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.
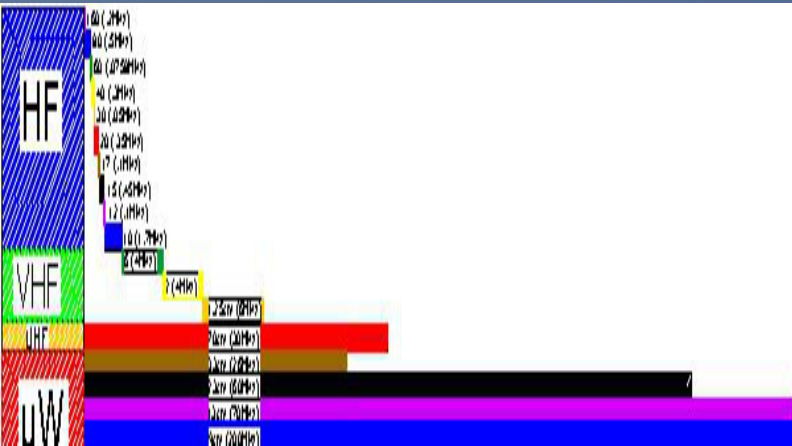
A network built by Hams for Hams.

But it is a totally different network !

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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 !

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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.

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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

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

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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
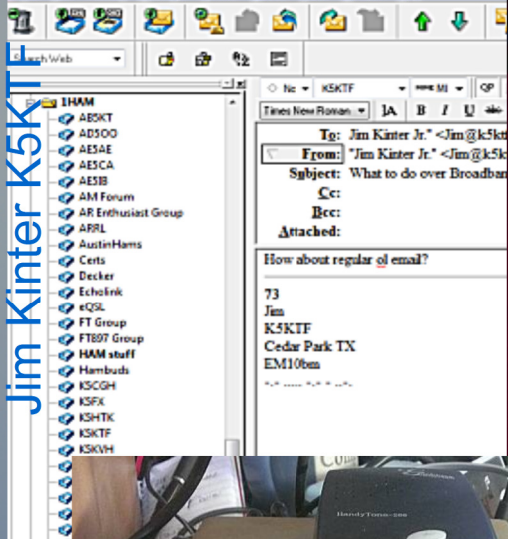UBNT M3: 108 Mb/s (observed by K5KTF on a ~2-mile link)
Gig-E Ethernet: 1,000 Mb/s

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What do we do with BBHN networking?

- FAST (>1Mb/sec) file and data transfers

- Live streaming video & audio (IP webcams, etc)

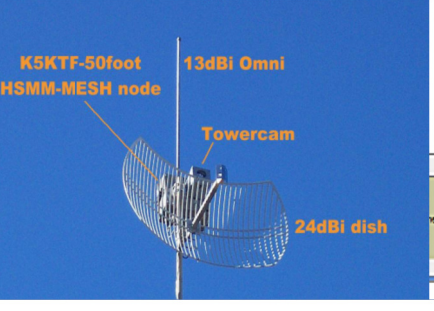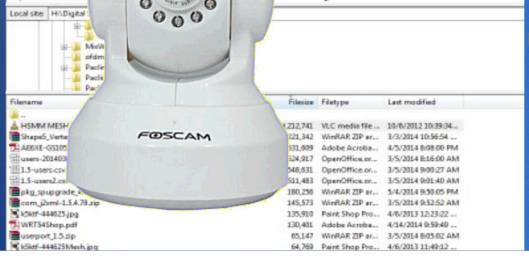- Voice over IP (VoIP) telephony

- 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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www.Broadband-Hamnet.org
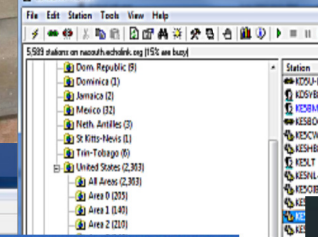
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BBHN enables the use of off-the shelf commercial hardware for the endpoints on the networks.

