Yellow Box Node Information and Setup

If this is your first experience with Allstar welcome to a great way to connect on amateur radio.

Please read the following instructions over before you begin so you understand how to get your new server setup and on the air.

As of mid 2020 the yellow box is no longer yellow but rather a smaller clear and heavier duty box. The design is the same except a power shutdown board and battery are included. It is a very nicely packaged node and a significant upgrade from the original "yellow box" that I am sure you will like.

Why a radio rather than a radioless node?

We had been offering both a "radioless" and "yellow box" radio nodes but we plan to stop production of the "radioless" node in early 2021. The reason is it is a hard node to build and although somewhat popular a radio node serves the same purpose and allows you the ability to move around an area rather than be tied to a wired microphone. Every ham today probably has at least one handheld device that could be used on 2 meters or 440 MHz. The yellow box node with a UV82 allows use on either band and gives a range from the device of at least several thousand feet or even more if you use an external antenna. The yellow box also works well in a vehicle. You can stash it under a seat or somewhere out of the way, connect it to 12V and it will boot up every time you start the car. You phone or hotspot device could also be in the car and would connect to it. You would then use a handheld or any radio to talk to it.

Things you will need to get started

Amateur Radio License
Access to Internet via Ethernet connection (not wireless to start)
Registered Node Number from allstarlink.org
Node Number and Password from node information at allstarlink.org

First steps

You probably have already registered at allstarlink.org and received a node number before getting your Yellow Box Node but if not you must do this BEFORE continuing the setup process. If you already have setup a server "on paper" and have a node number assignment and password then you can skip down to setup.

Before you can use an Allstar server it must be registered at allstarlink.org. Bring allstarlink.org up on a browser and register with your call and a password of your choice. Please use a secure password and **WRITE IT DOWN**. You will need it in the future. The registration process ensures you are a ham and usually happens fairly quickly. This process is accelerated if you have an email listed on qrz.com.

Once you can log into the allstarlink.org web site using your call and password you go to your profile and check the item that you want to be a sysop and submit it. At this point the banner will change and you will see an option to create a server. Go through the setup for the server which asks for a name and location. Use the google map to pinpoint your location. It is a very simple setup and you can change things at a later time if you desire. Once you have established a server you select the drop-down to request a node number. There is no need to make any comments, just submit it. You should receive an email in 24 hours or so with your new node number. You can also check at allstarlink.org to see if the number has been assigned. Before it is assigned it says pending. Once assigned you can find the node password under the server and node number with the mouse. The password is a 12 character mixture of numbers and letters. This and the node number are required for your local setup.

Setup

Your node is shipped with an SD card programmed with the hamvoip.org Allstar code and installed in the Pi. Unless you specifically requested to have it setup it is your responsibility to do that. Setup is very easy and takes no more than 10 minutes to do.

How do I initially connect to my Pi Allstar server?

Your Yellow Box Node has an Ethernet connection that **must be connected** to your router or local LAN to setup. Once the Yellow Box is powered up it will receive an IP address from the DHCP server in your router. In order to connect to your Yellow Box you will need to know its IP address. The IP address can be found in a number of ways.

The IP address will be displayed on your routers connected map. Log into your router and look for a hostname of “alarmpi” The IP address associated with it will be the IP address assigned to the Pi. It will probably be in the 192.168.x.x or 10.0.x.x range.

The IP address is also transmitted at boot from the node radio. If you are listening on a radio tuned to the node radios frequency and PL you could hear the IP address announced. This is dependent on the type of node radio and does not always work until the setup process is complete.

The IP address is also shown on the green LED on the Pi. It sends HI three times then the IP address. It repeats this three times.

Once you know the IP address you can log into the Pi from another computer on your LAN. If you are using Windows you will need to download a program called “putty” this can be downloaded and installed for either 32 or 64 bit Windows. The site to download is -

https://www.chiark.greenend.org.uk/~sgtatham/putty/latest.html

You can also Google “putty download” but make sure you get it from the official site as as shown in this link.

Putty is a simple program that allows you to connect to your Pi via your LAN. Remember you must hardwire connect to Ethernet for the initial setup of your node. Use a cable with RJ45 connectors to connect the Ethernet port on the Yellow Box Node to your router or a connection on your LAN. Enter the IP address you determined above and port 222 and select connect. Say “yes” to any confirmation message. The initial login for the Pi before setup is user – root and password - root

Once logged in

After logging in the system will ask a number of questions. For many you can select defaults but for others you will need to enter specific information. All of the setting have explanations. Go through the entire setup. If you make a mistake and want to run the setup again you can cancel (control C) and at the Linux prompt type firsttime.sh to restart the setup program. If you find yourself in the menu you can select item 9 – “start bash shell interface” to get to the Linux prompt.

The setup script will guide you through the entire setup process. The first thing it does is update your software to the latest version. This is an important step and you should say yes and update before continuing the setup process.

