Linux HAM-HOWTO, Amateur Radio Software List

Terry Dawson, VK2KTJ, terryd@extro.ucc.su.oz.au v1.8, 9 July 1995

It is hoped that this document will assist Amateur Radio operators in finding and trying the various amateur radio software that has been written for or ported to Linux. It is also hoped that as a consequence of this information being available that more amateur radio operators will choose Linux as the platform of choice for their experimentation, and that software developers will choose Linux as the platform for their software development, further expanding the role of operating systems like Linux in the Amateur Radio field. This document also provides some detailed information on how to configure and install some of the more important pieces of software.

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1 Introduction.

This list was prompted by comments that had been expressed in the various Linux newsgroups about the number of amateur radio operators that were involved with Linux. It is now clear that Linux is becoming a popular platform for Amateur Radio development work.

This list was originally called the RADIOLINUX list, but Matt Welsh suggested that there was no reason why it shouldn't be distributed with the Linux Documentation Project documents, so it has been renamed the HAM-HOWTO and will be made available with the rest of the Linux Documentation. I make no apologies for the name.

1.1 Changes from the previous version

```
Additions:
        Added Brian Lantz's TNOS.
        Added Philip VanBaren's audio spectrum analyser.
        Added Emarit Ranu's FT-890 controller program.

Corrections:
        Updated Packet Cluster information.
        Updated AX.25 kernel software.
        Updated AX.25 utilites information.
        Updated howto configure PI card.
        Updated rspf daemon information.
```

2 Where to obtain new versions of this document.

This list will be periodically posted to the `comp.os.linux.announce` newsgroup, and to the `HAMS` list on `niksula.hut.fi`.

It is also available from the following World Wide Web sites:

The Linux Documentation Project runs a Web Server and this list appears there as *The HAM-HOWTO* (http://sunsite.unc.edu/mdw/HOWTO/HAM-HOWTO.html).

Dennis Boylan N4ZMZ <dennis@nanovx.atl.ga.us> makes it available at the following three locations:

www.com (http://www.com/linux/radio/index.html), *www.hboc.com* (http://www.hboc.com/linux/index.html) and *www.lan.com* (http://www.lan.com/linux/index.html).

John Gotts N8QDW <jgotts@engin.umich.edu> makes it available at: *www.engin.umich.edu* (http://www.engin.umich.edu/ jgotts/linuxhamsoft.html).

Dan Todd <dantodd@fusilli.ucdavis.edu> makes it available at the following two locations: *wheel.dcn.davis.ca* (http://wheel.dcn.davis.ca/ dantodd/Linux/HAM-HOWTO.html), and *fusilli.ucdavis.edu* (http://fusilli.ucdavis.edu/Linux/HAM-HOWTO.html).

Alan Hargreaves VK2KVF <alan@dap.CSIRO.AU> makes it available in Australia at: *www.dap.csiro.au* (http://www.dap.csiro.au/RadioLinux).

Please let me know if you'd like to make it available somewhere too. I'd like to see it on some Web Servers that are accessible from radio.

3 Satellite Software.

The following software is for use in experimentation with Satellite communication.

3.1 MicroSat Ground Station Software

Author

John Melton, G0ORX/N6LYT, g0orx@amsat.org and Jonathan Naylor G4KLX, g4klx@amsat.org

Description

Microsat Ground Station software.

Status

BETA. Version 0.9-Xaw released.

System requirements

Alan Cox's kernel based AX.25 support ver 1.1.12 or better. X-Windows. The programs make use of the Athena Widgets and look much better with the 3D libraries.

Detail

This software allows you to use of a KISS tnc to directly communicate with the Microsat series of satellites. It provides an Athena Widgets based X-Windows interface, and allows you a comprehensive range of means of interacting with the satellite. The software should work with any window manager.

The software provides the following programs:

xpb:
broadcast monitor

xpg:
ftl0 file upload program, message upload program

xtlm:
telemetry display program

downloaded:
downloaded file list viewer

directory:
directory list viewer

message:
message preparation application

viewtext:
uncompressed ASCII text file viewer

viewlog:
display the contents of some log files

xweber:
special program for downloading webersat images

phs:
general purpose PACSAT header stripper

Where and How to obtain it.

John's software is available from: *ftp.ucsd.edu* (`ftp://ftp.ucsd.edu/hamradio/packet/tcpip/incoming/microsat-0.9-Xaw.tar.gz`) or *ftp.funet.fi* (`ftp://ftp.funet.fi/pub/ham/satellite/microsat/microsat-0.9-Xaw.tar.gz`). Please check for new versions.

Licensing/Copyright

GNU Public License. Freely redistributable, No warranty.

Contributed by:

John Melton, G0ORX/N6LYT, Alan Cox, GW4PTS, Jonathon Naylor, G4KLX

3.2 SatTrack - Satellite tracking program

Name

SatTrack

Author

Manfred Bester, DL5KR, manfred@ssl.berkeley.edu, (510) 849-9922

Description

Satellite realtime tracking and orbit prediction program with X11 color graphics.

Status

Version 3.1 has been released.

System requirements

A vt100 terminal and or X11 server. A Maths Coprocessor is useful, but not essential, for good performance.

Detail

SatTrack is a satellite tracking program that has been written in 'C' language on a UNIX workstation. It provides two different live displays, for single or multiple satellites, and two different orbit prediction facilities. Cursor controls used in both live displays are compatible with the VT100 standard, which allows the program to be run basically from any terminal. An optional X Window graphics display shows the typical world map tracking chart. The orbit prediction can be run either interactively or in a batch mode. In the latter case all necessary parameters are specified on the command line. The program uses the NORAD/NASA two-line Keplerian element (TLE) sets directly.

The current version of SatTrack can track a single satellite and/or display multiple satellites for a single ground station. It also can control suitable ground station hardware, like antennas and radio equipment, and has an autotrack mode in which it switches automatically between a number of specified satellites. For calibration purposes tracking of the Sun and the Moon are also provided. Future releases will provide more options. SatTrack requires about 5 MB of disk space in the full distribution with eight different world maps (2 styles, with 4 different sizes each, to fit everyone's screen and taste) and less than 1.5 MB of memory at run time. More information can be obtained from the *SatTrack WWW Home Page* (`http://ssl.berkeley.edu/isi_www/sattrack.html`)

Compiling the software under Linux is quite straightforward. Manfred has designed the Makefile to compile the software directly under your home directory, this is easy to change.

