

# AllStar Link

Skyler  
KDØWHB

# Why use the internet in amateur radio!?!

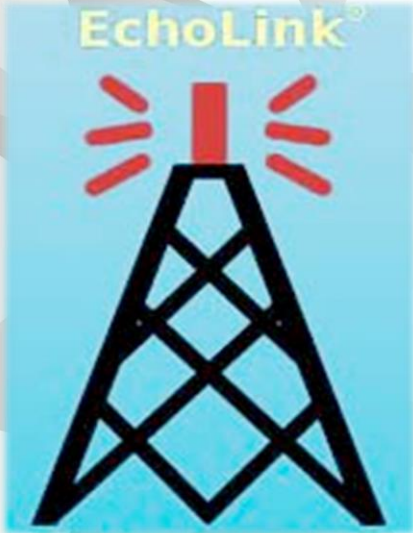
- Mesh networks
  - Intranet vs internet
  - Linked repeaters through microwaves
- Hams as experimenters with leading technology



# 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:



VS



# IRLP

- First Radio over Internet network Protocol (RoIP)
- Half-Duplex
- Node to node or node to reflector

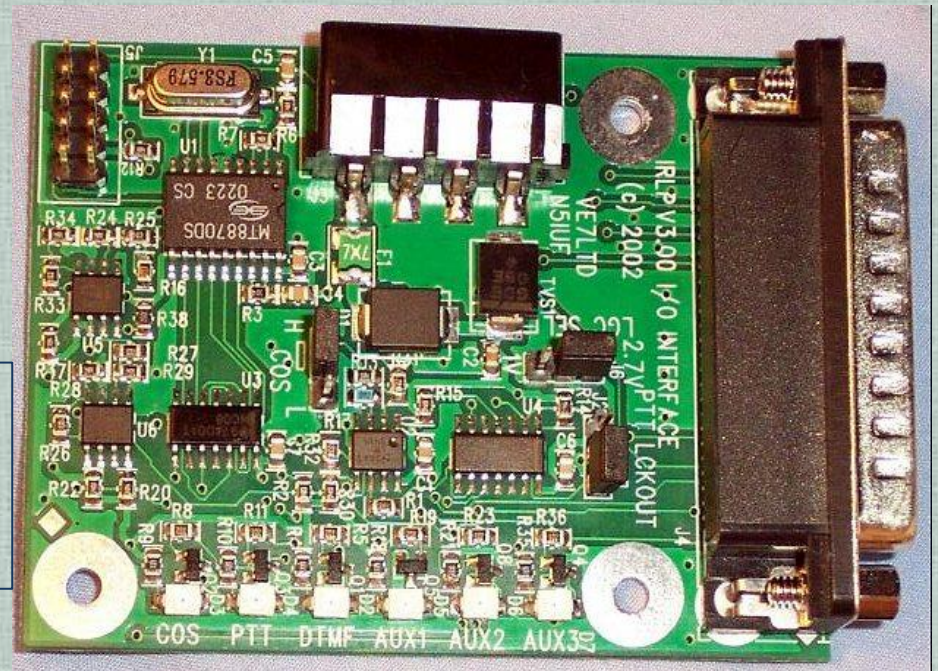
- Specific hardware
- REQUIRED

to come in through

a radio