Then it will ask a series of questions to complete the setup process. Before you proceed with the setup have the following things ready -

- Your assigned node number
- Your node password (6 digit for older node assignments and 12 character for new)
- Your new login password for your Pi which you select.

Safe passwords

A note about login passwords. It is important to use a strong password. We suggest 8-10 characters of mixed upper/lower, numbers and special characters. Don't use your call. **Write down your login password somewhere. If you forget it you will not be able to login to your Pi and you will have to re-image and re-setup your node!**

Hostname

For your convenience we recommend using a hostname that makes sense. The default is alarmpi - when asked erase that and use your call-node_number - ex. W3XYZ-40000. Using a distinctive hostname allows you to identify your node when logging in especially if you have multiple servers.

Simpleusb Setup

The Allstar image supplied with your Yellow Box Node has been pre-configured with the proper settings for the node radio that is installed. All you should need to do is check the receive and transmit audio levels as described below.

If you are loading a new image you will need to setup simpleusb to match your radio. The stock hamvoip image is defaulted to use the Alinco DR series or equivalent radios which use "usbinvert" for the receive COS signaling. If you are using a Baofeng 888 you must change the COS (carrierfrom) simpleusb setting to "usb". The Baofeng UV82 uses "usbinvert". Other radios might have different settings.

These settings can be made from the ADMIN menu item 12 "Run simpleusb-tune-menu application." The 'V' view setting shows the COS and PTT signals. When you key a radio talking TO your node the COS input and composite indicator should show "keyed" and when your node talks back to you the PTT should show "keyed". There are settings to change either of these should it be necessary. The PTT rarely needs to be changed.

Setting Audio Levels

Make sure you check your audio levels. Item 2 for your transmit audio TO your node . This is labeled RX audio as it is referenced to the node radio which is receiving your transmissions from the radio you are talking to it on. There is a bar graph showing the level and when you speak in a normal tone and distance it should peak to about 5khz but no above.

Item number 3 is audio you hear FROM your node. It is less critical but should be set so audio leveles are equal to other repeaters you might hear on your radio at the same volume level. In no case should it distort. If it does lower the level.

Audio settings are important. If you use multiple radios with your node you should check them all and reach a happy medium between them. It is better to have the levels lower setting it so the radio with the most deviation is not going past 5khz. Over driving leads to clipping distortion which would sound very bad at the other end.

The simpleusb-tune-menu also has an option to echo your voice back so you can check your audio. It is item C on the menu. Set it on and key a radio talking to your node and it records your voice and when you unkey it plays back. Tis will give you an idea of how you sound to others. Be sure to turn it off when you are done.

Before leaving the simpleusb-tune-menu be sure to save your settings using item W then 0 (zero) to exit.

Some Additional Notes

While we tested the SD card to make sure it boots and runs should you have any problems you can rewrite the card from the "downloadable" image. Full information is available at the hamvoip.org website. You should also join the arm-allstar email forum for the latest information.

There are several lines in the functions section of the /etc/asterisk/rpt.conf file that are commented out. It is very important to properly shutdown a node. With a portable node you often have no way of doing this unless you use the radio DTMF. These lines if uncommented would allow you to do that very easily using DTMF keys. Here are the lines -

;A1=cmd,/usr/local/sbin/sayip.sh xxxxx ; Say local IP to radio
;A3=cmd,/usr/local/sbin/saypublicip.sh xxxxx ; Say Public IP to radio
;B1=cmd,/usr/local/sbin/halt.sh xxxxx ; Halt the system (Linux total shutdown)
;B3=cmd,/usr/local/sbin/reboot.sh xxxxx ; Reboot the system
;B6=cmd,/usr/local/sbin/astres.sh ; Restart Asterisk

Note - the numbers after the command will be your node number not xxxxx as shown above.

An easy editor to use in Linux is nano. To edit the rpt.conf file at the Linux prompt you would type -

nano //etc/asterisk/rpt.conf

Edit the file and removing the semicolons before these lines. Save the file and reboot. As you can see you can interrogate your IP addresses, restart Asterisk, Reboot the system and shutdown the system using the assigned function codes. You should always use the code to shutdown (*B1) before removing power from your system. A voice will tell you the system is going down for halt in 10 seconds. Wait for the green light on the Pi to stop blinking and go out after executing this command before removing power.

Node Registration

In the initial setup a node registration and node password was added that you received from allstarlink.org. Once your node is setup and running you should additionally add a Hamvoip registration. This dual registration will improve the connection performance of your node. To request a Hamvoip registration send the node number(s) you would like registered to Dave - kb4fxc@inttek.net – requesting a hamvoip registration. This registration will include a password and all you need to do is copy it to your iax.conf file as per the directions. To check your registrations go to the bash (Linux) prompt and type **check_reg.sh.** You should see "registered" indications from both sites. If your node fails to register it will not be able to connect anywhere. If that is the case and you can't resolve the issue get back to us and we will help you fix the problem.

