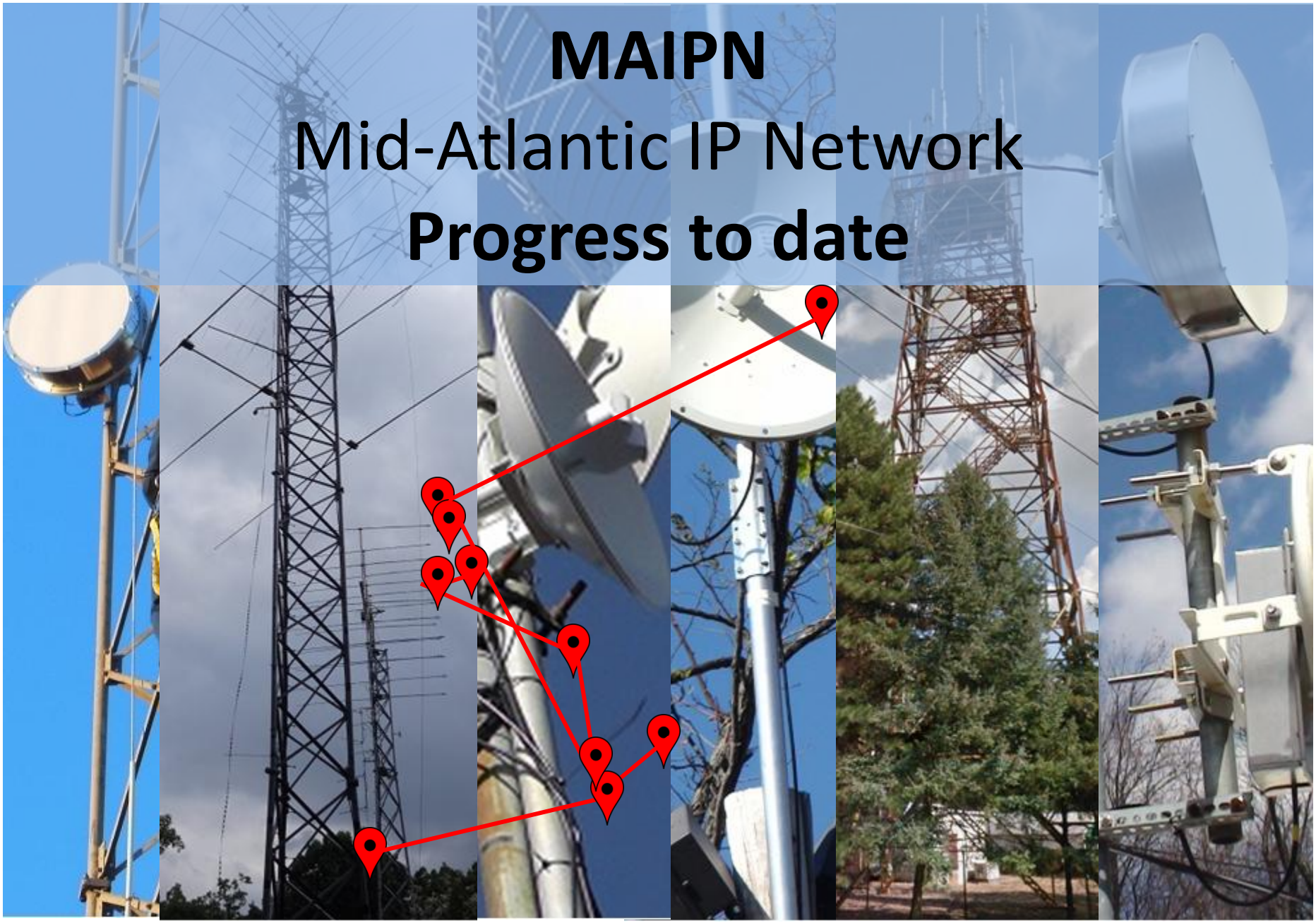
MAIPN

Mid-Atlantic IP Network

Progress to date



Background

- 2004 HSMM Radio Equipment
- 2006 ARRL HSMM (High Speed Multi Media) Working Group
- 2007 Experiments In Virginias Shenandoah Valley
- 2007 WEN (SCEWN)
- 2008 Broadband-Hamnet, HSMM-MESH
- 2009 BCWARN, British Columbia Wireless Amateur Radio Network
- 2009 CPIN
- 2012 MARC,"HSMM-MESH"
  - Kevin Whipp, W3KDW, David Bern, W2LNX and Vic Nardo, WB2U
- 2012 HamWAN
- 2013 MAIPN
- 2015 AREDN

Goals

- I think in a perfect world we would be just an Radio Amateur ISP and would connect to our **served agencies** and they would never know we were active if their primary ISP failed. It would all be automatic fail-over.
- But there must be an air gap, so we need to replicate the computing infrastructure…
- “The only difference between ‘Networking’ and 'Notworking’ is one letter."
  - Craig Anderson N6YXK, WEN

Achieving our goals

- Goals
  - Support Auxiliary communications.
  - Sustainable out of bounds communications
  - To bring Churches, Shelters and other community groups into the communications network.
- How best to do this
  - Amateur Radio organization
  - Amateur radio resources
  - Amateur radio knowledge

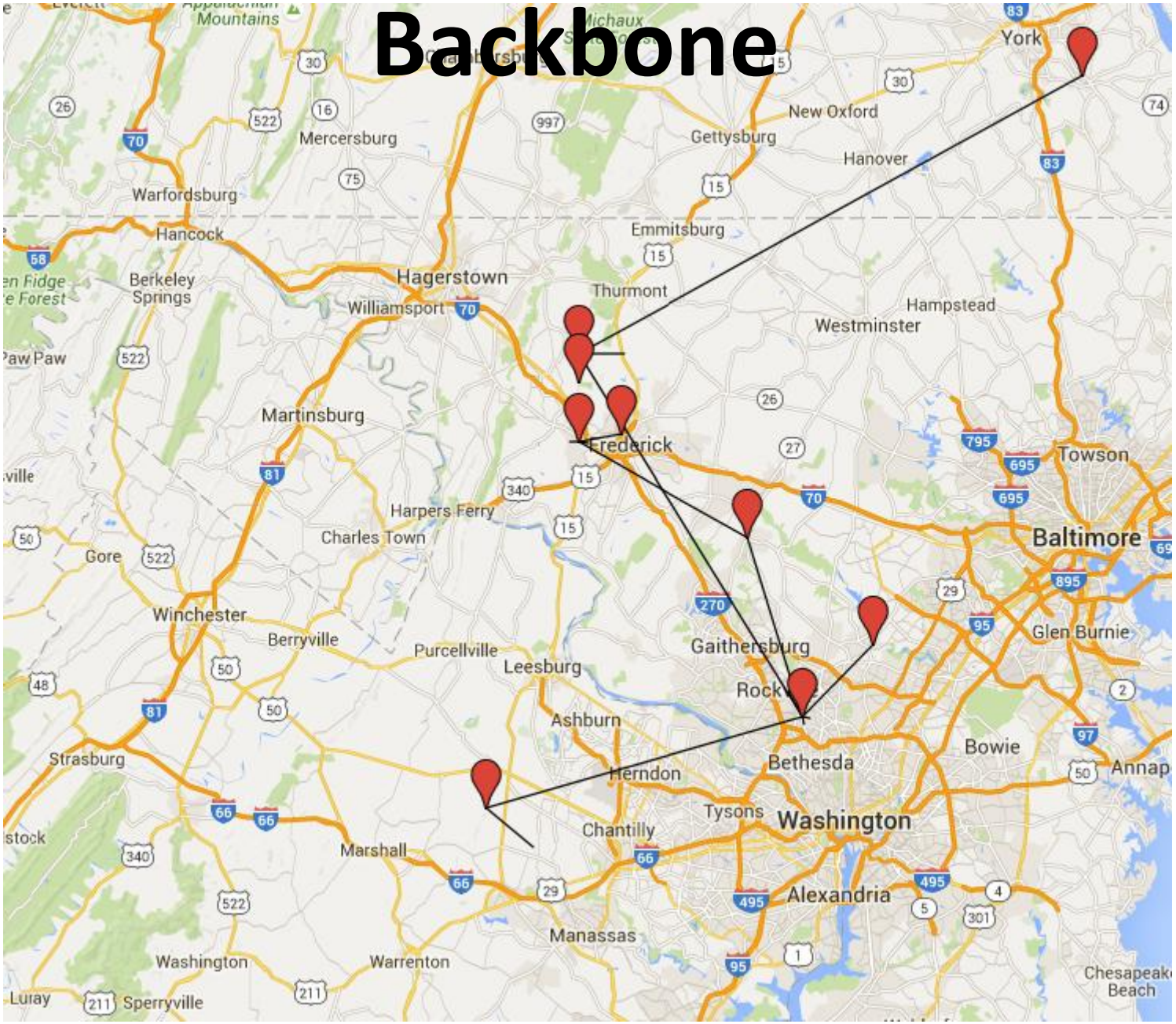
Steps on the way

- Presentations
- Equipment
- Node Locations
- Links
- Adding the services

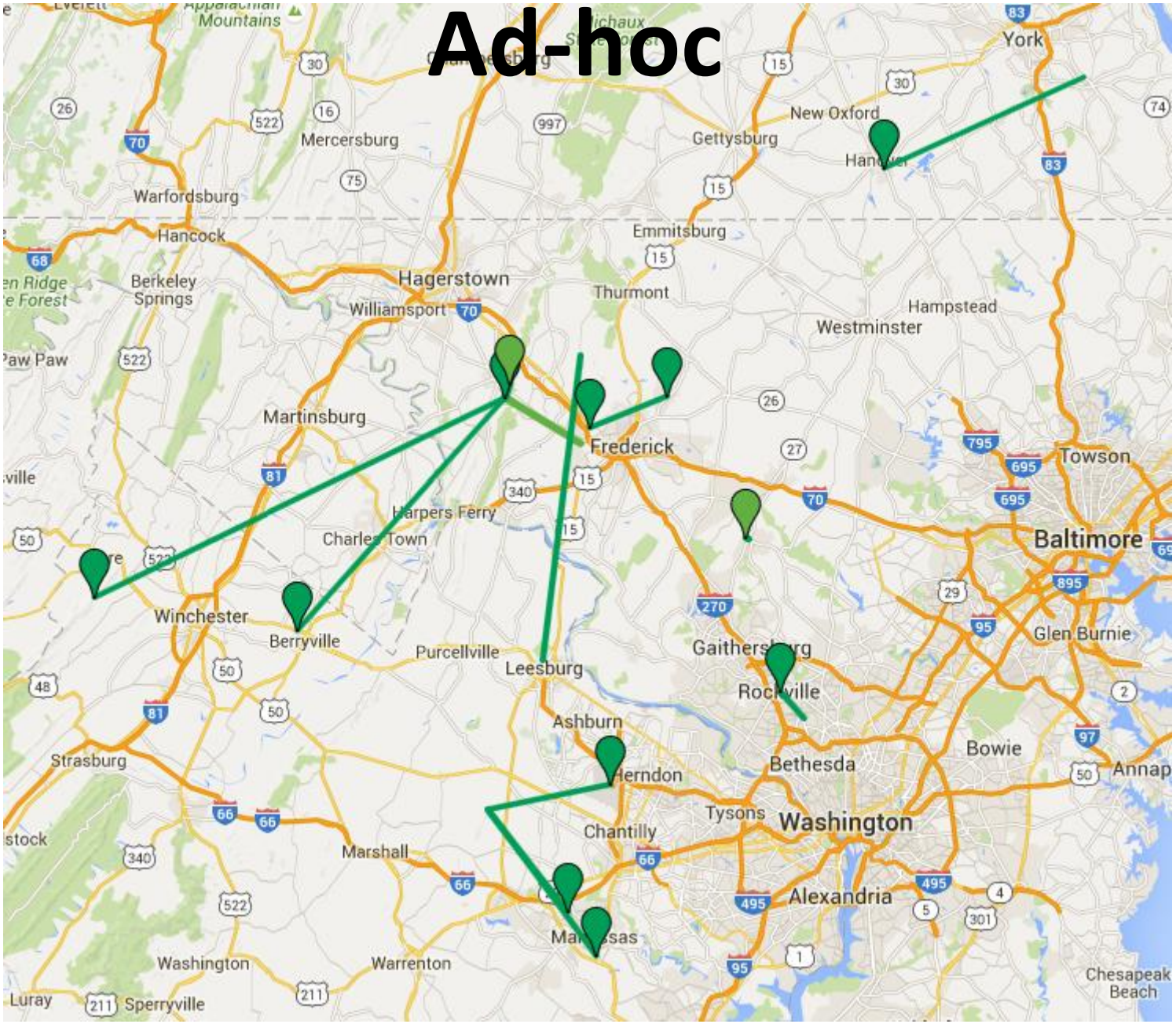
Provide ad-hoc remote links?

- One question, can we provide ad-hoc remote links at 5 GHz?
  - Red Cross, Frederick, MD – Overlook off Irongate Ln
  - Berryville – Boonsboro
  - Washington Monument State Park – KD3SU
  - Red Lion – Hanover Area ARA
  - Damascus volunteer fire Dept – Damascus Volunteer Fire Department Activity Center
  - And more…
- The Answer is **Yes**!

