

Bringing New Life in Old Computers

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Abstract

In this paper, we describe one of the possible implementations of older computers within the amateur packet radio experiments: A simulation of the local area network within an institution (radio club, school or university).

1. Introduction

I suppose that many of us still possess some old computing machines. So do me. Besides my Pentium computer which runs with either Windows or Linux operating systems, I also have an old box with CPU 80286 running DOS 5.0. Although that DOS box tends to 'persuade' me that it is really the right time to get retired I have decided to use it as long as it wants to work. I managed to find an old network card of the ISA standard which, unfortunately, only had the BNC connector. On the other side, the card I've had in the Pentium box was equipped with both UTP and BNC connectors, so, a short piece of the RG58 cable was enough to connect two computers into a small home LAN, regardless a fact that their dates of manufacture differ near a decade.

Almost the same amount of time passed since I learned basic commands of DOS operating system and it was tricky to find software capable to transfer (copy) files from the Windows/Linux computer. In fact, the DOS computer had only a 5.25 inch floppy drive which is almost impossible to use nowadays and

it also did not have a USB connector for a flash memory key or like. Anyway, I managed to find a kind of a 'DOS client' for Windows NT operating systems which supported outgoing Windows 2000 connections. That means I found a way to feed the old DOS box with programs that I couldn't copy with 5.25 inch floppies anymore.

2. Experiments

2.1 Telnet the packet radio BBS from a LAN

In order to let you know what I have been doing for years, let's start from beginning. I have been practicing the amateur packet radio from both home and a local school ham radio club. In the school we have several computers of category 80286 which I have been planning to interconnect within a club's LAN. In fact, the first packet computer in the club I have equipped with packet radio BBS software DosFBB 5.15c, a couple of VHF/HF modems using an internal USCC card and a radio station. Soon after I noticed that machine was often targeted by the students who just wanted to play with the computer and 'tweak' its parameters whenever I was absent in the school ham radio

room. You bet such activities resulted in nothing else but malfunctions of the packet BBS which, in turn, caused lots of disappointment not only in me - the 'sysop' but in the ham radio users within the area of the BBS coverage.

So, I decided to move the BBS in another, locked room but faced a problem: How to enable the students to reach the BBS's services, read bulletins and send some personal mail to me. The only solution was to establish a kind of a ham LAN that could be used from the club's 'client' stations but without any disturbances to the BBS server. I knew that newer versions of FBB should be capable to accept incoming telnet requests from a LAN in a similar way they service telnet requests from the Internet. Unfortunately, DOS versions of FBB (at least

those older versions capable to run on 286/386 computers) were not equipped with such an ability and that was why I had to think about some other solutions.

The only idea I got was to play with my home packet server which runs on both WinFBB (Windows) and LinFBB (Linux). I have already managed to test (successfully) their telnet functions via the Internet because I have been using them for exchanging email with remote FBB systems which I could not reach via radio. If I prove that telnet function works in a LAN the same way as it does via the Internet, then I could use it in a school's ham radio LAN. My home amateur packet gear is described in Figure 1.



Figure 1. DOS client (far left) and Windows/Linux server.

I was not sure which particular software to run in the DOS box. Anyway, some friendly hams suggested trying *NCSA Telnet Client* by the University of Port Elizabeth (version 2.3.07.04), Figure 2. It appeared that it was compact

enough to run from a 286 box having only 1 MB of RAM but required that a LAN interface (NIC driver) was up and running before the main program. The result of a successful outgoing telnet connection can be seen in Figure 3.