The steps I took were:

```
# cd /usr/src
# export HOME=/usr/src
# gzip -dc sattrack.V3.1.tar.gz | tar xvf -
# cd SatTrack/src
# vi Makefile
  {Comment SUN4 compile options}
  {Uncomment the linux options}
  {Select the options you want}
# make
```

Where and How to obtain it.

SatTrack can be found at: *ftp.amsat.org* (`ftp://ftp.amsat.org/amsat/software/Linux/sattrack.V3.1.tar.gz`) or *ftp.jvnc.net* (`ftp://ftp.jvnc.net/priv/kupiec/sattrack/sattrack.V3.1.tar.Z`) or the *SatTrack WWW Home Page* (`http://ssl.berkeley.edu/isi_www/sattrack-3.1.tar.gz`)

Licensing/Copyright

The software is Copyright of Manfred Bester. It can be used without special permission for non-profit, non-commercial use. For commercial applications a license from the author is required.

Contributed by:

Manfred Bester, DL5KR

4 Shack Automation Software.

Software for simplifying tasks in the shack. Examples might include software for controlling the newer breed of radios, logging programs, QSL database, or antenna rotation.

4.1 FT-890 remote control

Author

Emarit Ranu, drranu@holly.ColoState.EDU, KG0CQ.

Description

A simple program to control a Yaesu FT-890 transciever via its CAT port from linux.

Status

Working

System requirements

Yaesu FT-890, Yaesu FIF-232C interface converter or homebuilt equivalent (Feb 1993 "QST", page 37). Linux, serial cable.

Detail

The program is started with one parameter specifying the com port to use. Once started the program is menu driven. Future versions will support an X-Windows interface.

Where and How to obtain it.

The software is currently only available from the author by email.

Licensing/Copyright

You may copy this program millions of times, the only restrictions are:

- You may not charge ANYONE for the program itself.
- You may not distribute modified versions of the program.
- If you distribute the program, it MUST be the ORIGINAL tar file as received by the author. The README file has to be included.

Contributed by:

Emarit Ranu, drranu@holly.ColoState.EDU

5 Packet Radio

Software for use in conjunction with, or for facilitating packet radio.

5.1 Kernel Based AX.25 networking.

Author

Alan Cox, GW4PTS, iialan@iifeak.swan.ac.uk and Jonathon Naylor, G4KLX, jsn@cs.nott.ac.uk

Description

Software that allows the Linux Kernel to perform AX.25 networking.

Status

ALPHA. Still under development. In a working state.

System requirements

Linux kernel 1.3.0 or later.

Detail

Alan's software provides the programmer with a berkeley socket based interface to the AX.25 protocol. AX.25 sockets can opened for either connected, or connectionless modes of operation. Support to allow tcp/ip over AX.25 is provided. The user applications have been written by Jonathon Naylor G4KLX. Jonathon has recently added NetRom support and provided fixes and other enhancements to the code. The software comes in two parts, a kernel patch, and the user programs. The user programs included are:

axassociate

to associate a particular AX.25 callsign with a userid on your system.

axattach

to convert a serial device into a KISS device.

axl

an AX.25 listener designed to start a PMS when it receives an incoming connection. The PMS is still very new.

axsetcall

to change the callsign of a port.

beacon

generated beacon messages every 30 minutes.

call

A linemode AX.25 connection program. Call allows you to make connections to other AX.25 nodes. It provides file transmit and receive capabilities, and newer versions allow YAPP binary file transfers.

listen

a packet trace tool for radio links.

mheard

a program to display callsign heard on radio ports.

netromd

a daemon program to generate netrom routing broadcasts.

noderest

a program to restore netrom routing information from a file.

nodesave

a program to save netrom routing informtion to a file.

nrparms

a program to configure a netrom interface.

rip98d

an implementation of the rip98 routing protocol.

Where and How to obtain it.

There are a number of different versions of the software. You must choose the one that suits your version of Linux kernel. Software for kernel versions older than 1.3.* is available from: *sunacm.swan.ac.uk* (`ftp://sunacm.swan.ac.uk/pub/misc/Linux/Radio/`)

More detail on where and how to obtain the software is provided in the AX.25 section of the 'Installation, Configuration, Hints and Tricks' chapter below.

Licensing/Copyright

Most of the software is covered by the GNU Public License, some of the software is Copyright by the Regents of University California Berkeley.

5.2 JNOS

Author

Brandon Allbery, KF8NH, bsa@kf8nh.wariat.org

Description

Brandon ported JNOS to Linux. His port is currently of the 1.09 (aka 1.08df) release of JNOS. Future versions will probably be based on Doug Crompton's evolution of 1.08df. Brandon suggests that JNOS for Linux is primarily of interest to people with existing DOS-based NOS configurations (especially server/switch configurations) who wish to switch to Linux or to escape the 640K barrier.

Status

The current version is ALPHA.4. Brandon is still tracking down bugs, as well as evolving new features.

System Requirements.

Any version of Linux along with *ncurses* 1.8.1 or 1.8.5 (the latter is preferred). Optionally you will require Linux networking (at least loopback) and *slattach* (kernels pre-1.1.13 or post-1.1.20 required for this).

Detail

If you include the Linux networking code in addition to JNOS, you can link the two by a slip link running over a pty, so that Linux can provide services to your radio users. In this way you can easily add servers without having to build them into JNOS itself. Brandon has supplied the following list of known bugs:

- some servers seem to be causing unexplained exits.
- PPP is reported not to work in ALPHA.4, although it worked in ALPHA.3.
- BBS forwarding when convers is compiled in but not configured causes core dumps.
- the finger server is getting bad filenames.
- the bbs W command is case-munging filenames.

Where and How to obtain it.

You can obtain JNOS for Linux ALPHA.4 at: *ftp.ucsd.edu* (`ftp://ftp.ucsd.edu/hamradio/packet/tcpip/linux/j109lxA4.tgz`) *ncurses* is available on most Linux ftp sites.

Licensing/Copyright

Brandon's modifications to JNOS are public domain. Most of the pre-existing NOS code is copyrighted and restricted to non-commercial use by the various contributors from Phil Karn on.

Contributed by:

Brandon Allbery, KF8NH

5.3 TNOS

Author

Brian A. Lantz, brian@lantz.com

Description

TNOS is a NOS derivative that is being actively supported and which is avialable for both DOS and Linux. It features enhancements not found in other NOS versions.

Status

The current version is 1.14 and is stable.

System Requirements

Kernel networking slip support if you want to link the normal Linux network facilities with TNOS. A kiss tnc.

