



RMHAM Multi-State 5 GHz Microwave Network: A Realtime Demonstration of its Functionality and Capabilities

Ed James KA8JMW

Who We Are



RMHAM develops capabilities.

RMHAM facilitates technical education.

Who We Are



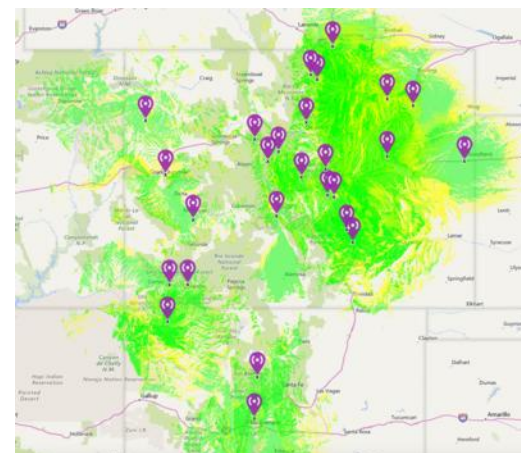
RMHAM develops capabilities.

- We provide microwave IP and/or network connectivity to partnering clubs and repeater organizations across New Mexico and Colorado to enable or expand their capabilities
- We own and operate 45 DMR, D-STAR, and AllStar repeaters and APRS i-Gates available for use by any amateur radio operator
- We get involved with many things RF, electrical, mechanical, and networking

Who We Are



RMHAM develops capabilities.



Who We Are

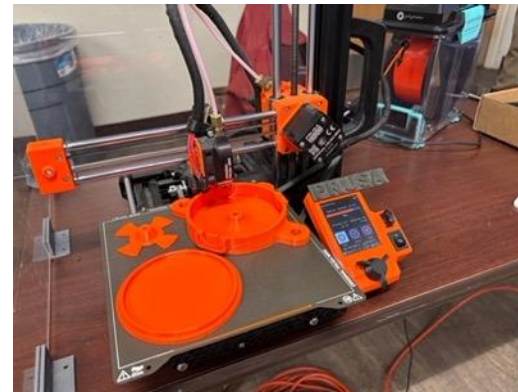


RMHAM facilitates technical education.

- We organize three annual events to teach amateur radio operators about a variety of technical topics:
 - New Mexico TechFest (each February in New Mexico)
 - NerdFest (each January in Colorado)
 - RMHAM University (weekend short courses throughout the winter months)

Who We Are

RMHAM facilitates technical education.

