

# Introduction to Broadband-Hamnet

Jim Kinter K5KTF

BBHN Webmaster Since 2010

First Licensed June 2008

General Upgrade September 2008

Extra Upgrade September 2010

# What is Broadband-Hamnet?

BBHN is simply a network.

A network built by Hams for Hams.

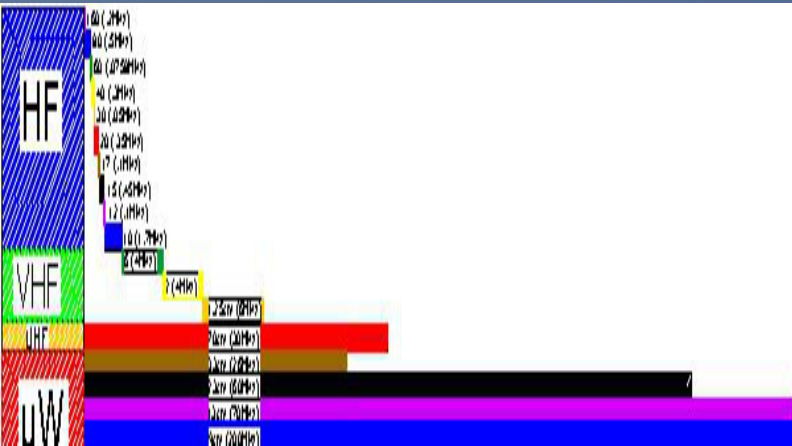
But it is a totally different network !



# Broadband-Hamnet

BBHN uses microwaves to connect different points with a large bandwidth.

ONE of our microwave bands has more spectrum than all the HF & VHF bands combined



With more bandwidth available, we can do so much more !

# Broadband-Hamnet

Microwave is different from VHF/HF !

The higher you go in frequency, the less the radio waves will bend or penetrate

But they BOUNCE and REFLECT !

Learn how the RF propagates and use it to your advantage.

# Broadband-Hamnet

While some may think this is a difficult subject, BBHN makes it easier.

When making backbone links, you can use the original firmware installed in the hardware.

If you want to make Mesh links, BBHN makes it easy to change the firmware to our own that is freely downloadable from our site, [www.broadband-hamnet.org](http://www.broadband-hamnet.org)

Knowing TCP/IP networking helps, but luckily there are thousands out there with this knowledge who can help.

# Broadband-Hamnet

Do not be intimidated by microwaves!

If you have a Wifi router in your home, you are using the same technology right now.

It is not difficult, just different from the lower bands we all are used to. Being Hams, nothing stops us from learning new things except ourselves.

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## Linksys AND Ubiquiti AND Bands

With the recent releases, there is a plethora of hardware now usable in the project.

The old-standby Linksys WRT54G, GL, and GS, versions 4 and below.

The Ubiquiti (UBNT) M2 2.4GHz, M5 5.8GHz, M9 900MHz gear, and *very soon* the M3 3.4GHz hardware.

That's FOUR bands we can use, with multiple pieces of hardware on each band.

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## Digital Bandwidth Comparisons

- Pactor/VHF Packet: 0.0012Mb/s
- Pactor III: 0.003 Mb/s
- Dialup Internet: 0.053 Mb/s
- ISDN (1 channel): 0.064 Mb/s (2 ch bonded): 0.128 Mb/s
- D-Star (max possible): 0.128Mb/s
- ∇ ---- BROADBAND (1Mb/s or faster) ---- ∇
- T-1: 1.5 Mb/s
- DSL: 10 Mb/s
- Linksys WRT54G: 27 Mb/s
- Cablemodem/FiOS: 50 MB/s ++
- 10/100 Ethernet: 100 Mb/s
- UBNT M3: 108 Mb/s (observed by K5KTF on a ~2-mile link)
- Gig-E Ethernet: 1,000 Mb/s



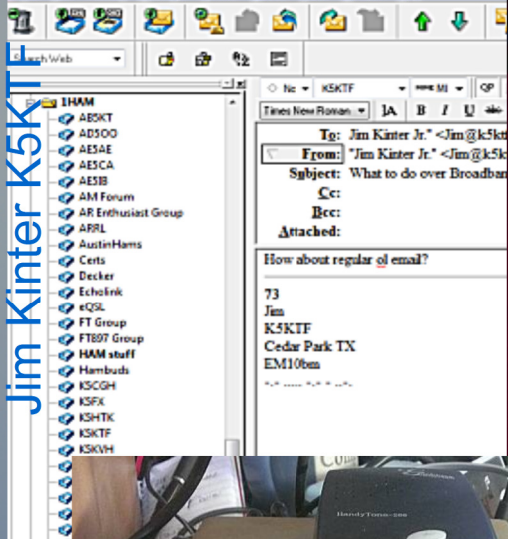
# Broadband-Hamnet

What do we do with BBHN networking?