Detail

Brian maintains a World Wide Web server which contains up to date information on TNOS, you can find it at *www.lantz.com* (`http://www.lantz.com/tnos/current/linux/`).

Where and how to obtain it

The current version of TNOS is always available from: *www.lantz.com* (`http://www.lantz.com/tnos/current/`), *sunsite.unc.edu* (`ftp://sunsite.unc.edu/pub/Linux/apps/ham/tnos/`), or *ftp.ucsd.edu* (`ftp://ftp.ucsd.edu/hamradio/packet/tcpip/linux/`).

Licensing/Copyright etc.

Free for use by amateur radio operators and educational oraganisations

5.4 N0ARY Packet BBS for UN*X

Author

Bob Arasmith, N0ARY, ported to Linux (and others) by Bob Proulx, KF0UW, rwp@fc.hp.com

Description

A packet bbs implemented under UN*X.

Status

ALPHA. Bob is running version ARY-0.9 on both Linux and HP-UX. The next version from N0ARY which is called 4.0 is in alpha test/development release. Bob has not been able to bring this online yet and is still running 0.9+kf0uw mods. Bob has about half it working with Alan Cox's AX.25 kernel which would be the desirable combination.

System Requirements.

Linux installation, C Compiler, plus HAM radio TNC hardware.

Detail

This bbs has an excellent packet user interface. It has a compatible set of commands with the RLI bbs so users will be familiar with it immediately. It then extends the command set to be a very nice natural language style interface (e.g "list at allus about KPC-3"). Many csh style bang commands are supported. Also included is a mail interface to provide a packet to internet gateway.

Currently you need to customize the source code for your installation so you need some C programming proficiency.

Where and How to obtain it.

For a Linux version or for Linux information send mail to `rwp@fc.hp.com`. For a SunOS version contact `bob@arasmith.com`. This code is not packaged for distribution yet since it is not past the alpha stage of development.

Licensing/Copyright

Copyright by Bob Arasmith, N0ARY, but freely redistributable.

Contributed by:

Bob Proulx, kf0uw, rwp@fc.hp.com

5.5 MBL/RLI message to NNTP and email converter.

Author

SM0OHI, pme@it.kth.se

Description

Software that will convert incoming MBL/RLI messages into either NNTP or RFC-822 formatted mail messages.

Status

Development, not yet released.

System requirements

Unknown.

Detail

This software would be ideally suited to those who want to establish a mail and news gateway between conventional tcp/ip networks and the amateur radio mail network.

Where and How to obtain it.

Not yet availale.

Licensing/Copyright

Unknown.

Contributed by:

SM0OHI

5.6 Packet Cluster Node software

Author

Franta Bendl, DJ0ZY, and Bernhard ("Ben") Buettner, DL6RAI, root@dl6rai.muc.de

Description

A PacketCluster like system running on Linux.

Status

Released in March 1995.

System Requirements

Linux Kernel version 1.1.50 or greater with Alan Cox's AX.25 version 025 driver, TCP/IP networking, SysV IPC. Also needs Perl and KISS TNC hardware on serial device.

Detail

PacketCluster nodes have been available for about six years. The original software was written by Dick Newell, AK1A, and is running under DOS. *clx* is a system which clones a PacketCluster node. To the outside user commands and features are mostly identical, remote PacketCluster nodes, which can be networked, don't see the difference between a generic PacketCluster node and *clx*. So it fits well into an established network of PacketCluster nodes.

clx is not a user application, it is network node software. As such it is not of much use for the individual amateur. SysOPs of PacketCluster nodes with some experience on both PacketCluster and Linux will find this application interesting.

Here are some of the features of CLX:

- It is fully compatible with the internal PCxx protocol and from a users' point of view. It allows multitasking and different priorities for different things.
- The software detects looping DX spots without generating endless messages. *clx* filters out such duplicate information. We have implemented a concept which allows us to connect the network at multiple points, which would formerly have been called a "Cluster Loop". *clx* knows of so-called "active" and "passive" links. The outcome is that more DX information is seen by clx.
- An interface to call your external programs (even dialog programs).
- *clx* uses modern programming concepts like shared memory for common data, lex & yacc to implement command language, shared libraries to keep binaries small (this is still on our wish list), remote procedure calls for inter process communication. It is strictly modularized with its own dedicated process for every major task.
- Comprises the following modules:

  con_ctl
  : interfaces AX.25 kernel code and provides a socket for local users.

  rcv_ctl
  : manages receive spooling.

  snd_ctl
  : manages transmit spooling.

  rm_disp
  : receive message dispatcher, forwards messages to other processes.

  usr_req
  : user database requests, forks a process for every database task to make it run in the background. The background process later sends the results directly to send_ctl.

  mb_ctl
  : mailbox control. The mailbox keeps messages in a file system, header information is stored in the database.

  usr_ctl
  : user administration (logins, logouts, logbook).

  usc_mng
  : manages external user commands and command extensions.

iu_com
inter user communication (talk, conference).

send_ctl
transmit spooling, handling priorities.

icl_com
inter node communication (processing and generating PCxx messages).

clx_ctl
system administration, installing shared memory pages.

int_com
manages internal program communications.

- The following is the only application program which can be run on the console:

loc_usr
allows console operator(s) to log in like a normal user.

Future enhance planned are:

- A console monitor to watch ongoing activities
- Speed optimization
- An internal clx protocol
- An additional command shell for experienced users

Where and How to obtain it:

You can obtain *clx* from *ftp.uni-erlangen.de* (`ftp://ftp.uni-erlangen.de/pub/public/pc-freeware/hamradio/packet/packclus/clx`) or *ftp.ucsd.edu* (`ftp://ftp.funet.fi/pub/ham/unix/Linux/cluster`)

There are five files that make up the package:

- 00index
- clx_105.tgz
- install.clx
- README_1.06
- upd_106.tgz

Licensing/Copyright

clx is available for non-commercial use, but the authors want to keep track of who is using their product, so before you can actually use the software you have to ask for an encrypted callsign string to be placed in the configuration file. You must send mail to <`clx_us@dl6rai.muc.de`> to organise this.

Contributed by:

Bernhard ("Ben") Buettner, DL6RAI

5.7 Single floppy disk AX.25 router.

Author

Alan Cox, GW4PTS, iialan@iifeak.swan.ac.uk

Description

A single floppy disk version of linux with enough software to allow a PC to act as an AX.25/IP router.

Status

Development, not yet released.

System requirements.

As for any Linux system a 386SX class PC or better.

Detail

No detail yet.

Where and How to obtain it.