Commanding your Node

To use your node you will need to issue DTMF commands from your handheld or other radio. All Allstar commands begin the the “*” character. Here are a few of the more important commands. The *A and *B commands need to be activated as shown above -

*A1 Say Local IP
*A3 Say Public IP
*B1 Halt The System
*B3 Reboot The System
*B6 Restart Asterisk
*80 Your ID
*81 Time 12 hour
*82 Time 24 hour
*3<node number> Connect to node
*1<node number> Disconnect from node
*73<node number> Connect to node permanent
*71<node number> Disconnect permanent
*76 Disconnect all nodes

A full listing of functions can be found at the hamvoip.org website in the howto section.

Port Forwarding

Your Allstar node will make outbound connections without any special configuration but if you want to allow other nodes to connect TO you and also add the ability for ssh login using putty from outside of your LAN you will need to add port forwarding in your router.

Routers are in essence firewalls as they restrict incoming traffic unless specifically allowed. To allow incoming traffic for your node you need to do several things. First you should make the IP address your router assigns to your Pi server (Yellow Box) permanent. Most all routers allow this. It is sometimes called address reservation or static DHCP. This makes you router assign the same address each time your server comes online.

Once you have a known permanent IP address you can add port forwarding. To allow incoming connections go to your routers port forwarding setup and add this rule -

4569 UDP to the IP address of your Allstar server (Yellow Box Node)

This can be labeled AllstarIAX. The port 4569 shown is the default port. If you changed this in the setup you must change it here also.

To allow ssh from the Internet add this rule -

222 TCP to the IP address of your Allstar server (Yellow Box Node)

This can be labeled AllstarSSH.

The 222 port is the default. If you changed this in the setup then use the same port here.

Port forwarding is optional and you can leave it undefined to restrict incoming connections if desired.

Important Information about your Node Radio

The Yellow Box Nodes are supplied with either a Baofeng 888 or UV82 radio. It is recommended that the radios should always be run on low power as Allstar connections can often be high duty cycle and the radios will overheat in the high power mode. Radios are shipped programmed with common simplex frequencies but can be reprogrammed by the user. They use a standard Baofeng programming cable. A Kenwood programming cable should also work. The free Chirp download will program either radio. When using Allstar you should always use matching PL or DCS on the node and user radios to ensure the channel will not be falsely keyed. The voice prompts should always be turned off on the radio as these are transmitted over the air and would go out over the Allstar network.

The Yellow Box Node should be used with an external antenna **NOT** a rubber duck antenna mounted directly to the yellow box as this can cause RF feedback which could result in the node keying itself repeatedly. Yellow Box nodes are often used as strictly local nodes or portable where the radio talking to them is within several thousand feet. A small antenna is supplied that should be separated from the Yellow Box Node by its length of coax. If you were always going to be fairly close to the node you could also make a dummy load with a couple of 100 ohm 1W carbon resistors in parallel soldered to a BNC connector.

Setting up WIFI

Once you have setup your node using the wired connection you can go wireless if you desire but it is always better to use a wired connection if you have one available. Mobile (hotspot) connections of course would be wireless. To setup wireless login and use the main menu item 7. If you are using a Pi 3B you are limited to the 2.4G band. The Pi 3B+ and Pi4 are both 2.4G and 5G. The Software will scan for access points and you can select one of your choice. It will then ask for the pass phrase (password) for the access point you select. The access point could be your local router or a phone hotspot, or WIFI at another location. Note that hotel or business WIFI will usually not work as it requires a web page login. After selecting the access point follow the directions and remove the Ethernet wired connection and reboot. Your node should come up on the WIFI connection. Never have both WIFI and the wired connection active at the same time. If you want to go back to a wired connection plug in the Ethernet connection and turn off the WIFI using menu item 7 then select 2 and 2 again to disable WIFI.

Thank You

We hope you enjoy your new Allstar node. Allstar is an extremely powerful system which has many configuration possibilities and can also be directly used as a repeater controller. This quick start guide is just to get you started and on the air. See the -

http://hamvoip.org/ or http://www.crompton.com/hamradio/hamvoip-howto/

web pages for many howto's and additional information and be sure to sign up for the email forum. Your node is online updateable and updates are announced on the forum periodically. Login to your server and select item 1 on the menu to update. It is important to keep your server updated.

Important Links

allstarlink.org - Node registration, node information
hamvoip.org - Software download, howto's and general Allstar information
http://www.crompton.com/hamradio/hamvoip-howto/ - Additional howto's
https://www.chiark.greenend.org.uk/~sgtatham/putty/latest.html – Putty downloaded
https://supermon2.groups.io - Supermon2 Allstar management and control software
https://allstar-discussion.groups.io - Allstar discussion group