

Ham Radio Applications of Linux Single Board Computers

Willem A. Schreüder AC0KQ
willem@prinmath.com

HamCon Colorado 2016

This talk is available online at
<http://www.prinmath.com/ham/talks/>

Single Board Computers

- Full Linux boxes (*today's topic*)
 - Raspberry Pi
 - Beaglebone
- Microcontrollers (*not covered*)
 - Arduino
 - PICAXE
 - BASIC Stamp

Linux SBCs

- Runs a full Linux OS
- Usable stand alone computer or server
- Built in connectivity
 - Ethernet networking
 - USB and serial
 - General purpose IO
- Expandable using daughter boards
- Inexpensive (\$50 for a working system)

Potential Applications

- This talk:
 - AllStarLink repeater
 - ADSB receiver
 - Software Defined Receiver (SDR)
- Other talks
 - BPQ BBS, RMS and iGate
 - Site monitoring

Pros and Cons

- Pros

- Inexpensive
- No moving parts
- 5V power
- Expandable

- Cons

- SD cards corrupted by bad power

AllStarLink Repeater

Allstar Connected Nodes and Status - Chromium

Allstar Connected N x

pi40552/cgi-bin/ltnodes_web?node=40552

Status for AC0KQ - Node 40552

Last update - 05/11/2016 20:04:14 My IP - 66.109.219.132

[View this Node Graphically](#) [Search/Command another Node](#)

Selected system state	0
Signal on Input	NO
System	ENABLED
Parrot Mode	DISABLED
Scheduler	ENABLED
Tail Time	STANDARD
Time out timer	ENABLED
Incoming connections	ENABLED
Time out timer state	RESET
Time outs since system Initialization	0
Identifier state	CLEAN
Kerchunks today	7
Kerchunks since system Initialization	7
Keyups today	12
Keyups since system Initialization	12
DTMF commands today	1
DTMF commands since system Initialization	1
Last DTMF command executed	81
TX time today	00:00:44211
TX time since system Initialization	00:00:44211
Uptime	01:25:06
Nodes currently connected to us	
Autopatch	ENABLED
Autopatch state	DOWN
Autopatch called number	N/A
Reverse patch/IAXRPT connected	DOWN
User linking commands	ENABLED
User functions	ENABLED

Node	Call	Description	Location
40552	AC0KQ	446.200	portable

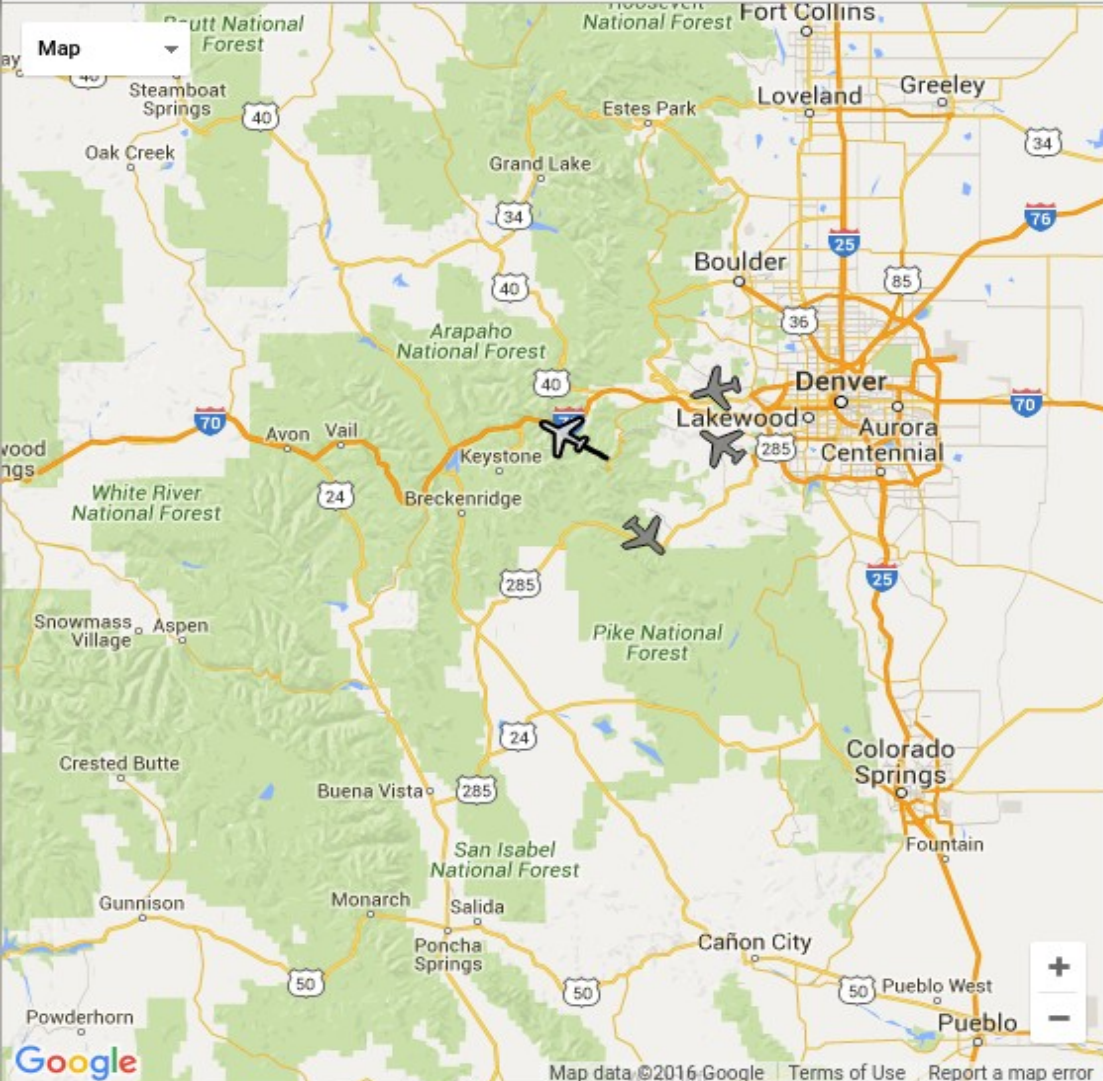
Node	Peer	Reconnects	Direction	Connect Time	Connect State
Host			Node	State	
67.215.233.178:4569			40552	Registered	



