

AllStar
EchoLink
IRLP

The “other” digital voice modes...

ABØL - September 21, 2021

Like DMR, DSTAR or C4FM, voice is converted to a digital stream via a codec.
Conversion happens inside a computer (node) attached to a radio or repeater.
Also called VoIP linking protocols.

IRLP

- Linux based, closed source
- Proprietary hardware you must purchase
- Tightly controlled
- Only radio traffic allowed
- Half-duplex
- Point-to-point linking only



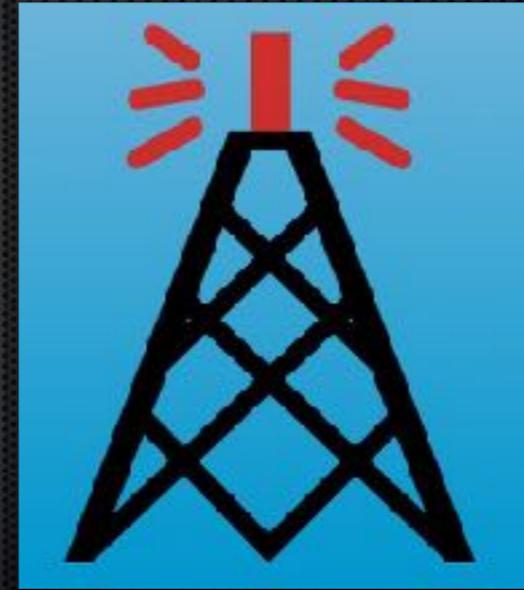
Developer Dave Cameron, VE7LTD. Originally and experiment in linking repeaters in Canada.

\$135 for a PC IRLP radio adapter board, \$150 for a Pi based version.

One-to-one connections, but link can be to special IRLP reflector software. Reflectors must be approved.

EchoLink

- Free, but closed source
- Primarily computer and phone clients
- Relatively poor half-duplex GSM audio
- Largest user base
- Multiple operating modes
- Multi-link via client conferencing and dedicated conference servers



Developer Jonathan Taylor, K1RFD

The “wild west” of analog audio linking solutions. Anything goes.

Official client is Windows only but lots of 3rd party ones. Some Kenwood radios have built-in EchoLink support.

Tigertronics SignaLink is popular radio adapter for computer interfacing.

User, Sysop (transceiver) modes. -L callsign suffix for simplex -R suffix for repeater

Low-barrier to entry leads to a LOT of misconfigured nodes (poor audio) and poor etiquette.

AllStar

- Uses Asterisk PBX
- Open source - many implementations
- Excellent full-duplex audio quality with choice of codecs
- Unlimited linking - every node is a hub
- Bridge support to other systems including EchoLink
- Easy firewall setup for clients - no port forwarding!



