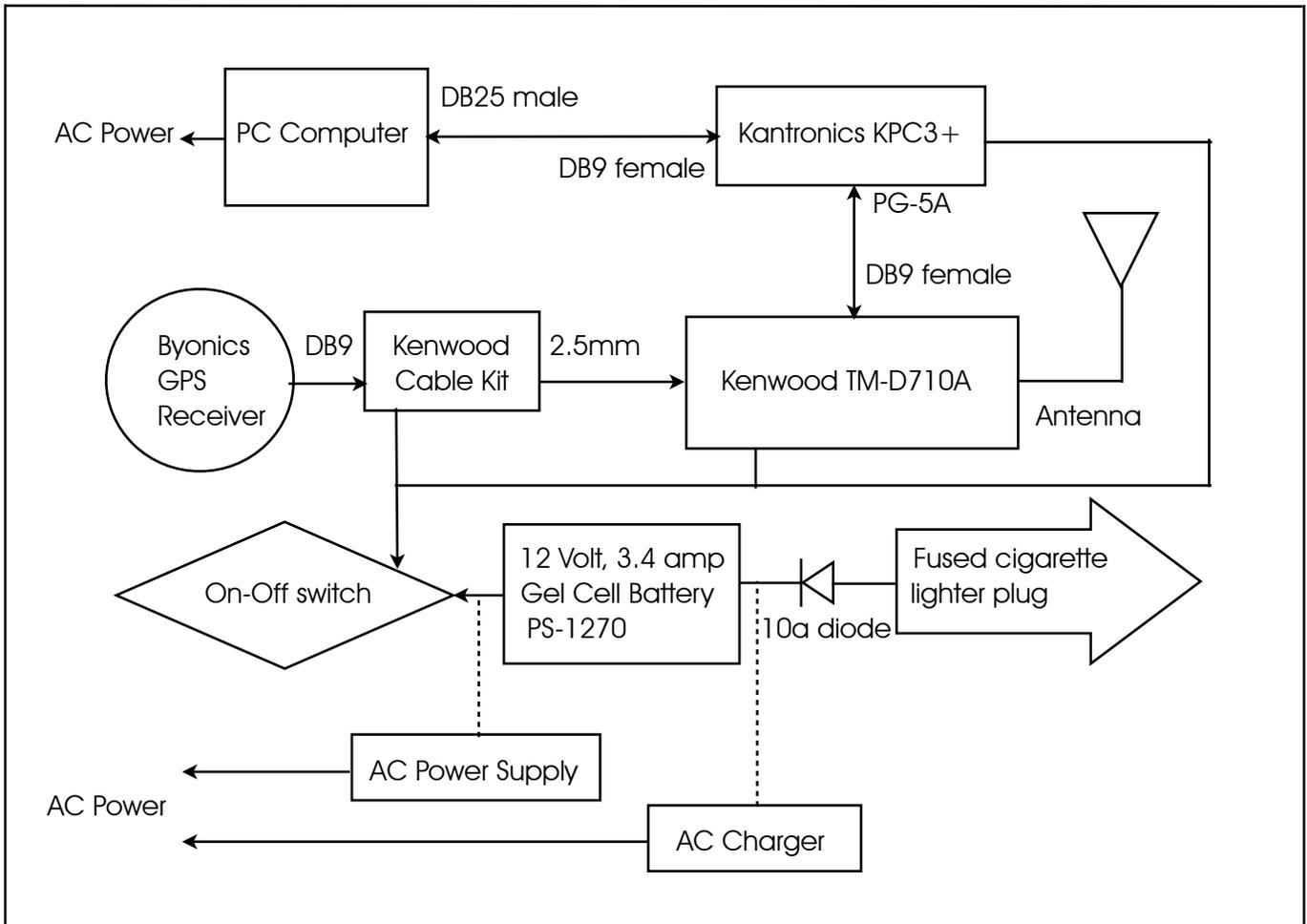


Portable APRS Packet Winlink Digipeater Igate Voice Communications System

Dr. John Anthony Allocca, WB2LUA, www.wb2lua.com, 1/14/12



Introduction

Those who had to carry heavy radio equipment through the subways and around New York City during the Sept 11th World Trade Center incident really know the true meaning of "lightweight" and "portable." Often, if something has a handle on it, it is considered portable. However, lightweight is the most important feature when traveling. During personnel recruitment, the type equipment an operator needs to carry should be announced prior to arrival at the incident. During the Sept 11th WTC incident, only UHF/VHF equipment has been selected. This system can be used for voice communications, APRS, APRS beaconing, APRS digipeating, APRS iGate, packet, packet digipeating, and Winlink 2000.

GPS Receiver

The Byonics GPS receiver acquires satellites quickly even from inside the car on the floor. It can also be ordered with the Kenwood cable kit with power pole connectors or cigarette lighter plug. from www.Byonics.com. The system can be used without a GPS receiver by using fixed coordinates.

Lightweight Portable Antenna System



The Smith-Victor 10 foot aluminum light stand extends to 10 feet high and weighs only 3 pounds. It collapses to 32" and easily fits into a 36" light stand case. The top section has a diameter of 5/8", which is suitable for most mounting clamps. The case is wide enough to accommodate the #901 dipole mount, while permanently mounted to the top section of the light stand.

The Diamond AZ507RSP Dual Band Mobile Antenna was selected because it is a 1/2 wave, 27.5", antenna that will easily fit into the 36" case. The Smith-Victor 10 foot light stand uses plastic connecting parts, which are not conductive. Therefore only the top section will conduct and it will provide the 1/2 wave 19.6" ground plane counterpoise required for UHF/VHF mobile antennas.

The System in a Briefcase or Spinner Luggage



Mount the UHF/VHF dual band transceiver, 13 volt, 23 amp switching power supply, Kantronics KPC3 Plus TNC, an on-off switch (because transceivers draw current when off), and a 12 volt 7 amp hour sealed gel cell battery, on a 3/4" pine board. The battery, power supply, and TNC are mounted with a Velcro straps. Place the unit into a 6 inch briefcase or spinner luggage case. To operate packet, a computer will be required. The Kenwood TM-D710A can operate as an APRS digipeater and send and receive beacons without the use of a computer.

A Power Sonic PS-1270, 12 volt 7 ah, 5.7 pounds, sealed gel cell battery with F1 terminals was used. Discharging a battery below 50% of its charge will probably damage the battery. Charging 50% of the same battery will require a charge for half the time.

