SHARI PiZero Allstar Node Setup and Configuration Guide

Table of Contents

Introduction

This document describes in detail, the process to setup and configure an Allstar node using a **SHARI PiZero** by N8AR (www.kitsforhams.com) and the Allstar software image you will download from the HamVOIP website (www.hamvoip.com). **Do not use this procedure for the SHARI PiHat or PiXX (Pi3U, Pi3V, Pi4U or Pi4V)**

When you have successfully completed this procedure, you will have a basic operating Allstar node. This document does not include the steps required to add enhancements to your node such as additional DTMF commands to your configuration, Supermon or Echolink. These can be found in the form of "How To" documents on the HamVOIP website.
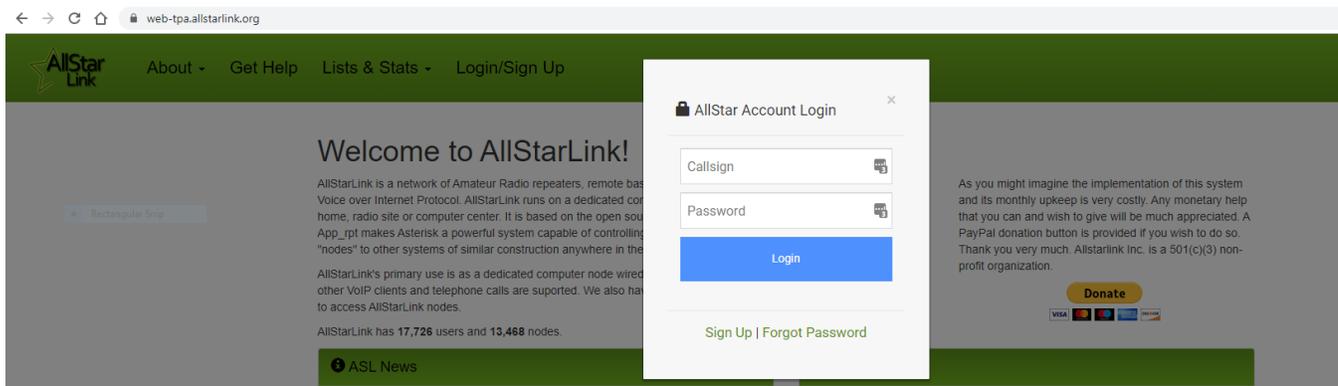
Required Hardware

1. A fully assembled SHARI PiZero Allstar node with a PiZero power supply.

2. A micro SD card – 4 GB minimum, Class 10 or better (16GB recommended).

3. A microUSB to Ethernet dongle using an RTL8251B integrated circuit chip.

Create an Account with Allstar

Normally your first step is to create an account with AllstarLink. It is possible to setup a private Allstar node without an account but that is beyond the scope of this document.

Using your computer and a browser such as Chrome, go to https://web-tpa.allstarlink.org/ and click on the "Logon/Sign up" Tab. A small Allstar Account Logon screen will appear. Click on the "Sign Up" link at the bottom of this smaller screen.

Read the information on the screen that appears and click on "Begin Registration."

Fill in the form with your information and click "Submit.". It will take 1 to 24 hours to receive confirmation email.

Create a Server and Request a Node number

This procedure assumes you are new to Allstar and have never created a server.

Go to https://web-tpa.allstarlink.org/ and logon using the information you received in your confirmation email from AllstarLink.

First you need to create a server. The server is your Raspberry PiZero in your SHARI PiZero node..

Click on the *Portal* tab. In the pull-down menu, click on *Server Settings*. Click on *Proceed with Server Setup*

New Server Settings

Server Name

`Server name`

25 characters max

Server Location

`location`

City/State/Providence of server location. 30 characters max.

Site

`Name of site, if any.`

Site Name, Bldg Number, etc. 30 characters max. Optional.

Affiliation

`Affiliation, if any.`

Affiliated with a club, etc. 30 characters max. Optional.

Hostname

`hostname`

Unix Hostname. 25 characters max. Optional.

IAX Port

`4569`

Normally 4569 when only one server behind a NAT router.

Proxy IP

`IP address`

Normally blank. Only needed in rare cases. Optional.

Click the map to select server latitude & longitude or type them in.

Latitude

`42.464683`

Server Logitude

`-83.646056`
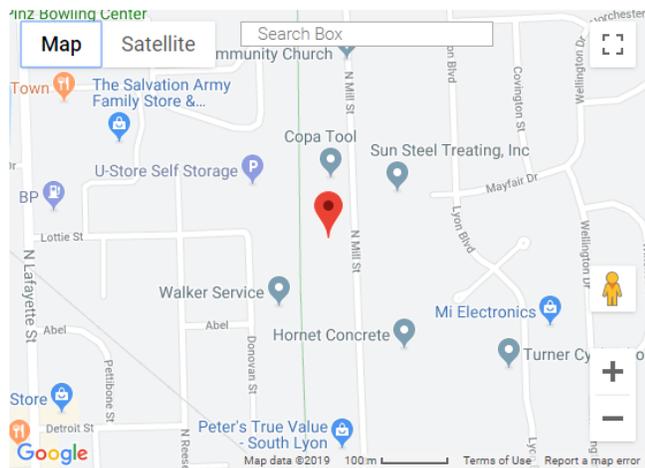
Submit

Fill in all the information:
1. Server name - The server name is arbitrary and will be adjusted later. Suggest [*your call-1*] (eg: "W8XYZ-1") for now.
2. Server location – City, State is customary.
3. Site – Suggest "Home," "Shack," Doghouse," etc
4. Affiliation – optional.
5. IAX Port – leave this unchanged (4569). (Note: If this is not your first node use declining numbers from 4569)
6. Latitude and Longitude – Use the map to locate your server site. This will enter the Lat./Long. data automatically.

Click on *Submit*

Next you need to request a node number. The node number is used by Allstar running on your Server (Raspberry Pi).

Click on the *Portal* tab. In the pull-down menu, click on *Node Settings*. Click on the *Request a new node number* link

The next screen that appears will prompt you to select the server to which the node is assigned. If you have only one server, the server you just created, it will appear in the selection box. If

you have more than one server, the selection box is a drop-down selector. Select the appropriate server and click on the **Submit** button. A message is optional.

You can Logout of AllstarLink.org.

It will take 1 to 24 hours to receive confirmation email.

Software

In this section you will obtain the Allstar software, other apps required to install it and prepare a microSD card which you will plug into your Raspberry Pi. These instructions assume you will be using a Windows PC. The process can be completed using an Mac PC or Linux PC but is beyond the scope of this procedure. This procedure is also specific to the HamVOIP Allstar image.

1. Select a Windows computer to be used as the setup and control computer for the Raspberry Pi node and do the following steps. The computer you choose needs to be capable of reading and writing microSD memory cards (normally a microSD to SD card adapter is used with a card reader in the PC or a microSD card USB adapter is used).

