

AllStar – Analogue FM RoIP - Rick Perks VK4HC/S79RP



1. INTRODUCTION

1.1 Why AllStar ?

As part of my project back in my home country of Seychelles, I need a means by which I can connect together and control a network of repeaters for the minimum amount of money possible. I also need to be able to experiment with different ways to access those repeaters by different types of user and monitor the usage to guarantee high levels of reliability and performance. I know that IRLP and Echolink are capable of connecting repeater networks but I have decided to go with AllStar which I consider is best suited to attempt to achieve my ambition. I'm going initially with AllStar due to its flexibility using its asterisk PBX base with the amateur radio repeater add-on (app_rpt). Users of AllStar experience excellent sound quality over analogue FM with full duplex repeater capability under the AllStar repeater control that can also bridge into the Echolink and IRLP platforms. AllStar can connect to platform translator sites such as CQUK through an AllStar node at the far end which can then cross connect to any of the digital voice modes such as DMR, Wires-X, P25 and NXDN. The first important difference I've spotted between Echolink (and hence possibly IRLP) and AllStar is that AllStar has the capability of being the repeater controller whereas from the brief research I've done so far, Echolink connects to the repeater's controller whereas AllStar can either connect to the repeater controller or be the controller in its own right.

If you want to connect to a repeater remotely, IRLP and Echolink are perfectly good systems that are proven and stable. It would appear that the Echolink development team have frozen the development of the platform since around 2006. They are happy with the job they've done and I congratulate them on a brilliant piece of work that gives the user a very friendly user interface that works well so long as you keep an eye on the proxy you are using and maybe test that using the test server before you go on a net to save being let down. But if you want something that allows you to work stations locally or anywhere all over the world that you can manipulate and experiment with that enables you to develop your own creative ideas whilst learning/enhancing your archlinux and IP skills, then in my humble opinion, AllStar is well worth looking into. As an aside, Foundation amateurs in Australia are legally permitted to use the AllStar system unlike the digital voice platforms such as DMR. This is due to AllStar using an FM carrier with an analogue input and with commands being done via DTMF tones that are decoded in a RIM (Radio Interface Module) after the node radio that then connects to a Raspberry Pi and then on into the internet. So all the digital networking is done beyond the RF connection. The simple way I like to think of AllStar is Echolink on steroids but I need more R&D time to ascertain if my thinking is correct.

With all that said let's get on with discovering AllStar.

First thing you need to do is register for a node number..

1.2 Registration

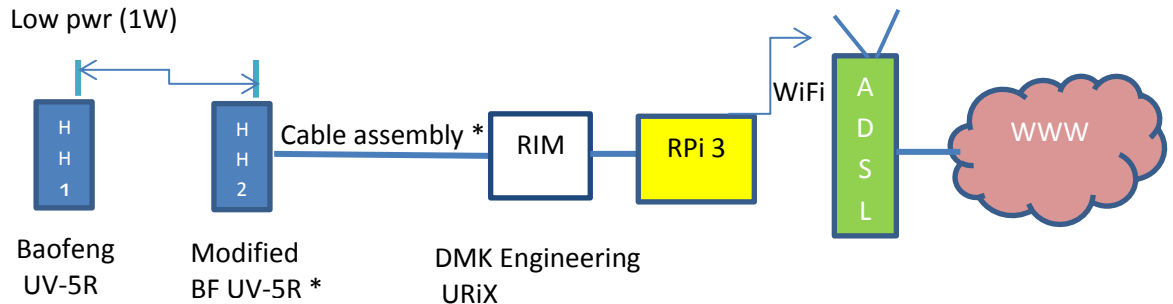
This is the link that takes you to the AllStarLink site where you register for a node number; <https://web-tpa.allstarlink.org/> Go to the top tool bar --> Portal --> Sign up for AllStar When you're requested to state a server, just make up any name as this is only a server 'on paper'. You should get a node number with a 6 digit password within a few days so long as your QRZ entry is up to date. I was not required to send a copy of my license (as is the case with Echolink).