Power Consumption:

<u>Transceiver Mode</u>	<u>Transceiver Current</u>	<u>Watts</u>	<u>50% Battery Runtime (7ah/2=3.5 ah)</u>
Receive	0.27 amps	3.24	12.95 hours
5 Watts Output	2.15 amps	25.8	1.63 hours
10 Watts Output	2.86 amps	34.32	1.23 hours
20 Watts Output	4.01 amps	48.12	0.875 hours (59 minutes)
50 Watts Output	7.42 amps	89.04	0.47 hours (28 minutes)

Voice Mode and Repeaters

Most of the time, only voice communications are used. Only a radio transceiver, power source, and antenna are required. Repeaters are receiving and retransmitting stations with antennas at great altitudes, which enables transmissions to reach much farther than the antenna of the originating station.

Packet

The Kantronics TNC will allow one to use packet. After connecting the TNC to a computer, run "Hyperterminal." Hyperterminal is a Windows XP program that does not come with Windows Vista or Windows 7. The Hyperterminal program and instructions can be downloaded from www.wb2lua.com and installed into a Windows Vista or Windows 7 computer. Packet is often used when a list of information needs to be sent from one radio and computer to another radio and computer.

Switch the transceiver ON and turn the volume up a quarter turn or just above the "9:00 o'clock position." Make sure the squelch is not set too low. The squelch should be set to a position where the transceiver is quiet. The squelch is set in a similar manner that you would use for voice operation. When first turned on, the TNC you may display garbled text on the screen. This is usually because the terminal to TNC baud rate is not set to the same parameters. Some TNC's will do a "search" mode to find the proper settings.

Perform a "control C" [Ctrl C] (press Ctrl and the letter C at the same time) to place the TNC into the command (cmd:) mode. This is where all commands are made to and from the TNC. Any command that is typed while in the "cmd: mode is received by the TNC as a direct order. These codes can vary with TNC's.

Once in the command mode, press the [Enter] key. Each time the [Enter] key is pressed a "cmd:" prompt should appear on the screen. This is an indication that the computer has control (command) of the TNC.

Packet Operation

All commands must be followed by the [Enter] key.

The next step will be to set the station call sign into the TNC. At the cmd: prompt, type:
MY (*your call sign*)

Test the TNC to see if the station call sign is set into the TNC. To do so, type:
MY

The screen should display a response from the TNC with:
MYCALL (*your call sign*)

MYCALL NOCALL indicates that a call sign has never been set, or the internal memory battery has been disconnected or is dead.

To enter your call sign type:
MY (*your call sign*)

The TNC should respond with:
MYCALL (*your call sign*)

This indicates that the computer and TNC are communicating properly. If there is no response after typing MY, then try typing:
ECHO ON

The :cmd: should appear on the screen again, with a message similar to the following:
ECHO was OFF

If the computer is displaying double letters, (for example; MMY CCAALLL), this indicates that the ECHO command should be turned OFF. Type the following:
ECHO OFF

The TNC should respond with:
ECHO was ON

Below are some commands that should be made active:
ECHO ON (normal) or ECHO OFF (if double letters are displayed)
MONITOR ON
MCOM ON
MCON OFF (to display only packets addressed to you) or MCON ON (to display all packets)
MRPT ON

If the RS-232 interface cable is wired using the RTS, CTS, Txd, Rxd, and Signal Ground leads, then set the XFLO command OFF. If the RTS, and CTS signals were not used, then make sure the XFLO command is ON.

Note: TNC's have 3 modes of operation: Command, Converse and Transparent. You must

remain aware of which mode the TNC is in at any current moment!

Command Mode

In the COMMAND mode, the TNC will interpret data received from the keyboard as a command to process data, not as data to transmit.

When you are in the command mode, the screen will display:

cmd:

Brief list of NEWUSER commands:

CONMODE CONVERS (TNC will automatically be placed into CONVERS mode after connection is established)

CONMODE TRANS (TNC will automatically be placed into TRANS mode)

CONNECT or C (connects to another station)

CONVERS (to enter convers mode)

DAYTIME (to read the time and date)

DAYTIME yymmddhhmm[ss] (to enter the time and date)

DIGIPEAT ON (turns digipeat on)

DIGIPEAT OFF (turns digipeat off)

DISCONNECT or D (disconnect from another station)

DWAIT n (n=0-255) (10 times n in milliseconds) (delay used to avoid collisions between digipeated packets)

ECHO ON (character received from the keyboard are echoed back to the screen)

ECHO OFF

HELP (for most TNC's will generate a list of commands)

INTERFACE NEWUSER (for most TNC's will enter standard terminal mode with a limited command set)

INTERFACE TERMINAL (for most TNC's will enter terminal mode with full command set)

MCOM ON (monitors all packets being transmitted)

MCOM OFF

MCON ON (will display all packets received)

MCON OFF (will display only packets addressed to you)

MHEARD SHORT (short list of stations heard * indicates digipeating)

MHEARD LONG (long list of stations heard)

MHEARD CLEAR (clear the list of stations heard)

MONITOR ON (unconnected packets will be seen. Also acts as a master control for MALL, MCOM, MCON, MRESP, MRPT)

MONITOR OFF

MRESP ON (monitors packets including AX.25)

MRESP OFF

MRPT ON (entire digipeat list is displayed)

MRPT OFF

MYALIAS xxxxx-n (n= 0-15) (sets TNC to an alias call sign for digipeating)

MYCALL xxxxx-n (n=0-15) (sets TNC for you call with the optional supplementation Station Identifier (SSID))

NOMODE ON (TNC does not change modes after a connection is established)

NOMODE OFF (TNC will change to whatever mode is established in CONMODE after a connection is established)

TXDELAY n (n=0-255) (delays transmit to give your radio enough time to reach full power, set delay to 10 times n in milliseconds) (300 ms is commonly used)
UNPROTO CALL VIA W2ABC,W2CDF,W2EFG (max 8 call signs)

Convers (Conversation) Mode

In the CONVERS mode, the TNC will interpret data received from the keyboard as data to be transmitted. Most TNC's will automatically switch to the CONVERS mode after a connection has been established. When you are in the COMMAND mode, you can switch to the CONVERS mode by giving the command:
CONVERS or K

If you are in CONVERS mode and want to switch to COMMAND mode, type:
[Ctrl] C

Trans (Transparent) Mode

A second method for transmitting data, called TRANS mode, is to instruct the TNC to ignore "control characters," such as "backspace," and transmit every character as data. For many TNC's TRANS mode is a TERMINAL mode not a NEWUSER mode.

If you are in TRANS mode and want to switch to COMMAND mode, type:
[Ctrl] C three times with a pause of less than second between entries

Monitoring or Calling CQ

If you turn the MONITOR command on, you will see other packet stations on your screen. You will see two call signs at the beginning of each packet separated by a ">". The first station is the station that is sending the packet. The second is the station receiving the packet.

To call CQ, you must be in the CONVERS mode, so that the data received from the keyboard will be interpreted as data to be transmitted.

To enter the CONVERS mode, type:
CONVERS or K

Anything you type at this point, will be transmitted.

