

# Broadband Hamnet

Wireless intranet for  
emergency communications

# Broadband Hamnet

- Repurposed home wifi routers
- Amateur 2.4GHz band overlaps lower half of wifi band
- Modified wifi routers form a mesh network
- Various applications can run over the mesh net
- Formerly hsmm-mesh

# Antenna mounted node

- Node mounted at antenna. Power over ethernet



# Linksys WRT54G

- many consumer routers are actually small linux computers with radios and ethernet
- Older version 1-4 of WRT54G
- \$20 on ebay, craigslist, garage sales
- Easily modified to BBHN
- Based on openWRT and OLSR open source protocols
- A few other makes and models

# WRT54G

- Turn your wifi router into a broadband hamnet mesh node



# Building your node

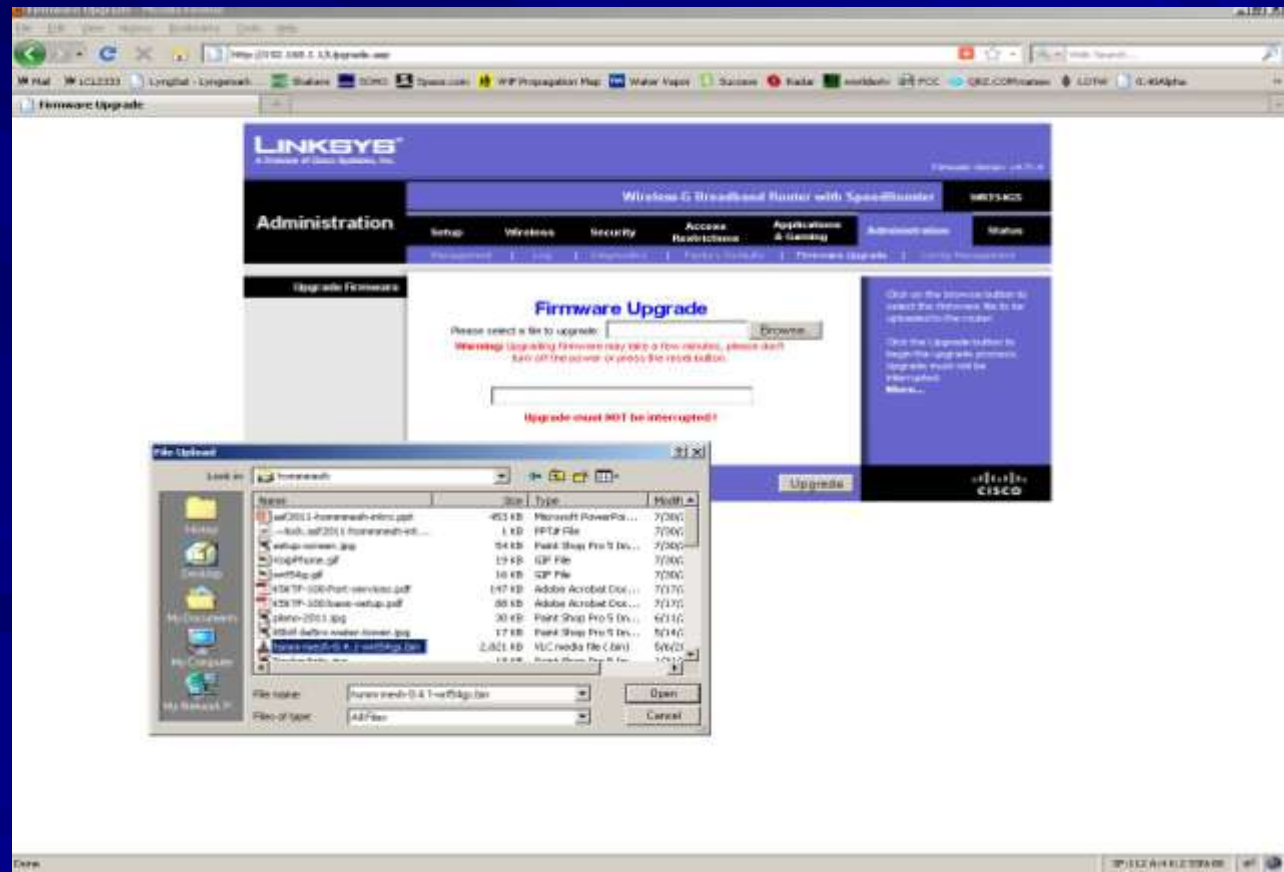
- Go to your router's admin page

The screenshot shows the 'Basic Setup' page of a Linksys WRT54GS router. The browser window title is 'Basic Setup - Mozilla Firefox' and the address bar shows 'http://192.168.1.1/'. The page features a navigation menu with tabs for 'Setup', 'Wireless', 'Security', 'Access Restrictions', 'Applications & Gaming', 'Administration', and 'Status'. The 'Setup' tab is active, and the 'Internet Setup' section is expanded. The 'Internet Connection Type' is set to 'Automatic Configuration - DHCP'. The 'Router Name' is 'WRT54GS'. The 'Local IP Address' is '192.168.1.1' and the 'Subnet Mask' is '255.255.255.0'. The 'DHCP Server' is 'Enable'. The 'Starting IP Address' is '192.168.1.100' and the 'Maximum Number of DHCP Users' is '50'. The 'Client Lease Time' is '0' minutes. The 'Time Zone' is '(GMT-08:00) Pacific Time (USA & Canada)'. The page also includes a sidebar with additional information and a footer with the URL 'http://192.168.1.1/Management.asp' and the version 'SP:1.12 A+K2 5294.00'.



