
Configure_Personal_JNOS

Raspberry Pi-JNOS

Installing a personal PBBS



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Abstract

The introduction of the TNC-Pi, an inexpensive TNC for the Raspberry Pi, opens the possibility of a low-cost Packet BBS including a mail server. This document describes how to install such a device.

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1. Introduction

1.1. Quickstart

If you are impatient, and reasonably computer literate, you may wish to turn directly to [Appendix A, The Cliff Notes Version](#).

1.2. Background

Michigan's standard for packet radio uses the Internet Protocol (IP) carried over AX.25 packet. This allows for somewhat automatic routing of packet messages. In contrast, basic AX.25 packet requires that the originator of a packet describe the path the packet must take through various digipeaters. There have been various other attempts to remedy this problem (KNet, Rose, NetROM) but none are based on widely accepted standards like IP and are limited in their ability to manage complex routes due to constraints within the AX.25 protocol.

A side benefit of IP routing of packets is that, in principle, it permits the use of standard, Internet tools for packet radio. To foster this, Michigan has chosen JNOS as it's standard for the state's packet infrastructure.

JNOS supports a rich set of common protocols, including

- Telnet - a standard protocol for keyboard connection to a computer.
- POP3 - the protocol for retrieving messages from a mail server.
- SMTP - the protocol for delivering messages to a mail server.
- FTP - a protocol for transferring files.
- http - a protocol for viewing rich content.
- finger - a protocol for getting information about a person (although within JNOS it is used more commonly to get information about JNOS itself).

Unfortunately, Windows does not support a rich range of transport protocols, and the only third-party alternative is no longer supported and does not work with recent versions of Windows. This leaves the Windows user with the alternative of having a separate JNOS box on his LAN, requiring a dedicated computer and considerable complexity of setup. As a result, most ARES programs have taken to using AX.25 only applications such as **Outpost** which lack the benefits of IP.

The benefits of being able to actually use the range of Internet-based applications cannot be understated. A Windows XP user with **AGW/IP** installed can:

- Send and receive packet messages using his normal email client, no matter what email client he happens to prefer.
- View packet content using his favorite web browser where such content is available. Several counties, for example, provide weather radar over radio so SKYWARN spotters can view radar from their vehicle during an activation.
- Transfer files over the radio using whatever FTP client the user happens to prefer. This includes not only text files but also images, or whatever other files the user wishes to transfer.

- Use any Telnet client such as **PuTTY** to use the local BBS over the radio and join in JNOS's CONVerse bridge, which provides a radio "chat room", extremely useful during activations.

Unfortunately, in addition to being unsupported, **AGWIIP** is relatively complex to set up, so again, it is rarely used.

1.3. The Raspberry Pi

Over the past few years, a number of small computers based on the ARM processor have been appearing. As most smartphones and television set-top boxes use the ARM processor, this processor has become quite inexpensive due to the very large volumes. In addition, the processor requires very little power, so large, expensive power supplies common to personal computers are not required.

More recently, a group in England set about to develop a very inexpensive ARM based PC to provide an accessible platform for children to learn programming. There are two models, the "Model A" and "Model B". The more powerful and more expensive Model B has become wildly popular.

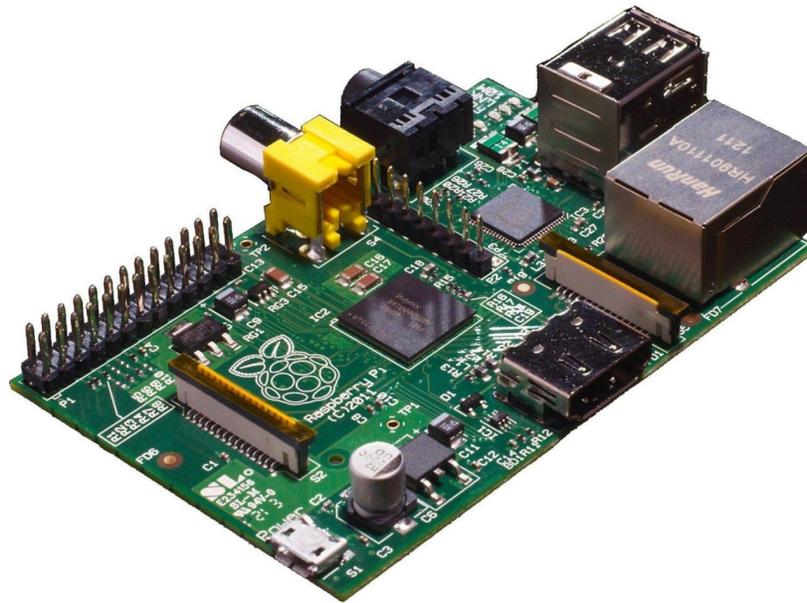


Figure 1. Raspberry Pi

Since Windows is an Intel-only operating system, it does not run on the Raspberry Pi. However, a number of popular Linux and Android distributions are available.

As a very inexpensive (\$35) PC, the Raspberry Pi is quite limited in peripherals, however, it does have a number of GPIO (General Purpose I/O) pins to allow for experimentation. The peripheral set of the Raspberry Pi consists of:

- An HDMI port for a 1080p flat screen
- A video port for a composite monitor

- Two USB ports
- An Ethernet port
- Audio out
- Eight GPIO Pins
- A serial port
- A SPI port
- An I2C bus

The Raspberry Pi's persistent storage is provided by an SD card slot. The Operating system must be provided on the SD card, although hard drives may be attached via USB. For most applications, sufficiently large SD cards are available that other storage is rarely needed. In the case of JNOS, a rather small 4Gb SD card is more than adequate.

1.4. The TNC-Pi

For some time now, the preferred TNC for JNOS has been the TNC-X from Coastal Chipworks. This is a very inexpensive, KISS-only TNC. Since the TNC is KISS-only, it avoids all the complex setup of more capable TNCs. The only thing it knows how to do is just what we want it to do, which makes it ideal for JNOS.

Recently, Coastal Chipworks introduced a version of the TNC-X tailored to the Raspberry Pi. The TNC connects to the GPIO pins of the Raspberry Pi and is the same size as the Pi. The TNC-Pi extends the GPIO pins so that a second TNC-Pi may be stacked on the first, or the GPIO pins may be used for other purposes, such as a GPS. At \$40, the TNC-Pi is slightly cheaper than the TNC-X. While the TNC-X is available as either a kit or assembled, the TNC-Pi is available only as a kit.

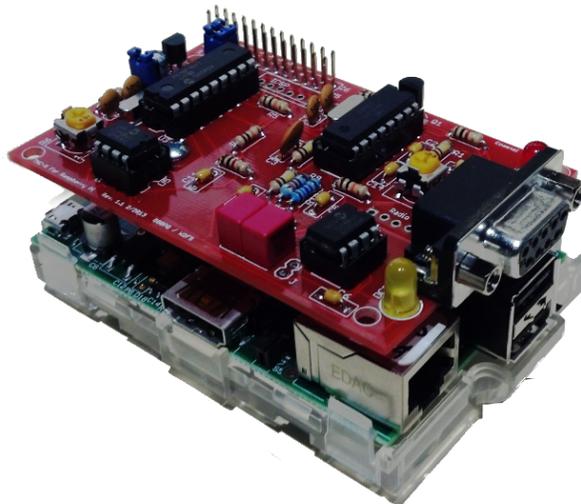


Figure 2. TNC-Pi mounted on a Raspberry Pi

The TNC-Pi includes a DB-9 connector for connection to the radio. Alternatively, PCB pads are provided for the radio connection. The DB-9 is on the same end of the board as the Raspberry Pi's Ethernet and USB connectors.

