

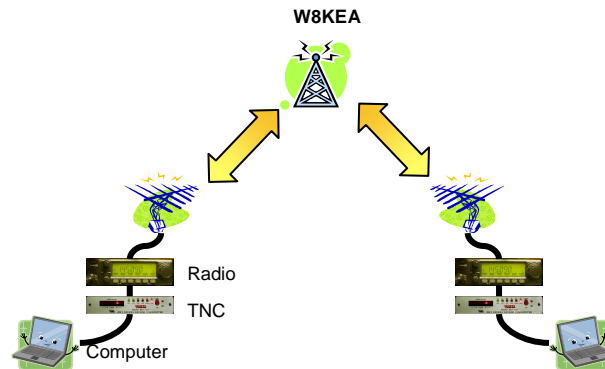
Tell me about JNOS

Introduction	<p>In recent months, there has been a lot of talk around packet, and especially JNOS. A number of folks seem confused about what exactly JNOS is. This paper will talk about the capabilities of JNOS, and where it fits in. It will not talk about the technical details.</p>
Packet Client	<p>Over the past few years, a number of club members have spent considerable effort trying to find the perfect packet client. TNCs have some client software built-in, and many people use terminal programs to access the TNC's software. Different TNCs behave differently, so some packet clients attempt to paper over those differences.</p> <p>Unfortunately, there are some messy aspects to packet, and no client can quite get the rough edges smoothed. It is basically the nature of the beast.</p> <p>Although JNOS can function as a packet client, that is not its purpose. And as packet clients go, it isn't a particularly good one. JNOS is more about eliminating the need for a packet client, rather than becoming one.</p>
Taking advantage of the technology	<p>The Internet is a network of networks. That is what <u>Inter</u>-net means. The Internet provides a way for networks of different technologies to work together.</p> <p>When we connect out over the Internet, chances are we are actually using a number of different networking technologies with different electrical connections, different ways of communicating, and different technologies for figuring out how to get the message from point A to point B. The amazing thing is that all of this is hidden from us. We simply poke in the final address of the place we want to get to, and the network itself figures out how to get there.</p> <p>JNOS is a way to add packet to that list of technologies. JNOS really does make the packet network a part of the Internet.</p>
Today's packet	<p>Packet isn't really very hard if the connections are all local. Typically, we tell our TNC to connect to some other station with a command like:</p> <p style="padding-left: 40px;">C W8KEA-1</p> <p>W8KEA-1 implements a simple bulletin board system where we can leave messages for other people. For some stations, we can connect to a name that allows us to type keyboard to keyboard to that other ham. Although the commands, and the station identification might be a little cryptic, it really isn't all that hard.</p> <p>But if we want to communicate outside our range, it gets pretty messy. Again, for local stations it isn't too hard. If I want to talk to W8QOI but I can't reach him, I can use W8KEA-8 to relay for me. I could simply type something like (depending on my TNC):</p> <p style="padding-left: 40px;">C W8QOI VIA W8KEA-8</p>

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Today's packet



But what if I wanted to leave a message for our section manager, W8EFK? He is always on packet, and I happen to know that he has an account on the Monroe hamgate, N8JKF. So all I have to do is connect to N8JKF-3, with the appropriate VIAs. Well guess what, N8JKF is on 144.91 and 223.4. W8KEA is on 145.09. There are no 144.91 or 223.4 digis in range.

Well, what I do is I connect to BAYBBS, which happens to be a gateway to the 145.76 network that heads south. I look at the list of 145.76 stations that BAYBBS has heard for stations closer to Monroe. I then try to connect to those and see if *they* can hear stations even closer, and if at some point I can make the hop to 223.4.

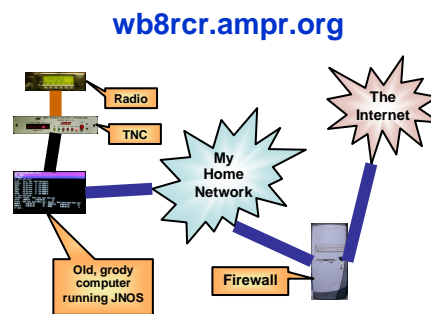
Chances are it will take me 5 or 6 hops to get to N8JKF, and for each hop I might have to try a half-dozen or a dozen stations to figure out how to get there. Each hop slows things down. This is no fun at all, and it will probably turn into an all-day affair. Once I have learned the route, it won't be so bad. That is, until someone along the way changes his station and I have to find a new route.