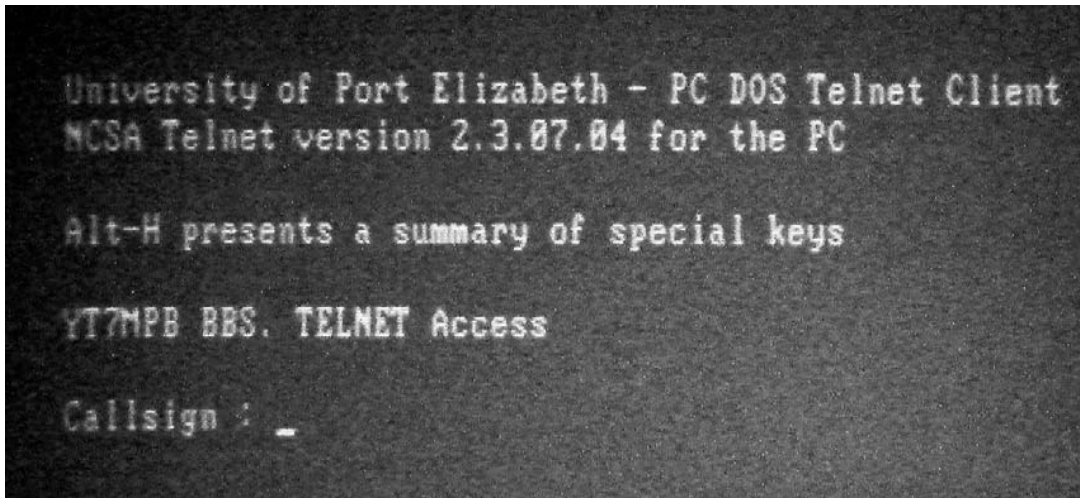


Figure 2. Simple telnet client software suitable for MS DOS / PC DOS computers.

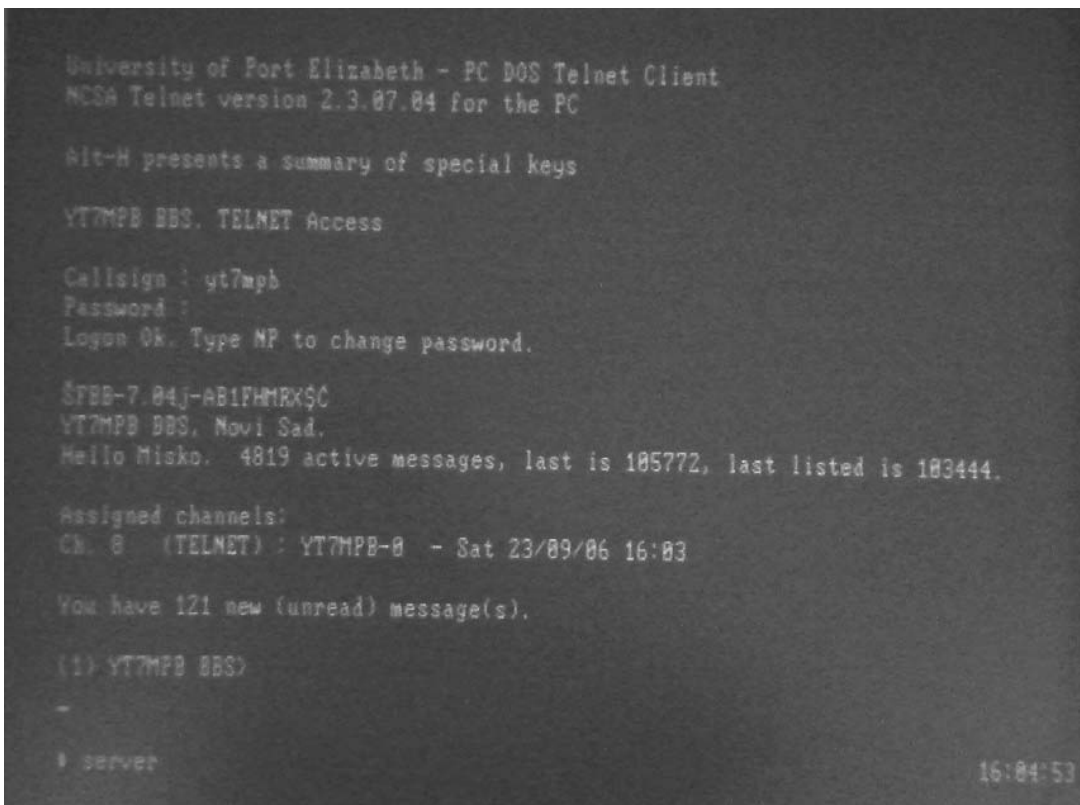


Figure 3. A successful telnet connection from a DOS computer.

