BPQ for BBS/RMS/APRS

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This talk is available online at *http://www.prinmath.com/ham/talks/*

What is BPQ?

- NET/ROM compatible Packet Switch
 - Multiple ports
 - As many serial ports as you have
 - Multiple protocols
 - Packet, Pactor, IP
 - Multiple functions
 - BBS, Chat, APRS

What can we use BPQ for?

- AX25 (Packet) Access point
- Bulletin Board System (BBS)
- Radio Message Server (RMS)
- APRS Internet Gateway
- Application Gateway

BPQ Web Configuration



BBS Message Page

Bedit Messages - Chromium		1	
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Status Conformation Uterry	BPQ32 BBS KONTS		Total Contraction
Filter From	Message 2555		
Via	From AC0KQ Sent 08-May 21:40Z Type P ▼ To K0TER Received 08-May 21:40Z Status F ▼ BID 2555 K0NTS Last Changed 08-May 21:41Z Size 210		
2503 2498 2497	VIA Title QTC 1 PHILA PA 215 276		
2494 2493 2492 2491	Edit Text Save Save Message Save Attachment Print Export Green = Sent, Yellow = Queued		
2486 2485 2483 2482	KONTS		
2481 -			

Message Forwarding

C ctopi:8080/Mail/FWD7M000038DD423A C Q Search C Search S Status Configuration Users Messages Forwarding Welcome Msgs & Prompts Housekeeping WP Update Node Menu Max size to Send Search S Sear	 Edit Forwarding - Mozilla Firefox Edit Forwarding × + 	
DECASE DESCRIPTION Status Configuration Users Messages Forwarding Medness A messages Message Message<	(i ctnpi:8080/Mail/FWD?M000038DD423A	C Q. Search ☆ Ê ♥ ♣ Ø ● ▼
Max size to Send 9999 Max size to Receive 9999 Max age for Bulls 365 Warn if no route for P or T Juse Local Time Aliases Ubdate BBS HA Enable Forwarding Interval 3600 (Secs) Request Reverse Interval 3600 (Secs)	Status Configuration Users Messages F	BPQ32 BBS KONTS Forwarding Welcome Msgs & Prompts Housekeeping WP Update Node Menu
Send new messages without waiting for poll timer FBB Max Block 10000 Send Personal Mail Only Allow Binary Use B1 Protocol Use B2 Protocol Send ctrl/7 instead of (ex in text mode forwarding	Max size to Send 99999 Max Size to Receive 99999 Max age for Bulls 365 Warn if no route for P or T Lises Update	Forwarding Config for RMS - 0 Messages Queued T0 AT TIMES Connect Script MS MITOI AL7N NXSK BBS HA Enable Forwarding Interval 3600 Send new messages without waiting for poll timer FBB Max Block 1000 Send netrol Send netrol Send netrol Send netrol Send netrol Send netrol

APRS Page

🔊 🗇 🗊 🛛 N0SZ-14's BPQ32 Web Server - Mozilla Firefox 📴 N0SZ-14's BPQ32 W... 🗙 🕂 0 Ξ (i) 192.168.11.88:8008/aprs/all.html Q Search ☆ 自 C N0SZ-14's BPQ32 APRS Web Server Home All Stations All Stations **RF Stations** All WX Stations (This page will automatically refresh every five minutes) **RF WX Stations** The following is a list of all the stations heard in the past 120 minutes, both on RF and on the internet. **All Mobile** Stations There are 90 callsigns in the list. **RF Mobile** click a callsign to get an information page for that station. Stations AC0XW-1 AC0YV-9 AD0WB-B AE5VO ALMGRE **K0BAN** ACOVP-10 BVILLE All Objects KOHEY-9 K0JSC-1 K0OED-10 K0RTS-9 K00ED K1DDN-4 K7HRO-9 K7RFW-9 **RF Objects** K7YE-3 KC0FAC-7 KB0IIT K8ZTT-9 KBOUSF KB9UZO-9 KC0D KC0D-6 Information KC6ETE-9 KD0FPY-9 KC0LAD-1 KC0WUV KD0JZX-10 KD0KVJ-15 KD0LAC-10 KD0SQA-4 Node Pages KG4JAM KI4GYZ-1 KI0CFW-9 KN0MAP-1 KT0AM-9 N0BN-1 KD0SOA-9 KE0GDI-7 NOLNE NOOI NORUX-13 NOSZ-14 N0SZ-2 N0WAR-9 N0WGM-3 NOEB N3GPS N1GEP-1 N2XGL-5 N2XGL-9 N4ATA-7 N4IIR-9 N7GN-5 N7MJ-9 N7SOI-9 NOADM SAG1 W0AKO-B W0ARP W0BSP-10 W0BSP-13 W0CDS-A W0CDS-B W0CDS-C W0DPD-1 WOJAW W0JAW-9 W0JRL-15 W0LRA-5 W0QEY-5 W0UPS-5 W8XAL-10 W8XAL-9 WORDR-9 WA0GEH WA0TOG WA5VRL WA6IFI-3 WB7GR-3 WB7GR-9 WD4IXD WD4IXD-10 **WQ8M-1** WQ8M-9 WR0AEN-B WB5PIB-B WR0AEN-D WY7ATH-2

Stations Heard on RF

0 N	NOSZ-14's BPQ32 Web	Server - Mozilla	Firefox							
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	RF Stations			RF Sta	tions					
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	RF WX Stations	(11	ins page win		ienesiiev	ery in	e minute	(5)		
			The fo	llowing is a list on RF in the	past 120 m	statio	ns			
	Stations		* ofter a cal	leign means t	hat it was k	a and a	ria a dicri			
	RF Mobile		alter a cal	isigii means u	llat It was I	learu	na a uigi			
	<u>Stations</u>	Th	e list only inc	cludes callsign	ns heard or	n RF, d	irect or v	ria		
	All Objects		It does not in	nclude callsig	ns heard of	n the i	nternet,			
	<u>RF Objects</u>		or heard as third-party RF traffic via IGATEs.							
	Information		There are 47 callsigns in the list,							
	<u>Node Pages</u>	clic	click a callsign to get an information page for that station.							
		Callsign	Symbol	Locat	ion	Miles	Bearing	Last hea	rd	
		ALMGRE*	No. Digi	38°46.33'N 1	0 <mark>4°59.55'W</mark>	54.9	159	16:31:27		
		K0BAN*	Truck	40°24.41'N 1	05°05.68'W	62.9	12	16:37:20		
		K0JSC-1*	No. Digi	38°13.86'N 1	04°36.65'W	97.3	156	16:30:12		
		KOQED*	Rec Veh'le	38°58.91'N 1	04°32.53'W	56.9	130	16:32:21		
		<u>K0QED-10*</u>	No. Diam'd	38°59.87'N 1	04°38.52'W	52.1	133	15:55:59		
		KORTS-9*	Truck	39°17.25'N 1	03°30.01'W	100.0	99	15:57:58		
		<u>K1DDN-4*</u>	Car	38°25.62'N 1	05°11.37'W	75.8	173	16:06:07		
		<u>K7HRO-9*</u>	Truck	41°09.63'N 1	04°47.80'W	117.1	14	16:21:42		
		<u>K7RFW-9*</u>	Van	41°33.88'N 1	06°08.23'W	147.3	344	16:39:01		
		<u>K7YE-3*</u>	Truck	40°24.43'N 1	04°49.41'W	67.5	24	16:11:59		
		K87TT-0*	Ieen	38°59 63'N 1	05°03 46'W	394	157	16.24.34		

Station Map



How does it work?

- BPQ is a software program
 - Runs on most computers
 - Somewhat complex configuration file
- Connects to radio via Terminal Node Controller (TNC)
 - Typically serial connection
- Interconnects via IP
- Built-in BBS, iGate, Chat server, ...

Outline

- Overview of BPQ
- Initial configuration (BBS & RMS)
- Expanding the configuration
 - Multiple TNCs, forwarding, ...
- Adding APRS
- Adding your own application
- Q&A and hands on

Presentation Format

- Presentation available online
 - http://www.prinmath.com/ham/talks/
- Ask questions as we go along
 - I may defer answer if covered later
- 5 minute break after 1 hour
- TNC/Pi donated by John W2FS of Coastal Chipworks
 - Drawing at the end of the talk

rPi/BPQ vs. KPC3+ BBS

- rPi/BPQ Pros
 - Lower cost (\$100)
 - Much larger capacity (GB vs. kB)
 - More ports (multiple RF, serial and IP)
 - Sophisticated forwarding
- rPi/BPQ Cons

- Higher current draw

Complaint: Hard to set up BPQ

- BPQ is very sophisticated, and that necessarily adds complexity
- Solutions:
 - Use mkbpq to get started
 - Web interface for BBS etc.
 - Join a support group
 - Yahoo BPQ32
 - RMHAM

Why so rPi and BBB centric?

