AllStar Link

Skyler
KDØWHB
Why use the internet in amateur radio!?!?

- Mesh networks
  - Intranet vs internet
  - Linked repeaters through microwaves
- Hams as experimenters with leading technology
What is AllStar?

- Radio Over Internet Protocol built for analog radios, nodes, repeaters, or
- Asterisk, app_rpt

- Open source and highly customizable
- ACID Built on CentOS Linux (No longer Supported by AllStar)
- Dial built on Debian or Raspbian for the pi
System Comparison:

EchoLink vs AllStar Link

Internet Radio Linking Project vs D-STAR
IRLP
• First Radio over Internet network Protocol (RoIP)
• Half-Duplex
• Node to node or node to reflector
• Specific hardware
• REQUIRED to come in through a radio
•

“Keeping the radio in amateur radio”
EchoLink

- Introduced the computer to ham radio
- Traditional node setup requires Windows
- Specific software required
- Poor audio quality (GSM)
- One node per IP address
- Max 3 nodes per CallSign
D-STAR

- Link System Similar to IRLP, Node to Node or Node to Reflector
- Only digital users allowed on the network, no analog cross-connecting
- FreeStar
- No software decoding (yet)
AllStar Linking Capabilities

- Unlimited simultaneous connections
- Remote Command
- Full duplex
- Remote base capability
- Rules pertain to the FCC regulations rather than their own set of rules unlike IRLP.
Allstar Link [surrounding node 28427] status of 11/07/15 05:36:37 GMT
Allstar Link [surrounding node 2500] status of 11/07/15 05:33:22 GMT
Private / Public Nodes

- Internet linked nodes can be
  - Public – Other AllStar nodes can connect
  - Private – Only connections to a specified private node
- Private suitable not only for ham radio, GMRS, talk server with friends using no RF, etc...
- FUN system and Colorado Connection- Private
- WIN System WAN system - Public
Typical AllStar System

- USB radio interface (basically a sound card with PTT)
- Computer
- Radio

Half-Duplex all-star node
Controller

- Repeater controller all performed in software:
  - PL tones
  - Courtesy beeps
  - Announcements
  - Schedules
  - DTMF commands
  - Shell scripts

Simple Configuration files for Repeater and USB radio interface
Old Tower PC
Beagle bone Black
Raspberry Pi 2

Jeremy W0JRL, right here in Denver made an image for the Raspberry PI 2!
Liva mini PC
Radio interface
URIx (Usb Radio Interface)

- DMK engineering
- $75 for hams
- $100 non-hams
- 25 pins for various functions
- RF shielded
Modified Sound FOB

- $15
- PTT needed at minimum, so modification to a CM108 sound chip is necessary
- RF shielding may be needed
- TINY surface mount soldering
AllStar RTCM

Radio Thin Client Module
Model No: MN-5000
Serial No: _________
Supported in AllStar one box

- AllStar ✔
- EchoLink ✔
- DSTAR (In the form of Free Star Digital Board Required) ✔
- IRLP ✗
Registration for the AllStar link network

• Go to AllStarlink.org
• Click Register
• CallSign Verification may be needed

To setup your own node, check “System Operator” and then run the setup wizard.
rpt.conf

• Located in /etc/asterisk
• Repeater Configuration file
• ID’s, DTMF functions/shortcuts, scheduler

[morse40764]
speed=20
frequency=750
amplitude=4096
idfrequency=680
idamplitude=1500

821=cop,21 ; parrot mode (store and forward repeat)
822=cop,22 ; parrot mode disable
823=localplay,/etc/asterisk/sounds/amsat
824=localplay,/etc/asterisk/sounds/louisiana
828=localplay,/etc/asterisk/sounds/amsat5min
829=localplay,/etc/asterisk/sounds/yachtin5mins
usbradio.conf

- Also in /etc/asterisk folder
- Configures your USB fob / URIx
- Choose between software and hardware CTCSS decoding

```plaintext
[usb40764]
hdwtype=0
rxboost=1
txboost=1
rxctcssrelax=1
txctcssdefault=103.5
rxctcssfreqs=103.5
txctcssfreqs=103.5
;rxctcssoverride=0
carrierfrom=dsp
ctcssfrom=dsp
rxdemod=flat

[usb41694]
hdwtype=0
rxboost=1
txboost=1
rxctcssrelax=1
txctcssdefault=123.0
rxctcssfreqs=123.0
txctcssfreqs=123.0
;rxctcssoverride=0
carrierfrom=usb
ctcssfrom=usb
rxdemod=speaker
```
radio-tune-menu