Doing it with JNOS

If I had a properly configured JNOS box on my local LAN, the problem is quite a bit different. I still need to know that Dale has an account at hamgate.monroe. What I do then, is to open up Outlook Express, select the account I have set up for the mail server on my local JNOS box, and address the mail to

`wa8efk@hamgate.monroe.ampr.org`

And click Send/Receive. That's it. The network figures out how to take the message to Monroe.



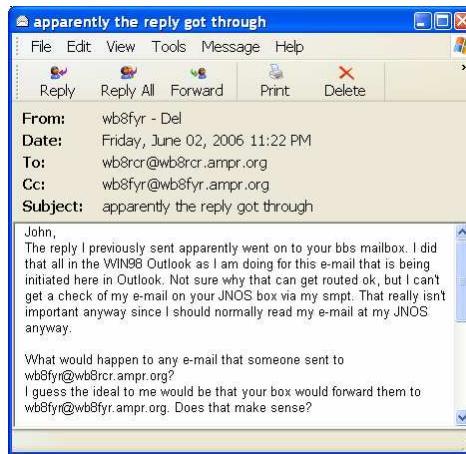
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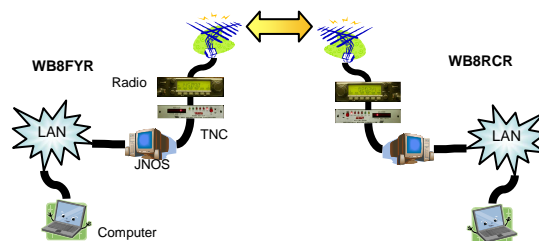
Reading my packet messages

When I set up my email, I have set up an account for packet. I can choose whether that account is included when I click Send/Receive on Outlook Express. If it was included, then my packet messages come in whenever I check my email. It happens I didn't include my JNOS box in my normal list of email accounts, so I need to click on the little arrow next to Send/Receive and select `wb8rcr.ampr.org` from the drop-down menu that appears.

There is nothing especially magic about Outlook Express. That happens to be my email client; almost any other client will work just as well.



Now it happens that Del sent that message from his Windows email program. The message went over his LAN to his JNOS box, then over the air to my JNOS box, where it sat waiting for me to click Send/Receive on Outlook Express. But if Del had used regular packet, and logged on to my BBS and left the message that way, I would have picked it up the same way.



In fact, if Del had left it on the Bay City BBS, that BBS would have been smart enough to send it to my BBS, so I still would have gotten it the same way.

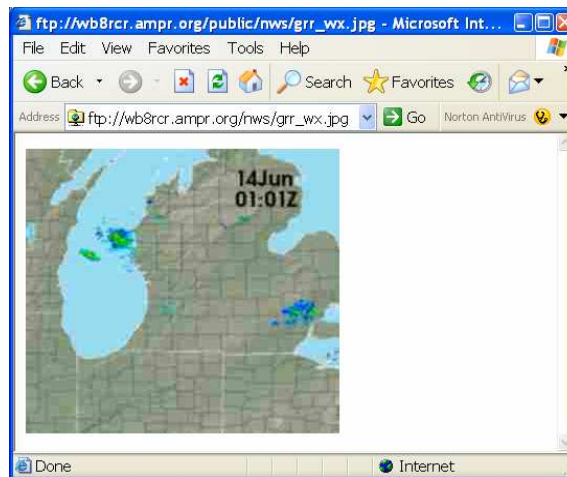
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Getting Files

Besides email, I can use other, normal PC clients. JNOS allows files to be shared using FTP. Windows includes an FTP command-line client, and it can be used to grab files. But many files I may just want to look at. For example, I might want to take a peek at the weather radar images stored on `wb8rcr.ampr.org`. These are very low resolution to be packet-friendly, but good enough to tell where the storm is, and there is no need to save them since they are updated every 15 minutes.

Most browsers can grab files over FTP and display them in one step:



Gateway

What is going on here? Well, JNOS is a lot of things, but at its core, it is a gateway. A gateway is a system that connects two networks. If you have a LAN, your router is a gateway to your ISP. Your ISP has a gateway to the Internet that you configured if you use a dial-up connection or in your router if you have a LAN. BAYBBS is a gateway between the 145.09 packet network and the 145.76 network. JNOS is a gateway between the IP network of your local LAN, and the AX.25 packet network.

What does it take?

Ideally, JNOS is a separate box that sits on your local LAN, much like your router. It can then connect the systems on your LAN to your TNC, and from there to the packet network. Once it is set up, you really don't need to "log on" to the JNOS box very often, depending on what you want to do.

JNOS can run on Linux or DOS. Obviously, DOS is a little easier to set up. However, there are a couple of limitations to DOS. If you can remember back in the DOS days, DOS had horrible memory restrictions. JNOS can be set up to do lots of things, but under DOS, memory can prevent you from doing many of those things at once. So you need to pick and choose what things you enable.