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

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

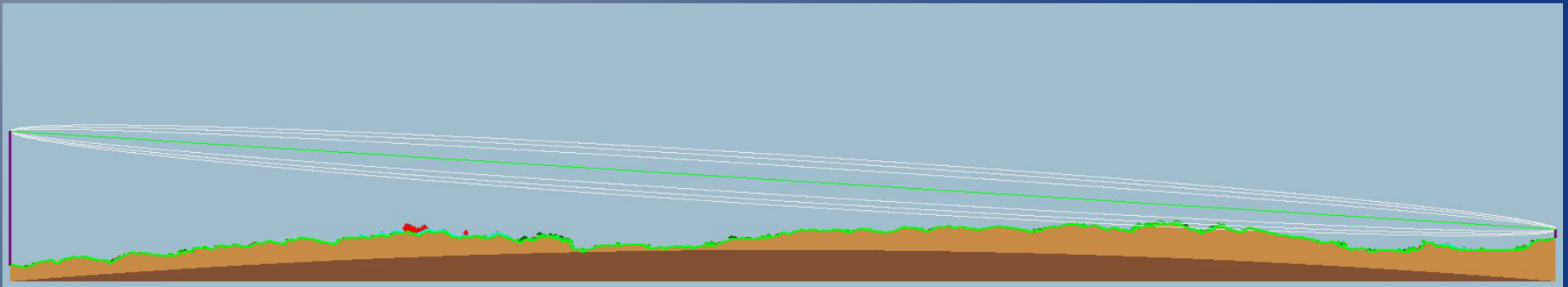HRO price: $149.95.

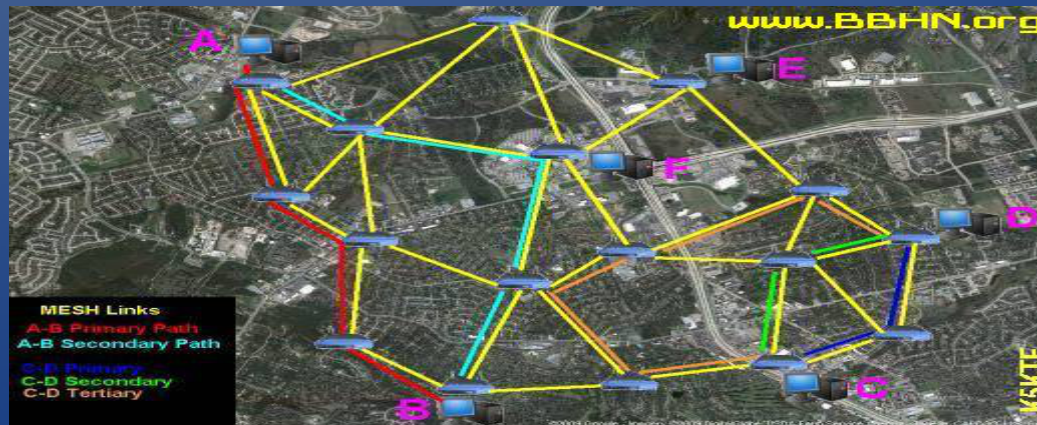Ubiquiti NSM2, 2.4GHz Nanostation, Amazon:

$82.48 INCLUDING SHIPPING !

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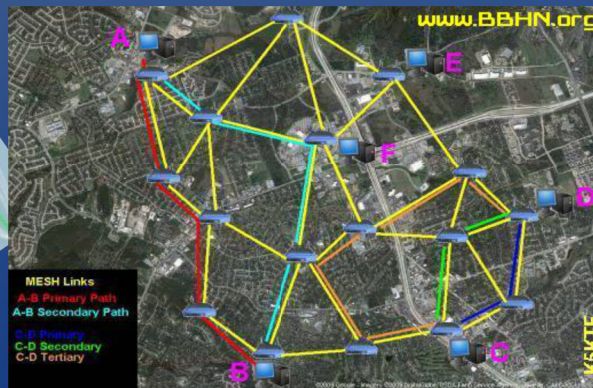## Ways to use BBHN Networking