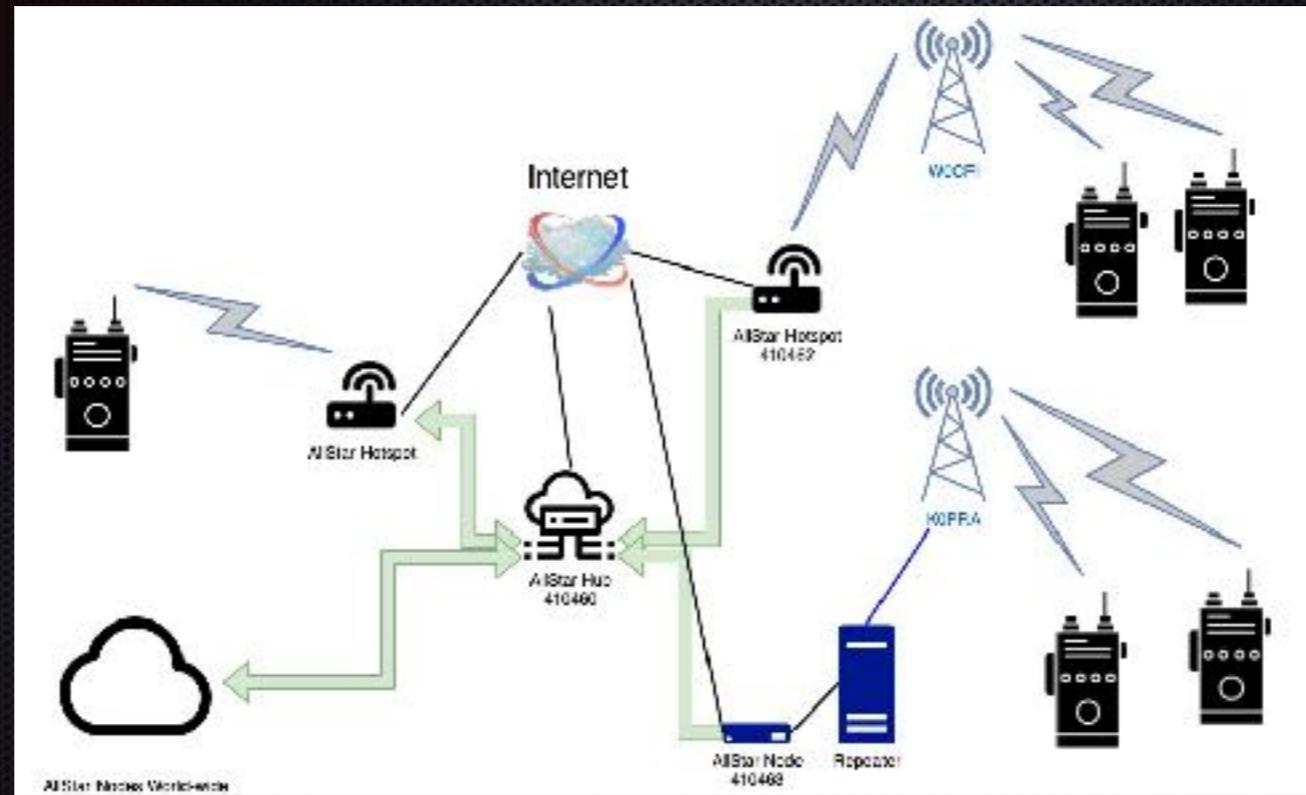
Jim Dixon, WB6NIL (SK) father of app_rpt an Asterisk module for repeater control.

ASL - Originally commercial, now free. Lots of hate for HAMVOIP.

HamVoIP - Fork of ASL. David McGough, KB4FXC, Made AllStar plug-and-play for Beaglebone and Pi.

RasLink - Jeremy Lincicome (Linzicomb), W0JRL, a visually impaired ham who lives downtown Denver. 100% command-line.

KOPRA AllStar Connections



Hub setup allows water tower links (behind cable modem) to connect.
Also provides a single point of entry to KOPRA world.
Asterisk manages routing and prohibits loops automatically!

Commercial AllStar Hotspot

Nano-Node AE Allstar Portable Hotspot



www.micro-node.com

\$495 (WiFi \$30 extra).

Programmable 430-450MHz 0.2 Watt simplex radio.

Kit AllStar Hotspot

SHARI (SA818 Ham Allstar Radio Interface)



Raspberry Pi based design by Stephen Smith (N8AR).

Simple kit (\$65) or fully assembled (\$90).

Uses SA818 UHF or VHF radio module.

This is what I wanted to do, just with a Pi Compute Module.

All-Mode Hotspot

Node-Ventures ClearNode



Raspberry Pi based AllStar, EchoLink and Digital Modes (DMR, P25, YSF, FCS, NXDN) simplex node with an integrated low power FM radio transceiver. Also uses SA818 UHF or VHF radio module and a modded Raspberry Pi.

Mobile app based configuration.

\$295

DIY AllStar Node



LOTS of really, really clever builds out there.
Radioless node possible with a mic and speaker.

AB0L Portable Node



My portable is a Pi with a Masters Communications RA-42 module and Baofeng 888. Under \$100.

ABØL Shack Node



Dual node (one radioless), touchscreen display.

