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Abstract.

This paper explains the requirements for an amateur radio station that communicates with an amateur radio web station/node on the 2 meter band. It uses a graphic user interface (GUI) desktop of a personal computer (PC),

Keywords.

Amateur radio, packet, web station, graphics, digital, Linux, VHF

Introduction.

Packet amateur radio [4] has advanced to the point it is now possible to build a packet station that processes web pages over amateur radio VHF frequencies. The building blocks are free or can be purchased at reasonable prices. Support systems are in place to make it happen. This paper will describe an actual working client station.

This beginner's station is being used as a start toward building a full blown ham radio web server station. It will teach network administering and PC technical supporting. The homebrewing and experimenting has been a joy.

Hardware.

This client station consists of the following hardware.

Homebrewed PC with an Intel **486DX2-66** cpu and 32 Meg..
Mitsumi Electronrics Corp Mouse **ECM-S3101**
Tigertronics **BayPac** BP 96A Modem in the PC parallel port.
MFJ VHF 5 watts Data Radio, FSK mode, 145.630 Mhz. [1]
Belden 9913 coax fitted with N connectors (50 feet).
Homebrewed **WD4FAB** 2 meter/440 Mhz J-pole up 20 feet. [2]
Hamtronics LNS-144 Kit mounted on the J-pole.
Homebrewed **13.8-V,5-A G4YNM** power supply. [3]
Grounding strap and rod.
MFJ 2 Meter FM Signal Analyzer.
MFJ SWR Analyzer.
EICO model 566 VOM Meter.

Software.

The softwares for the this user station are:

Red Hat Linux 4.2 network operating system cd-roms.
X Window System (GUI) on Red Hat cd-roms.
ImageMagick on Red Hat cd-roms.
ax25-module-14c.tar.gz from ftp.pspt.fi/pub/linux/ham/ax25/.
ax25-utils-2.1.42a.tar.gz from ftp.pspt.fi/pub/Linux/ham/.
net-tools-1.33.tar.gz from ftp.inka.de/pub/comp/Linux/.
web client start up script, see appendix.
web client configuration files. see appendix.

Technical Support.

Technical support was available from the following sources.

Air Capital Linux Users Group.
Ham Web Server Station Chief Operator.
Ham Client Stations Chief Operators.
Red Hat Software, Inc. for 30 days.
Majordomo@vger.rutgers.edu
subscribe linux-hams
subscribe linux-newbie
National Computer Resources (PC and parts dealer)

Helpful books and journals.

NEDA 1994 Annual Report, North East Digital Association,
P.O. Box 563, Manchester, NH 03105.

Linux Journal, SSC, Seattle, WA, phone 206-782-7733

AX25 HOWTO on Red Hat cd-rom.

Clock-mini HOWTO on Red Hat cd-rom.

The Official Red Hat Linux Users Guide, Red Hat
Software, Inc., Durham, NC, 1997.

Ian Wade, G3NRW, NOSintro-TCP/IP Over Packet Radio,
Dowermain Ltd, Luton, Bedfordshire, UK, 1992.

Operating Hints.

Before using the 30 watts station KOHYD located '15 miles away at 57 feet, a command is entered (ping -i6 -s255 -c100 -pff k0hyd). This causes it to acknowledge 100 transmissions from the 5 watts station WOUT at 20 feet, and displays the percentage of unacknowledged transmissions. This loss percentage indicates what the conditions of the 2 meter band are. Some of the results are:

<code>http://k0hyd.ampr.org</code>	downloads the ham web page.
<code>sethdhc bc0 -c 15</code>	sends a deviation calibrate signal.
<code>route -ne</code>	lists the TCP/IP routes.
<code>netstat -ot</code>	displays net statistics.
<code>ifconfig</code>	displays device configuration.

Building Hints.

When installing the Tigertronics **BayPac** BP-96A modem in the parallel printer port, re-compile the kernel with the printer **support[]** and **PLIP...[]**. A message in the `dmesg` report of **"lp1** at Ox378 (polling) means the printer device `lp1` is at the parallel port instead of the modem device **bc0**.

Set all maximum transmission unit (MTU) and packet length (`paclen`) parameters to 255 bytes.

Any kernel above 2.0.36 will not compile the ax25 utilities correctly. The earlier binaries will run on the later kernels.

Set the deviation pot on the modem so the transmitted calibrated signal is deviating 3.0-3.5 Khz per the deviation meter copying it.