- 

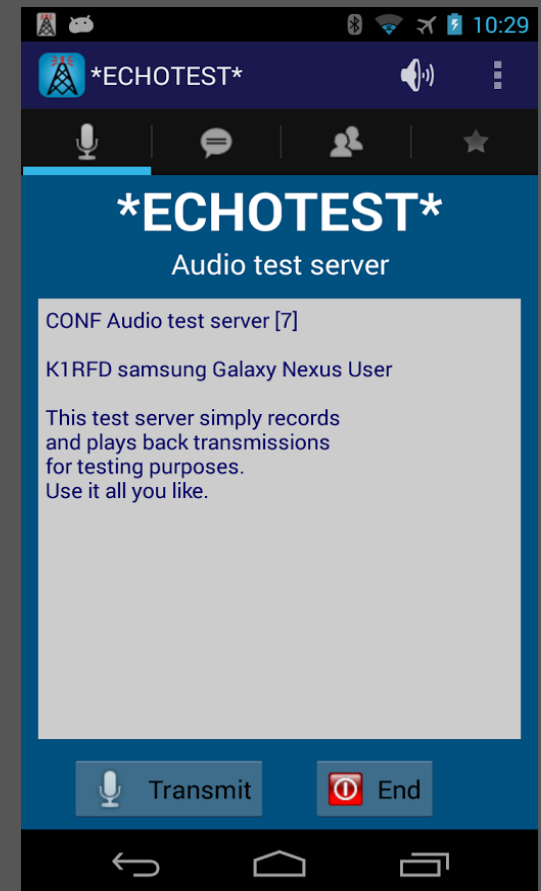
*IRLP  
board*



“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



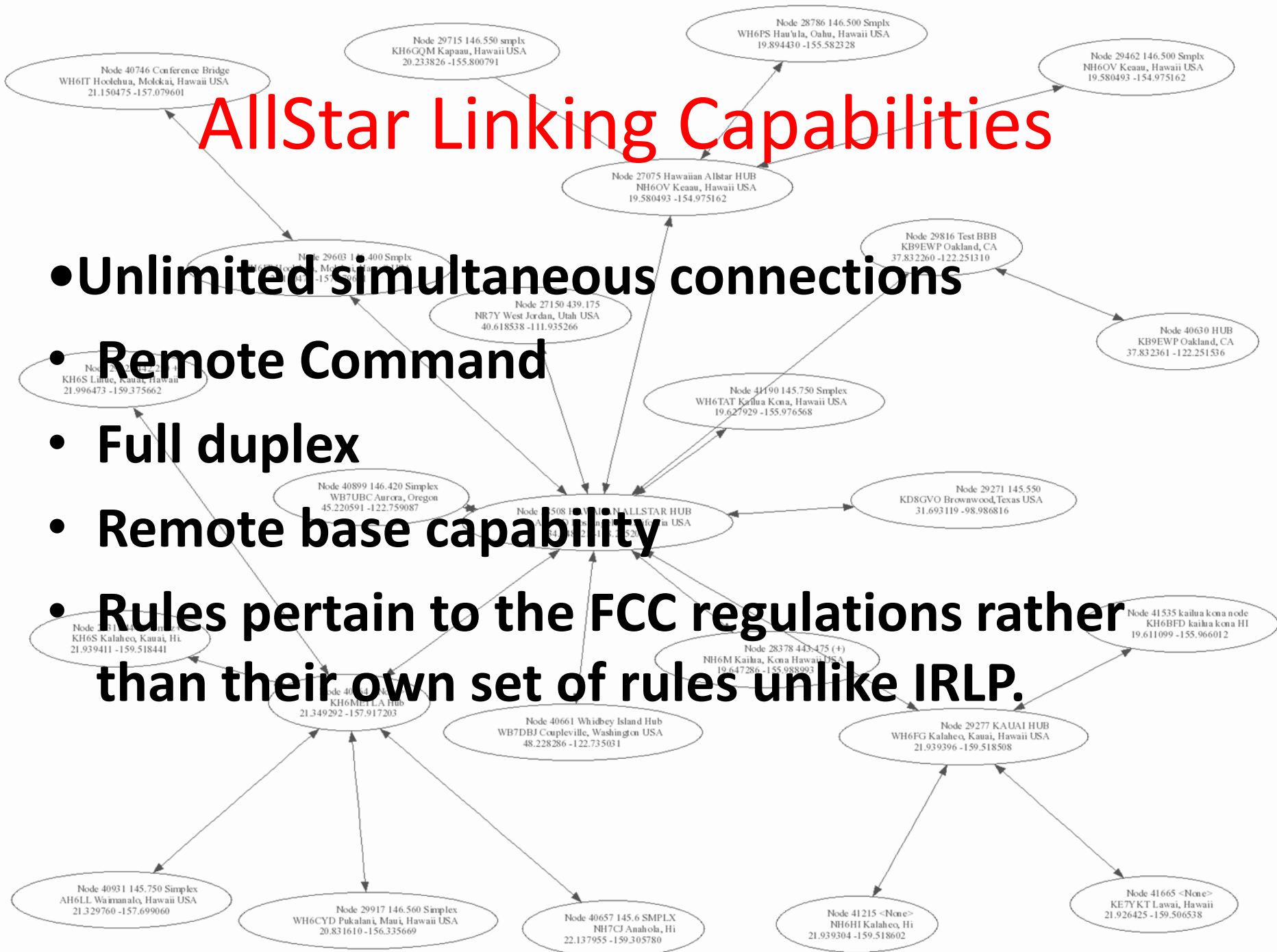
# D-STAR

- 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)

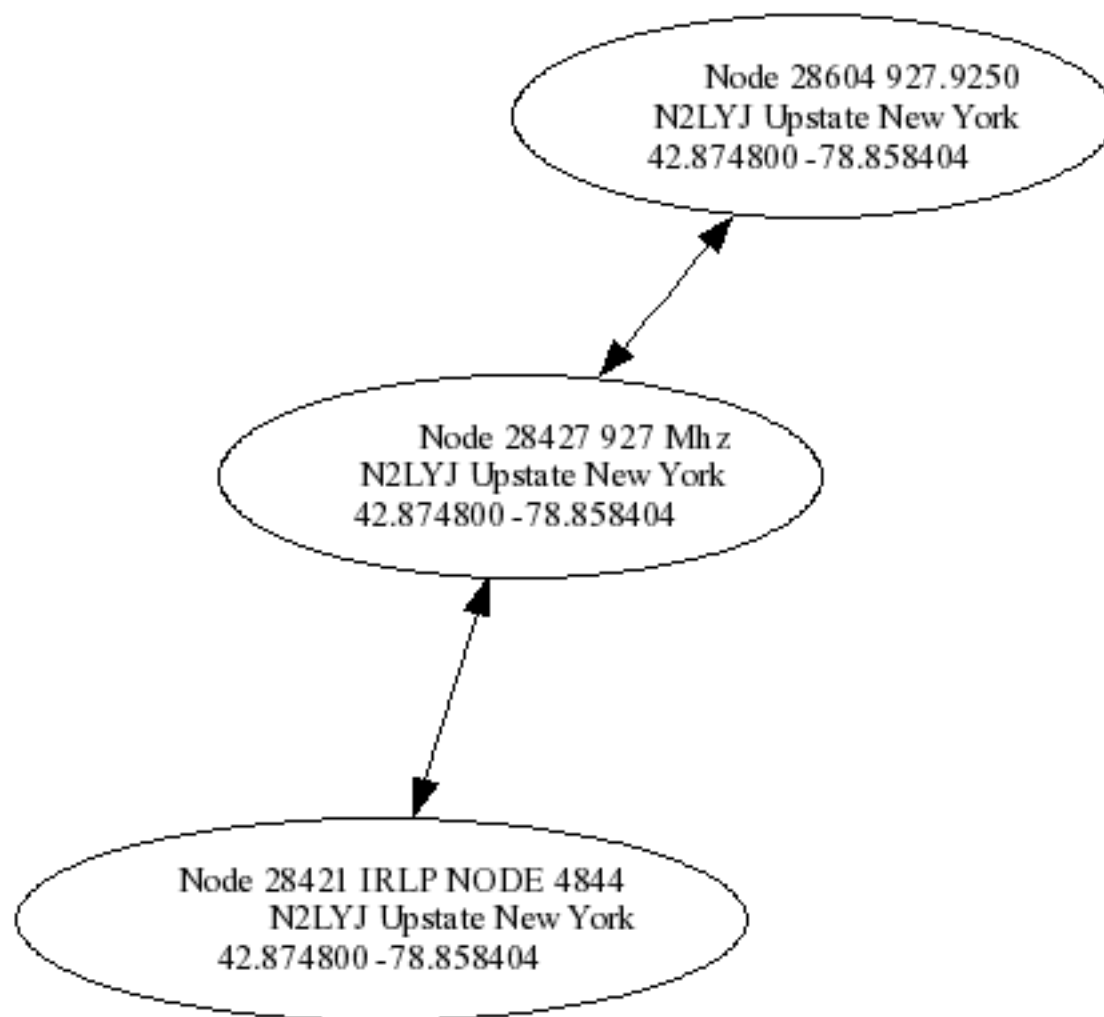


# AllStar Linking Capabilities

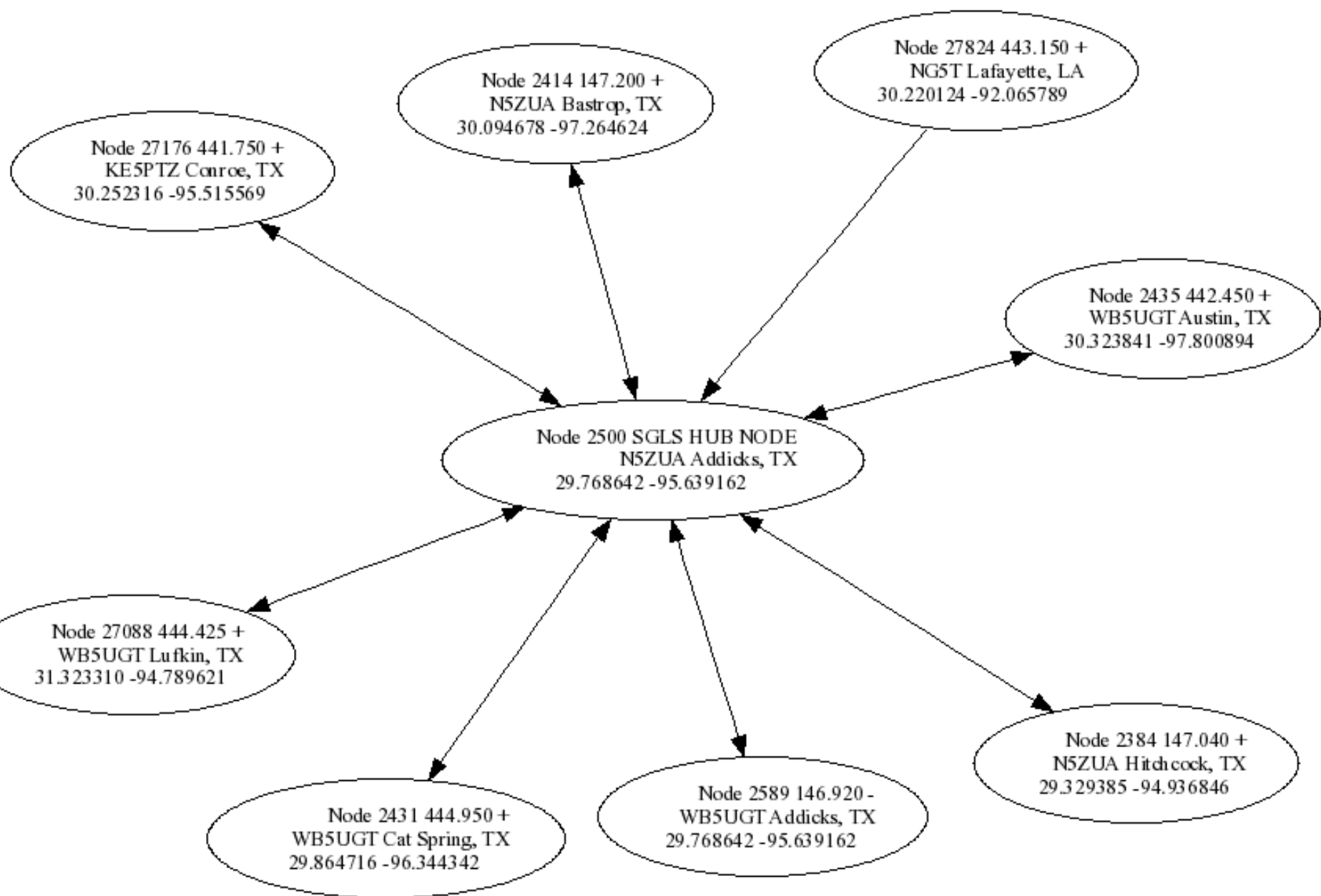
- Unlimited simultaneous connections
- Remote Command
- Full duplex
- Remote base capability
- Rules pertain to the FCC regulations rather than their own set of rules unlike IRLP.