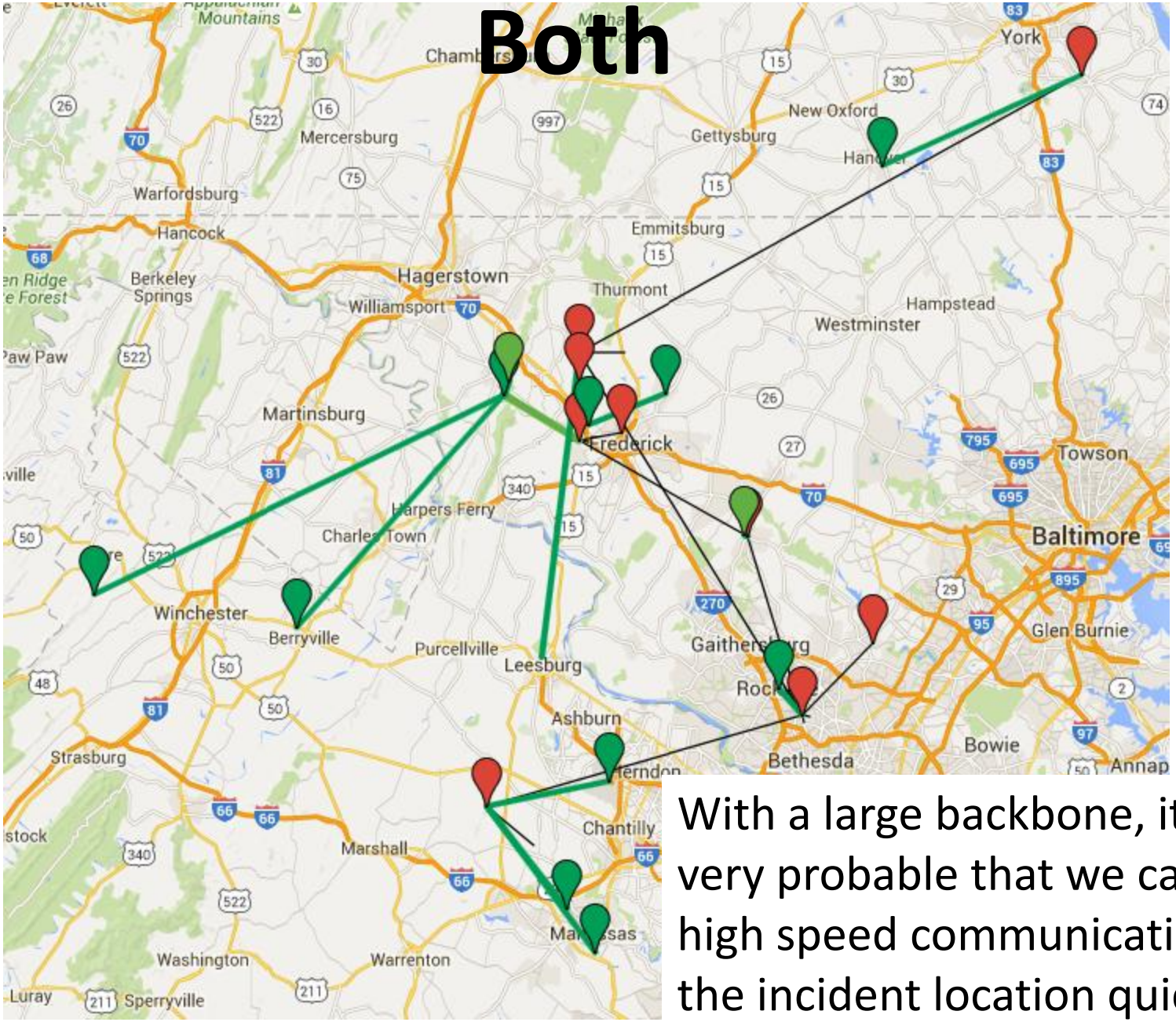
Backbone



Ad-hoc

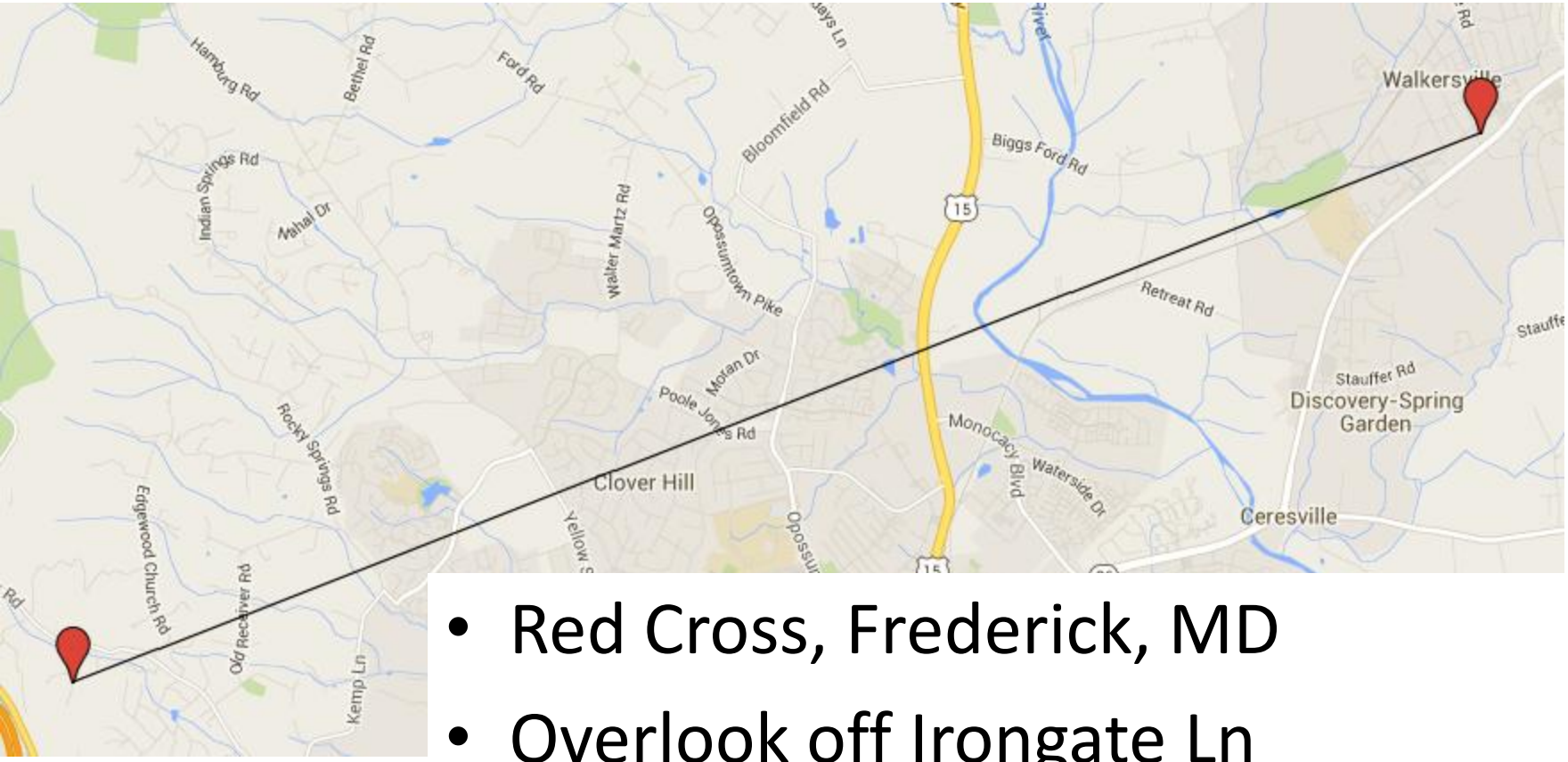


Both



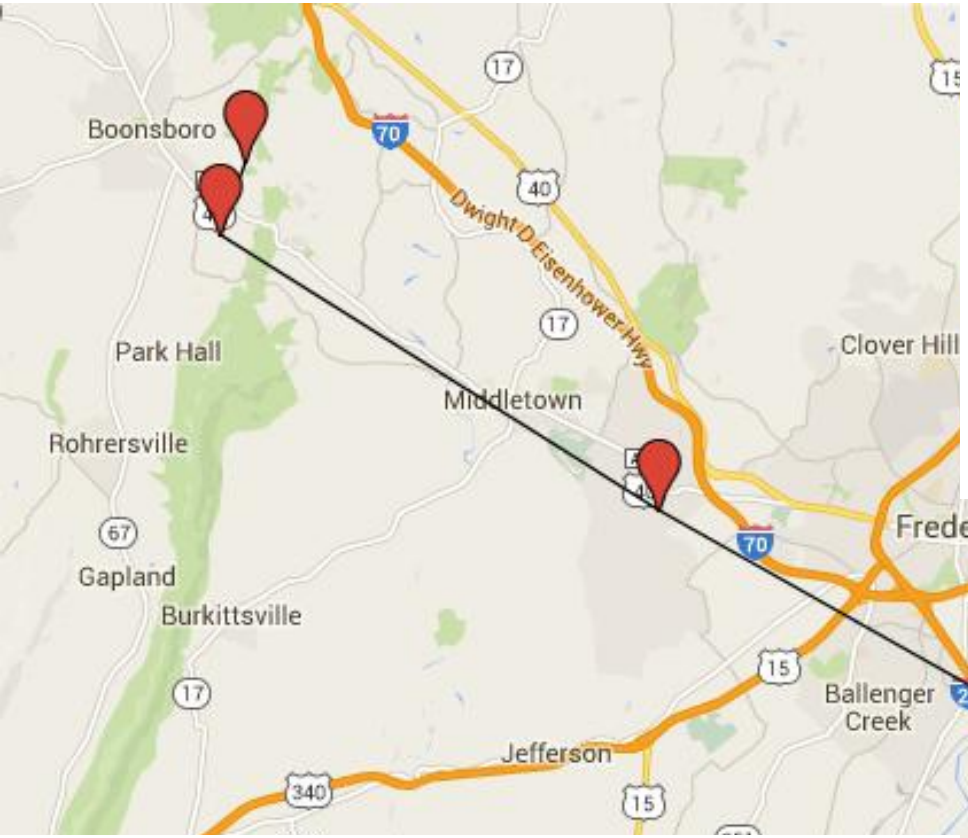
With a large backbone, it is very probable that we can get high speed communications to the incident location quickly.

Red Cross 2014 - Remote Link

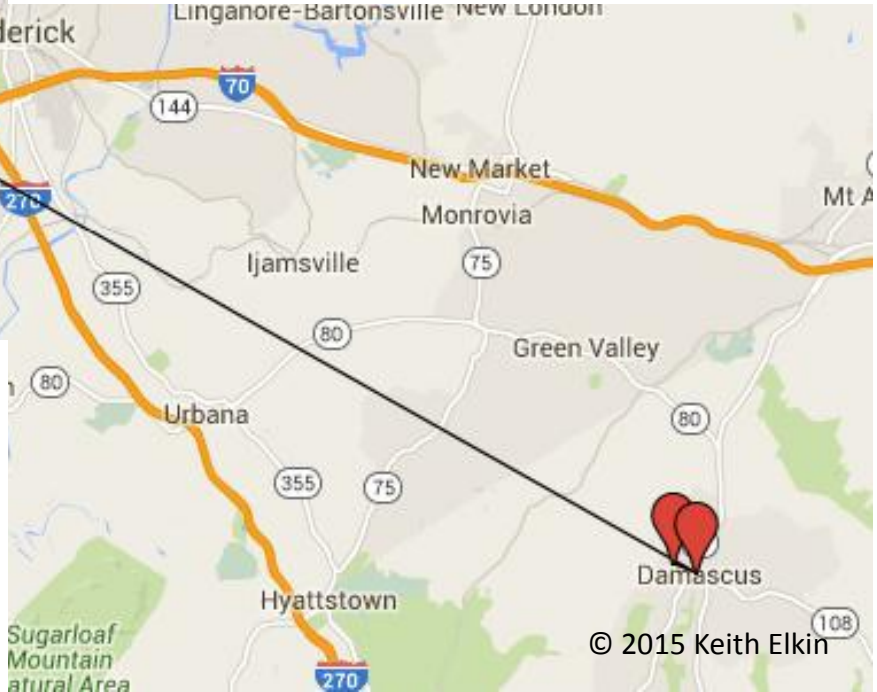


- Red Cross, Frederick, MD
- Overlook off Irongate Ln
- Two NanoBeams
- 7.79 miles

Field Day 2015 - Remote Link



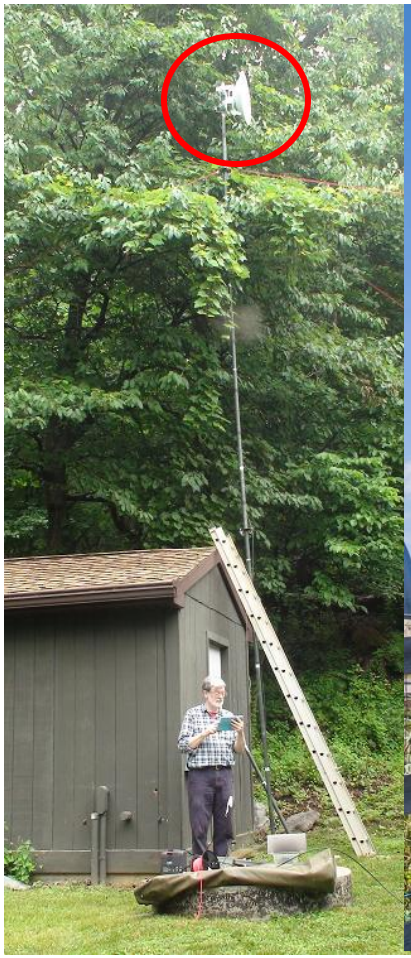
- Field Day 2015
  - Washington Monument State Park
  - MARC / DECT Field Day
  - 5G30 2’ dish at WMSP
  - Two 5G30 at KD3SU
  - Two 5G30 at Braddock Heights



  - One 5G30 at DVFD
  - One NanoBeam at activity building
  - One Sector Antenna at DECT
  - 18 miles longest, 29 miles total

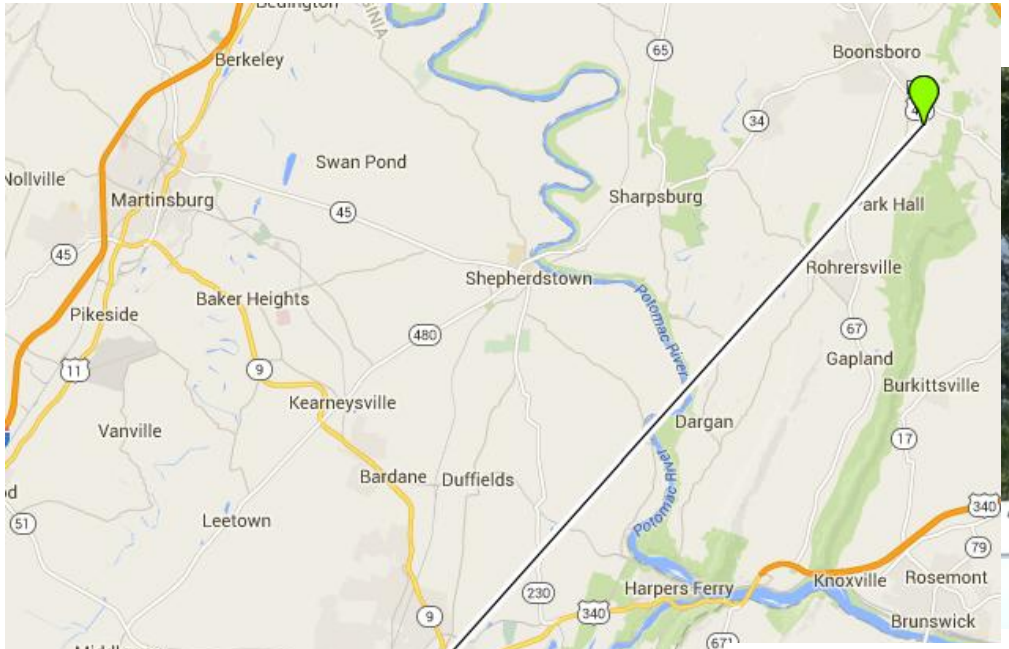
Field Day 2015

Randallstown Amateur Radio Club (RARC) - DECT Field Day



http://www.maipn.com/Articles/WashingtonMonumentFieldDay/FieldDay2015.htm

Berryville Hamfest- Remote Link



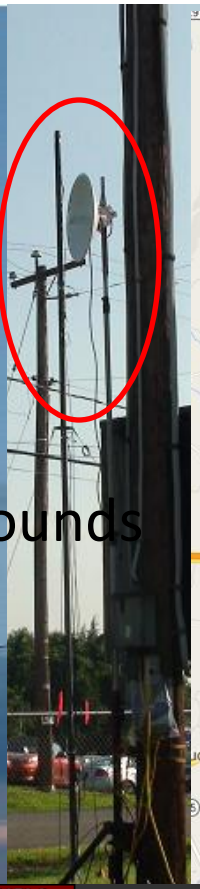
- Berryville Hamfest
  - Clarke County Ruritan Fairgrounds
- KD3SU - Gregory C Thornwall,
  - 6012 Moser Rd, Boonsboro, MD
- 29.3 miles