The most important thing is that the FBB packet server responds to an incoming telnet request from a LAN with a very similar appearance the radio users get on their screens. From a pedagogical point of view, it is very good because the school's students get accustomed to the server's response and commands even before they obtain their amateur licenses and start connecting the packet BBS from the air.

You can see in Figure 3 that the server in this example responded with a connection flag

containing a line with FBB-7.04j. That means the FBB server runs the version 7.04j for Linux, which is shown in Figure 4. In the picture you can see that one of the LinFBB's main windows ('All channels') returns to the system operator all communications between the server and the users, so the 'sysop' is capable to check the commands his/her students use within the LAN and the behavior of the server. By the way, there is not significant difference between responses Linux and Windows versions of FBB software send to DOS client users.

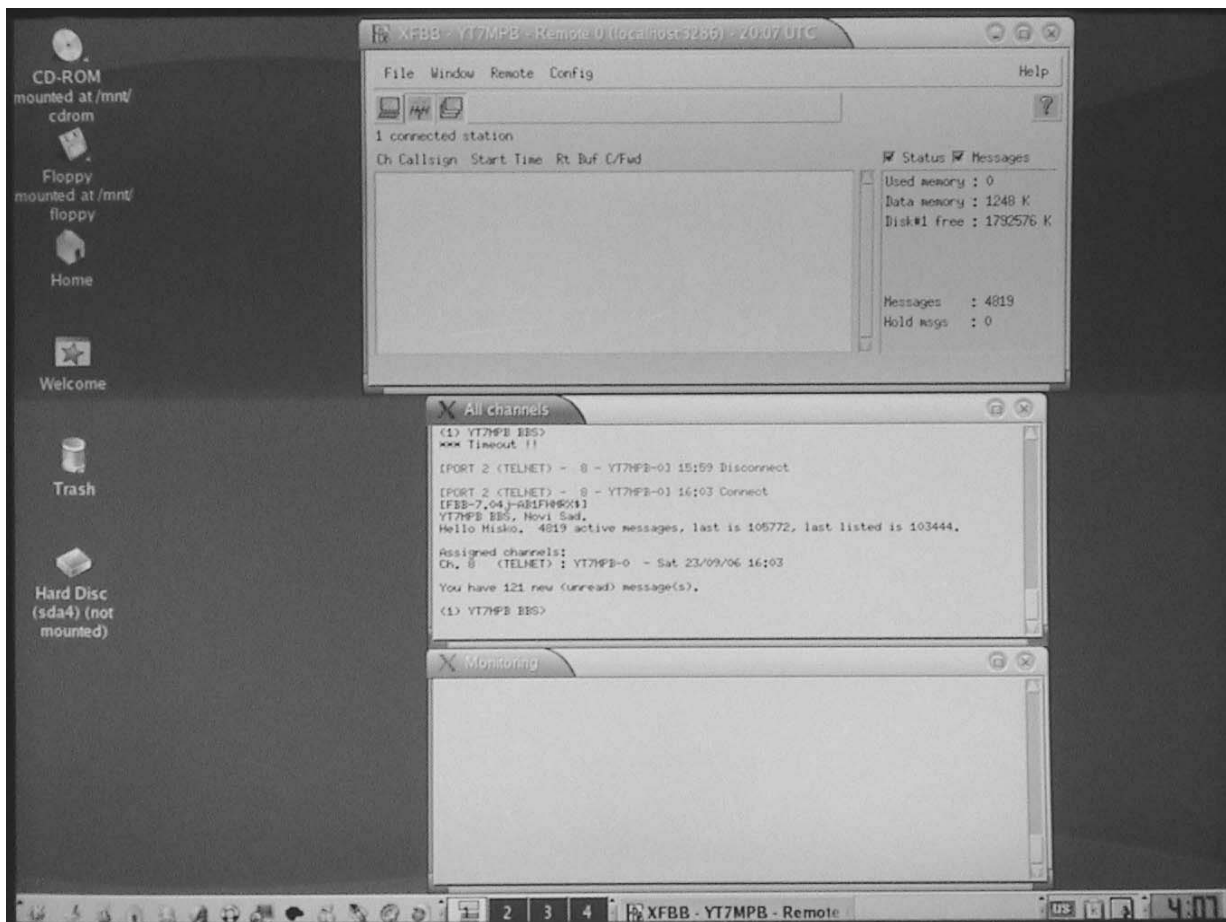


Figure 4. The LinFBB's middle window ('All channels') returns the same client's content as in Fig. 3.