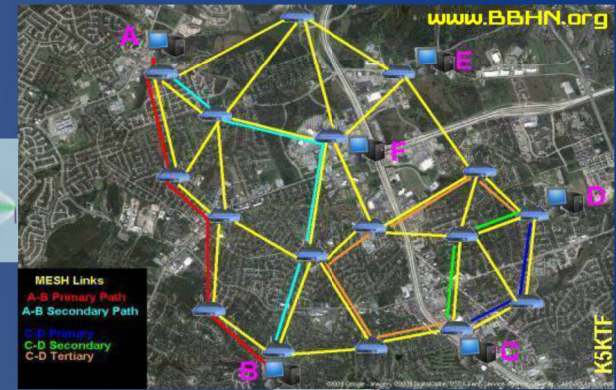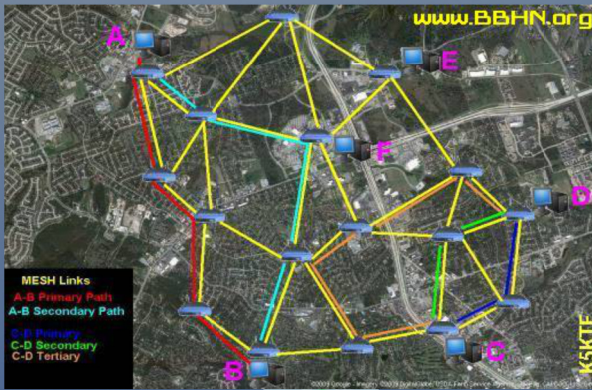## Direct point-to-point "Backbone" links

"Mesh"

