

NARS NEWS

The Northwest Amateur Radio Society

Houston, Texas

March 2012



March Meeting

HSMM-MESH Project

The March club meeting will be presented by Jim Kinter Jr., K5KTF. The meeting topic is HSMM-MESH Project.

Jim is from the Austin area, and he is part of the HSMM-MESH Project. He will present an overview of MESH and how it was used by AARC on field day to link all their logging computers.

Jim is the webmaster of the HSMM-MESH Project and you will find it at www.hsmm-mesh.org/.

So, get to the meeting early, you will want to take notes and you don't want to miss this presentation.

2012 NARS Membership Survey

Fellow NARSians, one week in and we have 44 responses out of 135 members.

Not too shabby but, I believe we can do better. Remember, this club is for you. It's your club, and only if you tell us what you want to get out of it, we can make it happen. The survey is open for one more week, so why don't you take the 5 minutes it takes to fill it out so we can get more insight into our members.

Here's the link again: <http://www.surveymonkey.com/s/XH5HZS2>

Thanks and 73 Mike K5TRI

Important Dates

Friday, March 16th, 7:30 PM

Monthly Club Meeting,
Cypress Creek Christian Community Cntr,
6823 Cypresswood Drive

Saturday, March 24th, 8:30 AM

VE License Exam Session
Tomball Community Center
S. Cherry & Market streets
(just South of Main)

Tuesday, March 27th, 7:30 PM

Board of Directors meeting
Ponderosa Fire Station
17061 Rolling Creek drive.

Lunch Bunch - North

Jason's Deli - Mar 14th
Baker St. - Mar 21st
Sweet Tomatoes - Mar 28th
BJ's Restaurant & Brewery - Apr 4th
Gianna Italian Kitchen - Apr 11th
Spring Creek Barbeque - Apr 18th

Lunch Bunch - West

Please contact Mark Tyler K5GQ for details.

Lunch Bunch - Medical Center

Morningside Thai - Mar 14th
Pronto Cucinino - Mar 21st
Jason's Deli - Mar 28th
Buffalo Grille - Apr 4th
Southwell's Hamburger Grill - Apr 11th
Marco's Mexican Bar & Grille - Apr 18th

Taildraggers Lunch Bunch

11:00 am, Aviator's Grill, Hooks Airport

Notice: NARS membership dues are \$20 per year, renewable on anniversary.

Deadline for articles to appear in the newsletter is the last day of this month.

BREAKFAST

at Denny's

7720 Louetta Road

Saturdays

7:30 AM

President's Corner

The rain of recent days was most welcome, but the rain has side effects that we have to work around; wet ground, (restricts vehicle activity), repairs to the QTH, (...hadn't been this wet in a long time and some new leaks have to be attended to.), you know the rest. Still, I will take the rain every time.

Your board of directors has been busy this first quarter of 2012. We have a NARS membership survey in progress managed by Director Mike Schulz, a NARS supported event, Buffalo Bayou Regatta was canceled due to weather, the search for a Field Day coordinator is high on our list, antenna and tower work is high our list when the ground dries out enough to get vehicles to these items, inventories are in progress for all NARS antenna parts, cables and connectors, and in summary, our normal things like speakers for the general meetings once each month. Your suggestions are needed and welcome.

I am asking all of you to think about how to improve our slowly declining membership. We have about 136 members as of the last update from our Admin. Secy. Joe Sokolowski. The reason is a simple one, normal attrition is not being off set by new members. In fact, we are not attracting any of the youngest hams. This fact is one of the driving elements behind the Membership Survey that Mike is doing. Could any one of you that have ideas about how to address this issue, just drop me or any member of the Board your thoughts and comments about how to best address this issue?

Warm weather will be with us soon. Our winter is over. I wish it would hang around for a few more months, but we live near Houston, Nuff said.

Jerry-KE5PUT

VE Session Notice

Keith Dutson NM5G - NARS VE Session Manager

Saturday, February 25 VE Test Session Results at Tomball Community Center

We had 6 test candidates taking 8 tests.

- element 2 tests given: 3; passed 1
- element 3 tests given: 3; passed 3
- element 4 tests given: 2; passed 1

Congratulations to:

- Raul Pavon KF5OHL - upgrade to Extra
- Jose Rosada KC5FZG - upgrade to General
- Steven Feagin N5UCI - upgrade to General
- John Mayhew KF5OGA - upgrade to General
- Douglas MacKinnon - new Tech

Thanks to the VEs in attendance:

- Sarah Connell W2AOV
- Sheree Horton KF5LMJ
- Ron Horton KF5LFL
- Martin Rogoff

The next session will be held Saturday, March 24 at 8:30AM at the Tomball Community Center, located at the corner of Market Street and South Cherry Street. Official address is 221 Market Street. Let me know if you would like to serve at this session.

