

# All About AllStarLink

## A Digital Voice Mode for HAM Radio

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# Topics

- ▶ What is AllStarLink
- ▶ Digital Audio for HAM Radio
- ▶ How To Get Started with AllStarLink
- ▶ Hardware and Software
- ▶ Connecting with your Radio
- ▶ Connecting and Managing Node with Supermon
- ▶ AllStarLink Connected Systems / Repeaters
- ▶ Questions

# What is AllStarLink?

- ▶ **AllStarLink** is a network of Amateur Radio repeaters, remote base stations and hot spots accessible to each other via Voice over Internet Protocol. AllStarLink runs on a dedicated computer (including the Raspberry Pi) that you host at your home, radio site or computer center.
- ▶ **ASL** is the software used to create an AllStar node. It consists of Linux, Asterisk and app\_rpt. ASL uses the Debian version of Linux. Asterisk is the OpenSource PBX. App\_rpt is an Asterisk application giving it the radio node functions. ASL runs on x86 or on the Raspberry Pi (ARM version).

# Digital Audio / Modes

- ▶ *“Keeping the Radio in Amateur Radio”*
  - ▶ IRLP
  - ▶ AllStarLink
  - ▶ D-STAR
  - ▶ YSF
  - ▶ DMR

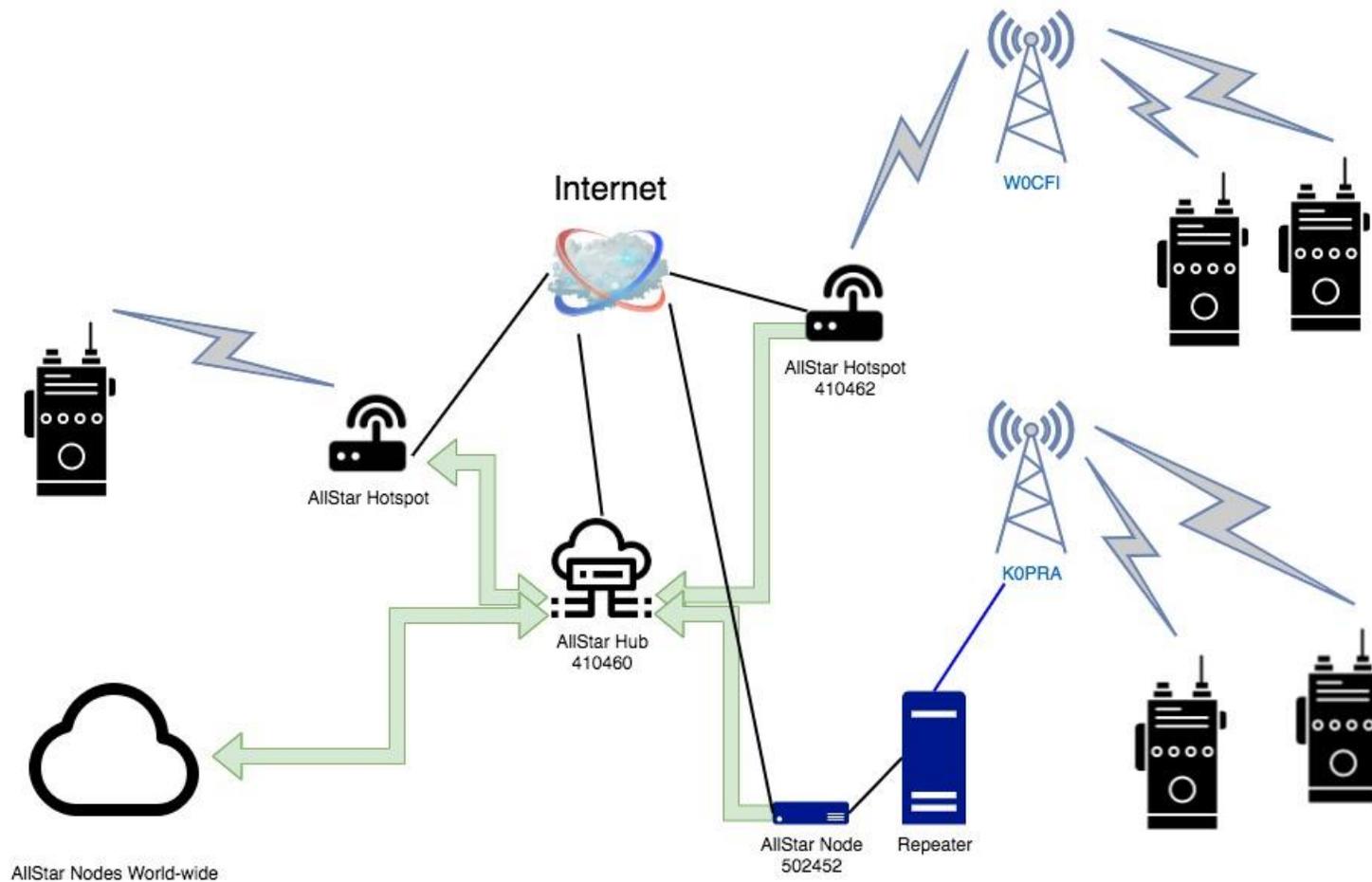
# Advantages of AllStarLink <sup>1</sup>

