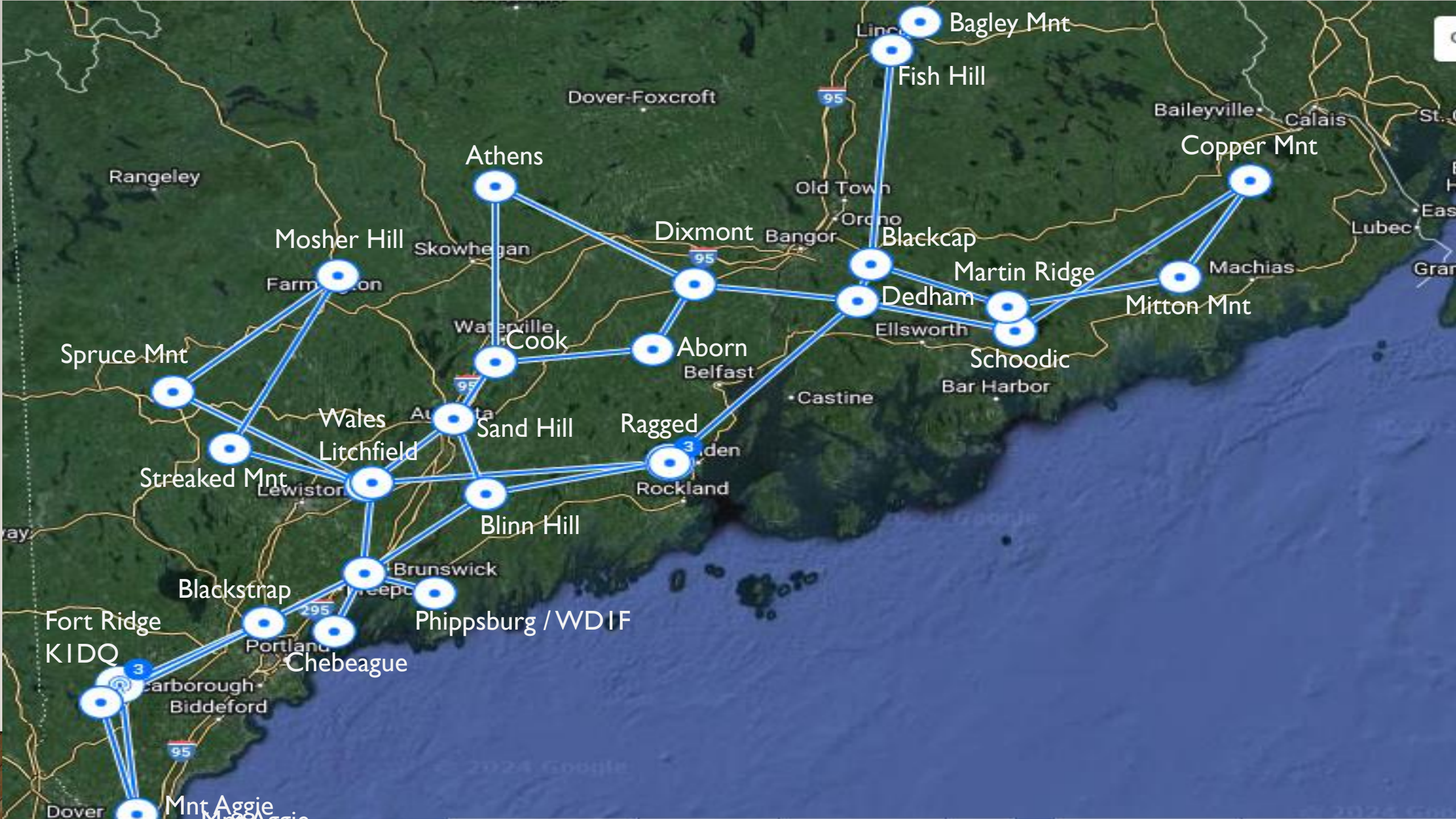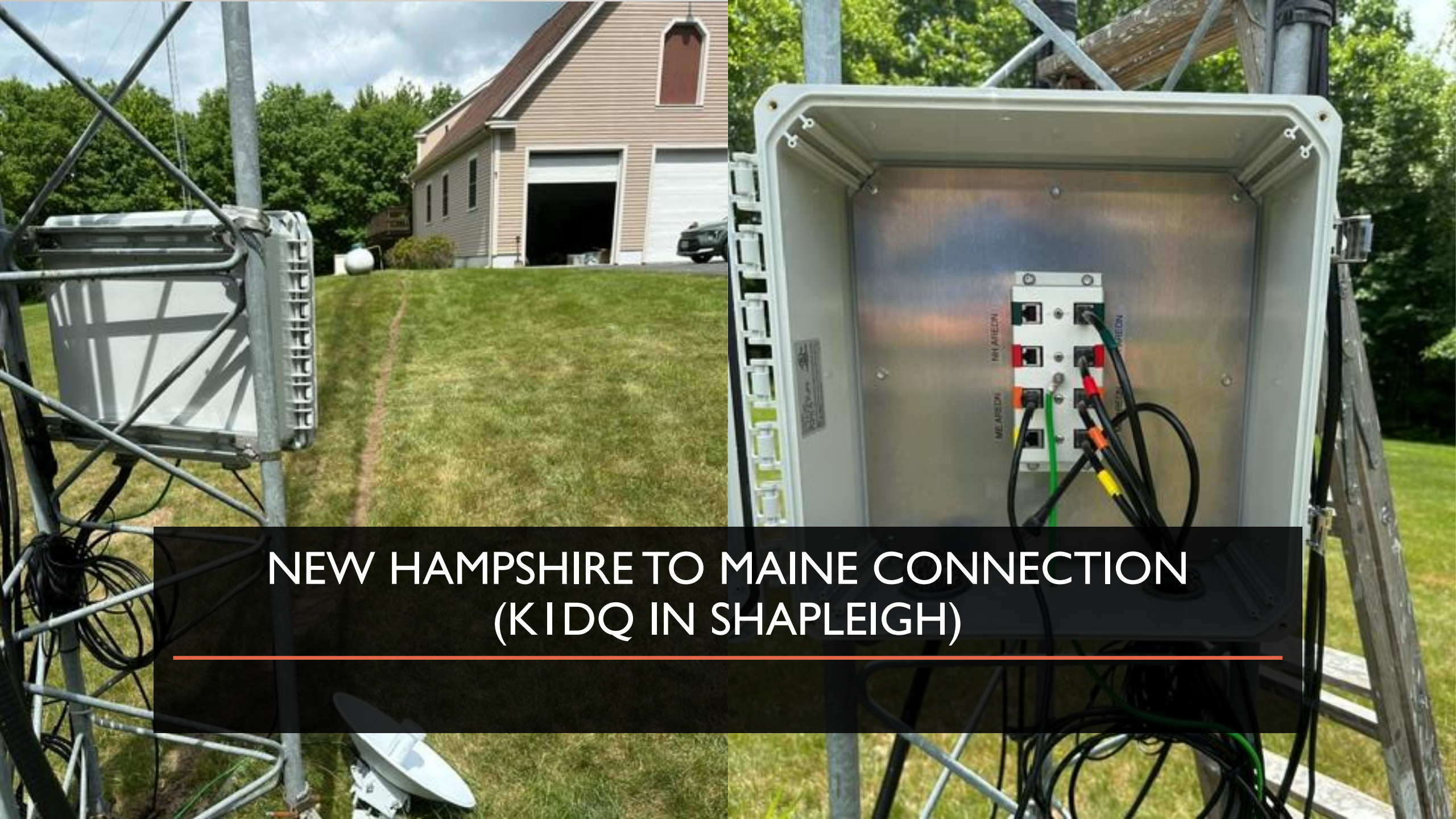
NEW HAMPSHIRE TO MAINE CONNECTION
(K1DQ IN SHAPLEIGH)