• Activated by simply typing radio-tune-menu

Active (command) USB Radio device is [usb40764]
1) Select USB device
2) Auto-Detect Rx Noise Level Value (with no carrier)
3) Set Rx Voice Level (using display)
4) Auto-Detect Rx CTCSS Level Value (with carrier + CTCSS)
5) Set Rx Squelch Level
6) Set Transmit Voice Level
7) Set Transmit Aux Voice Level
8) Set Transmit CTCSS Level
9) Auto-Detect Rx Voice Level Value (with carrier + 1KHz @ 3KHz Dev)
E) Toggle Echo Mode (currently Disabled)
F) Flash (Toggle PTT and Tone output several times)
P) Print Current Parameter Values
S) Swap Current USB device with another USB device
T) Toggle Transmit Test Tone/Keying (currently Disabled)
W) Write (Save) Current Parameter Values
0) Exit Menu
Asterisk CLI

• Type Asterisk –r
• Simulate DTMF commands by typing
  – rpt fun <node number> <dtmf command>
• Play a file on your node by typing
  – Rpt localplay <node number> <path to unsigned wav file or ulaw>
How can I link in to an AllStar node?
Topology

- Echolink
- Internet Radio Linking Project
- Linux - Centos 5.7 with Asterisk
- AllStar Link
- PC with Echolink Software
- The Internet
- Access via Webtransceiver, Mobile & Base Radio
  Echolink, IRLP, SIP Phone/Android/iPhone/Phone, DStar
RF

• Link in from handheld, mobile, or base (obviously)
• Configuration files for Simplex node,
Telephone portal

• Connect to an AllStar using any telephone
• Account required on the AllStar link networks
• DTMF activated PTT
SIP phone or iAX

Setup an iAX server or SIP on the node, and then log in via a smartphone or computer.
EchoLink App

KD0WHB-L
Denver CO [0/20]
Node 985839

Connect

Add to Favorites
EchoLink PC/Mac client
### State | Node
--- | ---
1 | OK <2075> W9SH MAIN QTH
2
3
4

The image shows a software interface named **iaxRpt**, which appears to be used for managing and monitoring network connections. The interface includes a table with columns for **State** and **Node**, showing the current status and node information for each entry. Below the table, there is a dial pad with buttons for connecting, scanning, and disconnecting, along with various options for different functions such as speaker, disconnect, and different nodes or commands like 2000-WB6NIL-Hub, 2070 - W9SH - Repeater, and more. The interface also includes buttons for **Monitor** and **Transmit**.
Network Requirements

• AllStar- **Port 4569 UDP**
• EchoLink- **Ports 1998-2000 UDP**
• Audio Codec used-
  – **ULAW** (for higher bandwidth internet connections, good quality)
  – **GSM** (echolink sounding quality)
## Allstar Monitor II