Not yet available.

Licensing/Copyright

Unknown/Undecided.

5.8 TNT.

Author

Mark Wahl, DL4YBG, DL4YBG @ DB0BLO.#.DEU.EU, wahlm@zelator.de

Description

A Hostmode terminal program for TNC's that support the WA8DED hostmode protocol.

Status

Version 0.8 is reportedly stable.

System requirements

TNC supporting WA8DED hostmode protocol, serial line.

Detail

TNT is a full featured hostmode terminal program. Compiling it on Linux is as difficult as untarring the source and typing 'make'. It provides both a 'dumb' terminal and X11 version. It comes with some comprehensive documentation which describes its features in some detail. Its main features are:

Multiple sessions:

TNT supports multiple packet radio connections on virtual screens that you can switch between. Each session window provides split screen (seperate transmit and receive text) operation with a status line. Commands can be entered in either a command session, or in any terminal session using a command key. Each of the virtual screens can be larger than the physical screen and can be scrolled around.

Data capture, file transfer and logging:

A number of options are available for logging received text to files. You can log transmit, receive or both to a log file. You can overwrite or append received data to existing files. You can use the 'autobin' protocol to transmit or receive binary files.

Remote Shell operation:

You can provide a shell to remote users so that they can access other programs on your computer. You can also run a program and direct its input/output to a channel so that users can use it.

Redirection of devices to a channel:

TNT allows you to redirect input/output from a channel to a device, a modem for example.

Umlaut conversion:

TNT provides umlaut conversion if necessary.

Remote mode:

Remote users can issue command themselves if allowed to do so.

Socket mode:

You can configure tnt so that it opens a socket for users to telnet to that allows them operation just as you have from the console. This is useful where your linux machine is on an ethernet and you want other terminal on the net to have use of your radio.

Where and How to obtain it.

The software is available by anonymous ftp from: *ftp.funet.fi* (`ftp://ftp.funet.fi/pub/ham/unix/packet/tntsrc08.tgz`). This site is mirrored at a number of places so you will probably find it at other places as well.

Licensing/Copyright

GNU Public License. Freely redistributable, no warranty.

Contributed by:

Steffen Weinreich, DL5ZBG.

5.9 IPIP encapsulation daemon.

Name

Mike Westerhof's IPIP encapsulation daemon.

Author

Mike Westerhof KA9WSB (original code), then Bdale Garbee N3EUA (port to BSD), then Ron Atkinson N8FOW and John Paul Morrison (port to Linux), then Bdale rolled it all back together again.

Description

A daemon that will allow you to use your linux machine as an IPIP encapsulating gateway.

Status

Ron is running this code himself, and the other version have been run quite successfully.

System requirements

KISS TNC, any version of Linux supporting RAW sockets.

Detail

If you've ever used an internet gateway from your amateur packet radio you have probably been connected by an encapsulation gateway of some descpription. Most run KA9Q's NOS and DOS, but others run Unix and this daemon. It allows you to encapsulate IP within IP, so that you can 'tunnel' IP connections over the Internet. The software allows you to connect a KISS TNC to your linux machine and to have all datagrams received on it carried across the Internet to a similar gateway. Bdale has installation instructions in the package.

Where and How to obtain it.

This software is available from the *col.hp.com* (`ftp:///col.hp.com/hamradio/packet/etc/ipip/ipip.tar.gz`) ftp site.

Licensing/Copyright etc.

Freely distributable, though Bdale asks that if you use the code and like it you might send him a QSL card or a postcard.

Contributed by:

Ron Atkinson, N8FOW, and Bdale Garbee, N3EUA

5.10 AXIP encapsulation daemon.

Name

Mike Westerhof's AXIP encapsulation daemon.

Author

Mike Westerhof KA9WSB, ported to Linux by Ron Atkinson N8FOW.

Description

A daemon that will allow you to use your linux machine as an AXIP encapsul ating gateway.

Status

Not properly tested, but assumed to work ok.

System requirements

KISS TNC, any version of Linux supporting RAW sockets.

Detail

This daemon is the partner to the IPIP encapsulation daemon. It allows you to encapsulate AX.25 frames in IP to carry them across the Internet. This is useful for linking AX.25 networks in remote areas. Ron has supplied a `Makefile` for linux, and with it the software compiled without errors on my system running a recent version kernel. Ron has also written some `README` files which give you the detail necessary to compile the system and the original documentation describes how to configure it.

Where and How to obtain it.

This software is available in the *sunsite.unc.edu ham apps directory* (`ftp://sunsite.unc.edu/pub/Linux/apps/ham/ax25ip.tar.gz`).

Licensing/Copyright etc.

Freely distributable so long as the original copyright notice is not removed.

Contributed by:

Ron Atkinson, N8FOW

5.11 Ping-Pong Convers Server

Name

Fred Baumgartens Convers Server for Linux.

Author

Fred Baumgarten, DC6IQ, <dc6iq@insu1.etec.uni-karlsruhe.de¿

Description

This is a version of the convers server that allows multiple users to simultaneously chat with each other in a round-table style conversation. It is compatible with the NOS convers servers, but provides extra facilities such as saving/restoring of Personal Text and Chanel Topics.

Status

In use of a number of popular convers servers, appears very stable.

System requirements.

Linux, GNU make, C compiler.

Detail.

Complete installation instructions are included in the `INSTALL` file that is included in the distribution.

Where and How to obtain it.

A distribution of this software is available in the *sunsite.unc.edu ham apps directory* (`ftp://sunsite.unc.edu/pub/Linux/apps/ham/convers-941122.tar.gz`). The home of the software is at *insu1.etec.uni-karlsruhe.de ftp server* (`ftp://insu1.etec.uni-karlsruhe.de/pub/hamradio/convers/convers`)

Licensing/Copyright etc.

Presumably copyright Fred Baumgarten (not specifically stated), but some portions appear to be free for non-commercial use and copying provided the copyright notices stay intact.

5.12 AX.25 digipeater for Linux

Name

axdigi

Author

Craig Small vk2xlz <csmall@acacia.itd.uts.edu.au¿

Description

Allows Linux to digipeat across different ax.25 ports

Status

Beta release

System requirements

Requires Alan Cox AX.25 kernel support

Detail.

Allows frames to come in one port and out another using normal ax.25 digipeater methods. Changes the digipeater callsign to the correct one for the correct return port.