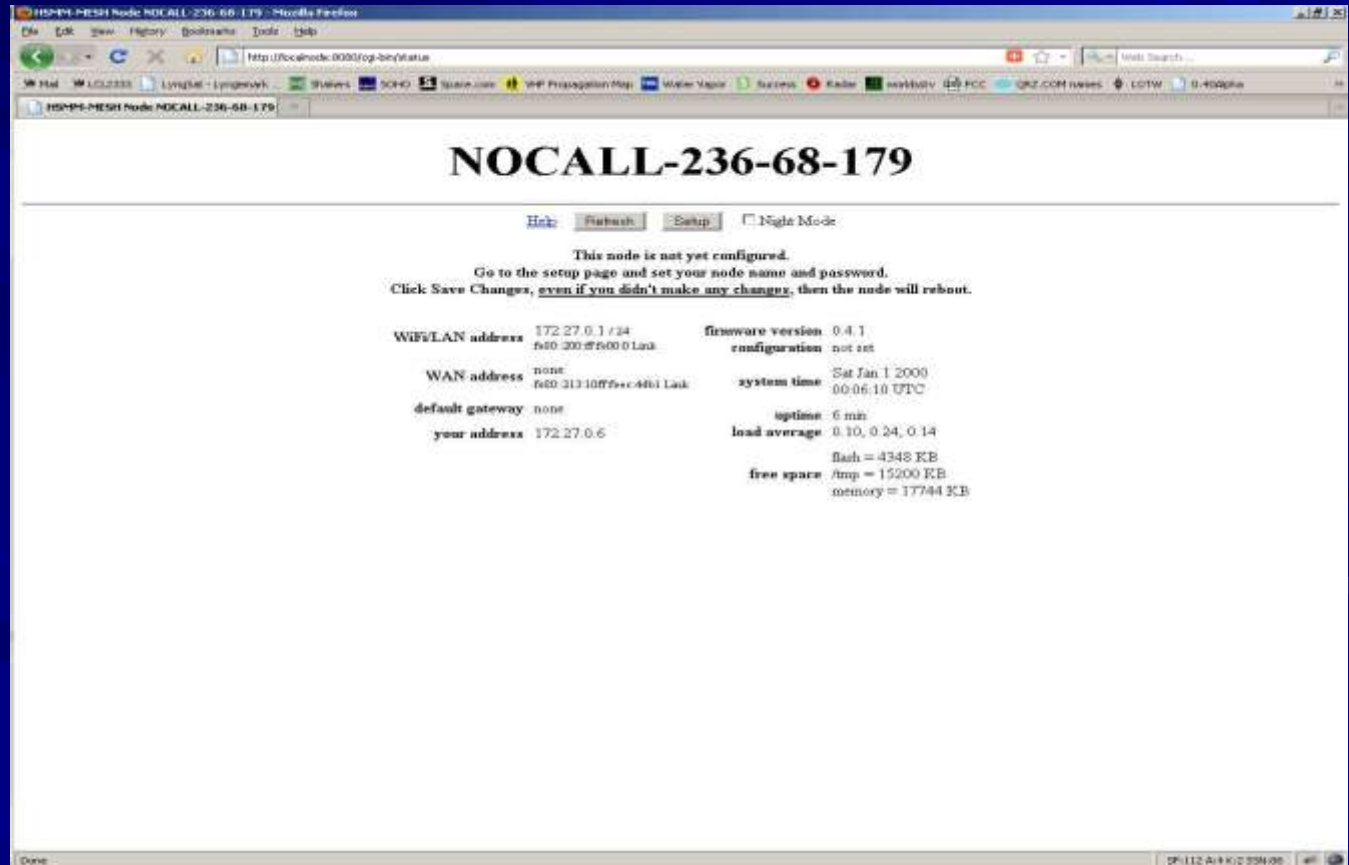
# Load firmware

- Go to firmware upgrade page, load file downloaded from hsmm-mesh.org



# Reboot/renew

- Firmware will load. Reboot. Renew IP. Open localnode:8080



The screenshot shows a web browser window with the address bar displaying `http://localnode:8080/cgi-bin/status`. The page title is **NOCALL-236-68-179**. Below the title, there are links for [Home](#), [Refresh](#), [Setup](#), and a checkbox for  Night Mode.

The main content area contains the following text:

**This node is not yet configured.**  
Go to the setup page and set your node name and password.  
Click Save Changes, even if you didn't make any changes, then the node will reboot.

The status information is presented in two columns:

<b>WiFi/LAN address</b>	172.27.0.1 / 24 fe80:200:27fe00:0 Link	<b>firmware version</b>	0.4.1
<b>WAN address</b>	none fe80:213:10ff6::c461 Link	<b>configuration</b>	not set
<b>default gateway</b>	none	<b>system time</b>	Sat Jan 1 2000 00:06:10 UTC
<b>your address</b>	172.27.0.6	<b>uptime</b>	6 min
		<b>load average</b>	0.10, 0.24, 0.14
		<b>free space</b>	flash = 4348 KB /tmp = 15200 KB memory = 17744 KB



# done

- Enter call and password. Node will reboot and you're done

The screenshot shows a web browser window displaying the 'KA5FZU-T100 mesh status' page. The page has a title bar and a navigation menu. The main content area is divided into several sections: 'Local Hosts', 'Services', 'Current