ADSB SDR Receiver

DUMP1090 - Chromium

DUMP1090

adsb:8080



Local Time  UTC Time 

[Reset Map] [Settings]

AAL1355 [\[FR24\]](#) [\[FlightStats\]](#) [\[FlightAware\]](#)

Altitude: 36000 ft Squawk: 6251
Speed: 396 kt ICAO (hex): ab6fdd
Track: 300° (NW)

Lat/Long: 39.663391, -105.759828

ICAO	Flight	Squawk	Altitude	Speed	Track	Msgs	Seen
a1babb	CPZ5932	2732	19100	344	255	46	0
ab6fdd	AAL1355	6251	36000	396	300	512	5
a0f828	DAL17	7240	38000	426	306	399	0
a0a092			44975	451	136	121	10

Map data ©2016 Google Terms of Use Report a map error

Raspberry Pi

- Most Popular
- Best supported
- rPi2 most powerful
- Lots of USB ports
- Lots of daughterboards
- No analog inputs
- \$35 plus SD card

BeagleBone

- Less well supported
- Onboard eMMC
- Power & Reset buttons
- More GPIO pins
- 8 analog inputs
- \$50 street price

Power and Storage

- Runs on 5V DC
 - Needs clean power
- Micro SD card storage
 - Finite life
 - Bad power kills SD

What is AllStarLink?

- Asterisk VOIP software for radio
- Interfaces with radio via URiX
 - CM119 USB audio chip
 - DB25 connector
- Can roll your own with equivalent fob



Installing AllStarLink

- Download from www.hamviop.com
 - Burn image to SD card
- Program your radio/repeater
 - Set radio to encode/decode CTCSS
 - On Motorola set accessories to output COS & PL on pin 8

Initial Login

```
willem@bashful: ~  
File Edit View Search Terminal Help  
willem@bashful:~$ ssh -p 222 root@192.168.100.237  
root@192.168.100.237's password:  
RPI2-3 Version 1.02beta Allstar - March 26, 2016 - WA3DSP, KB4FXC, W0AMN  
  
It appears that this is the first time this system  
has been booted. It would be prudent to change a few  
key settings now for the sake of security and convenience.  
Once this information is entered, the system will reboot  
and the next time the system boots, this message will not  
re-appear.  
  
Would you like to run first setup now ([y],n) ?   
*****  
Initial setup information  
  
Enter new UNIX password:   
Retype new UNIX password:   
passwd: password updated successfully  
Enter Node Number: 40552
```

Set Time Zone 1

```
willem@bashful: ~  
File Edit View Search Terminal Help  
*****  
Time Zone Configuration  
  
By default, the time zone is set to:  
  
    Time zone: American/Eastern  
  
A correct time zone entry will allow the system clock to report the  
correct time.  
  
Do you want to change the default time zone (American/Eastern) ([y],n) ? 
```

Set Time Zone 2

```
willem@bashful: ~  
File Edit View Search Terminal Help  
92 - America/Cuiaba  
93 - America/Curacao  
94 - America/Danmarkshavn  
95 - America/Dawson  
96 - America/Dawson_Creek  
97 - America/Denver  
98 - America/Detroit  
99 - America/Dominica  
100 - America/Edmonton  
101 - America/Eirunepe  
102 - America/El_Salvador  
103 - America/Fortaleza  
104 - America/Glace_Bay  
105 - America/Godthab  
Input your selection, or known index number, or press the "Enter" key  
to continue listing the time zones? 97  
  
America/Denver has been selected  
  
If you need to re-execute this script (settz.sh), you can do so at anytime.  
Press any key to continue...  
█
```

Network Configuration

```
willem@bashful: ~  
File Edit View Search Terminal Help  
*****  
Set Networking Configuration  
  
Currently networking is set up for DHCP. You will be able to set up the  
system to use either static or DHCP (dynamic) addressing. If you  
choose static addressing, you will need to have three key IP addresses  
handy: IP ADDRESS, NETMASK, and DEFAULT GATEWAY.  
  
Current IP Address: 192.168.100.237  
    inet 192.168.100.237/24 brd 192.168.100.255 scope global dynamic eth0  
  
***** Network interface setup *****  
  
Do you want to do this now ([y],n): ?  
Do you want to set up (S)tatic, or (D)CHP for the main network interface? D
```


Set Hostname

```
willem@bashful: ~  
File Edit View Search Terminal Help  
*****  
Set Host Name  
  
By default, the host name is set to alarmpi.  
The host name should be set to something meaningful  
(i.e. the location of this system)  
  
***** Host name setup *****  
  
The current hostname is: alarmpi  
  
Do you want to change this (Y/N)? y  
Enter the new host name: pi40552
```

Configure ssh

```
willem@bashful: ~  
File Edit View Search Terminal Help  
  
***** ssh Port setup *****  
  
This setup script allows you to select the Openssh port setting for the built  
in ssh server on your node.  
  
Currently, the port value is 222.  
  
If you wish to keep this port setting as the port 222, then press the  
"Enter" key to select this port or enter the new port value at the prompt.  
  
Do you want to change your ssh port configuration for asterisk ([n],y): ? 
```

Node Setup 1

```
willem@bashful: ~  
File Edit View Search Terminal Help  
*****  
Set Node Configuration  
Do you want to setup your node configuration for asterisk ([y],n) ? y
```