DEPLOYMENT IN MAINE

- Lots of possibilities
  - ✓ Use of current repeater sites is a must to create a backbone
  - ✓ 5.8Ghz as the point-to-point backbone (to mesh repeater sites)
    - ▪ Use 120 deg panel antennas/devices to support home/portable users
    - ▪ Lots of channels to use to prevent overlap/interference
  - ✓ 2.4Ghz sub nodes for home/remote use cases
    - ▪ Use 5Mhz width so we can divide between 2 channels
  - ✓ Packet BPQ nodes connected to sites (as needed) with VHF or UHF

5.8 GHz

5.8 GHz

Fixed AREDN Backbone
- On High-ground
- Collocated sectors
- Delivers AREDN to distributed Mid-Mile nodes, or directly to deployed hams

5.8 GHz

Fixed or Deployed Mid-Mile Node
- Placed on strategic hilltops
- Could be deployed mobile
- Delivers AREDN to deployed hams

2.4 GHz

Ham-Deployed Last-Mile Node
- Delivers User access to AREDN

WIFI Access Point (generic)

User devices

WIFI Access Point (generic)

User devices

FREQUENCIES

- 900 Mhz
  - 4 Channels and shared
- 2.4 Ghz
  - 13 Channels, 11 shared and 2 unshared
- 3.4 Ghz
  - 14 Channels shared, 10 removed
- 5.8 Ghz
  - 54 Channels (lots of room)
  - All shared

900 MHz

Channel	4	5	6	7
Freq	907	912	917	922
Status	Shared with unlicensed			

Refer to your local band plan for coordination

2.4 GHz

Channel	-2	-1	0	1	2	3	4	5	6	7	8	9	10	11
Freq	2.397	2.402	2.407	2.412	2.417	2.422	2.427	2.432	2.437	2.442	2.447	2.452	2.457	2.462
Status	Unshared		Cannot Use	Shared with wifi/unlicensed										

3.4 GHz

Channel	76	77	78	79	80	81	82	83	84	85	86	87	88	89
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	Amateur Radio secondary allocation													

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
~~ Estimated elimination early 2022 ~~									

Relevant FCC rulings include FCC-20-138A1 and FCC-21-321A1 (as of 20210320)

5.8 GHz

Channel	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148
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 Unlicensed National Information Infrastructure [U-NII-2C]															Shared with U-NII-3		

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 Unlicensed National Information Infrastructure [U-NII-3]																	

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 U-NII-3				Shared with Unlicensed National Information Infrastructure [U-NII-4]										Shared with vehicle ITS			

Relevant FCC rulings include FCC-20-164A1 (as of 20210320)

LINE OF SIGHT (LOS)

- LOS is a must. (get above tree line or between them)

- Microwave signals can go over 30 miles. (or one tree!)