Example:
W2XYZ CQ CQ CQ

If a station wants to connect to you, they will type the CONNECT W2XYZ command

To return to the COMMAND mode, type:
[Ctrl] C

Packet Direct

The most common frequency for packet communications is 145.010 mhz at 1200 Baud.

Begin in the command mode:

[Ctrl] C

Enter your call sign into the TNC

MY (*your call sign*)

Test that the TNC has received you call sign:

MY

The screen should display a response from the TNC with:

MYCALL (*your call sign*)

To connect directly to W2XYZ, assuming you both have a direct path:

CONNECT W2XYZ or C W2XYZ

If the TNC receives an acknowledgement of connection it will display:

*** CONNECTED TO W2XYZ

Once connected, the TNC should automatically switch to conversation mode (CONVERS). You can type in text, then press enter to send. You should automatically receive text from the station you are connected to.

When you have completed your conversation, you need to get back to COMMAND mode to sign off.

To get back to COMMAND mode, type:

[Ctrl] C

To disconnect, type:

DISCONNECT or D

The TNC should respond with:

*** DISCONNECTED

Northeastern FlexNet Site Information

Updated Northeastern USA FlexNet info can be found at www.northeastflexnet.org

Connecting through a Node

1. To connect to W2XYZ thru node WA2PNU, assuming both stations are listening to WA2PNU

node:

C W2XYZ V WA2PNU

2. To connect to W2XYZ thru node NY2LI, assuming your listening to WA2PNU node and W2XYZ is listening to NY2LI node:

C W2XYZ V WA2PNU NY2LI

3. To connect to W2XYZ thru distant node K2JFK (Clay NY), assuming your listening to WA2PNU and W2XYZ is in Clay NY listening to node K2JFK:

C W2XYZ V WA2PNU K2JFK

4. Above examples are from a disconnected state. You can connect first to your local node, C WA2PNU, and then the WA2PNU call can be deleted from the previous examples, such as:

1) C W2XYZ 2) C W2XYZ V NY2LI 3) C W2XYZ V K2JFK

5. To find out what node W2XYZ is monitoring, on an ARRL section by section basis, you connect to any node within that section, and then do a "find".

Example:

F W2XYZ

6. "A" command on any FlexNet will give a manually built list of nodes with geographic locations. Some sites have newer updates than others. "D" gives the machine made <D>estination list, showing callsigns, SSID range, and "round trip times" of other nodes. The D list will always be up to date! Nodes with RTT's under 1000 should be easily connected to, over about 1000 means the path may be dropping out due to propagation conditions.

Example (with your radio set to 145.07 MHz):

C W2PNU

*** CONNECTED to W2PNU

PC/FlexNet V3.3g West Hills, LI, NY, USA

1200 baud 145.07 9600 baud 145.59

<C>onnect <D>estinations <F>ind <H>elp <I>nfo <MH>eard <P>orts <Q>uit <U>ers
<A> for Callsign vs Location Table <M>ail will connect to the nearest BBS

Disconnecting from a node

Q for <Q>uit on FlexNet nodes, remember command is B for ye on FBB BBS's!

Bulletin Board Servers

Bulletin Boards are a "Store and Forward" device. Once you post your message or bulletin, the server stores it and then passes it on the neighboring BBS's.

Typically, Personal messages and NTS traffic are forwarded instantly, wherein Bulletins may be delayed until off peak hours as not they tie up the network.

Connecting to a BBS

BBS's usually are co-located with a Node. But not all Nodes have a BBS.

The nodes usually have the path a BBS programmed in. The M command will connect you to the BBS (<M>ailbox).

Users can either connect to their nearest Node, and then connect onward to the BBS, or just connect directly to the BBS itself.

Example:

Starting on 144.99 MHz, C WA2PNU, then M.

Or starting on 144.99 MHz, just C WA2PNU-4

But starting on 145.07 MHz, C W2XYZ, and then M, will also connect you to WA2PNU-4 BBS!

Example:

C WA2PNU

*** CONNECTED to WA2PNU

PC/FlexNet V3.3g West Hills, LI, NY, USA

1200 baud 145.07 9600 baud 145.59

<C>onnect <D>estinations <F>ind <H>elp <I>nfo <MH>eard <P>orts <Q>uit <U>ers
<A> for Callsign vs Location Table <M>ail will connect to the nearest BBS

M (command is short for <M>ailbox)

link setup...

*** connected to WA2PNU-4

[FBB-7.00g-AB1FHMRX\$]

WA2PNU BBS, QTH FN30HU.

Hello John, you are now on channel 1.

Here are 864 active messages, 229214 is last message and 228445 is the last you have listed.

Assigned channels:

Ch. 1 (FLEX) : WB2LUA-0 - MSP W2XYZ

on 01/04/02 10:43

via : WA2PNU-0 W2XYZ-2

Ch. 2 (FLEX) : KB2VLX-4 - Mon 01/04/02 10:42

via : WA2PNU-0

WA2PNU BBS (H for help) >

Abbreviated list of available FBB BBS commands:

- A Abort - Abort listing.
- B Bye - Log off the BBS.
- H Help - Help.
- K Kill - Kill messages.
- L List - List messages.
- M Make - Copy a message to a file.
- N Name - Change your name.

NQ	Your Home QTH, "City, ST"
NZ	Zip - State your zip-code.
NH	homeBBS - Type your home-BBS.
O	Option - Select options (paging, language, list/read personal etc).
R	Read - Read messages.
S	Send - Send messages.
X	Expert – Shortens the command prompt line

Supplemental Identifier (SSID)

By adding -0 to -15 after your call sign, the operator can use their call sign 16 times.

Types of messages

There are three basic types of messages, Personal (P), Bulletin (B), and NTS Traffic (T).

Personal messages are from one user to a second user, while Bulletins are from one user to a group of users in a designated area.

The difference being that (P) messages route only to the intended recipients home BBS while (B) bulletins flood every BBS in the designated area.

Example:

A bulletin may be sent to TRIBBS, NEBBS, NYBBS, CTBBS, USBBS or WW, meaning respectively the Tri-State Metro area, New England BBS's, New York BBS's, Connecticut BBS's, BBS's throughout the USA, or BBS's throughout the entire World.

NTS traffic is third party mail, forwarded via Postal ZIP codes. It is routed to the nearest BBS's to the third parties street address.

Listing messages

The following commands are used to list messages

L lists every message on the BBS, back to the marker of the previous last message you listed. Beware that this command will list the last couple weeks or more of messages (think in terms of several thousand) the first time you long on to a BBS as a new first time user.

LL ## lists the last ## number of messages. Again this command will list (P), (B) and (T) messages.

LM Will list (P) messages only addressed to you

LB will list only (B) bulletins

LT will list only (T) NTS traffic

LS (subject) will list messages containing the subject in message title

Example:

LS DX will list very message with "DX" in the title.