Parking is at the rear of the building. Use the entrance on the south side bordered by Fannin Street.

Exit 68, I-45 North
267 Cypresswood Drive
Spring, TX 77388

800-471-7373
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Houston Amateur Radio Supply, Inc.

David McCombs, K5FNG

www.houstonamateurradio.com

E-Mail: houstonamateurradio@sbcglobal.net

What Is HSMM-MESH?

HSMM-MESH is *the self-configuring ham network*.

Let's start with some basic concepts.

- Mesh nodes were originally consumer wireless routers but changed function when the firmware was changed
- After conversion, the WAN, LAN and Wi-Fi ports are linked using special rules and no longer operate like a normal wireless router
- Mesh nodes are **self-discovering, self-configuring, self-advertising and fault tolerant**
- Mesh nodes are a data network without the wires. Most tasks that you can do over a wired network will work on a mesh node
- Mesh nodes are small, portable, low-power and inexpensive. They are easily battery powered
- Mesh nodes can easily have a range of **10 miles or more using stock power** and gain antennas if you have true line of sight
- Mesh nodes communicate with other nodes over Wi-Fi frequencies and **only talk to other mesh nodes on the wireless port**
- You can't use Wi-Fi to connect to a mesh node from your computer, netbook, smart phone or other wireless device
- Computers connect to mesh nodes with an Ethernet cable and control them using a web browser
- Mesh nodes use peer to peer connections. This means many to many, not the star configuration where all users connect to the AP
- **Peer to peer connections share the same SSID** (network name) That name is HSMM-MESH.
- If you change the SSID, spell it wrong or change the punctuation, the mesh is broken. It must be exactly the same for all nodes
- Mesh nodes operate on channel 1. Channels 1-6 of the 802.11B/G wireless band are completely within the 2.4ghz ham band
- Mesh nodes on channels 1-6 use FCC part 97 rules instead of part 15. This allows big antennas, more power, other changes
- Mesh nodes talk to other nodes using RF (Wi-Fi), to the Internet over the WAN port and to computers and devices using the LAN ports
- Mesh nodes will create a network just by turning several of them on. They create high-speed data networks in minutes
- Mesh nodes don't need any computer to be attached to pass data to other mesh nodes. Just plug one in, it will expand the mesh
- Data is data. It can be IP Video, VOIP, LAN traffic between computers, clients to a web server/FTP/NAS/printer, hop to the Internet, etc
- IP addresses exist but you interact with mesh nodes by using their name. The names can be tactical but your ham call is still beacons
- Any mesh node within wireless range automatically joins the existing mesh and exchanges available routes with all others
- As signals grow stronger and fade, nodes join and leave the mesh. It can happen many times as you drive around
- Your path between any two mesh nodes may be single or multiple hop and can/will change with no notice or impact to you
- A single node joining your mesh may add many other nodes if it can reach each of the two groups of mesh nodes
- Mesh node owners from different parts of the country will join any existing mesh just by coming within range if it
- After initial conversion and setting the node name and password, no further changes are needed to connect with other nodes
- Computer resources on your mesh node can be shared with others on the mesh. These are **Advertised Services**
- Your mesh node can see and use advertised services on other nodes by just clicking on them in your web browser

- If one mesh node has its WAN port plugged into an Internet feed, and a config change, it can provide Internet to all mesh members
- Firmware upgrades and patching are done from an internal menu (Internet or local copy of the upgrade is required)
- Mesh nodes can be remotely managed and the firmware or patch level upgraded by any user with the password for that node
- Users on other parts of the mesh may view either mesh nodes or all wireless devices visible to that specific node
- Mesh nodes have several modes of operation and can change roles as you dictate
- Having spare mesh nodes means you can deploy them for each of several roles, such as putting up a local AP for served agencies
- **Several mesh nodes + one experienced ham operator = a portable, quick deployment, Swiss army knife of network services**

HSMM-MESH Design Philosophy

HSMM-MESH™ is not just any mesh network, it is a specific mesh network designed to meet certain goals and operate in a specific fashion. It will not meet the needs of everyone and is not suitable for every purpose. However, it is quite flexible and should provide a valuable and extensible service for its users.