Where and How to obtain it.

sunsite.unc.edu (`ftp://sunsite.unc.edu/pub/Linux/apps/ham/axdigi.tgz`) *ftp.ucsd.edu* (`ftp://ftp.ucsd.edu/hamradio/packet/tcpip/linux/axdigi.tgz`)

Licensing/Copyright etc.

GNU GPL

Contributed by:

Craig Small vk2xlz <csmall@acacia.itd.uts.edu.au¿

5.13 Gracilis PacketTwin kernel driver

Name

Gracilis PacketTwin kernel driver

Author

Craig Small vk2xlz <csmall@acacia.itd.uts.edu.au¿

Description

Device driver for Gracilis PackeTwin cards.

Status

Alpha test - needs some more work before it is properly released.

System requirements.

Gracilis PackeTwin card, Alan Cox's AX.25 kernel software.

Detail.

Provides kernel based driver support for the Gracilis PackeTwin card using the kernel AX.25 code.

Where and How to obtain it.

Currently available only by email from the author.

Licensing/Copyright etc.

Restricted use by alpha testers only, general GPL release is some months off.

Contributed by:

Craig Small vk2xlz <csmall@acacia.itd.uts.edu.au¿

5.14 RSPF Daemon

Name

RSPF - Radio Shortest Path First routing daemon for Linux

Author

Craig Small vk2xlz <csmall@acacia.itd.uts.edu.au¿

Description

An implementation of the Radio Shortest path First routing protocol for linux. The daemon supports version 2.2 of the protocol which corrects a lot of bugs and problems that were present in version 2.1.

Status

Alpha test - running. Current version is 0.03

System requirements.

Requires Alan Cox's kernel based AX.25 code.

Detail

This program will allow Linux to become an RSPF router. It hopefully addresses some of the quirks of RSPF v2.1, the version in NOS. It will also allow remote/local queries via a tcp session.

Where and How to obtain it.

Alpha versions are available from *sunsite.unc.edu* (`ftp://sunsite.unc.edu/pub/Linux/apps/ham/`), *ftp.ucsd.edu* (`ftp://ftp.ucsd.edu/hamradio/packet/tcpip/incoming/`) or from the author.

Licensing/Copyright

Will be covered by the GPL when formally released.

Contributed by:

Craig Small vk2xlz <csmall@acacia.itd.uts.edu.au¿

5.15 Z8530 SCC driver.

Name

generic Z8530 SCC device driver.

Author

Joerg Reuter, <DL1BKE@melaten.ihf.rwth-aachen.de¿

Description

A device driver to allow you to use a range of 8530 based SCC cards under Linux.

Status

stable

System requirements.

a modern Linux kernel

Detail

The Zilog Z8530 SCC provides Synchronous/Asynchronous, HDLC, NRZI encoding and other capabilities. There are a number of peripheral cards that use the Z850 as the basis of their design. The driver is generic enough to be pushed into service for just about any sort of 8530 card. The `README` file that comes with the package provides detail on installation and configuration.

Where and How to obtain it:

The driver can be obtained from: *ftp.ucsd.edu* (`ftp://ftp.ucsd.edu/hamradio/packet/tcpip/incoming/z8530drv-1.8.dl1bke.tar.gz`) for kernel versions older than 1.3.*. Kernel version 1.3.* supports the driver in the standard distribution.

Licensing/Copyright

Gnu Public License.

6 Morse Code

Software for use in conjunction with, or for facilitating Morse communication.

6.1 GW4PTS Morse trainer.

Author

Alan Cox, GW4PTS, iialan@iifeak.swan.ac.uk

Description

A Morse Code trainer that uses the PC internal speaker

Status

stable, works quite well, unfinished.

System requirements

Linux, any version

Detail

Alan wrote this small program in only an hour. It is quite neat, and allows you to play morse at a range of speeds and frequencies through the PC internal speaker. You can specify the text to be played either from the command line, from a file, or the program is capable of generating random character groups. As it stands you must invoke the program from a Linux Virtual Console, as it relies on certain kernel calls to produce the sound, and these don't work as easily from an XTerm. As it sounds each character it lists the character in verbal form (Di, Dit, Dah etc.) to the screen. Alan is hoping that someone will take the code and enhance it with the features he has listed in the comments at the head of the source file.

Where and How to obtain it.

I've had a large number of responses from people seeking this code, so I've obtained Alan's permission to make it available. You can obtain it from *sunsite.unc.edu* (`ftp://sunsite.unc.edu/pub/Linux/apps/ham/GW4PTS.morse.tar.gz`).

Copyright/Licensing

GNU Public License 2, freely redistributable, no warranty.

6.2 morse (aka superiormorse)

Author

Joe Dellinger, Hawaii Institute of Geophysics, University of Hawaii at Manoa, joe@sep.stanford.edu, jdellinger@trc.amoco.com, joe@soest.hawaii.edu

Description

A morse-code practice program for UNIX workstations.

Status

Quite stable

System Requirements

Currently supports X11, Sun4, HP, Indigo, and Linux

Detail

Lots of features and options. Includes a utility for generating random content QSOs, similar to those used in the FCC exams.

Where and How to obtain it:

morse can be obtained from: *sepftp.standford.edu* (`ftp://sepftp.stanford.edu/pub/UNIX_utils/morse/morse.tar.gz`).

Licensing/Copyright

Freely Redistributable

Contributed by:

Brian Suggs, AC6GV, and John Gotts, jgotts@engin.umich.edu

7 AMTOR Software.

Software for use in conjunction with, or for facilitating AMTOR.

8 PACTOR Software.

Software for use in conjunction with, or for facilitating PACTOR.

9 Slow Scan Television Software.

Software for use in conjunction with, or for facilitating Slow Scan Television.

10 Facsimile Software.

Software for use in conjunction with, or for facilitating Facsimile.

11 Design and Construction Software.

Software to assist in the design and construction of amateur radio related things. Antenna, Circuit Board, Filter, and QSL card design packages are all good candidates for this section.

11.1 Software Oscilloscope

Author

Jeff Tranter, Jeff_Tranter@Mitel.COM

Description

Scope is a simple software emulation of an oscilloscope. It graphically displays voltage as a function of time.

Status

ALPHA. First release.

System requirements

Sound card with input capability supported by the kernel sound driver. SVGALIB is used to do the display work.

Detail

Scope uses the `/dev/dsp` device to take audio in from the soundcard and displays it on the screen in a manner similar to an oscilloscope. Jeff claims Scope was written more for amusement value than for any serious purpose.

Where and How to obtain it.