- FAST (>1Mb/sec) file and data transfers
- Live streaming video & audio (IP webcams, etc)
  - Voice over IP (VoIP) telephony
  - And more!

**ALL AT THE SAME TIME !**

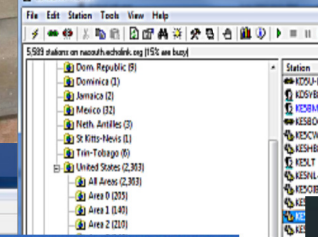
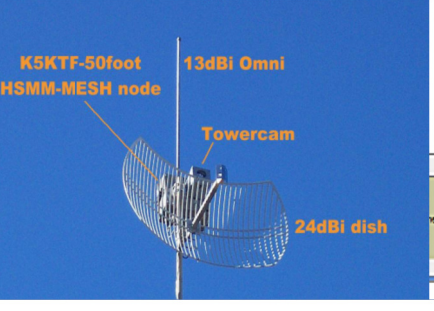
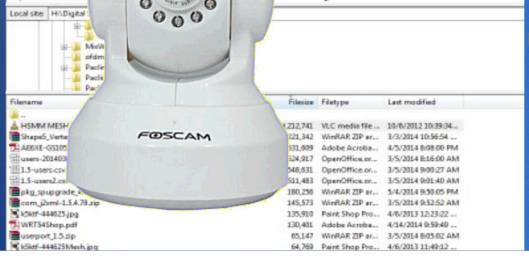
**ANYTHING** you can do on your home or office network, you can do over BBHN networks



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# Broadband-Hamnet

www.Broadband-Hamnet.org



# Broadband-Hamnet

BBHN enables the use of off-the shelf commercial hardware for the endpoints on the networks.

By using readily-available hardware, this keeps the costs of each site down.

ICOM IC-V80-HD-35, 2-meter HT

HRO price: \$149.95.



Ubiquiti NSM2, 2.4GHz Nanostation, Amazon:

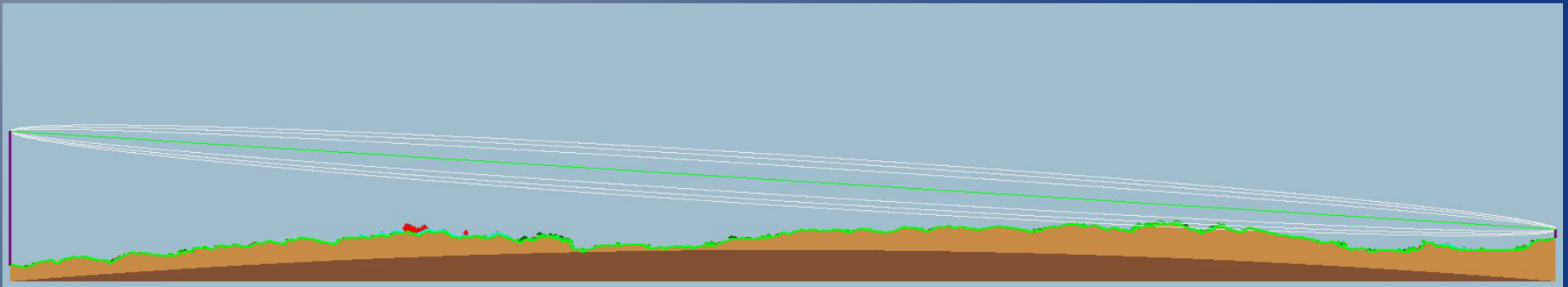


**\$82.48 INCLUDING SHIPPING !**

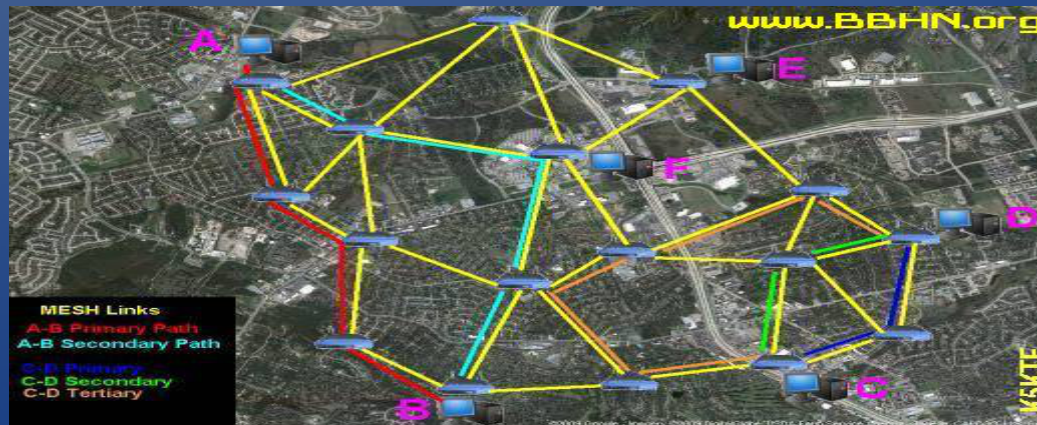
# Broadband-Hamnet

## Ways to use BBHN Networking

### Direct point-to-point “Backbone” links

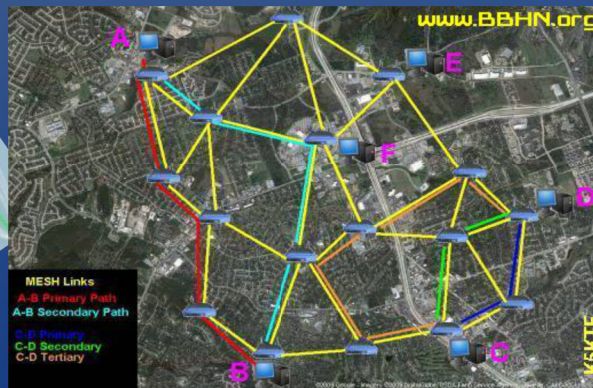
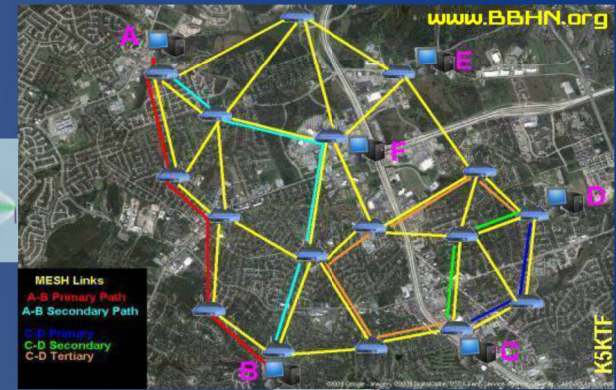
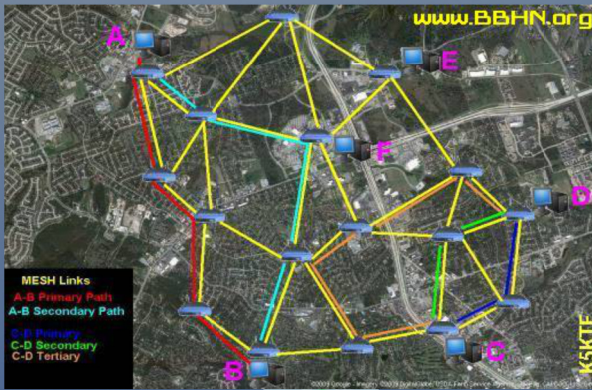