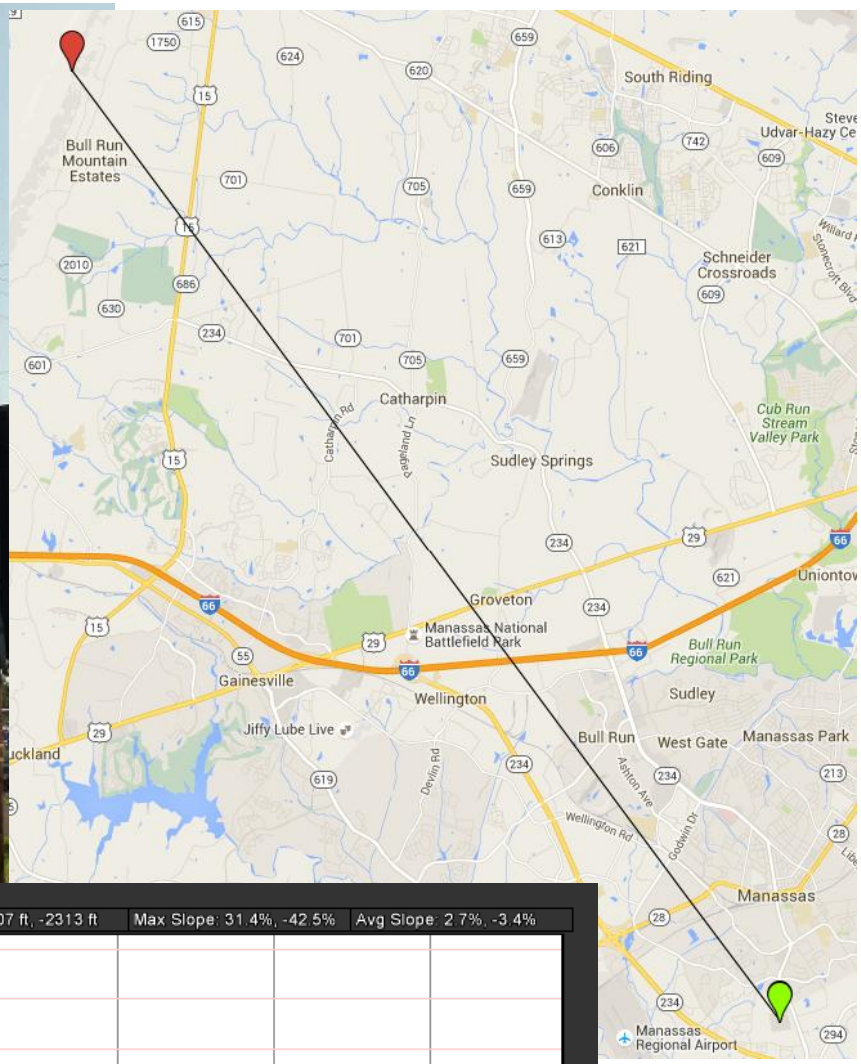
OVH Manassas Hamfest

Bull Run Mountain ARA
1708 Summit Drive
Haymarket, Va 2016

Prince William County Fairgrounds
10624 Dumfries Road
Manassas, Virginia

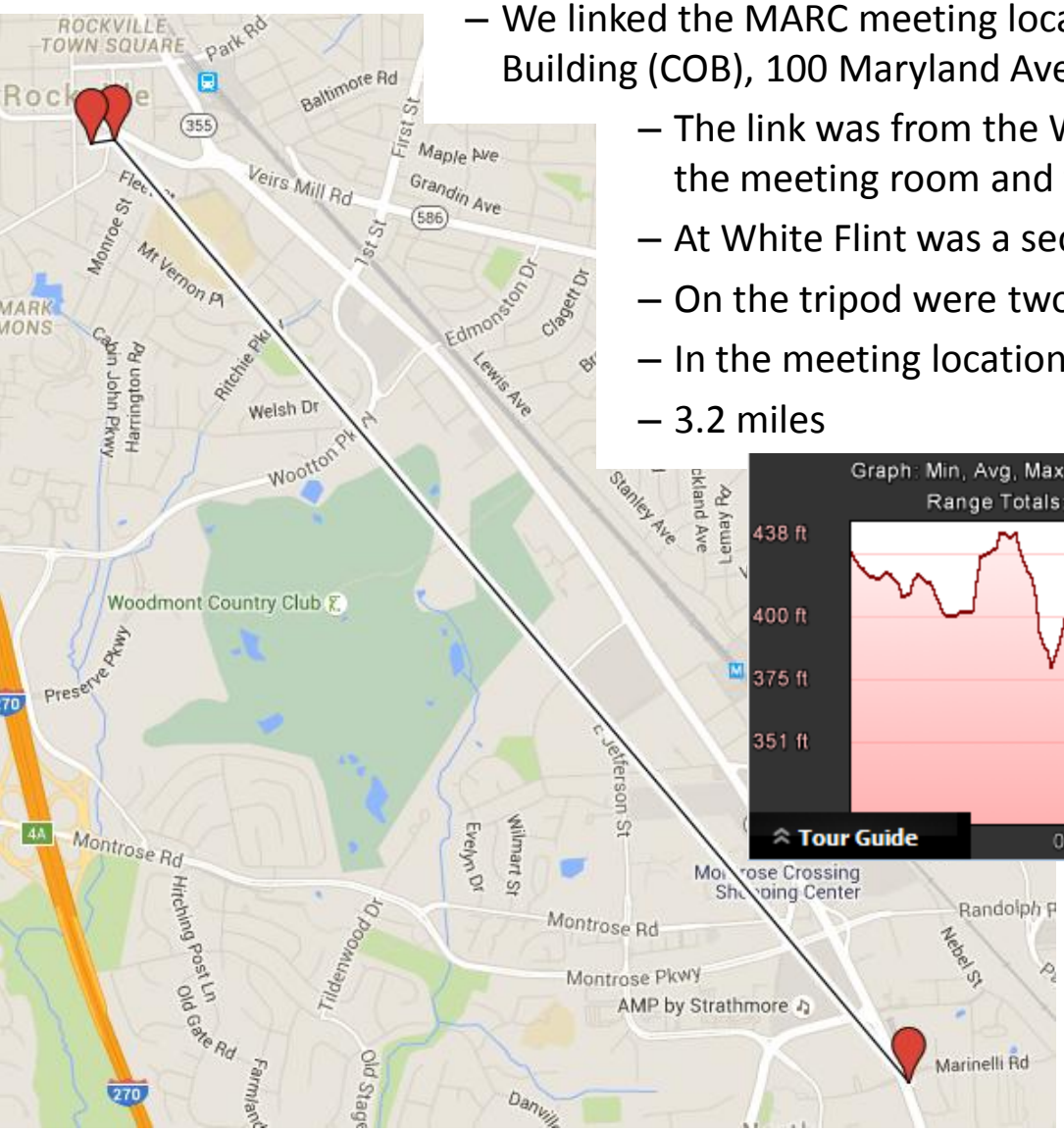
17 miles



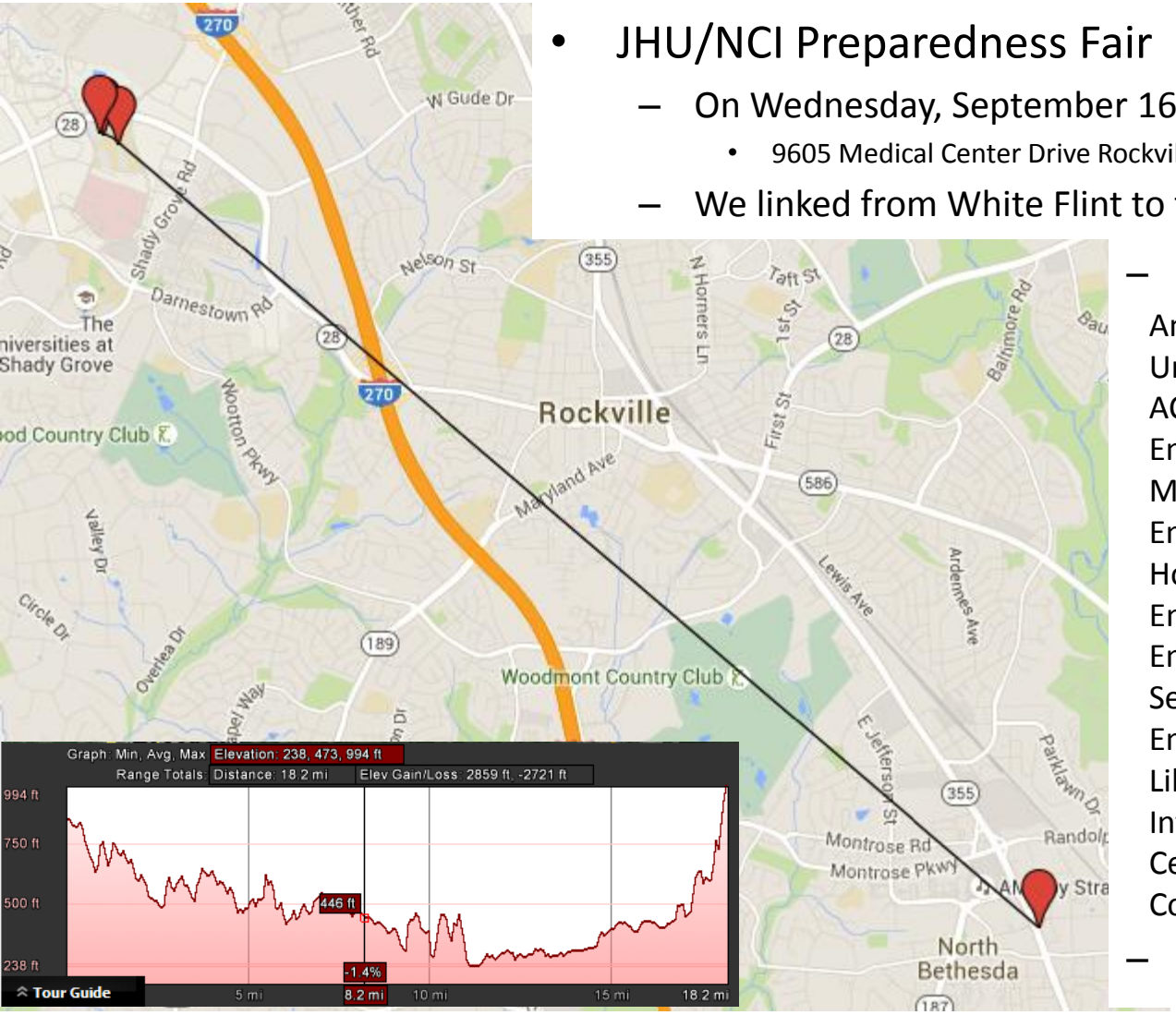


MARC Club meeting - Remote Link

- We linked the MARC meeting location at the Stella B. Werner Council Office Building (COB), 100 Maryland Avenue, Rockville, MD.
  - The link was from the White Flint location via a 10 foot tripod outside the meeting room and then into the meeting room.
  - At White Flint was a sector antenna
  - On the tripod were two Nanobeams
  - In the meeting location was another Nanobeam.
  - 3.2 miles



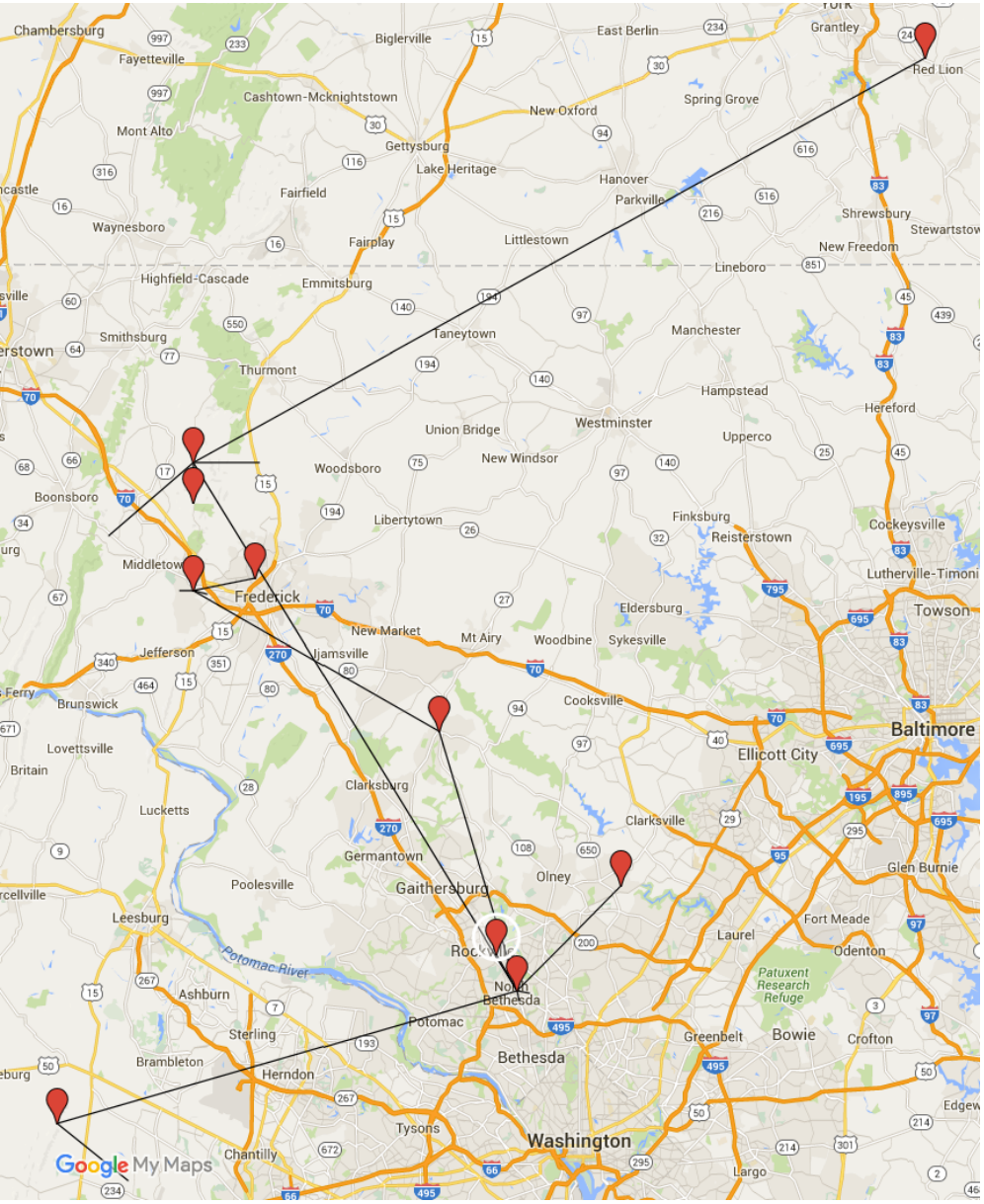
NCI Preparedness Fair - Remote Link



- JHU/NCI Preparedness Fair
  - On Wednesday, September 16 from 1100 to 1400 local,
    - 9605 Medical Center Drive Rockville, MD 20850
  - We linked from White Flint to the roof of the NCI building
  - Participants

    American Red Cross, Johns Hopkins University, MARC, Montgomery County ACS, Montgomery County Community Emergency Response Team, Montgomery County Office of Emergency Management and Homeland Security, MAIPN, NCI Emergency Response Team, NCI Emergency Management and Physical Security Branch , NIH Division of Emergency Management , National Library of Medicine's Disaster Information Management and Research Center, U.S. Public Health Service Commissioned Corps
  - 6 miles total

MAIPN Backbone today



- WN3R - Red Lion (53.6)
- WN3R - White Flint (39.9)
- KB3TCB - Braddock Heights
- Braddock Heights - Auto West
- Braddock Heights - KD3SU
- Braddock Heights – Damascus
- Damascus - White Flint
- White Flint – Haymarket (31 miles)
- Haymarket KE2N/W4BRM
- 130 miles MAIPN backbone
- The longest distance, including CPIN is **218** miles

www.MAIPN.com (I)

Documents (9/26/2015)

Phone numbers Trustees MAIPN

Remote Rig Control, Al Taylor, KN3U

Applications

live-view (guest@kb3tcb.com,guest)

Run airConrol 2 using server 173.166.180.188:9081 (guest,guest)

Examples of possible backup manuals, if the normal access is not available.