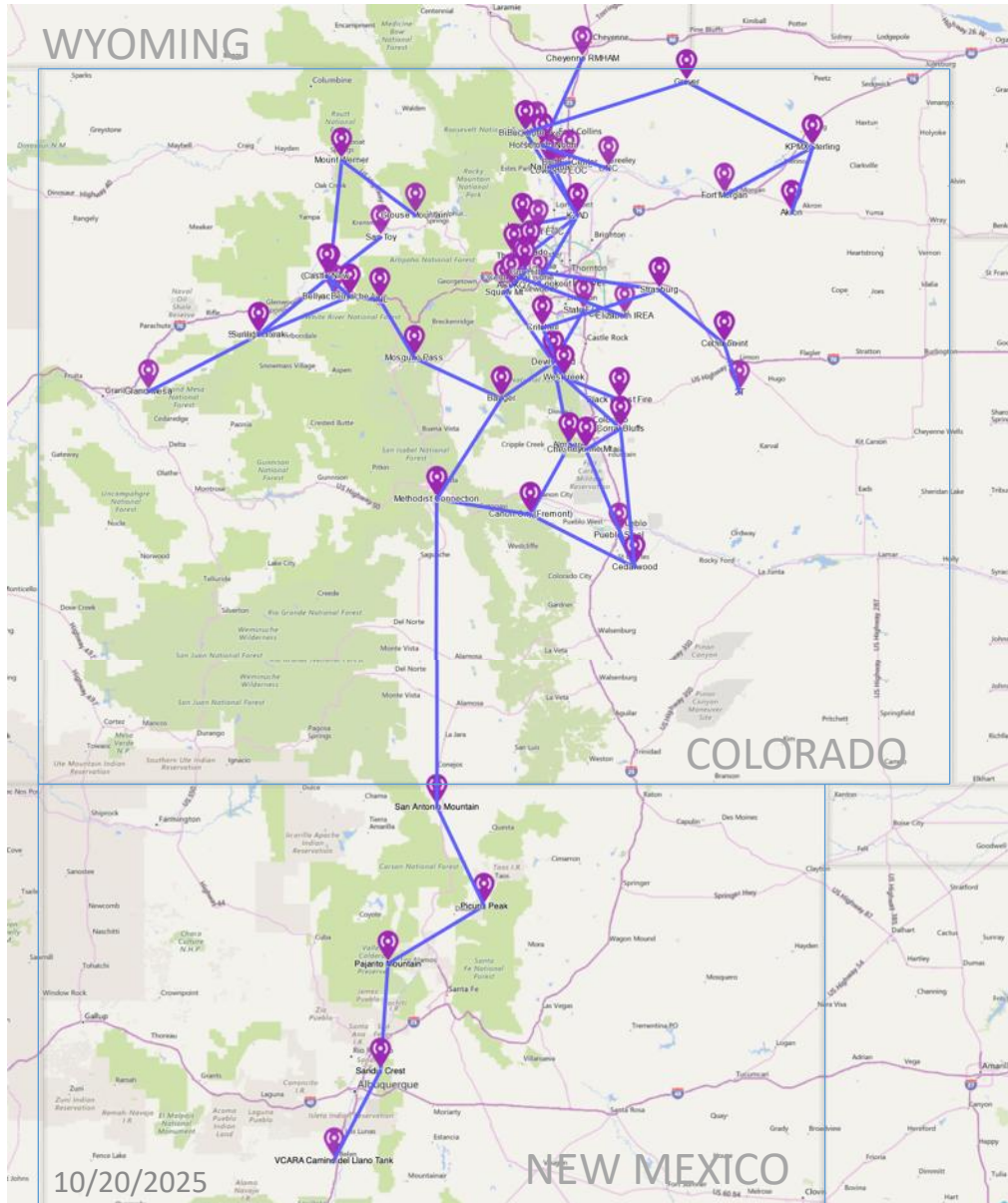


10/20/2025



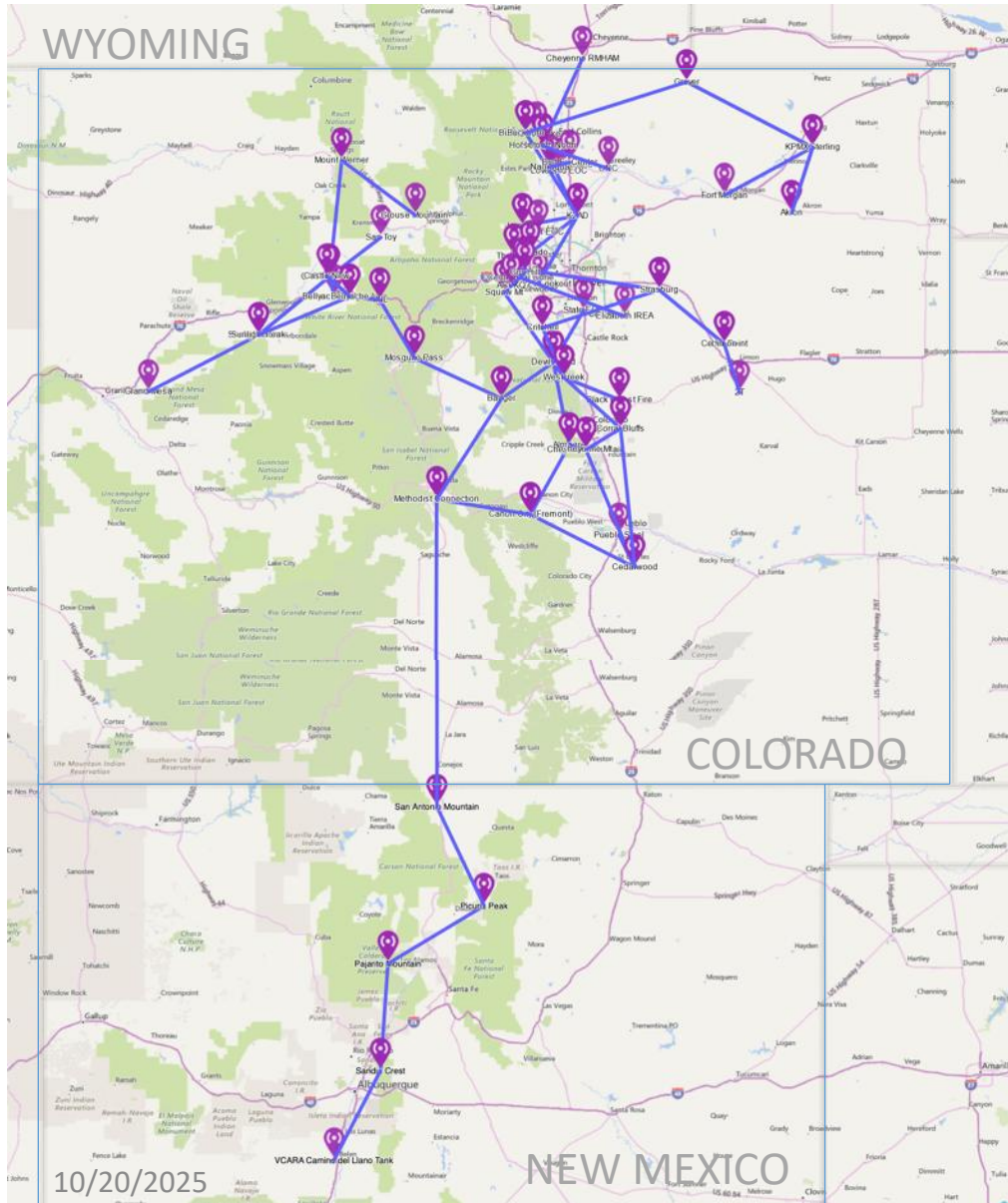
RMHAM 5-GHz Microwave Network

RMHAM's 5-GHz Microwave Network



- RMHAM has designed a fully-managed IP-based microwave backbone network
- Spans Cheyenne, Wyoming down to Belen, New Mexico and across Colorado's western slope (soon: down to El Paso, Texas)
- An infrastructure for partnering clubs and repeater organizations to expand their capabilities (repeater linking, repeater troubleshooting and administration, any IP-based application that is Part 97 compliant, etc.)
- RMHAM's network is comprised of **(as of TODAY):**
 - **950+ miles** of combined microwave shots
 - **106** point-to-point and **14** point-to-multipoint microwave links across New Mexico and Colorado
 - **923** registered devices (routers, repeaters, RTCMs, power controllers, PTZ cameras, VoIP phones, etc.)

RMHAM's 5-GHz Microwave Network



- It is secure*, firewalled, and accessible only through RADIUS authorization and authentication
- It is managed and monitored 24x7x365 by a dedicated network operations team and a suite of tools/protocols
 - DevDB, Observium, Smokeping, OSPF, and automated email/text alerts
- Throughput averages 150-Mbit/sec across the network
- It is built from reliable COTS 5-GHz networking and microwave equipment configured to operate on Part 97 amateur radio spectrum
- It does not rely on the internet to function...however we do have several internet taps for automatic fail-over if an RF link goes down temporarily

* = a relative term

Why it Matters for Clubs and Repeater Organizations



- **Use Case:** *San Antonio Mountain (on the Colorado-New Mexico border) now hosts several linked repeater systems for different organizations, enabled by a single RMHAM microwave link. Repeater owners also now have the the ability to troubleshoot, reconfigure, power-cycle, and restore equipment without needing to travel up to 3 hours (one-way) to the mountaintop site.*
- Provides high-bandwidth IP connectivity to remote RF sites
- Helps turn standalone analog repeaters into systems that can link across New Mexico, the United States, and world
- Allows for the expansion of digital repeaters (DMR, D-STAR) and APRS I-Gates
- Enables remote troubleshooting and system management (power-cycling, configuration, performance monitoring, site security, etc.) without needing to travel to the site

Why it Matters for Hams



- **Use Case:** *Pajarito Mountain (above Los Alamos) historically had just one 2-meter analog repeater. Using the IP connectivity provided by RMHAM's microwave network, the site also now offers DMR, Yaesu System Fusion, and APRS iGate service for amateur radio operators to use and enjoy.*
- **New capabilities to enjoy** → Because of the high-bandwidth IP provided by RMHAM's microwave network, isolated standalone RF sites can now offer additional capabilities such as DMR, D-STAR, AllStar, Echolink, APRS, even the ability to operate an HF station remotely
- **More coverage** → Standalone repeater systems can expand their coverage footprint because they can now easily link to other sites around the New Mexico, the United States, and world
- **More reliability** → Downtime, due to technical issues, is reduced because site owners can troubleshoot and resolve certain problems without having to travel to far-away, remote RF sites

Why it Matters for Emergency Communications



- **Use Case:** *In 2013, devastating flash floods destroyed commercial and government communications infrastructure and isolated remote communities around Estes Park, Colorado. RMHAM's microwave network was used to temporarily restore high-bandwidth connectivity for ARES teams, first responders, and disaster response organizations.*
- Provides a high bandwidth backbone that is independent of commercial internet
- Allows ARES to transmit large amounts of data, including video, photos, and logistical information
- Can tie strategic locations (within line of sight of each other and RMHAM microwave sites) such as EOCs, shelters, etc. together for seamless communications
- Preserves common methods of communication (Microsoft Outlook, Word, PowerPoint, conversations by VoIP telephone, etc.)