HSMM-MESH™ is meant to be the high speed digital progression of existing Amateur Radio practices and used only by licensed Amateur Radio operators. Emergency communication is very much a driving factor in the architecture of the network. To that end, it aims to be the network of choice when the need arises to quickly create a network where none exists, and to be the easiest to set up and most capable while running. It also is suitable for permanent installation, providing high speed digital Amateur Radio communications over a region with line-of-sight RF access to at least one of the participating nodes.

So with that in mind, here are some of the features that define HSMM-MESH™:

- All networks called HSMM-MESH are interoperable
 - A node configured to participate in one region can be moved to another region and

continue to operate, without reconfiguration, with full access to the network

- Experimentation is encouraged, but if a network is set up in which a standard node would not have full network access, its SSID must be changed to something other than HSMM-MESH to indicate that it is an alternate network
- The OLSR protocol is used to route traffic between all nodes that can see at least one other node, thereby forming a mesh network and allowing all nodes to communicate with each other if a path exists between them
- The WiFi interface operates in Ad-Hoc mode, otherwise peer-to-peer communication would not be possible
- A node should require a minimum amount of configuration before becoming fully operational
 - General participation in the mesh should not require any centralized administration
 - No allocation of resources or manual assignment of addresses or subnets is necessary
 - exceptions for specific cases include but are not limited to:
 - inter-mesh or inter-region bridges
 - any services which can cause network conflicts
- Access to the mesh is available only from a mesh node, not directly to client devices
- Equipment on the LAN of a mesh node should not require any special software or setup to gain full access to the mesh
 - The supplied DHCP parameters (or their static equivalent) should be sufficient for full network connectivity
 - This does not pertain to specific applications, only to general network access
- It is a fully self-sufficient network and does not require any other infrastructure or resources to be in place for its participating nodes to be able to communicate with each other

- DNS is an integral part of the system – you should never have to know the IP address of any mesh node, using the hostname is sufficient to initiate a connection

Additionally, there are certain things that HSMM-MESH™ is not:

- it is **NOT** a replacement for your home internet connection
 - being an Amateur Radio network, it can only carry traffic that is allowed under FCC Part 97 rules
 - several types of internet traffic violate these rules
- also, it is **NOT** a replacement for your home internet connection
- finally, it is **NOT** a replacement for your home internet connection
- and by the way, it most certainly **CANNOT** be used in any way with your business network

I hope I have made myself clear. If the internet traffic contains data types that are already being used over ham radio such as Echolink or findu.com, that is perfectly acceptable. I am not a lawyer so I will not attempt to enumerate all the types of data that are or are not permissible under Part 97. It is your responsibility to comply with the terms of your license. If you question the permissibility of your internet traffic, it is probably best to not use it. This is the kind of traffic that your home internet connection is better suited for. You probably have Part 15 WiFi access to the internet. Use that instead.

Section 97.113.a.5 states: *No amateur station shall transmit communications, on a regular basis, which could reasonably be furnished alternatively through other radio services.*

This is what Part 15 is for: your day-to-day non-ham internet activity. HSMM-MESH™ on the other hand is, as are all ham radio activities, a service for the purpose of self-training, intercommunication and technical investigations carried out by amateurs, that is, duly authorized persons interested in radio technique solely with a personal aim and without pecuniary interest.

What is a mesh node?

Each WRT54G mesh node has three network interfaces and acts as a router between each of them. These interfaces are known as the LAN, the WAN, and the mesh.

The LAN

The LAN is provided by the four port ethernet switch on the back of the node. The default IP subnet settings for the LAN port are 172.27.0.0/24. This subnet contains 256 addresses, 253 of which are available for use.

- 172.27.0.0 is reserved for the network
- 172.27.0.1 is the LAN address of the mesh node itself
- 172.27.0.2-254 are available for other devices on the LAN
- 172.27.0.255 is the LAN broadcast address

The node runs a DHCP server which configures its LAN clients as follows:

- 172.27.0.10 for an IP address (for example, yours will probably be different)
- 172.27.0.1 as the default gateway
- 172.27.0.1 as the DNS server
- austin.tx.us.mesh as the domain name

A bit more needs to be said about DNS as it is a major new feature of the 0.3.0 firmware. Every mesh node is known by its node name and the node name is directly usable by every device on the LAN side of every node. The nodes service the .mesh TLD. The default domain name is austin.tx.us.mesh, and that domain name is appended to every name query that your computer generates so it is not necessary to type it. If you try to access www.yahoo.com, the node knows that .com is not a TLD it serves directly so it will pass that request on to an upstream DNS server if one is available through an internet connection. The nodes are configured to use Google Public DNS as their upstream DNS service.