- BPQ is software runs anywhere
 - Supported on Windows, OSX, Linux
 - Best run as a headless server
- rPi and BBB are
 - Inexpensive
 - Reliable Linux boxes
 - DC powered
 - TNC/Pi & TNC/Black daughter boards

Brief history of BPQ

- Written by John Wiseman G8BPQ
- Originally called BPQCODE
- Became BPQ32 in late 90s
- Ported to OSX/Linux in 2000s
- Ported to Raspberry Pi/TNC-PI and Beagle Bone Black/TNC-Black

Brief diversion: Linux SBCs

- Runs a full Linux OS
- Usable stand alone computer or server
- Built in connectivity
 - Ethernet networking
 - USB and serial
 - General purpose IO
- Expandable using daughter boards
- Inexpensive (\$50 for a working system)

SBC Pros and Cons

- Pros
 - Inexpensive
 - No moving parts
 - 5V power
 - Expandable
- Cons

- SD cards corrupted by bad power

Raspberry Pi

- Most Popular
- Best supported
- rPi3 most powerful
- Lots of USB ports
- Lots of daughterboards
- No analog inputs
- \$35 plus SD card



Raspberry Pi models

- Raspberry Pi
 - A/A+ 700MHz CPU & 256MB SDRAM, 1xUSB
 - B 700MHz CPU & 512MB SDRAM, 2xUSB, Ethernet
 - B+ 700MHz CPU & 512MB SDRAM, 4xUSB, Ethernet
 - 2B 900 MHz Quad A7 & 1GB SDRAM, 4xUSB, Ethernet
 - 3B 1.2GHz Quad 64bit & 1GB SDRAM, 4xUSB, Ethernet
- Compute Module
 - 700MHz CPU & 512MB SDRAM
- Zero
 - 1GHz CPU & 512MB SDRAM

Beagle Bone

- Less well supported
- Onboard eMMC
- Power & Reset buttons
- More GPIO pins
- 8 analog inputs
- \$50 street price



Beaglebone Models

- White
 - Original 720 MHz A8
- Black
 - Most Popular 1GHz A8
- Green
 - Same CPU as Black
 - No barrel power, two Grove connectors

Power and Storage

Runs on 5V DC

Needs clean power

- Micro SD card storage
 - Finite life
 - Bad power kills SD

TNC-X/Pi/Black

- Designed by John Hansen W2FS
- Based on PIC Microcontroller
- MX614 Bell 202 modem chip
- KISS interface
 - Serial
 - USB
 - I2C



Why the BB/TNC-Black?

- BBB has 5 serial ports
- Mechanically stable stacked capes
- Powercape battery backup
- Lots of pins for site monitoring
- 50% more expensive



Why the rPi/TNC-Pi?

- Extremely well supported
- Complete package with screen



HOWTO

- Step by step instructions
 - Raspberry Pi

http://www.prinmath.com/ham/rPiHowto.htm

Beaglebone Black

http://www.prinmath.com/ham/bbHowto.htm

Covers configuring the OS and BPQ

Building the TNC kit

- It takes a few hours to build
 - Quality soldering iron time
 - Simple, excellent instructions
- Test it
 - Check voltages, insert ICs
 - LEDs should flash on power up
 - Configure OS and BPQ

Installing the OS

- Download OS image
- Burn the SD image
 - Linux/OSX
 - dd if=*.img of=/dev/mmcblk0 bs=8M
 - sync;sync
 - Windows Win32DiskImager
- Insert SD and boot

Configuring rPi

- Plug in keyboard, mouse and screen
 - Menu >Preferences > rPi Configuration
- Plug in ethernet cable and locate the IP address
 - Default hostname is raspberrypi
 - ssh pi@XXX.XXX.XXX.XXX
 - password raspberry

Running raspi-config

🗴 🗖 🗊 pi@raspberrypi: ~
File Edit View Search Terminal Help
willem@bashful: \$ ssh pi@192.168.11.114 pi@192.168.11.114's password:
The programs included with the Debian GNU/Linux system are free software; the exact distribution terms for each program are described in the individual files in /usr/share/doc/*/copyright.
Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent permitted by applicable law.
Last login: Sat May 7 18:09:10 2016 from 192.168.11.126 pi@raspberrypi: \$ sudo raspi-config

Expand file system

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pi@raspberrypi: ~

File Edit View Search Terminal Help

L Expand Filesystem	Ensures that all of the SD card s
2 Change User Password	Change password for the default u
3 Boot Options	Choose whether to boot into a des
1 Wait for Network at Boot	Choose whether to wait for networ
5 Internationalisation Options	Set up language and regional sett
ó Enable Camera	Enable this Pi to work with the R
7 Add to Rastrack	Add this Pi to the online Raspber
3 Overclock	Configure overclocking for your P
Advanced Options	Configure advanced settings
About raspi-config	Information about this configurat
<select></select>	<finish></finish>

Change the Password

pi@raspberrypi: ~

File Edit View Search Terminal Help

<pre>1 Expand Filesystem 2 Change User Password 3 Boot Options 4 Wait for Network at Boot 5 Internationalisation Options 6 Enable Camera 7 Add to Rastrack 8 Overclock 9 Advanced Options 0 About casei confine</pre>	Ensures that all of the SD card s Change password for the default u Choose whether to boot into a des Choose whether to wait for networ Set up language and regional sett Enable this Pi to work with the R Add this Pi to the online Raspber Configure overclocking for your P Configure advanced settings
<select></select>	<finish></finish>

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Set timezone 1

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pi@raspberrypi: ~

File Edit View Search Terminal Help

Raspberry Pi Software C 1 Expand Filesystem 2 Change User Password 3 Boot Options 4 Wait for Network at Boot	<pre>configuration Tool (raspi-config) Ensures that all of the SD card s Change password for the default u Choose whether to boot into a des Choose whether to wait for networ</pre>
5 Internationalisation Options 6 Enable Camera 7 Add to Rastrack 8 Overclock 9 Advanced Options 0 About raspi-config	Enable this Pi to work with the R Add this Pi to the online Raspber Configure overclocking for your P Configure advanced settings Information about this configurat
<select></select>	<finish></finish>

Set timezone 2

0	pi@raspberrypi: ~		×
File	Edit View Search Terminal Help		
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	I Kaspberry Pt Software Co	on cyuraccon root (raspt-conreg) r	
	I1 Change Locale	Set up language and regional sett	
	I2 Change Timezone	Set up timezone to match your loc	
	I3 Change Keyboard Layout	Set the keyboard layout to match	
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	(Calast)	-De also	
	<select></select>	<b9ck></b9ck>	

Set Hostname

pi@raspberrvpi: ~ - 🗆 🗙 File Edit View Search Terminal Help Raspberry Pi Software Configuration Tool (raspi-config) 1 Expand Filesystem Ensures that all of the SD card s 2 Change User Password Change password for the default u 3 Boot Options Choose whether to boot into a des 4 Wait for Network at Boot Choose whether to wait for networ 5 Internationalisation Options Set up language and regional sett 6 Enable Camera Enable this Pi to work with the R 7 Add to Rastrack Add this Pi to the online Raspber 8 Overclock Configure overclocking for your P 9 Advanced Options Configure advanced settings 0 About raspi-config Information about this configurat <Finish> <Select>
Set Hostname

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pi@raspberrypi: ~

File Edit View Search Terminal Help

Al Overscan		You may need to configure oversca T
A2 Hostname A3 Memory Split A4 SSH A5 Device Tree A6 SPI A7 I2C A8 Serial A9 Audio AA GL Driver	:	Set the visible name for this Pi Change the amount of memory made Enable/Disable remote command lin Enable/Disable the use of Device Enable/Disable automatic loading Enable/Disable automatic loading Enable/Disable shell and kernel m Force audio out through HDMI or 3 Enable/Disable experimental deskt ↓
	<select></select>	<back></back>

Disable serial login

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pi@raspberrypi: ~

File Edit View Search Terminal Help

Reboot and log in again

pi@raspberrypi: ~

File Edit View Search Terminal Help

Raspberry Pi Software Cor	nfiguration Tool (raspi-config)
1 Expand Filesystem 2 Change User Password 3 Boot Options 4 Wait for Network at Boot 5 Internationalisation Options 6 Enable Camera 7 Add to Rastrack 8 Overclock 9 Advanced Options	Ensures that all of the SD card s Change password for the default u Choose whether to boot into a des Choose whether to wait for networ Set up language and regional sett Enable this Pi to work with the R Add this Pi to the online Raspber Configure overclocking for your P Configure advanced settings
0 About raspi-config	Information about this configurat
<select></select>	<mark><finish></finish></mark>

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Where to run BPQ?

- Pick your user name
 - Can be run as root for another user
 - Must have privileges to write to devices
- Create a BPQ directory
 - Isolates BPQ files from other junk
 - Makes backups easier

Add user

```
🗙 🗖 🔲 pi@aid2: ~
File Edit View Search Terminal Help
pi@aid2: ($ sudo adduser willem
Adding user willem'
Adding new group `willem' (1001) ...
Adding new user `willem' (1001) with group `willem' ...
Creating home directory `/home/willem' ...
Copying files from `/etc/skel' ...
Enter new UNIX password:
Retype new UNIX password:
passwd: password updated successfully
Changing the user information for willem
Enter the new value, or press ENTER for the default
        Full Name []: Willem ACOKO
        Room Number []:
        Work Phone []:
        Home Phone []:
        Other []:
Is the information correct? [Y/n]
pi@aid2: 🥵 sudo adduser willem sudo
Adding user willem' to group `sudo' ...
Adding user willem to group sudo
Done.
pi@aid2:~ $
```

Install required packages

8
File Edit View Search Terminal Help
<pre>pi@aid2:~ sudo apt-get install vim telnet minicom libpcap0.8 Reading package lists Done</pre>
Building dependency tree
Reading state information Done
The following extra packages will be installed: lrzsz vim-runtime
Suggested packages: ctags vim-doc vim-scripts
The following NEW packages will be installed:
0 upgraded. 6 newly installed. 0 to remove and 0 not upgraded.
Need to get 6,373 kB of archives.
After this operation, 29.6 MB of additional disk space will be used.
Do you want to continue? [Y/n]

Downloading BPQ

- Do the automated download
 - wget http://www.prinmath.com/ham/getbpq
 - chmod a+x getbpq
 - ./getbpq
- getbpq downloads
 - pilinbpq (the BPQ executable for ARM)
 - HTML pages (needed by pilinbpq)
 - mkbpq (my program to create bpq32.cfg)