1.3 Which Way To Go - AllStarLink v HamVoIP ?

The AllStar intelligence is conveyed via an image file that you save onto an SD card using Win32diskimager and then load onto the Raspberry Pi. Due to disagreement within the original development team after the death of the founder and key developer there are now 2 distinct AllStar camps to choose from i.e. AllStarLink or HamVoIP. It's up to you – I went with the HamVoIP.org image file due to what I thought was better documentation, closer support and a more impressive development story as well as delicately asking other AllStar users which way they had decided to go. HamVoIP reckon they have 70% of all the worldwide nodes operating through their servers that are spread over several cities in the US. For the 100% open source enthusiast, AllStarlink maybe more to your liking. The good thing is that the nodes operating with the HamVoIP image file are 100% compatible with the nodes operating with the AllStarLink image file. Time will tell if I made the correct move.

2. MY SIMPLEX NODE

Simplex UHF Analogue FM
Low pwr (1W)



*Details below

HH1 – Speech/control mobile radio

HH2 – Node radio

RIM – Radio Interface Module

RPi – Raspberry Pi

ADSL – WiFi Router/modem

www - Internet

Unless you are installing a repeater or hub something like the above is all you require to enjoy AllStar. To keep the cost as low as possible I used 2 cheap Baofeng UV-5R's (see further below for the simple mod that brings out the COS - carrier operated switch).

Thanks to the assistance I got from Glenn VK4PK and Russell VK4DCM we established that the combination of the Baofeng UV-5R and an old Tait UHF 2020 with its line interface card and the RIM lite gave problems when trying to decode all the DTMF tones correctly. Changing the cheap Baofeng hand held operating into the Tait radio node fixed the problem. I stuck with the Baofengs. The DMK Engineering URiX RIM didn't have any problems decoding the DTMF. You

can't go wrong with the DMK RIM and if I was going to use a RIM in a repeater I think that's the RIM I would choose.

2.1 Building the Node

2.1 Materials

	Quantity	Approx (AUD)
Cheap handheld radio e.g. Baofeng UV-5R	2	80
Raspberry Pi 3 with blank 16 GB SD card	1	75
5V 2.5A mains to DC PSU	1	24
Case for Raspberry Pi	1	15
Radio Interface Module - DMK Engineering URiX (USA)*	1	195 inc P&P
2.5mm stereo plug	1	1
3.5mm stereo plug	1	1
25 way D type plug with shell cover	1	7
5 or 6 core cable	1m	2
	TOTAL	400

*DMK URiX from the States has 65 USD freight. There are other cheaper RIMs with less freight. I just wanted to begin with what I judged as apparently best in class and then work down from there.

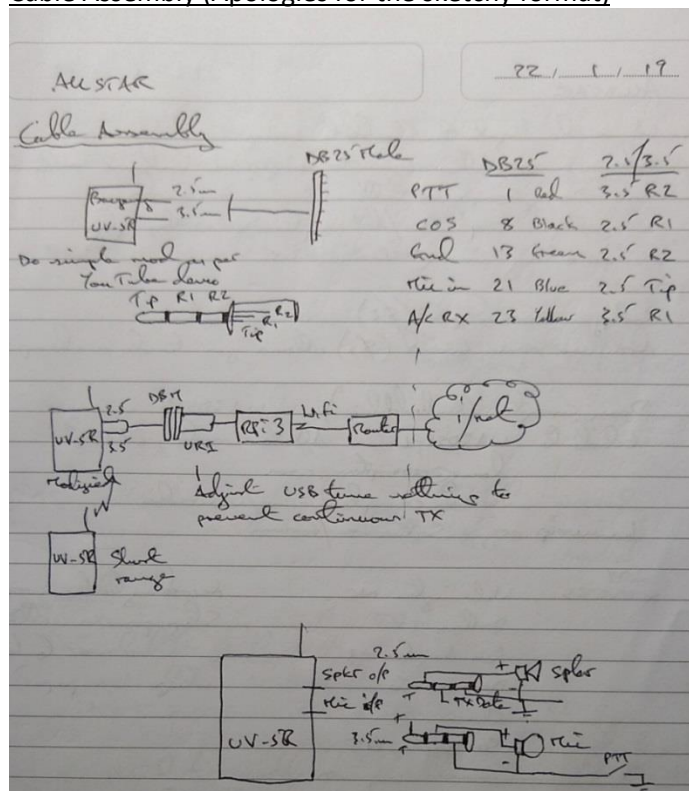
Here's a much cheaper RIM option that I tried and found to be OK so long as I used an extended antenna cable to get the node radio antenna away from the RIM to prevent the RF from locking it up.