Set the frequency of all stations with the same frequency counter. Different counters can be used if they have been recently certificated.

Use a preamp with the MFJ Data Radio. [1]

Use RG8 coax and keep it short. [5]

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References.

[1] Steve Ford, WB8IMY, Managing Editor, "Product Review: MFJ-8621 Packet-Only Data Radio", QST Journal, American Radio Relay League, Inc., Newington, CT, Vol. 80, No. 4, April 1996, pp. 73-74, phone 860-594-0200.

- [2] Dick Jansson, **WD4FAB**, "Antennas For Microsat Ground Stations", Getting Started on Amateur Radio Satellites, The Amateur Satellite Corporation - North America (AMSAT-NA), Silver Spring, MD, pp. 2,3, & 5, phone 301-589-6062.
- [3] "A 13.8-V, 5-A Power Supply", 1995 ARRL Handbook, American Radio Relay League, Inc., Newington, CT, Chapter 11, pp.28-30, 1994, phone 860-594-0200.
- [4] Jeff Tranter, **VE3ICH**, "Packet Radio Under Linux", Linux Journal, SSC, Seattle, WA, Issue #41, pp.44-47, September 1997, phone 206-782-7733
- [5] 'Losses in Transmission Lines', 1999 ARRL Handbook, American Radio Relay League, Inc., Newington, CT, Chapter 19, pp. 19.5-19.8, phone 860-594-0200.

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Appendix A. AX25 Start-up script and configuration files.

Downloadable from <http://www.fn.net/~k0hyd/ax25user.tar.gz>

```
#!/bin/sh
#This is /usr/local/sbin/start_ax25, a shell script to submit
#the /usr/local/sbin/ax25 shell script. It also puts non-error
#messages in the "report" file, and advisory and error messages
#in the "reporte" file.
#
if [ -- $1 ]
then
echo "need a script name. Example: ./start_ax25 ax25"
else
echo "starting"
./$1 2> reporte > report
fi
```

```

#!/bin/sh
# This is /usr/local/sbin/ax25, a shell script to start the AX.25 networking
# system on w0ut.ampr.org
#
# Configure the bc0 device driver as a Parallel port
# If "lp1 at 0x0378, (polling)" show in dmesg then re-compile kernel with
# parallel printer support [] and PLIP.. [].
# "6 lp" should disappear from cat /proc/devices list.

sethdhc -p -i bc0 mode par96 io 0x378 irq 7

# Configure the bc0 device with TxDelay, SlotTime, PPersist, ..plex.

sethdhc -i bc0 -a txd 200 slot 100 ppersist 40 half

# Configure the bc0 device with the ax25 callsign & bring it up (active/enable).

#/sbin/ifconfig bc0 hw ax25 bp-96a up

# Configure the bc0 device with the ax25 callsign

/usr/sbin/axparms -setcall bc0 w0ut-8

# Bring bc0 device up (active/enable).

/sbin/ifconfig bc0 up

# Setup TCP/IP datagram routing on Port bp-96a

/sbin/ifconfig bc0 w0ut broadcast 44.122.0.255 netmask 255.255.255.0 mtu 255 up
# /sbin/route add 44.122.0.0 netmask 255.255.255.0 bc0

# Start the ax25 daemon

/usr/sbin/ax25d

# Start the MHeard daemon

/usr/sbin/mheardd -n 20

# Associate WOUT with user jbandy
/usr/sbin/axparms -assoc w0ut jbandy

# Setup "loopback" to this host "w0ut" through bc0

```

```

/sbin/route add w0ut bc0

# Add KOHYD to ip routing table

/sbin/route add k0hyd bc0

# Display interrupts

cat /proc/interrupts

# Display devices in use

cat /proc/devices

# /etc/ax25/axports
# AX25 Port descriptions.
# The format of this file is:
#
# name callsign      speed paclen window  description
#
bp-96a WOUT-8        9600 255    1  145.630 Mhz (9600 bps) BayPac par

# /etc/ax25/ax25d.conf
#
# ax25d Configuration File.
#
# AX.25 Ports begin with a '['.
#
# All ports must be commented out except the ones to be used.
#
[ WOUT-8 via bp-96a]
NOCALL * * * * * L
default * * * * * L

# !/bin/sh
# This script starts the AX.25 listen utility
#
listen -8 -acrt

```