Download BPQ

⊗
File Edit View Search Terminal Help
willem@bashful-\$ ssh willem@192.168.11.114 willem@192.168.11.114's password:
The programs included with the Debian GNU/Linux system are free software; the exact distribution terms for each program are described in the individual files in /usr/share/doc/*/copyright.
Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law. Last login: Sat May 7 13:05:18 2016 from 192 168 11 126
willem@aid2: \$ mkdir BPQ
willem@aid2: \$ cd BPQ
willem@aid2:~/BPO_3 willem@aidz:~/BPO_\$_wget -g_http://www.prinmath.com/ham/getbpg
wille@@aid2:~/BPQ \$ chmod a+x getbpq
willem@aid2:~/BPQ \$./getbpq
willem@aid2:~/BPQ \$ willem@aid2:~/BPO \$./mkbpg

Configure BPQ

🛪 🗖 🔲 willem@aid2: ~/BPQ

File Edit View Search Terminal Help

willem@aid2:~/BPO 🏹 /mkbpg 🔵 Enter Node Callsign (e.g. KONTS [no -1 or -10]): NOSZ Enter Owner Acronym (1-4 letters, e.g. CTN, used in prompts): AID2 Enter Owner Name (e.g. Colorado Traffic Net, used in prompts): Aid Station 2 Enter Grid Square (e.g. DM79gr): DM79ht Enter Frequency in kHz (e.g. 145050): 145030 Enter Sysop Callsign (e.g. ACOKQ): [Default NOSZ] KD0ZYF Enter Sysop Username (e.g. willem): chris Enter Sysop Password (e.g. XyZ123): XYZ123 Enter Winlink Username (callsign of authorized station, - for no winlink): [Default NOSZ] NOSZ Enter Winlink Password: secret bpq32.cfg written bterm written ../.minirc.dfl written minicombpg written bpg.service written willem@aid2:~/BPQ \$

Start BPQ

🛚 🗖 🔲 willem@aid2: ~/BPO File Edit View Search Terminal Help willem@aid2.~/BPO \$ sudo mv bterm /usr/local/bin/ willerGaid2:~/BPO \$ sudo mv bpg.service /lib/systemd/system/ willem@atd:::/BPO \$ sudo systemctl enable bpg.service Created symlink from /etc/systemd/system/multi-user.target.wants/bpg.service to /lib/system d/system/bpg.service. willem@aid2: / 5 sudo systemctl start bpg.service willem@aid2: Sudo systemctl status bpg.service bpg.service - BPO Loaded: loaded (/lib/systemd/system/bpg.service; enabled) Active: active (running) since Sat 2016-05-07 13:49:51 MDT; 9s ago Main PID: 1175 (pilinbpg) CGroup: /system.slice/bpq.service -1175 /home/willem/BPO/pilinbpg May 07 13:49:51 aid2 systemd[1]: Started BPQ. May 07 13:49:51 aid2 LINBPO[1175]: G8BPO AX25 Packet Switch System Version 6.0.12.35 ...016 May 07 13:49:51 aid2 LINBPO[1175]: PORTS 1c7734 LINKS 1c9fe4 DESTS 1ccee4 ROUTES 1d34...388 May 07 13:49:51 aid2 LINBPQ[1175]: UIUtil Config File not found May 07 13:49:51 aid2 LINBP0[1175]: FirstChan 0 May 07 13:49:51 aid2 LINBPO[1175]: LinBPO Port /dev/ttyAMA0 fd 4 May 07 13:49:51 aid2 LINBPO[1175]: Resolving update.g8bpg.net May 07 13:49:51 aid2 LINBPO[1175]: Maint Clock 1462665600 NOW 1462650591 Time to Hous...009 May 07 13:49:51 aid2 LINBPO[1175]: Resolving chatmap.g8bpq.net Hint: Some lines were ellipsized, use -l to show in full. willem@aid2:~/BPO \$

mkbpq Configuration

- RF, Telnet and AXIP ports
- Sets good default parameters
- Sets default IP ports
 - Web: rPi 8080, BBB 8008
 - Telnet 8010
- Enables BBS and optionally WinLink

Default BPQ Configuration



Connect to BPQ web interface

NOSZ's BPQ32 Web Server - Mozilla Firefox					
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C 192.168.11.114:8080/1.ode/NodeIndex.ntml	I C Q	Searcn	₩ 🗉 🔍	• îî	9 • • =
BPO	32 Nod	e NOS	Z		
			0		
Routes Nodes Ports Links Users Stats Terminal	<u>Driver</u> Windows	<u>Stream</u> <u>Status</u>	(<u>Mail Server</u> <u>Pages</u>	<u>SYSOP</u> <u>Signin</u>	<u>Edit</u> Config
		Sec. 12			

Authenticate to BPQ

BPQ32 Mail Server Access - Mozilla BPQ32 Mail Server A ×	Firefox			
(192.168.11.114:8080/Mail/Header	C Search	☆ 🖻	🗢 🕇 n	e 🥶 🖷 🚍
	BPQ32 Mail Server N0SZ Acces	55		
Please ente	er Callsign and Password to acc	ess the B	BS	
(User chris			
	Submit Cancel			



Be Main Configuration	ion - Mozilla Firefox		
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Status Configurat	tion Users Messages Forwarding Welc	ome Msgs & Prompts Housekeeping W	VP Update Node Menu
	Main Co	nfiguration	
	BBS Params		
	BBS Call NOSZ	SYSOP Call NOSZ	
	H Route	Redirect msgs to BBS Call to SYSOP Call	
	BBS APPL No 0 Streams 0		
	Send System Msgs to SYSOP Call		
	Enable FBB UI System		
	Send Mail For Beacons every 0	Minutes Config UI Ports and Digis	
	Don't Hold Messages From New Users		
	Don't Request Home BBS		
	Allow users to kill T messages		
	Forward Messages to BBS Call		
	POP3 Port 0 SMTP Port 0	NTPPort 0 Enable Remote	e Access
	AMPR Address	Send AMPR Mail to AMPR host	

😣 🗐 🗊 Main Configurati	on - Mozilla Firefox					
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♦ ♦ 🛈 192.168.11.114	:8080/Mail/Conf?M000038EC5070	C Q Search	☆ 自 ♥ 🤻		😕 😐	
Status Configura	BPQ32	BBS NOSZ	ceeping WP Upda	ate No	<u>de Menu</u>	
	Main Cor	nfiguration				
	BBS Params					
	BBS Call NOSZ	SYSOP Call KDOZYF				
	H Route	Redirect msgs to BBS Call to	SYSOP Call			
	BBS APPL No 1 Streams 32					
	 Send System Msgs to SYSOP Call Refuse Bulls Enable FBB UI System Send Mail For Beacons every 30 Don't Hold Messages From New Users Don't Request Name Don't Request Home BBS Allow users to kill T messages Forward Messages to BBS Call 	Minute Config UI Ports and Dig	is			
	POP3 Port 0 SMTP Port 0 AMPR Address	NTPPort 0 Er	nable Remote Access			

 ← → ③ 192.168.11.1 	14:8080/Mail/Conf?M	000038EC	5070		C Q Sea	arch		1	☆ 自		÷	⋒	ø	ABP 🔻	≡
	POP3 Port 0		SMTP Port	0	NTPPort	0		Enab	le Remo	te Acce	ess				
	AMPR Address	240.00			Send .	AMPR M	ail to AM	PR host							
	ISP Params														
	Enable ISP Int	terface													
	My Domain														
	SMTP Server				Port	t	0								
	POP3 Server				Port	t (0								
	ISP Account Name				Pass	sword									
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	POP3 Poll Interva	10		SMTP Serv	ver Requires	Authe	ntication								
	WP Params														
	Send WPUpdates	s 🔘 ı	Reject WF	Bulls	Туре в О Ту	ype P	D								
	WP Destinations														
		-3.2 2		Save	Cancel										
	Message Filters			1											
	Reject From Reje	ct To	Reject At	Hold From	Hold To	Hol	d At								
											2	_			

Be Main Configuration - Mozill	a Firefox			
(i 192.168.11.114:8080/Mail/Cor	fig?M000038EC5070	C Q Search	☆ 自 💟 🦊 🏫 😕 🐵 🗸	≡
	BPQ32	BBS NOSZ		
Status Configuration User	s Messages Forwarding Welc	ome Msgs & Prompts Housek	ceeping)WP Update Node Menu	
	Main Co	onfiguration		
BBS Para	ims			
BBS Call	NOSZ	SYSOP Call KDOZYF		
H Route		Redirect msgs to BBS Call to	SYSOP Call	
BBS APPL	No 1 Streams 32			
Send S	System Msgs to SYSOP Call			
🗌 Refuse	Bulls			
Enable	e FBB UI System			
Send M	ail For Beacons every 30	Minutes Config UI Ports and Dig	is	
Don't	Hold Messages From New Users			
Don't	Request Name Request Home RPS			
Allow	users to kill T messages		A CONTRACT OF	
Sorwar	rd Messages to BBS Call			
POP3 Port	0 SMTP Port 0	NTPPort 0	mable Remote Access	
AMPR Addr	ess [Send AMPR Mail to AMPR ho	ost	

 Housekeeping - Mozilla Firefox Housekeeping × + 	2255522			d D such			
tatus Configuration User	s Messages	Forwarding	<u>Welcome M</u> Prompts	Isgs &	Housekee	ping WP Update	Node Menu
			Housekeepin	g			
Parameters	5	Per	sonals	Life	times	NT	5
Maintenance Time (UTC) Max Message Number BID Lifetime (Days) Log File Lifetime (days) Delete Inactive Users (days) Delete Messages and log to recycle bin Send Non-delivery Notif for P and T messages Supress Mailing of Housekeeping Result Run Housekeep	0 60000 60 7 0 s ications	Read Unread Forwarded Unforwarde The followi Bulletin or To apply to Specify Cal From Apply Over	30 30 30 30 d 30 ng boxes all igins and de unsent, che l, Lifetime. T rides to uns	Forwarded Unforwarded Ow you to spect stinations. No ck box below. eg ALL, 10 o	30 30 ify different rmally these	Delivered Forwarded Unforwarded	30 30 30 ifferent Messages.
			Save Car	ncel			