### “Mesh”



# Broadband-Hamnet

Or a combination of both



# Broadband-Hamnet

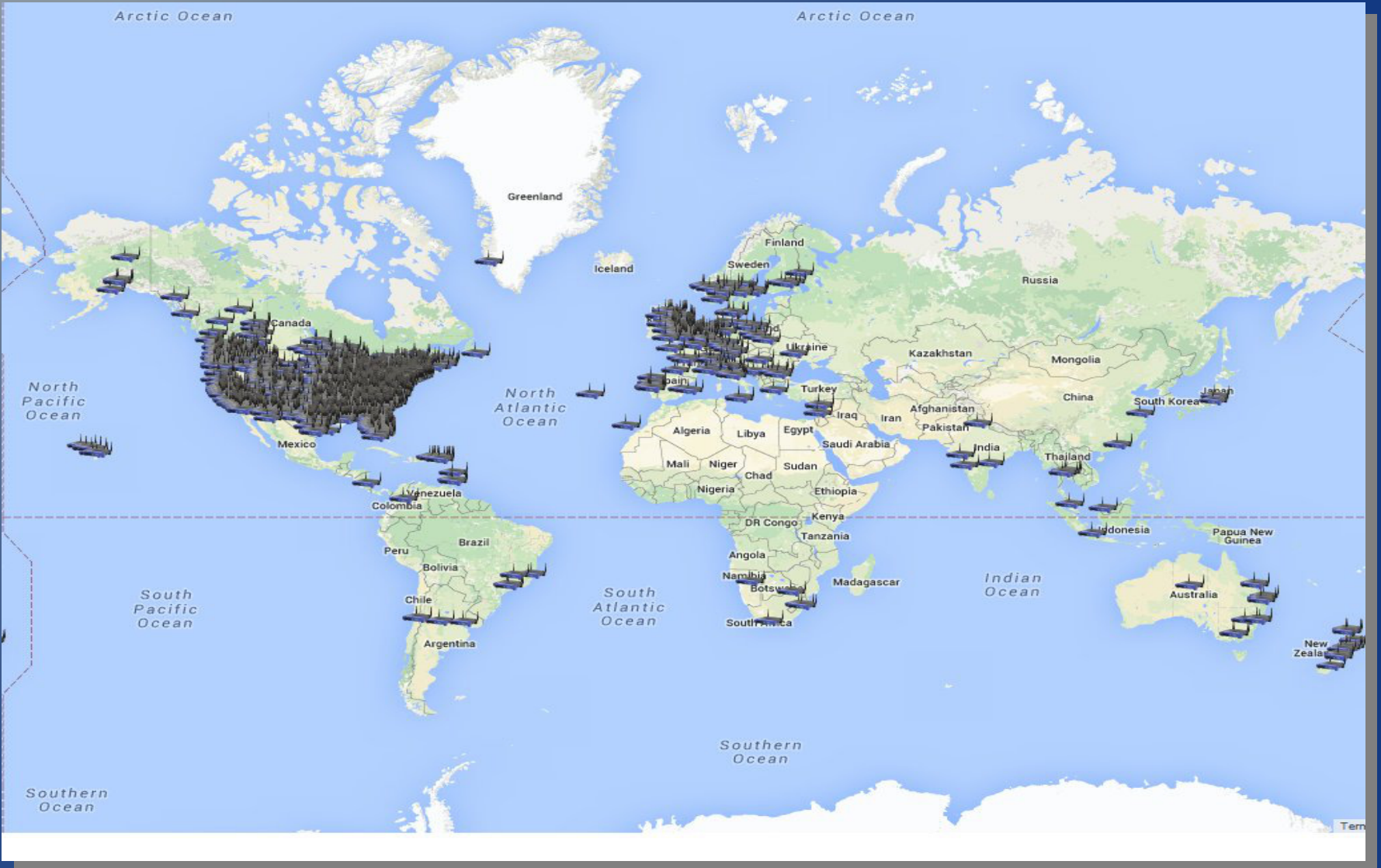
## Who is Using BBHN?

As of January 2015, the project web site has almost 5,000 registered users worldwide.

But everyone doesn't need to register or login to learn about it. There are only 3 things that need logging in for: Viewing the Googlemap, Viewing the Elmer's list, and posting to the forums.