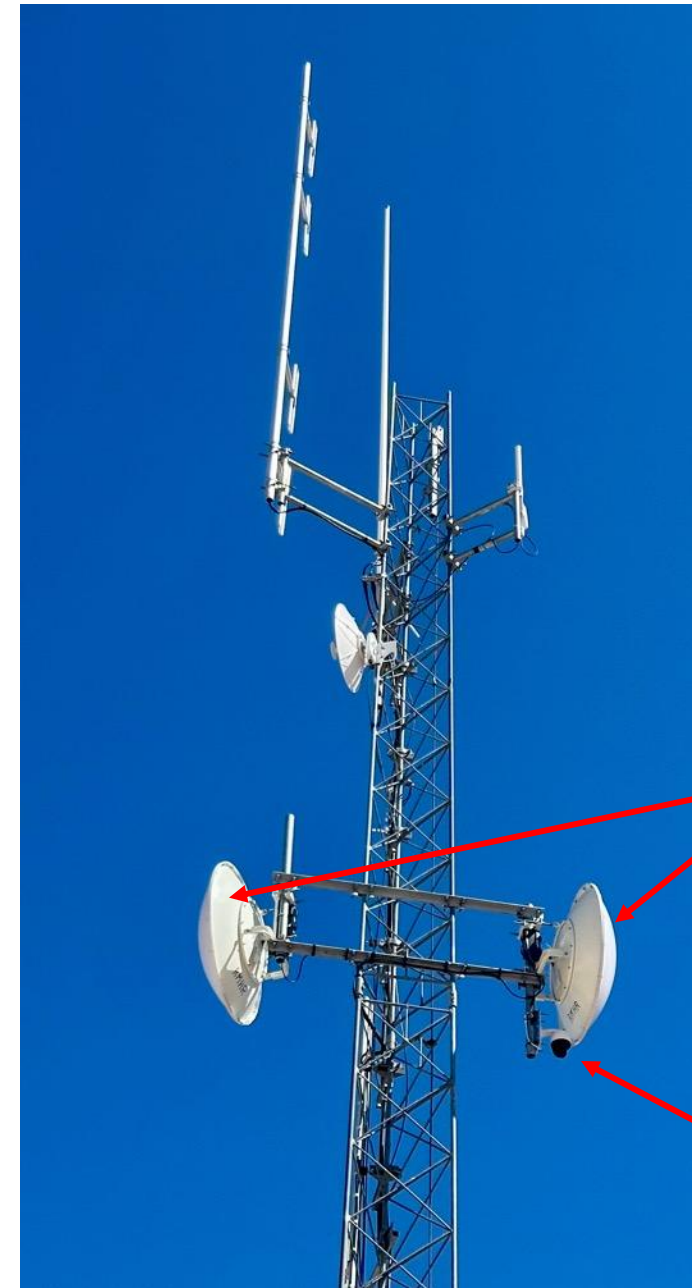
What a Typical Link Looks Like



VoIP phone

Router

*Remote IP power
management unit*



*5-GHz
microwave
dish and radio*

*PTZ video
camera*

Configuration Management.



- RMHAM Network Operations Webpage
[Netops](#)
- DevDB RMHAM Device Database
[DevDB](#)
- Network Device setup and configuration utility
Winbox



RMHAM Network Operations webpage

[illegible]

DevDB “One app to rule them all”

Site Link Device Port Network AllStar					
Sites					
Domain	Title	Subnet	Location	Scan	
albuquerque.nm	Albuquerque	10.40.10.0/24	Albuquerque [35.151102,-106.572682]	Yes	
belen.nm	Belen Camino del Llano	10.40.12.0/24	Belen [34.651663,-106.810880]	Yes	
farmington.nm	Farmington	10.40.4.0/24	Farmington [36.77863889,-108.18583333]	Yes	
edgewood.nm	KA8JMW RMHAM	10.40.11.0/24	Edgewood [35.106200,-106.256500]	Yes	
mvarc.nm	Mesilla Valley ARC N5BL	10.40.7.0/24	Las Cruces [32.4048, -106.7612]	No	
n5zgt.nm	N5ZGT portable ground terminal	10.40.40.0/24	Albuquerque	Yes	
qrv-nm.nm	NM QRV	10.40.250.0/24	Albuquerque	Yes	
testbed.nm	NM testbed	10.40.254.0/24	Santa Fe [35.6562, -105.9665]	Yes	
pajarito.nm	Pajarito Mtn NM	10.40.1.0/24	Pajarito Mtn [35.886771,-106.395348]	Yes	
roswell.nm	Pecos Valley ARC W5ZU	10.40.9.0/24	Roswell [33.4016, -104.3788]	Yes	
picuris.nm	Picuris Peak	10.40.2.0/24	Picuris Pk [36.246985,-105.654777]	Yes	
sanantonio.nm	San Antonio Mountain NM	10.40.3.0/24	San Antontio Mtn [36.858844,-106.018157]	Yes	
sandia.nm	Sandia Crest	10.40.0.0/24	Sandia Crest [35.208889,-106.446944]	Yes	
faa.nm	Sandia Crest FAA Bldg	10.40.14.0/24	SCrest [35.2168,-106.4523]	Yes	
sffs4.nm	SF Fire Station 4	10.40.22.0/24	SF Fire Station 4 [35.656979,-105.941232]	Yes	
sfeoc.nm	SF FMAC	10.40.23.0/24	SF County EOC [35.564195, -106.048919]	Yes	
fooddepot.nm	SF Food Depot	10.40.20.0/24	SF Food Depot [35.658564, -105.995575]	Yes	
oemcomplex.nm	SF OEM complex	10.40.21.0/24	SF OEM complex [35.562966, -106.063387]	No	
sfpres.nm	SF Presbyterian	10.40.24.0/24	SF Presbyterian [35.615913,-106.025687]	Yes	
socorro.nm	Socorro M Mtn	10.40.6.0/24	Socorro [34.071495,-106.963106]	Yes	
taos.nm	Taos	10.40.5.0/24	Taos [36.387387, -105.587788]	Yes	
tarc.nm	Taos Amateur Radio Club	10.40.8.0/24	TaosARC OPD [36.40953, -105.5725]	Yes	
urfmsi.nm	Upper Rio FM Society Hub	10.40.13.0/24	KAFB [35.058, -106.587]	Yes	

Site Link Device Port Network AllStar

Belen Camino del Llano

Plugs Out Test Site Frequencies

Site

Domain	belen.nm
Subnet	10.40.12.0/24
Netmask	255.255.255.0
Broadcast	10.40.12.255
Location	Belen [34.651663,-106.810880]
Remarks	Belen, Camino del Llano water tank
Scan	Yes
Status	Active

Devices

IP	Hostname	Title	Type	Remarks
10.40.12.1	router	belen-camino Router	Router	
10.40.12.3	power	AC PDU	AC Power Control	Synaccess NP-0801DU
10.40.12.15	fusion	Yaesu Fusion rprr	Radio	VCARA Yaesu Fusion repeater
10.40.12.20	phone	SIP Phone	Phone	
10.40.12.90	camera	PTZ camera	Web Cam	Reolink RLC-823A PTZ camera
IP	Hostname	Title	Type	Remarks
10.45.12.4	radio-sandia	Belen Camino Del Llano Radio to Sandia Crest	Radio	