<https://technobygeorge.com/>

2.1.1 Node Radio Modification

<https://www.youtube.com/watch?v=lsx-F6wID-c>

2.1.2 Cable Assembly (Apologies for the sketchy format)



2.1.3 Setting Up the Raspberry Pi

You need to load a HamVoIP image onto an SD card and use this to boot up the Raspberry Pi. You download the windows self extracting image file, extract and transfer onto the SD card with Win32diskimager. Be very careful when you transfer the image onto the SD card because if you get the target drive wrong you could wipe out your laptop hard drive.

Download Win32diskimager from here;

<https://sourceforge.net/projects/win32diskimager/>

How to use Win32diskimager is here;

<http://raspi.tv/2012/how-to-make-a-raspberry-pi-disk-image-to-sd-card-with-win32diskimager>

Download the latest HamVoIP image and read all the setup instructions here;

<https://www.hamvoip.org/#download>

Connect a video monitor and keyboard to RPi

Boot up RPi (first time in the user name and password are root, root) and go through the first time setup procedure.

Connect RIM, node radio, and control radio.

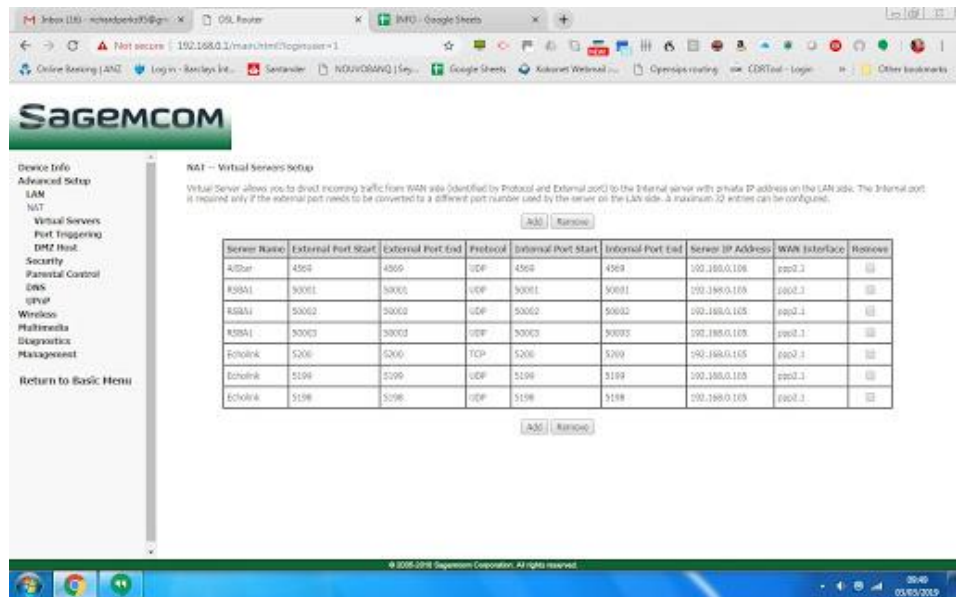
From the HamVoIP Admin menu on the RPi select Simple usb setup

Simple USB settings should be as follows;

```
Active simpleusb stanza: [usb]
USB device String: 1-1.4:1.0
Card is: 0
Name is: usb
Rx Level: 500
Rx no-delay: 0
Rx audio-delay: 0
Tx A Level: 500
Tx B Level: 500
preemphasis: no
deemphasis: no
pfilter: yes
dcsfilter: no
rxboost: no
PTT: Active LOW
COS from Mode: usb
PTT status: Un-Keyed
CTCSS (input): Ignored
COS (input): CM108/CM119 Active HIGH
COS (test): Un-Keyed
COS (composite): Un-Keyed
```

2.1.4 Port Forwarding

To allow incoming connections to your node you need to open port 4569 (UDP).



2.2 Testing

If you prefer to use PuTTY and ssh into the RPi you go in on port 222.