1.5. The opportunity

The combination presents the possibility of having a complete JNOS system for less than the cost of a traditional TNC. As a small, low power device, it can be far less intrusive than a traditional JNOS computer. Furthermore, it is inexpensive enough that it can be treated as another accessory, rather than the full-blown computer which it really is.

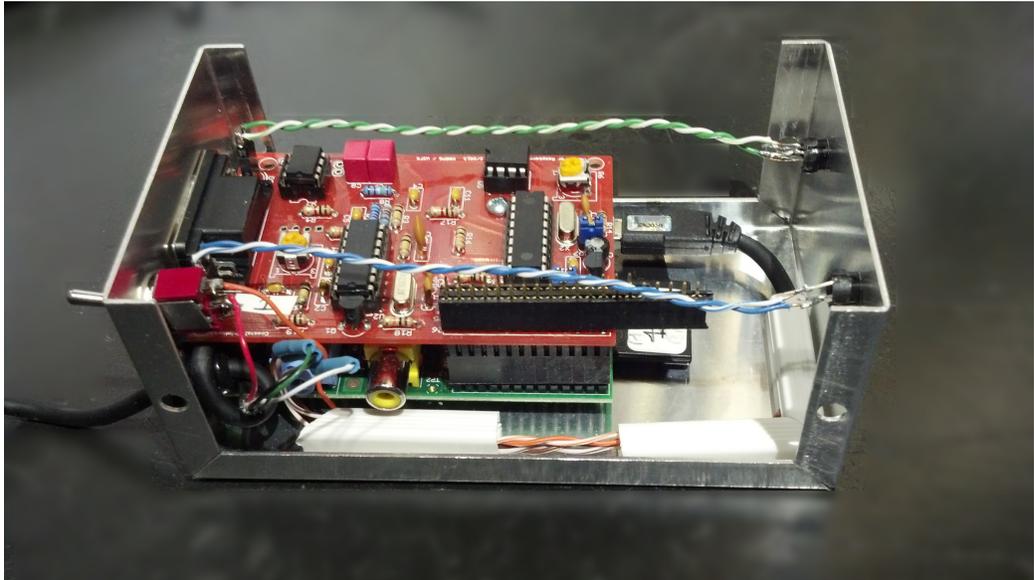


Figure 3. Pi/TNC packaged for the shelf

Having a fixed configuration also means that it is possible to greatly simplify the setup of JNOS. Over the past few years there has been an emphasis on setting up JNOS based HamGates. A HamGate is somewhat more complex than an ordinary packet station, in that it is responsible for routing packet traffic to other stations. This routing can occur over multiple RF links as well as over the Internet. In addition, the HamGate sysop may wish to provide BBS content, files, web pages, news groups and all nature of other goodies to make the HamGate more attractive.

However, the average amateur probably does not have a lot of interest in being the sysop of a Packet BBS. If we assume that the major concern is sending and receiving packet messages as easily as possible, and that we have a known configuration, then we can greatly simplify the setup. We can further simplify the setup if we assume the station of interest is in Michigan and will use Michigan conventions. If we further add a graphical user interface tool for the setup, then packet messaging should be accessible to every amateur. That is what this paper is about.

2. Prerequisites

Before setting up your personal radio-email server, there are a few things that must be dealt with. In addition to the hardware, there are a number of pieces of information required.

2.1. Radio IP Address

Because the radio IP network is a part of the Internet, you must have an Internet address for your radio. If you intend to run more than one system at the same time, for example, have a station for your go-kit, you must have an address for each station.



Important

You should obtain your IP address before even ordering your Raspberry Pi and TNC. The IP process can take some time.

The packet network domain, ampr.org, is a "Class A" Internet network. That means that there are 16,777,216 addresses available for packet radio. That address space is divided into subnets of 65,536 addresses each. In the U.S. each of those subnets is assigned to a state. Within Michigan, those addresses are further divided into counties. Depending on population, each Michigan county has between 512 and 4096 addresses assigned to the county. (Exception, there are only 768 addresses assigned to the entire Upper Peninsula.)

This organization allows the HamGates to know how to route packets across the world. If everything is to work properly, there are a few requirements:

- Your address must be unique in the world
- Your address must be associated with a unique name
- Your address must be known to the global Internet database
- Your address must be an address assigned to your county (there are special considerations for mobile stations)

To ensure that these requirements are met, each state has a network coordinator, responsible for managing addresses within the state. In Michigan, that coordinator is the Assistant Section Manager for Digital, Jay Nugent, WB8TKL. (Like all Section staff, his contact information is on <http://ares-mi.org>.)

The Michigan Digital Radio Group (DRG) has established a web form to register for packet addresses <http://www.mi-drg.org/ip-addr-form.html>.



Warning

Here be dragons!

Unfortunately, the global ampr.org database is currently undergoing an upgrade which is taking longer than expected. Because of this, you should contact Jay directly, or work with the sysop of your local HamGate to obtain an IP address for your radio. you will still want to fill in the web form, but you need to note the assigned address in the comments.

2.2. LAN IP Addresses

Every device on your LAN needs a LAN address, including your Raspberry Pi. If you want to find that device, you need to know what that address is.

Most home LANs use the Dynamic Host Configuration Protocol (DHCP). This protocol assigns IP addresses automatically to every device on the LAN. The router, often a wireless router, is usually given this job. Since the addresses are assigned automatically, the user typically doesn't know what those addresses will be.

There are two ways we can deal with this, but in both cases, we start by finding out what addresses our router uses. Each router can assign addresses up to the entire subnet, usually 256 addresses. However, for reasons like our current situation, most routers only assign addresses for part of the available range. Rarely will the home user need more than a dozen or so addresses.

Every router is different, but on the router's administration web page will be a section like the following:



Figure 4. Router DHCP address range

What we care about is the range of addresses reserved for DHCP, in the above case, 100 to 149. The router itself almost always uses 1, and 255 is a reserved address, so the possible addresses are 2 to 99 and 150 to 254. We may have assigned one or two other addresses for the router, so we should look through the router pages to see if there are others, and of course, we may have assigned addresses for something else so we need to avoid those.

We need to select two addresses not within the DHCP range and not used by something else. One of these must have the first three numbers the same, the second can be almost any address not used by something else. So, for example, we might choose 192.168.1.163 for the first, and 192.168.253.252 for the second. (Addresses beginning with 192.168 are slightly safer than most other numbers.)

2.3. Hardware

There are assorted other bits and pieces needed. The TNC-Pi can only be ordered from Coastal Chipworks (<http://www.tnc-x.com/TNCPi.htm>). The Raspberry Pi can be ordered from a number of places, but only a few actually ship any time soon. Newark (<http://www.newark.com>) keeps a good stock, and several people have reported getting delivery from MCM. Most offer some packages including the power supply and case. Keep in mind that the TNC-Pi will be too tall for most Pi cases.