- ▶ Any node can connect to any other node
- ▶ Port addressing allows multiple nodes per IP
- ▶ Private nodes / networks
- ▶ Open Source
- ▶ CD quality audio
- ▶ Control and monitor with Supermon from a web browser

<sup>1</sup> <https://www.rmham.org/wp-content/uploads/2020/04/RepeaterLinking.pdf>

# System Diagram

## AllStarLink Network



# Getting Started with AllStarLink

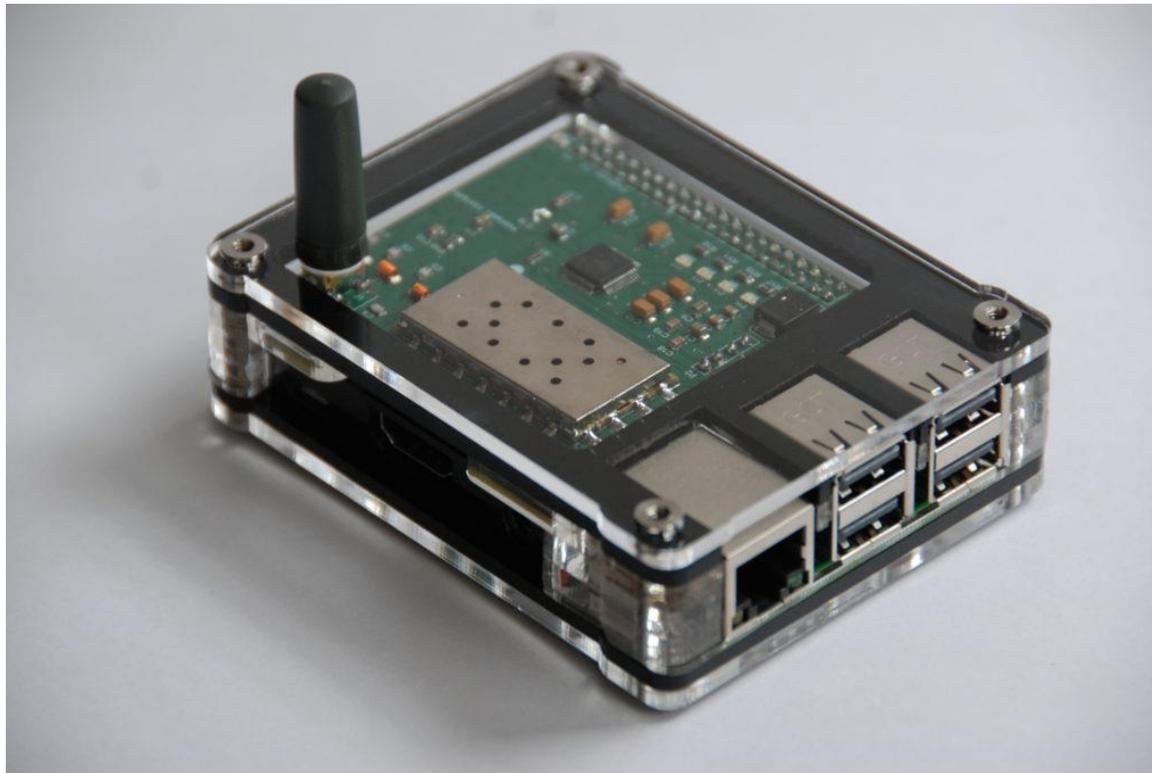
<https://www.allstarlink.org/>

- ▶ Open an account
- ▶ Create a Server
- ▶ Request a node number
- ▶ Configure your node settings
- ▶ Setup your server