Receiving a Message

R ### where ### is the message number will give you the text of that message, be it (P) (B) or (T).

With (P) mail, it is polite to kill any message you have received and read with either the K ### or KM commands.

K ### will kill one message, as specified by the number ###

KM will kill all messages addressed to you.

In the case of NTS traffic, once you have delivered the message, it is proper to log back onto the BBS and kill that message.

Receiving Private Mail

RP (Receive Private) or R ###, where ### is the message number

KM (Kill Message) to delete the current message

To Send a Reply:

SR (Send Reply) or SR ###, where ### is the message number

Sending Private Mail

SP K2HAM (Send Private)

Routing (from WP) to K2JFK.#CNY.NY.USA.NOAM.

{White Paper (WP) server transparently learns users home BBS address's from traffic passing through each BBS, and in turn automatically shares this information between BBS's}

Enter the title for this message to K2HAM

Text Message

Enter the text for the message, end with Ctrl-Z or /EX on a blank line)

Hello test, 1 2 3 4 5 6 7 8 9 10

73 de Jose

/ex {Always end with /EX on a new line}

Mid: 32607_WA2PNU Size: 85 bytes

WA2PNU BBS (H for help) >

An (P) mail address must follow this format:

K2HAM@K2JFK.#CNY.NY.USA.NOAM

^ addresses call sign

^ addresses home BBS

^ supplemental geographic info (often ARRL Section)

^ State

^ Country

^ Continent

Sending a Bulletin

SB RACES @ TRIBBS (Send Bulletin)

(this bulletin will flood all the BBS's in the Tri State area)

Enter the title for this bulletin:

Monday Nights Test Message

Enter the text for the message, end with Ctrl-Z or /EX on a blank line)

Hello test, 1 2 3 4 5 6 7 8 9 10 from the EOC in Huntington, LI, NY.

73 de Jose, RACES Officer, Huntington

/ex {Always end with /EX on a new line}

Mid: 32607_WA2PNU Size: 185 bytes

WA2PNU BBS (H for help) >

Sending NTS TRAFFIC

When the message is ready to be entered into your local BBS, you must use the ST command, which means "Send Traffic", followed by the zip code of the destination city, then @ NTS followed by the two letter state abbreviation. The form used is:

ST ZIPCODE @ NTSxx (send NTS traffic)

Example:

A message being sent to Boston, MA 02109 would be entered as follows:

ST 02109 @ NTSMA

Enter the title for this bulletin:

Test Message

Enter the text for the message, end with Ctrl-Z or /EX on a blank line)

Hello test, 1 2 3 4 5 6 7 8 9 10 from the EOC in Huntington, LI, NY.

73 de Jose, RACES Officer, Huntington

/ex {Always end with /EX on a new line}

Mid: 32607_WA2PNU Size: 185 bytes

WA2PNU BBS (H for help) >

To Send a Reply:

SR (Send Reply) or SR ###, where ### is the message number

Disconnecting from the BBS

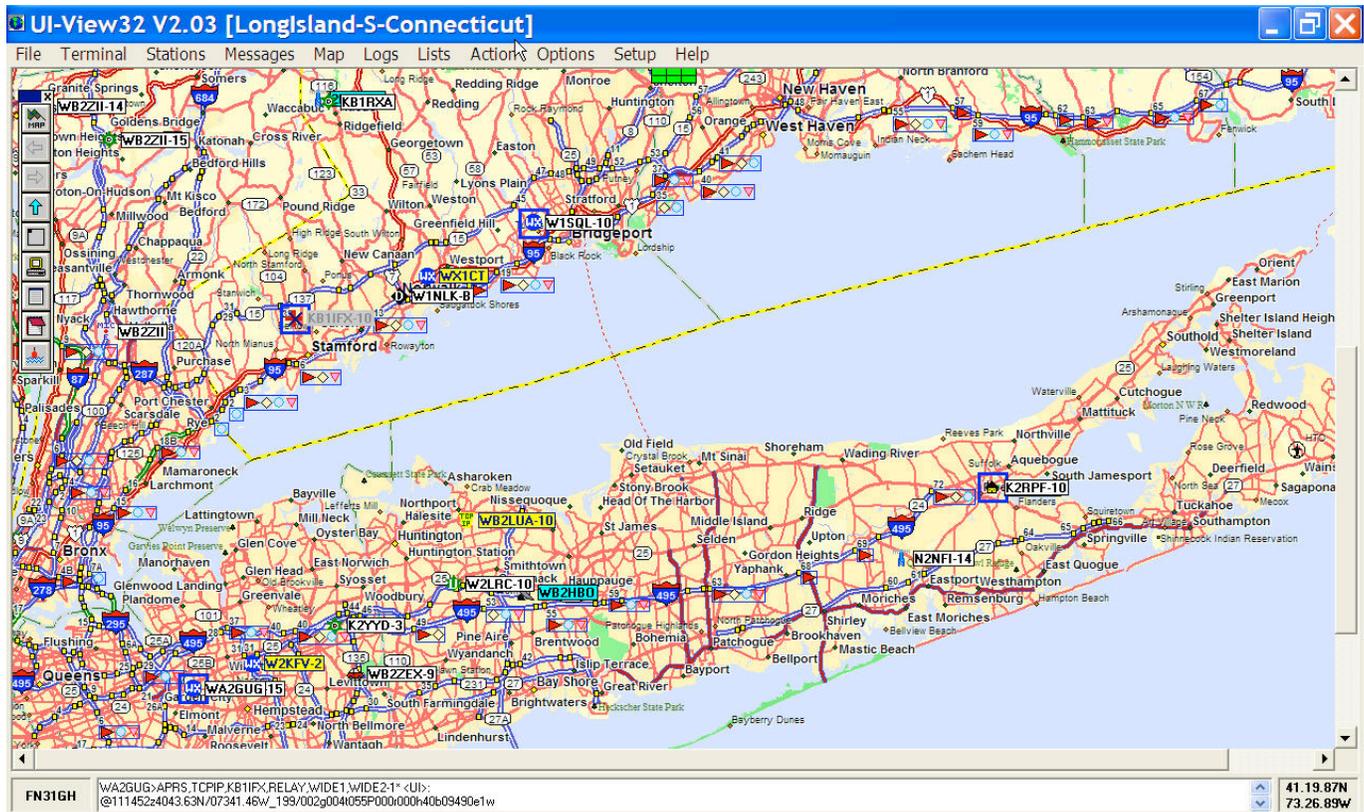
B for ye on FBB BBS's, remember command is Q for <Q>uit on FlexNet Nodes!

You have been connected 5mn 14s - Computer-time: 9s

Bye, John, and welcome back.