Housekeeping - Mozilla Firefox Housekeeping × +	5070		Ct Q Sourch			
Status Configuration Users M	lessages Forwarding	Welcome Ms Prompts	gs &	Housekeep	ing WP Update	Node Menu
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Parameters	Pers	sonals	Lifet	imes	NT	<u> </u>
Maintenance Time (UTC)100Max Message Number600BID Lifetime (Days)365Log File Lifetime (days)365Delete Inactive Users (days)0Delete Messages and logs to recycle bin0Send Non-delivery Notificat: for P and T messagesImage: Comparison of Housekeeping ResultSupress Mailing of Housekeeping ResultImage: Comparison of Main of Run Housekeeping	200 200 200 5 5 5 5 5 5 5 5 5 7 7 8 8 9 10 10 10 10 10 10 10 10 10 10	30 999999 30 999999 30 999999 ng boxes allow igins and dest unsent, check 1, Lifetime To To	you to speci- inations. Norr box below. .eg ALL, 10	30 99999 fy different mally these a	Delivered Forwarded Unforwarded values for di pply to Sent	30 30 99999 ifferent Messages.
		Save Cance	<u>د</u>			

 NOSZ'S BBS Web Server - Mozilla Firefox NOSZ'S BBS Web Ser × 			
() 192.168.11.114:8080/Mail/Wel?M000038EC5070	C Search	☆自 ♥	7 🖡 🏠 🧐 🖷 - 🚍
	BPQ32 BBS N0SZ		
Status Configuration Users Messages Forw	arding Welcome Msgs & Prompts	Housekeeping WP Upda	ate Node Menu
Hello \$I. Latest Message is	Normal User Welcome \$\$L, Last listed is \$Z		
	New User Welcome		
Hello \$I. Latest Message is	\$L, Last listed is \$Z		
	Expert User Welcome		
	Normal User Prompt		
de NUSZ>			
	New User Prompt		
de NOSZ>			
	Expert User Prompt		
de NOSZ>			
	Signoff		
\$U:Callsign of the user \$I:Fir \$L:Number of the latest message	st name of the user \$X:Messages for \$N:Number of active messages. \$Z:L	user \$x:Unread message ast message read by use	es er

Restart BPQ to enable BBS

🛛 🖨 🔲 willem@aid2: ~/BPQ

File Edit View Search Terminal Help

```
willem@aid2:~/DF0 5 sudo systemctl restart bpg.service
willem@aid2: Sudo systemctl status bpg.service
bpg.service - BPO
   Loaded: loaded (/lib/systemd/system/bpg.service; enabled)
  Active: active (running) since Sat 2016-05-07 14:49:52 MDT; 6s ago
Main PID: 1302 (pilinbpg)
   CGroup: /system.slice/bpg.service
           -1302 /home/willem/BPQ/pilinbpq
May 07 14:49:52 aid2 systemd[1]: Started BPO.
May 07 14:49:52 aid2 LINBPO[1302]: G8BPO AX25 Packet Switch System Version 6.0.12.35 ...016
May 07 14:49:52 aid2 LINBPO[1302]: PORTS 1c7734 LINKS 1c9fe4 DESTS 1ccee4 ROUTES 1d34...388
May 07 14:49:52 aid2 LINBPO[1302]: UIUtil Config File not found
May 07 14:49:52 aid2 LINBP0[1302]: FirstChan 0
May 07 14:49:52 aid2 LINBPO[1302]: LinBPO Port /dev/ttyAMA0 fd 4
May 07 14:49:52 aid2 LINBPO[1302]: Resolving update.g8bpg.net
May 07 14:49:52 aid2 LINBPO[1302]: Maint Clock 1462701600 NOW 1462654192 Time to Hous...408
May 07 14:49:52 aid2 LINBPO[1302]: Resolving chatmap.g8bpg.net
Hint: Some lines were ellipsized, use -l to show in full.
willem@aid2:~/BPO $
```

Connect out via RF

🗴 🕒 🗉 willem@bashful: ~
File Edit View Search Terminal Help
willem@bashful: \$ telnet 192.168.11.114 8010 Trying 192.168.11.114 Connected to 192.168.11.114. Escape character is '^]'. user:chris password:
AID2 BPQ32 Telnet Server Enter ? for list of commands
c 1 KONTS-1 NOSZ} Connected to KONTS-1 [BPQ-6.0.12.35-IHJM\$] Hello KDOZYF. Latest Message is 2506, Last listed is 2506 CTN BBS> b
73 de CTN BBS *** Disconnected from Stream 1
Connection closed by foreign host. willem@bashful:~\$ 🗌

Connect in via RF (as AC0KQ)

🛚 🕒 🔲 🖉 willem@bashful: ~

File Edit View Search Terminal Help

cmd c N0SZ cmd:*** CONNECTED to NOSZ Welcome to the Aid Station 2 BPO32 Node. N0SZ> BBS CONNECT BYE INFO NODES ROUTES PORTS USERS MHEARD info NOSZ} This is the BPO32 Node for the Aid Station 2. Sysop KD0ZYF. Traffic left on this node will be forwarded using the National Traffic System. Type BBS to connect to the BBS. ports NOSZ} Ports 1 145.030 MHz 1200 bps 2 Telnet Server 3_AX/IP/UDP bbs NOSZ} Connected to BBS [BPO-6.0.12.35-IHJM\$] Hello ACOKQ. Latest Message is 2, Last listed is 2 de NOSZ> Ь *** DISCONNECTED cmd:

Connect via RF to WinLink

🗴 🗖 🔲 willem@bashful: ~

```
File Edit View Search Terminal Help
cmd:c N0SZ-10
cmd:*** CONNECTED to NOSZ-10
Trying brentwood.winlink.org
*** AC0K0 Connected to CMS
[WL2K-3.2-B2FWIHJM$]
:PO: 72781840
Brentwood CMS via NOSZ >
lm
Login [246]:
Brentwood CMS via NOSZ >
CR 067MRW
Hello ACOKO
Brentwood CMS via NOSZ >
lm
2884 KOTER 2016/05/07 01:27 676 KOTER@Winlink.org OTC 2
3KYUXDSAP727 2016/05/02 15:51 889 K6HTN@Winlink.org Re: OTC 1 K6HTN
2882_K0TER 2016/05/04 16:40 1180 K0TER@Winlink.org OTC 4
6A09D0G3C59D 2016/05/04 18:30 1295 WA30LW@Winlink.org OTC 8
2883_KOTER 2016/05/05 18:35 2281 KOTER@Winlink.org QTC 7
2868 KOTER 2016/05/03 17:26 2803 KOTER@Winlink.org OTC 9
2886_KOTER 2016/05/07 21:52 3103 KOTER@Winlink.org QTC 10
Brentwood CMS via NOSZ >
b
Disconnecting...
*** DISCONNECTED
cmd:
```

BBS Messages

See Edit Messages - Chromium					±
🔇 🔪 🥑 🗋 ctnpi:8080/Mail/Msgs?M00	00039592D06				☆ 〓
	BPQ	32 BBS KONTS			
Status Configuration User	s Messages Forwarding V	Velcome Msgs & Prompt	ts Housekeeping W	P Update Node M	lenu
Filter From To Via 2504 2503 2498 2497 2494 2497 2494 2493 2492 2491 2486 2485 2485 2483 2482	From ACOKQ To KOTER BID 2555 KONTS VIA Title QTC1PH EditText Save Gr KONTS	Message 2555 Sent 08-May Received 08-May Last Changed 08-May HLA PA 215 276 08-May Save Message Save At een = Sent, Yellow = 08-May	y 21:40Z Type y 21:40Z Status y 21:41Z Size 21	P T F T 10	

General BBS Users

Beit Users - Chromium		±
< 📎 🥑 🗋 ctnpi:8080/Mail/Users?M0000	039592D06	¶☆ =
Status Configuration Users	BPQ32 BBS K0NTS Messages Forwarding Welcome Msgs & Prompts Housekeeping WP Update	Node Menu
KB5YZB KC0JPO KC0NP KC0WDN KC4YLV KD0CIM KD0CRX KD0DPX KD0FDS KD0GBX KD0KVJ KD0RML KD0RNF KD0RNF KD0RNF KD0RNF KD0RNF KD0RNF KD0RNF KD0RNF KD0RNF KD0SQA KD0SQA KD0SQA KD0SQA KD0WHB KD0WZK KD0WZK KD0WZK	Update User KD0ZYF BBS Permit Email PMS RMS Express User SYSOP Poll RMS Expert For SSID's Excluded Hold Messages Include SYSOP msgs in LM Don't add @winlink.org Allow Sending Bulls NTS MPS Connects In 6 Msgs in 0 Rejects In 0 Connects Out 0 Msgs Out 0 Rejects Out 0 Bytes In 0 Last Connect 08-May 20:12Z Bytes Out 0 Last Listed 2507 Name KD0ZYF Password CMS Pass QTH ZIP Home BBS Update	