2.2 Using Xrouter and JNOS in a LAN

When I asked the amateur radio community to give me some ideas for older DOS computers, Paula Dowie, G8PZT suggested trying her

Xrouter. Although it appeared that *Xrouter* was equipped with a lot of functions I did not need at the time, it was an interesting experience to try it because it also contained telnet command, see Figure 5. It also simulates a local node LIMAN (a part of Novi Sad city where I live).

In case such a node was equipped with a radio channel remote users could reach the node via

radio and from there use the possibility to telnet segments of the local computer network.

```
18/06/07 21:29:39 CON:1 YT7MPB XROUTER v176c
telnet 192.168.1.1 6300

YT7MPB:LIMANĆ TELNET: Trying 192.168.1.1 6300

YT7MPB:LIMANĆ Connected to 192.168.1.1 6300

YT7MPB BBS. TELNET Access

Callsign :
```

Figure 5. Xrouter v 1.76c also has telnet capabilities.

Similarly to *NCSA Telnet Client* mentioned earlier, *Xrouter* also wants the network interface be up and running as the *sine qua non* rule. After some experiments I found that the very same network driver I used for *NCSA Telnet Client* was completely fine for *Xrouter*. By the

way, for the sake of my home server-client connection experimentations, I still haven't tested *Xrouter's* advanced packet routing features and other functions, but just how to list and read bulletins:

```
18/06/07 21:31:45 CON:1 YT7MPB XROUTER v176c 3YT7MPB:LIMANĆ 191040
ENTER = continue, A = Abort, R/U # = Read message # ->

23121 B$ 7487 KEPS 2AMSAT CX2SA 0618/1246 Orbital Elements 07168.MICROS
23120 B$ 3793 KEPS 2AMSAT CX2SA 0618/1246 Orbital Elements 07168.OSCAR
23119 B$ 9008 KEPS 2AMSAT CX2SA 0618/1246 2Line Orbital Elements 07168.A
23118 B$ 14920 FBBLOG2WW CX2SA 0618/1246 FBBLOG Nr 24/2007 * CX2SA BBS
23117 B$ 14924 FBBLOG2LATNET CX2SA 0618/1246 FBBLOG Nr 24/2007 * CX2SA BBS
23116 B$ 2486 SOLAR 2EU OK0NAG 0618/1246 Solar & Geophysical Activity S
23115 B$ 2769 EMC 2WW KB2VXA 0618/1246 Re: UK3XX > 10MHz wipeout
23114 B$ 1954 SOLAR 2EU OK0NAG 0618/1246 Solar Region Summary (SRS)
23113 B$ 15213 DX 2WW KB8NW 0618/1246 Ohio/Penn DX Bulletin No. 813
23112 B$ 1423 LAW 2WW UK6BE 0618/1246 Re: Landmark ruling on gays in
23111 B$ 5473 METEO 2BRANET CX2SA 0618/1246 Previs|o do tempo 18/06/2007
23110 B$ 4604 PONDER2WW G4EBT 0618/1246 Sony's violent Cathedral game
23109 B$ 8400 RONDE 2NLDNET PI4MPL 0618/1246 BULLETIN MEPPELRONDE 2023
23108 B$ 5994 SMACK 2WW G4EBT 0618/1246 UK Smacking law review
23107 B$ 3001 SOLAR 2EU OK0NAG 0618/1246 Report of Solar Geophysical Ac
23106 B$ 1020 TERROR2WW G4WYW 0618/1246 Re: Gitmo detainees (G0FTD)
23105 B$ 1627 EMC 2WW GM7HUD 0618/1246 Re: 10Mhz to be wiped out?
23104 B$ 805 METEO 2CXNET CX2SA 0618/1246 WX Minas 17/06/2007 - 16:00
23103 B$ 15566 RTTY 2NLDNET PI4RCK 0618/1246 PI4RCK RTTY Bulletin (170607)
ENTER = continue, A = Abort, R/U # = Read message # ->

F1=Help F2=Mon=OFF F3=MPORT=FFFF F4=MMASK=03FF F5=Capt=OFF Alt-X=Exit
```