The following is an outline of all the parts except the radio cable:

Vendor	Item	Price
Newark	Raspberry Pi	35.00
	Power Supply	8.93
	SD Card	7.95
	Tax & Shipping	9.12
	Total	61.00
Coastal Chipworks	TNC-Pi	40.00
	Shipping	6.00
	Total	46.00

Table 1. Required Hardware

The TNC-Pi connects to the radio through a DB-9 connector. The pinout can be found in *the manual*¹. Alternatively, there are four pads on the TNC-Pi which can be used to connect to the radio. Should you prefer the DB-9 you might wish to add a DB-9P and hood to your Newark order. The radio end is radio-specific, so you may want to determine what connectors you want before placing your order.

You will also want an Ethernet cable. The length depends on the distance between your router and where you want the Raspberry Pi. This is an ordinary Ethernet cable. Again, you might find the Newark price better than local suppliers, or might not depending on what is available locally.

2.4. Other Information

The author placed his pair in a Bud box (Newark P/N 91F578 *Figure 3, "Pi/TNC packaged for the shelf"*). The micro-USB cable was cut to allow for a switch. Round holes are easily dealt with by a Harbor Freight punch, but the square holes for Ethernet and USB are more challenging. A nibbler and a lot of work with a file are called for if you don't have an elaborate set of metal punches.

For setup only, you will need a USB keyboard and mouse and a 1080p TV or monitor with an HDMI input. Note that the Pi doesn't support 720. Once JNOS is set up there is no longer a need for these.

¹ <http://www.tnc-x.com/TNCPi.pdf>

3. Building the SD card

An SD card must be prepared containing the Pidora operating system and the JNOS software. The image can be downloaded from <http://ares-mi.org/downloads/pidora-jnos.zip>.

The web site <http://pidora.ca> contains instructions and links to software for installing the image on the card. Basically, there are two approaches. Linux and the Macintosh include a command line utility called **dd** which is suited to the job. This is available for Windows, but **dd** is quite a dangerous application, so an alternative is preferred.

Fedora provides a graphical user interface application for this purpose called **ARM Image Installer**. The application is straightforward to use and is available on Windows and Linux.

Platform	ARM Image Installer	dd
Windows	Available	Not recommended
Macintosh	Not available	Included in OS
Linux	Available	Included in OS

Table 2. Installation Tools

Once the image is on the SD card, it should be booted on the Raspberry Pi. When booted the first time, Pidora will ask a number of questions. These are all simple such as time zone, default user name and passwords, etc. There are no special requirements; simply provide the obvious answers.

After first boot, the system will boot again. During this second pass, the system will appear to hang for a while. During this time the image is being resized to fill the SD card. The larger the card the longer this will take.

No other preparation is necessary. Simply log on to Pidora using the password you provided a few minutes earlier, and proceed to the configuration step.

4. Configuring JNOS

Start the JNOS configuration application by selecting the **JNOS** from the **System** submenu of the **Applications Menu** at the top left of the screen.

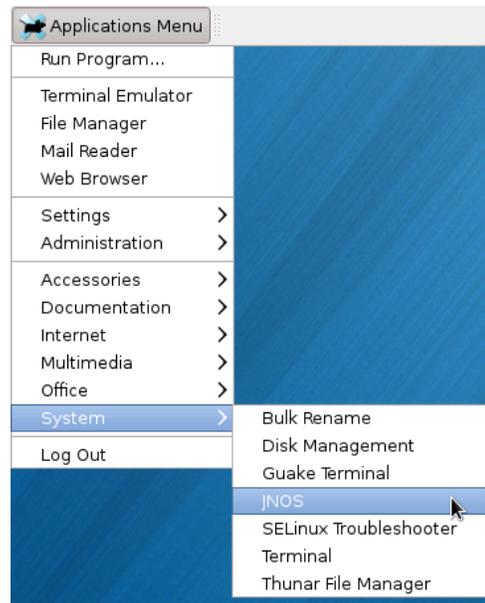


Figure 5. Launch Configuration

A terminal window will appear which requests the root password. Provide the password you offered during first boot:

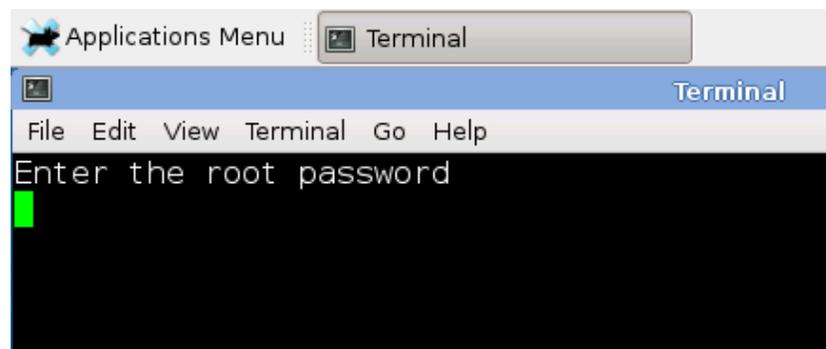


Figure 6. root password

After a delay, during which information is being gathered from your system, the configuration panel will appear. Fill out all fields in the panel. If an entry is known to be incorrect, it will be red. The "Install JNOS" button will remain inactive until all fields are black. Be aware that the combo boxes (Frequency, County, Quadrant) can be quite slow to appear.

The screenshot shows a window titled "Configure_Personal_JNOS" with the following configuration sections:

- JNOS Configuration**
- AMPR Configuration**: Nodename: test.wb8rcr.ampr.org, AMPR IP: 44.102.200.20
- Hamgate Configuration**: Hamgate Name: hamgate.midland.ampr.c, Hamgate IP: 44.102.200.1
- Radio Configuration**: Frequency: 145.09, TNC Device: ttyAMA0
- Ethernet Configuration**: Device: eth0, Linux IP: 192.68.0.65, MAC: b8:27:eb:d6:6c:1a, JNOS IP: 192.68.0.165
- Geography**: JNOS Call: WB8RCR, City: Midland, Grid: EN73vp, County: Midland, Quadrant: ne, Zip: 48642
- Sysop**: Sysop call: wb8rcr, Sysop Password: [masked], Retype Password: [masked]

Buttons: "Install JNOS" and "Close". A mouse cursor is pointing at the "Install JNOS" button.

Figure 7. Configuration Panel

If you are uncertain about the meaning of a particular field, hovering the mouse over the field will bring up a more detailed description of the field:

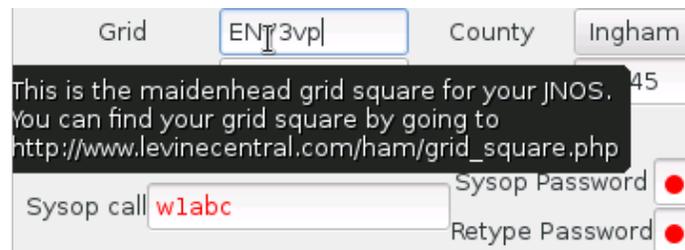


Figure 8. Help

A description of each field may be found in [Appendix B, Field Definitions](#).

Once all fields are correct, click on the **Install JNOS** button. This button will not be active if any fields are red.

When you click **Install JNOS**, you will begin to see some activity in the text window. This takes some time. After several minutes, you will see:

```

Configuring TNC-Pi
8 0 78 14 4 64 1 0 0 1d 18 c0 sum 0

01 TXDelay - Zero means use ADC 120
02 Persistence                20
03 Slottime (in 10 mS)       4
04 TXTail                     100
05 Full Duplex - Not used    1
06 Our Channel (Hex)         00
07 I2C Address (0 = async) Hex 00
   ADC Value                  29

Network configured

The system will now shut down.

When LED activity ceases, remove power. Then apply
power to reboot.
  