Neighbors', 'Remote Nodes', 'Previous Neighbors', and 'When'. The 'Local Hosts' section lists 'KA5FZU-T100'. The 'Services' section lists 'ESET-Tunnel' and 'ESET-100'. The 'Current Neighbors' section lists 'ESET-101' and 'ESET-102'. The 'Remote Nodes' section lists various nodes with their respective ETX values and services. The 'Previous Neighbors' section lists 'ESET-100' and 'ESET-TunnelHost'. The 'When' section lists '1 minute ago'.

Local Hosts	Services	Current Neighbors	LQ	Services
KA5FZU-T100		<a href="#">ESET-101</a>	42%	<a href="#">CookinCam</a>
		<a href="#">ESET-102</a>	10%	<a href="#">Cam</a>

Remote Nodes	ETX	Services	Previous Neighbors	When
<a href="#">AESB-Tunnel</a> (out)	6.30		ESET-100	1 minute ago
<a href="#">ESET-100</a>	4.43	AGW00MS Packet (8000) Email (25110587) <a href="#">Web Server</a>	ESET-TunnelHost	1 minute ago
<a href="#">ESET-TunnelHost</a> (out*)	4.30			
<a href="#">ESETW-401-WPKA-na</a> (out*)	5.30			
<a href="#">ESET-101</a>	7.50			
<a href="#">HSGSH-1</a>	9.37	<a href="#">Webcam</a>		
<a href="#">HSGSH-2</a>	8.16			
<a href="#">HSGSH-4</a>	9.15			
<a href="#">HSGSH-5</a>	9.20			
<a href="#">HSGSH-6</a> (in)	6.30			
<a href="#">HSGSH-7</a> (in)	6.30			
<a href="#">WPKA-001-k4m6w22</a> (in)	6.30			
<a href="#">WPKA-003B-k4m6w21</a> (in)	6.30			
<a href="#">WPKA-003B-k4m6w21</a>	7.51			
<a href="#">WPKA-003B-k4m6w21</a>	5.30			
<a href="#">WPKA-003B-k4m6w21</a>	6.30			
<a href="#">WPKA-003B-k4m6w21</a>	5.30			