Provides full CAT control of my Kenwood TM-V71A via custom DTMF.

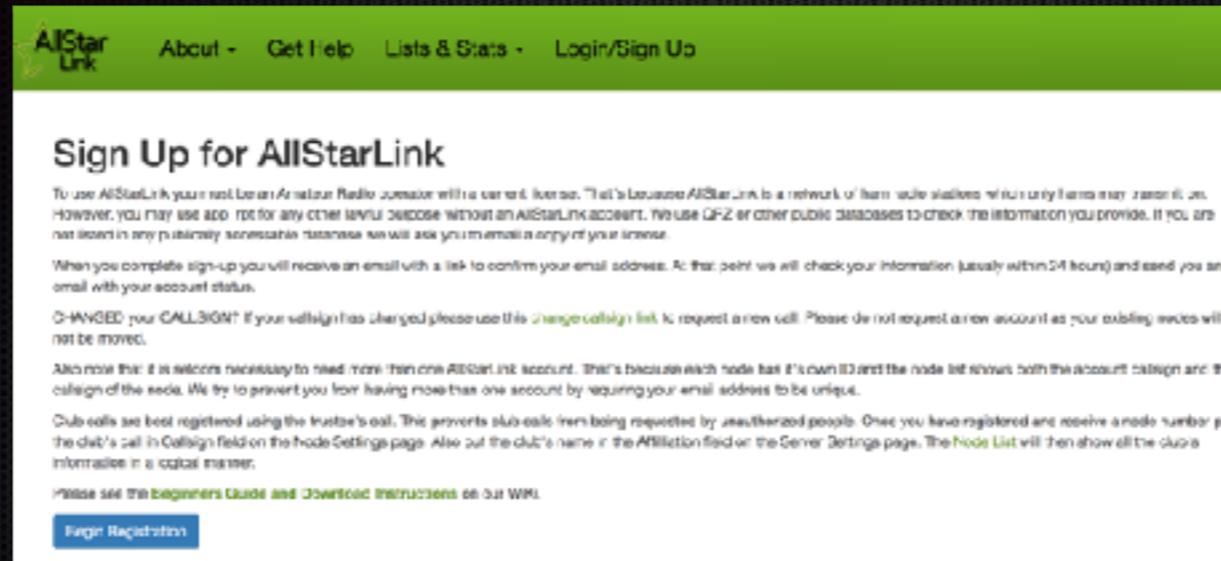
Water Tower AllStar node



Water Tower AllStar node



ASL registration



The screenshot shows the AllStarLink website's registration page. At the top, there is a green navigation bar with the AllStarLink logo and links for 'About', 'Get Help', 'Lists & Stats', and 'Login/Sign Up'. The main content area has a white background with the heading 'Sign Up for AllStarLink'. Below the heading, there are several paragraphs of text explaining the registration process, including a warning about changing call signs and instructions for club calls. At the bottom of the text, there is a blue button labeled 'Begin Registration'.

AllStarLink About - Get Help Lists & Stats - Login/Sign Up

Sign Up for AllStarLink

To use AllStarLink you must be an Amateur Radio operator with a valid license. That's because AllStarLink is a network of ham radio stations where only licensed operators can use it. However, you may use add ip for any other service without an AllStarLink account. We use QRZ or other public databases to check the information you provide. If you are not listed in any publicly accessible database we will ask you to email a copy of your license.

When you complete sign-up you will receive an email with a link to confirm your email address. At that point we will check your information (usually within 24 hours) and send you an email with your account status.

CHANGED your CALLSIGN? If your callsign has changed please use this [change callsign link](#) to request a new call. Please do not request a new account as your existing nodes will not be moved.

Also note that it is not necessary to need more than one AllStarLink account. That's because each node has it's own ID and the node list shows both the account callsign and the callsign of the node. We try to prevent you from having more than one account by requiring your email address to be unique.