Allstar Link [surrounding node 28427] status of 11/07/15 05:36:37 GMT



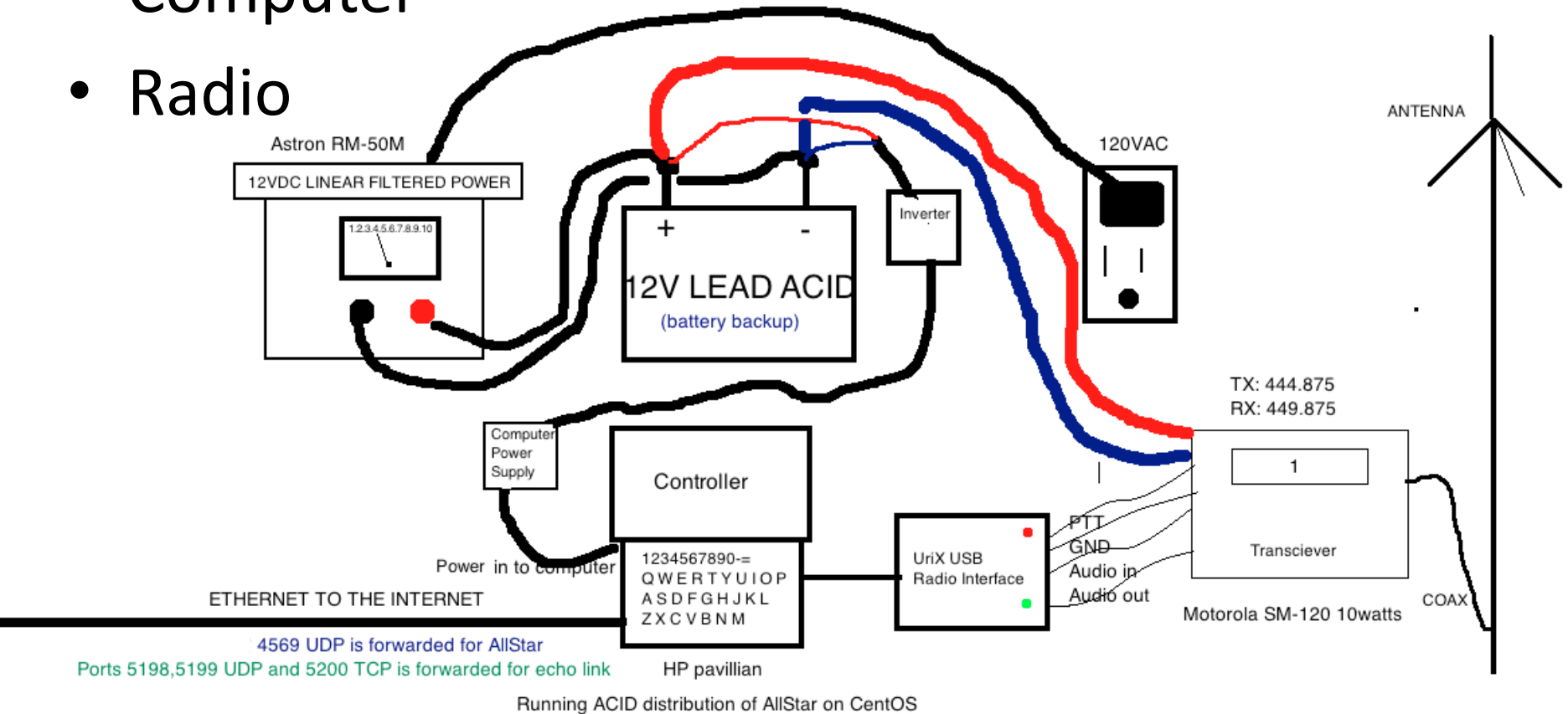
Allstar Link [surrounding node 2500] status of 11/07/15 05:33:22 GMT