2. Click on the following link (or type it into your browser)

    https://hamvoip.org/RPi2/RPi2-3-4_V1.6-14_Allstar.exe

3. This will start a download process by opening File Manager on your PC. Save the file in a well know directory – suggest - /My Documents/Allstar.

4. Open the directory where the downloaded file was saved. Double click on the file. Depending on your virus protection, you may be presented with a warning notice about an unrecognized app. It is OK to continue the installation. (For Windows Defender, click on *more info* and select *Run Anyway*. The file is a self-extracting executable that will yield the following files:
    PuTTY.exe - SSH terminal software.
    RPi2-3_V1.6-01_Allstar.img - Rasp Pi image for micro SD card
    Win32diskimager-1.0.0-install.exe - Software to write the SD card
    WinSCP-5.13.7-Setup.exe – SFTP/FTP Client

5. Run (double-click) the win32diskimager installer. Place an icon on the desktop for convenience.

6. We are not going to use PuTTY or WinSCP. You can delete them from your computer if desired. We are going to use MobaXterm instead. Click on the following link (https://mobaxterm.mobatek.net/) On the MobaXterm website, click on **GET MOBAXTERM NOW!** Then click on *Download Now* for the free edition and then click on the *Installer Edition.* Unzip and install the downloaded MobaXterm Zip file.

7. Insert a micro SD card (using SD card adapter or USB adapter) in the computer. If you have any security software running that prevents "MBR" (master boot record" access, **TURN IT OFF** before you begin the transfer process. (Turn it back on afterward.)

8. Start win32diskimager (double-click on the desktop icon). It should point to the SD card as the destination. Browse to the directory containing the Allstar.img file and select it as the source to be transferred. Click **Write**. The process should take 5 to 20 minutes depending on your computer.

9. Once the transfer is completed, safely eject the microSD card by clicking on the **Safely Remove Hardware and Eject Media** in the Windows System Tray. Remove the microSD card from the PC and insert it into the microSD card slot in the Raspberry Pi Zero 2W when directed.

PiZero Hardware Configuration for Node Setup

Since access to the microSD card used with the SHARI PiZero is normally not required after setup of the node, there is no access slot in the PiZero enclosure provided for the microSD card. You must remove the two endcap screws (antenna end) and partially slide the PC boards out of the case to insert/remove the microSD card.

The HamVOIP image can be setup using an SSH (secure shell connection) from a computer, the Archlinux console or a different stand-alone Pi3/Pi4. This procedure uses MobaXterm running on a PC for this SSH connection.

For initial setup, the physical SSH connection to the node is made using a wired ethernet connection (not WiFi). The PiZero 2W has no wired ethernet connection and only one USB connection. Therefore, in order to provide the capability for a wired ethernet connection, the SHARI PiZero features a USB hub with three external micro-B USB ports. An ethernet dongle with a micro-B connector can then be used to provide a wired ethernet connection. It is required that this dongle be recognized by the ArchLinux OS used with the HamVOIP image. We have found that a dongle with the RTL8251B IC works OK but an SR9900 IC does not.

We recommend this Ethernet dongle available from Amazon.

https://www.amazon.com/Smays-Realtek-Ethernet-compatible-Raspberry/dp/B009XU6N54

You can plug this dongle into any of the three micro-B USB ports. Do not plug it into the micro-B power port (it won't damage the dongle but it will not work).

There are at least two alternative SHARI PiZero setup procedures not covered in this document.

1. As an alternative, the Archlinux console can be used with a USB keyboard connected to one of the USB ports on the SHARI and an HDMI monitor plugged into the mini-HDMI connector on the PiZero provided you can locate an HDMI to mini-HDMI adapter that is sufficiently small to work in the small space below and to either side of the mini-HDMI connector on the PiZero. (We were able to cut away overmold on our mini-HDMI cable to obtain the required clearance).

2. Another approach is to perform the setup on a raspberry Pi3 or Pi4 (including WiFi setup if desired) and then move the microSD card to the SHARI PiZero.

Configuring Allstar

In this step you will configure the HamVOIP Allstar image to work with your SHARI PiZero using the previously mentioned ethernet dongle and an SSH terminal emulation session via MobaXterm.

1. Begin by inserting the microSD card with the Allstar image into the PiZero 2W

2. Connect your SHARI PiZero (using an ethernet dongle in any one of the three micro-B USB ports) and your PC to the same network and router.

3. Turn on the radio you will be using to communicate with your node. If it is a UHF node, set the radio to 425.750 MHZ with no CTCSS (i.e. PL). Use 145.750 MHz for VHF.

4. Plug the power supply into the micro-B POWER connector on the SHARI PiZero PC board (not the PiZero) and listen to your radio for an announcement of the IP address assigned by the DHCP function of your router.

    As an alternative, you can observe the flashing green LED on the bottom of the PiZero. If you know Morse code, you may recognize it is sending a message. It sends HI HI followed twice by the IP address that has been assigned by the DHCP function in your router. We need the IP address so that we can connect to the Pi4 from the PC using MobaXterm. If you can't copy the Morse code from the blinking LED, you can log into your router and see the IP address that has been assigned to the Pi4 by checking the attached devices. Look for a device called "alarmpi".

5. Start the MobaXterm app. Click on the ***Session*** icon. This opens a new window. Click on the **SSH** icon. Enter the following:
    a. Remote host = the IP address assigned to the PiZero by your router
    b. Put a check in the Specify Username checkbox
    c. Enter *root* for the username
    d. Change the Port to *222*