Links

Title	Subnet	Neighbor	SSID	Frequency (MHz)	Channel Width (MHz)	Remarks
Sandia Crest <-> Belen	10.45.12.0/24	Sandia Crest	NM5HR-12	5875	20	

Mikrotik WinBox

RouterOS WinBox

Session Settings Dashboard

Safe Mode Session: 10.40.0.1

Memory: 71.8 MiB CPU: 10% Date: Oct/20/2025 Time: 13:24:16

Interface List

Interface	Name	Type
R	bridge1-LAN	Bridge
RS	ether1-Albuquerque-PTP	Ethernet
R	ether2-Pajarito-PTP	Ethernet
R	ether3-to FAA bldg	Ethernet
R	ether4-URFMSI_HUB-PTP	Ethernet
R	ether5-DSTAR_router	Ethernet
R	ether6-Belen-PTP	Ethernet
RS	ether7-aux_router	Ethernet
RS	ether8-DMR	Ethernet
S	ether9-LAN	Ethernet
S	ether10-LAN	Ethernet
R	lo	Loopback
S	sfp1	Ethernet

13 items (1 selected)

Interface <ether1-Albuquerque-PTP>

General Ethernet Loop Protect Overall Stats Rx Stats Tx Stats Status Traffic

Tx/Rx Rate: 3.5 kbps / 600 bps

Tx/Rx Packet Rate: 4 p/s / 1 p/s

FP Tx/Rx Rate: 1600 bps / 1048 bps

FP Tx/Rx Packet Rate: 3 p/s / 2 p/s

Tx/Rx Bytes: 3790.5 MiB / 14.7 GiB

Tx/Rx Packets: 24 905 228 / 14 174 782

Tx/Rx Drops: 0 / 0

Tx Queue Drops: 0

Tx: 3.5 kbps Rx: 600 bps

Tx Packet: 4 p/s Rx Packet: 1 p/s

enabled running slave passthrough inactive link ok

OK Cancel Apply Disable Comment Torch Reset Traffic Counters Cable Test Blink Reset MAC Address Reset Counters

Find

FP Tx	
155.4	
1600	
149.2	
17.9	
1824	
103.0	
151.8	
776	
0	
0	
0	
0	

Network Monitoring.



- Observium SNMP monitoring.

[Observium](#)



- SmokePing

[SmokePing Latency](#)



- Cping

Putty 10.40.0.70

Observium

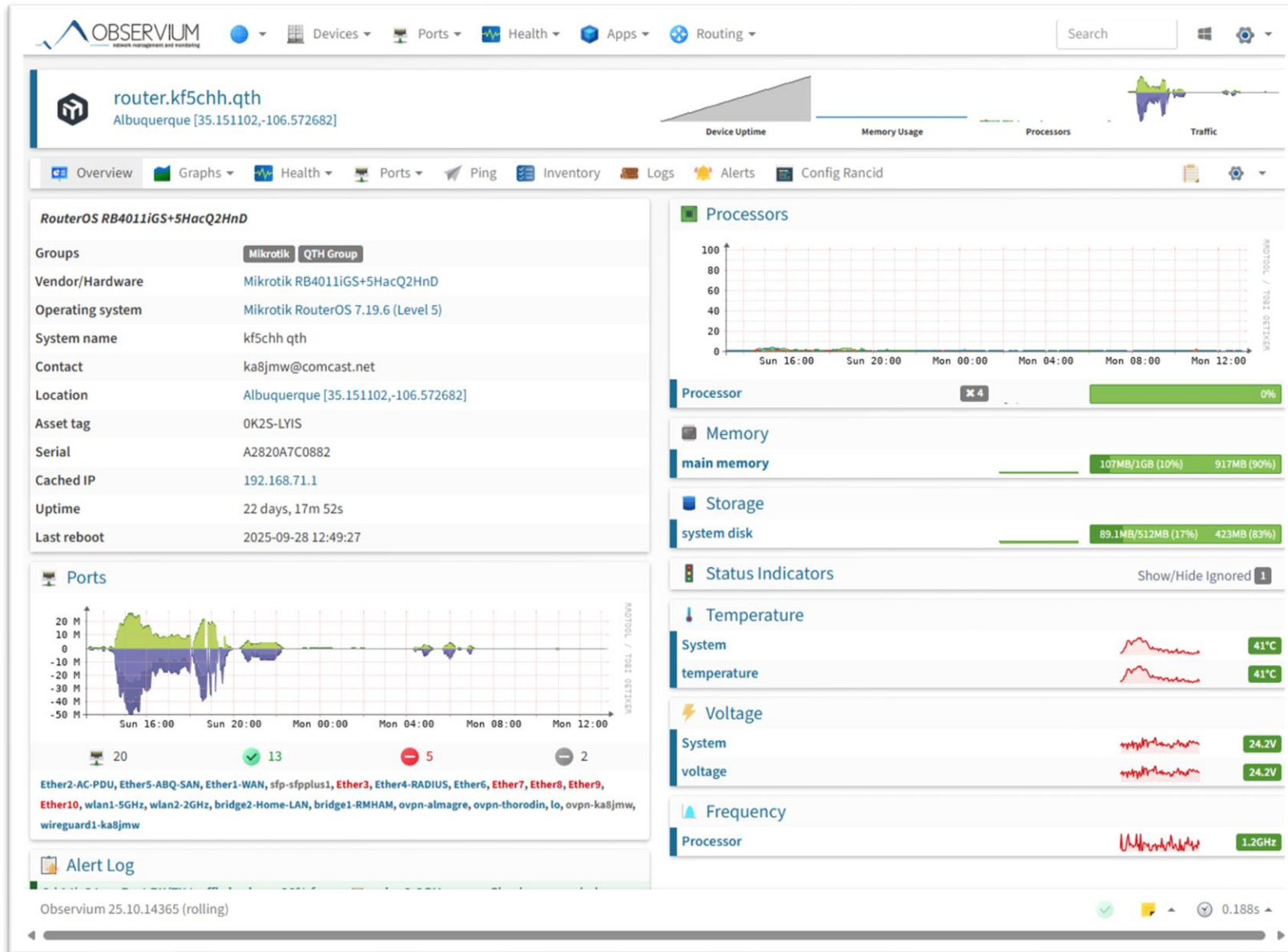
The screenshot displays the Observium web interface. At the top, there is a navigation bar with icons for Devices, Ports, Health, Apps, and Routing. Below this is a search bar and a set of filters. The filters include fields for Hostname, sysName, sysDescr, and various selection dropdowns for OS, Hardware, Vendor, OS Version, Featureset, Device Type, Location, Distro, and Serial Number. A 'Search' button is also present.