Club calls are best registered using the trustee's call. This prevents club calls from being requested by unauthorized people. Once you have registered and receive a node number put the club's call in Callsign field on the Node Settings page. Also put the club's name in the Affiliation field on the Server Settings page. The [Node List](#) will then show all the club's information in a central manner.

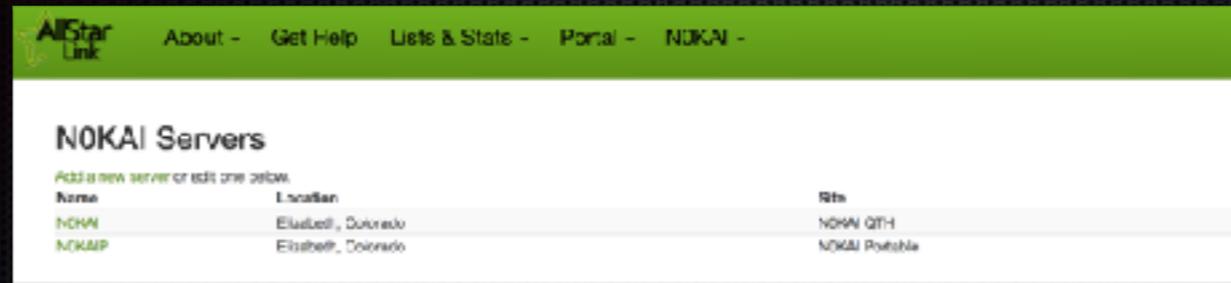
Please see the [beginners Guide](#) and [Download Instructions](#) on our Wiki.

[Begin Registration](#)

Regardless of distro, start here.

Processed in under 24 hours. <1 isn't unusual during the day.

ASL server setup



The screenshot shows the ASL Link website interface. At the top, there is a green navigation bar with the ASL Link logo and menu items: About - Get Help Lists & Stats - Portal - NOKAI -. Below the navigation bar, the main content area is titled "NOKAI Servers". Underneath the title, there is a link that says "Add a new server or edit one below.". Below this link is a table with three columns: Name, Location, and Site. The table contains two rows of data.

Name	Location	Site
NOKAI	Elizabeth, Colorado	NOKAI QTH
NOKAMP	Elizabeth, Colorado	NOKAI Portable

- Typically one node per server but servers can support multiple nodes.
- Think of the server as the Pi, nodes as radio adapters.
- Remember to change the IAX port number if you're running multiple servers on the same IP.

ASL node setup

NOKAI Nodes

Press Continue to:

- Request a new node number from AIStarLINK.
- Extend a node number up to 10 spaces.
- Delete a node number.

[Continue...](#)

Or click a node number below to edit it.

Node Number	Server	Callplan	Password	Web Receiver	Show Cards	Firms Ad	Phone Portal	Print Base	Azale	MHX
47712	NOKAI	NOKAI		Yes	Yes	No	Yes	No	No	No
47810	NOKAI*	NOKAI		No	Yes	No	No	No	No	No
48121	NOKAI	NOKAI		Yes	Yes	No	Yes	No	No	No

Mouseover password to show.

- Most config options aren't recognized by HAMVOIP, but no harm in filling it out.
- Node numbers are human-issued and take time. Typically an hour or two during business hours.
- New "extend" feature allows self-service of generating up to 10 node numbers off an existing one.

Hover over the password field to reveal the node password. You'll need it for setup.

Radio config (CHIRP)



The screenshot shows the CHIRP software interface with a table of radio configurations. The table has the following columns: LOC, Frequency, Mode, PL, DTCS, UPLS LDR, UPLS TX LDR, UPLS FM, UPLS MOD, PLDEC, UPLS, MODE, POWER, and SKD. The rows represent different radio channels, with LOC numbers 1 through 15. The configurations include various frequencies, modes (DTCS, FM), and power levels (High, Low).