# 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



rpt.conf



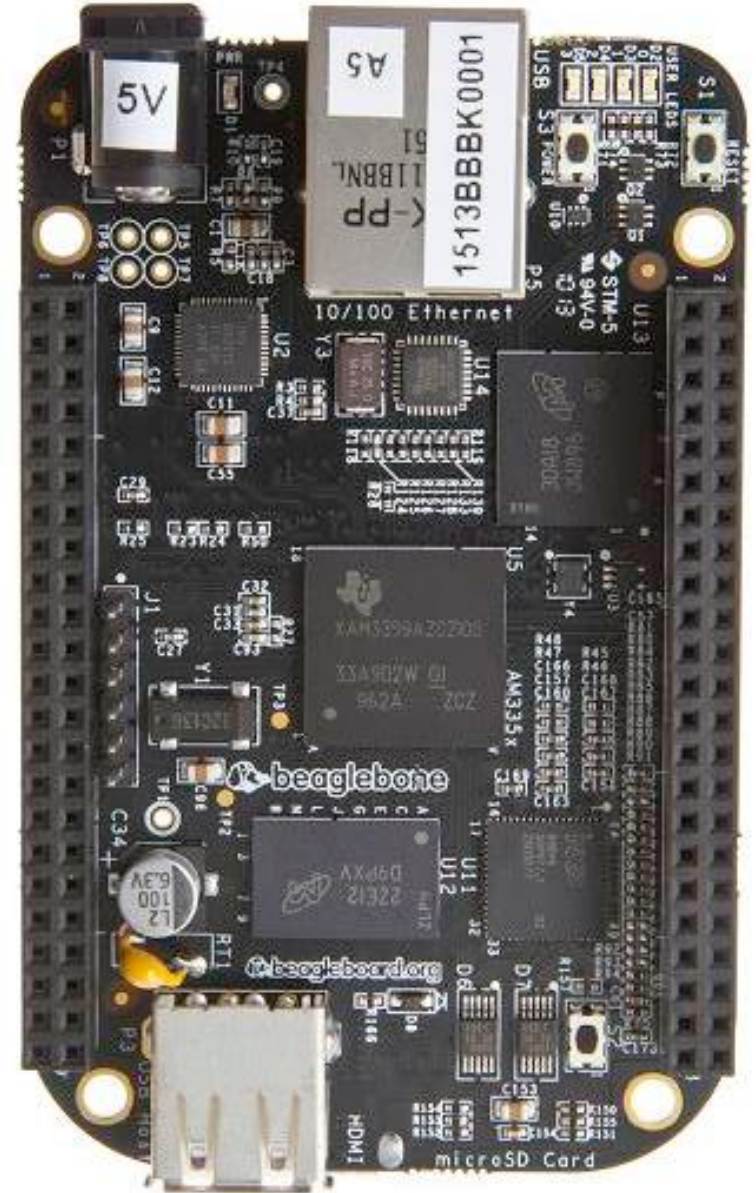
usbradio.conf

Simple Configuration files  
for Repeater and USB  
radio interface

# Old Tower PC

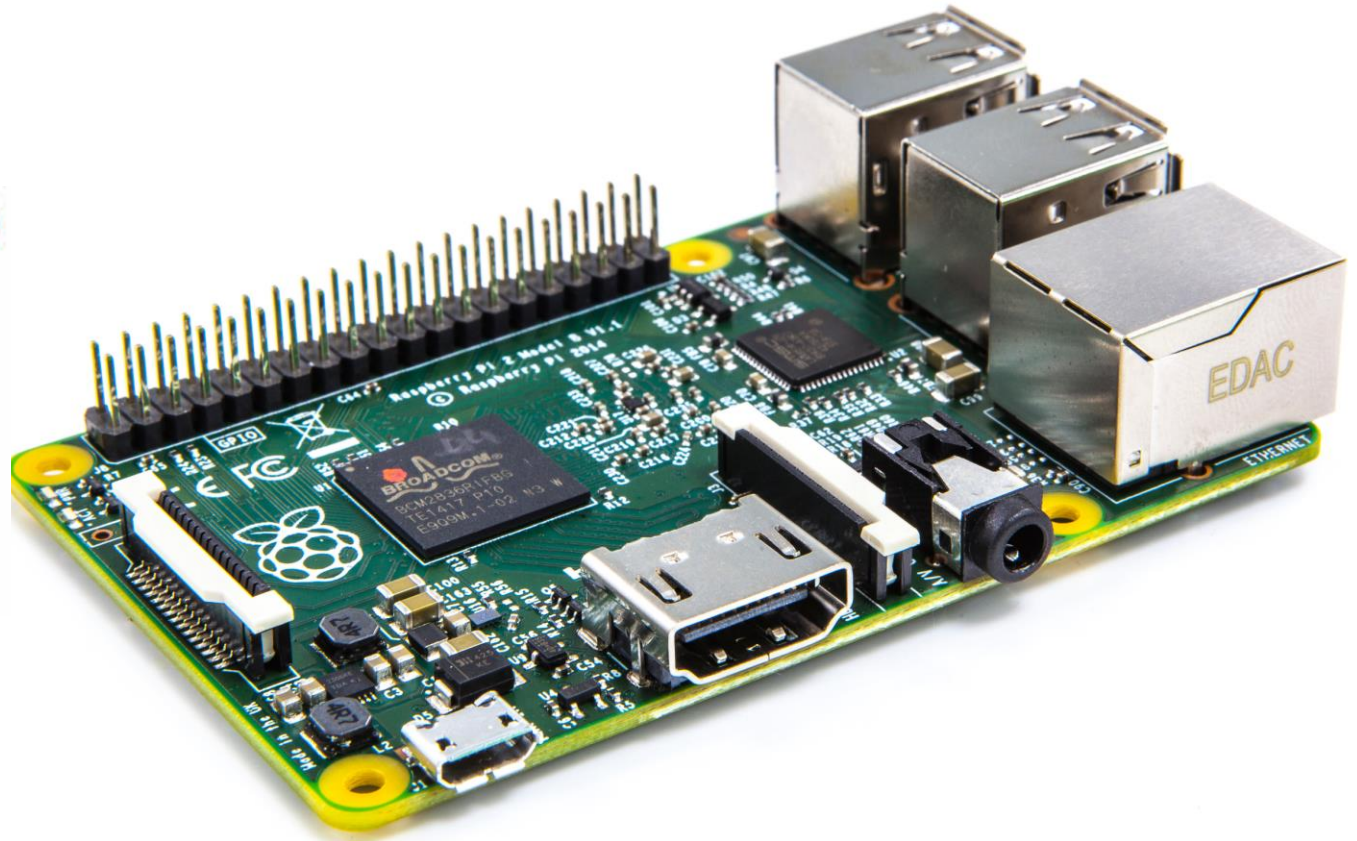


# Beagle bone Black



# Raspberry Pi 2

**Jeremy W0JRL,  
right here in  
Denver made an  
image for the  
Raspberry PI 2!**





# Liva mini PC



# Radio interface



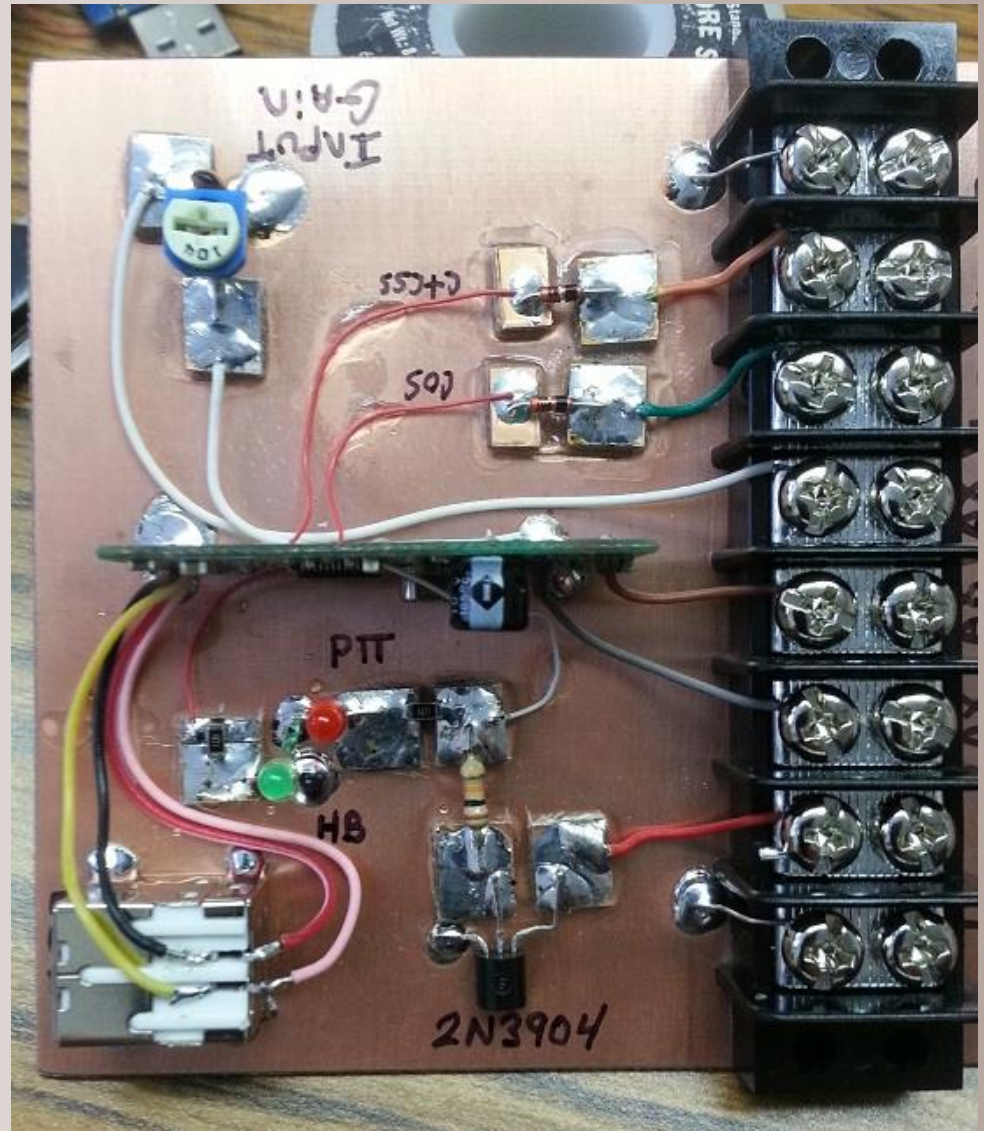
# URix (Usb Radio Interface)