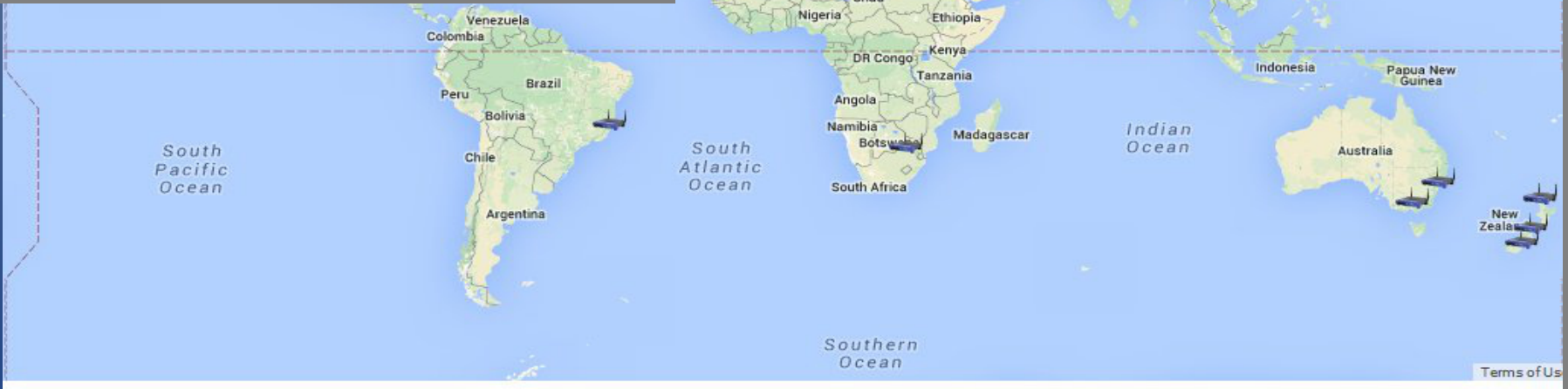
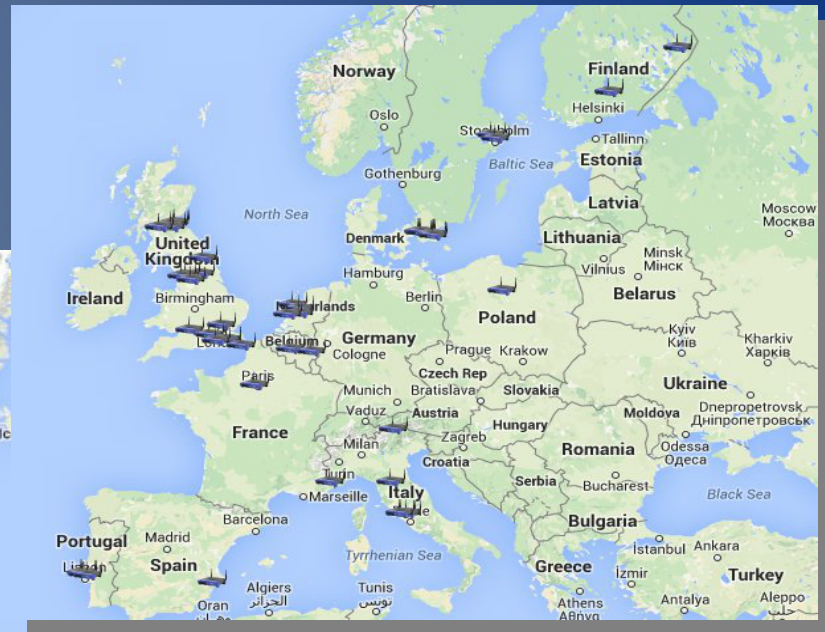
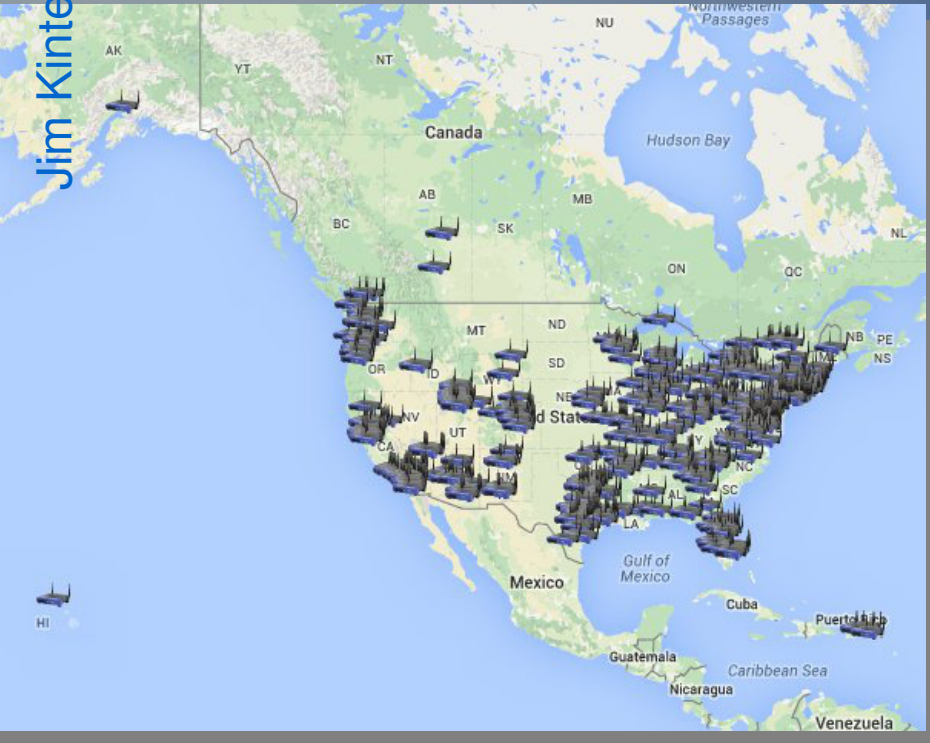
So we know there are more meshers out there than we know about.