LOC	FREQ	MODE	PL	DTCS	UPLS LDR	UPLS TX LDR	UPLS FM	UPLS MOD	PLDEC	UPLS	MODE	POWER	SKD
1	440.70000	DTCS			DTCS		FM	(None)			FM	High	
2	440.88000	DTCS			DTCS		FM	(None)			FM	High	
3	440.82000	None						(None)			FM	High	
4	440.84000	None						(None)			FM	High	
5	440.87000	None						(None)			FM	High	
6	440.88000	DTCS			DTCS		FM	(None)			FM	High	
7	440.90000	None						(None)			FM	High	
8	440.92000	None						(None)			FM	High	
9	440.97000	None						(None)			FM	High	
10	440.98000	None						(None)			FM	High	
11	440.99000	None						(None)			FM	High	
12	440.97000	None						(None)			FM	High	
13	440.98000	None						(None)			FM	High	
14	440.98000	None						(None)			FM	High	
15	440.98000	DTCS			DTCS		FM	(None)			FM	High	

- ALWAYS use PL tone or DTCS. Otherwise, unwanted traffic could be passed back into your connected AllStar nodes.
- Set power to low unless you removed the final transistor, then it doesn't matter. Might want to adjust the timeout timer in settings as well.

Consider setting up several frequencies based on the band plans of the places you frequently travel.

HAMVOIP 1st boot

- Is your hotspot wireless? Google for the tip in placing a pre-built WiFi config file on the Pi SD card prior to boot.
- Have your HT on the right frequency and you'll hear the server beep out it's IP address in morse code during startup.
- Code copy rusty? Find the IP in your firewall or router's DHCP logs. Look for 'ALARM' (I think).
- Using your favorite terminal client (Putty, etc), connect to the server IP via ssh on port 222. Login is root, password is root.
- The "First Time" script will start automatically. Fill in all the goodies, including your node password. Refer to <https://hamvoip.org> directions if you get stuck.
- Firewall / port-forwarding is not required for outbound AllStar connections. To allow inbound, you'll need to port-forward UDP for your IAX port (typically 4569) to your server.

An active Internet connection is required to complete setup.

You can skip over the simpleusb-tune part for now. You'll be spending a fair bit of time in there later fine-tuning audio levels.

There are more port forwarding requirements for EchoLink, if enabled.

Welcome to HAMVOIP!

```
Admin Menu List for: n0kai (192.168.0.11)
Please select:
1 Perform a system UPDATE (Internet access required)
2 Change the ROOT password
3 Change the primary NODE number
4 Change the system Timezone
5 Change the system Hostname
6 Configure the Wired Ethernet Networking
7 Configure the WiFi Interface Networking
8 Change the Secure Shell (SSH) port
9 Start Bash shell interface
10 Display System Version Numbers
11 Run Asterisk CLI client
12 Run simpleusb-tune-menu Application
13 Restart Asterisk Server
14 Power-cycle the USB sub-system
15 Reboot this system
16 Perform system power down

<Run Selected Item>    < Exit / Logout >
```

Tip: To force a re-run of the “First Time” setup, select 3, Change primary node #.

Summon a bash shell via 9. Sadly, you will be editing config files from the command line at some point.

Asterisk CLI

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

Asterisk 1.4.23-pre.hamvoip-V1.5.3-58-app_rpt-0.327-07/22/2019, 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-V1.5.3-58-app_rpt-0.327-07/22/2019 currently runn
ing on n0kai (pid = 335)
Verbosity is at least 4
n0kai>CLI> rpt fun 67712 *1410460
```

Monitor Asterisk events (including DTMF decodes).

Enter commands to HAMVOIP via 'rpt fun'.

Asterisk can also be called from the command line - perfect for scripting.

simpleusb-tune

```
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
E) 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 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 "usb")
L) Change CTCSSFROM Mode (currently "no")
M) Change RXONDELAY value (currently "25")
N) Change RXAUDIODELAY value (currently "8")
W) Write (Save) Current Parameter Values
B) Exit Menu