6. Click on **OK**. You should now be connected to your PiZero and see a window similar to this.
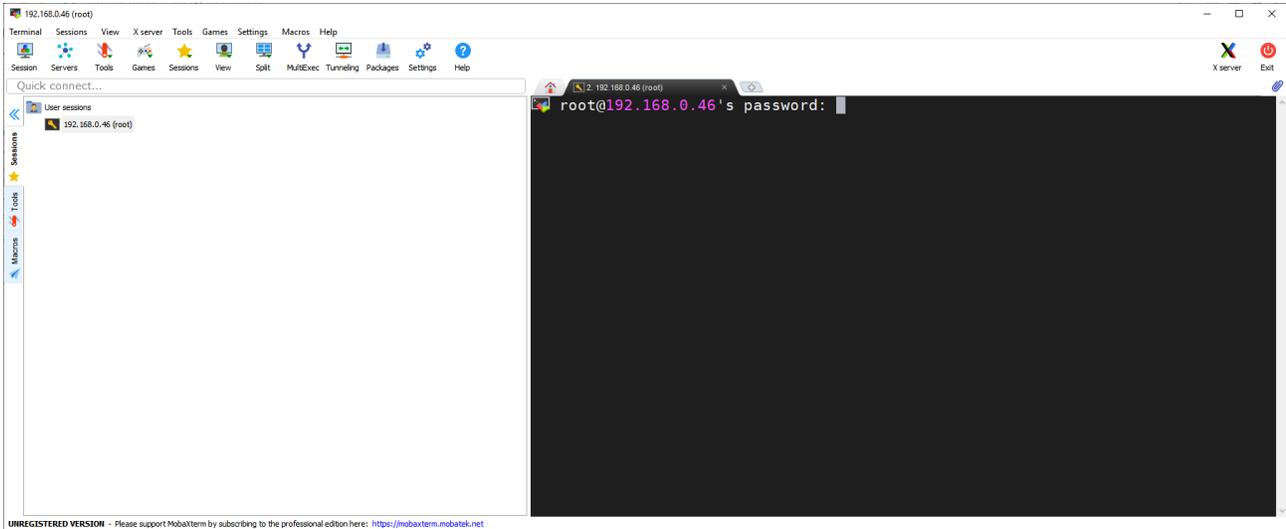
7. Enter *root* for the password and press **<enter>.** The password does not type on the screen so you should see the following.
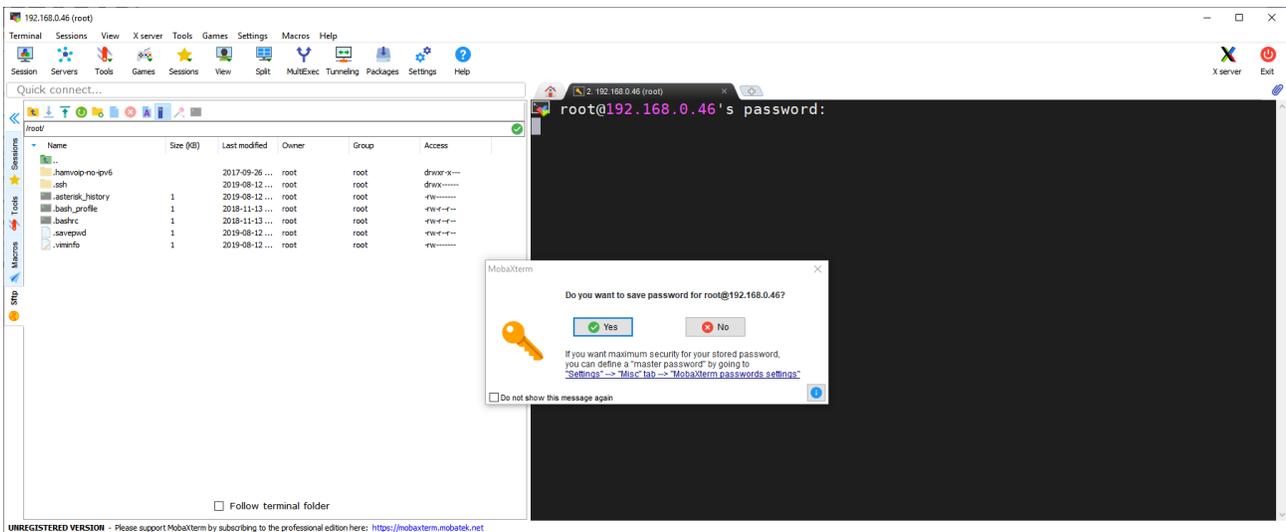
8. Click on **NO** because you will be changing the password in the following setup steps. You should now see the following screen
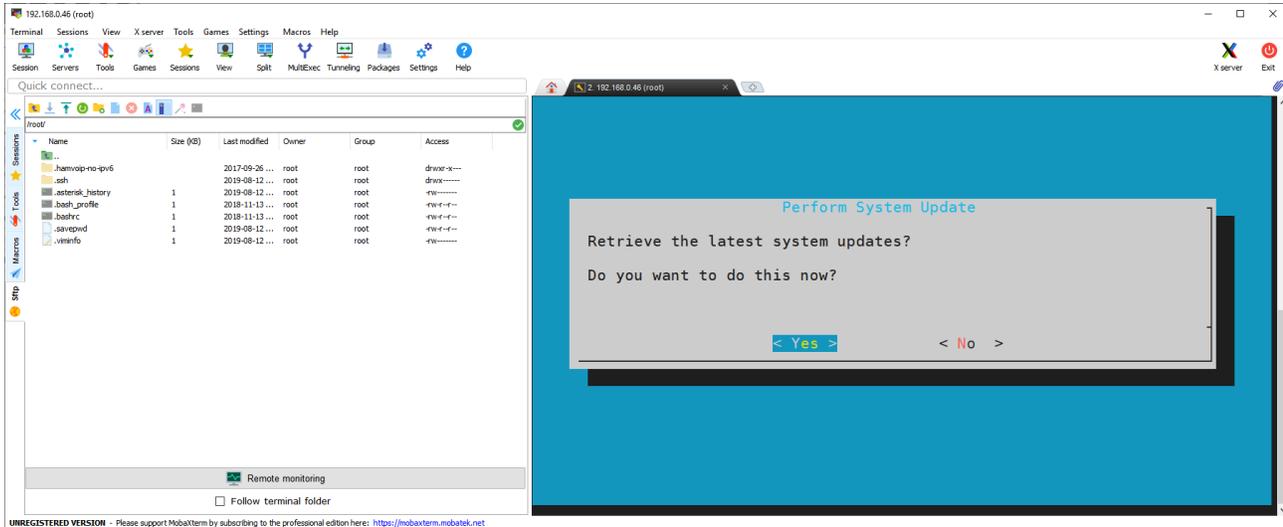
9. Click on **Yes** to retrieve the latest system updates. You will see the latest system updates being installed on your Pi. Wait until the screen indicates that the System has been updated. Click on **OK**
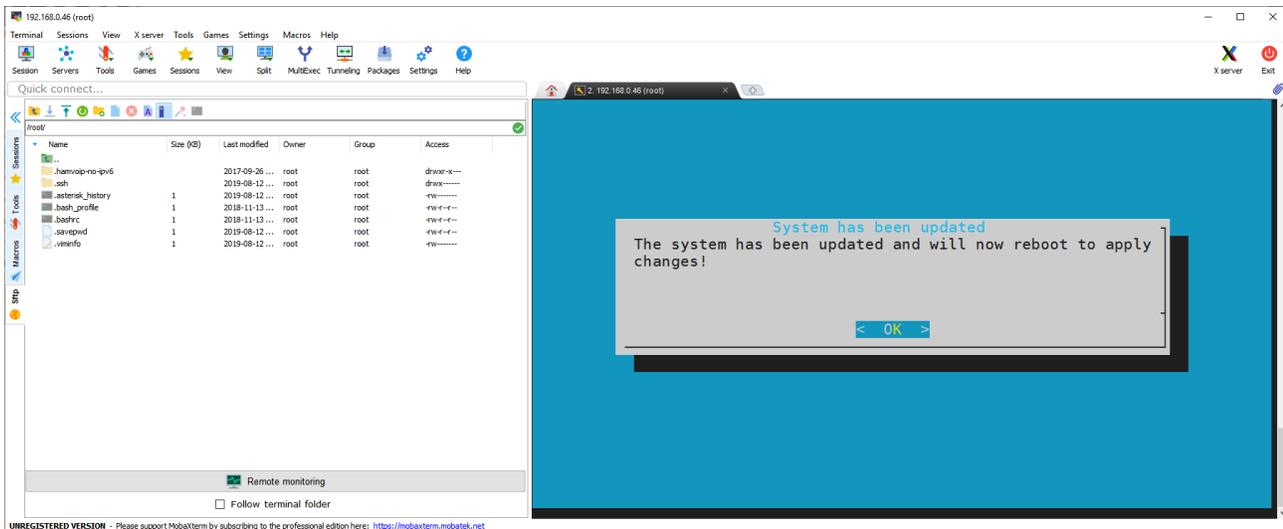
10. Click on **OK** to reboot and apply the changes. The Pi will reboot (watch the blinking green LED). MobaXterm will indicate that the Remote Side has unexpectedly closed the network connection.
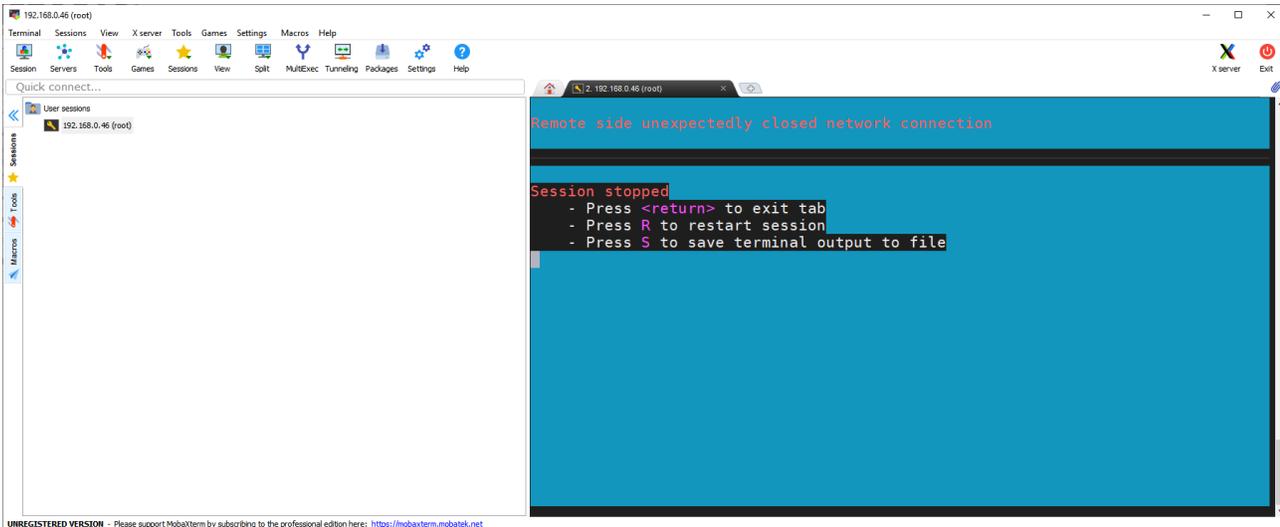
11. Press **R** to restart the session then enter *root* for the password. Click on **NO** to not save the stored password. You will be asked if you want to retrieve the latest system updates. Click **No**. You will see the following screen.
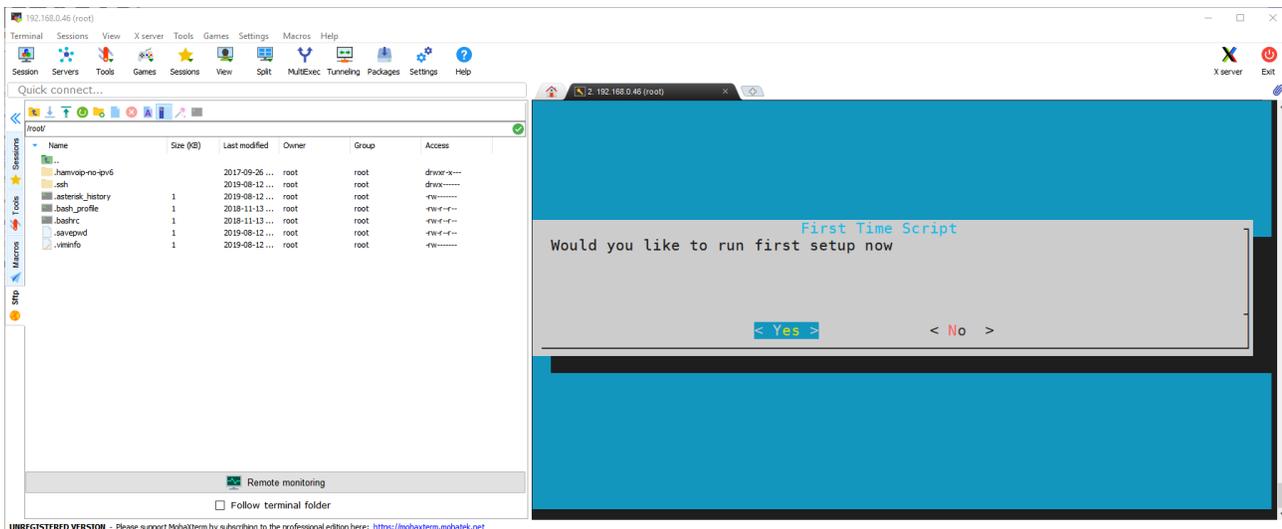
12. Click **Yes** to run the first setup now script.