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Or a combination of both

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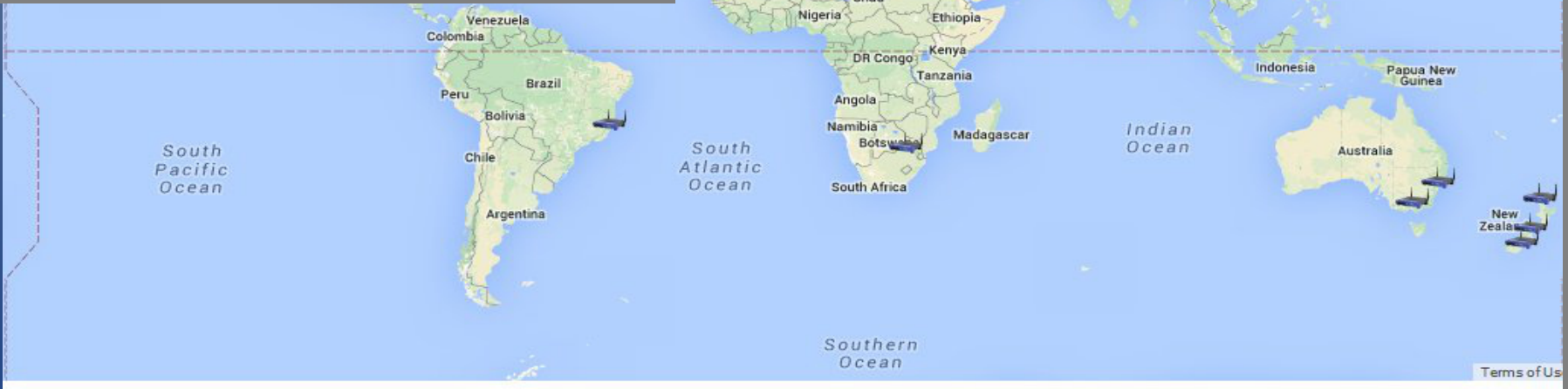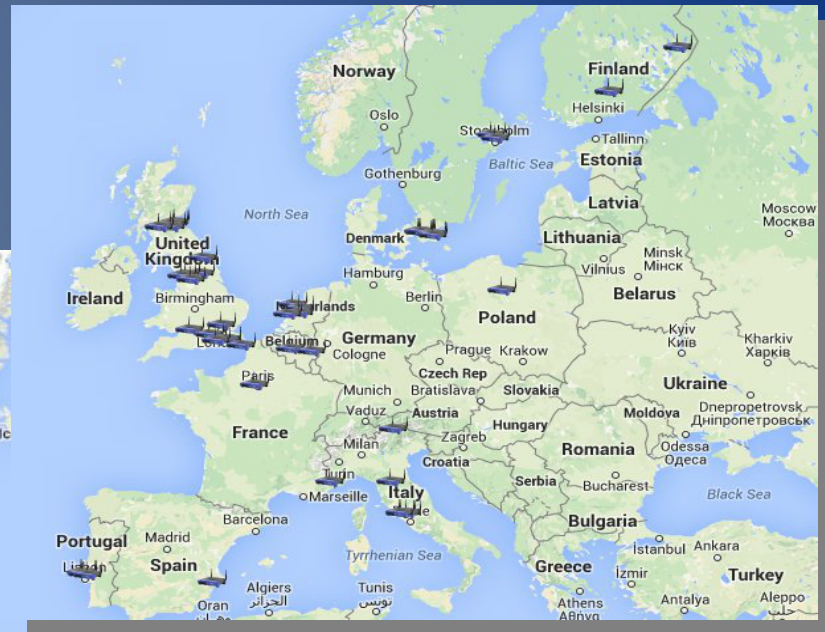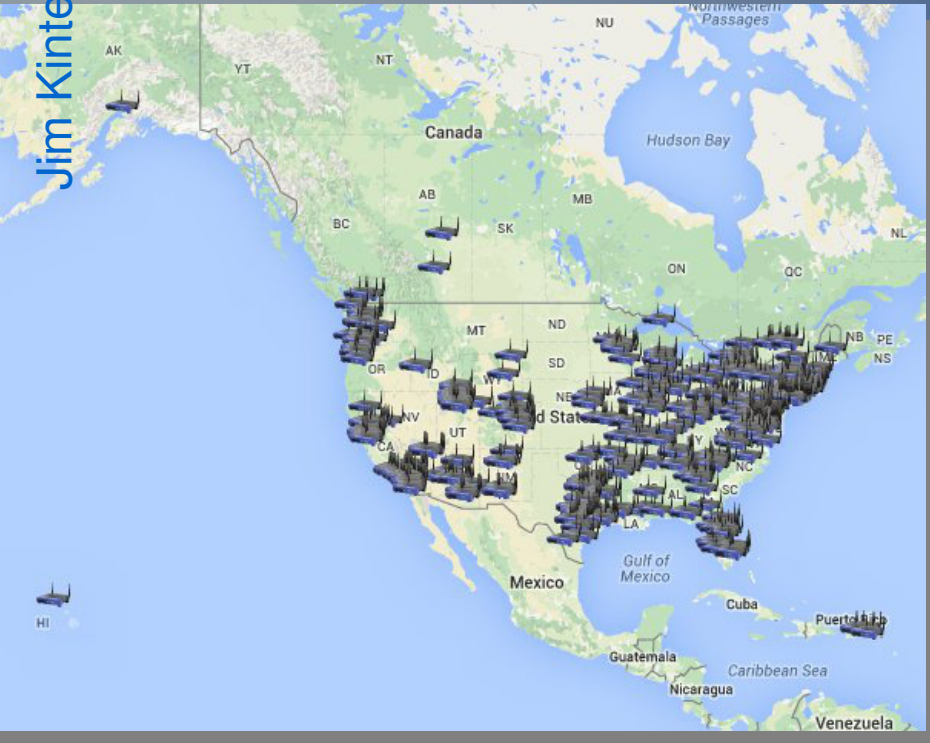
So we know there are more meshers out there than we know about.