WinLink User Download

Se Edit Users - Chromium		_
🔇 🔪 🥑 🗋 ctnpi:8080/Mail/Users?M0000	39592D06	¶☆ ≡
Status Configuration Users	BPQ32 BBS K0NTS Messages Forwarding Welcome Msgs & Prompts Housekeeping WP Update Node Menu	
AAOQC ACOKQ ACOTG ACOVC AC9D ADORX A18Z KOKAI KOLAI KOLAI KOMEL KONTS KOSCH KOXK KOSCH KOXK K6DHN K6XCQ KAOBSA KB0BSA KB0BSA KB1SGJ KB5YZB KCOJPO KCONP KCOWDN KCOWDN	Update User ACOKQ BBS Permit Email PMS RMS Express User SYSOP Poll RMS Expert For SSID's . Excluded Hold Messages Include SYSOP msgs in LM Don't add @winlink.org Allow Sending Bulls NTS MPS Connects In 9 Msgs in 42 Rejects In 0 Connects Out 0 Msgs Out 1 Rejects Out 0 Bytes In 10416 Last Connect 08-May 21:392 Bytes Out 533 Last Listed 2514 Name Willem Password CMS Pass ***** OTH ZIP Home BBS Update Delete Add	

Add User RMS

😣 🖻 🗉 Edit Users - Chromium		
[₽] ₀ Edit Users ×		
< 🔪 🤁 🗋 192.168.11.114:8080/Mail/Us	sers?M00003959E6E8	요☆ 〓
Status Configuration Users	BPQ32 BBS N0SZ Messages Forwarding Welcome Msgs & Prompts Housekeeping WP Update Node Menu	
ACOKQ KBSYZB KDOZYF NOSZ	Update User N0SZ BBS Permit Email PMS RMS Express User SYSOP Poll RMS Expert For SSID's Excluded Hold Messages Include SYSOP msgs in LM Don't add @winlink.org Allow Sending Bulls NTS MPS Connects In 0 Msgs in 0 Rejects In 0 Bytes In 0 Last Connect 01-Jan 00:00Z Bytes Out 0 Last Listed 0 Name CMS Pass ZIP Home BBS Update Delets Add RMS	

Make RMS a BBS

Belit Users - Chromium		
🔇 🔪 🥑 🗋 192.168.11.114:8080/Mail/U	Jsers?M00003959E6E8	Q☆ =
Status Configuration User	BPQ32 BBS N0SZ	
ACOKQ KB5YZB KDOZYF NOSZ RMS	Update User RMS PBS Permit Email PMS RMS Express User SYSOP Poll RMS Expert For SSID's Excluded Hold Messages Include SYSOP msgs in LM Don't add @winlink.org Allow Sending Bulls NTS MPS Connects In 0 Msgs in 0 Rejects In 0 Connects Out 0 Msgs Out 0 Rejects Out 0 Bytes In 0 Last Connect 01-Jan 00:00Z Bytes Out 0 Last Listed 0 Name Password CMS Pass QTH Update Delete Update Delete Add	

Set Forwarding 1

See Edit Forwarding - Chromium		±
< 📎 🧲 🗋 192.168.11.114:8080/Mail/FWD?M0	0003959E6E8	ର୍∽ୁ ≣
Status Configuration Users Message	BPQ32 BBS N0SZ	
Max size to Send NOSZ 99999 RMS	Forwarding Config for RMS - 0 Messages Queued	
Max Size to Receive 99999 Max age for Bulls 365 Warn if no route for P or T Use Local Time Aliases	TO AT TIMES Connect Script Hierarchical Routes (Flood Bulls) HR (Personals and Directed Bulls) BBS HA BBS HA	
Update	Request Reverse Interval O (Secs) Send new messages without waiting for poll timer FBB Max Block O Send Personal Mail Only O Allow Binary Use B1 Protocol Use B2 Protocol Send ctrl/Z instead of /ex in text mode forwarding O Update Start Forwarding	

-

Set Forwarding 2



Forwarding BBS

Y C □ 192.168.11.114.8080/Mail/0sets:M00000399D835D
BPQ32 BBS N0SZ Status Configuration Users Messages Forwarding Welcome Msgs & Prompts Housekeeping WP Update Node Menu
ACOKO KBISCZB KD0ZYF NOSZ RMS Update User KBISGJ Image: Strategy of the strate

Forwarded Users



RF > NOSZ & AXIP > KONTS-1

🙁 😑 🗉 🛛 willem@bashful: ~

File Edit View Search Terminal Help

cmd:c N0SZ cmd:*** CONNECTED to NOSZ Welcome to the Aid Station 2 BP032 Node. NOSZ> BBS CONNECT BYE INFO NODES ROUTES PORTS USERS MHEARD ports NOSZ} Ports 1 145.030 MHz 1200 bps 2 Telnet Server 3 AX/IP/UDP c 3 KONTS-1 NOSZ} Connected to KONTS-1 [BPO-6.0.12.35-IHJM\$] CTN BBS> ι No New Messages CTN BBS> Ь 73 de CTN BBS *** DISCONNECTED cmd: cmd: cmd: cmd:
How did that happen?

N0SZ's BI	2's BPQ3 PQ32 We	32 Web Se eb ×	rver - M	4ozilla F	irefox								
D 192.1	58.11.11	4 :8080/No	de/Rou	tes.html		C	Q Sear	ch	5	2 自 🛡	4 🏠	ø	ABP -
				B	PQ3	2 N	ode	NO	SZ				
utes N	odes	Ports]	Links	Users	Stats	<u>Ferminal</u>	Driver Windo	ws Sta	eam tus	<u>Mail</u> <u>Server</u> <u>Pages</u>	SYS Sign	OP in	<u>Edit</u> Con
						Roi	ites						
Port	Call	Quality	Node	Count F	rame Cour	t Retries	Percent	Maxframe	Frack	Last Heard	Queued	Rem Q	ual

D 192.168.11.114 :8080/Node/EditCfg.html	C Search 🔂 🖻 🛡 🕇 🎓 😕
; AID2 RMS Gateway Config File	
SIMPLE NODECALL <mark>INOSZ</mark> LOCATOR <mark>IDM79ht</mark> LINMAIL	; This set a whole load of <u>paramters</u> to reasonable defaults ; Default node <u>callsign</u> ; <u>Defailt</u> node location ; Enable BBS
IDINTERVAL=10 IDMSG: Aid Station 2 BBS & RMS. Connect ***	; UI broadcast interval (minutes) ; UI broadcast text o NOSZ-1 & NOSZ-10
CTEXT: Welcome to the Aid Station 2 BPQ32 N0SZ> BBS RMS CONNECT BYE INFO NOD ***	; Connect Message Node. S ROUTES PORTS USERS MHEARD
BTINTERVAL=10 BTEXT: Aid Station 2 BBS & RMS. Connect ***	; Beacon interval (minutes) ; Beacon text o NOSZ-1 & NOSZ-10
INFOMSG:	; Text for INFO command

Save concer	Save	Cancel
-------------	------	--------

i) 192.168.11.114 :8080/Node/EditCfg.html	C Search 🗘 🖻 🛡 🕹 🎓 🤒
TNCPORT COMPORT=/home/willem/BPQ/com10 TYPE=TNC2 APPLNUM=32 APPLFLAGS=6 ENDPORT	; Host Port ; Serial connection (created by <u>BPQ</u>) ; TNC2,KANT, <u>SCS,DED</u> ; Last Application ; Display Connected Message
PORT ID=145.030 MHz 1200 bps TYPE=ASYNC PROTOCOL=KISS KISSOPTIONS=PITNC,NOPARAMS COMPORT=/dev/ttyAMA0 SPEED=19200 CHANNEL=A	; PORTS command text ; RS232 connection ; KISS protocol ; KISS options for <u>TNC</u> ; Serial port ; Serial port speed ; <u>TNC</u> channel
MAXFRAME=2 FRACK=7000 RESPTIME=1000 RETRIES=10 PACLEN=128 TXDELAY=500 SLOTTIME=100 PERSIST=64	<pre>; Max outstanding frames ; Level 2 timeout (ms) ; Level 2 delayed ACK (ms) ; Level 2 max retries ; Max packet length (bytes) ; Transmit keyup delay (ms) ; CMSA interval timer (ms) ; Persistence (256/(# transmissions-1)</pre>

① 192.168.11.114:8080/Node/EditCfg.html	C 🔍 Search 🔂 🖻 🔍 🕹 🏠 🧐
WL2KREPORT PUBLIC,server.winlink	.org,8085,N0SZ-10,DM79ht,00-23,145030000,PKT1200,50,25,9,0
ENDPORT	
PORT	
TD=Telnet Server	· PORTS command text
DRIVER=TELNET	: TCP/IP connection
CONFIG	: Driver specific configuration from here to ENDPORT
LOGGING=1	: Log all connections
DisconnectOnClose=1	; Disconnect on close
TCPPORT=8010	; Port for telnet connections
FBBPORT=8011	; Port for FBB protocol BBS connections
HTTPPORT=8080	; Port for web interface
LOGINPROMPT=user:	; Telnet login prompt
PASSWORDPROMPT=password:	; Telnet password prompt
LOCALECHO=NO	; Do not echo input
MAXSESSIONS=10	; Maxmimum simultaneous connections
CTEXT=AID2 BPQ32 Telnet Server\ <u>n</u>	<u>Enter</u> ? for list of commands\n\n ; Telnet connect message
USER= <u>chris</u> ,XYZ123,KD0ZYF,, <u>SYSOP</u>	; Telnet user
CMS=1	; Enable <u>WinLink CMS</u> connection
CMSCALL=N0SZ	; <u>Callsign</u> for <u>WinLink</u>
CMSPASS=secret	; Password for <u>WinLink</u>
ENDPORT	
PORT	
ID=AX/IP/UDP	: Displayed by PORTS command
	,,