# Commercial Plug-n-Play Nodes

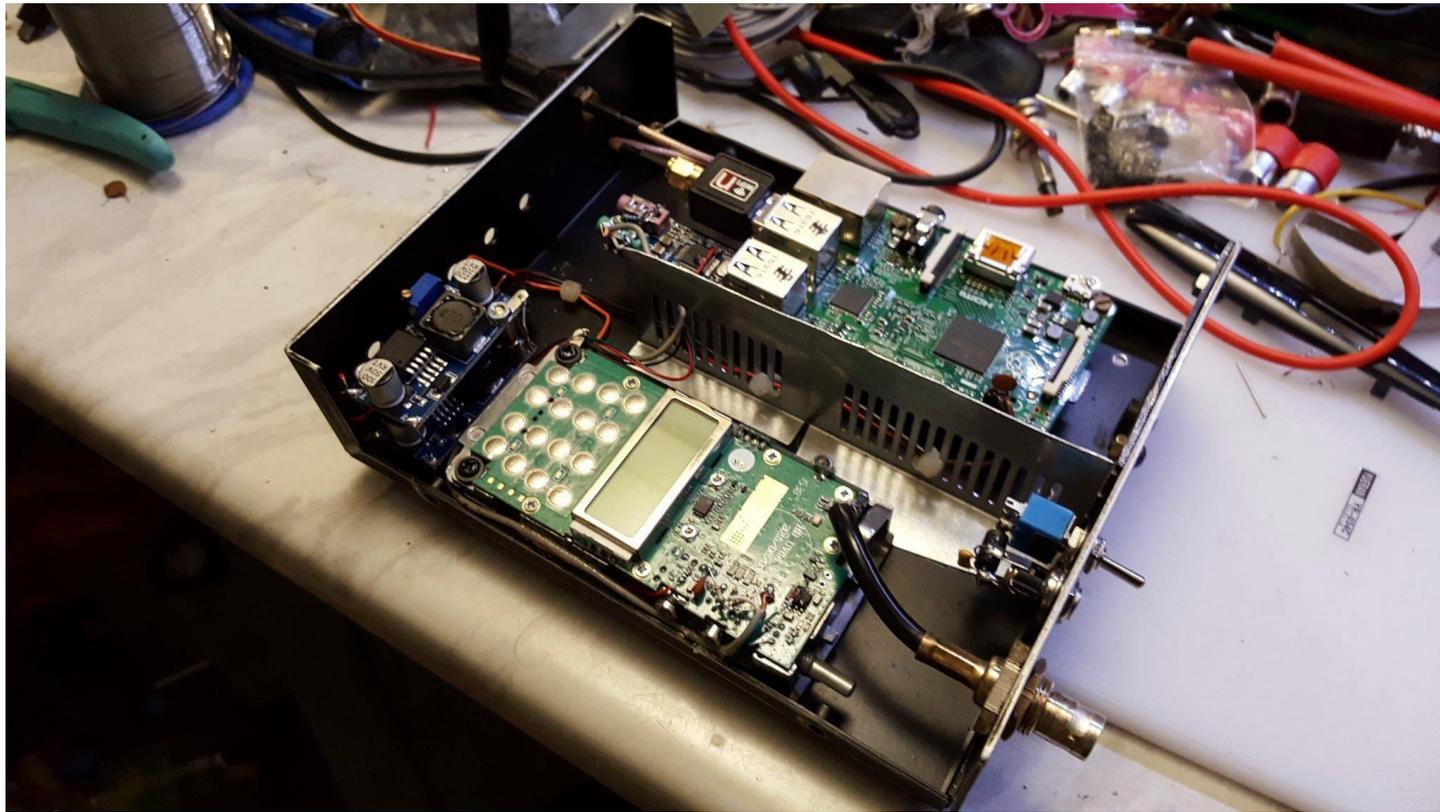
Turn Key / Pre-packaged and configured Rpi + Node Radio

- ▶ W6WMG / Node-ventures.com offers the ClearNode
  - ▶ \$280



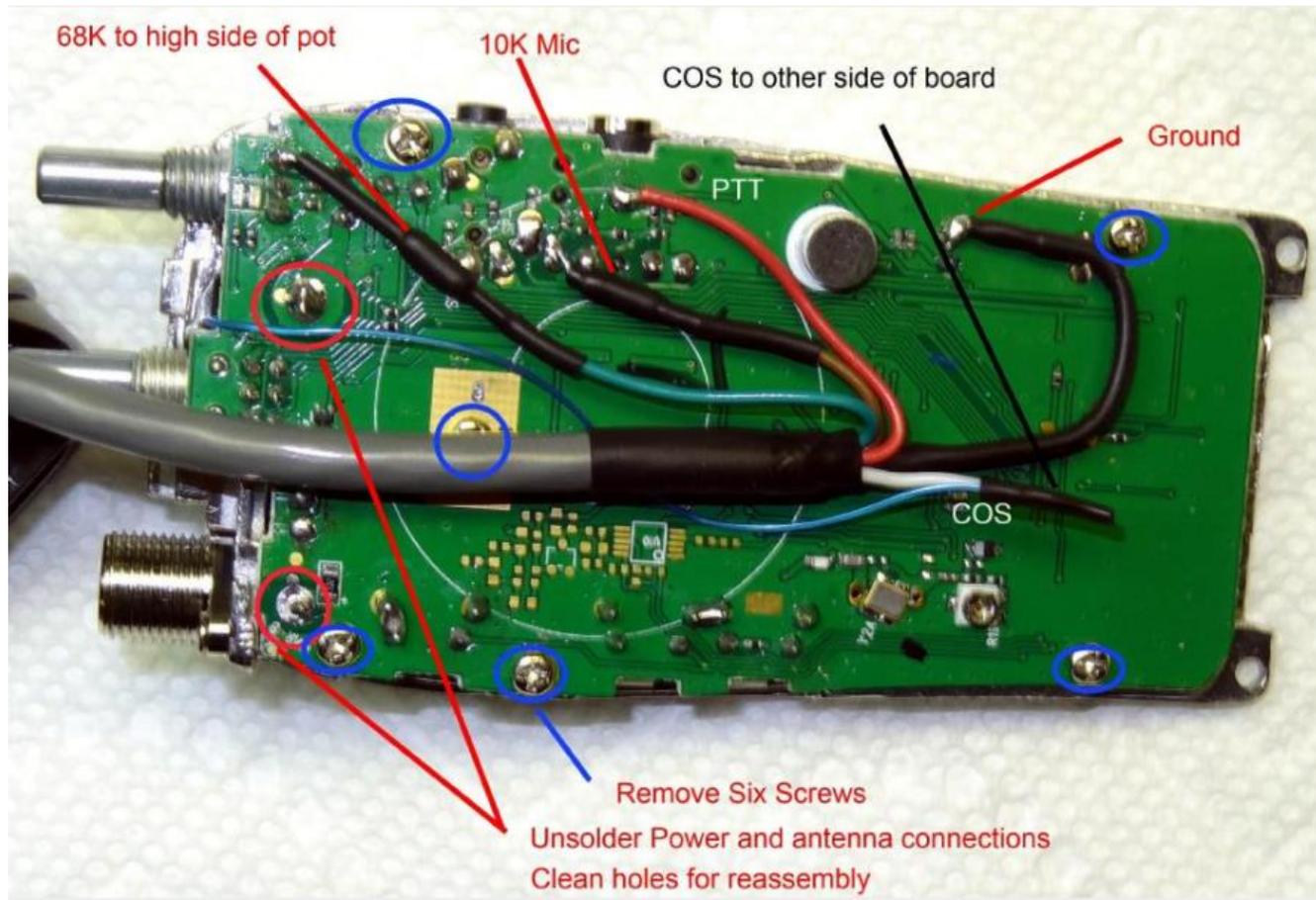
# Hardware

For the Adventurous..