If, for any reason, you exit the "firsttime.sh" script before reaching its end, you will need to rerun the "firsttime.sh" script again in order to complete the node configuration. If this happens, follow these steps to rerun the "firsttime.sh" script.

         a. From the "Admin" screen, select item 9 "Start Bash shell interface" by typing 9 (**top row numeric keys ONLY!**) or scrolling to item 9. Click on the <**Run Selected Item**> or press <enter>.

         b. Type *firsttime.sh* and press <enter>

When entering numbers in the "firsttime.sh" setup script, **DO NOT USE THE NUMERIC KEYPAD. ENTER NUMBERS ONLY BY USING THE NUMBERS ALONG THE TOP**

ROW OF KEYS ON THE KEYBOARD!!!!! The numeric keypad may cause the script to terminate abruptly or to skip questions, resulting in an incomplete setup and a need to re-run the script.

13. You will now be prompted to change the password for the root login account. **Change the password** and **write down the new password.** It is the ONLY way you can log back into the Pi, unless you want to start over with a NEW image load to the SD card! Remember, the password is case sensitive

14. The next screen asks if you are setting up a private node. Answer **NO**

15. Enter your assigned node number in the next screen and press **OK**

16. The script will next ask if you want to set up the node configuration for asterisk – respond – **YES.** You will be notified that some configurations will continue after reboot, but the system will not reboot at this time. Confirm the notification.