CMSPASS=secret	; Password for <u>WinLink</u>
ENDPORT	
PORT	
ID=AX/IP/UDP	; Displayed by PORTS command
DRIVER=BPQAXIP	; Uses <u>BPQAXIP</u>
QUALITY=220	; Quality factor applied to node broadcasts heard on
MINQUAL=165	; Entries in the nodes table with qualities greater or
MAXERAME=5	; Max outstanding frames (1 thru /)
RESPTIME=1000	; Level 2 delayed ack timer in milliseconds
RETRIES=5	: Level 2 maximum retry value
PACLEN=236	; Maximum packet length
CONFIG	; Driver specific configuration from here to ENDPORT
MHEARD	; Keep heard stats
UDP 10093	; UDP port
AUTOADDMAP	; Automatically add new connections
MAP KONTS argon schreuder us	; BIDD 10003 R · AXTP to KONTS
MAP N4ATA n4ata dyndns org	UDP 10093 B : AXTP to N4ATA
ENDPORT	

Adding an AXIP station

i) 192.168.11.114 :8080/Node/EditCfg.html	C Q. Search ☆ 自 ♥ ♣ ♥	ABP 🔻
🗏 Dilbert 📓APOD 💷 GN 🕅 XKCD 🛞 N	TP ⊠WL2K 🚾CTN 📄DOQ ▼ 📄Temps ▼ 🍈 moodle 📄 Network ▼ 📄 BBB ▼	
ENDPORT	,	
PORT		
ID=AX/IP/UDP	; Displayed by PORTS command	
DRIVER=BPOAXIP	; Uses BPOAXIP	
QUALITY=220	; Quality factor applied to node broadcasts heard on	
MINQUAL=165	; Entries in the nodes table with qualities greater or	
MAXFRAME=5	; Max outstanding frames (1 thru 7)	
FRACK=3000	; Level 2 timeout in milliseconds	
RESPTIME=1000	; Level 2 delayed <u>ack</u> timer in milliseconds	
	; Level 2 maximum retry value	
CONFIG	· Driver specific configuration from here to ENDPORT	
MHEARD	: Keep heard stats	
UDP 10093	; UDP port	
AUTOADDMAP	; Automatically add new connections	
BROADCAST NODES	; Broadcast	
MAP KONTS argon. <u>schreuder</u> .us <u>U</u>	DP 10093 B ; AXIP to KONTS	
MAP N4ATA n4ata.dvndns.org U	DP 10093 B : AXIP to N4ATA	
MAP KD0DPX 192.168.11.88	DP 10093 B ; AXIP to KD0DPX	
NDPORT		
ADDI TOATTON 1 DDC NOCZ 1 ATDODDC	255 · DDC Application	
APPLICATION 1, BBS, NUSZ-1, AID2BBS	,255 ; BBS Application	
AFFLICATION 2, MIS, C 2 CHS, NOS2-10	, AIDZNHS, 255 , CH5 Application	0

AXIP Forwarding

- AXIP encapsulates AX25 packets and forwards them via IP
 - UDP is a good match for packet
- Allows RF-IP-RF transport
 - Integrates packet and high speed networks
 - BPQ nodes on the RMHAM microwave backbone connected at megabit speeds

Adding more Telnet Logins

i) 192.168.11.114 :8080/Node/EditCfg.html	C Search 🔂 🖻 🛡 🖡 🎓 😕
PORT	
ID=Telnet Server DRIVER=TELNET CONFIG LOGGING=1 DisconnectOnClose=1 TCPPORT=8010 FBBPORT=8011 HTTPPORT=8080 LOGINPROMPT=user: PASSWORDPROMPT=password:	<pre>; PORTS command text ; TCP/IP connection ; Driver specific configuration from here to ENDPORT ; Log all connections ; Disconnect on close ; Port for telnet connections ; Port for FBB protocol BBS connections ; Port for web interface ; Telnet login prompt ; Telnet password prompt</pre>
LOCALECHO=NO MAXSESSIONS=10 CTEXT=AID2 BPQ32 Telnet Server\ USER=chris,XYZ123,KD0ZYF,,SYSOP USER=willem,ABC123,AC0KQ USER=john,ABC789,W0VG CMS=1 CMSCALL=N0SZ CMSPASS=secret ENDPORT	<pre>; Do not echo input ; Maxmimum simultaneous connections nEnter ? for list of commands\n\n ; Telnet connect message ; Telnet user ; Telnet user ; Telnet user ; Enable WinLink CMS connection ; Callsign for WinLink ; Password for WinLink</pre>

Adding more RF ports

- BPQ can connect up to 32 ports
 - VHF Packet
 - UHF Packet
 - HF Pactor
 - APRS Packet
- BPQ switches connections
 - Port to port
 - Port to applications

Adding ports

- Beaglebone has 5 serial ports
 - Stack 4 TNC-Blacks
 - Attach external devices via headers
- Raspberry Pi has 1 serial port
 - Access TNC-Pi via I2C bus
 - Requires reprogramming of TNC-Pi

Reprogramming TNC

- Disable BPQ to have exclusive access to the TNC device
 - systemctl disable bpq.service
 - systemctl stop bpq.service
- Turn off power between steps
- Enable BPQ when done
 - systemctl enable bpq.service
 - systemctl start bpq.service

Enable I2C kernel modules

⊗ 🗖 🔲 willem@aid2: ~

File Edit View Search Terminal Help

Raspberry Pi Software Configuration Tool (raspi-config)

A1 Overscan	You may need to configure oversca 1
A2 Hostname	Set the visible name for this Pi
A3 Memory Split	Change the amount of memory made
A4 SSH	Enable/Disable remote command lin
A5 Device Tree	Enable/Disable the use of Device
A6 SPI	Enable/Disable automatic loading
A7 I2C	Enable/Disable automatic loading
A8 Serial	Enable/Disable shell and kernel m
A9 Audio	Force audio out through HDMI or 3
AA GL Driver	Enable/Disable experimental deskt ↓

<Select>

<Back>

Check current parameters

🛿 🖨 🔲 willem@aid2: ~/BPQ	
File Edit View Search Terminal Help	
<pre>willem@aid2:~/BPQ sudo ./pitnc_</pre>	getparams 0 0
Using Serial port /dev/ttyAMA0	
PIC Software Version	1
01 TXDelay - Zero means use ADC	40
02 Persistance	64
03 Slottime (in 10 mS)	10
04 TXTail	0
05 Full Duplex - Not used	0
06 Our Channel (Hex)	00
07 I2C Address (0 = async) Hex	00
ADC Value	69
8 1 28 40 a 0 0 0 0 <u>4</u> 5 2e c0 sum	0
willem@aid2:~/BPQ \$	

Set I2C address to 16 (0x10)

🕲 🖨 🔲 willem@aid2: ~/BPQ	
File Edit View Search Terminal Help	
willem@aid2:~/ 😳 \$ sudo ./pitnc	_setparams 0 0 7 16
PIC Software Version	1
01 TXDelay - Zero means use ADC	40
02 Persistance	64
03 Slottime (in 10 mS)	10
04 TXTail	0
05 Full Duplex - Not used	0
06 Our Channel (Hex)	00
07 I2C Address (0 = async) Hex	10
ADC Value	69
8 1 28 40 a 0 0 0 10_45 3e c0 su	m 0
willem@aid2:~/BPQ \$	

Power off&on and check

Ed Lem 0	it \ <mark>@ai</mark> 1	/iew d2: 2	Sea ~ \$ 3	arch suc 4	Ter do i	min 12co	al H dete	Help	N						
lem 0	@ai 1	d2: 2	~\$ 3	suo 4	do i	i2co	dete	ect							
0	1	2	3	- 4	5	_			-у	1					
				-	2	6	- 7	8	9	а	ь	С	d	e	f
10															
lem	@ai	d2:	~ \$												
	10 Lem	10 lem@ai	10	10	10	10	10	10	10	10	10	10	10	10	10

Check parameters

🛛 🖨 🔲 willem@aid2: ~	
File Edit View Search Terminal Help	
willem@aid2:~ sudo ./pitnc_getp	barams 1 16
PIC Software Version	1
01 TXDelay - Zero means use ADC	40
02 Persistance	64
03 Slottime (in 10 mS)	10
04 TXTail	0
05 Full Duplex - Not used	0
06 Our Channel (Hex)	00
07 I2C Address (0 = async) Hex	10
ADC Value	69
8 1 28 40 a 0 0 0 10 45 3e c0 sur	n 0
willem@aid2:~ \$	

Update BPQ configuration

2K CTN DOQ T Temps Temps Moodle Network EBBB C2,KANT,SCS,DED st Application splay Connected Message
C2,KANT, <u>SCS,DED</u> st Application splay Connected Message
st Application splay Connected Message
splay Connected Message
RTS command text
232 connection
C connection
SS protocol
SS options for TNC
rial port
rial port speed
C bus 1
C device 16 (10 hex)
<u>Ç</u> channel
x outstanding frames
vel 2 timeout (ms)
vel 2 delayed ACK (ms)
vel 2 max retries
x packet length (bytes)
ansmit <u>keyup</u> delay (ms)
SA interval timer (ms)

Adding a Second RF Port

- Must use I2C since rPi has only one serial port
- Convert first TNC to I2C before mounting second TNC
- Test it to make sure it works
- Add second TNC
- Power down between steps

Set I2C addres for 2nd TNC

🕲 🖨 🔳 willem@aid2: ~	
File Edit View Search Terminal Help	
<pre>willem@aid2: sudo ./pitnc_set</pre>	params 0 0 7 17
PIC Software Version	1
01 TXDelay - Zero means use ADC	40
02 Persistance	64
03 Slottime (in 10 mS)	10
04 TXTail	0
05 Full Duplex - Not used	0
06 Our Channel (Hex)	00
07 I2C Address (0 = async) Hex	11
ADC Value	62
8 1 28 40 a 0 0 0 11 3e 44 c0 su	m 0
willem@aid2:~ \$	