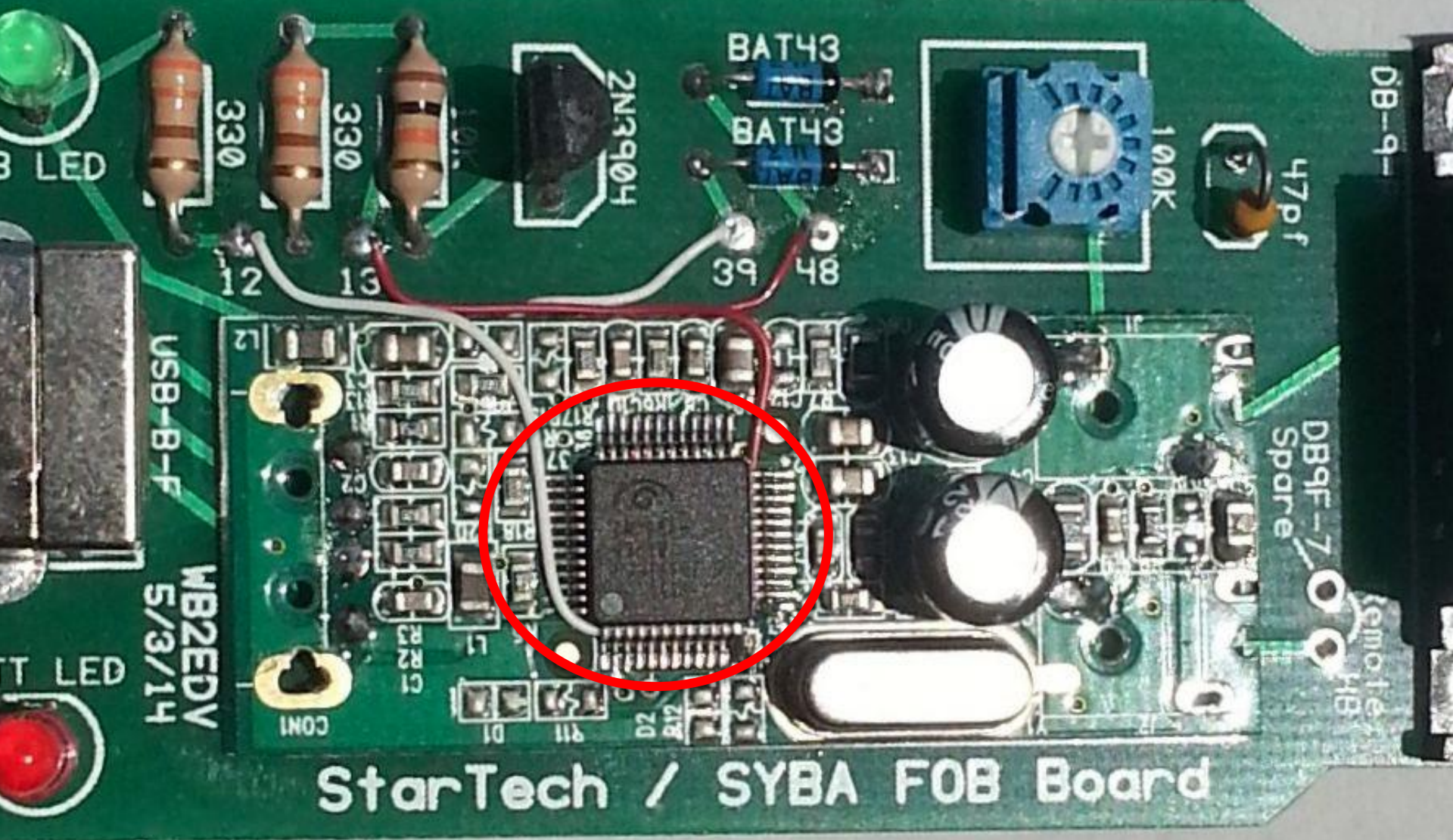
- DMK engineering
- \$75 for hams
- \$100 non-hams
- 25 pins for various functions
- RF shielded



# 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





DB-9-

47pF

100K

BAT43

BAT43

2N3904

330

330

B LED

12

13

39

48

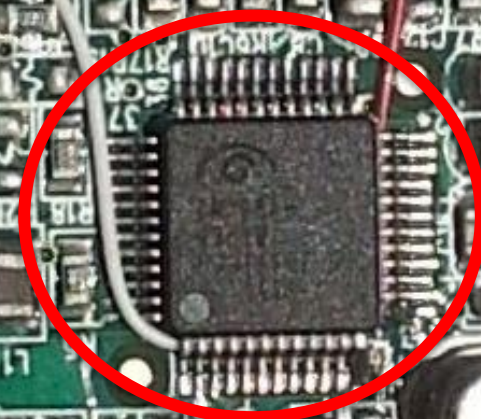
USB-B-F

WB2EDV  
5/3/14

DB9F-7

Spare

Remote



StarTech / SYBA FOB Board

# AllStar RTCM



# 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](http://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 / URlX
- Choose between software and hardware CTCSS decoding

```
[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
```