Please enter your selection now: █
```

V to view live telemetry.

2 & 3 (main) to set audio levels (4 is aux/tone audio).

C enables "parrot" (local only). There are real AllStar parrot nodes - google.

If PTT keeps "looping" due to squelch tail, tweak RXONDELAY.

Don't forget to W!

Common HAMVOIP config files

- /etc/asterisk/rpt.conf
“main” config file. Pretty well commented.
- /etc/asterisk/iax.conf
Codec and network settings.
- /etc/asterisk/simpleusb_tune_*.conf
Pretty well handled by simpleusb-tune.
- /etc/asterisk/echolink.conf
EchoLink setup.
- /usr/local/etc/allstar.env
Lots of startup options.
- root crontab
Stop the silly hourly time announcement.

There are more... Lots more.
Use a light touch.

Operating Tips

- Love DTMF, hate DTMF.
- Consider setting up Allmon or Supermon.
- Beeps and boops, or how to deal with courtesy tones and telemetry.
- Be a good ham. Announce your DTMF.
- Bookmark <http://stats.allstarlink.org/>



Some radios are better at DTMF than others. Too loud, too soft, missing ABCD, etc.

Baofeng DTMF config gotcha.

Web based config / supervisor tools Allmon / Supermon are useful, even for a single node.

Want to totally shut up a node? duplex=0 in rpt.conf. Legal???

While connected, always announce with your call that you're about to send DTMF ASL commands. Even though there's options to suppress, a bit does leak past and you'll still have the linked repeaters keyed up while sending.

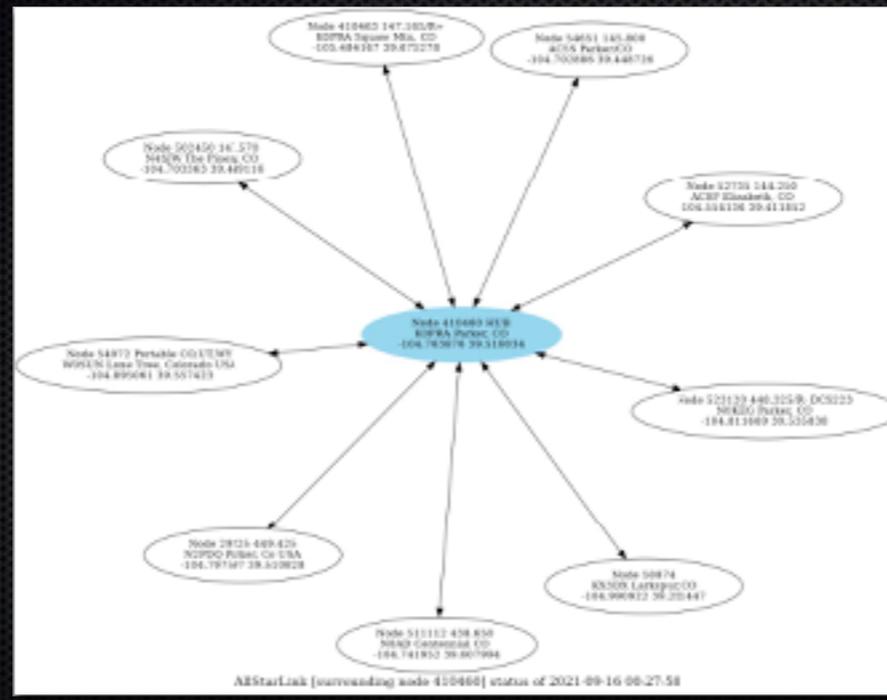
Getting help

- Google site search of hamvoip.org for specific questions.
- Very active listserv at <http://lists.hamvoip.org/cgi-bin/mailman/listinfo/arm-allstar> - best way to reach developers.
- <https://web-tpa.allstarlink.org/support/> - beware though - HAMVOIP is a fork of ASL.

hamvoip.org homepage is deceptively simple. There's a LOT of nested and buried content. Good site search is your friend here.

ASL has wikis and support forums but beware - there's bad blood between these teams. Also, not all ASL configs and commands are identical to HAMVOIP!

AllStar Stats bubble map



Obligatory cat pic



Thanks for listening!
73, ABØL