Software Manuals

WebEOC 7.4 User Manual (pdf)

Hardware Manuals

Network Extender User Manual (pdf)

TM1000A Manual (pdf)

Examples of possible backup services, if the normal access is not available.

Services

Each major location has a set of mirrored services.

Each location has managed switch and a VoIP phone.

Braddock Heights	KB3TCB	DECT	KE2N	WN3R	White Flint	
Web Server	Document Server	Document Server	Document Server	Document Server	Document Server	
Map server	Map server		Map server	Map server	Map server	
Camera (use IE)	Camera 1 (guest/guest)	Camera	Camera	Camera		
Camera UVC Pro (use Chrome)	Camera 2 (guest/guest)		AllStar Link			
	Camera3 (guest/guest)			ownCloud		
ownCloud			ownCloud	easyRTC	ownCloud	
easyRTC	ownCloud		easyRTC	Wheather station	easyRTC	
Wheather station	easyRTC		Wheather station	email server	Wheather station	email server
email server	WeatherLink	SIP phonw	email server	SIP phone	email server	SIP phone
SIP phone	email server		ext: 6004		SIP phone	
	ext: 6001					
ARCS (K3WX)	KD3SU	East 1	West 1	South 2	East 2	North 2
SIP phone	SIP phone	SIP phone	SIP phone	SIP phone	SIP phone	SIP phone

- Documents
- Applications
- Manuals
- ownCloud
- easyRTC
- Phone service

www.MAIPN.com (II)

- Documents
- Applications
- Repositories
  - Software, updates, manuals
- Access to infrastructure

Examples of possible backup documents if the normal access is not available.

EOP Support Material

Montgomery County, MD

Emergency Operations Plan (EOP) Local Emergency Center Contacts and Hotline

Virginia

Local Emergency Managers Directory

Examples of possible backup software, if the normal access is not available.

Downloads

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PDF reader

Ubiquiti firmware

unifi-video UniFi aircontrol-v2.0

jxpiinstall ipscan24

GrandStream Firmware HT502 1.0.14.1

Network

Login as (guest/guest)

Device	Mode	Model	Device	Mode	Model
BRADFRMDKB3TCB	AP	Rocket M5 GPS	KB3TCBFRMDBRAD	STA	Rocket M5
BHFRMDKD3SU	STA	Rocket M5	KD3SUFRM	(Field Day)	
BHFRMDMark	STA	Rocket M5			
			MikeFRMDBH	STA	Rocket M5
BHFRMDDECT	AP	Rocket M5	DECTMOMDBH	STA	Rocket M5
WFlintMOMDDECT	AP	Rocket M5	DECTMOMDWFlint	STA	Rocket M5
WFlintMOMDNorthSA	AP	Rocket M5		STA	Rocket M5
WFlint_SouthSA	AP	Rocket M5		STA	Rocket M5
KB3TCBOmni	AP	Rocket M5		STA	Rocket M5
WFlintMOMDKE2N	AP	Rocket M5	KE2NPRWVAWFlint	STA	Rocket M5 GPS
KE2N_EastSA	AP	Rocket M5		STA	Rocket M5
WFlintMOMDWN3R	AP	Rocket M5	WN3RFRMDWFlint	STA	Rocket M5
WFlintMOMDK3WX	AP	Rocket M5	K3WXMOMDWFlint	STA	Rocket M5
WFlintMOMDNIH	AP	Rocket M5	NIHMOMDWFlint	STA	Rocket M5
WN3RFRMDCPINRLY	STA	Rocket M5		AP	Rocket M5
WN3RFRMDWFlint	AP	Rocket M5		STA	Rocket M5
WN3RFRMDEast	AP	Rocket M5		STA	Rocket M5
WN3RFRMDWest	AP	Rocket M5		STA	Rocket M5
WN3RFRMDLeesburg	AP	Rocket M5		STA	Rocket M5
WN3RFRMDSouthSA	AP	Rocket M5		STA	Rocket M5
WN3RFRMDNorthSA	AP	Rocket M5		STA	Rocket M5

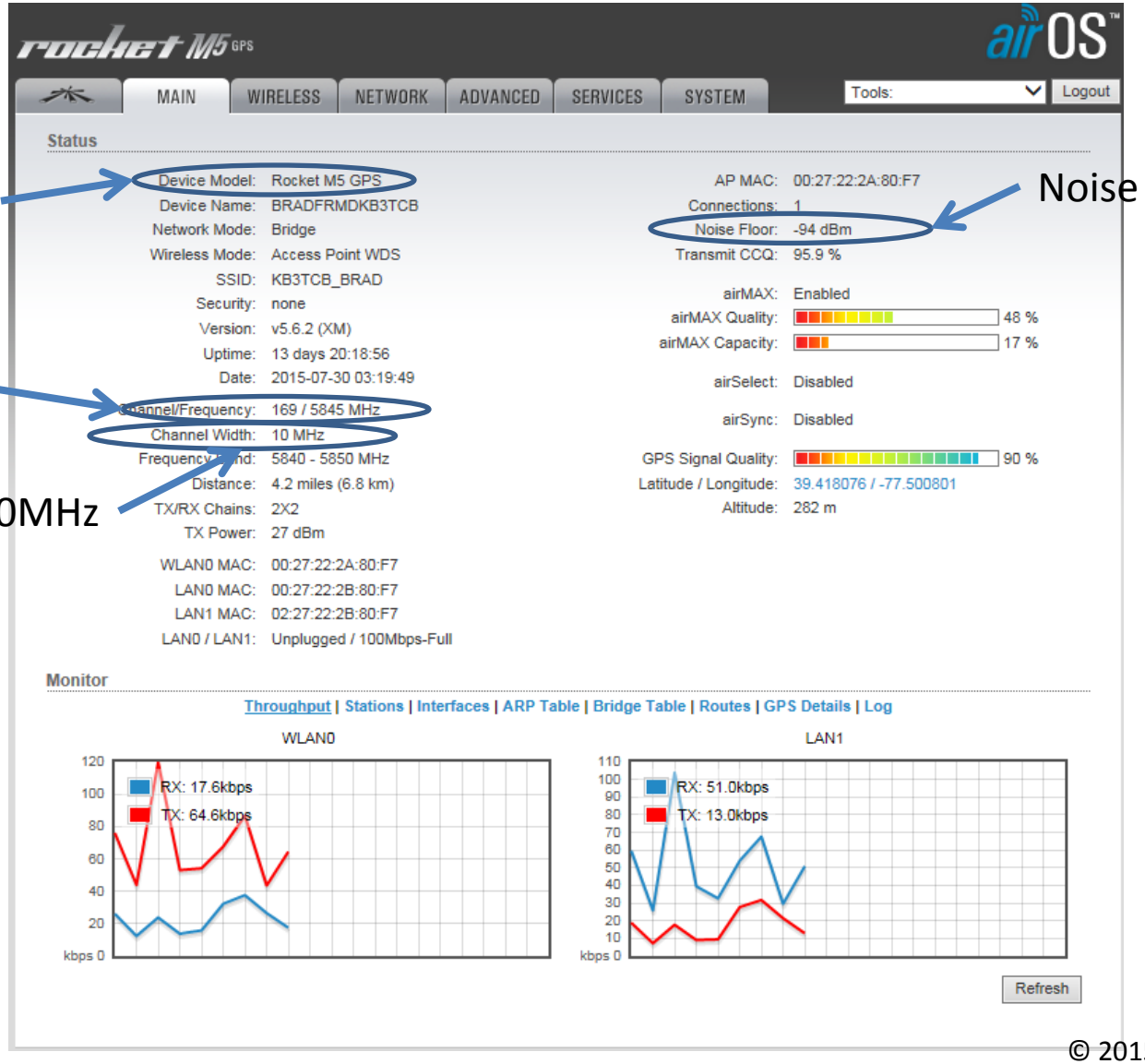
The Rocket M5 (Repeater++)

Includes a GPS

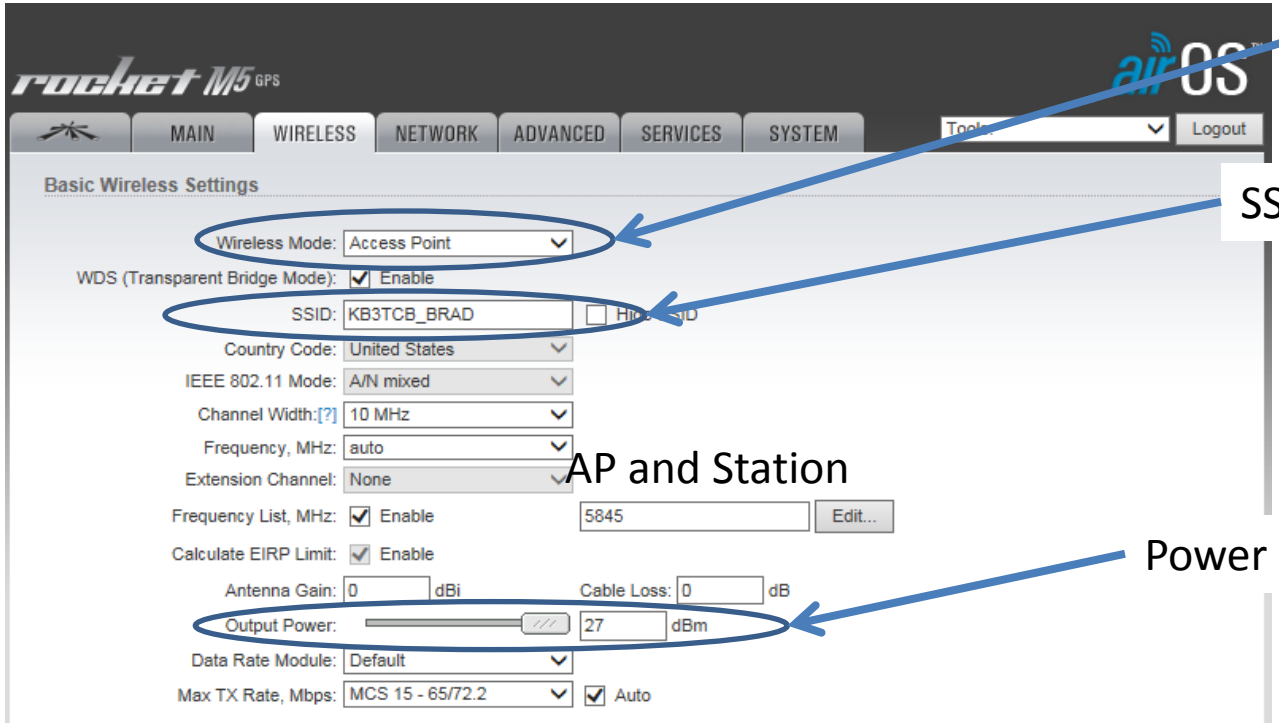
Freq: 5845

Channel Width 10MHz

Noise Floor -95dbm



Wireless



Access Point

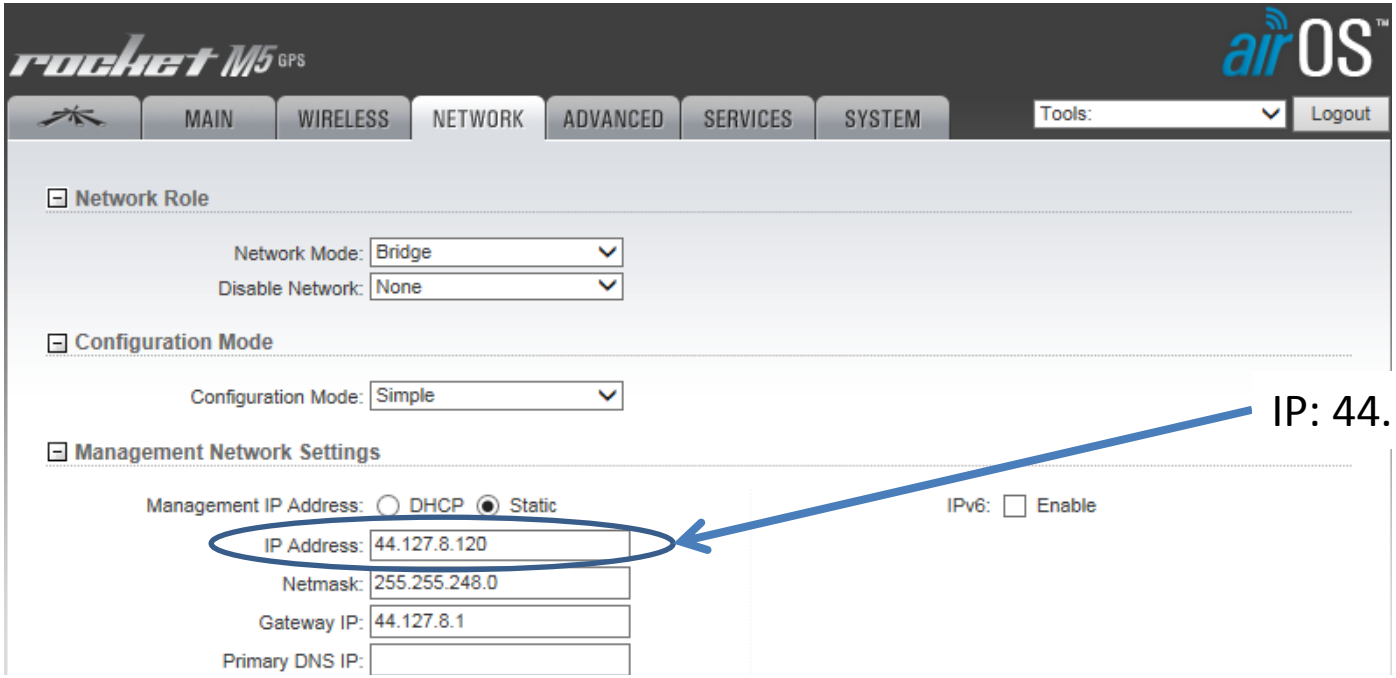
SSID: KB3TCB_BRAD

AP and Station

Power 27dbm(500 mW)