Node Setup 2

```
willem@bashful: ~  
File Edit View Search Terminal Help  
*****  
System Reboot  
  
Remember to log back in using the new password and using the new IP address  
if you changed it.  
  
Use these values for your next login after reboot:  
  IP Address - 192.168.100.237  
  ssh Port - 222  
System will now reboot...  
  
Connection to 192.168.100.237 closed by remote host.  
Connection to 192.168.100.237 closed.  
willem@bashful:~$
```

Node Setup 3

```
willem@bashful: ~  
File Edit View Search Terminal Help  
-----  
This script configures the Asterisk configuration files based upon template  
files found in /usr/local/etc/asterisk_tpl directory. The files that will be  
changed are: iax.conf, rpt.conf, and extensions.conf.  
  
While this script is intended for first time configuration of these files, it  
can be run at anytime to make changes. BUT, please keep in mind that every  
time you execute this script, it uses the template directory files and NOT  
the active configurations files to create new active configuration files. So  
if you want to continue to use this script after the initial first time  
configuration, any changes should be made to the three configuration files in  
the /usr/local/etc/asterisk_tpl directory.  
  
If this is a first time configuration, it is safe to continue otherwise read  
the above paragraph and understand that any manual changes that you have made  
to the active configuration files in the /etc/asterisk directory will be  
overwritten. The old files will be renamed extensions.conf_orig, iax.conf_orig,  
and rpt.conf_orig.  
  
-----  
Do you wish to continue: ([n],y): ? y
```

Node Callsign

```
willem@bashful: ~  
File Edit View Search Terminal Help  
-----  
Basic Node and Call Information.  
-----  
Enter Node Number [40552]:  
Enter Station Call for node []: AC0KQ
```

Stats

```
willem@bashful: ~  
File Edit View Search Terminal Help  
-----  
Note that reporting the status of your node is not mandatory  
but without reporting your node will not appear in the  
allstarlink.org status screen and others will not know  
your node exists unless you give them your node number.  
Even if your node does not appear on the status page another  
node will be able to connect to you using your node number.  
While the usual answer is to say yes and report your status  
some may wish to remain private by not advertising their node.  
-----  
Do you want your node to report status to stats.allstarlink.org ([y],n): ? █
```

CW or Voice ID

```
willem@bashful: ~  
File Edit View Search Terminal Help  
-----  
Asterisk can use either voice or CW id for FCC identification.  If you  
select voice id a simple gsm voice ID audio file will be generated.  
This file is located at "/etc/asterisk/local/" and is called  
"node_id.gsm".  
  
If you select "y" to voice id, then a voice id will be created.  If you  
select "n", then the default CW id will be used.  
-----  
Do you want to use voice id ([n],y): ? 
```


Network Port

```
willem@bashful: ~  
File Edit View Search Terminal Help  
-----  
Port 4569 is the default iax protocol port. If you are using just  
one server on your public IP address, then you can skip this step  
by hitting return to select the default value.  
-----  
Enter Bind Port [4569]: 
```

Duplex

```
willem@bashful: ~
File Edit View Search Terminal Help
-----
Duplex setting

This setting setups up the different duplex modes for your allstar node.
Here are the values and their meaning:

0 = half duplex (telemetry and courtesy tones do not transmit)
1 = semi-half duplex (telemetry and courtesy tones transmit, but not
  repeated audio (Default)
2 = normal full-duplex mode)
3 = full-duplex mode, without repeated audio from main input source
4 - Normal except no main repeat audio during autopatch only

Normally for a simplex node, you would choose "1". For a repeater, you
would choose "2".

If you want a "silent" simplex node (no courtesy tones or telemetry),
you would choose "0".

-----
Enter the desired duplex mode [1]: 
```

Node Password

```
willem@bashful: ~  
File Edit View Search Terminal Help  
-----  
The node password is the password that is assigned with your node  
number. If you don't have this handy it can be retrieved by logging  
into your account at allstarlink.org and checking node 40552  
password. The password is a 6 digit number.  
-----  
Enter Node password for node 40552 []: ████████
```

IAX Password

```
willem@bashful: ~  
File Edit View Search Terminal Help  
-----  
Asterisk Allstar has the capability to receive connections from a  
Windows computer using a program called iaxRpt. In order to do this you  
need to specify a password which will be used to confirm connections  
from that program. You would then use this same password to configure  
a iaxRpt account on a Windows computer. Information on how to  
configure iaxRpt can be found at the hamvoip.org website.  
-----  
Do you want to configure the password for an iaxrpt connection ([y],n): ? n
```

Simple USB Configuration 1

```
willem@bashful: ~  
File Edit View Search Terminal Help  
-----  
You now will need to review and configure simpleusb.conf. In particular  
the 'carrier from' needs to be set to match your radios COS polarity.  
See the configuration howto on the hamvoip.org web page for more info  
on configuring simpleusb and setting audio levels.  
-----  
Do you want to configure Simple USB settings now: ([n],y): y
```

Simple USB Configuration 2

```
willem@bashful: ~
File Edit View Search Terminal Help
-----
[Introduction of script]
This script will create the configuration file for the simple usb device.

During each setting, you will see the currently defined setting followed
by a description of the values. You will be prompted with a simple yes or
no question.

NOTE, you can run this script as many times as required. It will remember
the last setting used. If it's run for the first time, you will be prompted
for a radio selection which will load its default settings. Please review
these settings when you are prompted and change if necessary.

-----
Do you wish to continue: ([n],y): ? y
```

Select Radio

```
willem@bashful: ~  
File Edit View Search Terminal Help  
-----  
0 - GM300_cos_invert  
1 - GM300_cos_noninvert  
2 - Dorji_Transceiver_Module  
3 - Alinco_DRx35  
4 - Baofeng_ba-666  
5 - default  
If radio type is not shown above, select 'default'  
-----  
Enter number from above to select radio type: 5
```