Reboot and check

8	•) v	ville	m@a	aid 2	: ~/E	BPQ							_					 	
File	Ec	lit V	/iew	Sea	irch	Ter	min	al H	Help											
wil	lem	@ai	d2:	~/BF	PQ	SI	obu	i20	cde	tec	t -	y 1	>			-				
	O	1	2	3	4	5	6	~	8	9	а	Ь	с	d	e	f				
10:	10	11	1																	
20:																				
30:																				
40:																				
50:																				
70:																				
wil	lem	@ai	d2:	~/BF	PQ :	\$														

Copy PORT and update

' ⊠WL2K 🖉CTN 📄DOQ ▼ 📄 Temps ▼ 🍈 moodle 📄 Network ▼ 📄 BBB ▼							
; Allow Digipeat on this port							
nk.org,8085,N0SZ-10,DM79ht,00-23,145030000,PKT1200,50,25,9,0							
; PORTS command text							
; I2C connection							
; KISS protocol							
; KISS options for TNC							
; 12C bus 1							
; I2C device I/ (II nex)							
; INC Channel							
; Max outstanding frames							
· Level 2 delayed ACK (ms)							
: Level 2 max retries							
PACLEN=128 ; Max packet length (bytes)							
: Transmit kevup delav (ms)							
; CMSA interval timer (ms)							
; Persistence (256/(# transmissions-1)							
; Allow Digipeat on this port							
nk.org,8085,N0SZ-10,DM79ht,00-23 441050000 PKT1200,50,25,9,0							
	<pre>> WL2K ▲ CTN DOQ Temps Mnoodle Network BBB ; Allow Digipeat on this port hk.org,8085,N05Z-10,DM79ht,00-23,145030000,PKT1200,50,25,9,0 ; PORTS command text ; I2C connection ; KISS protocol ; KISS options for TNC ; I2C bus 1 ; I2C device 17 (11 hex) ; TNC channel ; Max outstanding frames ; Level 2 timeout (ms) ; Level 2 delayed ACK (ms) ; Level 2 delayed ACK (ms) ; Level 2 max retries ; Max packet length (bytes) ; Transmit keyup delay (ms) ; CMSA interval timer (ms) ; Persistence (256/(# transmissions-1)) ; Allow Digipeat on this port hk.org,8085,N05Z-10,DM79ht,00-23 441050000 PKT1200,50,25,9,0</pre>						

New Port Numbering



Update CMS connect

TP ⊠WL2K E CTN ■ DOQ • ■ Temps • m moodle ■ Network • ■ BBB • ; Displayed by PORTS command	
: Displayed by PORTS command	
: Displayed by PORTS command	
<pre>; Uses BPQAXIP ; Quality factor applied to node broadcasts heard on ; Entries in the nodes table with qualities greater or ; Max outstanding frames (1 thru 7) ; Level 2 timeout in milliseconds ; Level 2 delayed ack timer in milliseconds ; Level 2 delayed ack timer in milliseconds ; Level 2 maximum retry value ; Maximum packet length ; Driver specific configuration from here to ENDPORT ; Keep heard stats ; UDP port ; Automatically add new connections ; Broadcast UDP 10093 B ; AXIP to K0NTS UDP 10093 B ; AXIP to N4ATA UDP 10093 B ; AXIP to KD0DPX</pre>	
	<pre>; Gutily fuctor applied to hode broadcasts heard on ; Entries in the nodes table with qualities greater or ; Max outstanding frames (1 thru 7) ; Level 2 timeout in milliseconds ; Level 2 delayed ack timer in milliseconds ; Level 2 maximum retry value ; Maximum packet length ; Driver specific configuration from here to ENDPORT ; Keep heard stats ; UDP port ; Automatically add new connections ; Broadcast UDP 10093 B ; AXIP to KONTS UDP 10093 B ; AXIP to N4ATA UDP 10093 B ; AXIP to KD0DPX</pre>

Creating an APRS iGate

- Configure BPQ as shown above
 - Configure one port for 144.390 MHz
- Download and run getaprs
- Run mkaprs to create aprs.cfg
- Add aprs.cfg to bpq32.cfg

Creating an APRS iGate

🛛 🖨 🔲 willem@aid2: ~/BPQ

File Edit View Search Terminal Help

```
willem@aid2:~/BPQ $ wget -q http://www.prinmath.com/ham/getaprs
willem@aid2:~/BPQ $ chmod a+x getaprs
willem@aid2:~/BPQ $ ./getaprs
willem@aid2:~/BPO $ ./mkaprs
Enter Node Callsign (e.g. KONTS [no -1 or -10]):
NOSZ
Enter APRS SSID (e.g. 11]):
14
Enter BPO Port (e.g. 1):
1
Enter Status Message (used in broadcast):
RMHAM iGate
Enter Latitude (ddmm.mm[NS]):
3931.04N
Enter Longitude (dddmm.mm[EW]):
10521.00W
willem@aid2:~/BPO $
```

APRS Port Configuration

C 192.168.11.114:8080/Node/	EditCfg.html	Q
APPLNUM=32 APPLFLAGS=6 ENDPORT	; Last Application ; Display Connected Message	^
PORT ID=144.390 MHz APRS TYPE=I2C PROTOCOL=KISS KISSOPTIONS=PITNC,NOPARAMS I2CBUS=1 I2CDEVICE=16 CHANNEL=A MAXFRAME=2 FRACK=7000 RESPTIME=1000 RETRIES=10 PACLEN=128 TXDELAY=500 SLOTTIME=100 PERSIST=64 DIGIFLAG=1 ENDPORT	<pre>; PORTS command text ; I2C connection ; KISS protocol ; KISS options for TNC ; I2C bus 1 ; I2C device 16 (10 hex) ; TNC channel ; Max outstanding frames ; Level 2 timeout (ms) ; Level 2 delayed ACK (ms) ; Level 2 delayed ACK (ms) ; Level 2 max retries ; Max packet length (bytes) ; Transmit keyup delay (ms) ; CMSA interval timer (ms) ; Persistence (256/(# transmissions-1) ; Allow Digipeat on this port</pre>	
PORT		-

APRSDIGI Configuration

S ■ ■ 192.168.11.114:8080/Node/EditCfg.html - Chromium ^B P ₀ 192.168.11.114:8080 × ■		<u>ـ</u>
I 192.168.11.114:8080/Node/EditCfg.html	Q 🕁	
MAP N4ATA n4ata.dyndns.org MAP KD0DPX 192.168.11.88 ENDPORT UDP 10093 B ; AXIP to KD0DPX ENDPORT	•	
APRSDIGI ; APRS callsign APRSPATH 1-APRS.WIDE1-1,WIDE2-1 ; APRS port and mode STATUSMSGENWHAM iGate ; APRS status message SYMBOL=a ; APRS icon LAT=1931.04N ; Latitude (ddmm.mmM/S) LON=10521.00W ; Longitude (ddmm.mmE/W) BeaconInterval=30 ; Beacon interval (minutes) TraceCalls=WIDE,TRACE ; Calls for CALLN-n Processing with Trace FloodCalls=USA ; Calls for CALLN-n Processing without Trace Digitals=NOS2 ; Max value of n in CALLN-n processing. MaxTraceHODS=2 ; Max value of n in CALLN-n processing. ISHost=noam.aprs2.net ; APRS-IS host name ISPort=14580 ; Normal port for a filtered feed ISPascode=28296 ; Passcode for APRS callsign	•	
Save Cancel		

Node Page Update



APRS Main Page

BPQ NOSZ-14'S	Z-14's BPQ32 Web S	Server - Chron	ium							_	
< > C [C 192.168.11.114:8080/aprs/all.html									ବ 🏠 🔳	
Home NOSZ-14's BPQ32 APRS Web Server											
	RF Stations		All Stations								
	All WX Stations	300	(This page will automatically refresh every five minutes)								
	RF WX Stations		The following is a list of all the stations heard in the past 120 minutes.								
	RF Mobile Stations		both on RF and on the internet.								
	All Objects	There are 21 callsigns in the list,									
	RF Objects		chek a cansign to get an information page for that station.								
	Information	AC0VP-10 BVILLE KB0USF KC0D KC0D-6 KC0WUV KD0SQA-4 N0EB									
	Node Pages	NOLNE	<u>N0SZ-14</u>	<u>N0SZ-2</u>	N0WGM-3	N1GEP-1	<u>N7GN-5</u>	W0JAW	W0JRL-15		
		WA0GEH	WB5PJB-B	WD4IXD	WD4IXD-10	<u>WQ8M-9</u>					
der marte a series a									-		

APRS RF Stations

🔊 🗐 🔲 N0SZ-14's BPQ32 Web Server - Chromium

N0SZ-14's BPQ32 WE X

C 192.168.11.114:8080/aprs/allrf.html

Home
All Stations
RF Stations
All WX Stations
RF WX Stations
All Mobile Stations
RF Mobile Stations
All Objects
RF Objects
Information
Node Pages

N0SZ-14's BPQ32 APRS Web Server

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RF Stations

(This page will automatically refresh every five minutes)

The following is a list of all the stations heard on RF in the past 120 minutes.

'*' after a callsign means that it was heard via a digi

The list only includes callsigns heard on RF, direct or via digipeaters. It does not include callsigns heard on the internet, or heard as third-party RF traffic via IGATEs.

There are 8 callsigns in the list, click a callsign to get an information page for that station.