Also, each node is known as “localnode” from its own LAN port. Send your browser to <http://localnode:8080/> and it will bring up the web interface on whatever node it is connected to.

Each node beacons its own DNS information every 30 seconds, and each node updates its internal DNS database every minute. So there will be up to a minute delay from the time a node becomes visible to the time your computer can reach it by name.

Obviously the default domain name is based in Austin. It is not worked out yet exactly how other regions will be incorporated into DNS, but at least the naming structure is ready for it.

As you can see, the LAN is actually quite involved. But it is where all the magic happens that allows you to plug in your computer, have it be automatically configured, and let the mesh node do all of the work of figuring out where everything else is

and how to get to it. It should be about as “plug and play” as it gets.

The WAN

The WAN is where internet service comes from, if it is available. Connect the WAN port to a network device that has internet access and both the LAN and the mesh will also have internet access. All packets leaving the WAN port go through the NAT process.

One feature of OLSR is called the “dynamic default gateway”. When a node has internet access, as verified by periodic pings of various internet servers, it tells its neighbors that internet is available and the surrounding nodes will use this node as its default gateway. This is how every node gains internet access even if only one of them is connected to the internet. It still works if multiple nodes have direct internet access, but its behavior in this mode is not well tested. Sporadic internet access such as web browsing should handle this well. However, connections intended to be continuous, like VoIP, will definitely come to a halt if internet access switches from one node to another. This is because the IP address that you are accessing the internet from just changed and the far end will close the connection, as it should.

The current state of the firmware requires that the WAN port be plugged in to an ethernet network running a DHCP server, such as the LAN port of a typical wireless router or the back of a cable modem. Connections that require more “twiddling” before they will work, like usernames and passwords, are not yet supported.

The Mesh

The mesh is the network formed by the WiFi interfaces of all participating nodes. The IP address of each WiFi interface is automatically generated from the last three bytes of the MAC address of that interface. There is a small chance that these automatically generated addresses may be duplicates. If that happens it is a simple matter to manually assign a different address to one of the nodes from the Basic Setup page. All packets leaving the WiFi interface also go through the NAT process.

The software that makes the mesh work is called OLSR. It does the job of keeping track of what other nodes it can see directly, and what nodes and networks the other nodes can see. The end result is that as long as a path exists from one node to another, OLSR allows them to communicate.

Welcome, Congratulations, and Condolences

NARS Resource List

General Help:

Bill Stietenroth K5ZTY
281-893-3901, k5zty@juno.com
Allen Majeski WA5REJ
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Deral Kent K5WNO
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VHF/UHF:

Brian Derx N5BA
281-894-5942

PC Programming and Operations:

Keith Dutson NM5G 281-351-7683,
keith@dutson.net

Building Electronics & Kits:

Mark Tyler K5GQ
281-587-0256, k5gq@juno.com

Interference (Basic Advice):

Terry Myers KQ5U
281-443-6042,
tmyers1031@sbcglobal.net

Card Checking for Awards:

Bob Walworth N5ET - DXCC
281-292-2221, rwalworth@charter.net

Brian Derx N5BA - WAS, VUCC
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Bob Walworth N5ET - WAZ
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NETS

10-Meter Ragchew: Mon 8:00 PM,
28.444 MHz

2-Mtr Wed. Night: 8:00 PM, 146.06/66
Coordinator; Jerry Whiting KB5VGD
g_whiting@sbcglobal.net

WEB SITE

URL: <http://www.w5nc.net>
Web master: Bill Buoy N5BIA
281-370-3510, n5bia@arrl.net

NARS REFLECTOR

NARS@mailman.qth.net
Coordinator: Keith Dutson NM5G
281-351-7683, keith@dutson.net

TEXAS QSO PARTY

Coordinator: Chuck Sanders NO5W
936-273-6930, no5w@consolidated.net

VE SESSION (ARRL) Manager:

Keith Dutson NM5G
keith@dutson.net

REPEATERS (KA5AKG)

2-m: 146.06/146.66 MHz Tone: 141.3
70 cm: 444.375/449.375 MHz Tone: 103.5

MEETINGS

Monthly General Membership
Third Friday each month at 7:30 PM
Cypress Creek Christian Community
Center, 6823 Cypresswood Drive

Saturday Breakfast

Denny's, 7720 Louetta, 7:30 AM

Wednesday Lunch 11:30 AM

Various locations (Info on 146.660 and
listed on front page in *Important Dates*
section)

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