EEPROM on URI

```
willem@bashful: ~  
File Edit View Search Terminal Help  
-----  
eeprom Setting  
  eeprom=0  
          ; 1 = Indicates that an EEPROM internal to the radio  
          ;     adapter and cable is expected.  
          ; 0 = no warning message if no EEPROM found.  
  
Normally, you will select "n" unless you are using an internal eeprom.  
-----  
Are you using an eeprom in your URI/radio ([n],y): ? 
```


URI Type

```
willem@bashful: ~
File Edit View Search Terminal Help
-----
Hardware Type setting
  hdwtype=0
                ; USB Sound Adapter Hardware Type
                ; Set to 0 for DMK Eng. URI, or USB sound adapaters
                ;   modified using the instructions from usbfov.pdf.
                ; Set to 1 for DingTel/W9SH modified usb adapters.

(To be removed, use default hdwtype=0, only option for bbb is hdwtype=0)

Answer "n" to this question, if using a URI or modified FOB.
-----
Are you using a Dingotel/Shp interface ([n],y): ? 
```

Audio Boost

```
willem@bashful: ~  
File Edit View Search Terminal Help  
-----  
Receiver Audio Boost  
rxboost=1  
; Rx Audio Boost  
; 0 = 20db attenuator inserted,  
; 1= 20db attenuator removed  
; Set to 1 for additional gain if using a low-level  
; receiver output.  
  
Answer "y" if you are using a low-level receiver output.  
-----  
Should the receive audio be boosted (attenuator removed) ([y],n): ? 
```

Carrier Detect (COR or COS)

```
willem@bashful: ~  
File Edit View Search Terminal Help  
-----  
Carrier Detection  
  carrierfrom=usbinvert  
  
      ; Options - no,usb,usbinvert  
      ; no - no carrier detection at all  
      ; usb - via USB radio adapter COR connection  
      ; usbinvert - same as above but inverted polarity.  
  
Normally, you will be using this option. This is the COS (carrier detection)  
which indicates that a carrier is present. This signal comes for the radio to  
the modified FOB or URI. This supports the option to invert the detected signal  
which depends on the radio.  
-----  
Do you want to use carrier detection ([y],n): ?  
  
  Does the COR line need to be inverted ([y],n): ? 
```

CTCSS Decode

```
willem@bashful: ~
File Edit View Search Terminal Help
-----
CTCSS Decoding
  ctcssfrom=no

          ; CTCSS Decoder Source
          ; Options = no,usb,dsp
          ; no - CTCSS decoding, system will be carrier squelch
          ; usb - CTCSS decoding using input from USB adapter
          ; usbinvert - same as above but inverted polarity.

Some radios use the CTCSS signal to indicate that a CTCSS signal is preset,
like COS, it provides a method of signal detection and indicates that a
carrier is present. This signal comes from the radio to the modified FOB or
URI. This supports the option to invert the detected signal which depends
on the radio.
-----
Do you want to use CTCSS decoding ([n],y): ? 
```

Transmit Left Channel

```
willem@bashful: ~
File Edit View Search Terminal Help
-----
TX Mixer A
  txmixa=voice

; Tx Mix Output Channel A (Left) Output Type
; Options = no,voice,tone,composite,auxvoice
; no - Do not output anything
; voice - output voice only
; tone - CTCSS tone only
; composite - voice and tone
; auxvoice - voice output for monitoring

; Left channel output: no,voice,tone,composite,auxvoice
; no - Do not output anything
; voice - output voice only

The current value for this parameter is: voice. Nomally, this is set for
"composite".
-----
Do you want to change the TX Mix A setting ([n],y): ? 
```

Transmit Right Channel

```
willem@bashful: ~  
File Edit View Search Terminal Help  
-----  
Transmit Mixer B  
  txmixb=no  
  
      ; Tx Mix Output Channel B (Left) Output Type  
      ; Options = no,voice,tone,composite,auxvoice  
      ; no - Do not output anything  
      ; voice - output voice only  
      ; tone - CTCSS tone only  
      ; composite - voice and tone  
      ; auxvoice - voice output for monitoring  
  
The current value for this parameter is: no. Nomally, this is set for  
"no".  
-----  
Do you want to change the TX Mix B setting ([n],y): ? 
```

PTT

```
willem@bashful: ~  
File Edit View Search Terminal Help  
-----  
PTT Setting  
  invertptt=0  
  
      ; Invert PTT 0 = ground to transmit, 1 = open to transmit  
      ; This is the collector lead of the 2n4401 on the modified  
      ; usb sound fob.  
  
Please refer to the howto for the procedure to do this.  
-----  
Should the PTT be grounded to transmit ([y],n): ? 
```

Filter CTCSS

```
willem@bashful: ~  
File Edit View Search Terminal Help  
-----  
PL Filter Setting  
  plfilter=yes  
                                ; enable PL filter  
                                ; yes, enabled  
                                ; no, disabled  
  
**Only use if necessary for your installation**  
Some radios require additional filtering the the PL tones, this will help  
attenuate this signal from the receiver.  
-----  
Should the plfilter be enabled ([y],n): ? 
```


Flat or Speaker Audio

```
willem@bashful: ~  
File Edit View Search Terminal Help  
-----  
De-emphasis Filter  
  deemphasis=no  
                ; enable de-emphasis (input from discriminator)  
                ; yes, enabled  
                ; no, disabled  
  
**Only use if necessary for your installation**  
-----  
Should the deemphasis be enabled ([n],y): ? 
```

Flat or Mic Audio

```
willem@bashful: ~  
File Edit View Search Terminal Help  
-----  
Pre-emphasis Filter  
preemphasis=no  
                ; enable pre-emphasis (output to Tx)  
                ; yes, enabled  
                ; no, disabled  
  
**Only use if necessary for your installation**  
-----  
Should the preemphasis be enabled ([n],y): ? 
```