To check you are registered, go to the Admin menu and then select the bash prompt then type **check_reg.sh**

Check to see if you are on the Worldwide map here;

<http://allstarmap.org/allstarmap.html>

Also at the bash prompt type **asterisk -rvv** (This will show you what's going on in the AllStar app)

Press the PTT on the control HH and key in the characters *, 1, 2,3,4,5,6,7,8,9,0 If your audio levels are correct you should see the characters appear at the alarmpi*CLI> prompt

Try *81 to see if you get a time check back

If you have a friend with an AllStar node try to connect with *3<node number>

You disconnect with *1<node number>

If you have no friend with AllStar try to connect to node 47845 which is a large cross platform hub called CQUK that is operated out of Belfast by Rickie MI5DAW who is a friendly guy.

2.3 Other Useful Commands at the Bash Prompt

dns-query 47845	Checks that you have a connection to the far end node – shows ip
firsttime.sh	Runs the script that sets up the node for the first time
asterisk -rvv	Shows you all whats going on
astres.sh	Restarts Asterisk to get configs to stick
ping [ip address]	Checks connectivity
trace route [ip address]	Checks connectivity
check_reg.sh	Checks if node is registered
myip.sh	Display ip address
hostname -i	Shows ip given by DHCP
cd /etc/asterisk	Takes you to the asterisk sub directory
nano rpt.conf	Start editing rpt.conf in the asterisk sub directory
exit	Takes you back to the Admin menu
admin.sh	Change the time zone

3. PROBLEMS ENCOUNTERED WHILST ATTEMPTING TO CONNECT TO THE BDARS 70cm REPEATER
It's not a good idea to send the BDARS repeater ID to the AllStar platform. If we did that and you connected into large networks with 70 repeaters or more nobody would be impressed when they heard our ID interfering with all their traffic. Just imagine if they all had their ID's coming onto the platform – what a mess that would be. The tail from the repeater is also a problem as it sets the AllStar node off and you get a ping pong cycle of the repeater keying up and the node reciprocating. There are ways to overcome these problems but it means changing the configuration of the 70cm repeater. I'm reluctant to do any work on a live repeater so I decided to make an experimental repeater using some more Baofengs. I did everything under the sun to try to get the 'spur' to work but no joy. What it needs is the repeater to send a carrier with CTCSS based on an incoming CTCSS only and not PTT that accompanies the ID and then you've still got a tail problem. The 70cm repeater needs reconfiguration and experimentation to allow a spur to work. It's all too much hassle - What we need is the Allstar node to be in the heart of the repeater as the repeater controller itself.

4. REPEATER NODE WITH ALLSTAR AS THE REPEATER CONTROLLER

Glenn (VK4PK) and I tried to get the AllStar to control an Icom FR4000 but unfortunately the FR4000 PTT was not functioning correctly when we set up as per the instructions i.e. Base Station mode with the Remote Control button enabled and the repeater software set for ACC CH ticked should extend the Pin 19 PTT to the back accessory plug on the rear of the repeater which is then provided a low condition from the AllStar RIM and should key up with the AllStar setup for full duplex working.

I will need to do further experimentation in Seychelles to see if I can get a repeater to work with AllStar as the repeater controller.

5. FURTHER WORK TO BE DONE

I feel as though I have only scratched the surface of what AllStar can do and will continue to use it as my core project. I know it is supposed to be able integrate Echolink/IRLP and APRS but as yet I haven't had the time to explore these extras. I have read that through the use of ArchLinux scripts you can configure the nodes to do all sorts of interesting things and this would be an area that I have never been in before so I'm looking forward to learning more along the way. If you are interested, I recommend you go to the HamVoIP.org site and read all the How To's – Join the ARM-ALLSTAR email forum and when you start to get your head around what AllStar can do, go lay down in a darkened room and think of something creative...I hope you come up with something special and you are able to bring the thought to reality without too much grief. Enjoy the journey !

6. ANOTHER DESCRIPTION

This is a much better write up than mine <http://www.repeater-builder.com/voip/pdf/allstar-newbie-guide.pdf>

7. KEEPING IN TOUCH

If you decide to give AllStar a go my simplex node is 49893 and my repeater node is 40258 but at the moment I'm still working to get a repeater connected. My email is richardperks95@gmail.com and I check it daily.

Have fun and don't forget at the end of the day we're amateurs so we're bound to make mistakes but that's the best way to learn ☺