```

Figure 9. Configuration is done

At this point, configuration is complete. After a delay, the system will shut down. Remove power and then re-apply power. When the system reboots, JNOS will start.

Part of configuration involves creating a **jnos_system_account** user and giving this user privileges. The privileges will not be available, and hence JNOS cannot start, until the system has been rebooted. The TNC-Pi must be powered off in order to accept new parameters. This is why the Pi is shut down instead of being rebooted.

When JNOS is running, you may view the JNOS console by pressing **Ctrl+Alt+F6**. Return to the graphical console with **Ctrl+Alt+F1**.

This, of course, requires that you have the display, keyboard and mouse still attached. Once the system has been configured, there is little reason for this, so at this point, if desired, you can shut down the Pi, remove these accessories, and place it on the operating table connected only to power, your LAN, and the radio.

5. Using email to send and receive messages

JNOS includes a mail server integrated with packet BBS messages. To use the mail server it is first necessary to create a mail account for that server.

In Outlook Express (other mail programs will be similar) select **Accounts...** from the **Tools** menu.

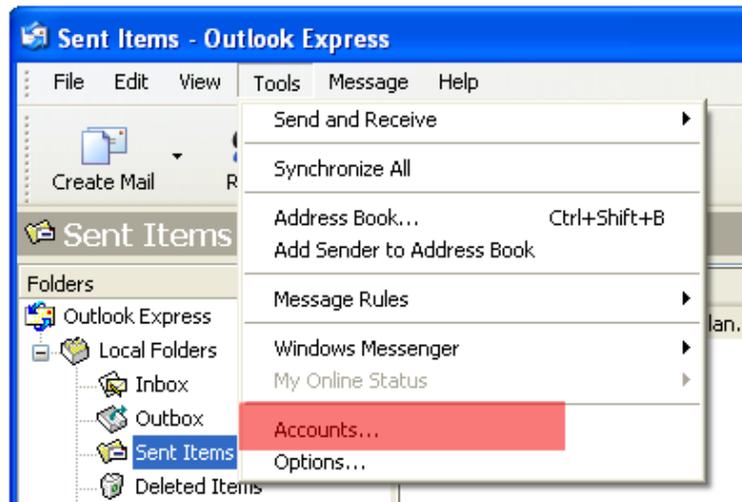


Figure 10. Opening the Accounts Window

Next, select **Add -> Mail...**

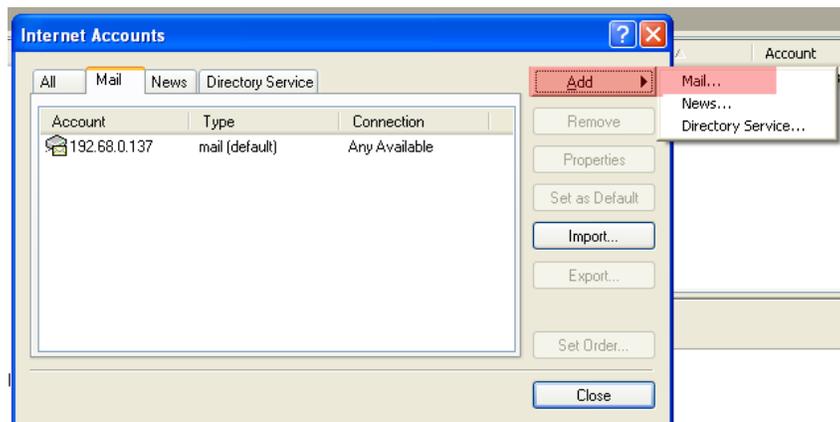


Figure 11. Adding an account

The email address is determined by the data you provided during configuration. It will be "Sysop call"@ "Nodename", so in the example in [Figure 7, "Configuration Panel"](#), the email address would be `wb8rcr@test.wb8rcr.ampr.org`.

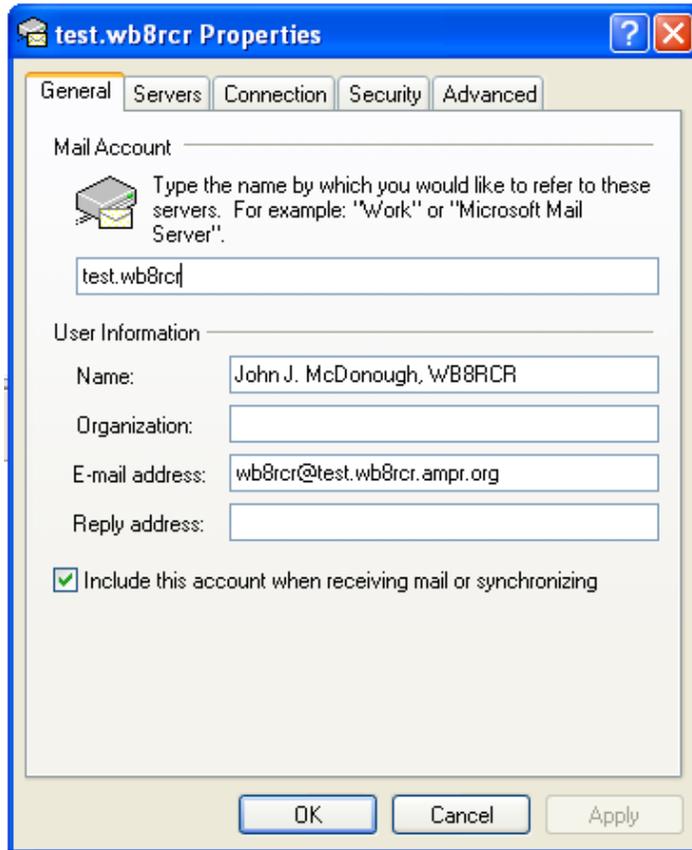


Figure 12. Packet email address

If you are not going to leave your JNOS system connected to your LAN full time, you may wish to uncheck **Include this account when receiving mail or synchronizing**.

The Incoming and Outgoing mail servers should be set to the same value you provided for the **AMPR IP** when configuring JNOS.

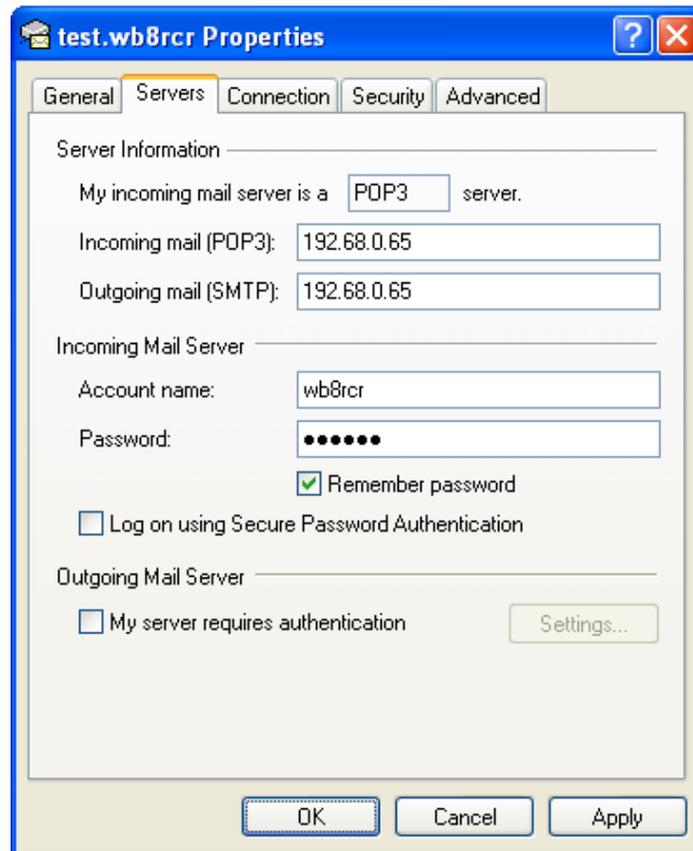


Figure 13. Servers Tab

The **Account name** and **Password** will be the values from **Sysop call** and **Sysop Password** that you provided in [Figure 7, "Configuration Panel"](#).