Audio Delay

```
willem@bashful: ~  
File Edit View Search Terminal Help  
-----  
rxaudiodelay parameter  
  rxaudiodelay=0  
      ; default value is 0  
      ; Squelch tail delay in 20ms frames. Values are 0  
      ; (no delay) to 24 (480ms delay)  
      ; Typical values would range from 3-12 (60-240ms)  
  
Please refer to the documentation prior to changing from the default  
value.  
-----  
Enter the value of rxaudiodelay [0] : 
```

Set Audio Levels

```
willem@bashful: ~  
File Edit View Search Terminal Help  
-----  
Audio Levels  
  
If you know the audio values for your node setup, you can modify them  
now.  If not, please run "simpleusb-tune-menu" program at the Linux  
prompt to properly set your sound levels.  
  
-----  
Do you want to set your audio levels for your node now ([n],y): ? y
```

Receive Audio Levels

```
willem@bashful: ~  
File Edit View Search Terminal Help  
-----  
RX Mixer Value  
  rxmixerset=500  
  
This value sets the Receiver Audio Levels or incoming audio levels "from"  
the node radio.  
-----  
Enter the new value for the RX Mixer Level [500]: 
```

Transmit Left Audio Levels

```
willem@bashful: ~  
File Edit View Search Terminal Help  
-----  
TX Mixer A Value  
  txmixaset=500  
  
This value sets the Transmit Audio Levels or outgoing audio on the  
A output side "to" the node radio.  
-----  
Enter the new value for the TX Mixer A Level [500]: 
```

Transmit Right Audio Levels

```
willem@bashful: ~  
File Edit View Search Terminal Help  
-----  
TX Mixer B Value  
  txmixbset=500  
  
This value sets the Transmit Audio Levels or outgoing audio on the  
B output side "to" the node radio.  
-----  
Enter the new value for the TX Mixer B Level [500]: █
```

Done

```
root@pi40552:~  
File Edit View Search Terminal Help  
-----  
(final info)  
  
After any simpleusb.conf changes you should do an Asterisk restart. This  
will restart and reload the Asterisk modules. These simpleusb changes will  
not take effect until Asterisk is restarted.  
  
If needed, please run "simpleusb-tune-menu" program at the Linux prompt to set  
your sound levels.  
-----  
Do you want to restart Asterisk to enable selections: ([y],n): ?  
Restarting Asterisk..  
Restarting Asterisk...  
[root@pi40552 ~]#
```


Make it Transmit

```
root@pi40552:~
File Edit View Search Terminal Help
[root@pi40552 ~]# asterisk -r
Asterisk , Copyright (C) 1999 - 2008 Digium, Inc. 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  currently running on pi40552 (pid = 252)
Verbosity is at least 3
pi40552*CLI> rpt fun 40552 *81
-- <DAHDI/pseudo-917589702> Playing 'rpt/goodafternoon' (language 'en')
-- <DAHDI/pseudo-917589702> Playing 'rpt/thetimeis' (language 'en')
-- <DAHDI/pseudo-917589702> Playing 'digits/2' (language 'en')
-- <DAHDI/pseudo-917589702> Playing 'digits/20' (language 'en')
-- <DAHDI/pseudo-917589702> Playing 'digits/p-m' (language 'en')
-- Hungup 'DAHDI/pseudo-917589702'
pi40552*CLI> 
```

Set Levels

```
root@pi40552:/etc/asterisk
File Edit View Search Terminal Help
[root@pi40552 asterisk]# simpleusb-tune-menu

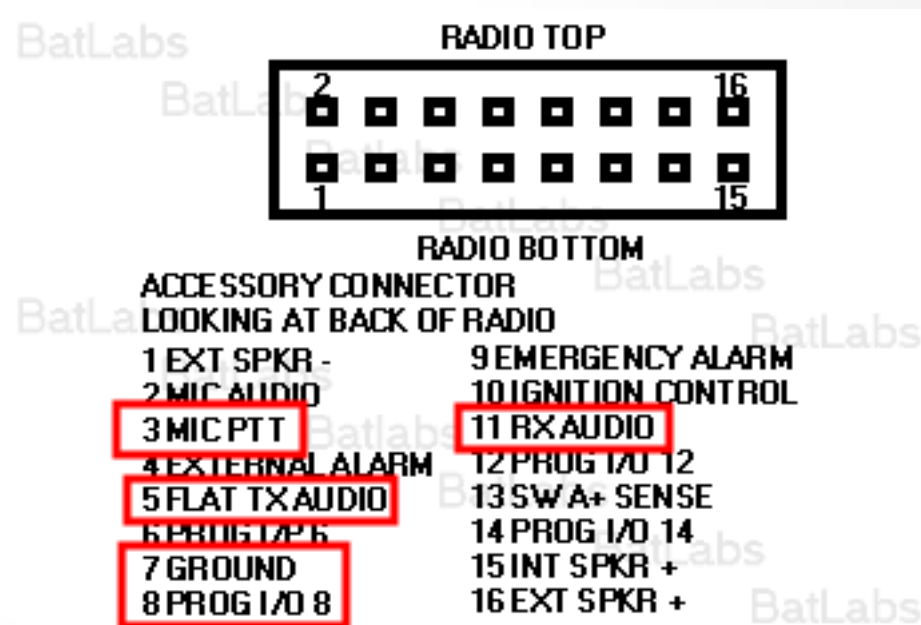
active (command) USB Radio device is [usb]
1) Select USB device
2) Set Rx Voice Level (using display)
3) Set Transmit A Level
4) Set Transmit B Level
E) Toggle Echo Mode (currently Disabled)
F) Flash (Toggle PTT and Tone output several times)
P) Print Current Parameter Values
S) Swap Current USB device with another USB device
T) Toggle Transmit Test Tone/Keying (currently Disabled)
W) Write (Save) Current Parameter Values
0) Exit Menu

Please enter your selection now: 
```