*** reconnected to WB2CIK

APRS (Automatic Position Reporting System)



Automatic Position Reporting System is a specialized form of packet operating on a single frequency, which is 144.390 MHz in the USA. If one reaches an IGate, the position information transmission will enter the internet. It can be seen using; Google Maps for a region (example Long Island, NY <http://aprs.fi/?lat=40.8287&lng=-73.3962&timerange=86400>), and Findu (example: <http://www.findu.com/cgi-bin/find.cgi?call=wb2lua-3&terra=4>). Mobiles often use GPS receivers to automatically send beacons. Fixed stations mostly use their fixed location coordinates. UI-View 32 is the PC-based mapping software that is often used. Mobile radios such as the Kenwood D710a have built in TNC's and only require a GPS receiver to beacon on APRS. Only an internet connection and computer are required to see the beacon locations. APRS was developed by Bob Bruning, WB4APR.

During emergencies, APRS can be very valuable. It can be monitored at an emergency operations center to track emergency response teams, mobiles, etc. Responders in the field can also see their own location.

The Global Positioning System is maintained by the U.S. Department of Defense and consists of 25 satellites in orbit around the earth. Positioning information is determined by a small receiver which measures the time in micro-seconds that it takes to receive the broadcast from between 1-12 satellites. By receiving the signal from at least four satellites, position information down to about 10 meters can be determined. Altitude information can also be obtained from the system. In mobile situations you can determine speed and direction.

SSID's

- 0 Your primary station usually fixed and message capable
- 1 generic additional station, digi, mobile, wx, etc
- 2 generic additional station, digi, mobile, wx, etc
- 3 generic additional station, digi, mobile, wx, etc
- 4 generic additional station, digi, mobile, wx, etc
- 5 Other networks (Dstar, Iphones, Androids, Blackberry's etc)
- 6 Special activity, Satellite ops, camping or 6 meters, etc
- 7 walkie talkies, HT's or other human portable
- 8 boats, sailboats, RV's or second main mobile
- 9 Primary Mobile (usually message capable)
- 10 internet, I gates, echolink, winlink, AVRS, APRN, etc
- 11 balloons, aircraft, spacecraft, etc
- 12 APRStt, DTMF, RFID, devices, one-way trackers*, etc
- 13 Weather stations
- 14 Truckers or generally full time drivers
- 15 generic additional station, digi, mobile, wx, etc

New nN Paradigm

1. RELAY, WIDE, TRACE, TRACEN-N and SS are obsolete.
2. Use WIDE2-2 for fixed stations (3-3 is ok for areas far from any city or mountains)
3. WIDE1-1, WIDE2-1 for mobiles (WIDE1-1, WIDE2-2 is ok for areas far from any city or mountains.
4. Use WIDE1-1, SSn-N for selected non-routine State or Section nets or when humans are present for a large area emergent needs. (will not work reliably during transition period)
5. Use DIGI1, DIGI2, DIGI3... for point to point communications (but realize success becomes vanishingly small beyond 2 hops)

WARNINGS:

- A. Never use WIDE1-1 beyond the first hop
- B. Never use anything other than WIDEn-N on a Balloon for aircraft. (N=2 should work well)

UI-View Software

Download UI-View V2.03 from the UI-View website <http://www.ui-view.org>. There are also maps and other UI-View Add-Ons and information at this site.

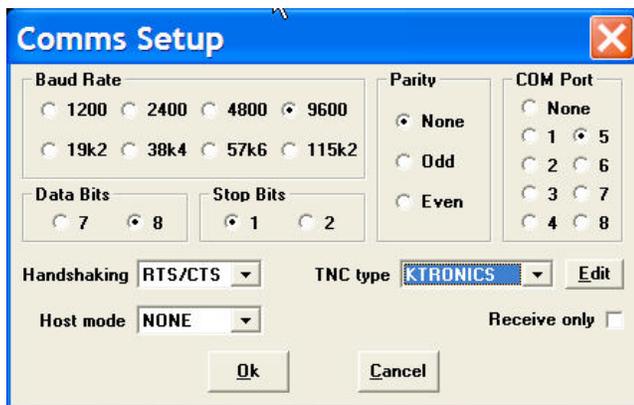
UI-View requires a Registration Key which you can obtain from www.apritch.myby.co.uk Note: Registration is only available to Licensed Amateurs.

To install UI-View, run 32full203.exe and follow the prompts.

Next install maps for the local area. Download maps from the UI View website or make them from Street Atlas 9. Unzip the map files and copy them into the UI-View Maps directory C:\Program Files\Peek Systems\UI-View32\Maps

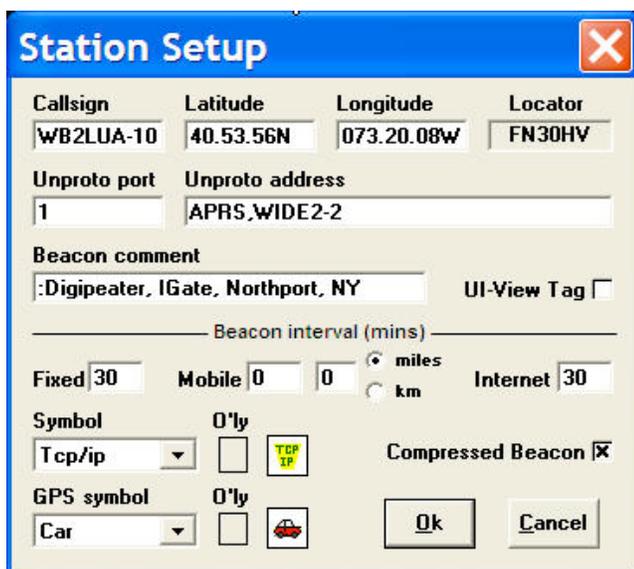
Comms Setup

From the Setup Menu, select Comms setup and select the type of TNC, Comm Port, etc. as seen below. The Kantronics KPC3+ works very well for this application and for Winlink 2000.



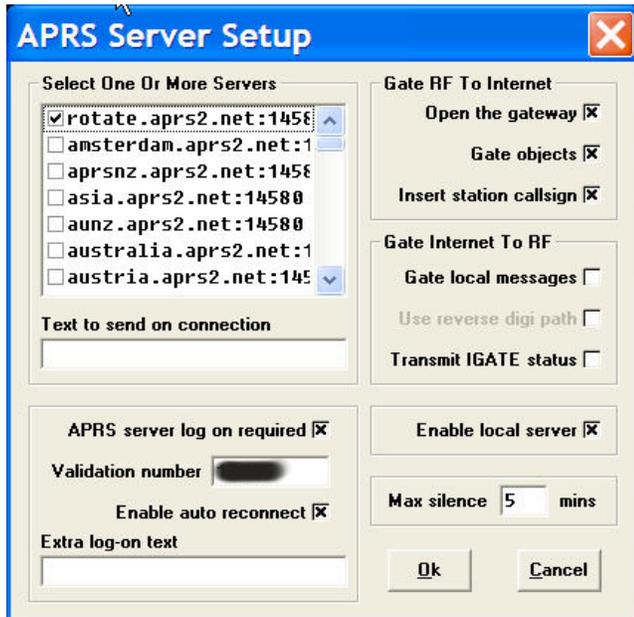
Station Setup

From the Setup Menu, select Station Setup and configure as seen below.