Figure 6. Accessing to the packet bulletins using Xrouter's telnet option.

In addition, the current maintainer of *JNOS*, Maiko Langelaar, VE4KLM and his merry band of users suggested me trying their version of Network Operating System. It appeared that *JNOS* came to 2.0+ versions that seemed to be 'too fresh' to run in my old 286 box, so I had to

stay with *JNOS* 1.1+ product family (at the moment I use version 1.11f, last maintained by recently passed James, N5KNX), Figure 7. You bet, *JNOS* offers telnet command the same way the other programs do, so I am capable to reach FBB from the main *JNOS*' screen (Figure 8.)

```
21:34 03440/116128 FH=17 IDLE=10
BBS:
@ Command:
JNOS version 1.11f (80186)
by Johan. K. Reinalda, WG7J/PA3DIS
and James P. Dugal, N5KNX
Copyright 1991 by Phil Karn (KA9Q) and contributors.
XMS detected.
TxDelay: 40
Persist: 64
SlotTime: 5
TxTail: 5
FullDup: 0
vhf: input output (ASCII dump)
jnos> telnet 192.168.1.1 6300_
```

Figure 7. *JNOS* 1.11f works as the 24/7 mailbox with MS DOS here ...

```
BBS:
1 Telnet: 192.168.1.1:6300 TxQ 0000 St: Established
Resolving 192.168.1.1... Trying 192.168.1.1:6300...
Telnet session 1 connected to 192.168.1.1

YT7MPB BBS. TELNET Access

Callsign : _
```

Figure 7. ... Users of the *JNOS* mailbox can make outgoing telnet access to LinFBB.

From the examples given in this paper you can see that if you run a FBB server in your school,

a university or some other place, you can offer your local area network 'clients' to reach the

server's email capabilities – even if your clients run older computers equipped with black/white (or other monochrome) monitors. Of course, should your clients use newer computers with Windows or Linux environment they can easily run telnet commands which are included within their workstations. For the sake of email integrity and system security, it is advisable to restrict non-licensed users (say kids in the school) to a read-only set of permissions but allow full privileges to those who have their licenses and callsigns.

After several months of experimenting mentioned above, I came to an idea to test my

old DOS box in order to see if it is capable to run 24/7 JNOS BBS. It required a lot of practicing with parameters and looking for help in JNOS forums, but resulted in my JNOS mailbox been running for some few months now. I moved my VHF radio and antenna ("A" in Figure 8) and TNC2 ("C") to the JNOS box ("B") and left my Pentium WinFBB / LinFBB server with only network and Internet connections. So, the DOS box runs as a full-time *JNOS* packet mailbox and it is independent of the Pentium system. The latter I use only to forward bulletins with remote FBB stations using the Internet.



Figure 8. Main parts of the JNOS mailbox subsystem in the home LAN.

Interestingly, I faced to some technical mysteries: Besides Windows 2000 Prof. and Mandrake 9.1 Linux, I also installed a Windows XP partition. Somehow, Windows XP can not recognize my network card in the Pentium box, so it seems not to be usable for home networking (though it is fine to dial up to the Internet and exchange packet emails with my

FBB forwarding partners). That means, after finishing an internet-forwarding session, I have to reboot the computer – this time with Linux or Windows 2000, activate LinFBB or WinFBB respectively, and re-establish a LAN with the DOS JNOS box. To test JNOS, the easiest way is to telnet it either from Linux or Windows (Figures 9 and 10):