/etc/asterisk/simpleusb.conf

- Configuration for Motorola SM50

```
[usb]
eeprom=0
hdwtype=0
rxboost=1
carrierfrom=usb
ctcssfrom=usb
txmixa=voice
txmixb=no
invertptt=0
duplex=0
plfilter=yes
deemphasis=no
preemphasis=yes
rxaudiodelay=0
```



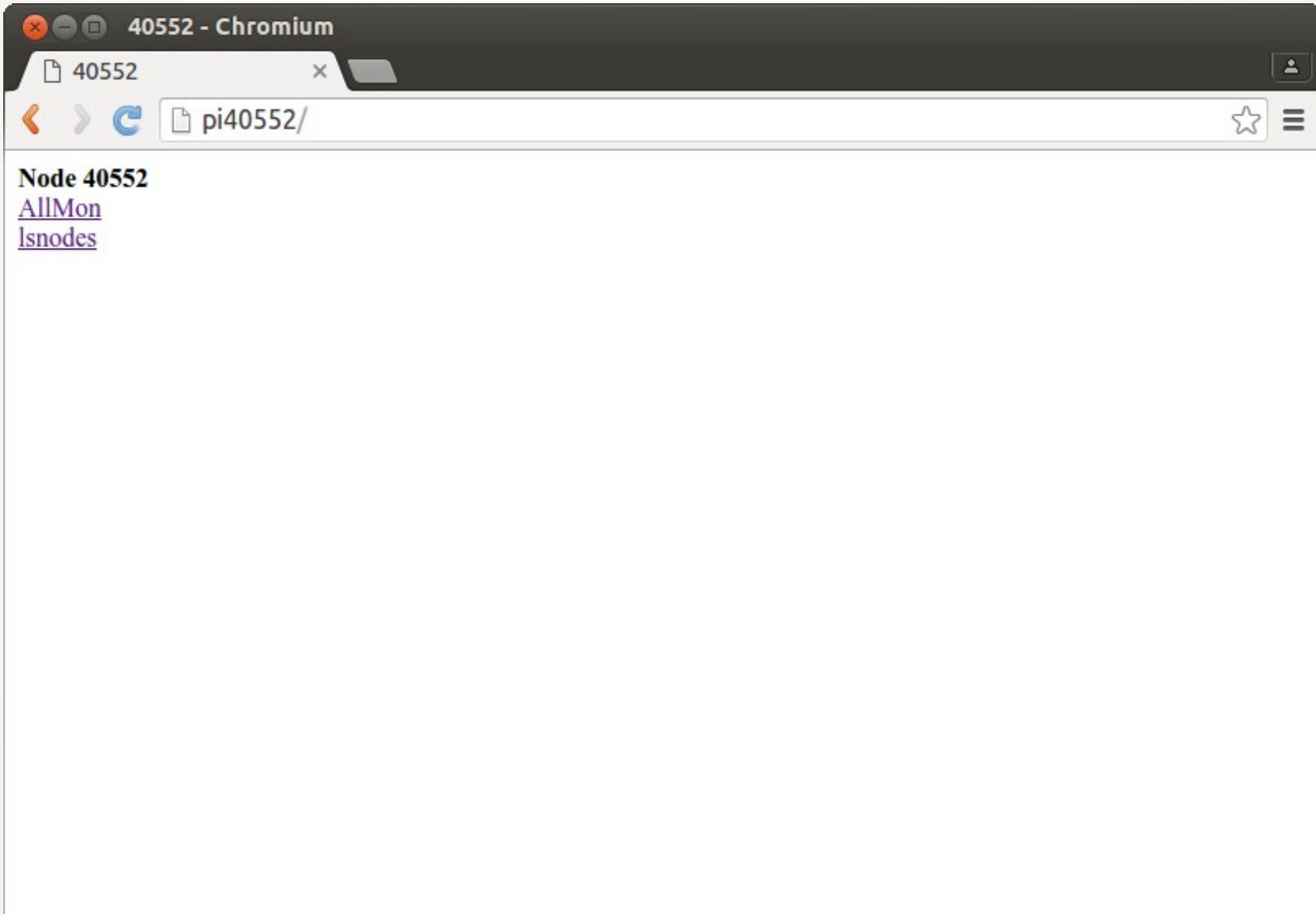
Update /srv/httpd/index.html

```
<html>
<head>
<title>40552</title>
</head>
<body>
<b>Node 40552</b>
<br><a href=allmon2/link.php?nodes=40552>AllMon</a>
<br><a href=cgi-bin/ltnodes_web?node=40552>ltnodes</a>
</body>
</html>
```

Edit AllMon Files

- Edit `/srv/httpd/allmon2/allmon.ini.php`
 - Change XXXXX to node number
 - Change passwd
- Edit `/etc/asterisk/manager.conf`
 - Add the same password to secret =
- Restart allstar
 - `astres.sh`

Base Access



AllMon2

The screenshot shows a Chromium browser window with the following details:

- Tab: PI40552 | Allmon | 40552 - Chromium
- Address Bar: pi40552/allmon2/link.php?nodes=40552
- Page Header: Allstar Monitor II, Monitoring the World One Node at a Time, AllStar Link logo
- Navigation: About, 40552, Login
- Section: Node **40552** - [Bubble Chart](#)
- Table with columns: Node, Node Information, Received, Link, Direction, Connected, Mode
- Table Content: No connections.
- Footer: Site by WD6AWP. [There are some who call me... Tim?](#)

Node	Node Information	Received	Link	Direction	Connected	Mode
No connections.						