APRS Server Setup

From the Setup Menu, select APRS Server and configure as seen below.



APRS Servers:

1. From the File menu, Click on "Download APRS Server List"
2. Type in: `www.aprs2.net/APRServe2.txt`
3. Click on the Download button. A list of APRS servers will be displayed.

Some Regional Servers are:

maine.aprs2.net:14580
midwest.aprs2.net:14580
northwest.aprs2.net:14580
southwest.aprs2.net:14580
or rotate between Tier2 Servers: rotate.aprs2.net:14580

Filter for extra long-on texts may be added as: `filter m/100`

4. Check the box for the server selected and enter the validation number that came with your registration document.

To Add a url:

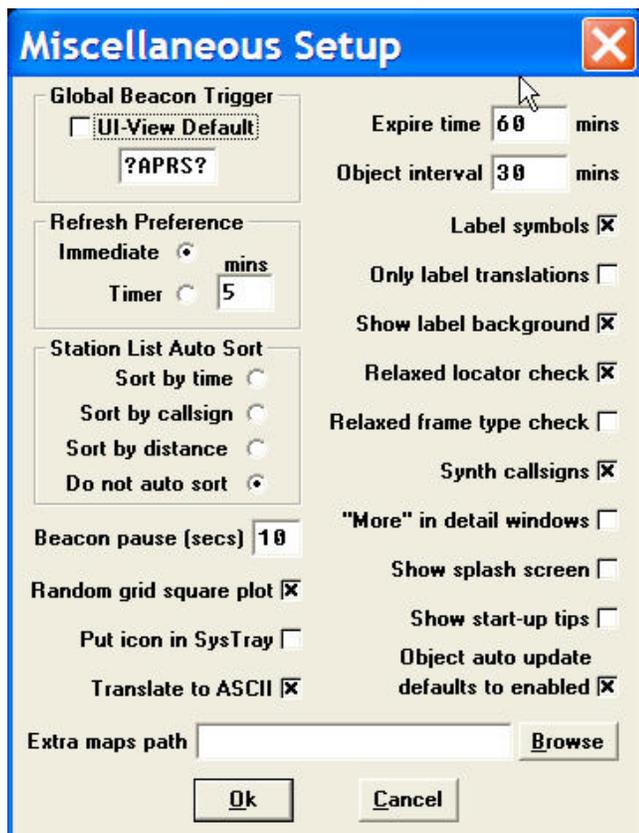
1. Press the Insert key
2. Type in the url
3. Press enter

To Remove a url:

1. Click on the entry and press the delete key

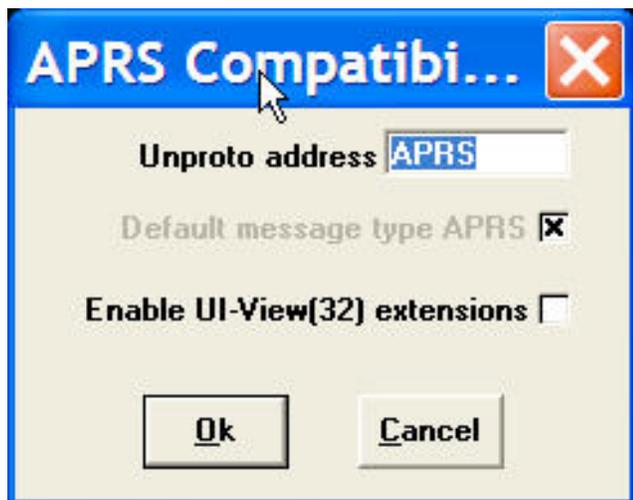
Miscellaneous Setup

From the Setup Menu, select Miscellaneous and configure as seen below.



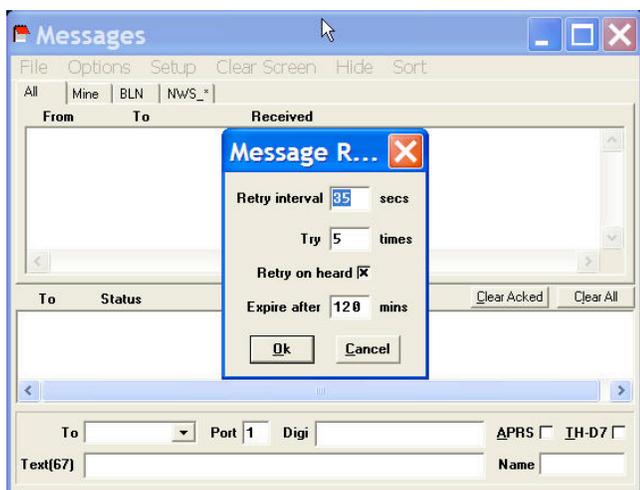
APRS Compatibility

From the Setup Menu, select APRS Compatibility and configure as seen below.



Messaging Setup

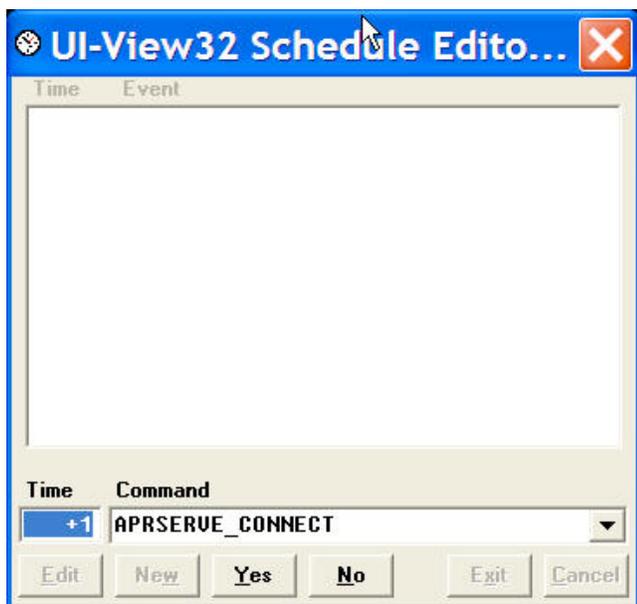
From the Message Menu, select Setup at the Message Retries dialog box. Set the *Retry interval*, *Try*, *Retry on heard* and *Expire after* as shown below.