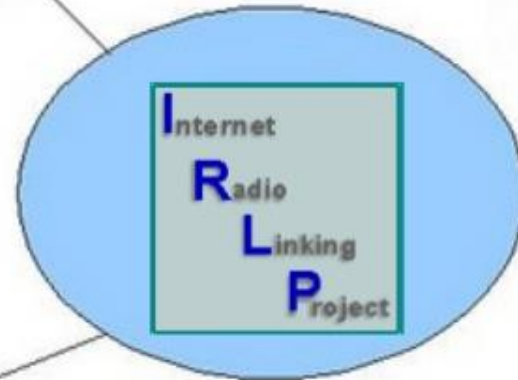
# Asterisk CLI

- 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



The Internet



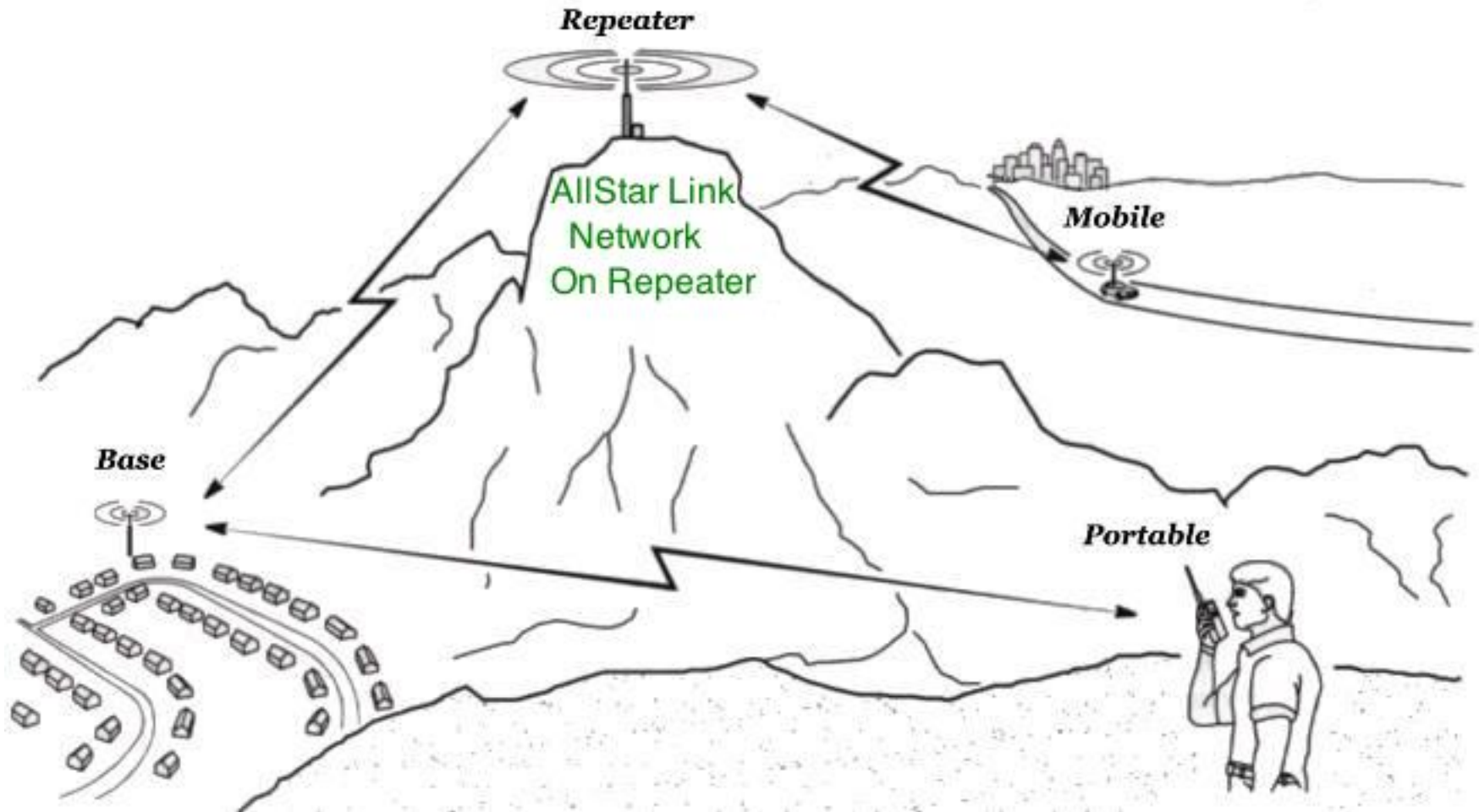
PC with EchoLink Software



Access via Webtransceiver, Mobile & Base Radio  
Echolink, IRLP, SIP Phone/Android/iPhone/Phone, DStar