- This is the backbone, it is not HSMM-MESH
  - All links have one Access Point and one Station
  - These are Daisy chained together
- In HSMM Mesh, all radios talk to all radios

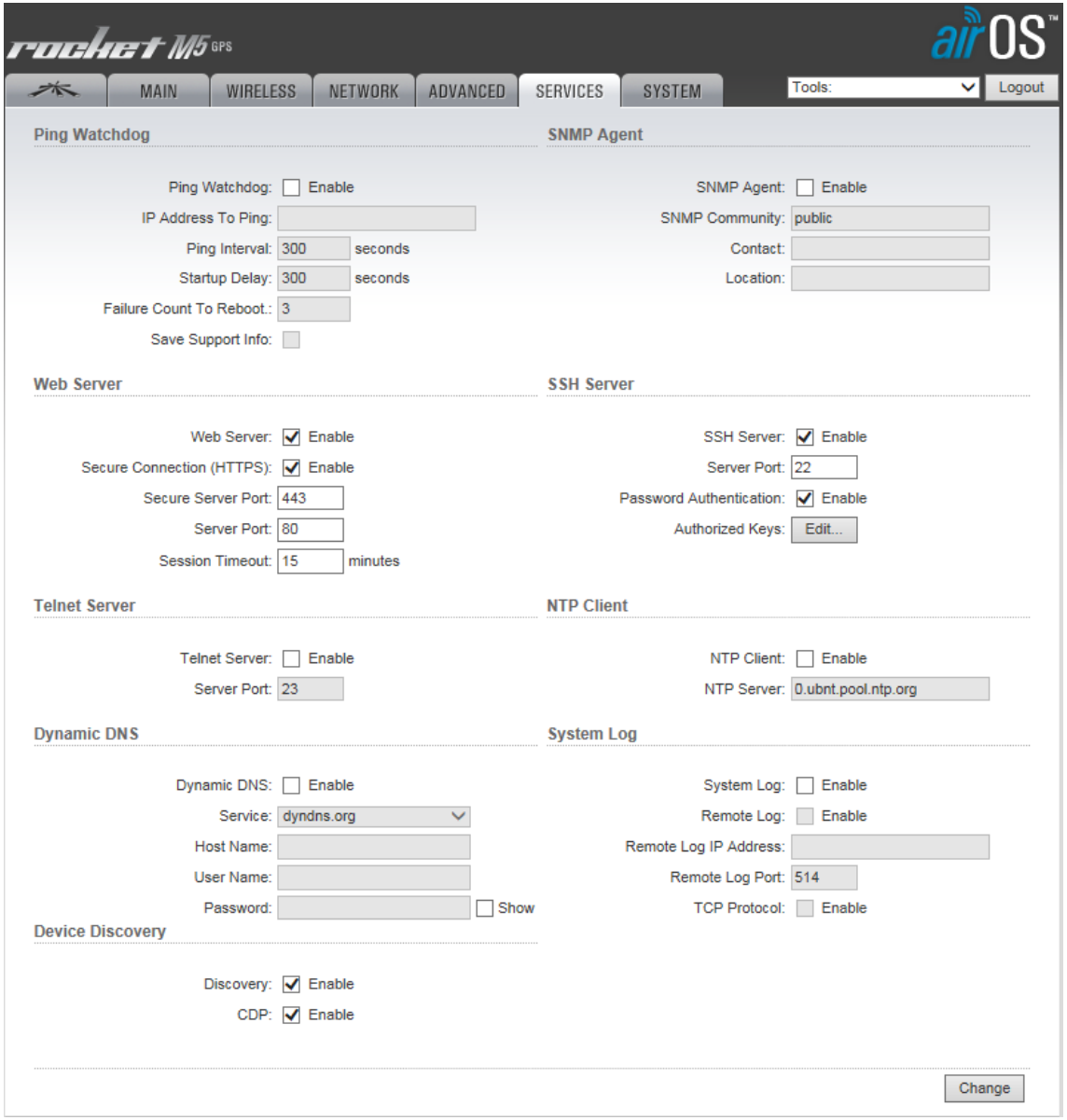
Network



IP: 44.127.8.120

The AMPRNet (AMateur Packet Radio Network) is a name used by amateur radio operators for computer networks connected over amateur radio. The class A 44 netblock of 16.7 Million IP addresses was set aside for amateur radio users worldwide

Services

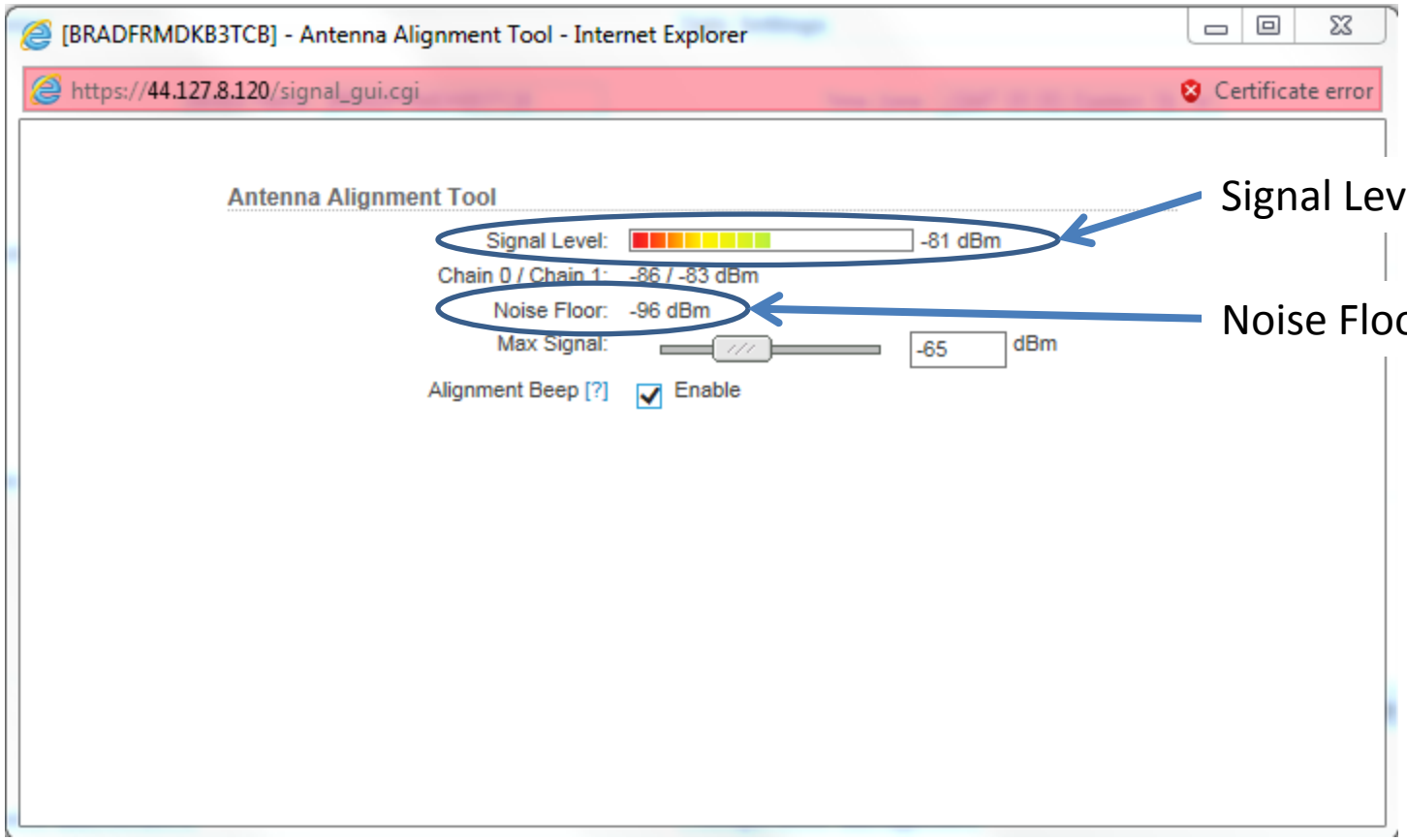


- Ping
- Web Server
- Telnet
  - remote computer administration
- Dynamic DNS
- Device Discovery
- SNMP Agent
  - Simple Network Management Protocol
- SSH Server
  - Secure Shell, is a encrypted network protocol
- System Log

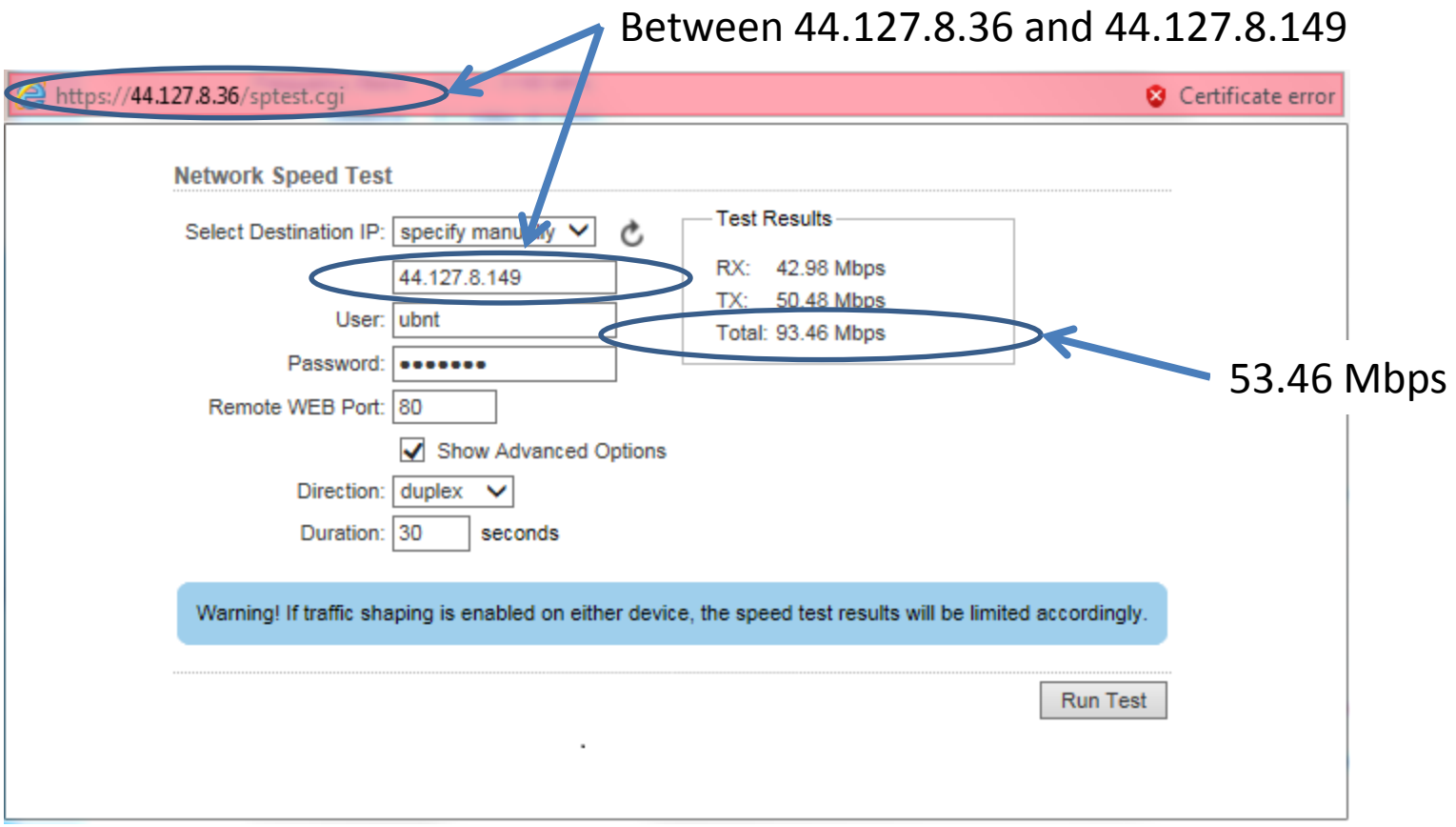
Tools

- There are useful tools built in each radio
- Antenna Alignment
- Site Survey
- Discovery
- Ping
- Traceroute
- Speed Test
- airView

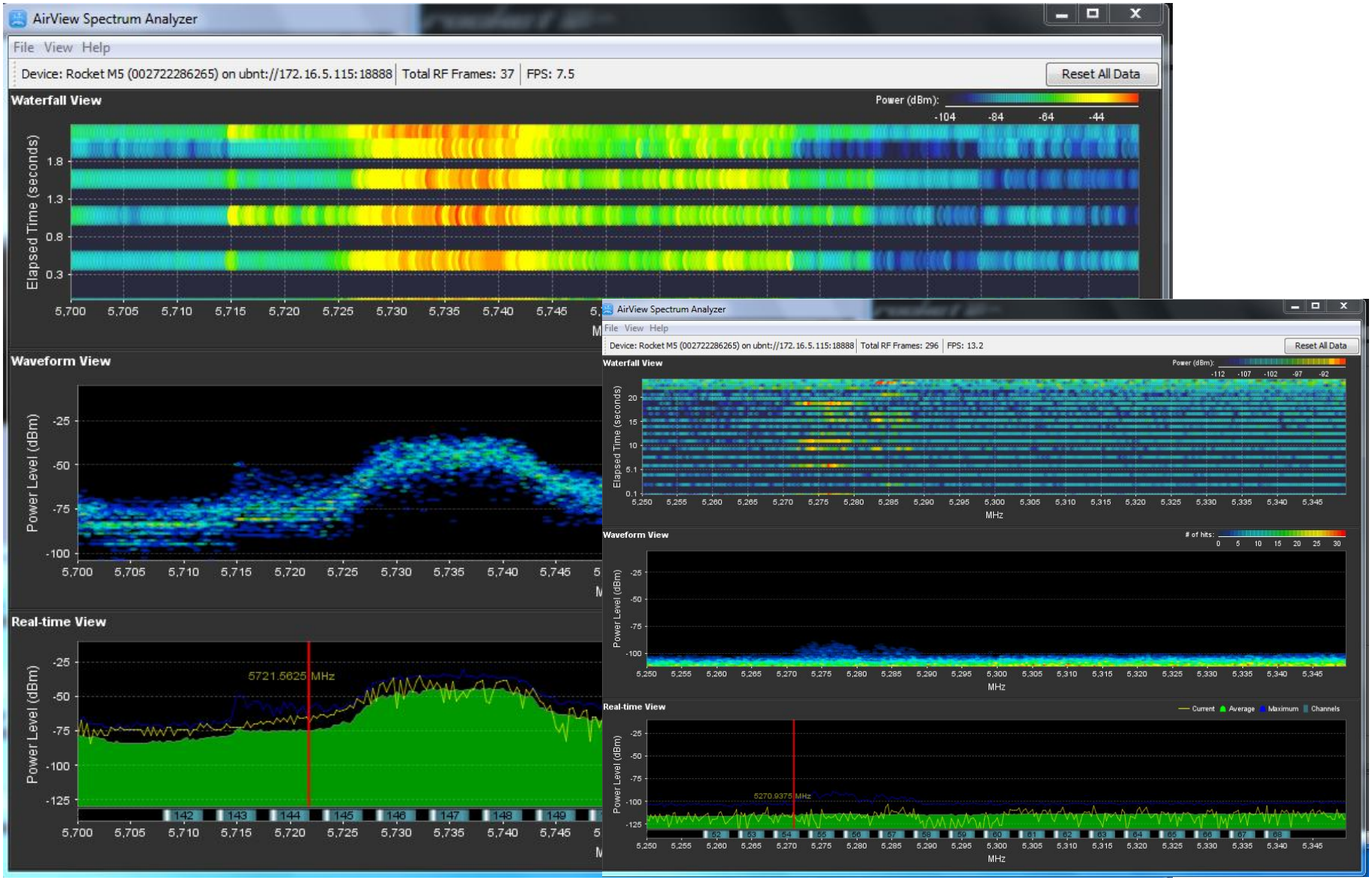
Antenna Alignment



Speed Test



Spectrum Analyzer



Applications I

- airControl
  - network management
- Open Street Maps
  - compliment to Google
- ownCloud
  - Compliments DropBox
- easyRTC
- CAD ticketing
  - computer Aided Dispatch software w/training database
- VoIP