Connecting to APRS-IS

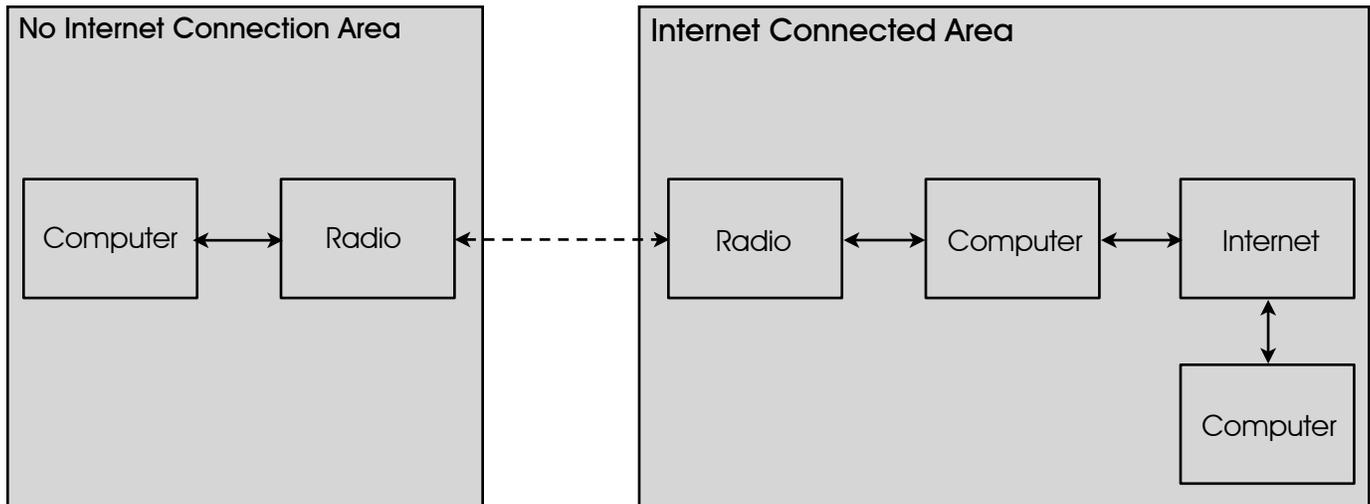
From the Files Menu, select Schedule Editor, then New. Then, select *APRSERVE_CONNECT* from the pull down menu in the *Command* box. Type: +1 in the *Time* box. Then click Yes. Then exit. This will connect UI-View Client to APRS-IS 1 minute after it has started.

Or one can click on Connect to APRS Server from the Action menu.



Winlink 2000

Winlink 2000 allows an email to be sent through a radio transmission to enter the internet as a regular email. The receiving person only needs a computer, not a radio. A reply will be sent through the internet. Then, through a radio transmission. The software that is commonly used is Airmail, which is compatible with the Kantronics TNC. But, not with the built-in Kenwood TNCs.



UHF/VHF for Short Distance
HF for Long Distance

Winlink 2000 is a worldwide digital amateur radio message transfer system. It provides E-mail transfer with attachments, map & text-based position reporting, graphic & text-based weather bulletin services, and emergency communications by linking radios to the Internet.

The Winlink 2000 system is currently being utilized for emergency communications where local or regional communications are disrupted, including the loss of the Internet, and where accuracy of information is important.

Winlink 2000 can be used by any licensed Amateur radio operator. The operator logs into one of the participating network stations using the "AirMail" software. Currently, Winlink 2000 has a flow of over 150,000 messages monthly into 41 participating stations from 5100 + users. The Winlink 2000 user must have a General Class or higher license to use HF radio.

Winlink 2000 may be very useful for emergency communications using the [Telpac](#) with [Paclink](#) email-based VHF/UHF radio Packet for "last mile" communications coverage. "Airmail" is the software used for greater distances using the VHF and HF radio link to Winlink 2000 and the internet.

"Telpac" stands for TELnet-PACket Bridge and it allows the Winlink 2000 operator to use the VHF/UHF Packet mode with the B2F protocol. Telpac is used by the Packet nodes to interface with the end-user, who is using Paclink or Airmail. Paclink utilizes Outlook or Outlook Express to provide the end-user with a connection to the Winlink 2000 system by way of Telpac.

How to Send E-mail to a Winlink User

To send a message to a Winlink user (or, to allow the user to receive it) the sender's e-mail address must be listed in the recipient's whitelist (accept list). If the sender's address is not there the message will be rejected. This restriction can be bypassed by including a special keyword in the subject line of each message. For example:

Subject: //WL2K (then any normal subject)

The "//WL2K" informs the Winlink mail processing system to allow the message to be forwarded to the Winlink user. This code may be changed from time-to-time.

Why are you doing this?

SPAM control on the WL2K system is important because our licensed users and station operators are bound by laws and regulations that prohibit the content of most SPAM over radio. Moreover, slow radio circuits are easily clogged with unwanted messages when an urgent or emergency message must get through.

Currently Active Long Island VHF Packet Winlink 2000 Gateways

Log onto the nearest packet station. Then, connect to one of the gateways below. If a gateway is local and reachable, log on directly.

Hopping from node to node will slow the operation. From Northport, NY a connection needs to be made to the local WA2PNU digipeater, then to KC2COJ digipeater, then to WA2GUG-10 gateway. From Northport, use the direct link to N1EZT-10 gateway in Stamford, CT or N1BDF-10 gateway in New Haven, CT.

RMS Packet Gateway Positions Map is found at <http://www.winlink.org/RMSPacketPositions>

WA2GUG-10, Far Rockaway, NY, 145.090 MHz

K2YYD-10, Levittown, NY, 145.090 MHz

KC2UCD-10, Smithtown, NY, 145.070 MHz

KC2TGD-7, Montauk, NY, 145.070 MHz

N1EZT-10, Stamford, CT, 145.030 MHz

N1BDF-10, New Haven, CT, 145.050 MHz

W1GTT-10, New London, CT, 145.030 MHz

W1JPZ, Charles Town, CT, 145.050

Airmail Software Setup

Software: Download and install "Airmail" version 3.3.081 or later from <http://www.siriuscyber.net/ham>
Airmail software is NOT compatible with Kenwood built-in TNC's. It works well with the Kantronics KPC3+.

Note: the first time one logs onto winlink, ones callsign and license may need to be verified.

Address Book Setup

Main page
Click on the black book icon (second from left)
Click New
Name: person's name
To: Their email address
Email gate: Email
Post Via: WL2K
Click OK

VHF Packlink Client Setup

Main page
Tools
Options
Modules
VHF Packet Client - check the block and click on the Setup button
From the Connections column:
TNC Type: select the TNC you are using - KPC-3 is at the bottom of the list
Com Port: Select your computers serial com port (usually Com1)
Baud Rate: Select the serial port baud rate (usually 9600)
Do not make changes in the Port Settings column
Check Show Hints
Check Terminal Window and Telnet Client
Check Show in Taskbar for Terminal Window and for VHF Packet Client and Telnet Client
Click Apply at the bottom
Click OK
Close Airmail and restart it.
Note: you cannot program multiple connections. You need to connect directly with a Telpac node.