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Website registered users

# Broadband-Hamnet



From the Googlemap on the website



# Broadband-Hamnet

**Broadband-Hamnet™**  
HSM-MESH™

for the latest info

News

search...

**Who's Online**  
We have 167 guests and 7 members online

- k5kpf
- k6dlq
- z11000
- VE3RTJ
- n8im
- N4ZKR
- K6KTF

**Main Menu**

- Home
- Just starting? Read this
- Web Links
- HSM-MESH™ Forums
- Awards

**Resources**

- Administrator access
- Contact the Webmaster
- Which hardware to use
- Software Download
- Applications for the mesh
- Voice over IP
- Regional Mesh Elmers

**HSM-MESH Info**

- Under Development
- User Documentation
- Developer Documentation
- FAQ
- FD Logging With Mesh
- HSM files
- Videos
  - Usage Articles
  - Learn about OLBR
  - Learn about Open WRT
  - Learn about WRT54G
  - Learn about WRT54GL
  - Learn about WRT54G B
  - Visual of a Mesh Network
  - Googlemapped Mesh Nodes
  - Quotes

**User Menu**

- Your Details
- Submit an Article
- Submit a Web Link
- Logout

**Regional Elmers**  
*(Written by Jim Kinter - K5KTF)*

**Regional HSM-Mesh™ Elmers**

We have setup this list to assist users in finding local HSM-Mesh(tm) experts to help them with getting started in their own local area.

If you would like to offer your expertise in helping out your fellow Hams locally, email Jim@k5krf.com and we can get you on this list for your area.

Also, if you have a specific area of expertise (VoIP, hardware hacks, antennas, You are willing to give local presentations, etc), we can list those as well. Just let us know what you work with.

The project has grown so much that we developers have become swamped trying to provide help to all the newcomers. We are hoping that users would contact their local Elmer for help first, then those Elmers can contact us with questions they cannot answer. We want all meshers to get the help they need, and we hope that spreading the load across regions will help anyone get the help they need quicker.

If there isn't a local Elmer listed for your area, or for comments/questions regarding the website, feel free to email me and I will try and help how I can as always.

	NAME	CALL	EMAIL	SPECIALTIES
<b>UNITED STATES</b>				
Alabama	Huntsville/Madison County	Bob KV4PC	kv4pc@qsl.net	General
Alaska	Anchorage	Rich AL4S	al4s@outlook.com	Skype: rich.gillin
Arizona	Phoenix	Rob K7XFM	rmurray@gmail.com	Equipment, antennas, applications, networking, and general use.
Arkansas	N. Mississippi Tri-state	Tim KD5CKP	kd5ckp@gmail.com	General
California	Berkeley/NoCal	Jordan KG6UAE	KG6UAE@arrl.net	Basics
	Sacramento/Lincoln	Steve N6HTV	sotoole@sotoole.com	General
	/Rocklin/ Roseville Area. Southern California	Andre K6AH	andre.k6ah@gmail.com	
Colorado				Equipment, antennas, electrical, software, hardware, solar, local presentations/demos, hardware hacking, all things RF, Linux/Unix - applications, mesh networking, off-grid power generation.
	Denver Metro	Bill N0QAX	wrfarrer5@gmail.com	
	Denver	Frank K0FEI	K0FEI@arrl.net	General/Presentations /Announcements/etc.
Connecticut	Any	Troy KB1BVF	kb1bv@gmail.com	General stuff

SPONSORED AD

**Ships Same Day!**

Website Elmer's List (33 states, 1 Province, 7 countries)

# Broadband-Hamnet

“My home router can only reach a few houses away. How can you guys claim links of 10 miles or more?”