# Hardware

For the Adventurous..



# Hardware

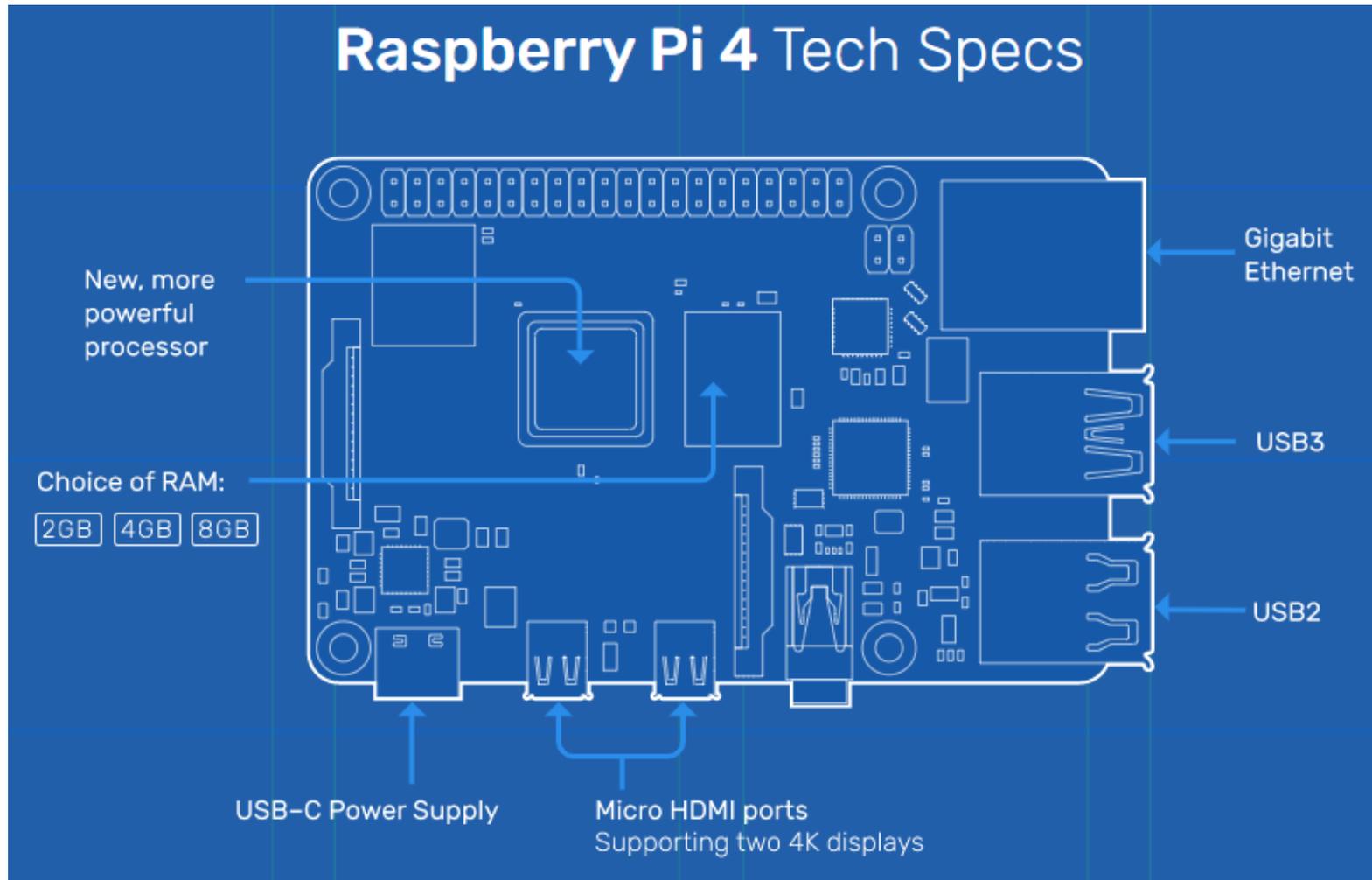
## Raspberry Pi

- ▶ Version 4B / 4GB RAM  
Around \$55 from [adafruit.com](http://adafruit.com)



# Hardware

## Raspberry Pi



# Hardware

## Node Radio

- ▶ SA818 Ham AllStar Radio Interface (SHARI)  
<https://hamprojects.info/shari/>
  - ▶ Designed by Steve Smith N8AR from hamprojects.info
  - ▶ Fully assembled for \$85
  - ▶ Uses NiceRF SA818 embedded UHF module (420-450 MHz)
    - ▶ [https://www.nicerf.com/product\\_151\\_104.html](https://www.nicerf.com/product_151_104.html)