When sending a packet message, select your packet account in the **From:** field in the mail header. This will cause the mailer to send the message to JNOS instead of your normal mail server.

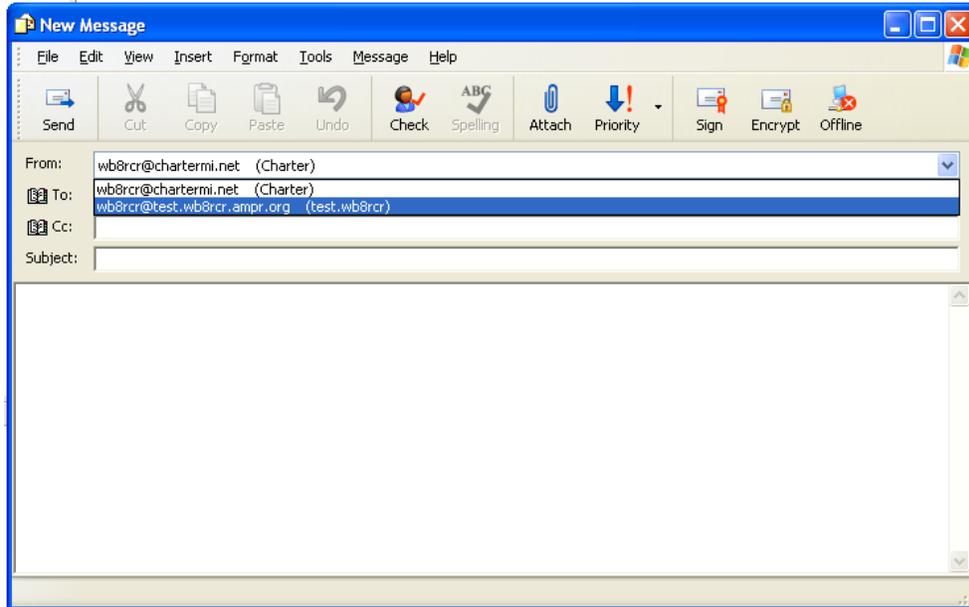


Figure 14. Sending a message

Received packet messages look just like any other email, except that the **From:** address will end in **.ampr.org**.

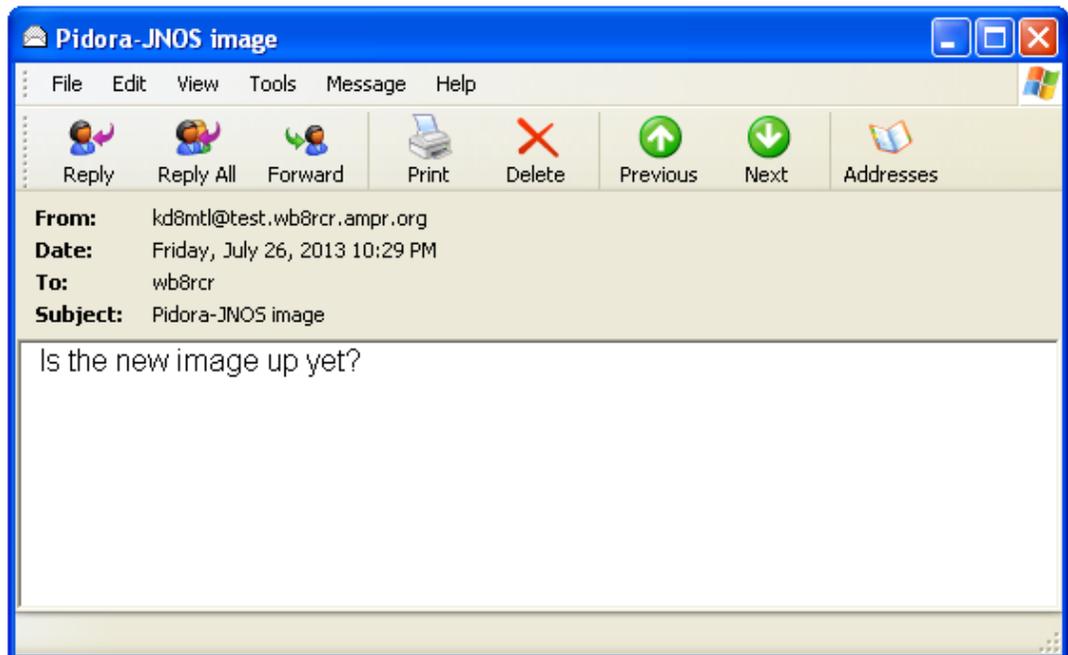


Figure 15. Received message

When replying to a packet message, the **From:** will default properly, making replying to a packet message no different than replying to any other email.

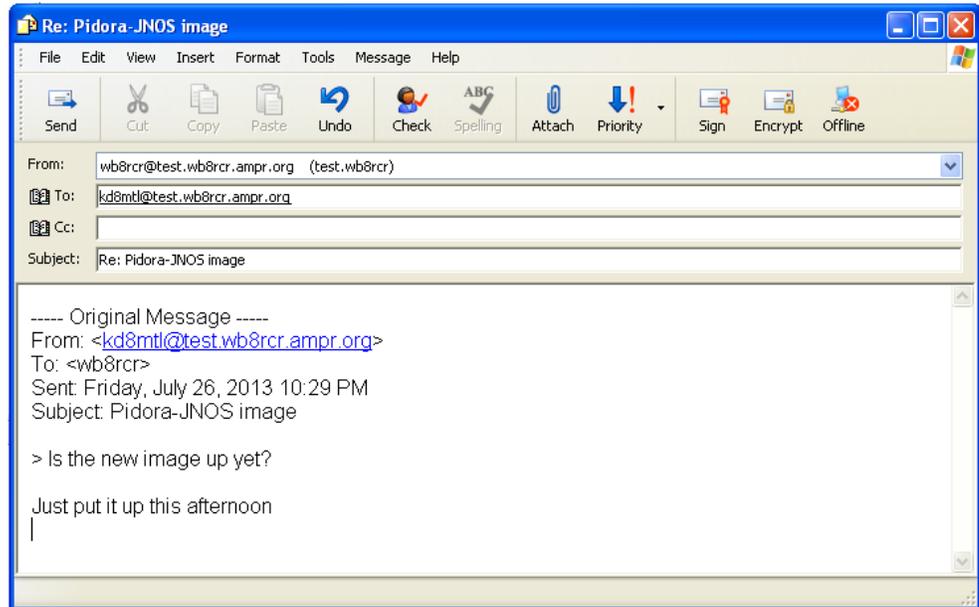


Figure 16. Replying to a message

6. Using the Packet BBS

For most users, sending and receiving messages is the primary use for packet radio. However, there are a number of other features of the PBBS that might be of interest, particularly the CONVerse bridge. To access those features, it is necessary to install **PuTTY**²



Figure 17. PuTTY

When **PuTTY** is launched, the **PuTTY Configuration** appears. There are many options, but to get started, place the IP address you earlier provided in the **Linux IP** field and tick the **Telnet** button.