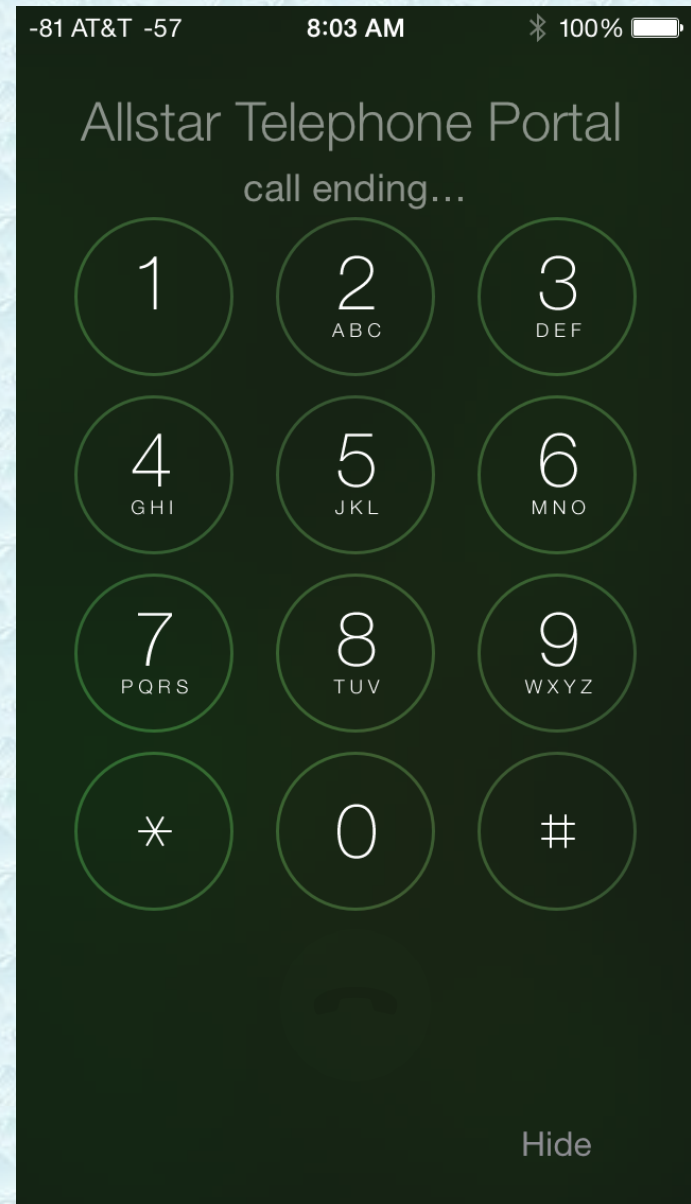
# RF

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



# Telephone portal

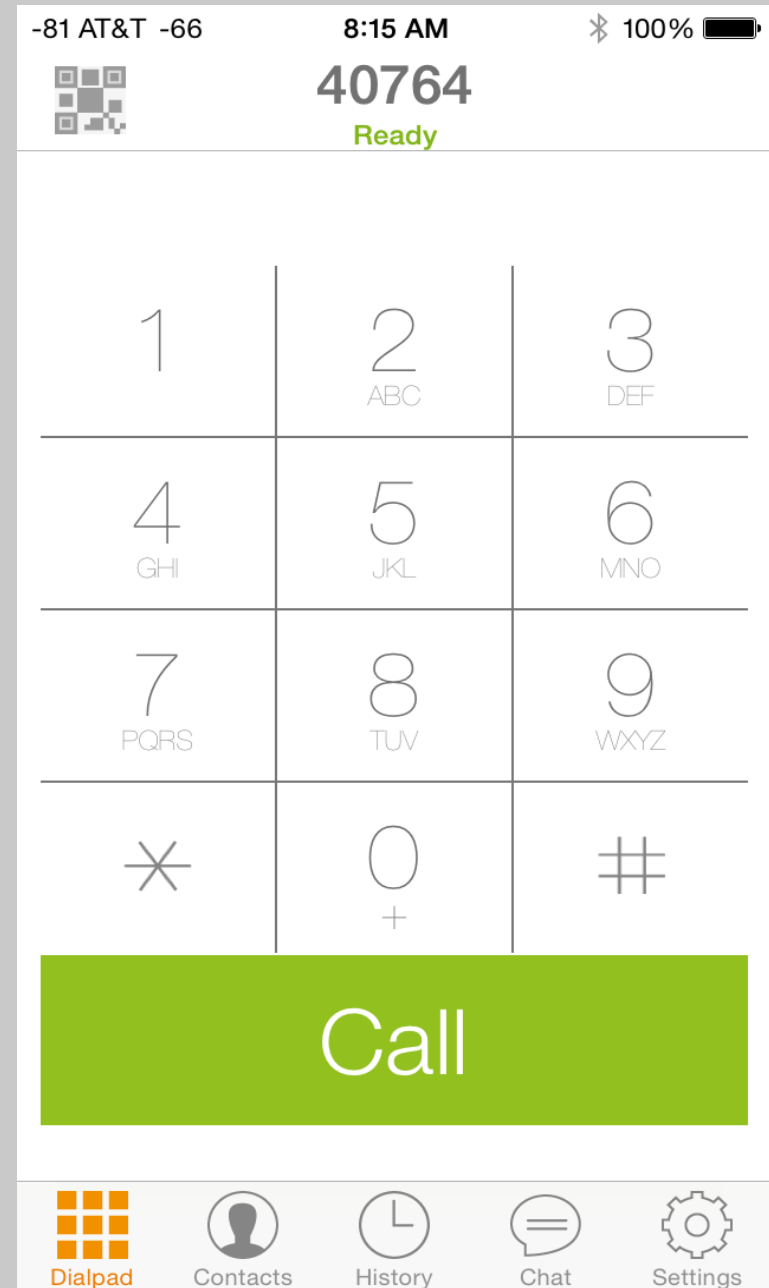
- Connect to an AllStar using any telephone
- Account required on the AllStar link networks
- DTMF activated PTT





# SIP phone or iAX

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



# EchoLink App

-81 AT&T -60 7:52 AM 100%

< Favorites



## KD0WHB-L

Denver CO [0/20]