You can obtain source, makefile and man page for Scope from: *sunsite.unc.edu* (`ftp://sunsite.unc.edu/pub/Linux/apps/circuits/scope-0.1.tar.gz`)

Licensing/Copyright

GNU Public License, Freely redistributable, No warranty.

11.2 Printed Circuit Board design tool.

Author

Thomas Nau, <Thomas.Nau@rz.uni-ulm.de¿

Description

An X11 based interactive printed circuit board design tool.

Status

Vers 1.3, stable.

System requirements

X11 Windowing system and a recent flex program.

Detail

The pcb package comes with good instructions on how to compile and install the software. I compiled it without error under X11R6. It comes with package layouts for a range of popular components and the example layout nicely demonstrates the capabilities of the package.

Where and How to obtain it.

You can obtain the pcb package from: *sunsite.unc.edu* (`ftp://sunsite.unc.edu/pub/Linux/apps/circuits/pcb-1.3.tar.gz`) or from: *ftp.medizin.uni-ulm.de* (`ftp://ftp.medizin.uni-ulm.de/pub/pcb-1.3/pcb-1.3.tar.gz`)

Licensing/Copyright

GNU Public License

11.3 Chipmunk circuit design and simulation tool

Author

Dave Gillespie <daveg@synaptics.com¿ and John Lazzaro <lazzaro@cs.berkeley.edu¿

Description

Schematic Entry and Digital or Analog Simulation.

Status

vers 5.10, stable.

System requirements

X11 windowing system and older (XFree86-2.x) libs, 8 bpp (256 color) only

Detail

I haven't tried this one out yet.

Where and How to obtain it.

You can obtain the Chipmunk package from: *sunsite.unc.edu* (`ftp://sunsite.unc.edu/pub/Linux/apps/circuits`)or *ifi.uio.no* (`ftp://ifi.uio.no/pub/`).

Licensing/Copyright

Modified GNU Public License, Caltch specifically disclaimed from liability.

11.4 irsim

Author

Dmitry Teytelman, dim@leland.stanford.edu

Description

An event-driven logic-level simulator for MOS circuits

Status

Version 9.2, production.

System Requirements

X-Windows.

Detail

irsim is an X11 based simulator for MOS circuits. It has two simulation modes, either *switch* where each transistor is modelled as a voltage controlled switch, or *linear* where each transistor is modelled as a resistor in series with a voltage controlled switch, and each node has a capacitance.

Where and How to obtain it.

You can obtain irsim from: *sunsite.unc.edu* (`ftp://sunsite.unc.edu/pub/Linux/apps/circuits/irsim-9.2.linux.1.tar.gz`).

Licensing/Copyright

Freely Redistributable

11.5 Spice vers. 3f4

Author

University of California, Berkeley, ported by Jeff@EE.Ryerson.Ca

Description

Spice is an analog circuit emulator.

Status

Stable release.

System requirements

Unknown.

Detail

Spice allows you to design and test circuits in a computer modelled environment to see how they will behave without having to touch a soldering iron, or solder. A `readme` file comes with the package. To install I did the following:

```
# cd /usr/src
# gzip -dc spice3f4.tar.gz | tar xvf -
# cd spice3f4
# ./utils/build linux
# ./utils/build linux install
```

Where and How to obtain it.

You can obtain version 3f4 of Spice from: *sunsite.unc.edu* (`ftp://sunsite.unc.edu/pub/Linux/apps/circuits/spice3f4.tar.gz`)

Licensing/Copyright

Copyright held by University California, Berkeley. Freely redistributable provided you are not unfriendly to the U.S.

11.6 svgafft - Spectrum analyser

Author

Andrew Veliath, drewvel@ayrton.eideti.com

Description

svgafft is a spectrum analyser for Linux.

Status

Alpha software, but usable.

System requirements

Linux supported sound card, svgalib, a 486DX33 or better.

Detail

svgafft uses the `/dev/dsp` device and currently supports 16-bit and 8-bit sample resolution on supported Linux soundcards. It's display is something akin to a high-end spectrum analyzer with falling peaks.

Where and How to obtain it:

Look for `svgafft-0.2.tar.gz` on `sunsite.unc.edu`

Licensing/Copyright

Unknown, check any `README` supplied.

11.7 Audio Spectrum Analyser

Author

Philip VanBaren, phillipv@eecs.umich.edu

Description

An audio spectrum analyser for Linux SVGALIB or X-Windows.

Status

Alpha but usable

System requirements

Linux supported sound card, svgalib or X-Windows.

Detail

freq5a1 uses the `/dev/dsp` device, samples the incoming audio, performs a fast fourier transform on the data and displays the output in either 640x480 VGA or an X-Window.

Where and How to obtain it:

You can obtain freq5a1.tar.gz from: *umich.edu* (`http://bul.eecs.umich.edu/ phillipv/signal`), *sunsite.unc.edu* (`ftp://sunsite.unc.edu/pub/Linux/apps/sound/freq5a1.tar.gz`) or by mail from the author.

Licensing/Copyright

GNU Public License vers 2.0.

12 Training/Educational Software.

Software to assist in education or training for amateur radio. Morse Code tutorials, technical examination database, Computer Based Training software, and the like are listed here.

13 Miscellaneous Software.

Software that didn't neatly fit into any other category.

13.1 Linux for HAMS CD-ROM

Author

Bruce Perens, bruce@pixar.com

Description

A complete linux distribution on CDROM specifically designed for Amateur Radio operators.

Status

Not yet available.

System requirements.

Linux compatible hardware, some software will obviously require specialised hardware to operate. No additional software should be required.

Detail

A complete Linux distribution specifically catering for Amateur Radio operators. It will include a fully featured Linux installationplus a range of amateur radio specific software such as those listed in this document. Bruce has detail and updated status report available at the *LinuxForHams WWW page* (`http://www.rahul.net/perens/LinuxForHams`).

Where and how to obtain it:

It isn't yet available, details will be made available when it is released.

Licensing/Copyright

GNU Public License.

Contributed by:

Bruce Perens, bruce@pixar.com

13.2 SunClock

Author

John Mackin, john@cs.su.oz.AU

Description

A clock that will show you instantly what parts of the globe are exposed by sunlight and what parts aren't.

Status

Released.

System requirements.

X-Windows.

Detail

sunclock is another of those desktop gadgets that most people think look nice but really don't have a lot of use for. I use sunclock to obtain an at-a-glance indication of the time anywhere in the world. In its iconic form it sits in a small Mercator projection. When maximised it produces the same image but obviously larger with slightly more detail. It also displays the date, local time and UTC. sunclock actually calculates mathematically what parts of globe are sunlit and which aren't, it seems quite accurate, so long as you assume the earth has no atmosphere.