17. Next the script asks if you wish to change the time zone. The default time zone is "America/New York" or Eastern USA. Answer **NO** if you are in the Eastern time zone, otherwise answer YES and select your time zone.

18. On the next screen, the script will display the "hostname" of the Pi computer and ask if you wish to change to a new name. While any name is OK, it is suggested that you change the name to [*your call*]-[*node number*] (eg:W8XYZ-12345). To change the hostname answer **Yes**

19. The script will display a screen asking you to enter the new hostname. Enter the new name and respond – **OK**.

20. The next screen displays the Pi's IP address and whether it is dynamic or static, asking if you wish to change these parameter. For most applications, it is recommended that you use a dynamic IP. Answer **No**.

21. The script then asks if you want to change the SSH port number. It is not suggested that you change the port number from 222. Answer **No**.

22. The next screen will prompt you to reboot the Pi system, reminding you to use the new password that you entered earlier It also displays the IP address and SSH port numbers that must be used to log in.. Respond – **REBOOT.**

23. Again, as the system reboots, you will lose terminal communication with it through MobaXterm. In MobaXterm, press **R** to restart the session.

24. Log into the Pi. Password is the **NEW** password that you earlier in this procedure. MobaXterm will ask if you want to save the password. This time answer **Yes**

25. A screen will be displayed that indicates that the first time node configuration will now proceed. This is the continued configuration that was indicated after reboot notified previously. Answer **Yes.**

26. A screen prompts you to enter the node number. This is the number assigned to your node by AllstarLink.org. **DO NOT USE THE NUMERIC KEYPAD TO ENTER THIS NUMBER!** After entering the number, respond – **OK**.

27. You will be asked if it is a private node. Answer - No

28. The next screen asks for entry of your station call. Enter your call and respond – **OK**. **DON'T USE THE NUMERIC KEYPAD!**

29. The next screen asks if you want to report the status of your node to AllstarLink.org. This is very useful for the organization and does not compromise you in any way. You are encouraged to respond – **YES**.

30. Next, you choose a voice ID or a CW ID that will be broadcast by your node. If you respond – **NO**, a CW ID will be used. If you respond – **YES**, a voice ID will be created and used.

31. The next screen asks if you need to change the default iax protocol port number. Leave this at 4569 if this is your first node. It is customary to decrease this number by 1 for each additional node (i.e. 4568, 4567….) Respond – **OK**.

32. The next screen chooses the duplex mode for your node. The choices are presented and explained on the screen. Normal simplex nodes select the default choice of "1" and respond – **OK**.

33. Next, you must enter the password that was assigned to your node by AllstarLink.org. This was obtained by you from the Allstar Link website. Enter this password carefully and **DO NOT USE THE NUMERIC KEYPAD** for any numbers that appear in the string. Respond – **OK**.

34. On the next screen you are asked if you would like to set a password for iaxRpt. Explaining iaxRpt is beyond the scope of this document, but this password can be entered at another time if you chose to use this program. Respond – **YES** if you want to enter a password, and respond to the prompts that will be presented by the script in that case. Otherwise, respond – **NO**.

35. Next, you will be prompted to configure the "Simple USB" settings. These settings can be reviewed and adjusted once the Asterisk Admin menu is up and running. Respond – **NO**.

36. The next asks if you want to restart Asterisk. Respond **Yes**

37. The next screen that should appear is the "Admin Menu List for: [*host-name*]" followed by a menu of choices for configuring and controlling the host node.

Configuring SimpleUSB-Tune-Menu for SHARI PiZero

1. From the "Admin Menu" select item 12 – Run the SimpleUSB-tune-menu Application, by clicking on item 12 or scrolling to item 12 with the arrow keys, and then clicking on **<Run Selected Item>** or by pressing **<enter>**

2. The "SimpleUSB-tune-menu" will be displayed as shown below. <mark>Some values may be different than those shown in the Figure.</mark>
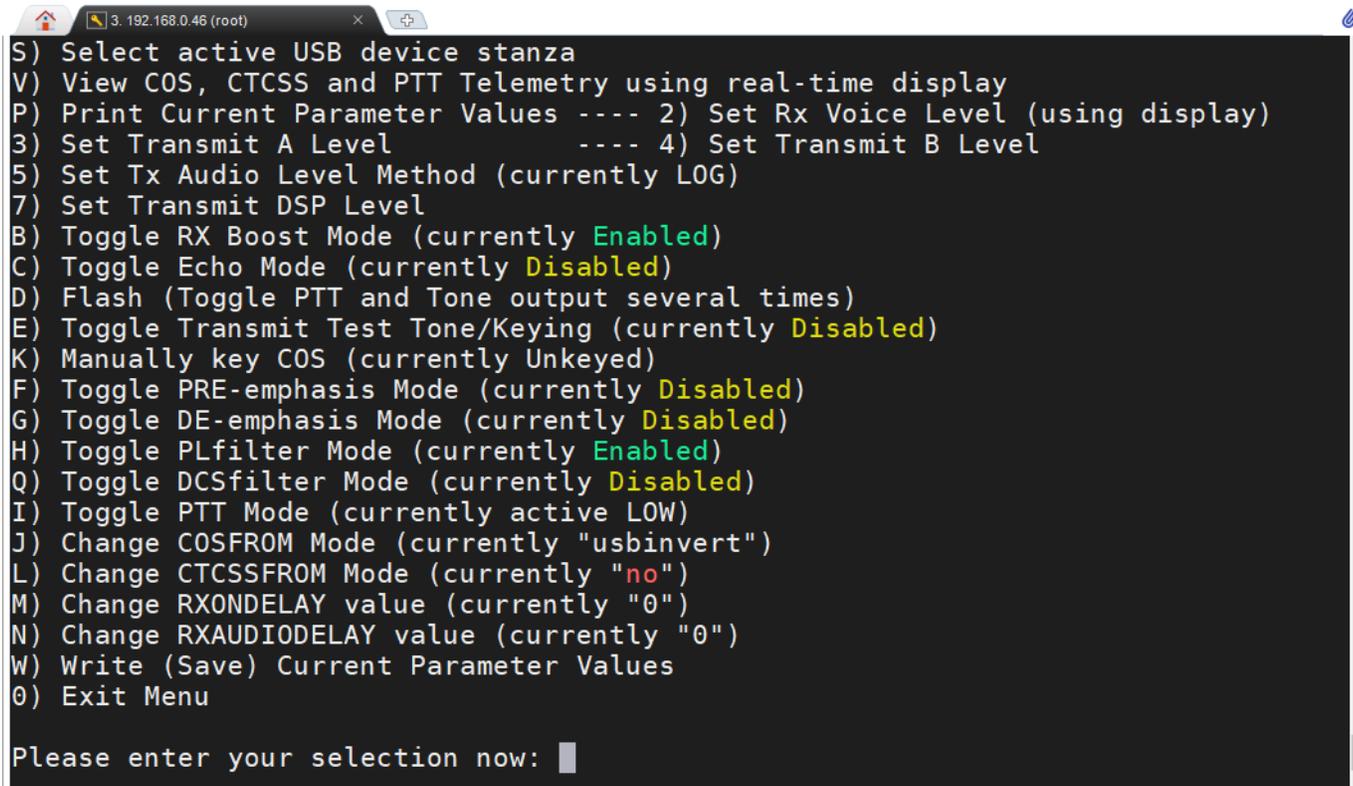
```
                  3. 192.168.0.46 (root)          ×
S) Select active USB device stanza
V) View COS, CTCSS and PTT Telemetry using real-time display
P) Print Current Parameter Values ---- 2) Set Rx Voice Level (using display)
3) Set Transmit A Level          ---- 4) Set Transmit B Level
5) Set Tx Audio Level Method (currently LOG)
7) Set Transmit DSP Level
B) Toggle RX Boost Mode (currently Enabled)
C) Toggle Echo Mode (currently Disabled)
D) Flash (Toggle PTT and Tone output several times)
E) Toggle Transmit Test Tone/Keying (currently Disabled)
K) Manually key COS (currently Unkeyed)
F) Toggle PRE-emphasis Mode (currently Disabled)
G) Toggle DE-emphasis Mode (currently Disabled)
H) Toggle PLfilter Mode (currently Enabled)
Q) Toggle DCSfilter Mode (currently Disabled)
I) Toggle PTT Mode (currently active LOW)
J) Change COSFROM Mode (currently "usbinvert")
L) Change CTCSSFROM Mode (currently "no")
M) Change RXONDELAY value (currently "0")
N) Change RXAUDIODELAY value (currently "0")
W) Write (Save) Current Parameter Values
0) Exit Menu

Please enter your selection now:
```