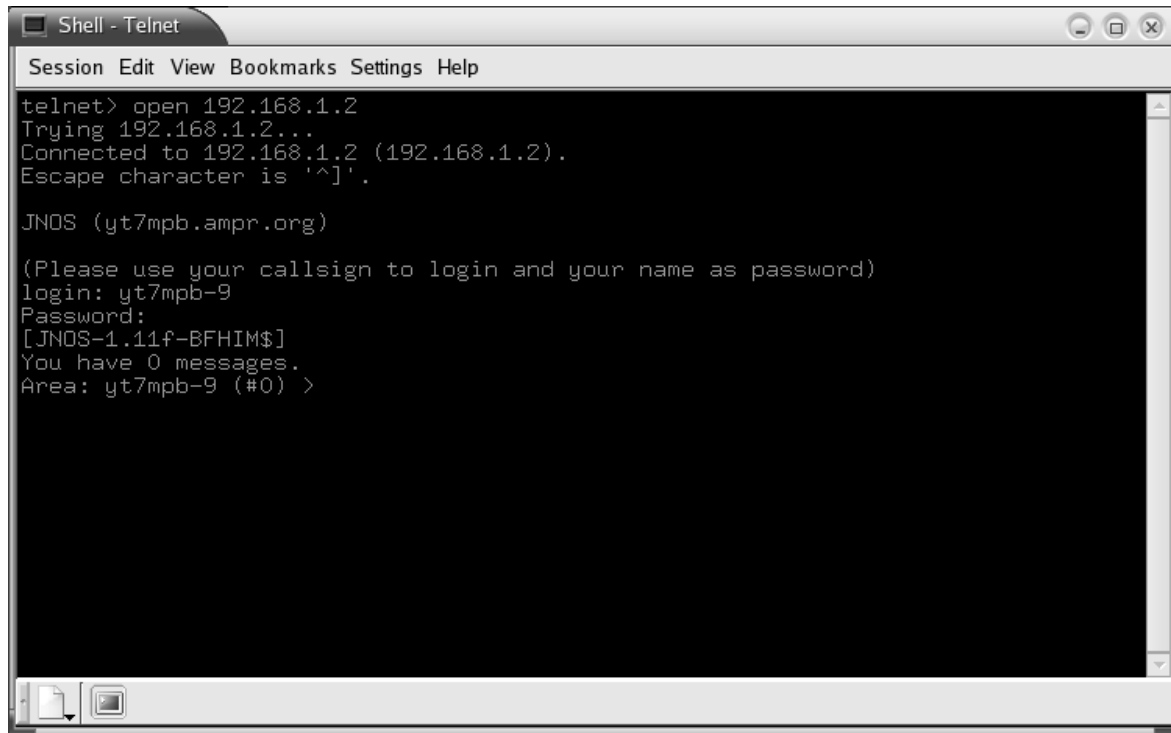


Figure 9. An outgoing Linux telnet connection to the JNOS mailbox.