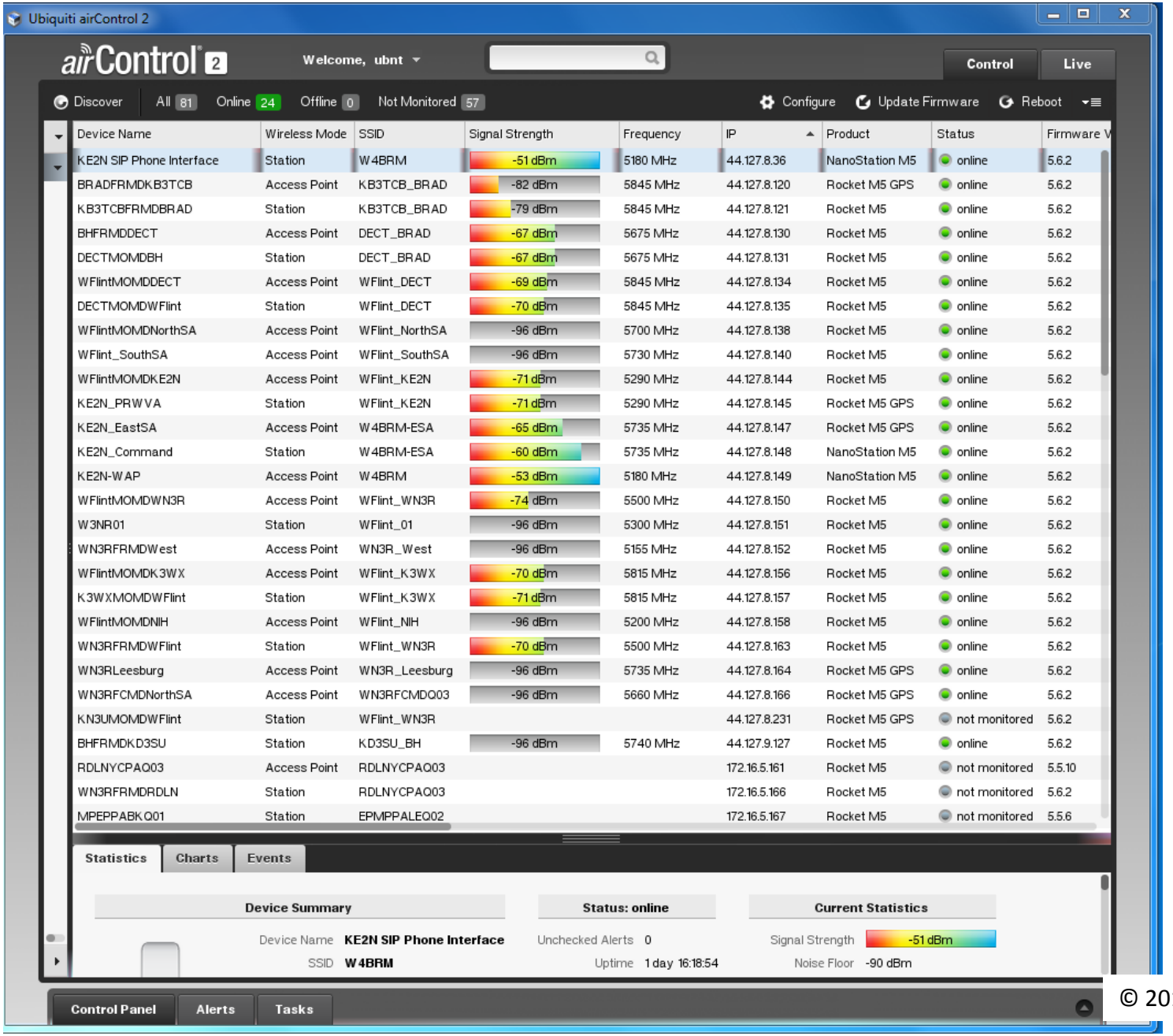
Applications II

- A wiki server
  - briefings, Operational Period Plans
- IRC Chat Servers
- A Web Server
  - ICS Forms in PDF
  - Web ICS Forms
  - VoIP & phone list
  - Remote network printer list
  - Download
    drivers, software, user account database, VPN Server
- Infrastructure Network Monitoring

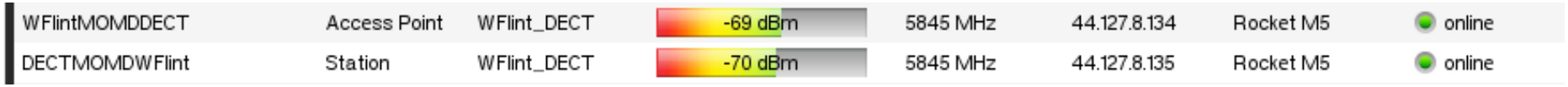
Possible Applications

- Sahana
  - GIS-enabled databases
- OpenMeetings
  - Audio/video/whiteboard web-conferencing server
- Usenet NetNews
  - redundant servers with newsgroups that can be based around Incidents and ICS org structures
- Xastir
  - a distributed, shared map, report/track damage reports and deployed personnel
- OBS
  - Open Broadcaster Software, centralized video re-distribution
- Network Printing

airControl main panel



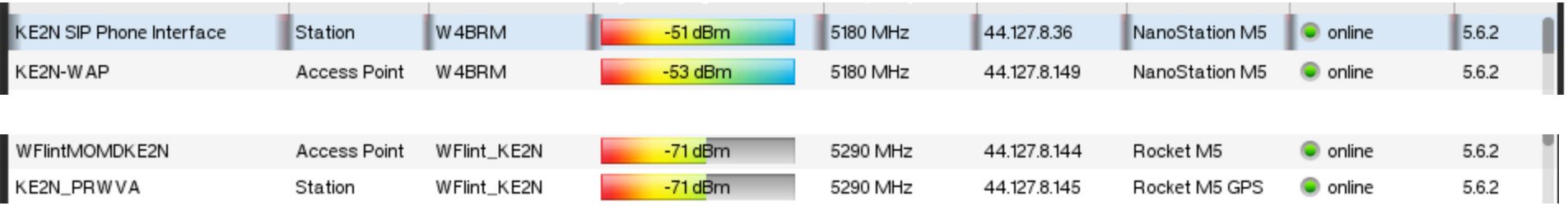
Naming Standards



WFlintMOMDDECT	Access Point	WFlint_DECT	-69 dBm	5845 MHz	44.127.8.134	Rocket M5	online
DECTMOMDWFlint	Station	WFlint_DECT	-70 dBm	5845 MHz	44.127.8.135	Rocket M5	online

- Link between DECT & White Flint
- Device name: **WflintMOMDDECT**
  - Access Point
  - White Flint, Montgomery County, Maryland
- Device name: **DECTMOMDWflint**
  - Damascus, Montgomery County, Maryland
- SSID: Wflint_DECT
  - Both radios have the same SSID
- Center Frequency: 5845
  - Both radios have the same SSID

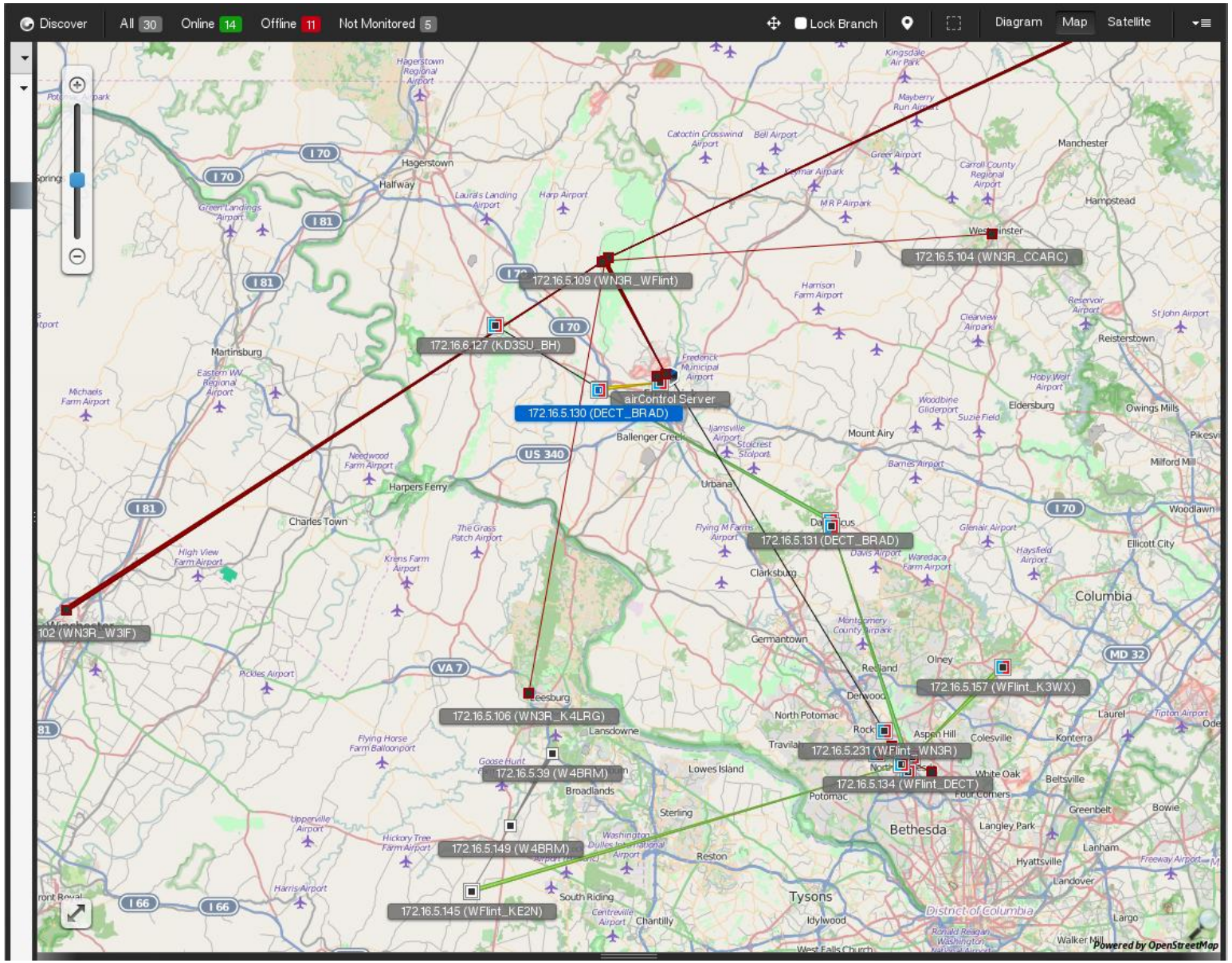
airControl main panel



KE2N SIP Phone Interface	Station	W4BRM	-51 dBm	5180 MHz	44.127.8.36	NanoStation M5	online	5.6.2
KE2N-WAP	Access Point	W4BRM	-53 dBm	5180 MHz	44.127.8.149	NanoStation M5	online	5.6.2
WFlintMOMDKE2N	Access Point	WFlint_KE2N	-71 dBm	5290 MHz	44.127.8.144	Rocket M5	online	5.6.2
KE2N_PRWVA	Station	WFlint_KE2N	-71 dBm	5290 MHz	44.127.8.145	Rocket M5 GPS	online	5.6.2

- Station – Access Point pairs
- -75 dbm
  - Good for a client
- -65 dbm
  - Good for the backbone

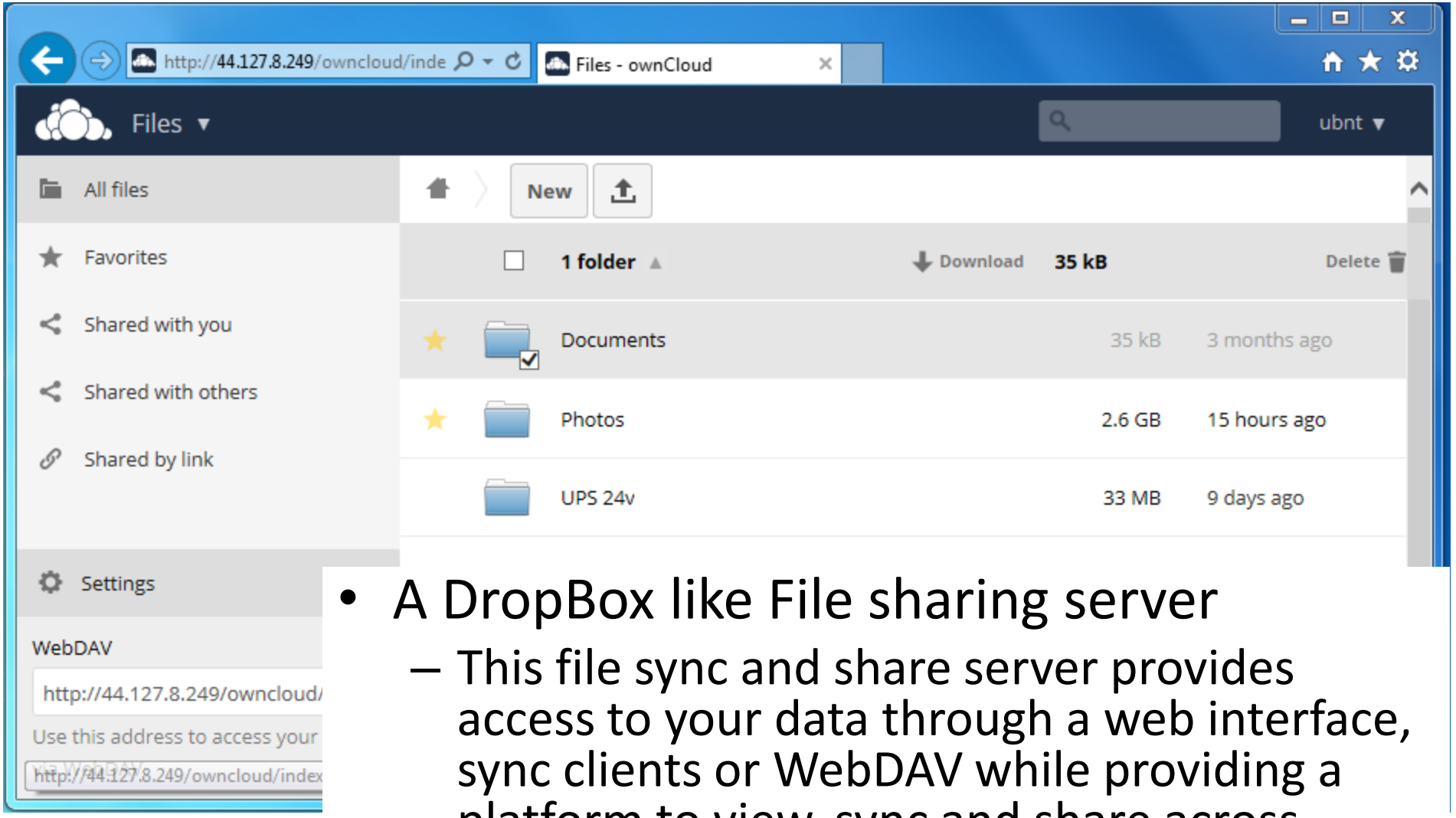
airControl map



Open Street Maps

- Open Street Maps is there if Google maps fails.