Thats where Part 97 comes in!

With our licenses, we are allowed to change the **HARDWARE** from how it was originally shipped.

And the biggest improvement we can make is **ANTENNAS** ! Thats how you get range in microwaves.

# Broadband-Hamnet

Example links in use right now:

- Cedar Park Hospital to W3MRC - 3M campus in Northwest Austin: ~9 miles on 2.4GHz
- AE5CA to Club Shack in southwest Waco TX: 13 miles on 3.4GHz with 2 Nanostations.
- St. John -(~9 miles)- St. Thomas -(~43 miles)- St. Croix (USVI)

Most links are STOCK power output and high-gain antennas, or just stock antennae on UBNT gear. Only the St. John to St. Croix link uses bi-directional amps (1 watt) as the link without was unstable.

# Broadband-Hamnet



## Linksys vs. Ubiquiti

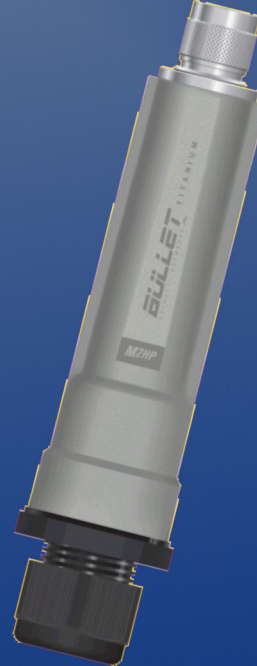


While the BBHN project will stop creating new firmware for our beloved WRT54G/GL/GS on April 30, 2015, that does not mean they will all die that day.

The files will remain on the website, and they will still be usable, they just may not link up to newer UBNT gear in the future.

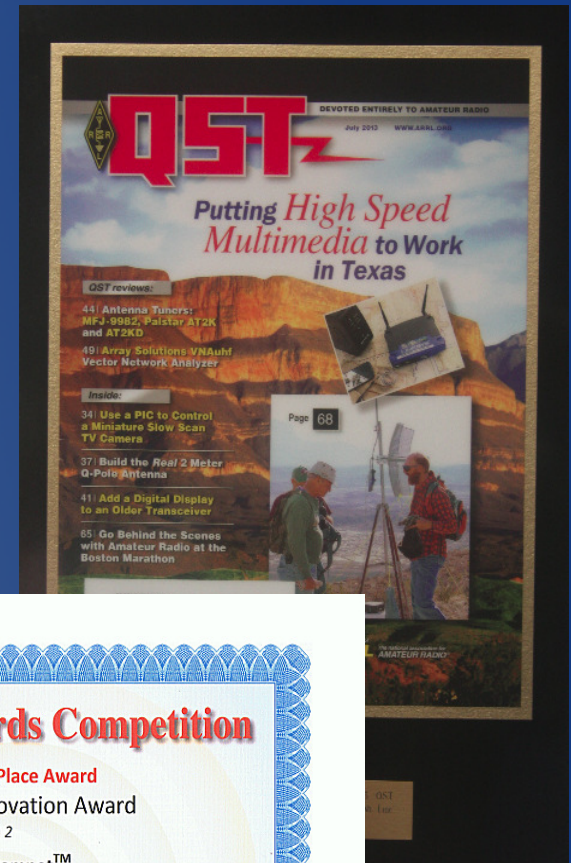
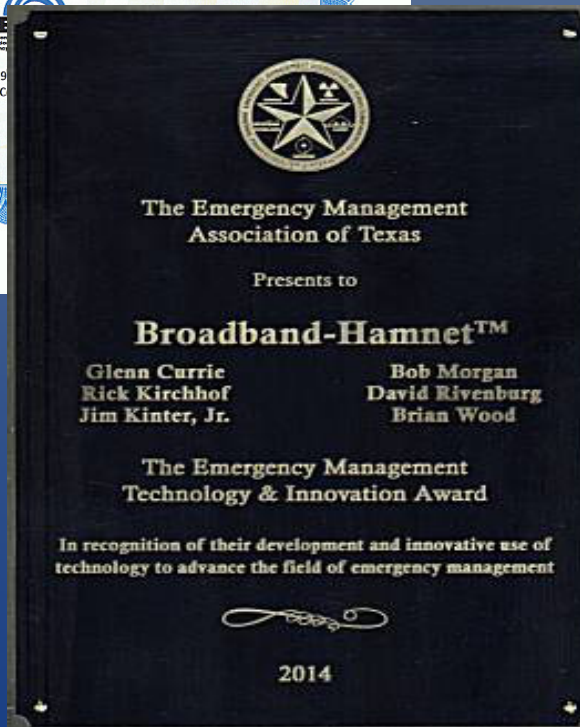
But we are supporting new hardware on every release, so we are not locked to 1 or 2 devices.