The SHARI PiZero simpleusb-tune-menu before modification

3. Make changes as required so that you have the selections shown in the next Figure

---

```
Active simpleusb device stanza: [usb] ----------------------------------
S) Select active USB device stanza
V) View COS, CTCSS and PTT Telemetry using real-time display
P) Print Current Parameter Values ---- 2) Set Rx Voice Level (using display)
3) Set Transmit A Level           ---- 4) Set Transmit B Level
5) Set Tx Audio Level Method (currently LOG)
7) Set Transmit DSP Level
B) Toggle RX Boost Mode (currently Disabled)
C) Toggle Echo Mode (currently Disabled)
D) Flash (Toggle PTT and Tone output several times)
E) Toggle Transmit Test Tone/Keying (currently Disabled)
K) Manually key COS (currently Unkeyed)
F) Toggle PRE-emphasis Mode (currently Enabled)
G) Toggle DE-emphasis Mode (currently Enabled)
H) Toggle PLfilter Mode (currently Enabled)
Q) Toggle DCSfilter Mode (currently Disabled)
I) Toggle PTT Mode (currently active LOW)
J) Change COSFROM Mode (currently "usbinvert")
L) Change CTCSSFROM Mode (currently "no")
M) Change RXONDELAY value (currently "0")
N) Change RXAUDIODELAY value (currently "0")
W) Write (Save) Current Parameter Values
0) Exit Menu
```

The SHARI PiZero simpleusb-tune-menu after modification

4. Enter **W** to save the changed settings then enter **0** to exit the SimpleUSB-Tune-Menu

Configuring the SHARI PiZero Serial Port

SHARI PiXX uses a serial connection via USB to program the SA818 radio module. This has been changed for the SHARI PiZero. In SHARI PiZero, the Raspberry Pi4 primary UART is used. This UART is called ttyAMA0. The **818-prog** has been modified to use this UART. The new program is called **SA818-prog**. It is part of the HamVOIP provided you have done the latest updates. If you do not see it when performing the following process, re-run Item 1 of the Admin menu (UPDATE).

The physical serial connection uses the TX (pin 8) and RX (pin 10) of the Pi4 GPIO connector. The programming connection is automatically made when the SHARI PiZero is plugged into the Pi GPIO connector during construction of your SHARI PiZero node.

In the HamVOIP software Allstar distribution, two changes are required to use the ttyAMA0 UART. These changes are described in the following paragraphs.

Begin by logging into your SHARI PiZero Pi4 directly or using MobaXterm SSH. The following describes the process using MobaXterm.

Open MobaXterm—it will then show recent sessions identified by your Pi4 address (eg 192.168.1.200)…click on that. The admin screen will appear. On the left had side you will be shown as in the root directory.

Note: *Instead of making the changes to config.txt and cmdline.txt using the method described in the following 2 sections, you can edit these files using the **Notepad** program on your PC after you have written the HamVOIP image to the microSD card. Also, the **SA818-prog** program should already be installed in your image as it is included in the HamVOIP updates.*

Modify the cmdline.txt file

First, backup the /boot/cmdline.txt file before editing:

- Using the Left hand side (LHS) of MobaXterm, double-click the green "up directory" button on the top of the LHS.
- Go to boot directory near the top of the list and double-click on it.
- A list of the files in the boot directory will appear—go to cmdline.txt and double-click it.
- Go to the File tab at the top and scroll down to the "Save As" line and push it.
- The file directory of your computer will come up for you to identify a save location—use something convenient like desktop.—and save.
- Go to the desktop and rename file cmdline_backup.txt.
- Next, go to MobaXterm (still at the boot directory on the LHS) and push the "import" button at the top (a file folder with an up arrow in it). Your computer directory will reappear—go to desktop (or where you saved cmdline_backup.txt) and import the file---it will appear in the boot directory on your Pi.

Now edit the file:

- Double click on cmdline.txt file. The MobaXterm text editor will open the file.

The HamVOIP version of the file contents then is shown—the file contents in bold below are the parts which must be deleted:

   root=/dev/mmcblk0p2 rw rootwait **console=ttyAMA0,115200** console=tty1 selinux=0 plymouth.enable=0 smsc95xx.turbo_mode=N dwc_otg.lpm_enable=0 **kgdboc=ttyAMA0,115200** elevator=noop audit=0

- Delete the bold sections by going to the end of the bold part with your cursor, click to get a flashing line, and backspace to delete the desired text

For the PiZero, the new cmdline.txt file becomes (one line):

   root=/dev/mmcblk0p2 rw rootwait console=tty1 selinux=0 plymouth.enable=0 smsc95xx.turbo_mode=N dwc_otg.lpm_enable=0 elevator=noop audit=0

Save the file by going to the File tab on top and scrolling down to "save". Exit the editor by closing the file.

Modify the config.txt file

In the boot directory, backup the config.txt file as you did for cmdline.txt

   Then double-click on the config.txt file---the contents of the file will appear in MobaXterm Txt editor.

Add the following line in the space after the initial commented line:

   dtoverlay=disable-bt

The file should still have 8 lines (including one vs. two blank lines).