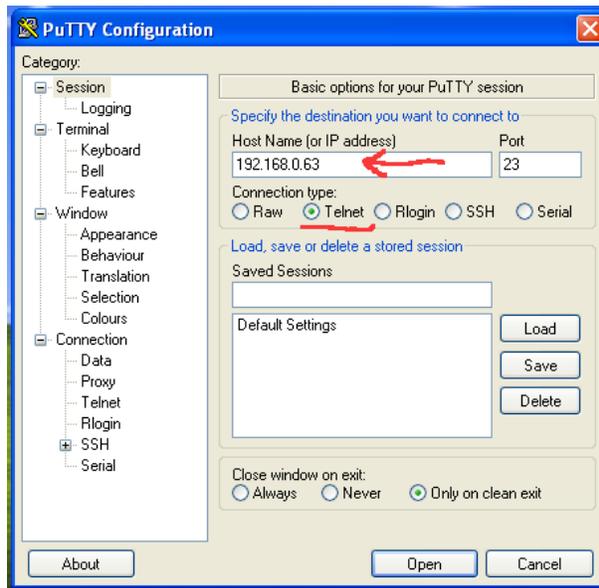
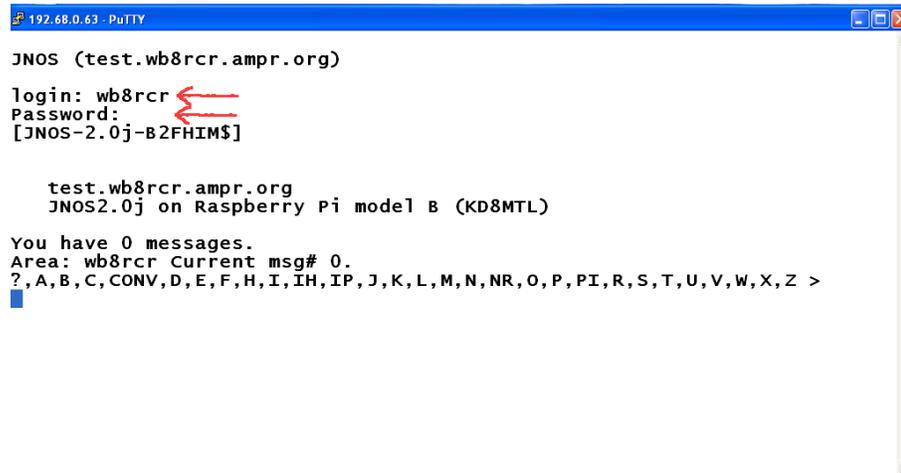


Figure 18. PuTTY Configuration Window

You may save the connection with a name, and you may adjust the appearance and other features on this window, but all you actually need is the IP address and the selection of Telnet.

It is possible to use **Hyperterm**, especially with versions of Windows prior to XP. However, beginning with XP it takes a great deal of tweaking of settings to make **Hyperterm** usable and even then it is far from optimal.

When you click the **Open** button a window similar to the one below will appear. (Depending on other options you may have selected, colors and font may be different). Enter the usercode and password you provided as the **Sysop call** and **Sysop Password**. The password will not echo when it is typed.



```
192.68.0.63 - PuTTY
JNOS (test.wb8rcr.ampr.org)
Login: wb8rcr
Password:
[JNOS-2.0j-B2FHIM$]

test.wb8rcr.ampr.org
JNOS2.0j on Raspberry Pi model B (KD8MTL)

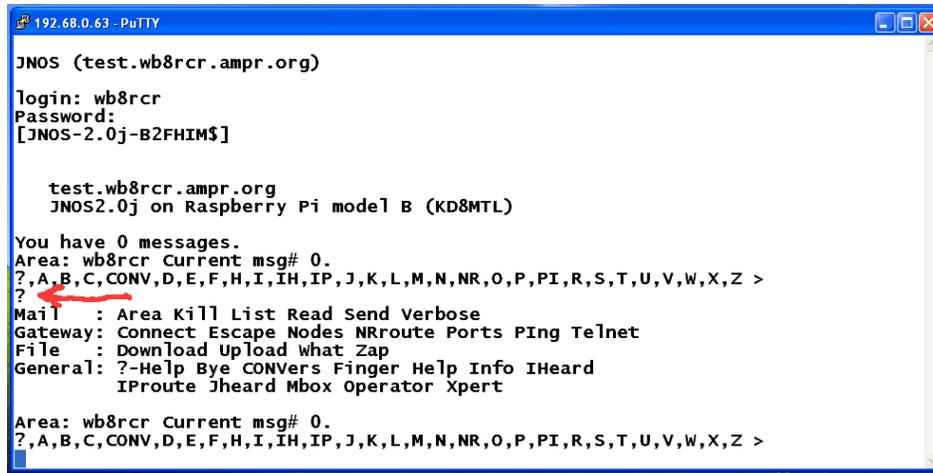
You have 0 messages.
Area: wb8rcr Current msg# 0.
? , A, B, C, CONV, D, E, F, H, I, IH, IP, J, K, L, M, N, NR, O, P, PI, R, S, T, U, V, W, X, Z >
```

Figure 19. Logging On

If the usercode and password are correct, a string of letters will appear. This is often called the "Alphabet Soup" prompt and shows the first few letters of the available BBS commands.

The BBS commands may be entered as the complete command, or you may enter only as many letters as are required to make the command unique. The Alphabet Soup prompt shows these shortened commands which are usually only a single letter.

If you type a `?` followed by a return, you will be shown a list of the commands that can help make a little more sense of the alphabet soup prompt.



```
192.68.0.63 - PuTTY
JNOS (test.wb8rcr.ampr.org)
login: wb8rcr
Password:
[JNOS-2.0j-B2FHIM$]

test.wb8rcr.ampr.org
JNOS2.0j on Raspberry Pi model B (KD8MTL)

You have 0 messages.
Area: wb8rcr Current msg# 0.
?,A,B,C,CONV,D,E,F,H,I,IH,IP,J,K,L,M,N,NR,O,P,PI,R,S,T,U,V,W,X,Z >
?
Mail : Area Kill List Read Send Verbose
Gateway: Connect Escape Nodes NRroute Ports Ping Telnet
File : Download Upload What Zap
General: ?-Help Bye CONVers Finger Help Info IHeard
IProute Jheard Mbox Operator Xpert

Area: wb8rcr Current msg# 0.
?,A,B,C,CONV,D,E,F,H,I,IH,IP,J,K,L,M,N,NR,O,P,PI,R,S,T,U,V,W,X,Z >
```

Figure 20. Help

You can get more detailed help by typing **H** or **Help** followed by the command you would like help on. Once you have logged on, all entries are case-insensitive except for file names.

You may exit the PBBS by typing **Bye** which will cause the **PuTTY** window to close (unless you have configured it otherwise).

6.1. Using the CONVerse bridge

One of the more commonly used features of the PBBS is the **CONVerse** bridge. This allows multiple people to chat, keyboard to keyboard, much like an Internet chat room.