Below the filters, there is a tabbed interface with 'Devices' selected. The 'Devices' tab shows a list of network devices. The table has columns for Hostname / Domain / Location, Operating System / Hardware Platform, and Uptime / sysName. The devices listed include:

Hostname / Domain / Location	Operating System / Hardware Platform	Uptime / sysName
router.kf5chh.qth Albuquerque [35.151102,-106.572682]	Mikrotik RouterOS 7.19.6 (Level 5) RB4011iGS+5HacQ2HnD	22d 17m 52s kf5chh qth
radius.albuquerque.nm Albuquerque [35.151102,-106.572682]	Linux 5.10.103-v7+ (Linux radius) Generic ARMv7	22d 6m 38s radius
radio-sandia.kf5chh.qth Albuquerque [35.151102,-106.572682]	Mikrotik RouterOS 7.19.4 (Level 3) RBDynaDishG-5HacDr2	22d 34m 31s abq-san
router.albuquerque.nm Albuquerque [35.151102,-106.572682]	Mikrotik RouterOS 7.19.6 (Level 5) RB4011iGS+5HacQ2HnD	22d 17m 41s kf5chh qth
router.belen.nm Belen [34.651663,-106.810880]	Mikrotik RouterOS 7.19.4 (Level 5) RB2011UiAS	28d 15h 4m 54s belen
radio-sandia.belen.nm Belen [34.651663,-106.810880]	Mikrotik RouterOS 7.19.4 (Level 4) RB921UAGS-5SHPaC	28d 15h 6m 37s bln-san
router.edgewood.nm Edgewood [35.106200,-106.256500]	Mikrotik RouterOS 7.20 (Level 5) RB2011UiAS-2HnD	16d 4h 53m 51s edgewood rmham
router.farmington.nm Farmington [36.77863889,-108.18583333]	Mikrotik RouterOS 7.19.4 (Level 4) RB750r2	64d 3h 50m 18s farmington
router.iron.rmcom Iron Mtn [36.598478, -105.252238]	Mikrotik RouterOS 6.49.18 (Level 4) RB750r2	15d 14h 22m 9s spectracomm iron
lower.iron.rmcom Iron Mtn [36.598478, -105.252238]	Ubiquiti AirOS 8.7.1.42832 PowerBeam 5AC ISO Gen2	1y 2d 1h 51m 5s iron bottom
upper.iron.rmcom Iron Mtn [36.598478, -105.252238]	Ubiquiti AirOS 8.7.7.46663 PowerBeam 5AC ISO	1y 75d 2h 42m 31s iron top
radio-sandia.urfmsi.nm KAFB [35.058, -106.587]	Mikrotik RouterOS 7.19.4 (Level 4) RB921UAGS-5SHPaC	15d 14h 59m 27s hub-san
router.urfmsi.nm	Mikrotik RouterOS 7.19.4 (Level 5)	15d 2h 23m 46s

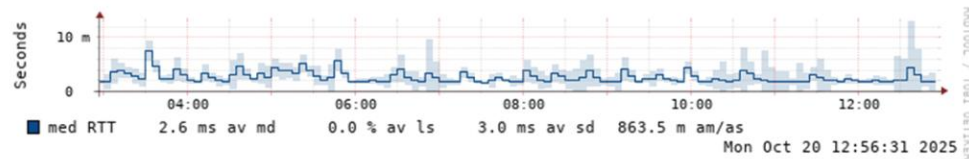
At the bottom of the interface, there is a status bar showing 'Observium 25.10.14365 (rolling)' and a refresh button with a timer set to 0.293s.

Observium (cont.)

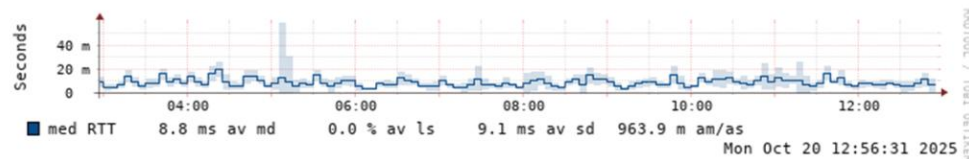


SmokePing

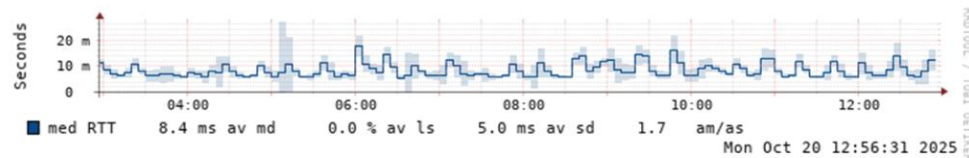
Pajarito Mtn Router (10.40.1.1)



Picuris Pk Router (10.40.2.1)

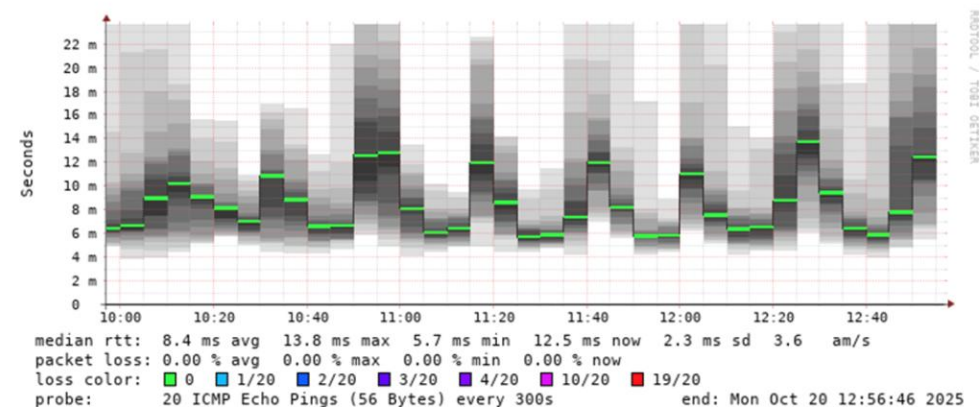


San Antonio Mtn Router (10.40.3.1)

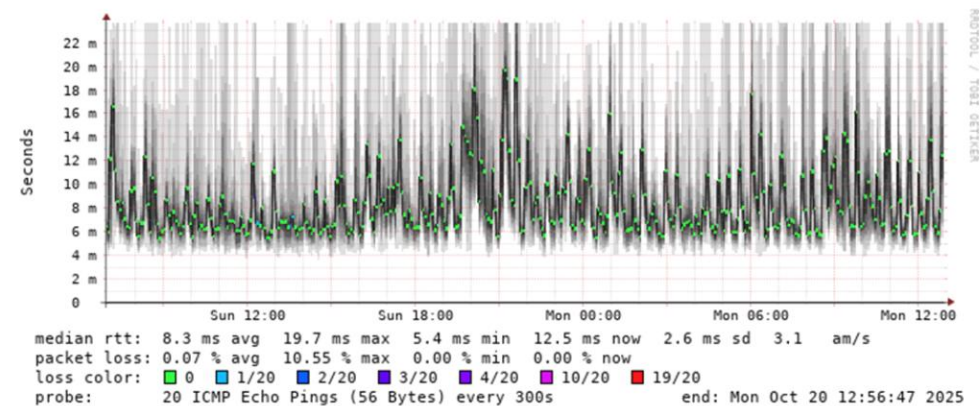


San Antonio Mtn Router (10.40.3.1)