Go to File-save and save the file. Exit the editor. Confirm that the new files are in the boot directory

Reboot the Pi

- Type exit [enter]
- At the admin menu, go to item 15 (Reboot), and [run selected item]

Connecting and Configuring SHARI PiZero

In this section you will use the **SA818-prog** program to setup the SA818 radio module in the SHARI PiZero.

1. Configure a radio you will use to communicate with SHARI PIZERO (an HT is perfect) to the RF and CTCSS frequencies you have selected.

2. Use MobaXterm to connect to your SHARI PiZero.

3. Scroll down to Admin Menu Item 9 and press **<enter>**. This will start a Bash Shell session. You should now see the following command line prompt on your screen -
   [root@<your call> - <your node> ~]#

4. Type **cd /usr/local/sbin** and press <enter>. You should now see the following command line prompt on your screen -
   [root@<your call> - <your node> sbin]#

5. Type **SA818-prog** and press **<enter>.** This will run a program to setup the radio module (SA-818) in SHARI PiZero. You will then be prompted by the program to enter information. There is one minor detail you need to be aware of before you start. The **SA818-prog** does not have a selection for the SHARI PiZero so use the selection for the SHARI PiHat.

   The program does extensive error checking. If you make a mistake, you can press **CTRL+ C** at any time to exit the program and return to the command prompt. Press the **UP-Arrow** key to retype the command and start over.

   If you get an error trying to start the SA818-prog program, return to the Admin Menu by typing **exit** and do an update using Admin Menu, Item 1. Then return to step 4 above.

   The following figures shows a typical programming session for a SHARI PiZero. It begins by showing you the last values that were programmed into the SA818 by the program. These values are not read from the SA818 (NiceRF does not provide commands to read from the SA818) so they are only correct if for the SA818 last programmed.

   If this is the first time you are using the **SA818-prog** program no values can/will be shown.

   The program then checks serial communications to verify that the UART on your Pi4 can communicate with the SA818 in SHARI. If you receive a message that they are not OK, the most likely cause is a problem with the modification of the modifications to **cmdline.txt** and **config.txt** you made performed previously.

```
SA818-prog, Version 1.07

Programing SHARI PiXX / SHARI PiHat / SA818(U/V) Module

Programming Device name:
        /dev/ttyAMA0


------------------------------------------------------------


Last values programed to SA818:
------------------------------------------------------------
        Channel Spacing: 1
           Tx Frequency: 446.1000
           Rx Frequency: 446.1000
           Tx CTCSS code: 0015 Frequency: 110.9 Hz
           Rx CTCSS code: 0015 Frequency: 110.9 Hz
   CTCSS Reverse Burst: n
          Squelch Value: 1
           Volume Value: 6
   PreEmphasis Enabled: n
     High Pass Enabled: n
      Low Pass Enabled: n                    • Rectangular Snip
------------------------------------------------------------
Testing serial communications
Serial communications with the SA818 module are OK
```

The program then interactively asks you for the SA818 programming data. The values shown are what we use to program SHARI kits that we construct for *Kits for Hams* customers. The RF frequencies and sub-audible tone information will most likely be different for you.

```
What are you programming?
Enter 1,2 or 3 where SHARI PiXX=1, SHARI PiHat=2, SA818 Module=3: 2

        Programming a SHARI PiHat
        Wide channel spacing

Enter band (VHF=1, UHF=2): 2
        You chose UHF

Enter transmit frequency in MHz (xxx.xxxx): 446.1000
        The transmit frequency is 446.1000 MHz

Enter receive frequency in MHz(xxx.xxxx): 446.1000
        The receive frequency is 446.1000 MHz

Do you want to use a sub audible tone? (0 = No, 1 = CTCSS, 2= DCS): 1
        You chose CTCSS

Enter Tx CTCSS Frequency in Hz(xxx.x): 110.9
        You entered 110.9 Hz
        The Tx CTCSS code is 0015

Enter Rx CTCSS Frequency in Hz(xxx.x): 110.9
        You entered 110.9 Hz
        The Rx CTCSS code is 0015

Enable Reverse Burst (y/[n]): n
        Reverse burst is not enabled


Enter Squelch Value (1-8): 1
        Squelch is set to 1

Enter Volume (0-8): 6
        Volume is set to 6

Enable Pre/De-Emphasis (y/[n]): n
        Pre/De-emphasis is not enabled

Enable High Pass Filter (y/[n]): n
        High pass filter is not enabled

Enable Low Pass Filter (y/[n]): n
        Low pass filter is not enabled
```

The program then asks you to verify your data and then writes
it to the SA818. It also saves it to the root directory on your microSD card to be read
back the next time you use the program.

```
Verify:
       ---------------------------------------------------
            Channel Spacing: 1
               Tx Frequency: 446.1000
               Rx Frequency: 446.1000
              Tx CTCSS code: 0015 Frequency: 110.9 Hz
              Rx CTCSS code: 0015 Frequency: 110.9 Hz
        CTCSS Reverse Burst: n
              Squelch Value: 1
               Volume Value: 6
        PreEmphasis Enabled: n
          High Pass Enabled: n
           Low Pass Enabled: n
       ---------------------------------------------------
       Is this correct ([y]/n, or a to abort) ?y

       Sending Frequency, Sub Audible Tone, and Squelch Information...
       Frequency, Sub Audible Tone, and Squelch information correct

       Setting Volume - 6
       Setting Reverse Burst
       Setting Filters

       Programming Successful

       Configuration log written to /root/SA818.log

       [root@N8AR-40270 /]#
```

6. This completes the SA818 programming. Reboot your Raspberry Pi by typing
   reboot.sh<enter> at the command line prompt in MobaXterm. You will hear your node
   send your callsign ID and the IP address of the node to your radio.

7. Type **R** in MobaXterm to re-establish your connection to your node and return to the
   Admin Menu List.

Setting Receive and Transmit Voice Levels

1. From the "Admin Menu" select item 12 – Run the SimpleUSB-tune-menu Application, by
   clicking on item 12 or scrolling to item 12 with the arrow keys, and then clicking on <Run
   Selected Item> or by pressing <enter>

2. In the SimpleUSB-Tune-Menu, select item **2**. This will start the procedure to set the receive
   voice level for your node.

```
Please enter your selection now: 2
RX VOICE DISPLAY:
                             v -- 3KHz        v -- 5KHz

```

3. Key up your radio and speak into your microphone at normal levels. You will see a bar emerge from the left side of the screen. Its length will vary with the level of your voice in real time. You want to set the RX level so that the bar just extends slightly beyond "5 KHz" on the screen. Press **<enter>** and you will see the following screen.

```
Please enter your selection now: 2
RX VOICE DISPLAY:
                              v -- 3KHz         v -- 5KHz

Current setting on Rx Channel is 500
Enter new value (0-999, or CR for none): █
```

4. Follow the instructions entering new values for the setting until the level shown by the moving bar as seen on the display is correct. Then press <return> to return to the SimpleUSB-Tune-Menu. Most users find a level of 375 is required for an HT with the Mic gain set correctly.