To enter the **CONVerse** bridge, type **CONV** at the alphabet soup prompt. You will be presented with some very brief instructions. When in the **CONVerse** bridge, anything you type will be echoed to everyone else in the same channel, unless you begin with a `/`. Anything starting with a `/` will be interpreted as a command.

It is often useful to begin by typing **/VERB ON**. This causes you to be notified whenever someone joins or leaves the channel. Other useful commands are **/Who** shows who is on the channel and **/Link** shows what other systems are directly linked (note that nodes linked to other nodes are not shown, so there may be many nodes linked into the bridge.) Adding an **L** to either of these commands results in a more detailed list.

```

192.68.0.63 - PuTTY
You have 0 messages.
Area: wb8rcr Current msg# 0.
?, A, B, C, CONV, D, E, F, H, I, IH, IP, J, K, L, M, N, NR, O, P, PI, R, S, T, U, V, W, X, Z >
conv ←
Conference @ KD8MTL Type /HELP for help.
Welcome to the converse bridge at test.wb8rcr.ampr.org
/b = bye, /w = who, /i = invite <call>, /C # - Channel #, /h = Help

/verb on ←
/w 1 ←
*** Wed Jul 31 19:34:14 2013
User      Host      Via      Channel Name      Time Personal
wb8rcr    KD8MTL    telnet   56 Midland        19:34
kd8mtl    WB8RCR    WB8RCR   56 Midland        19:30
***
/l 1 ←
*** Wed Jul 31 19:34:17 2013
Host      State      Software  Since NextTry Tries Receive Xmitted Tx
Queue
WB8RCR    Connected JNOS2.0j 17:10
31
***

```

Figure 21. CONVerse Bridge

There are a great many channels available. Channels 1 through 83 are reserved for the 83 Michigan counties, in alphabetical order (1=Alcona, 83=Washtenaw). Each District has a channel numbered as the district repeated three times; e.g. 777 is District 7. Channel 911 is used for statewide incidents, and 411 for weather events. You may obtain a partial list of channels by typing /Channel.

```

/c ←
*** You are on channel 56 (Midland).
Channel names:
  56 Midland
  333 District 3
  911 Statewide Incident
  411 Weather Event
***

```

Figure 22. Channel List

You may exit the **CONVerse** bridge by typing /Bye which will return to the alphabet soup prompt.

7. Connecting to Linux using PuTTY

Sometimes it may be useful to manipulate the underlying Linux operating system. This is rarely required but for some advanced uses it can be helpful. If you still have the keyboard and television attached, you may select the terminal icon from the bottom of the screen to get to the command line, or you may switch to a full screen command window by typing **Ctrl+Alt+F2** through **Ctrl+Alt+F5** and using **Ctrl+Alt+F1** to return to the graphical screen.

However, if you no longer have these connected, you can still access the operating system over your LAN using **PuTTY**.

To do this, bring up the **PuTTY** configuration screen and enter the IP as in [Figure 18, "PuTTY Configuration Window"](#), but instead of selecting **Telnet** select **SSH**. **PuTTY** will ask for the user to log on as, and then show the Linux logon. (The SSH protocol requires that the user be exchanged before the remote end shows anything, unlike the JNOS or Windows logon where the usercode is requested then the password.)

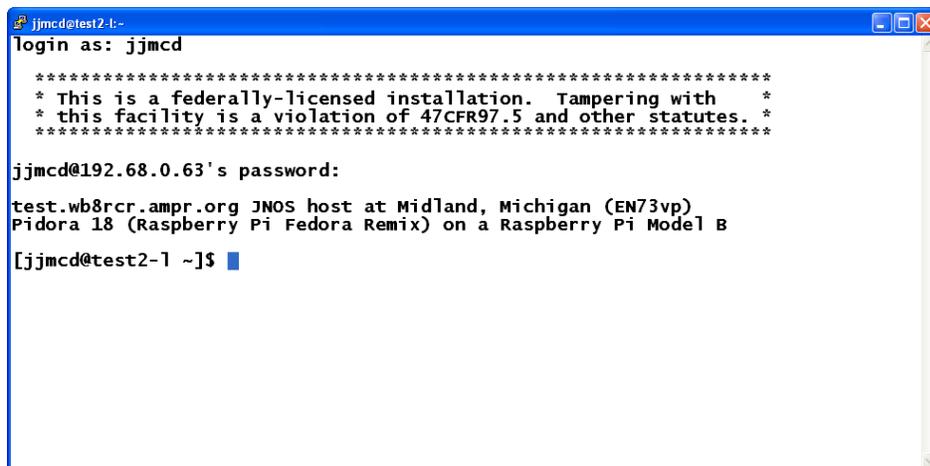


Figure 23. Linux login

8. Controlling JNOS from the command line

The operating system sees JNOS as a service. A service is something that starts and stops more or less automatically. In our case, JNOS starts whenever the computer is booted. Should JNOS crash or be stopped from the console, it will be automatically restarted.

The **systemctl** command is used to start and stop services. JNOS is known to the operating system as **getty@tty6.service**.

You can view the status of JNOS by typing (at the command line)

```
systemctl status getty@tty6.service
```



```
[root@raspi ~]# systemctl status getty@tty6.service
getty@tty6.service - JNOS PBBS on tty6
   Loaded: loaded (/usr/lib/systemd/system/getty@tty6.service; enabled)
   Active: active (running) since Fri, 2013-07-26 21:05:36 EDT; 43s ago
     Docs: http://www.langelaar.net/projects/jnos2/documents
    Main PID: 730 (login)
    CGroup: name=systemd:/system/getty@.service/tty6

Jul 26 21:05:36 raspi.local systemd[1]: Starting JNOS PBBS on tty6...
Jul 26 21:05:36 raspi.local systemd[1]: Started JNOS PBBS on tty6.
[root@raspi ~]#
```

Figure 24. JNOS Status

The remaining commands must be executed as root.

To stop JNOS:

```
systemctl stop getty@tty6.service
```

To start JNOS:

```
systemctl start getty@tty6.service
```

To cause JNOS to start automatically on boot:

```
systemctl enable getty@tty6.service
```

To prevent JNOS from starting at boot, or restarting automatically:

```
systemctl disable getty@tty6.service
```

9. Controlling JNOS from the GUI

As a service, JNOS can also be controlled using the **system-config-services** program. **system-config-services** is not installed by default, so to use the application, it is first necessary to install it by:

```
sudo yum install system-config-services
```

Once installed, the application can be launched from the **Services** item of the **Administration** submenu.

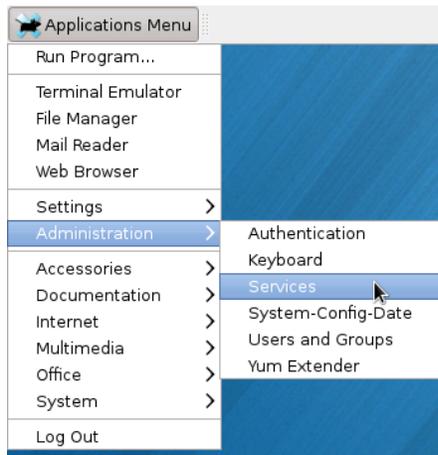


Figure 25. Launching Services

The application shows a list of services on the left. The icon to the left of the name shows whether or not the service is enabled, disabled or running.