Callsign	Symbol	Location	Miles	Bearing	Last heard
KC0D	No. Digi	39°22.20'N 104°40.76'W	37.2	106	02:17:57
KC0D-6*	WX Station	39°18.13'N 104°41.32'W	38.3	113	02:20:18
KD0SQA-4*	Digi	39°40.14'N 104°55.46'W	25.0	65	02:16:58
NOEB	XAPRS	39°53.56'N 104°58.15'W	32.9	38	02:21:22
N0SZ-2*	Car	40°07.90'N 104°55.73'W	47.9	28	02:19:20
N0WGM-3*	WX Station	40°48.92'N 104°47.64'W	94.3	18	02:20:59
N1GEP-1*	Rover	39°40.36'N 104°45.90'W	32.9	71	02:18:02
N7GN-5*	WX Station	40°32.73'N 105°05.53'W	72.3	11	02:19:50

APRS Station Map



Po NOSZ-14's BPQ32 We ×

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192.168.11.114:8080/aprs/find.cgi?call=N0SZ-2

Home
All Stations
RF Stations
All WX Stations
RF WX Stations
All Mobile Stations
RF Mobile Stations
All Objects
RF Objects
Information
Node Pages

N0SZ-14's BPQ32 APRS Web Server

(This page will automatically refresh every five minutes)

Information about <u>NOSZ-2</u> Click the callsign to look it up on qrz.com Location: 40°07.90'N 104°55.73'W The bearing from NOSZ-14 to NOSZ-2 is 028 degrees, the distance is 47.9 Miles

Last posit: TPPWYP,W0UPS-5,WIDE1,KC0D,WIDE2*

Status: Last heard 00:05:11 ago



Report on aprs.fi



Data graph on aprs.fi

Station statistics for X	or N0SZ-14 – Google Maj	ps APRS - Chromium			1
🔇 📏 🥑 🗋 aprs.fi/info/g	graphs/a/N0SZ-14				☆ 〓
Station info - map view · info · te	lemetry · weather · raw · sta	atus • beacons • messages •	bulletins · browse · n	noving · my account	
Callsign or ship name: NOSZ-14 Clear Completed generating statistics (took 0.064 s).					
► AdChoices	► Satellite	Google Maps	► ISS	Space Station	
Station statistics for NOSZ-14	🚯 - info				
Packets transmitted by NOSZ-14 packets / hour	: 2016-05-07 07:00:00 ->	2016-05-09 07:24:43 MDT		7	
10.0 7.5					
5.0					
May 7 8:00 May 7 16:00	May 8 0:00 May 8	8:00 May 8 16:00	May 9 0:00		

Adding a new service

- BPQ adds new services via TCP/IP
- BPQ connects to local port
- Received stream piped to stdin
- Transmits output from stdout
- First line is connected station call

Monitor service

- Written in Perl
- Interprets commands
- Used to get system time and disk
- Bye to exit
- Mapped to N0SZ-2 and port 8004

Command Port

C 192 168 11 114 8080/Node/EditCEa h	tml	Θς
		~ 1
ENDPORT		
PORT ID=Telnet Server DRIVER=TELNET CONFIG LOGGING=1 DisconnectOnClose=1 TCPPORT=8010 FBBPORT=8011 HTTPPORT=8080 CMDPORT=8004 LOGINPROMPT=user: PASSWORDPROMPT=password: LOCALECHO=N0 MAXSESSIONS=10 CTEXT=AID2 BPQ32 Telnet Server\nEn USER=chris,XYZ123,KD0ZYF,,SYSOP USER=willem,ABC123,AC0KQ USER=john,ABC789,W0VG CMS=1 CMSCALL=N0SZ CMSPASS=secret ENDPORT	<pre>; PORTS command text ; TCP/IP connection ; Driver specific configuration from here to ENDPORT ; Log all connections ; Disconnect on close ; Port for telnet connections ; Port for FBB protocol BBS connections ; Port for web interface ; Port for monitor ; Telnet login prompt ; Telnet login prompt ; Do not echo input ; Maxmimum simultaneous connections ter ? for list of commands\n\n ; Telnet connect message ; Telnet user ; Telnet user ; Telnet user ; Telnet user ; Enable WinLink CMS connection ; Callsign for WinLink ; Password for WinLink</pre>	
Application

8 🗖 🗊 192.168.11.114:8080/Node/EditCfg.html - Chromium	
 In the second sec	ৎ ☆ =
PORT ID=AX/IP/UDP ; Displayed by PORTS command DRIVER=BPQAXIP ; Uses BPQAXIP QUALITY=220 ; Quality factor applied to node broadcasts heard on MINQUAL=165 ; Entries in the nodes table with qualities greater or MAXFRAME=5 ; Max outstanding frames (1 thru 7) FRACK=3000 ; Level 2 timeout in milliseconds RESPTIME=1000 ; Level 2 delayed ack timer in milliseconds RETRIES=5 ; Level 2 maximum retry value PACLEN=236 ; Maximum packet length CONFIG ; Diver specific configuration from here to ENDPORT MHEARD ; Keep heard stats UDP 10093 ; UDP port AUTOADDMAP ; Automatically add new connections BRADACAST NODES ; Broadcast MAP K0NTS argon.schreuder.us UDP 10093 B ; AXIP to K0NTS MAP N4ATA n4ata.dyndns.org UDP 10093 B ; AXIP to KDOPX ENDPORT APPLICATION 1, BBS, N05Z-1, AID2BBS, 255 ; BBS Application APPLICATION 2, RMS.C 3 (MS.N05Z-10, AID2RMS, 255 ; INC Application APPLICATION 3, MON, C 3 HOST 0, N05Z-2, AID2XX, 255 ; MON Application APPLICATION 3, ABOT 0, N05Z-2, AID2XX, 255 ; MON Application	
Save Cancel	

systemd Socket Service

/lib/system/systemd/mon.socket

[Unit] Description=MON socket

[Socket] ListenStream=8004 Accept=yes

[Install] WantedBy=sockets.target /lib/system/systemd/mon@.service

[Unit] Description=MON server

[Service] ExecStart=/home/willem/BPQ/mon.pl StandardInput=socket

mon.pl

```
#!/usr/bin/perl -w -T
```

```
# Monitor server
# Willem ACOKQ
use strict;
$ENV{PATH} = '/bin';
# Set autoflush
my $old_fh = select(STDOUT);
$| = 1;
select($old fh);
```

```
# Read callsign of connecting station
my $call = <STDIN>;
$call =~ s/^\s*//;
$call =~ s/\s*$//;
```

```
#
#
Match command
#
sub match
{
    my ($cmd,$pat) = @_;
    $pat = substr($pat,0,length($cmd));
    return ($pat eq $cmd);
}
```

```
# Welcome message
print "NOSZ Monitor\nConnect from '$call'\n> ";
```

```
# Read lines
while(my $line = <STDIN>)
{
   # Split on whitespace
  my ($cmd,@line) = split(' ',$line);
  $cmd = defined($cmd) ? lc $cmd : '';
   # Do nothing
   if ($cmd eq '')
   {
   }
   # Help
   elsif($cmd eq '?')
   {
      print "Commands: time disk bye\n";
   }
   # Bye
   elsif (match($cmd, 'bye'))
   {
      die "73 $call\n";
   }
   # Print time
   elsif (match($cmd,'time'))
   {
      print "Time ".localtime(),"\n";
   }
   # Print disk usage
  elsif (match($cmd,'disk'))
   {
     my @disk = `df -kh /`;
     my (undef, $size, $used, $avail, $pct) = split(' ', $disk[1]);
      print "Disk size=$size used=$used ($pct) available=$avail\n";
   }
   else
   # Unknown command
   {
      print "Unknown command $cmd args @line\n";
   }
   # Print command prompt
   print "NOSZ> ";
}
```

Enable the service

- Enable and start the service
 - sudo systemctl enable mon.socket
 - sudo systemctl start mon.socket

```
💌 🗖 🔲 willem@bashful: ~
File Edit View Search Terminal Help
cmd c N0SZ-2
cmd:*** CONNECTED to NOSZ-2
Connected to
NOSZ Monitor
Connect from 'ACOKO'
> ?
Commands: time disk bye
NOSZ> t
Time Sun May 8 17:48:49 2016
NOSZ> d
Disk size=15G used=3.5G (26%) available=11G
N0SZ>b
73 AC0K0
*** DISCONNECTED
cmd:
```

Time

- rPi and BBB does not have a real time clock, sets time using NTP
- If network does not recover after power failure, messages may be purged
- Add DS1307 RTC from Adafruit or similar device



Power Backup

- With a 6600 mAh LiPo battery the *PowerCape* will run a BB and TNC for more than a day
- Controlled shutdown on low battery



Beaglebone Notes

- The BB configuration is similar except that up to 4 TNC can be run as /dev/ttyO1 - /dev/ttyO4
- *mkbpq* puts web configuration on port 8008 since 8080 is used

What breaks BPQ

- Things that mess with serial and I2C
 - Raspberry Pi 3 (bluetooth, CPU freq)
 - Raspberry 7" Display
 - getty
- Use *lsof* and *i2c-tools* to debug
 - If BPQ receives (stations in *mh*) but no transmit, a device clash is likely
- Run sudo ./pilinbpq from command line

Updating BPQ

- BPQ is updated regularly
- getbpq will dowload the latest version of pilinbpq executable and the matching HTML pages
- After downloading restart BPQ
 - systemctl restart bpq.service

BPQ with external TNC

- BPQ supports Pactor modems including channel steering
- Attach via serial port
- Configure in BPQ
 - DRIVER=SCSpactor
 - RIGCONTROL to steer

Coming attractions

- Interactive config utility for BPQ (like raspi-config)
 - Text base so you can run it remotely
 - More options to avoid hand editing
- Statewide ARES/NTS/Red Cross packet mail network (local WinLink)

- Uses custom mail app to database

And so much more...

Detailed documentation is at

http://www.cantab.net/users/john.wiseman/Documents/

- HOWTO and downloads at http://www.prinmath.com/ham
- Join BPQ32 Yahoo Group
- Join RMHAM and get lots of hands on experience

Questions?