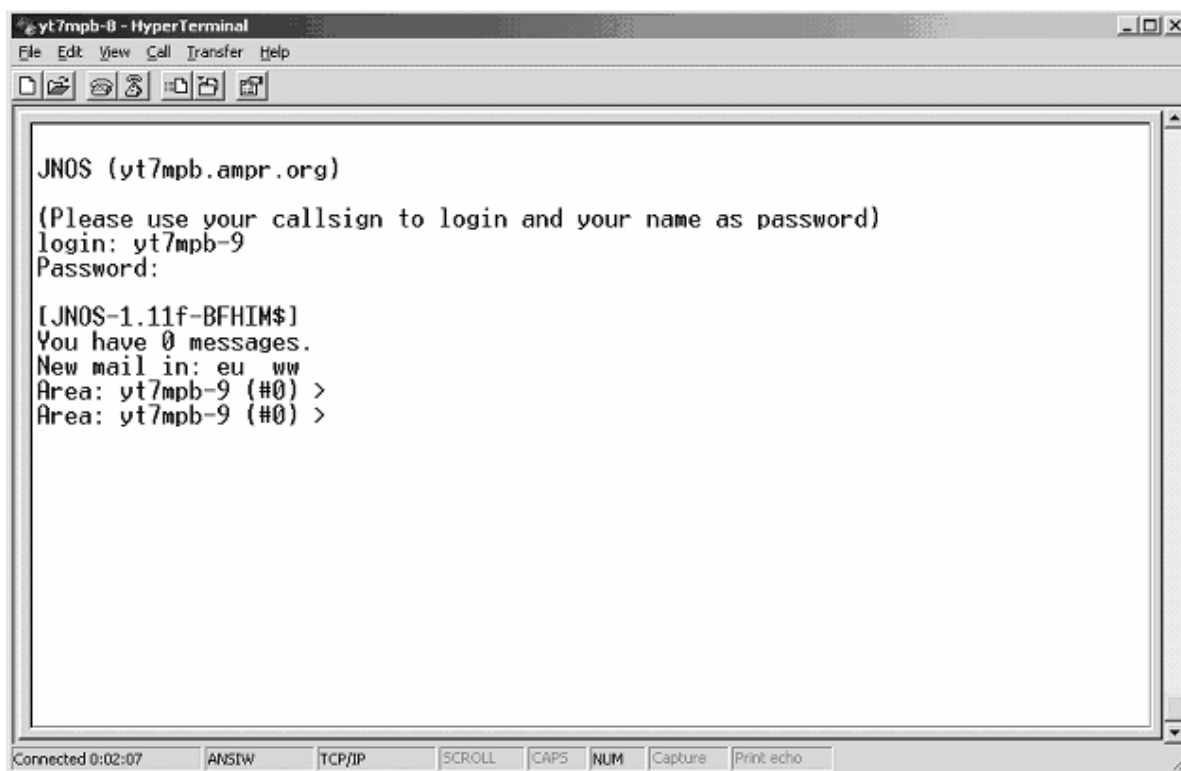


Figure 10. An outgoing Windows telnet connection to the JNOS mailbox.

To begin with some email exchange within a local area network, I experimented with FBB's outgoing telnet sessions to JNOS. I recognized that an old issue appeared: After a while, any subsequent running FBB-JNOS session gets broken due to a link error. It seems that telnet is not reliable protocol between FBB and non-FBB systems when it comes to packet mail forwarding in a LAN. Besides that particular issue and in order to improve the email transfer in a 'compressed' forwarding between FBB and JNOS, I had to establish an AXIP tunnel between the two. With JNOS it was an easy task, i.e. I just had to add an AXIP-capable port

and redirect outgoing traffic to it (instead of the telnet port which I've still kept for the remote telnet connections to the JNOS mailbox, as described earlier). On the Windows machine, the only way to implement AXIP which I know of, is using BPQ32 packet switch software (The older versions of BPQ for DOS do not work with Windows 2000 and I use BPQ32 v 4.10 Beta now). As you can see in Figure 11, AXIP enables a user "connected" to a BPQ switch to issue a usual packet radio command of type '`c <callsign>`' ('`c yt7mpb-14`' in this example, which is the callsign of JNOS mailbox):

```

BPQ Terminal Version 2.0.0.2 - using stream 1 - Connected to SWITCH
Action Monitor Edit Help
13:56:28R YT7MPB-14>YT7MPB-5 Port=1 <I C S2 R1>:

    *** WELCOME TO YT7MPB'S TEST BBS ***

    You can only read bulletins in this bbs!

    AX.25 ttycall: YT7MPB      (use this to chat to me)
    AX.25 bbscall: YT7MPB-14  (use this preferably)
    AX.25 mycall:  YT7MPB-8   (need to press <Enter
13:56:29T YT7MPB-5>YT7MPB-14 Port=1 <RR R R3>
13:56:31R YT7MPB-14>YT7MPB-5 Port=1 <I C S3 R1>:
> to start up)

13:56:32T YT7MPB-5>YT7MPB-14 Port=1 <RR R R4>
13:56:34R YT7MPB-14>YT7MPB-5 Port=1 <I C S4 R1>:
>
13:56:35T YT7MPB-5>YT7MPB-14 Port=1 <RR R R5>

c yt7mpb-14
WINNOD:YT7MPB-5} Connected to YT7MPB-14
[JNOS-1.11f-BFHIM$]
>
i
JNOS version 1.11f (80186)

    *** WELCOME TO YT7MPB'S TEST BBS ***

    You can only read bulletins in this bbs!

    AX.25 ttycall: YT7MPB      (use this to chat to me)
    AX.25 bbscall: YT7MPB-14  (use this preferably)
    AX.25 mycall:  YT7MPB-8   (need to press <Enter> to start up)
>

```

Figure 11. BPQ Terminal running upon BPQ32 v 4.10 Beta.