5. Selection **3** is used to adjust the audio level from your node that you hear on your radio. The current setting is 500. This should not require any or much adjustment but if you notice that the audio level you hear from your node differs from what you hear on your local repeaters or simplex, you can adjust it.

6. Select **0** to exit the SimpleUSB-Tune-Menu and return to the Admin Menu. Press **W** and **<enter>** to save your current configuration before exiting if required.

Testing DTMF Decoding

In this section you will verify that all of your DTMF tones are being properly decoded and explore some of the available DTMF commands.

1. In the Admin Menu, scroll down and select item **11**. This will start the Asterisk client.

```
Erase is backspace.


        Starting Asterisk client. Please type: exit<ENTER>
        when done and you will return to the admin menu.




Asterisk 1.4.23-pre.hamvoip-V1.5.4-03-app_rpt-0.327-10/22/2019, Copyright (C) 1999 - 2019
 HamVoIP.org and others.
Created by Mark Spencer <markster@digium.com>
Asterisk comes with ABSOLUTELY NO WARRANTY; type 'core show warranty' for details.
This is free software, with components licensed under the GNU General Public
License version 2 and other licenses; you are welcome to redistribute it under
certain conditions. Type 'core show license' for details.
====================================================================
Connected to Asterisk 1.4.23-pre.hamvoip-V1.5.4-03-app_rpt-0.327-10/22/2019 currently run
ning on N8AR-44230 (pid = 329)
Verbosity is at least 4
N8AR-44230*CLI>
```

2. Key your transmitter and send all 16 DTMF characters in sequence. Verify that they are all correctly decoded. If some do not decode correctly please refer to the PDF document titled "Setting the RX Level in HamVOIP Allstar " in the SHARI group Files section.

```
[Oct 30 16:25:29] NOTICE[355]: chan_simpleusb_generic.c:2717 simpleusb_read: Got DTMF char 1
[Oct 30 16:25:29] NOTICE[355]: chan_simpleusb_generic.c:2717 simpleusb_read: Got DTMF char 2
[Oct 30 16:25:30] NOTICE[355]: chan_simpleusb_generic.c:2717 simpleusb_read: Got DTMF char 3
[Oct 30 16:25:31] NOTICE[355]: chan_simpleusb_generic.c:2717 simpleusb_read: Got DTMF char 4
[Oct 30 16:25:31] NOTICE[355]: chan_simpleusb_generic.c:2717 simpleusb_read: Got DTMF char 5
[Oct 30 16:25:32] NOTICE[355]: chan_simpleusb_generic.c:2717 simpleusb_read: Got DTMF char 6
[Oct 30 16:25:33] NOTICE[355]: chan_simpleusb_generic.c:2717 simpleusb_read: Got DTMF char 7
[Oct 30 16:25:33] NOTICE[355]: chan_simpleusb_generic.c:2717 simpleusb_read: Got DTMF char 8
[Oct 30 16:25:34] NOTICE[355]: chan_simpleusb_generic.c:2717 simpleusb_read: Got DTMF char 9
[Oct 30 16:25:36] NOTICE[355]: chan_simpleusb_generic.c:2717 simpleusb_read: Got DTMF char 0
[Oct 30 16:25:36] NOTICE[355]: chan_simpleusb_generic.c:2717 simpleusb_read: Got DTMF char *
[Oct 30 16:25:37] NOTICE[355]: chan_simpleusb_generic.c:2717 simpleusb_read: Got DTMF char #
[Oct 30 16:25:38] NOTICE[355]: chan_simpleusb_generic.c:2717 simpleusb_read: Got DTMF char A
[Oct 30 16:25:39] NOTICE[355]: chan_simpleusb_generic.c:2717 simpleusb_read: Got DTMF char B
[Oct 30 16:25:39] NOTICE[355]: chan_simpleusb_generic.c:2717 simpleusb_read: Got DTMF char C
[Oct 30 16:25:40] NOTICE[355]: chan_simpleusb_generic.c:2717 simpleusb_read: Got DTMF char D
    -- Hungup 'DAHDI/pseudo-488850447'
N8AR-44230*CLI>
```

3. Key your radio and send *A1. Verify that you hear the IP address of your node played back by SHARI PiZero to your radio.

4. The following table contains most of the DTMF commands preconfigured in the HamVOIP Allstar distribution. Watch what is displayed by the Asterisk client as you test them.

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.

5. Type **exit** to exit the Asterisk client and return to the Admin Menu.

Enabling the COS LED

SHARI PiZero has three status LEDs on the front panel. They are;

BLINKING GREEN – Indicates that Allstar is communicating properly with SHARI
YELLOW – Lights when SHARI is receiving an RF signal
RED – Lights when SHARI is transmitting

You also may have noticed that the YELLOW LED is not lighting up when a signal is being received. The YELLOW COS LED is activated by Allstar to show the presence of a received signal. This uses bit 4 of the CM108B/119B. To use it you must configure your Allstar to use the bit defined for the COS LED. The current HamVOIP image download has the required code already installed in the config files but they must be uncommented to be active.

1. In MobaXterm, in the left "File Browser" panel, note that the window at the top shows */root/* Left click on the green folder icon with the up-arrow in it until you have a "/" in the window. Double click on the etc folder. Double click on the asterisk folder. You will now have */etc/asterisk/* in the window.

2. Double click on the rpt.conf file to open it in the MobaXterm editor**.**

3. Verify that there is a statement near line 159 which says
   events=eventsXXXXX where XXXX is your node number. If there is a semi-colon in front of it, remove it.

4. Verify that there is a statement near line 906 which reads
   [eventsXXXXX] where XXXXX is your node number. If there is a semi-colon in front of it, remove it.

5. Look for two lines below the **[eventsXXXXX]** which state
   cop,62,GPIO4:1 = c|t|RPT_RXKEYED
   cop,62,GPIO4:0 = c|f|RPT_RXKEYED
   They will have semi-colons in front of them. If so, remove them.

6. In the MobaXterm editor click on File>Save and click on Yes to save the file to your Allstar node.

7. In the Admin Menu, reboot the node (Item 15)

8. Transmit to your node and verify that the YELLOW COS LED is operational.

WiFi Setup

WiFi setup is accomplished using Item 7 of the Admin menu. Select option 1 of the Wireless Menu. When asked, clear the wpa_supplicant file. Follow the menu prompts. Be sure to unplug your wired ethernet connection during the reboot of the node as described in the instructions.

Address Reservation and Port Forwarding

At this point, your node is operational and can make outgoing connections. However, other nodes will not be able to connect to you until you log into your router and forward port 4569 (UDP) to your Raspberry Pi.   Also, unless you reserve the IP address assigned to your Raspberry Pi by your router's DHCP function, it might change at a later time.

Address reservation and port forwarding is router specific. Consult your router documentation for specific instructions.

Release Notes:

Release	Date	Changes
1.00	4/18/22	Initial release
1.01	4/20/22	Modified simpleusb-tune-menu and SA818 programming sections