Node 985839



Connect



Add to Favorites



QSO



Text



Stations

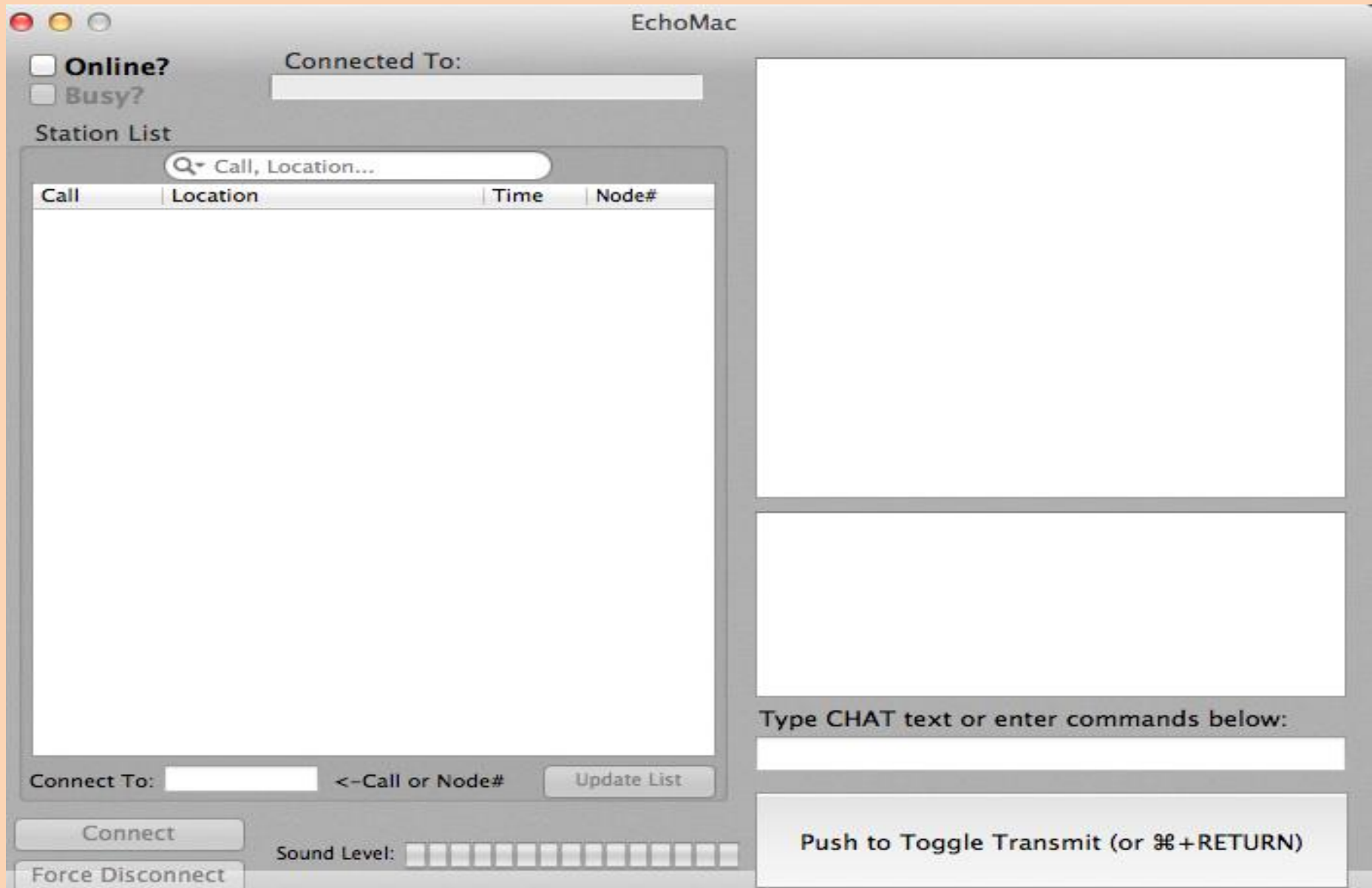


Favorites

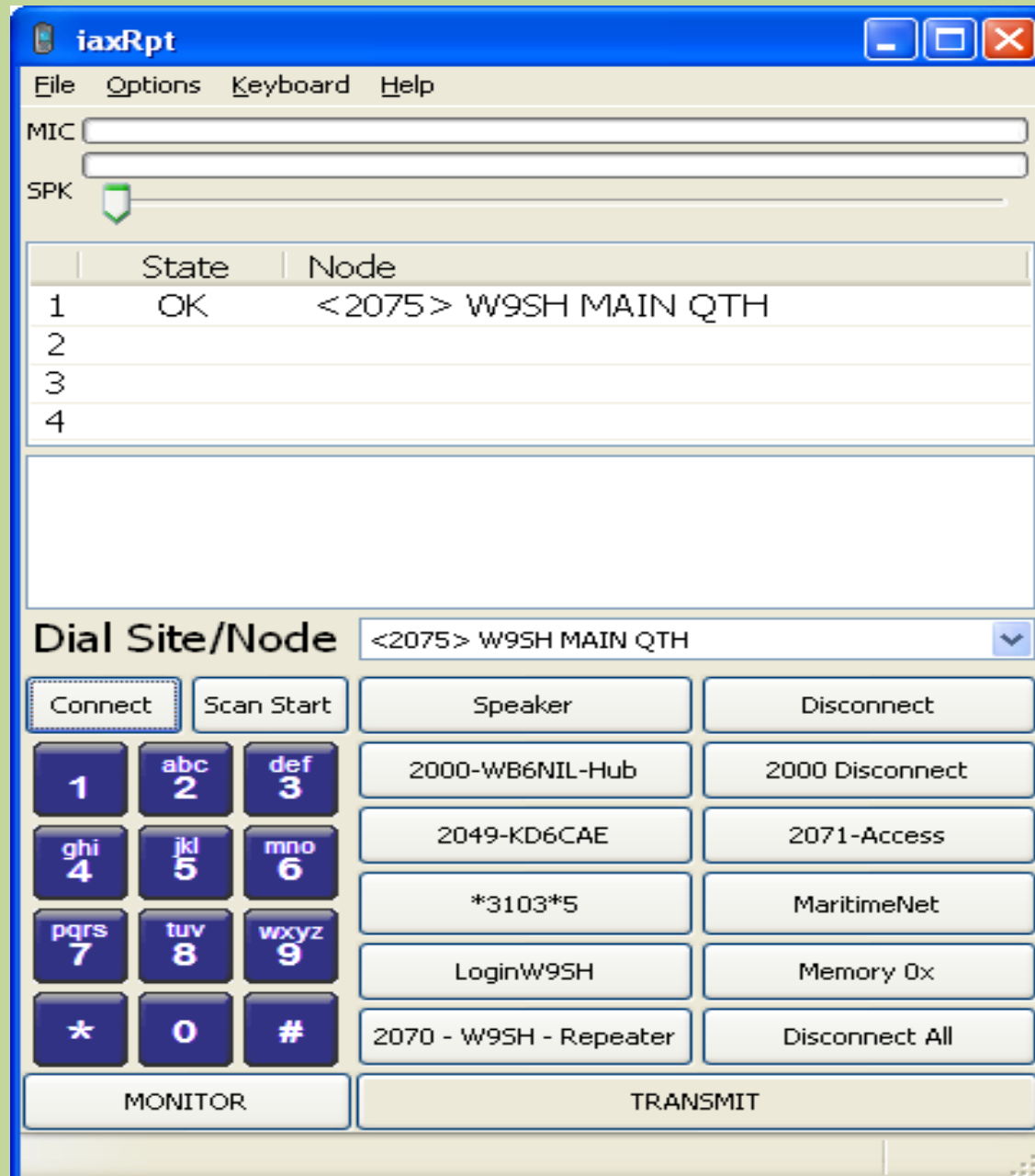


Settings

# EchoLink PC/Mac client



# iaxRpt



# Web Transceiver

AllStarLink.org

<b>Key (Transmit)</b>		<b>Disconnect</b>	<b>Node Connection Status</b> Portal Users: KD0WHB
1	2	3	
4	5	6	
7	8	9	
*	0	#	
<b>Sent And Received Messages</b>			
<input type="text"/>			
<b>Enter Message Here (Press &lt;Enter&gt; to send)</b>			
<input type="text"/>			

# 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)

# Extra Features

## Allstar Monitor II

Monitoring the World One Node at a Time

[28508](#)[27196](#)[28387](#)[41174](#)[My Nodes](#)[My Hubs](#)[About](#)[Login](#)

### **Node [28508](#) - AH6OD HAWAIIAN ALLSTAR HUB San Francisco, California USA** [Bubble Chart](#)

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



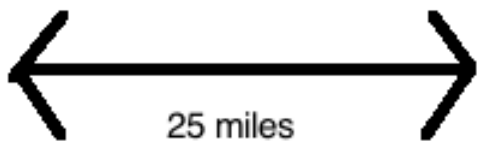
Denver, CO



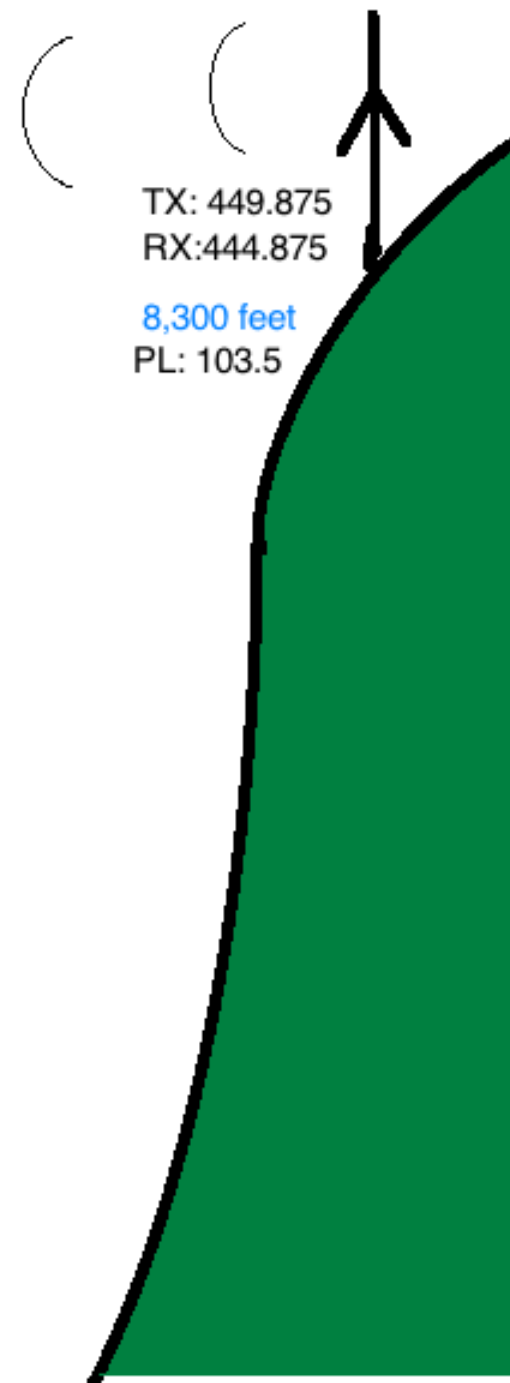
Node linked to the internet  
at Skyler KDØWHB's QTH

TX: 444.875  
RX: 449.875  
Half Duplex Link

Services:  
Allstar and  
Echolink



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

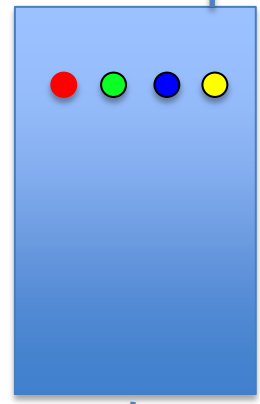
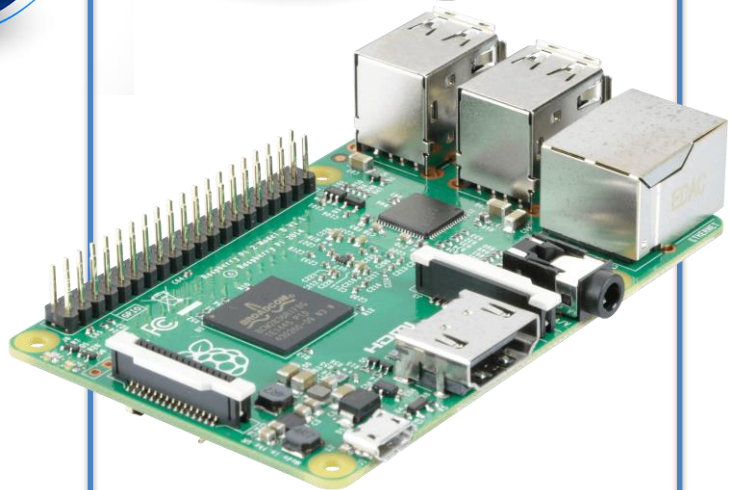
COMPUTER

→ 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 WOJRL'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