ownCloud

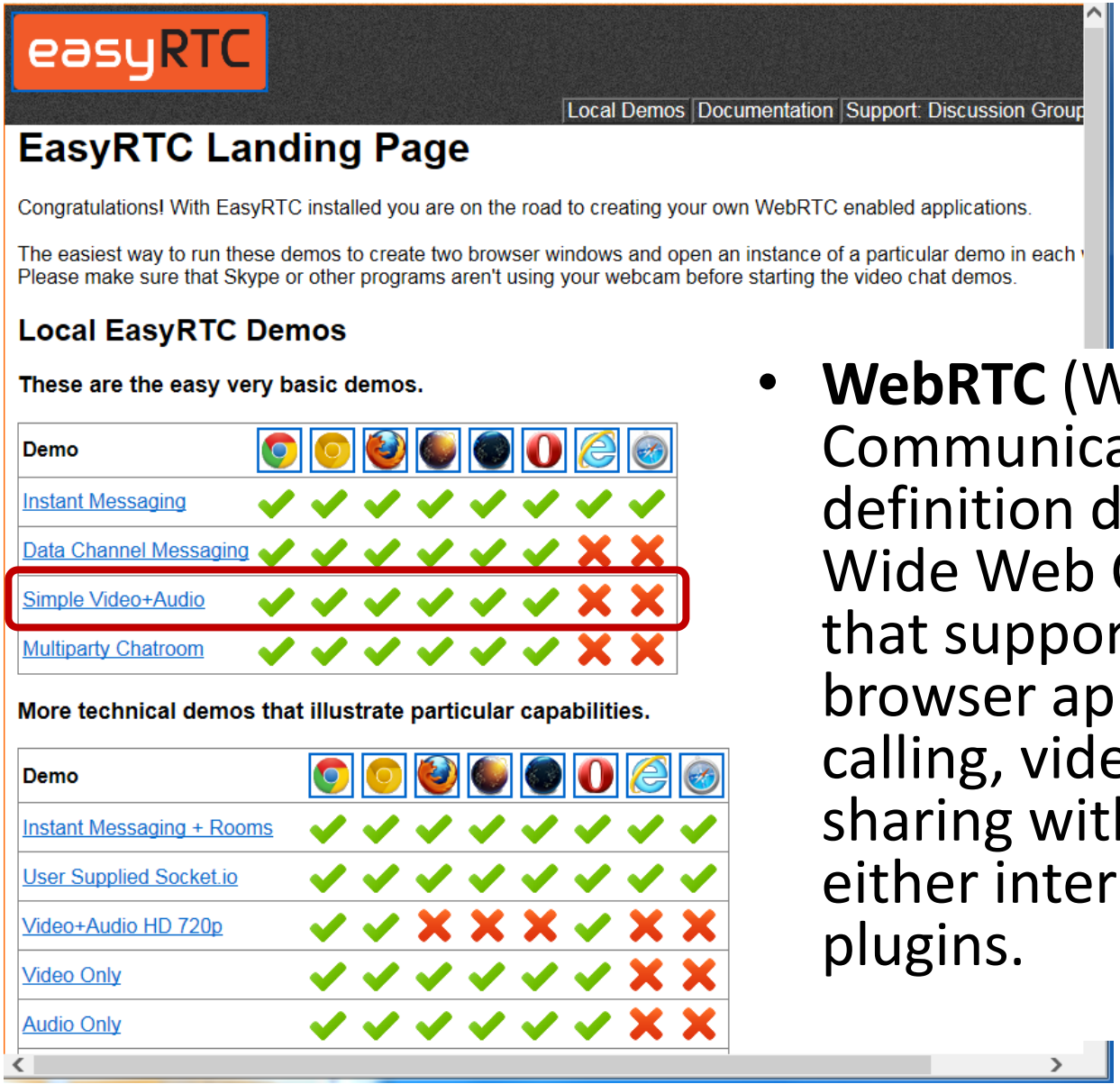


- A DropBox like File sharing server
  - This file sync and share server provides access to your data through a web interface, sync clients or WebDAV while providing a platform to view, sync and share across devices easily.

Video Monitoring

- Ubiquiti airCam
- 1 UVC-Pro
- 2 Aircam
- HIPAA requirement?

easyRTC



- **WebRTC** (Web Real-Time Communication) is an API definition drafted by the World Wide Web Consortium (W3C) that supports browser-to-browser applications for voice calling, video chat, and P2P file sharing without the need of either internal or external plugins.

easyRTC

easyRTC

Local Demos | Documentation | Support: Discussion Group | EasyRTC.com

EasyRTC Demo: Simple Video+Audio

The application provides a simple audio-video chat using the easyrtc.easyApp method.

Connection is handled using an onload statement in the body. Requests are automatically accepted.

To hang-up on a call, hover your mouse over the upper right of the video, and click on the 'X' which appears at the top right of other person's video object.

The Demo

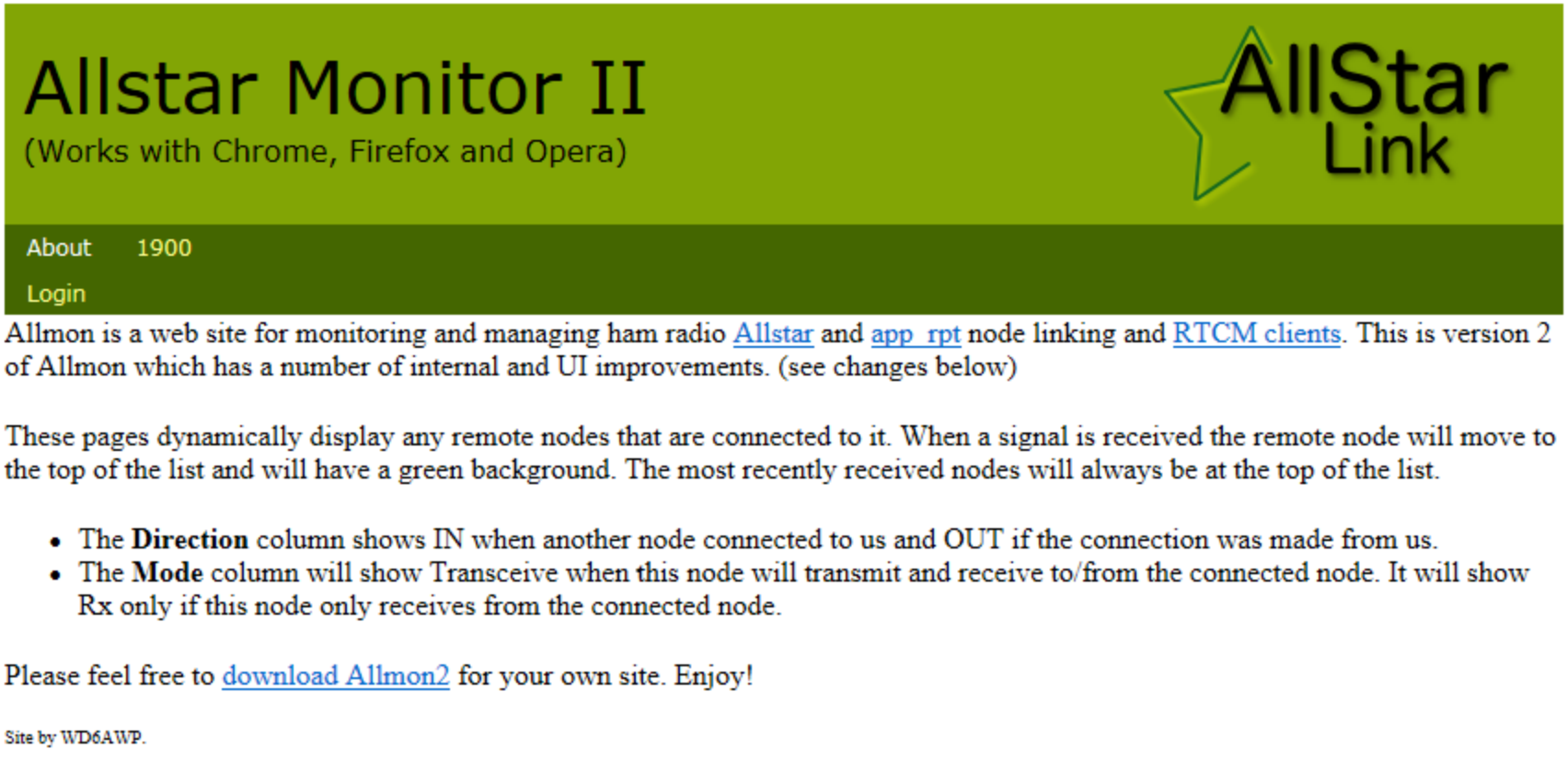
You click this link

I am 0SqNNk6yxHo96plgGl8S

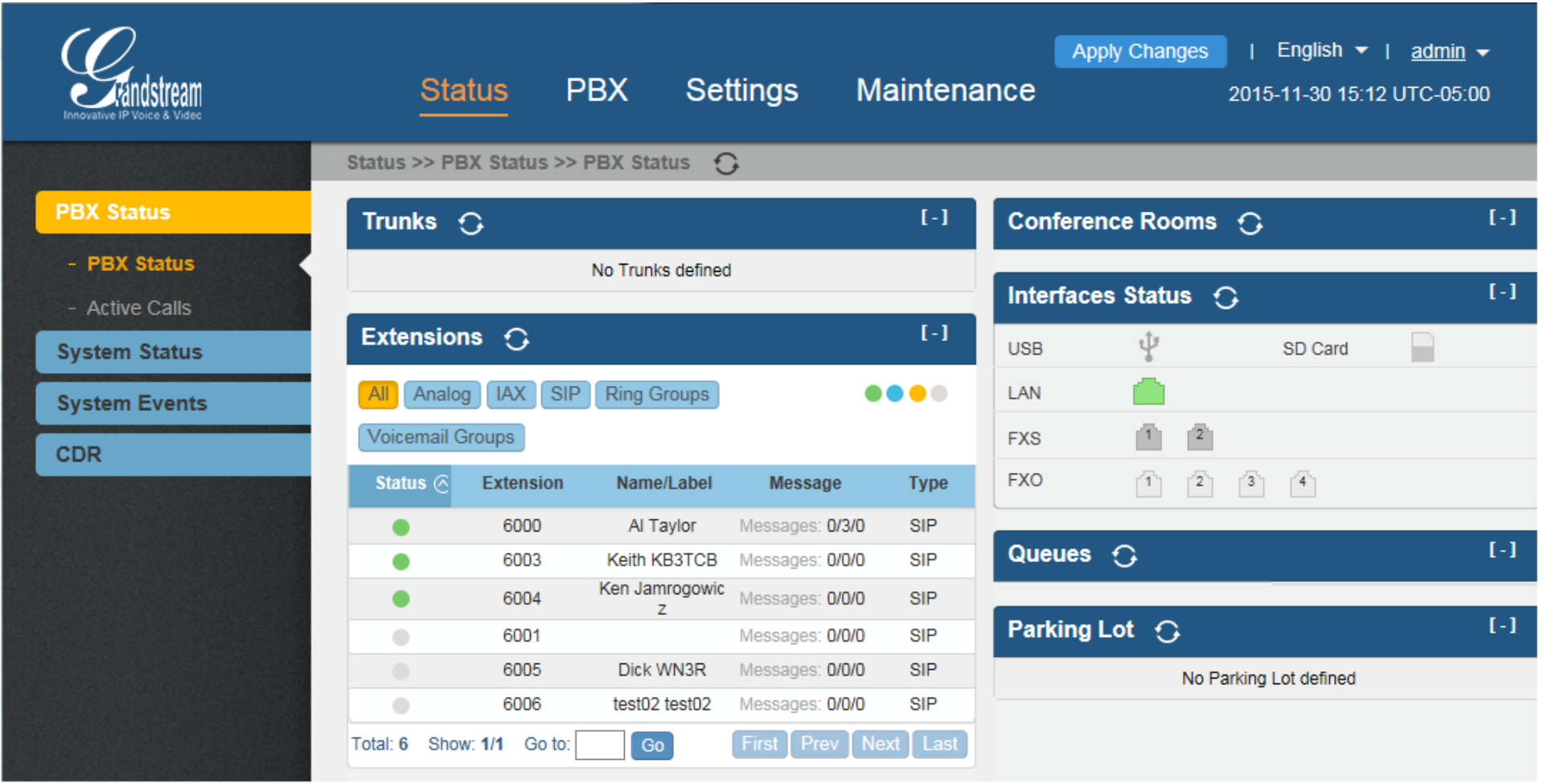
Connected users:

MjHCLIWITd5PJr-hGl8T

AllStar



VoIP Server

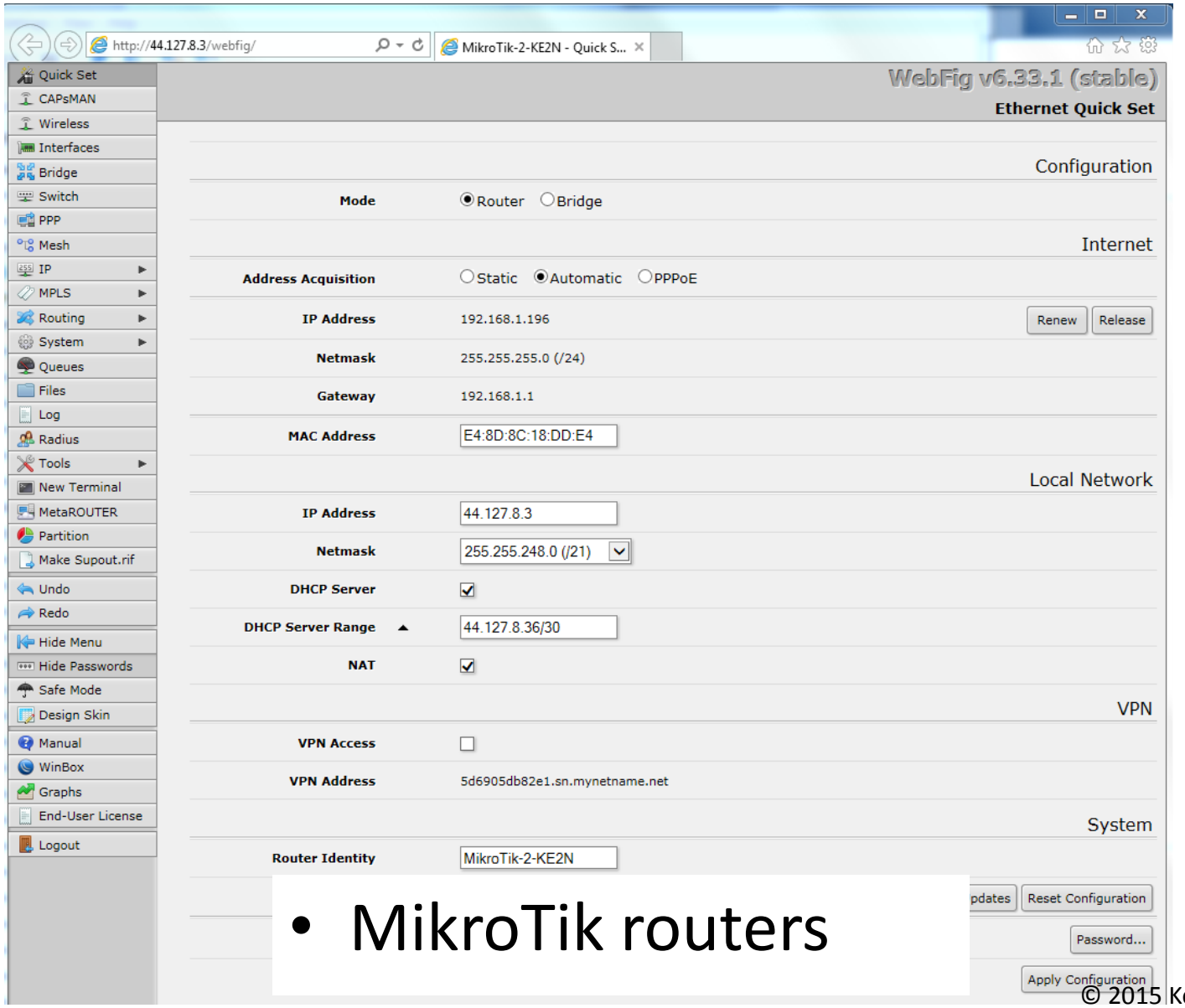


- I am using this for quick portable demonstrations and Asterisk on the backbone.

VoIP video phone

- 3-in-1 device
- The GXV3275 IP Video Phone combines a 6-line IP video phone with a video conferencing solution and the functionality of an Android. HD video
  - Gigabit ports
  - web browser

Infrastructure



- MikroTik routers

There are 84 radios on the MAIPN and CPIN networks

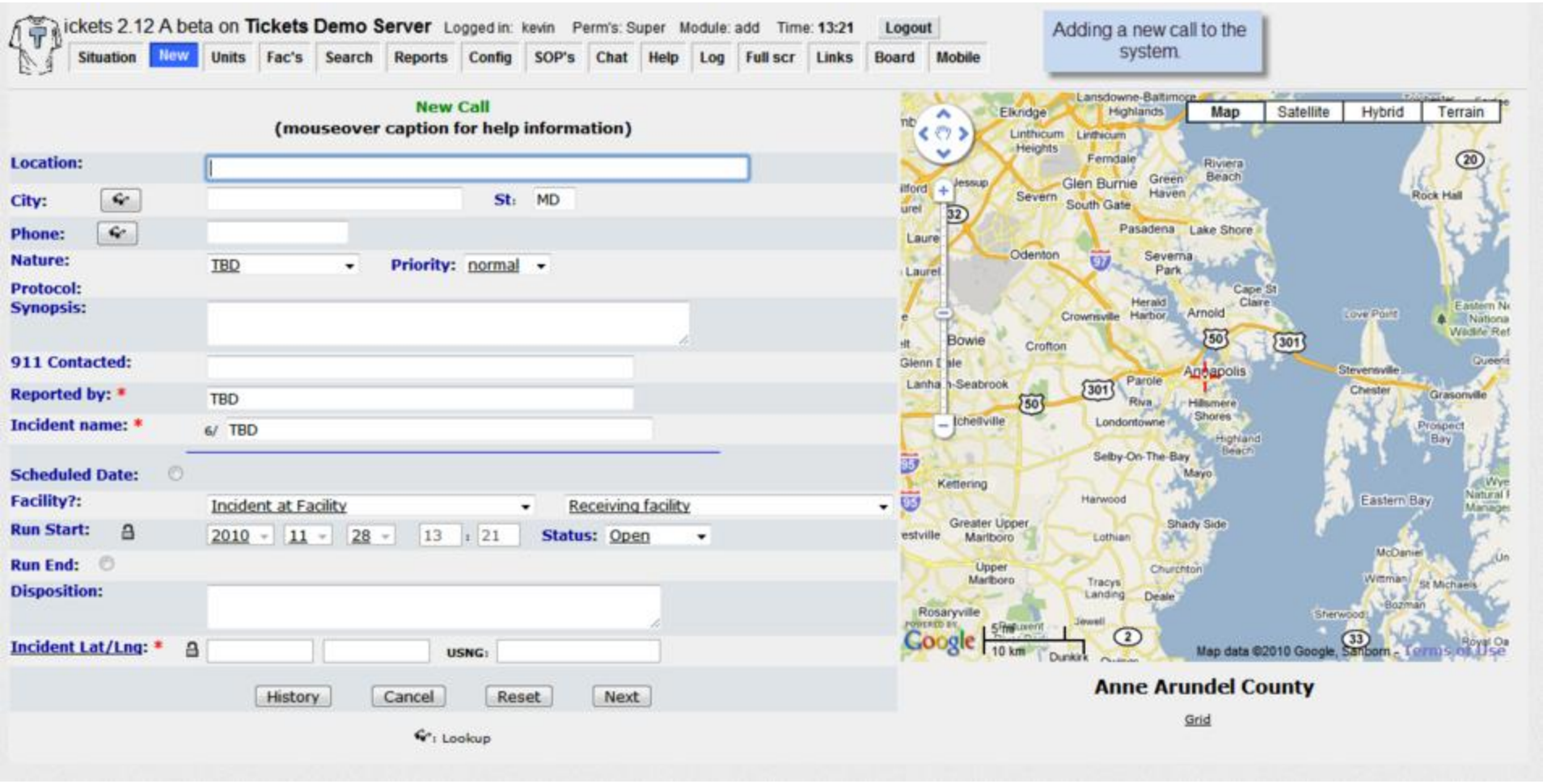
Results | Favorites

Status	Name	IP	Manufacturer	MAC address
	T60	44.127.8.122	FOXCONN	00:15:58:82:34:D9
	KE2N-Shack	44.127.8.129	ASUSTek COMPUTER INC.	54:A0:50:6F:FB:B6
	44.127.8.130	44.127.8.130	Ubiquiti Networks, INC	24:A4:3C:A4:25:04
	44.127.8.131	44.127.8.131	Ubiquiti Networks, INC	24:A4:3C:A4:1E:E2
	44.127.8.134	44.127.8.134	Ubiquiti Networks	04:18:D6:C6:70:6A
	44.127.8.135	44.127.8.135	Ubiquiti Networks	04:18:D6:C6:6F:E1
	44.127.8.138	44.127.8.138	Ubiquiti Networks	04:18:D6:E4:77:EE
	44.127.8.140	44.127.8.140	Ubiquiti Networks	04:18:D6:E4:7A:38
	44.127.8.144	44.127.8.144	Ubiquiti Networks	04:18:D6:C6:70:6B
	44.127.8.145	44.127.8.145	Ubiquiti Networks	00:27:22:28:65:2D
	44.127.8.146	44.127.8.146	Ubiquiti Networks, INC	24:A4:3C:3C:02:1A
	44.127.8.147	44.127.8.147	Ubiquiti Networks	00:27:22:28:68:16
	44.127.8.148	44.127.8.148	Ubiquiti Networks, INC	24:A4:3C:60:9A:43
	44.127.8.149	44.127.8.149	Ubiquiti Networks, INC	24:A4:3C:60:9C:93
	44.127.8.150	44.127.8.150	Ubiquiti Networks	04:18:D6:C6:6D:C3
	44.127.8.151	44.127.8.151	Ubiquiti Networks	04:18:D6:C6:6D:BB
	44.127.8.152	44.127.8.152	Ubiquiti Networks	04:18:D6:C4:CC:6B
	44.127.8.156	44.127.8.156	Ubiquiti Networks	04:18:D6:C6:6D:B5
	44.127.8.157	44.127.8.157	Ubiquiti Networks, Inc.	44:D9:E7:28:04:B3
	44.127.8.158	44.127.8.158	Ubiquiti Networks	04:18:D6:C6:6D:CC
	44.127.8.163	44.127.8.163	Ubiquiti Networks, Inc.	44:D9:E7:54:5E:9E
	44.127.8.164	44.127.8.164	Ubiquiti Networks	00:27:22:2A:83:8B
	44.127.8.166	44.127.8.166	Ubiquiti Networks	00:27:22:C6:E5:DC
	44.127.8.210	44.127.8.210	Dell Inc.	00:24:E8:3E:5B:10

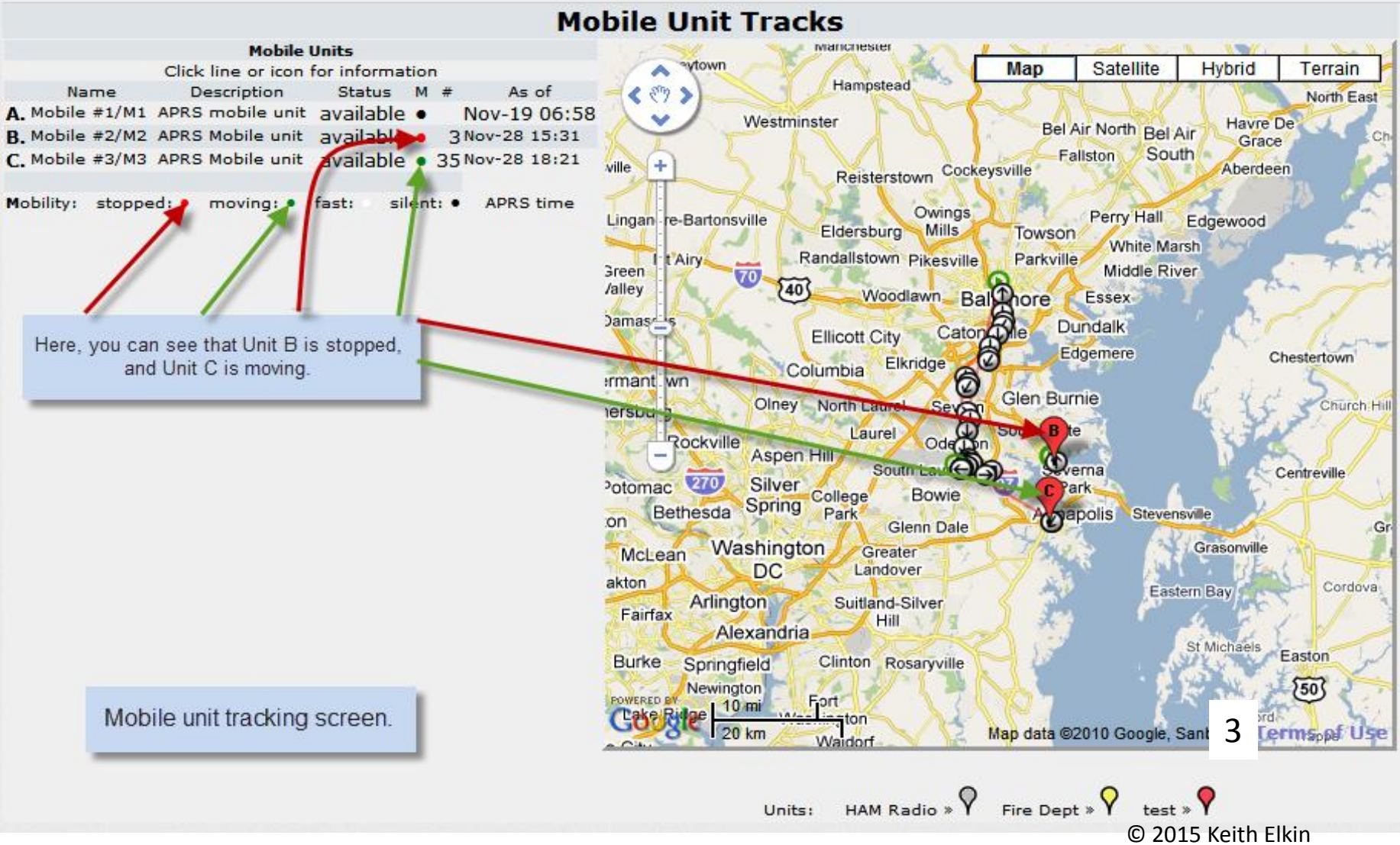
CAD Ticketing

- Features
  - Any browser, any web server, any OS.
  - Under continuous development and upgrade since 1994.
  - Free (although donations gratefully accepted!) and Open Source.
  - Oriented to use by volunteer and career teams with budget 'challenges' and limited availabiity for formal training.
  - Capabilities based on user needs and feedback.
  - Chat, maps, directions, GPS tracking, extensive email/SMS/messaging capabilities.
  - In world-wide use; provisions for adapting to local terminology and language.
  - Use with mobile devices.
  - Optional member administration module.
  - A no-Internet option.

CAD Ticketing



CAD Ticketing



Live Streaming Video

- Wowza Streaming Engine Advantage:
  - High-Quality On-Demand and Live Video and audio Streaming
- Any Media to Any Device Anywhere
- Convert video formats and adaptive bitrate streaming.
- Deploy on Premises or in the Cloud
- Latest Standards
  - MPEG-DASH, Apple HLS,
  - Adobe HDS, video codecs

livestream

WOWZA media systems

USTREAM

and there is more to do!

- More Nodes
- Remote Rigs
- Repeater Linking
- Weather
- Remote Power Control
- Radio/Audio streaming, Feeds
- RemoteBase
- Winlink
- Safety Check-In
- EchoLink, IRLP, APRS Digipeater, D-Star
- VLANS, Firewalls
- HIPAA & PCI standards
- Depiction
- WebEOC

References

- http://www.depiction.com/
- http://www.ticketscad.org/
- https://www.intermedix.com/product/product-webeochttps://www.nh.gov/safety/divisions/hsem/documents/webeoc-user-guide.pdf
- https://dl.ubnt.com/guides/airOS/airOS_UG.pdf
- http://hamradio.arc.nasa.gov/meetings/SCEWNatAARC.html
- http://slidegur.com/doc/11869/central-pa-ip-network--cpin-
- https://www.wowza.com/

Questions

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- Send your questions and suggestions to:

  mesh@KB3TCB.com