Where and How to obtain it.

I haven't seen any precompiled sunclock binaries for Linux about, so check your nearest *archie* server. sunclock compiled straight out of the box for me.

Licensing/Copyright

Public Domain and may be freely copied as long as the notices at the top of sunclock.c remain intact.

13.3 Xearth

Author

Kirk Lauritz Johnson, tuna@cag.lcs.mit.edu, modified by Dimitris Evmorfopoulos, devmorfo@cs.mtu.edu.

Description

A rotating earth for X-windows root window. It has real life shading, and options for geostatic view, and non geostatic view. A prettier and more modern version of *sunclock* but requires a bit more processing power.

Status

released, stable.

System requirements.

X-Windows.

Detail

xearth is much like *sunclock* except that it draws a view of the earth onto your root map in blue and green, as the earth would be viewed from space. You have a number of options in determining the behaviour of the view. You can either have it so that the same part of the earth is displayed, and the sun rotates, so you'll have varying light and shadow on the display, or you can have it shown as if you were travelling with the sun, so the whole of the globe is visible, and the earth rotates. You can specify the latitude/longtitude that will be the centre of the display. *xearth* is also capable of producing *gif* and *ppm* graphics output, so you can generate custom graphics of the globe. When run as your root map, you can adjust the interval of time between updates. On my 486sx25 you notice a small degradation in performance when it is recalculating, but it's not annoying.

Where and How to obtain it.

A precompiled *xearth* binary is available from: **sunsite.unc.edu**, or the source can be obtained from just about any X11/contrib directory. Try **export.lcs.mit.edu** if you can't find it elsewhere.

Licensing/Copyright

Copyright (C) 1989, 1990, 1993 by Kirk Lauritz Johnson. The copyright notice included states that *xearth* is freely redistributable so long as the copyright notice is left intact, and be included in documentation.

Contributed by:

Alan Cox, GW4PTS.

14 Installation, Configuration, Hints and Tricks.

This section provides some detail on how to actually install and use some of the listed software. It will also detail some solutions to some tricky problems that you might encounter with the software.

14.1 AX.25 - Packet Radio protocol kernel software.

The *AX.25* protocol offers both connected and connectionless modes of operation, and is used either by itself for point-point links, or to carry other protocols such as tcp/ip and netrom.

It is similar to X.25 level 2 in structure, with some extensions to make it more useful in the amateur radio environment.

Alan Cox has developed some kernel based AX.25 software support for Linux and these are available in ALPHA form for you to try. Alan's code supports KISS based TNC's (Terminal Node Controllers), the Ottawa PI card and the Z8530 SCC driver.

The User programs contain a P.M.S. (Personal Message System), a beacon facility, a line mode connect program, 'listen' an example of how to capture all AX.25 frames at raw interface level and programs to configure the NetRom protocol.

Be sure to read `/usr/local/ax25/README` as it contains more complete information regarding this software.

14.1.1 Where to obtain the AX.25 software.

The AX.25 software is comprised of two component, the kernel source and the utility programs. As of the version 1.3.* release of Linux kernel source the AX.25, Netrom, Z8530 SCC and PI card drivers are all included as a standard. I strongly recommend you obtain and use the version 1.3.* kernel source. Be warned though, this software is **alpha** and may have problem that you wouldn't otherwise encounter.

You can obtain the latest kernel source from:

ftp.funet.fi

```
/pub/OS/Linux/PEOPLE/Linus/v1.3/
```

You will also need the utility programs. The latest version of those can be found at:

ftp.ucsd.edu

```
/hamradio/packet/tcpip/incoming/ax25-utils-030.tar.gz
                           .../ax25-utils-030-patch1.gz
```

14.1.2 Installing the AX.25 software.

The software comes in two parts, the kernel source, and the user programs.

The kernel source. If you are using the 1.3.* kernel source then all you have to do is build the kernel as you would normally.

The following should be safe:

```
# cd /usr/src/linux
# make config
# make dep;make
```

Be sure to answer 'yes' when you are asked if you should include the AX.25 support in the *make config* step. You will also need to answer 'y' to including SLIP if you want the AX.25 code to support a KISS TNC or if you intend running a version of NOS on your system so you can link the two. You will be asked if you wish to include the Z8530 driver. If you wish to support the Ottawa PI driver then you must answer 'y' when asked: `Do you want to be offered ALPHA test drivers ?` and: `Other ISA cards ?` then 'y' when prompted: `Ottawa PI and PI/2 support`.

The user programs. To install the user programs you should try:

```
# cd /usr/local
# gzip -dc ax25-utils-030.tar.gz | tar xvvof -
# gzip -dc ax25-utils-030-patch1.gz | patch -p0
# cd ax25
```

You should then read the `README` file and follow its instructions. When you are happy you are ready to compile, then do:

```
# cd /usr/local/ax25/src
# make clean
# make install
```

14.1.3 Configuring and using the AX.25 software.

Configuring an AX.25 port is very similar to configuring a slip device. The AX.25 software has been designed to work with a TNC in *kiss* mode or an Ottawa PI2 card. You will need to have the TNC preconfigured and connected to your serial port. You can use a comms program like *minicom* or *seyon* to configure the TNC into kiss mode if you wish.

You use the *axattach* program in much the same way as you would use the *slattach* program. For example:

```
# /usr/local/ax25/bin/axattach -s 4800 /dev/cua1 VK2KTJ &
```

would configure your `/dev/cua1` serial device to be a *kiss* interface at 4800 bps, with the hardware address `VK2KTJ`.

You would then use the *ifconfig* program to configure the ip address and netmask as for an ethernet device:

```
# /sbin/ifconfig sl0 44.136.8.5
# /sbin/ifconfig sl0 netmask 255.255.255.0
# /sbin/ifconfig sl0 broadcast 44.136.8.255
# /sbin/ifconfig sl0 arp mtu 257 up
```

To test it out, try the following:

```
/usr/local/ax25/bin/call VK2DAY via VK2RVT
```

The *call* program is a linemode terminal program for making ax.25 calls. It recognises lines that start with ‘ ’ as command lines. The ‘ .’ command will close the connection.

You also need to configure some items such as the window to use. This necessitates editing only one file. Edit the `/usr/local/ax25/etc/ports` file. This is an ascii file containing one line for each AX.25 port. You must have the entries in this file in the same order as you configure your AX.25 interfaces.