Last 3 Hours from sandia



Last 30 Hours from sandia



Cping (continuous ping)

```

cping NM links × + ▾
2025-10-20 13:06:37 #45 Period 1s Ping time x1 x10 x100 x1000 SILENT
Target Address 40 30 20 10 0 ms hop min avg max lost
Google..... google.com.....112111111121112111111111211111111111111 16.6 14 16.0 17.8 24.6 0
Google
DNS A..... 8.8.8.8.....11211111121211112111111112111131111121111 17.6 14 15.9 18.2 31.2 0
DNS B..... 8.8.4.4.....112111111111112111111311111211111111111111 17.8 14 15.8 18.5 38.3 0
Colorado
Thorodin..... thormain.rmham.org2212221212222112222221211122221312212121122 20.1 17 18.6 21.4 30.8 0
thor..... 10.30.20.1.....22522212222222242222221144443422222252224 42.1 2 19.2 28.0 58.3 0
Almagre..... almagre.rmham.org.22222222222222222222422222222222222222 21.5 14 19.5 23.6 82.6 0
almagre..... 10.30.120.1.....2242232423324236342346263743673312322253223 35.6 7 25.1 41.3 106.7 0
Albuquerque - Sandia Link
Albuquerque router.... 10.45.1.1.....122111111112112111221131112111111111221111 17.2 2 14.6 19.7 79.5 0
Sandia router..... 10.45.1.2.....5556554435566455555464346616143767664684355 54.9 6 36.0 59.7 125.1 0
ABQ-SAN radio..... 10.45.1.3.....1112111112212111211122111121211112111112111 16.0 3 15.5 19.3 54.7 0
SAN-ABQ Radio..... 10.45.1.4.....1121111111213111212222121121122111211111111 16.2 3 15.8 19.7 39.4 0
Sandia - Belen Link
Sandia Router..... 10.45.12.1.....8888777971877871688181979817119987871888988 83.8 6 68.3 89.4 165.9 0
Belen Router..... 10.45.12.2.....191111111119111189191181811181981881991919 93.9 7 86.0 121.5 190.9 0
Sandia Radio..... 10.45.12.3.....111711111118118119119119111119111111191111 150.0 7 74.9 123.2 174.7 0
Belen Radio..... 10.45.12.4.....111911111111111119199911111199111119111111 133.8 8 94.4 119.6 158.6 0
Sandia - Pajarito Link
Sandia router..... 10.45.0.1.....6119198911111119919811118111988911199898891 117.4 6 67.5 110.8 175.7 0
Pajarito router..... 10.45.0.2.....1111191811919918119811819991891191918761118 80.7 5 64.7 105.7 155.7 0
SAN-PAJ radio..... 10.45.0.3.....1111111111111111111111111911181199111991181 104.4 7 80.7 119.6 168.3 0
PAJ-SAN radio..... 10.45.0.4.....181111111111111111111111911111981111119111191 145.9 7 84.4 122.1 199.2 0
Pajarito - Picuris Link
Pajarito router..... 10.45.2.1.....1619911191891197191111991191779981111811191 129.7 5 69.0 106.7 159.2 0
Picuris router..... 10.45.2.2.....1779911919991881898117871181899989191181199 94.0 4 73.9 99.5 163.2 0
PAJ-PIC radio..... 10.45.2.3.....1818811911981811898117891178981191118181119 98.1 6 71.9 104.4 151.7 0

```

Power Monitoring & Control.



- AC Power Control

[Synaccess netBooster](#)



- DC Power Control

[RIGRunner Sandia Crest](#)



- Auto load shedding at a Solar site

[RIGRunner Picuris](#)

DC Power monitoring & Control.

Synaccess *netBooter*

- Control power to attached devices
- Automatically turn off or cycle power to devices based upon their ping response
- Automatically turn on/off devices dependent of temperature

The screenshot displays the netBooter web interface. At the top, it shows the device ID (RMHR), location (Sandia Crest), user (netops), and time (10/19/2025-14:08:05). The interface includes a sidebar with navigation options: Operation Status, System, Network, Outlet Setup, AutoPing, Administration, Event Notification, View Event Logging, Help, and Logout. The main content area is titled 'Power Outlet Status' and contains a table with 16 rows, each representing an outlet. The table columns are Outlet, On/Off, Reboot, Status, Name, and Reservation. The Status column uses icons: a blue circle with a white power symbol for 'Power ON' and a black circle with a white power symbol for 'Power OFF'. A legend at the bottom right confirms these icons.

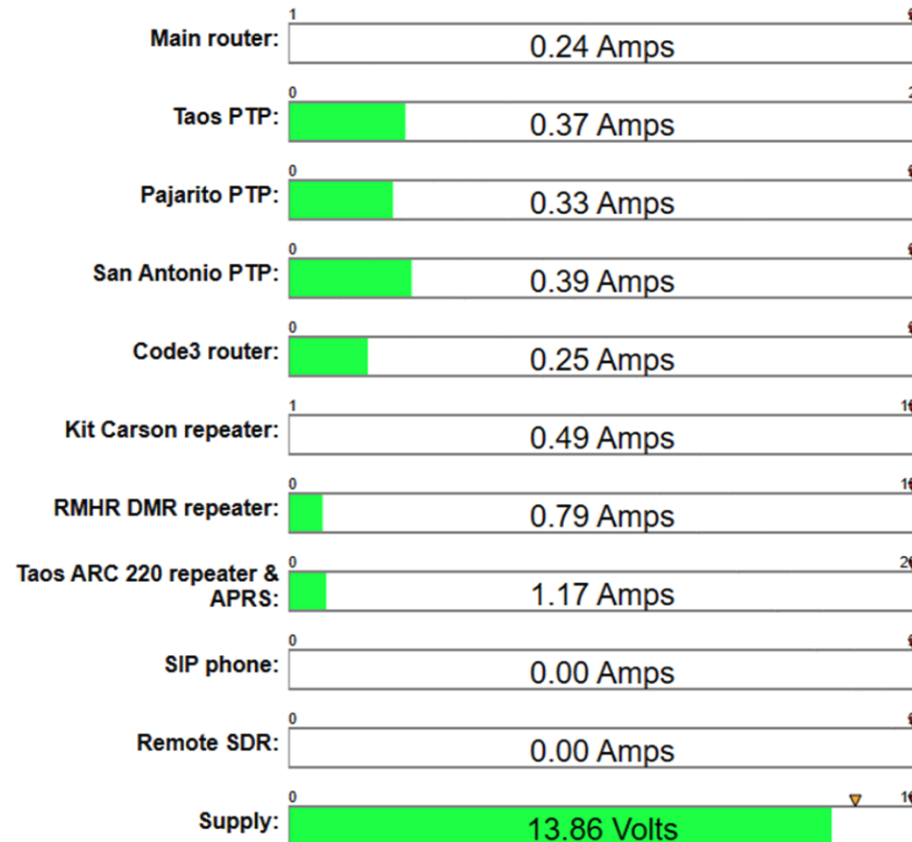
Outlet	On/Off	Reboot	Status	Name	Reservation
1				Main Router	
2				Tower Camera	
3				12V power	
4				SAN-ABQ PTP	
5				SAN-PAJ PTP	
6				DMR Repeater	
7				Camera	
8				SAN-BLN PTP	
9				UPS	
10				Phone	
11				PBX	
12				D-STAR router	
13				SAN-HUB PTP	
14				Ethernet_Switch	
15				outlet-15	
16				PTMP West	