# Hardware

## Node Radio



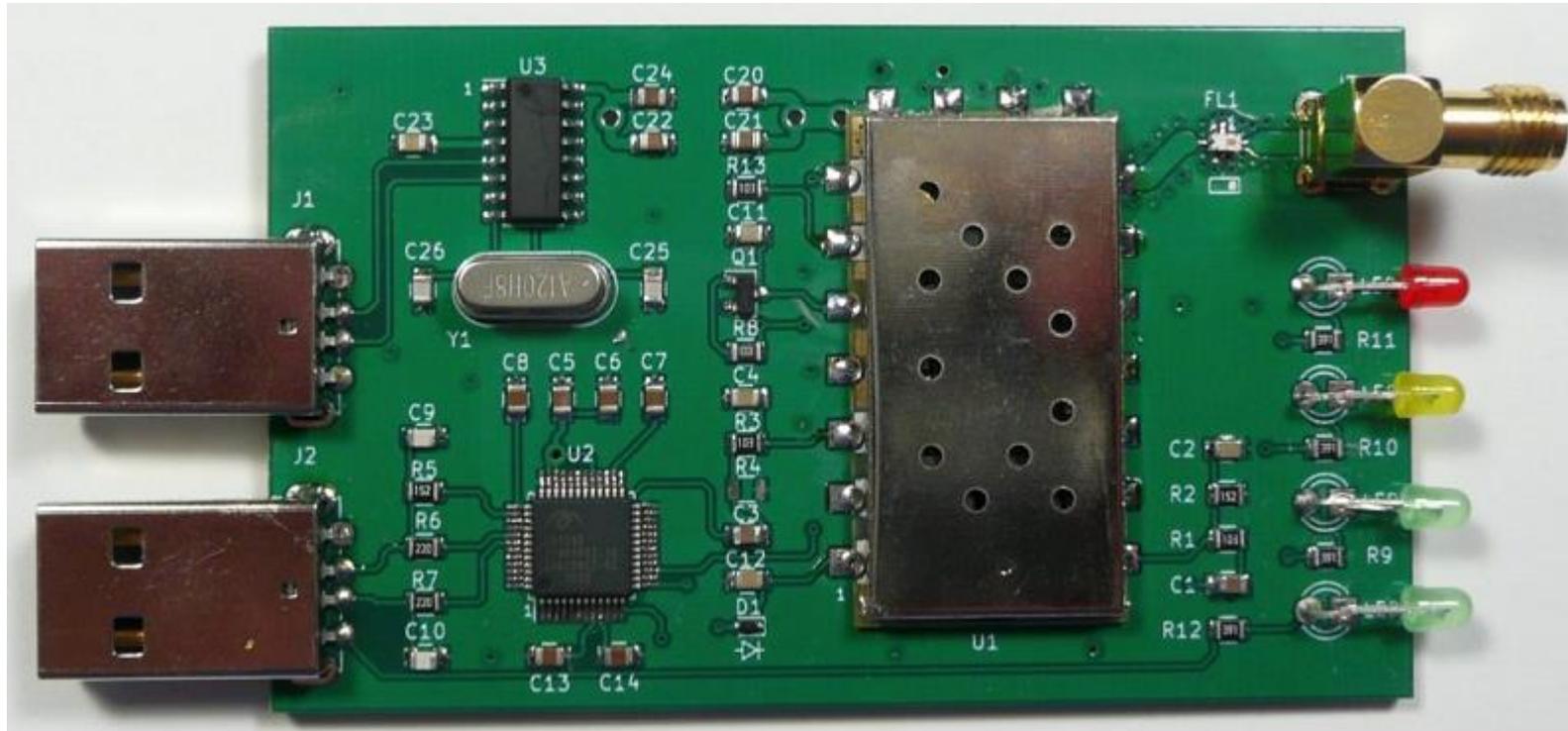
# Hardware

## Node Radio

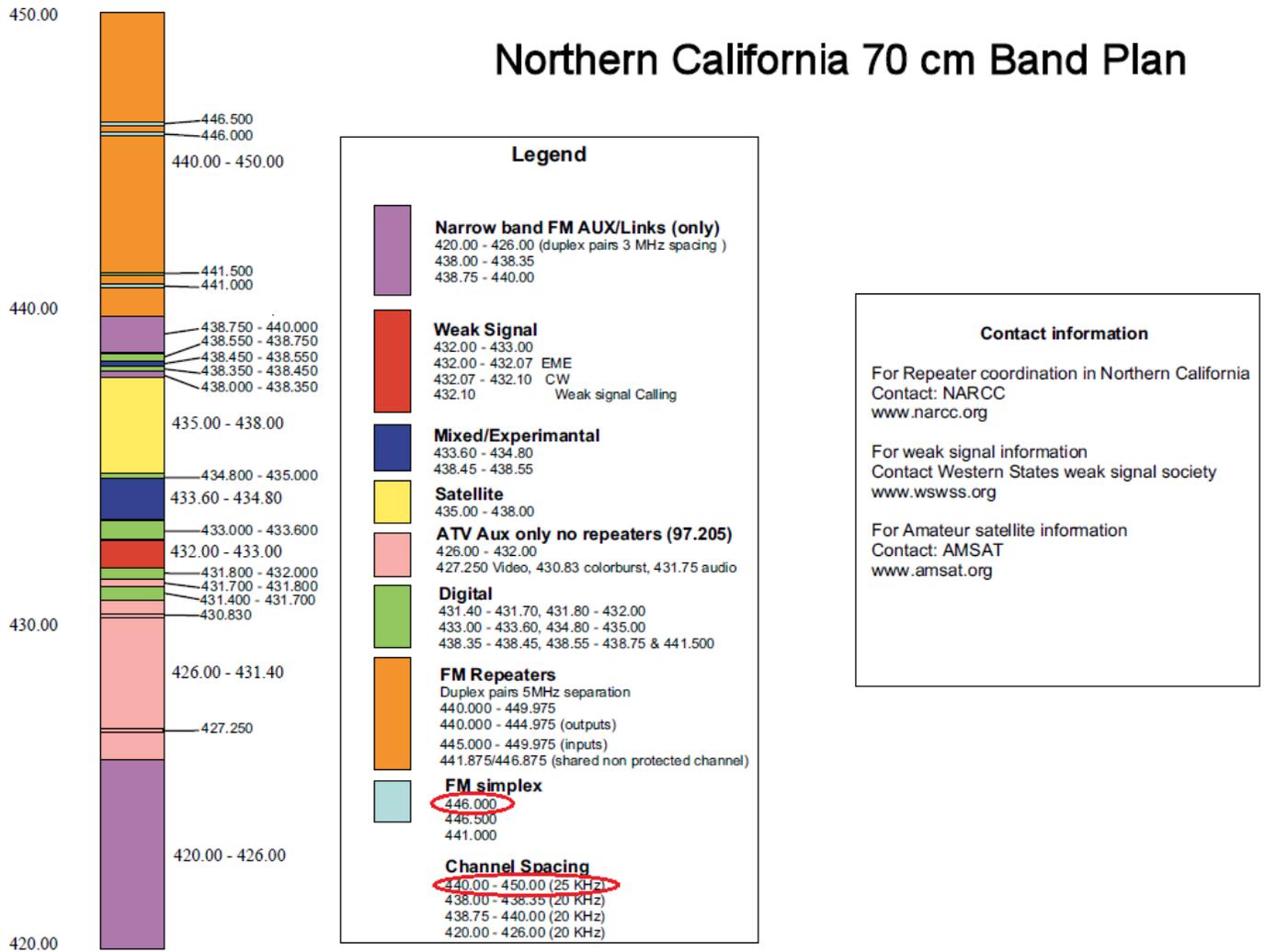


# Hardware

## Node Radio



# What Frequency Should I Choose?



# Software

## Tools you will need

- ▶ Win32 Disk Imager <https://sourceforge.net/projects/win32diskimager/>
  - ▶ Used to write your raw Linux/Asterisk image to an SD card for the Rpi
  - ▶ Also used to make a backup (copy) image
- ▶ MobaXterm <https://mobaxterm.mobatek.net/>
  - ▶ X server and SSH client
  - ▶ Used to connect to the Rpi for login, setup and configuration
  - ▶ Sessions (with auto login) can be saved for ease of use
- ▶ WinSCP <https://winscp.net/eng/index.php>
  - ▶ SFTP / FTP client for Windows
  - ▶ Drag&Drop GUI file manager between Windows and Rpi

# Software

## Rpi Image

- ▶ HamVoIP or Allstar image?
- ▶ AllStar
  - ▶ Jim Dixon / WB6NIL 'Father of Allstar'
  - ▶ The 'Official' AllStar SW
- ▶ HamVoIP
  - ▶ Developed by David McGough / KB4FXC
  - ▶ Archlinux based
  - ▶ Specified for SHARI setup

# Software

## Booting from the image, network setup, and AllStar configuration

### ▶ AllStar Node Setup and Configuration Guide

- ▶ This includes information on all that is needed to set up your node and install Asterisk, including how to request a node number and where to get the download for Allstar, which includes supporting applications (Raspberry Pi image, Windows Disk Manager, PuTTY, and WinSCP).
- ▶ To get the ip address of the node once it is connected to your network: `ping alarmpi`
- ▶ When you connect to your node via PuTTY or MobaXterm, use port 222
- ▶ The configuration files for asterisk are in: `/etc/asterisk`
- ▶ The asterisk scripts are in: `/usr/local/sbin`
- ▶ You can add users on your Raspberry PI using: `sudo useradd new-username`
- ▶ NOTE: You can use WinSCP to copy files to your computer to edit, instead of using the editor on the terminal. Use the IP address of your node, either your root id or another userid you set up on the node server and use port 222.

# Software

## Supermon Enable and Setup

### ▶ Supermon How To

- ▶ To update the files per the **Installation Notes**, connect to the node through a terminal session (i.e. using MobaXterm or PuTTY), which will launch the **Admin Menu List**, and select **9. Start Bash Shell Interface** and go to the supermon directory to start configurations with Step 1:

```
cd /srv/http/supermon
```

You can either edit the files on your terminal or copy them to your computer via WinSCP.