The format is as follows:

```
callsign baudrate window frequency
```

At this stage not much of this information is used, it will be picked up and used in later developments.

Please refer to the man pages in `/usr/local/ax25/man` and the `README` file in `/usr/local/ax25` for more information.

14.2 Ottawa PI/PI2 card driver.

The Ottawa PI card is a Z8530 SCC based card for IBM PC type machines that is in common usage by Amateur Radio operators worldwide. While it is most commonly used by Amateur Radio Operators, it could be pressed into service in other fields where it is desirable to have the features of a Z8530. It supports a high speed half duplex (single DMA channel) port, and a low speed (<9k6bps interrupt driven) half duplex port. The PI2 is a new version of the card that supports an on board radio modem, and improved hardware design.

A driver for this card has been written by `David Perry, <dp@hydra.carleton.edu>`, and is available from in the standard linux kernel. Please refer to the AX.25 section for configuration details.

14.3 HOWTO link NOS and the Linux kernel networking software

Many people like to run some version of NOS under Linux because it has all of the features and facilities they are used to. Most of those people would also like to have the NOS running on their machine capable of talking to the Linux kernel so that they can offer some of the linux capabilities to radio users. Brandon S. Allbery, KF8NH, contributed information to explain how to achieve this.

Since both Linux and NOS support the slip protocol it is possible to link the two together by creating a slip link. You could do this by using two serial ports with a loopback cable between them, but this would be slow and costly. Linux provides a feature that many other unix-like operating systems provide called 'pipes'. These are special pseudo devices that look like a standard tty device to software but in fact loopback to another pipe device. To use these pipes the first program must open the **master** end of the pipe, and the open then the second program can open the **slave** end of the pipe. When both ends are open the programs can communicate with each other simply by writing characters to the pipes in the way they would if they were terminal devices.

To use this feature to connect the Linux Kernel and a copy of NOS, or some other program you first must chosoe a pipe device to use. You can find one by looking in your `/dev` directory. The master end of the pipes are named: `ptyp[1-f]` and the slave end of the pipes are known as: `ttyp[1-f]`. Remember they come in pairs, so if you select `/dev/ptypf` as your master end then you must use `/dev/ttypf` as the slave end.

Once you have chosen a pipe device pair to use you should allocate the master end to you linux kernel and the slave end to the NOS program, as the Linux kernel starts first and the master end of the pipe must be opened first. You must also remember that your Linux kernel must have a different IP address to your NOS, so you will need to allocate a unique address for it if you haven't already.

You configure the pipe just as if it were a serial device, so to create the slip link from your linux kernel you can use commands similar to the following:

```
# /sbin/slattach -s 38400 -p slip /dev/ptypf &
# /sbin/ifconfig sl0 broadcast 44.255.255.255 pointopoint 44.70.248.67 /
        mtu 1536 44.70.4.88
# /sbin/route add 44.70.248.67 sl0
# /sbin/route add -net 44.0.0.0 gw 44.70.248.67
```

In this example the Linux kernel has been given IP address `44.70.4.88` and the NOS program is using IP address `44.70.248.67`. The *route* command in the last line simply tells your linux kernel to route all datagrams for the amprnet via the slip link created by the *slattach* command. Normally you would put these commands into your `/etc/rc.d/rc.inet2` file after all your other network configuration is complete so that the slip link is created automatically when you reboot. Note: there is no advantage in using *cslip* instead of *slip* as it actually reduces performance because the link is only a virtual one and occurs fast enough that having to compress the headers first takes longer than transmitting the uncompressed datagram.

To configure the NOS end of the link you could try the following:

```
# you can call the interface anything you want; I use "linux" for convenience.
attach asy ttypf - slip linux 1024 1024 38400
route addprivate 44.70.4.88 linux
```

These commands will create a slip port named 'linux' via the slave end of the pipe device pair to your linux kernel, and a route to it to make it work. When you have started NOS you should be able to ping and telnet to your NOS from your Linux machine and vice versa. If not, double check that you have made no mistakes especially that you have the addresses configured properly and have the pipe devices around the right way.

15 How to contribute or update an entry.

I'd like for this list to be as complete and up-to-date as possible. So I'm keen to hear about any developments or products that I don't already know about, or that the entry is obselete or outdated for.

What I'd like as a minimum set of requirement would be something like the following:

Name

The name of the software in question.

Author

Who wrote, or ported the software. An email address, or some other means of contacting them is also essential.

Description

A single line description of what the software does.

Status

An indication of the software's status. Is it still in testing? Is it a production release? Is it still in the design stage?

System requirements

What does the software require to run? Does it require X-Windows? Does it need a soundcard? Does it need a certain version of kernel? Does it need other software to support it?

Detail

I'm not keen on including a large amount of detail on each piece of software as this would consume a lot of time reading and trying to keep up to date. So instead what I'd like to list is what makes this software unique, anything special about it. Perhaps its most outstanding features, that sort of thing.

Where and How to obtain it.

If the software is freely distributable then ftp details would be great. If it is commercial software then the name of the company distributing the software, and an address or telephone number. If it is available only by some other means, say mail order, then details on where and how to obtain it.

Licensing/Copyright

Is the software Copyleft? Copyright? Shareware? Public Domain? Restricted in use in any way?

Don't worry if you don't know all of these details, just send me what you do know and I'll list what I can. I'd rather have an incomplete listing than no listing at all.

Please mail any contributions to:

`terryd@extro.ucc.su.oz.au` or `terry@orac.dn.itg.telecom.com.au`

I'd list a packet radio address too but I'm still not properly operational again yet after moving house.

16 Discussion relating to Amateur Radio and Linux.

There are various places that discussion relating to Amateur Radio and Linux take place. They take place in the `comp.os.linux.*` newsgroups, they also take place on the `HAMS` list on `niksula.hut.fi`. Other places where they are held include the `tcp-group` mailing list at `ucsd.edu` (the home of amateur radio tcp/ip discussions), and I believe there is an 'IRC' channel that sometimes is used to discuss them as well.

To join the Linux **HAMS** channel on the mail list server, send mail to:

```
linux-activists@niksula.hut.fi
```

with the line:

```
X-Mn-Admin: join HAMS
```

at the top of the message body (not the subject line).

To join the `tcp-group` send mail to:

```
listserver@ucsd.edu
```

with the line:

```
subscribe tcp-group
```

in the body of the text.

Note: Please remember that the `tcp-group` is primarily for discussion of the use of advanced protocols, of which tcp/ip is one, in Amateur Radio. *Linux specific questions should not ordinarily go there.*