RIGRunner - Picuris

Status	Device Setup	Sensor Setup	Fuse Setup
User Setup	Network Setup	E-Mail Setup	Logout (Guest)

RIGRunner Status



DC Power monitoring & Control

Node Readings

Supply

Under alarm

Threshold: < 11.9 Volts

Allow auto Recovery: Yes

Recovery: 12.2 Volts

Send e-mail: Alarm Recovery

- ☐ ☐ E-mail address #1
- ☐ ☐ E-mail address #2
- ☐ ☐ E-mail address #3
- ☐ ☐ E-mail address #4
- ☐ ☐ E-mail address #5
- ☐ ☐ E-mail address #6

- Nodes to disable:
- ☐ Main router
 - ☐ Taos PTP
 - ☒ Pajarito PTP
 - ☒ San Antonio PTP
 - ☐ Code3 router
 - ☐ Kit Carson repeater
 - ☒ RMHR DMR repeater
 - ☒ Taos ARC 220 repeater & APRS
 - ☒ SIP phone
 - ☒ Remote SDR

Network Infrastructure Resources.

- DMR C-bridge VM
[CO-RMHR](#)



- RMHAM Blueiris VM
[RMHAM NM Blue Iris](#)



- NM PBX
[UCM6202 | Dashboard](#)



DMR c-Bridge, where talkgroups come together



2018 W. Woodland - Springfield, MO 65807
www.rayfield.net - 800-743-9711

Control Center CO-RMHR

9612.2019.11.8
19:52:21 October 20, 2025 UTC
ka8jmw Single connection Log Out

Home

Config

Calls

Diagnostics

Net watch

Live network

Data watch

Help

-1 +1

Active calls and History filter

start time	duration	ch	name	source peer id	source radio id	source peer alias	source radio alias	dest. bridge group	dest. radio ID	RSSI (dBm)	source site name	loss rate
-1 +1												
History												
19:27:08.787 Oct 20	3.0	5	RMHAM Fremont TS1 TG700	g 310815	3197170	Fremont UHF	AE0QL - 3197170	Rocky Mt Wide TG700	700	-95.4	CO-RMHR	0.0%
16:41:02.617 Oct 20	2.0	2	RMHAM Northern TS2 TG721	g 310813	3108294	Eldorado UHF	KA0BSA - 3108294	North TG721	721	-66.0	CO-RMHR	0.0%
16:16:56.478 Oct 20	2.0	5	RMHAM Fremont TS1 TG700	g 310815	3197170	Fremont UHF	AE0QL - 3197170	Rocky Mt Wide TG700	700	-112.1	CO-RMHR	0.0%
16:16:22.158 Oct 20	4.0	5	RMHAM Fremont TS1 TG700	g 310815	3197170	Fremont UHF	AE0QL - 3197170	Rocky Mt Wide TG700	700	-105.5	CO-RMHR	0.0%
15:22:01.696 Oct 20	13.0	5	RMHAM Fremont TS1 TG700	g 310815	3197170	Fremont UHF	AE0QL - 3197170	Rocky Mt Wide TG700	700	-100.1	CO-RMHR	0.0%
15:21:38.846 Oct 20	18.0	1	RMHAM Northern TS1 TG700	g 315603	3179338	CheyWy UHF	KC5VGD - 3179338	Rocky Mt Wide TG700	700	-91.4	CO-RMHR	0.0%
15:21:05.672 Oct 20	25.0	5	RMHAM Fremont TS1 TG700	g 310815	3197170	Fremont UHF	AE0QL - 3197170	Rocky Mt Wide TG700	700	-96.9	CO-RMHR	0.2%
15:20:16.646 Oct 20	37.0	1	RMHAM Northern TS1 TG700	g 315603	3179338	CheyWy UHF	KC5VGD - 3179338	Rocky Mt Wide TG700	700	-105.3	CO-RMHR	0.2%
15:19:58.292 Oct 20	14.0	5	RMHAM Fremont TS1 TG700	g 310815	3197170	Fremont UHF	AE0QL - 3197170	Rocky Mt Wide TG700	700	-96.3	CO-RMHR	0.0%
15:19:50.606 Oct 20	3.0	1	RMHAM Northern TS1 TG700	g 315603	3179338	CheyWy UHF	KC5VGD - 3179338	Rocky Mt Wide TG700	700	-90.1	CO-RMHR	0.0%
15:19:39.100 Oct 20	3.0	5	RMHAM Fremont TS1 TG700	g 310815	3197170	Fremont UHF	AE0QL - 3197170	Rocky Mt Wide TG700	700	-97.5	CO-RMHR	0.0%
15:19:19.586 Oct 20	16.0	1	RMHAM Northern TS1 TG700	g 315603	3179338	CheyWy UHF	KC5VGD - 3179338	Rocky Mt Wide TG700	700	-95.7	CO-RMHR	0.0%
15:19:09.205 Oct 20	5.0	5	RMHAM Fremont TS1 TG700	g 310815	3197170	Fremont UHF	AE0QL - 3197170	Rocky Mt Wide TG700	700	-100.1	CO-RMHR	0.0%
15:18:19.406 Oct 20	46.0	1	RMHAM Northern TS1 TG700	g 315603	3179338	CheyWy UHF	KC5VGD - 3179338	Rocky Mt Wide TG700	700	-87.6	CO-RMHR	0.0%
15:18:06.257 Oct 20	8.0	5	RMHAM Fremont TS1 TG700	g 310815	3197170	Fremont UHF	AE0QL - 3197170	Rocky Mt Wide TG700	700	-105.5	CO-RMHR	0.0%
15:17:43.885 Oct 20	16.0	1	RMHAM Northern TS1 TG700	g 315603	3179338	CheyWy UHF	KC5VGD - 3179338	Rocky Mt Wide TG700	700	-83.7	CO-RMHR	0.0%
15:17:36.377 Oct 20	3.0	5	RMHAM Fremont TS1 TG700	g 310815	3197170	Fremont UHF	AE0QL - 3197170	Rocky Mt Wide TG700	700	-112.8	CO-RMHR	1.4%