Monitoring the World One Node at a Time

**Node 28508** - AH6OD HAWAIIAN ALLSTAR HUB San Francisco, California USA

<table>
<thead>
<tr>
<th>Node</th>
<th>Node Information</th>
<th>Received</th>
<th>Link</th>
<th>Direction</th>
<th>Connected</th>
<th>Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>27062</td>
<td>N3CMD 145.650 Mapleton, Utah USA</td>
<td>000:37:09</td>
<td>ESTABLISHED</td>
<td>OUT</td>
<td>32:26:06</td>
<td>Transceive</td>
</tr>
<tr>
<td>40564</td>
<td>KH6XP Hub LA</td>
<td>001:09:11</td>
<td>ESTABLISHED</td>
<td>IN</td>
<td>06:05:44</td>
<td>Transceive</td>
</tr>
<tr>
<td>27150</td>
<td>NR7Y 439.175 West Jordan, Utah USA</td>
<td>001:59:38</td>
<td>ESTABLISHED</td>
<td>OUT</td>
<td>31:18:22</td>
<td>Transceive</td>
</tr>
<tr>
<td>29277</td>
<td>WH6FG KAUAI HUB Kalaeo, Kauai, Hawaii USA</td>
<td>007:59:38</td>
<td>ESTABLISHED</td>
<td>OUT</td>
<td>32:25:24</td>
<td>Transceive</td>
</tr>
<tr>
<td>27075</td>
<td>NH6OV Hawaiian Allstar HUB Keaau, Hawaii USA</td>
<td>011:28:22</td>
<td>ESTABLISHED</td>
<td>IN</td>
<td>32:27:05</td>
<td>Transceive</td>
</tr>
<tr>
<td>41190</td>
<td>WH6TAT 442.325 + Kailua Kona, Hawaii USA</td>
<td>019:07:39</td>
<td>ESTABLISHED</td>
<td>OUT</td>
<td>12:50:06</td>
<td>Transceive</td>
</tr>
<tr>
<td>42063</td>
<td>WH6EUQ 446.150 SMPLX Hawi, Hawaii USA</td>
<td>030:51:08</td>
<td>ESTABLISHED</td>
<td>OUT</td>
<td>32:25:55</td>
<td>Transceive</td>
</tr>
<tr>
<td>41683</td>
<td>KE7VPU St. George, Utah USA</td>
<td>035:16:00</td>
<td>ESTABLISHED</td>
<td>OUT</td>
<td>32:26:14</td>
<td>Transceive</td>
</tr>
<tr>
<td>40899</td>
<td>WB7UBC 146.400 Simplex Aurora, Oregon</td>
<td>035:22:25</td>
<td>ESTABLISHED</td>
<td>IN</td>
<td>32:27:10</td>
<td>Transceive</td>
</tr>
<tr>
<td>km4kuh</td>
<td>Never</td>
<td></td>
<td>ESTABLISHED</td>
<td>IN</td>
<td>11:58:46</td>
<td>Transceive</td>
</tr>
<tr>
<td>29816</td>
<td>KB9EWP Test BBB Oakland, CA</td>
<td>Never</td>
<td>ESTABLISHED</td>
<td>IN</td>
<td>11:28:05</td>
<td>Transceive</td>
</tr>
<tr>
<td>41125</td>
<td>KH6TZ Waikiki Hub 2412MHz Honolulu, Hawaii, USA</td>
<td>Never</td>
<td>ESTABLISHED</td>
<td>IN</td>
<td>02:02:28</td>
<td>Transceive</td>
</tr>
</tbody>
</table>
Node linked to the internet at Skyler KDØWHB’s QTH

TX: 444.875
RX: 449.875
Half Duplex Link

Services:
Allstar and
Echolink

25 miles

Eldorado Mountain Repeater

TX: 449.875
RX: 444.875
8,300 feet
PL: 103.5
Tutorial Videos

- Setting up an AllStar node on a PC computer
  - http://tinyurl.com/allstarsetuppc
- AllStar Link System Demo
  - http://tinyurl.com/allstarlinkdemo
- AllStar Link Raspberry Pi 2 setup video
  - (coming soon)
NanoStar (Coming Soon!)

- **Cheap** USB AllStar / EchoLink node ready to go
- Just plug into old computer or raspberry pi, and install the AllStar operating system
- **70cm** operating band
- $55 (**Preorder** now, coming January)
- 1W output power with frequency programmable with software.
- Great for portable operation or a home node to operate from handheld
- Help support me to go to Dayton to speak at the youth Forum
NanoStar (preorder at demo table)

INTERNET ➔ Ethernet/WiFi

COMPUTER ➔ USB

NanoStar ➔ RF

User ☺

12vdc
Conclusion

• Open Source
• Possible with Cheap hardware
• Powerful linking capabilities
• Although requires command line setup, simple steps are all shown when running the setup script
Great Resources!

- Allstarlink.org – Official AllStar Page, web transceiver.
- Amsatnet.info/#node – My webpage on AllStar link
- App_rpt users eMail group
- http://ohnosec.org/drupal/ Some documentation on AllStar
- Jlappliedtechnologies.com – Jeremy W0JRL’s website with his AllStar Raspberry PI image.
Live DEMO time!!

- Please tune your handheld transceiver to **446.275 Mhz simplex** with a transmit tone of **100 hz**!

- **Also** tune into **446.225 (-5.0Mhz)** **100hz** repeater