Isnode

Allstar Connected Nodes and Status - Chromium

Allstar Connected N x

pi40552/cgi-bin/lnodes_web?node=40552

Status for AC0KQ - Node 40552

Last update - 05/11/2016 20:04:14 My IP - 66.109.219.132

[View this Node Graphically](#) [Search/Command another Node](#)

Selected system state	0
Signal on Input	NO
System	ENABLED
Parrot Mode	DISABLED
Scheduler	ENABLED
Tail Time	STANDARD
Time out timer	ENABLED
Incoming connections	ENABLED
Time out timer state	RESET
Time outs since system initialization	0
Identifier state	CLEAN
Kerchunks today	7
Kerchunks since system initialization	7
Keyups today	12
Keyups since system initialization	12
DTMF commands today	1
DTMF commands since system initialization	1
Last DTMF command executed	81
TX time today	00:00:44211
TX time since system initialization	00:00:44211
Uptime	01:25:06
Nodes currently connected to us	
Autopatch	ENABLED
Autopatch state	DOWN
Autopatch called number	N/A
Reverse patch/IAXRPT connected	DOWN
User linking commands	ENABLED
User functions	ENABLED

Node	Call	Description	Location
40552	AC0KQ	446.200	portable

Node	Peer	Reconnects	Direction	Connect Time	Connect State
Host			Node		State
67.215.233.178:4569			40552		Registered

Observations

- By default the node list is updated daily via a cron job
- The rPi uses simpleusb due to limited CPU performance
- AllStar uses ArchLinux
- There is no need to expand the OS to fill the SD card (image size 4GB)

ADSB SDR Receiver

- Receiver based on RTL2832 USB
- About \$20 on Amazon
- Also used in many ham related SDR projects



Software Build

Build and install rtl-sdr module

```
git clone git://git.osmocom.org/rtl-sdr.git
cd rtl-sdr
mkdir build
cd build
cmake ../ -DINSTALL_UDEV_RULES=ON
make
cd ..
```

Build and install dump1090

```
git clone git://github.com/MalcolmRobb/dump1090.git
cd dump1090
make
cd ..
```

Command line interface

- `./view1019`

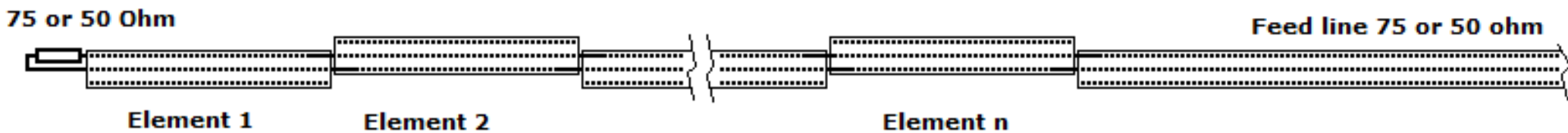
```
willem@adsb: /usr/local/bin
File Edit View Search Terminal Help
Hex      Mode  Sqwk  Flight  Alt    Spd  Hdg   Lat     Long   Sig  Msgs  Ti/
-----
A1B3FF   S     1455  740     18025  331  036  39.419 -105.146  20  134   1
ACF600   S           33975           12   27   5
A50119   S     2406  UAL1881 34025           15  172   5
```

Running web interface

- `./dump1090 --net --lon -105 --lat 39`
 - `--net` enables web interface port 8080
 - `--lon` and `--lat` sets location
- Run at boot from `rc.local`

Building a high gain antenna

- Colinear made from coax



- Mount on N female inside PVC pipe



Installation

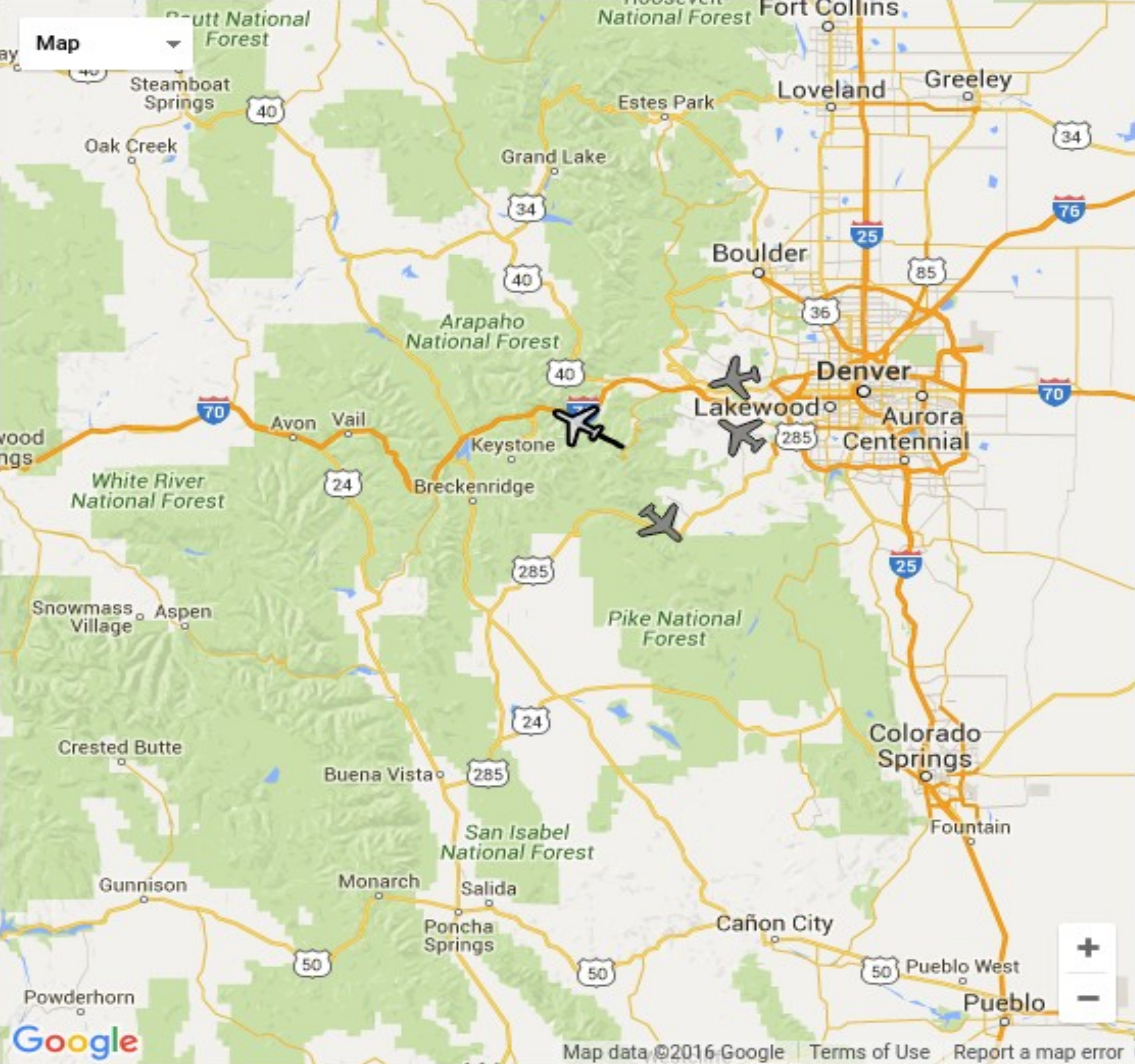
- Mount the receiver as close to the antenna as possible
 - RTL-SDR is not weather proof
 - 18" N to micro-UHF jumper
- Run long USB cable to rPi