To restart asterisk when instructed: `sh /usr/local/sbin/astres.sh`

- ▶ For **Step 2**, updating `allmon.ini`:

- ▶ Make sure no spaces after `userid/password` entries on lines.
- ▶ The `userid/password` is the one set up in the `/etc/asterisk/manager.conf` file
- ▶ The host entry for your node configuration (under `[your node number]`) should be as follows:

```
host=127.0.0.1:5038
```

- ▶ **Step 3**, creates the Supermon `userid`, which will be stored in the `/srv/http/supermon/.htpasswd` file. This is the `userid` you will use to log into the Supermon web page.
- ▶ You can add Favorites that are shown in the Favorites button on the webpage in the `favorites.ini` file. The PDF explains how to set up additional options/features as well.

# When All Else Fails..

Problems getting Supermon to control the node?



[https://www.youtube.com/watch?v=\\_c3GNXstuhA&t=635s](https://www.youtube.com/watch?v=_c3GNXstuhA&t=635s)

# Software

## SHARI Node Radio connect and setup

<https://hamprojects.info/wp-content/uploads/SHARI-Allstar-Node-Setup-Procedure-Version-1.0.pdf>

- ▶ Plug SHARI Node Radio into Rpi and startup the Rpi.
- ▶ Run '818-prog' program:
  - ▶ Set CTCSS Code "0015" (110.9 Hz)
  - ▶ Set the Tx Radio Frequency 446.025
  - ▶ Set the Rx Radio Frequency 446.025
  - ▶ Set Squelch Value 1\*
  - ▶ Set Volume 8\*
  - ▶ Set Pre/De-Emphasis (y/n) No\*
  - ▶ Set High Pass Filter (y/n) No\*
  - ▶ Set Low Pass Filter (y/n) No\*

\* These settings were the default values

# Connecting from your Base or HT

- ▶ Set HT or base station to the simplex node frequency.
  - ▶ We are operating simplex. There is no offset.
- ▶ Set HT or base station Tx PL to the same AllStar simplex node Rx PL.
  - ▶ Typical for AllStarLink connected systems to require a PL tone on the node Rx.
  - ▶ Do NOT set your HT or base station for PL on the Rx .
- ▶ Set your HT or base station to the lowest power.
  - ▶ We want to limit our Tx footprint.
  - ▶ Good practice to keep the power as low as possible.
  - ▶ Other HAMS within signal range can hear you and the node traffic. They can communicate with you but not through the node.
- ▶ Use your PTT and DTMF tones to instruct the node where to connect.

# Connecting from your Base or HT

## DTMF Codes for Node control from your transceiver

Command	DTMF Example	Function
*1<node>	*129789	Disconnect an Allstar node
*10	*10	Disconnect the last node connected
*2<node>	*229789	Connect an Allstar node – monitor only
*3<node>	*329789	Connect an Allstar node (note 1)
*51	*51	Macro to announce time and ID repeater
*70	*70	Announce the system status
*71<node>	*7129789	Disconnect a permanently connected node
*72<node>	*7229789	Permanently connect specified node - monitor only
*73<node>	*7329789	Permanently connect specified node - transceive
*75	*75	Announce complete system status
*76	*76	Disconnect all nodes
*77	*77	Reconnect nodes disconnected with "disconnect nodes"
*78<node>	*7829789	Permanently connect specified node - local monitor only
*79	*79	Last node to key up
*80	*80	Play N8SL repeater ID
*81	*81	Announce time of day
*82	*82	Say 24 hour time
*A1	*A1	Announce IP address assigned to your node
*A5	*A5	Say registration status of your node
*B6	*B6	Restart Asterisk