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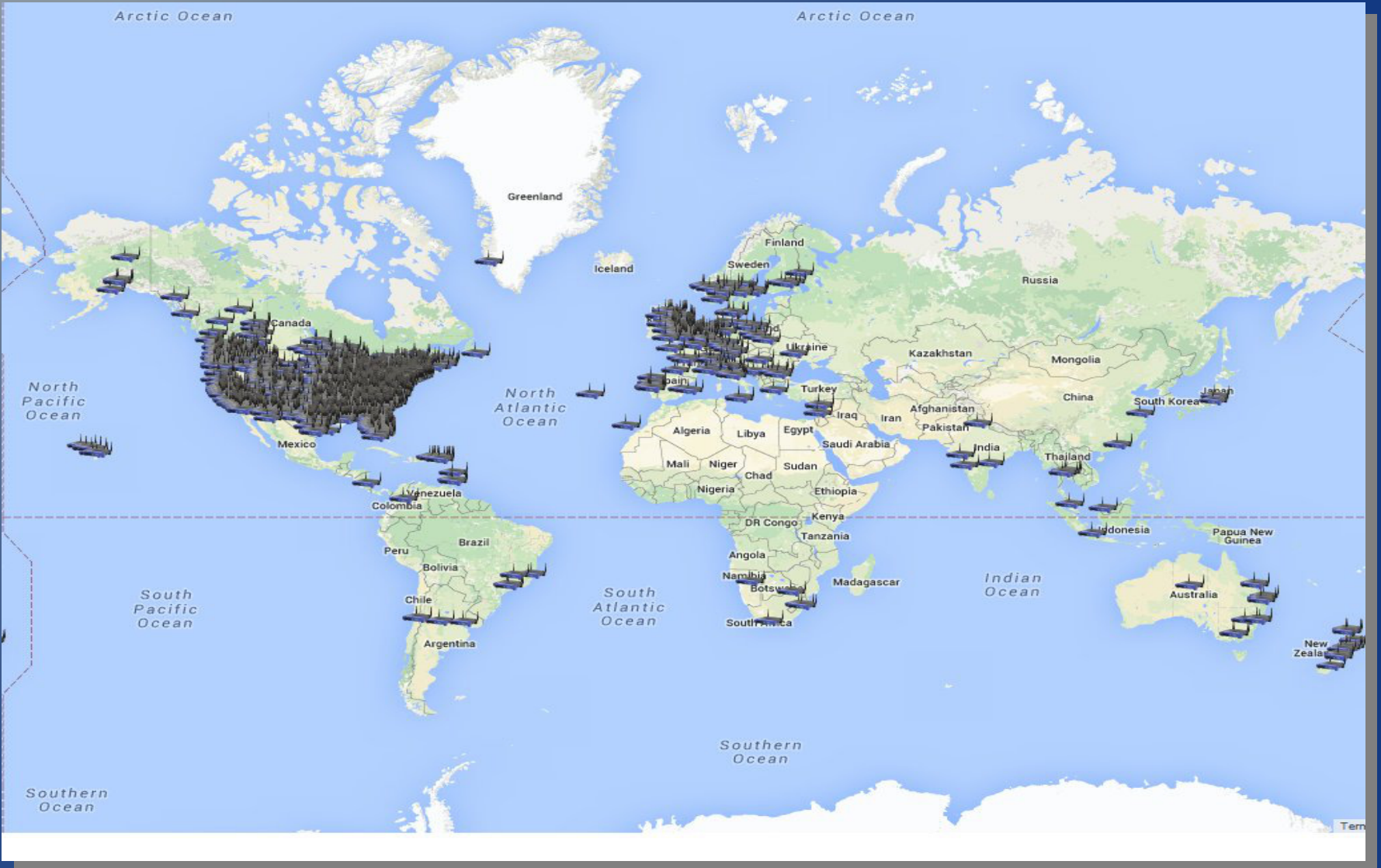
Website registered users

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From the Googlemap on the website

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

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"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.