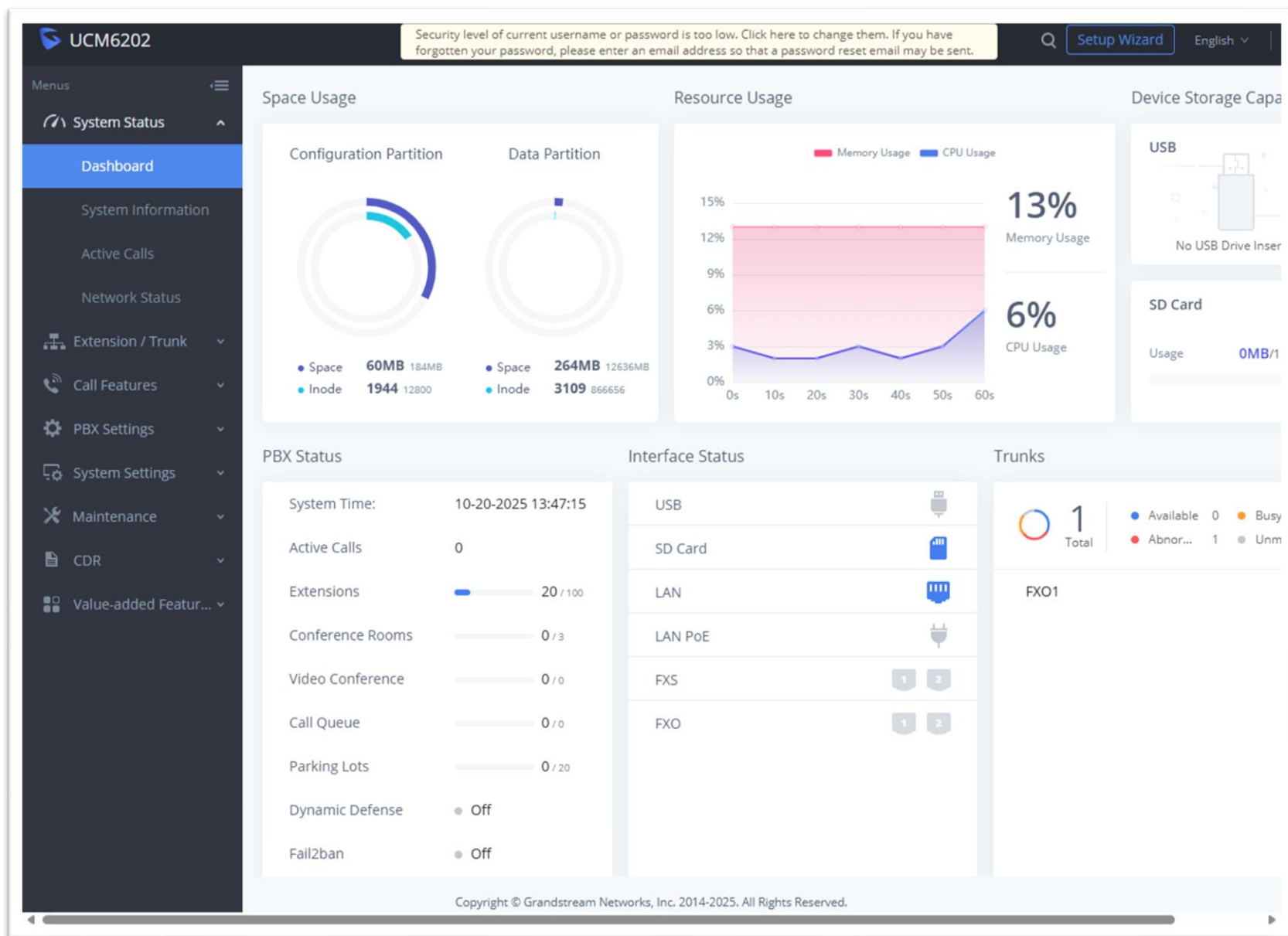
Gateway (1)
CO-RMHR

Total calls
428 Network
18 Local

Peers 38

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Grandstream UCM6202 SIP Phone PBX



Blue Iris Webcam software.

KA8JMW

Live View Clips Timeline

Filter by:
RMHAM
All Recent
Alerts
search

Today, October 20 (Mon)

01:31:04 PM Pajarito
01:29:04 PM Pajarito
01:28:28 PM Pajarito
01:26:27 PM Pajarito
01:25:23 PM Pajarito
01:25:01 PM Pajarito
01:20:57 PM Pajarito
01:20:42 PM Pajarito
01:18:06 PM Pajarito
01:17:45 PM Pajarito
01:10:23 PM Pajarito

Server Status
CPU 52%
MEM 34%
DISK 1%
FPS 5

FAA-Alcove (ALC) Inside Camera (S-CREST) Screen Room (S-ROOM)
Pajarito (PAJ) San Antonio Mtn (SAM) Picuris (PIC)
Belen (BLN) Sandia Crest tower (Crest twr)

The screenshot displays the Blue Iris Webcam software interface. At the top, the username 'KA8JMW' is shown. Below it are tabs for 'Live View', 'Clips', and 'Timeline'. A sidebar on the left contains a 'Filter by:' section with a dropdown menu set to 'RMHAM', buttons for 'All Recent' and 'Alerts', and a search bar. Below the filters, a list of video clips is shown, each with a thumbnail, a timestamp, and the location 'Pajarito'. At the bottom of the sidebar is a 'Server Status' section showing CPU at 52%, MEM at 34%, DISK at 1%, and FPS at 5. The main area of the interface is a grid of live video feeds. The top row shows three indoor feeds: 'FAA-Alcove (ALC)', 'Inside Camera (S-CREST)', and 'Screen Room (S-ROOM)'. The middle row shows three outdoor feeds: 'Pajarito (PAJ)', 'San Antonio Mtn (SAM)', and 'Picuris (PIC)'. The bottom row shows two outdoor feeds: 'Belen (BLN)' and 'Sandia Crest tower (Crest twr)'. Each feed has a timestamp in the top right corner.

10/20/2025

Network Infrastructure Resources (cont).



- VMware server
 - Hosts much of our software
 - Blue Iris
 - C-Bridge
 - File Server
 - Email
 - ...
 - [VMware ESXi](#)
- NTP server
 - [Spectracom NetClock/GPS 9383](#)



Network Community Resources.

- New Mexico Site Cameras

[Rocky Mountain Ham Radio Webcams](#)



- Site Temperatures

[FAA Building Alcove, Room Temperature](#)



- PAJ APRS iGate

[aprs.fi – live APRS map](#)

- With more coming...



Network RMHAM User Resources.



- Virtual machines that host our network applications
Linux, various flavors
Windows
- Remote packet, Sandia Crest
Putty into 10.40.0.70 run minicom
- Remote HF station operation
Wfview demo





Questions

Thank You

- Ed James KA8JMW, ka8jmw@arri.net
- <http://www.rmham.org>