**Note1** – Node 29789 is the N8SL Repeater in South Lyon, Michigan.

# Connecting from your Base or HT

Yaesu VX-6 / 300mW



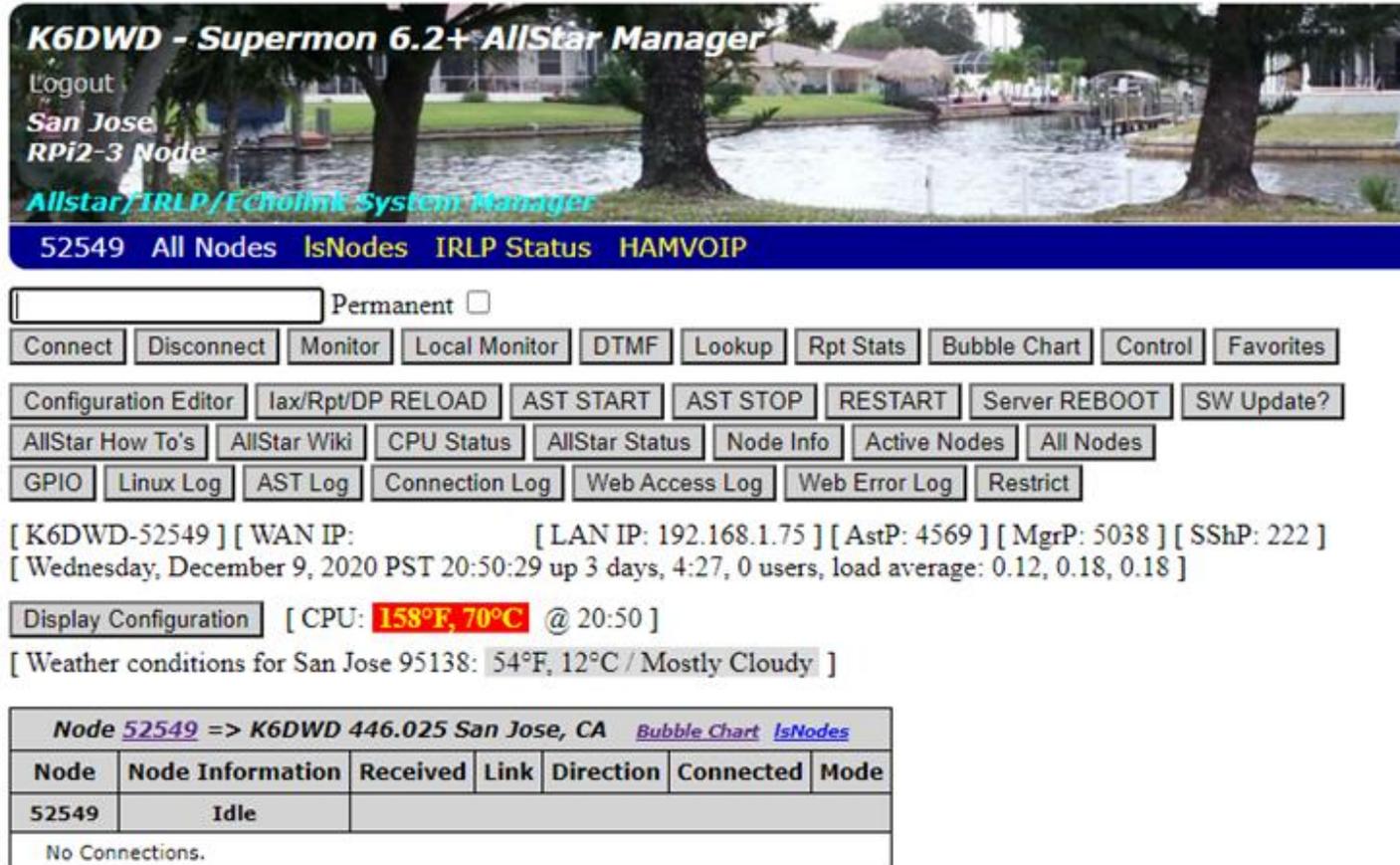
Baofeng BF-F8P / 1W



iCOM ID-5100 / 5W



# Connecting from Supermon



**K6DWD - Supermon 6.2+ AllStar Manager**  
Logout  
San Jose  
RPi2-3 Node  
*Allstar/IRLP/Echolink System Manager*

52549 All Nodes IsNodes IRLP Status HAMVOIP

Permanent

Connect Disconnect Monitor Local Monitor DTMF Lookup Rpt Stats Bubble Chart Control Favorites

Configuration Editor Iax/Rpt/DP RELOAD AST START AST STOP RESTART Server REBOOT SW Update?

AllStar How To's AllStar Wiki CPU Status AllStar Status Node Info Active Nodes All Nodes

GPIO Linux Log AST Log Connection Log Web Access Log Web Error Log Restrict

[ K6DWD-52549 ] [ WAN IP: [ LAN IP: 192.168.1.75 ] [ AstP: 4569 ] [ MgrP: 5038 ] [ SShP: 222 ]  
[ Wednesday, December 9, 2020 PST 20:50:29 up 3 days, 4:27, 0 users, load average: 0.12, 0.18, 0.18 ]

Display Configuration [ CPU: **158°F, 70°C** @ 20:50 ]

[ Weather conditions for San Jose 95138: 54°F, 12°C / Mostly Cloudy ]

Node <a href="#">52549</a> => K6DWD 446.025 San Jose, CA <a href="#">Bubble Chart</a> <a href="#">IsNodes</a>						
Node	Node Information	Received	Link	Direction	Connected	Mode
52549	Idle					
No Connections.						

# Some Popular AllStarLink Connections

- ▶ WIN System / node #2560 <http://www.winsystem.org/>
  - ▶ Insomnia Net / every night
  - ▶ Tech Net / every Friday night
- ▶ Alaska Morning Net / node #29332 <http://wl7lp.com/amnsite/>
  - ▶ Every day (10am PST)
- ▶ Puget Sound Repeater Group / node #2462 <https://web.psrg.org/>
  - ▶ Nightly check-in Net at 9PM PST
  - ▶ Various other nets

Questions..?



# Other Resources

- ▶ C4Labs <https://www.c4labs.com/product-category/cases/raspberry-pi/>
  - ▶ They make some really nice inexpensive Raspberry Pi cases
- ▶ Adafruit <https://www.adafruit.com/category/105>
  - ▶ Good selection and product descriptions for Raspberry Pi and related hardware
- ▶ Audio Playback of your Transmitted Voice over AllStarLink
  - ▶ Node #40894 (Audio Test Server) part of HubNet based in the UK  
<https://hubnetwork.uk/>
- ▶ Some Rules Applicable to VoIP
  - ▶ <http://www.arrl.org/voip-faq>

# Acknowledgements

- ▶ AllStar Repeater Linking
  - ▶ <https://www.rmham.org/wp-content/uploads/2020/04/RepeaterLinking.pdf>
- ▶ AllStar Linked Nets
  - ▶ <https://kc3cduonline.wordpress.com/are-there-any-good-allstar-nets/>
- ▶ D-STAR, DMR, YSF Comparison / Mike Myers (K3DO)
  - ▶ <http://www.mikemyers.me/blog/2016/2/19/d-star-dmr-fusion-which-is-right-for-you-7nhdl>