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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.

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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.

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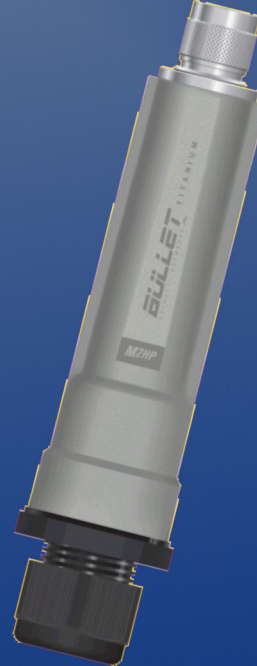
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AWARDS

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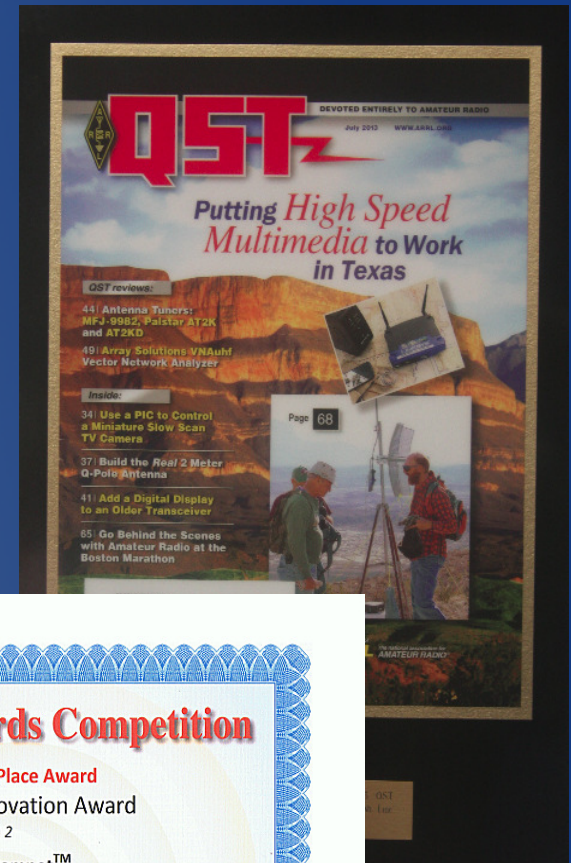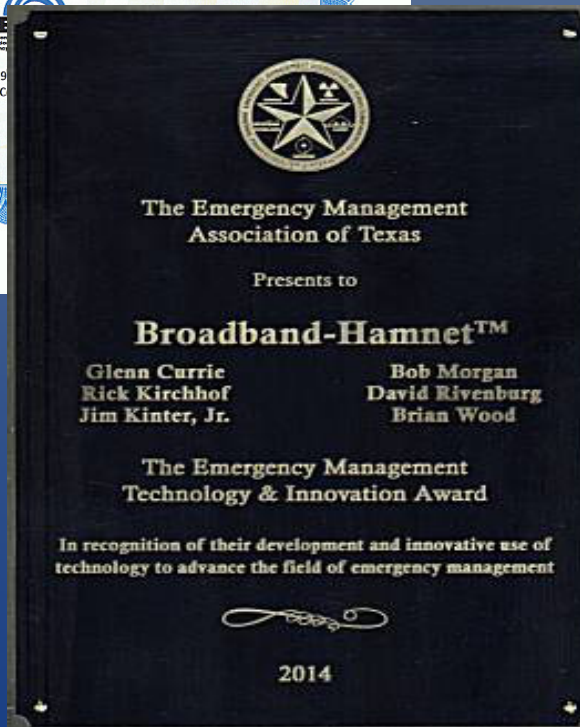
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EmComm

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.

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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.

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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).

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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 !

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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.

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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. 28

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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.

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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).

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Time for Q & A

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www.Broadband-Hamnet.org

(www.bbhn.org works too)

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www.Broadband-Hamnet.org

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