Running



DUMP1090 - Chromium

DUMP1090

adsb:8080



Map

Local Time  UTC Time 

[Reset Map] [Settings]

AAL1355 [\[FR24\]](#) [\[FlightStats\]](#) [\[FlightAware\]](#)

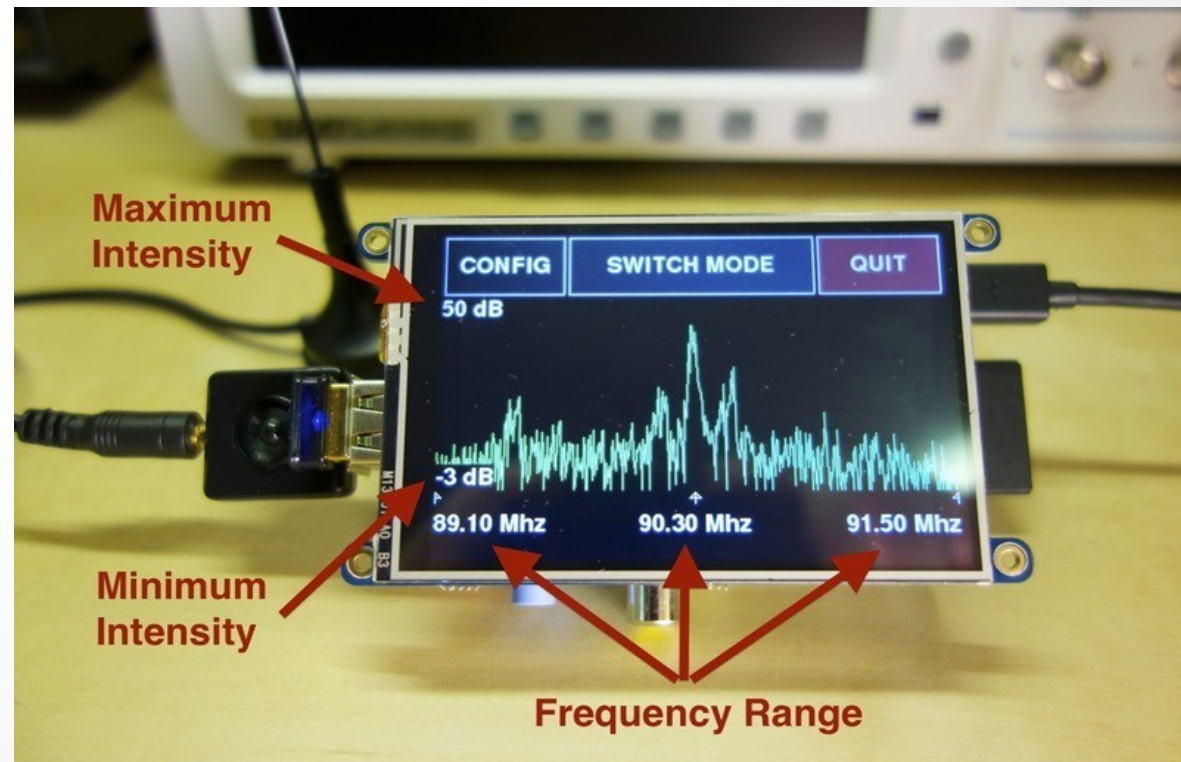
Altitude: 36000 ft Squawk: 6251
Speed: 396 kt ICAO (hex): ab6fdd
Track: 300° (NW)
Lat/Long: 39.663391, -105.759828

ICAO	Flight	Squawk	Altitude	Speed	Track	Msgs	Seen
albabb	CPZ5932	2732	19100	344	255	46	0
ab6fdd	AAL1355	6251	36000	396	300	512	5
a0f828	DAL17	7240	38000	426	306	399	0
a0a092			44975	451	136	121	10

Google Map data ©2016 Google Terms of Use Report a map error

Other Projects

- The rPi 3 is a 1.2GHz 64 bit quad core machine with 1GB memory
 - Processing power to do cool stuff
- GNU radio
- Adafruit Freq Show



SmokePi (SmokePing rPi)



SmokePi = Bad Idea

- SD storage not suitable for database applications
 - Lots of writes wears out flash
- SmokePi generates lots of graphs
 - SD slow compared to disk
 - Lots of writes wears out flash

Questions?