# 2.4GHz band

- Lower half of wifi band overlaps with amateur 13cm band
- Hams can run high power and gain antennas as primary users
- Routers can be modified to go below the wifi band for quieter spectrum
- Range can be several miles line-of-sight with stock power and antennas

# Portable node

- Runs all day on 12A gel cell

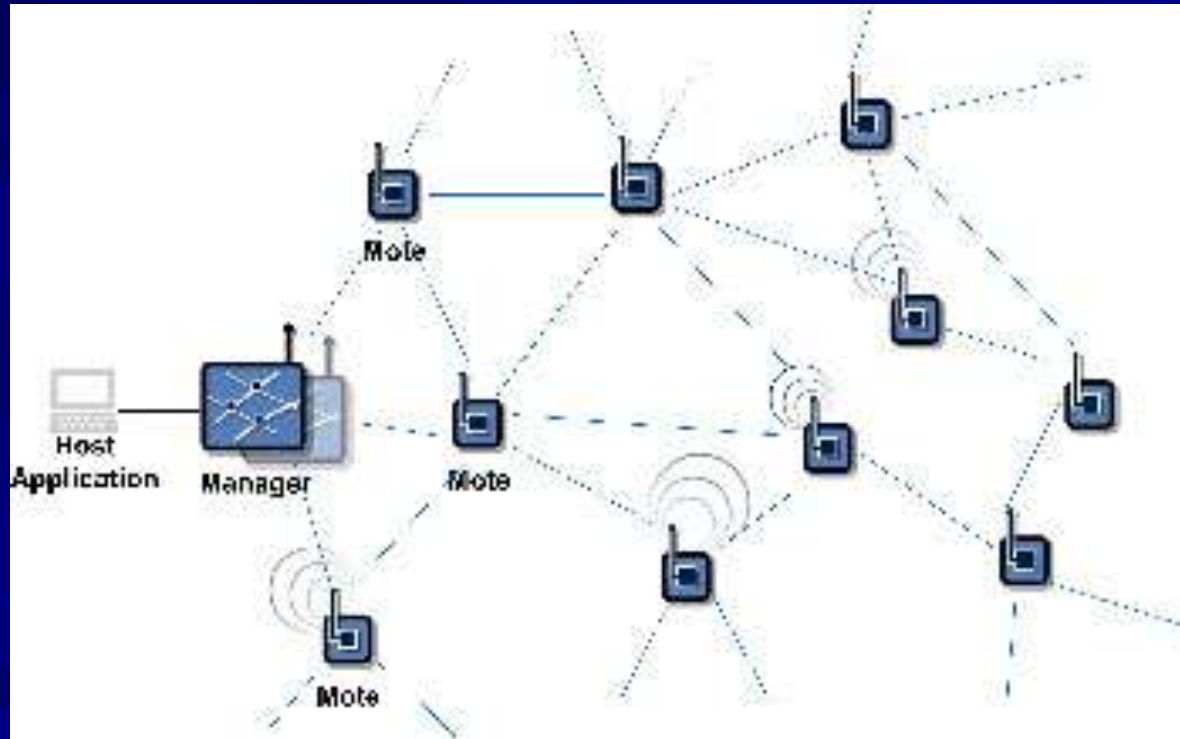


# Mesh network

- Nodes automatically connect to each other
- Form multiple paths across network
- More nodes increase reliability, fault tolerance and range of mesh
- No longer accessible by wifi directly, radios only connect to the mesh
- Can be connected to other nets, wifi, Internet

# Mesh

## ■ Mesh network





# Applications

- Anything that you can run over a network
- Video, audio, text chat, VOIP
- Webcams
- Web pages, share files, print
- Remote console
- WebEOC
- Remote radio control, HRD, etc.
- Apps can run directly on a node



# Sample scenario

- APRS is running in the ARES trailer
- Command post is across the parking lot or down the road. Is too noisy/crowded/RF inaccessible
- Broadband hamnet deployed between the two sites
- Command post can now see the APRS screens
- No internet required

# Q&A

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- [Hsmm-mesh.org](http://Hsmm-mesh.org)