So, if you keep both telnet and AXIP ports of your JNOS for DOS system, as described in this paper, you will have at least two options to reach JNOS from within a LAN: a) to telnet its IP address, and b) to connect its callsign in the same manner as you connect a packet station on the air. The choice is yours!

On the other hand, Linux does not need additional BPQ software being installed but it

does want some more system tweaking in order to activate AXIP. Then it is possible to activate a forwarding session between JNOS for DOS and FBB for Linux.

Figure 12 shows two 'empty' forwarding attempts, the first initiated by JNOS (upper half of the picture) and the second initiated by LinFBB (lower part).

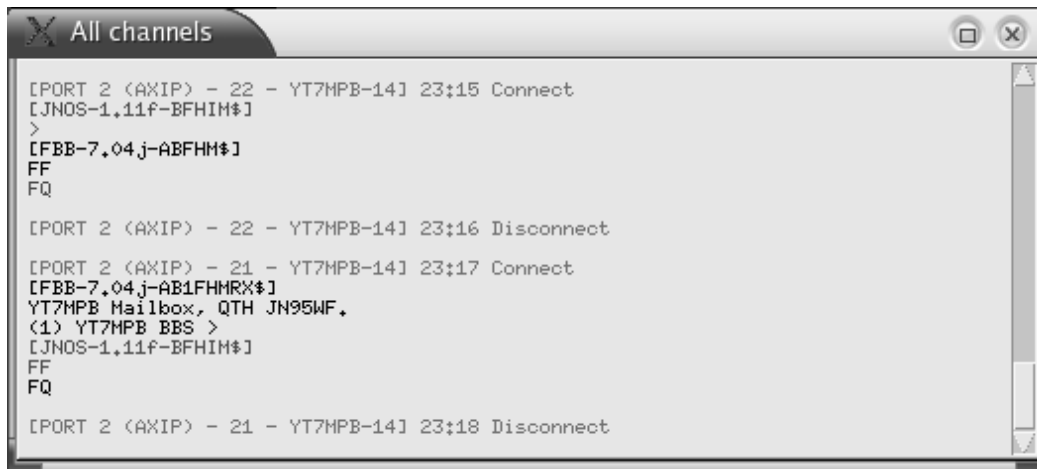


Figure 12. Short forwarding sessions between JNOS and LinFBB (both directions).

3. Conclusion

What I haven't managed yet is to enable forwarding of mail originated in JNOS mailbox to be delivered to FBB. To be precise, whenever a forwarding session occurs, it looks like that JNOS does not offer (propose) anything to the FBB system – though it still has some stuff in forwarding queue. Some people think that a reason for that might be in the same callsigns I use for both JNOS and FBB mailboxes – though I tried to implement various substation identifications (SSID's).

It is obvious that the old 286 boxes in the school's ham club would be just fine to run both JNOS as a mail server and its clients, as described, as well as to serve as useful tools in future computer and communication courses.

This paper wanted to motivate radio amateurs to pull out their old computers from the closets and play with them again. There is plenty of room to experiment with old hardware and software. I did not use my old DOS box for years. Recently I refreshed my knowledge of DOS operating system and found new horizons in computing to explore. I am sure that computer equipment and accessories should be replaced with a new stuff only when the existing gear does not satisfy user needs anymore. Until then, you would find many happy hours experimenting with what you have as well as while learning new networking skills.

4. References

Skoric, M. (2000-2007). FBB Packet-radio BBS mini-HOWTO, <http://tldp.org/HOWTO/FBB.html>