The second limitation of DOS (which maybe isn't a limitation at all) is that it needs an *old* computer. DOS won't run on the newest computers. If you recall back to the old days, DOS can't see a disk drive larger than 2 gigabytes. Most older computers can use drives up to about 40 gigs, providing you don't mind wasting most of the

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What does it take? (continued)	<p>space. But generally, these boxes will hang if you try to install a drive larger than 40 gigs. Of course, finding a drive even much smaller than 80 gigs is a challenge these days.</p> <p>DOS also isn't all that hot with Ethernet, and you want to put the JNOS box on your LAN. To do that with DOS, you need a piece of software called a "packet" driver. This isn't amateur radio packet, but Ethernet packet. In any case, only older Ethernet cards came with these drivers.</p> <p>So the perfect JNOS/DOS computer is going to be something newer than a 486, but older than a Pentium III. For most people, 10 or 20 megs of disk will be plenty for JNOS, and you need an older Ethernet card. Many older cards were NE2000 compatible. An NE2000 compatible packet driver is included in the JNOS software from the Digital Radio Group. The 3Com 3C503 was also a popular card back in the day. This driver is also included.</p> <p>Remember DOS can only do one thing at a time, and you probably want to have JNOS running all the time. So if you are going to put a computer on your LAN that is going to sit there and be pretty much invisible, it probably isn't so bad if it's some old clunker.</p>
But what if I don't have a LAN?	<p>Remember, the main issue isn't JNOS, it's IP. What you need to participate is the ability to connect your computer's IP protocol to the AX.25 protocol used by packet.</p> <p>On Linux, the AX.25 protocol is built-in, so it is simply a question of enabling the correct modules.</p> <p>In Windows, the AGW packet software has an available IP stack. AGW is usually used for sound card packet, but it can also connect to your TNC. In fact, AGW works a lot better with a TNC. If you have the IP stack operational, your PC programs can now connect to packet.</p>
How do you know me?	<p>Before you can participate, either through JNOS, AGW, or any of dozens of other IP alternatives, you need to have an IP address for your TNC. Packet IP addresses are allocated from the ampr.org domain. You can get an address by going to:</p> <p style="text-align: center;">http://www.mi-drg.org</p> <p>and signing up for an address. They are free. On the question about requested subnet, select 200 if you are east of Sanford, 201 if Sanford or west. It takes a few days to get registered, and then it takes a few days for the name to get spread across the Internet, so even if you're not ready yet, go ahead and get an address.</p>

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You said JNOS is a lot of things

Earlier we mentioned that the core feature of JNOS was a gateway, but there was more. Well, JNOS also includes a number of Internet servers, some of which we referred to earlier although we didn't separate them well from the gateway feature, and JNOS is also a BBS.

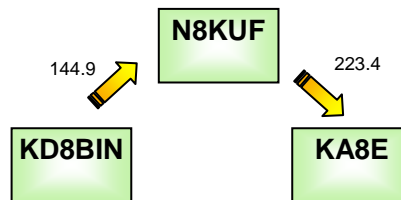
Let's examine the gateway features in a little more detail, and discuss the hamgate functionality, a special variant of the gateway.

Gateway capability

As an IP gateway, JNOS can make the jump from one network to another. Those might be radio or traditional computer networks. When we connect in order to type in commands, but want to use IP instead of AX.25, we use the *telnet* command. Telnet takes the name or address of the target station, rather than the SSID required by normal packet.

If, for example, WB8FYR wanted to connect to the WB8RCR BBS, he would issue the command `telnet wb8rcr`.

But let's suppose KD8BIN wanted to connect to KA8E. It turns out that KD8BIN is on 144.91, but KA8E is on 223.40. Well, bbs.n8kuf is a gateway between those frequencies. So KD8BIN would type `telnet ka8e`, and bbs.n8kuf would pick up the packets and retransmit them on 223.40, since it knows that it is responsible for that routing.



Hamgates

Certain gateways are connected to the Internet, and are assigned responsibility for routing certain subnets. These stations are called *hamgates*. Typically these subnets represent counties, and typically they are named *hamgate.county*. Since *hamgate.midland* is not yet operational, *wb8rcr.ampr.org* currently has responsibility for routing not only Midland, but also Bay, Arenac, Saginaw and Tuscola. When *hamgate.midland* becomes available, it will take this responsibility, and as Bay and Saginaw get their hamgates, the responsibility for their parts of the network will pass to them.