# Broadband-Hamnet



# Broadband-Hamnet

## AWARDS



# Broadband-Hamnet

## EmComm

With BBHN tools in the toolbox, you scatter nodes about (radio operators, Emergency Manager desks, logistics, etc), you can build an interconnected network in a matter of minutes to connect all aspects of incident management.

Deploying VoIP phones, laptops, portable servers, IP cameras, and more, you can supply emergency managers information and connectivity they need to handle any incident.

# Broadband-Hamnet

## EmComm (con't)

BBHN also has the ability to be connected to the internet. When one or more nodes have internet access, they can supply the entire network with access.

In an emergency, this can supply necessary connectivity to those who may not be able to connect otherwise.



# Broadband-Hamnet

With BBHN and the higher bandwidths, there are so many possibilities unavailable via other RF means.

You can use BBHN networks to interconnect other ham networks, such as D-star, Echolink, IRLP, ALL-Star, Winlink systems, etc.

**ALL AT THE SAME TIME !**

Everyone can connect and use the network at once, unlike other networks that are 1-user-at-a-time systems (the more users on at a time may slow down overall performance, just like any other TCP/IP network).

# Broadband-Hamnet

In accordance with Part 97 rules, keep the power down. Microwaves can get to dangerous levels quickly. Use only what you need to make the link. And make it a habit of not walking in front of the dishes!

Dont just add amps without knowing and testing the path first ! You will just generate more noise.

Its always better to spend more money on the antenna first, you get a better ROI. Remember, you have to be able to receive just as good as transmitting. A better antenna always does much more than an amp !

# Broadband-Hamnet Security

As with any computer or network, there are security risks to be noted. Even highly secure government and corporate networks get hacked now and again.

These risks are mitigated due to the fact that, even though we are visible to Wifi users, without other components built in to the BBHN firmware, a standard wifi client will never be able to connect and use our networks.

Since the BBHN firmware is freely available on the BBHN web site, anyone can download it. This provides a possibility (however slim) for those with less-than-good intentions to try and gain access to a BBHN network.

Knowing your network and who is SUPPOSED to be on it will greatly minimize concerns.

# Broadband-Hamnet

## Security (cont'd)

Personally, I would rather have my personal information going over a BBHN mesh network than over VHF or HF packet radio. Reason is, the point-to-point limits the possible places the RF and data are going. You would have to be within sight of a node to see the RF. THEN you would have to have BBHN firmware running on a compatible device, which would then show up on the BBHN network. With VHF and HF, anyone with a receiver and PC with the right software connected properly could sniff the data on that RF.

Someone in Russia could receive and decode that Winmor message just sent from California via HF.

# Broadband-Hamnet

## Security (cont'd)

Also, per Part 97 of the FCC rules, encryption is currently not allowed within any Amateur Radio communications.

That includes BBHN mesh and backbone networks running under Part 97.

This means that any BBHN user must be careful not to use any software over the RF links that would use SSH or SSL encryption as used to secure traffic over the internet. While this does limit what we can do over BBHN, there are still plenty of other applications in which we can enjoy the additional bandwidth afforded.

# Broadband-Hamnet

## Security (cont'd)

As this is a very raw subject, and has been hashed out many times and many places with the same result (people just getting upset), I ask that we limit this in the in the Q & A portion.

There are plenty of resources already on the web where anyone interested could research this on their own.

Me giving you advice on the FCC laws would have the same value as giving you advice on how to file your taxes (I am no where near a tax consultant).

# Broadband-Hamnet

## Time for Q & A

**Jim Kinter K5KTF**

**Jim@k5ktf.com**

**www.Broadband-Hamnet.org**

**(www.bbhn.org works too)**