- Two's company and Tree's a crowd ☺ (Per Orv W6BI)

- Demo Ubiquiti free LOS tool (link.ui.com)

HARDWARE AT THE BACKBONE SITES

Ubiquiti LAP120 (End user)
16dBi

15+ miles
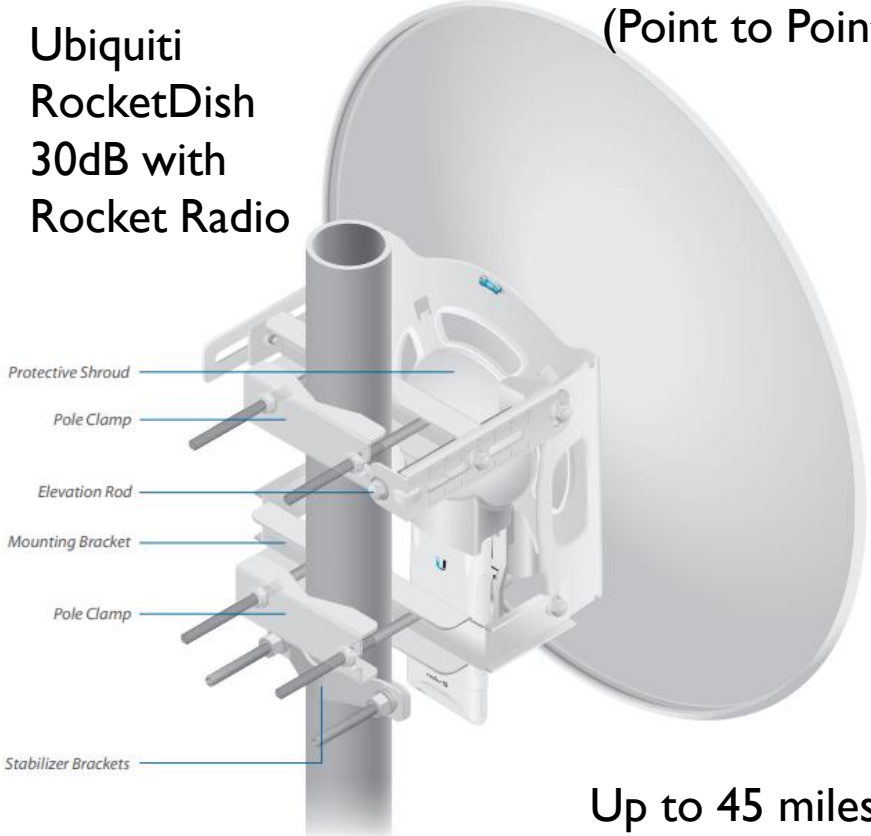
Ubiquiti (Point to Point)
PowerBeam 5AC
500mm 27dBi

Up to
30 miles

Ubiquiti
RocketDish
30dB with
Rocket Radio

(Point to Point)

Protective Shroud

Pole Clamp

Elevation Rod

Mounting Bracket

Pole Clamp

Stabilizer Brackets

Back View of the Fully Assembled RD-5G30-LW

Up to 45 miles

HOME AND PORTABLE GEAR

(Most common and recommended)

Ubiquiti

MikroTik

GL.iNet
(indoor rated)

Nanostation,   Rocket M5   Rocket AC5   Nanobeam

HOW TO GET STARTED?

- Cory KU1U has started a working group for this effort for New England.
  - [nemesh@groups.io | Home](mailto:nemesh@groups.io)

- Get your own mesh node going (the more involved the bigger the mesh)
  - [Device Selection Chart | Amateur Radio Emergency Data Network (arednmesh.org)](https://arednmesh.org)
  - [Supported Platform Matrix (arednmesh.org)](https://arednmesh.org)

- Join the AREDN forums to build a better understanding (just about every question has been asked and answered (Read!) If you can't find the answer, ask a question)
  - [Amateur Radio Emergency Data Network (arednmesh.org)](https://arednmesh.org)
  - [Maine | Amateur Radio Emergency Data Network (arednmesh.org)](https://arednmesh.org)

- Make friends with tower owners ☺

- Tunnelling is a temporary solution until an RF link is created.

HELP NEEDED

- Looking for:
  - A project manager (Get folks scheduled for installs)
  - Certified/insured tower climbers (This is more money then what was budgeted for)
  - Folks willing to support their local area.

THANK YOU!