There are really only two things that make a hamgate special; 1) the hamgate knows all the other hamgates, and 2) all the other hamgates know the hamgate.

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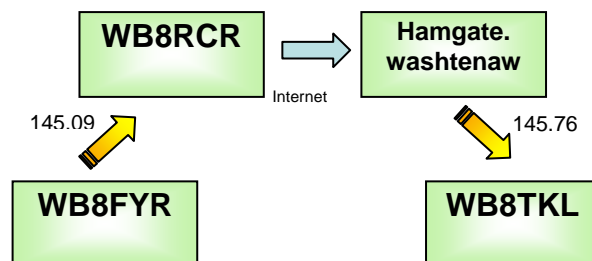
Is this magic?

Actually, the routing, although fairly complex when viewed as a whole, is fairly simple when viewed from the standpoint of any particular station.

A typical station would have only two entries in its table. There would be an entry that said to use the radio port for anything in the county, and another entry that says to use the nearest hamgate for anything else.

So for example, if WB8FYR wanted to connect to `w8lss`, his station would simply send packets out his 145.09 port. However, if he wanted to connect to BAYBBS, his JNOS would ask `wb8rcr` (later `hamgate.midland`) to do that for him. `wb8rcr` would know to go out the 145.09 port to connect to BAYBBS.

However, if Del wanted to connect to `wb8tkl`, it gets more interesting. His station would still pass the message over 145.09 to `wb8rcr`. From the standpoint of `wb8fyr.ampr.org`, there isn't much difference between `wb8tkl` and `baybbs`; neither is in Midland county. WB8RCR would recognize that `hamgate.washtenaw` was responsible for routing to `wb8tkl`, so it would pass the message over the Internet to `hamgate.washtenaw`. `hamgate.washtenaw`, in turn, would recognize that Jay is on the 145.76 port, and send the message out over 145.76 to Jay's TNC.



Del simply set up his station to route anything he can't reach over `wb8rcr`. Everything else is handled automatically by the network. And there is no reason that the hamgate to hamgate traffic has to go over the Internet. Until there are more hamgates, this is generally an easier route, but if an Internet circuit was out, it is pretty simple business to go over the radio. But `wb8fyr` would never have to be affected.

Internet Servers

JNOS also offers a number of Internet services over radio. All JNOS nodes have telnet, which allows us to connect to the node directly by keyboard. Most also offer POP and SMTP servers, which allow us to receive and send packet messages using email clients. Most also have FTP servers, which allow us to send and receive files. (Windows has a built-in FTP client, and most web browsers can also communicate by FTP). Some JNOS nodes have web servers, which allow the node to serve up web pages. There is also a finger server, which allows you to get information about a particular user of the node. (Windows also has a built-in finger client). Finger also allows you to get information about the node such as who has logged in lately.

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BBS

Finally, JNOS includes a packet BBS. The BBS behaves like other BBSs, although there are a few more commands than W8KEA currently has. Where the simple TNC-based BBSs like W8KEA have a command, the JNOS command is the same, although there are sometimes differences in syntax. You can send a message with the S command, read a message with the R command, list messages with the L command, see what stations have been heard with the J command, and so forth.

The C (connect) command is a little different. Since a gateway might have multiple ports, you need to specify the port. In Michigan, the convention is that the ports are named by the frequency. So to connect to KB4EIZ over AX.25, you would type:

```
C 145.09 KB4EIZ
```

Like most digis, JNOS has an “alphabet soup” command prompt. Unlike most digis, there is help for every command. Some BBSs have some unique commands. For example, on WB8RCR, typing **wx** will give you the 7 day weather forecast for Midland.

Where do we go from here?

If you have an old clunker of a computer, consider getting JNOS on it and joining in the network. For your laptop, try AGW. The AGW IP stack isn't free, but it isn't very expensive.

On the infrastructure side, we have plans. We expect that before too long, hamgate.midland will become operational at the hospital, with emergency power and Internet provided from outside Midland. A little later we hope to have hamgate2.midland operational in Jerome township, providing a redundant Internet connection.

Because of the hidden transmitter problem (see the mi-drg website), we are looking at higher frequencies to link the hamgates, and possibly to link other nearby hamgates. We are even considering higher frequency local access frequencies. Higher frequencies allow faster data speeds, and because the hamgates can be gateways between frequencies, adding, say, 9600 baud on 70 cm doesn't exclude the folks already on 2 meter / 1200 baud.

Conclusion

This is an exciting time. The possible capabilities we can offer our served agencies are substantial. The amount of fun available is also substantial. So start reading up on IP packet on the mi-drg site, dust off that old clunker you were about to trash and join in on the fun.