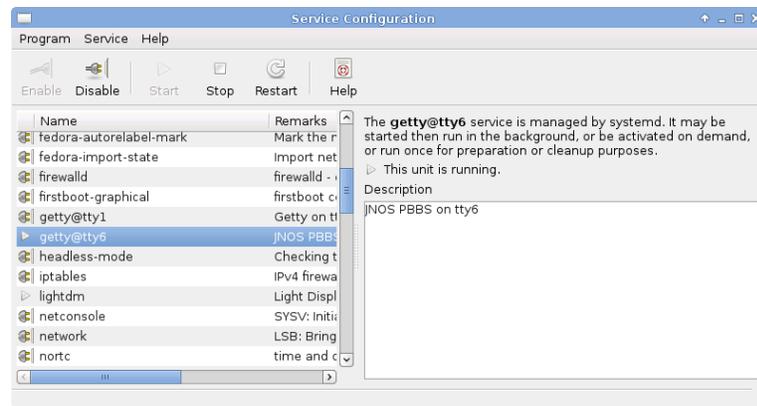


Figure 26. The Services window

To control JNOS, scroll down to **getty@tty6** and highlight it. The panel on the right will show the status and a (very) brief description of the service.

Across the top of the window are six buttons. Two of the left four will be grayed (disabled). These four buttons allow you to Enable (cause to run at boot), Disable,

Start and Stop JNOS. (Obviously, you cannot stop a service that is already stopped or enable a service already enabled.)

A. The Cliff Notes Version

The following are the steps very briefly:

1. Obtain a radio IP address (<http://www.mi-drg.org/ip-addr-form.html>)
2. Build the TNC-Pi and install it on your Raspberry Pi
3. Select two LAN addresses, one for the Raspberry Pi, one bogus ([Section 2.2, "LAN IP Addresses"](#))
4. Download the preconfigured image (<http://ares-mi.org/downloads/pidora-jnos.zip>)
5. Install the image onto the SD card (<http://pidora.ca>, [Section 3, "Building the SD card"](#)).
6. Do firstboot, answer a number of simple questions
7. Logon and select **JNOS** from the system menu ([Section 4, "Configuring JNOS"](#)).
8. Fill in all fields, click **Install JNOS**
9. When LEDs become inactive, remove screen, keyboard, mouse and power, move Pi to its place on the radio shelf, connect LAN and radio and apply power
10. Configure your email client to use the Pi as a second email account ([Section 5, "Using email to send and receive messages"](#)).

B. Field Definitions

Nodename

This is the fully-qualified node name you supplied when registering for your IP address. It must end in **.ampr.org**

AMPR IP

This is the IP address you were assigned for your node. It consists of four numbers between 0 and 255 separated by periods. It must begin with **44.102.**

HamGate Name

This is the name of the HamGate responsible for your county. It must end with **.ampr.org** and is usually of the form **hamgate.county.ampr.org**

HamGate IP

This is the IP address of your HamGate. It consists of four numbers between 0 and 255 separated by periods. It must begin with **44.102.** and it usually ends in **.1**

Frequency

This is the frequency your node will use. This is a dropdown listing the valid Michigan packet frequencies

TNC Device

This is the device to which the TNC is attached. The field is not changeable. It is always **ttyAMA0**.

Device

This shows the Ethernet device name for your Raspberry Pi. The field is not changeable and is always **eth0**

Linux IP

This is the IP address of the Raspberry Pi on your LAN. You selected this in [Section 2.2, "LAN IP Addresses"](#).

MAC

This is the hardware address of the Ethernet interface on your Raspberry Pi. It is read from the hardware and cannot be changed.

JNOS IP

This is the IP address of the JNOS end of the imaginary pipe connecting the Ethernet to JNOS. It may be any IP not otherwise used on your LAN. Except in rare cases, it does not even need to be in your LAN's subnet.

JNOS Call

This is the callsign that will be used for your packet station. Usually it is your call. This field will be converted to uppercase as you type.

City

This is the city in which your packet station will reside.

Grid

This is the Maidenhead grid square for your station

County

From this drop down list, select your county.

Quadrant

Select the quadrant of the state to be used for old-style hierarchical addressing. If you don't know your quadrant, it can be found in <http://www.mi-drg.org/HOSTS.NET>.

Zip

Your Zip code

Sysop call

This is your call, normally the same call you used in **JNOS Call**. It will be used as the user name for logging on to the PBBS as well as for FTP and Mail.

Sysop Password

This is your desired password. It echoes as dots. This password will be used for logging on to the PBBS, as well as for mail and FTP.

Retype Password

Since you can't see your password as you type it, this is the verification. The field will not turn black until it is the same as the previous field.

C. ax25-apps

The manual for the TNC-Pi references some tests using ax25-apps. The install process also installed these tools as well as set up the port based on your JNOS answers.

If you wish to run these tests, you must first shut down JNOS as at has control of the TNC. Log on as root using ssh (or open a command window if you still have a television attached and set root), then shut down JNOS as in [Section 8, "Controlling JNOS from the command line"](#):

```
systemctl stop getty@tty6.service
```

Instead of doing the **kissattach**, the install provided a script, **ax25-start** with the parameters already set based on your answers during configuration.

```
ax25-start
```

You may now use the **axlisten** command as outlined in the TNC-Pi manual, and the **axcall** command. The **axcall** requires two parameters, the name of the interface and the SSID of the station to call. The interface name is the frequency, following the Michigan convention. So, for example, if you wanted to call hamgate.washtenaw (assuming you are within range) you would say something like:

```
axcall 145.76 WB8TKL-3
```

When ax25 has been started, most Internet tools can be used over radio, providing, of course, that there is a server on the other end of the radio circuit. One simple application is **finger** which is used to get information about users, but on a JNOS system, there are a number of special "users" which tell us information about JNOS. For example, if we wanted to see who has logged into HamGate.Washtenaw recently, we could say:

```
finger mpast@hamgate.washtenaw.ampr.org
```

When we have completed our test, we can stop the AX.25 subsystem with:

```
ax25-stop
```

JNOS can then be restarted using the method outlined in [Section 8, "Controlling JNOS from the command line"](#)

```
systemctl start getty@tty6.service
```

Or, we could simply reboot:

```
shutdown -r now
```

D. Revision History

Revision 0.9	Mon Aug 19 2013	John McDonough wb8rcr@arr1.net	Add appendix on using ax25-apps
Revision 0.8	Wed Aug 7 2013	John McDonough wb8rcr@arr1.net	Add cross references to Cliff Notes appendix
Revision 0.7	Tue Aug 6 2013	John McDonough wb8rcr@arr1.net	Add connecting to Linux using PuTTY section
Revision 0.6	Thu Aug 1 2013	John McDonough wb8rcr@arr1.net	Add PuTTY section
Revision 0.5	Tue Jul 30 2013	John McDonough wb8rcr@arr1.net	Link to image where referenced
Revision 0.4	Sun Jul 28 2013	John McDonough wb8rcr@arr1.net	Add Cliff Notes version of instructions
Revision 0.3	Fri Jul 26 2013	John McDonough wb8rcr@arr1.net	Add description of controlling JNOS Add email configuration Add downloading and installing image
Revision 0.2	Fri Jul 26 2013	John McDonough wb8rcr@arr1.net	Move field definitions to appendix Discuss power down instead of reboot Include help popup image/prose
Revision 0.1	Wed Jul 24 2013	John McDonough wb8rcr@arr1.net	Draft of first three sections
Revision 0-0	Mon Jul 22 2013	John McDonough wb8rcr@arr1.net	Initial creation of book by publican