Formatting a New Message for VHF/UHF Packet

Main page
Click on white page icon (third from left)
Click on a name from your address book
Click OK
Type a message
Click on the small floppy disk icon (6th from the left to save it)
Click on the mailbox icon to post it (7th from the left to say it is ready to send)
Now, click on the Inbox (on the left, you should see a mailbox with a blue arrow and the message)

Sending a Message Through VHF/UHF Packet

Set your radio for the appropriate frequency

Main page

Click on modules

Click on Packet Client

Connect To: Callsign of the Telpac Station

Connect As: Your callsign

Click on the Handshaking icon (third from the left)

Click on the green button and the message should go. Watch closely, it does not take long.

Example

145.030 MHz (Set your radio for the appropriate frequency)

Main page

Click on modules

Click on Packet Client

Connect To: N1EZT-10 (Callsign of the Telpac Station)

Connect As: WB2LUA (Your callsign)

Click on the Handshaking icon (third from the left)

Click on the green button and the message should go. Watch closely, it does not take long.

Sending a Message Through VHF/UHF Packet via Multiple Nodes

Set your radio for the appropriate frequency

Main page

Click on modules

Click on Packet Client

Connect To: Callsign of the first packet station

Connect As: Your callsign

Click on the Handshaking icon (third from the left)

Click on the green button

Once connected to the first packet station, Click on the Keyboard Icon (fourth icon from the left)

Using the connect command (c) in the lower window (C Callsign) to connect to the next node

If you need the connect to more nodes, use the above step repeatedly until you come to the Telpac node

Once connected to the telpac node, click on the Handshaking icon (third from the left)

The message should go. It may take a long time depending upon the number of nodes used

Example

145.070 MHz (Set your radio for the appropriate frequency)

Main page

Click on modules

Click on Packet Client

Connect To: WA2PNU (Callsign of the first packet station)

Connect As: WB2LUA (Your callsign)

Click on the Handshaking icon (third from the left)

Click on the green button

Once connected to the first packet station, Click on the Keyboard Icon (fourth icon from the left)

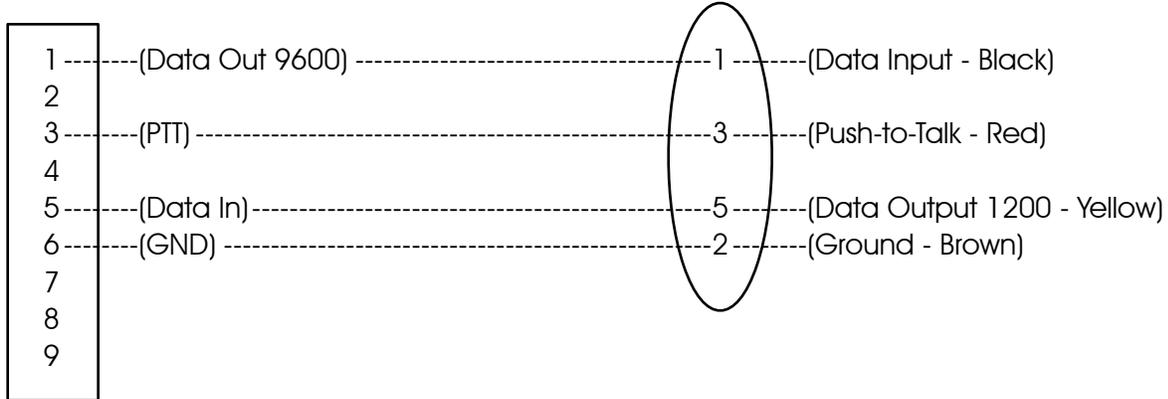
C KC2COJ to connect to the next node

C WA2GUG-10 to connect to the Telpac node

Once connected to the telpac node, click on the Handshaking icon (third from the left)

The message should go. It may take a long time depending upon the number of nodes used

Yaesu CT-39A Cable



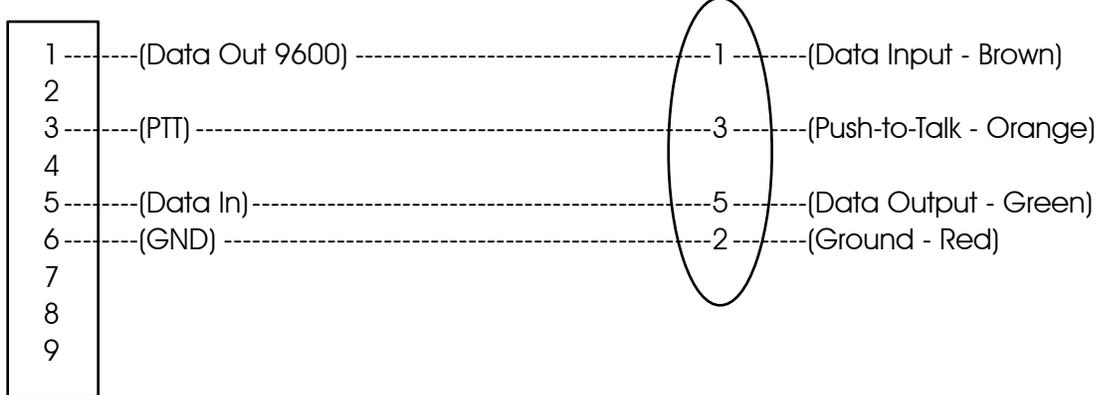
Kantronics DB9 Female Connector

Yaesu CT-39A 6 Pin mini DIN Male Connector

Pin Number Cable Color

1 -----Black
 3 -----Red
 5 -----Yellow
 6 -----Brown

Kenwood PG-5A Cable



DB9 Male To Kantronics

PG-5A 6 Pin mini DIN Male to Transceiver

Pin Number Old Cable Color

New Cable Color

1 -----Brown	Brown
3 -----Orange	White
5 -----Green	Black
6 -----Red	Blue

Kenwood TM-D710A Digipeater Setup

Secondary Station Identifiers

- 0 Your primary station usually fixed and message capable
- 1 generic additional station, digi, mobile, wx, etc
- 2 generic additional station, digi, mobile, wx, etc
- 3 generic additional station, digi, mobile, wx, etc
- 4 generic additional station, digi, mobile, wx, etc
- 5 Other networks (Dstar, Iphones, Androids, Blackberry's etc)
- 6 Special activity, Satellite ops, camping or 6 meters, etc
- 7 walkie talkies, HT's or other human portable
- 8 boats, sailboats, RV's or second main mobile
- 9 Primary Mobile (usually message capable)
- 10 internet, Igates, echolink, winlink, AVRS, APRN, etc
- 11 balloons, aircraft, spacecraft, etc
- 12 APRStt, DTMF, RFID, devices, one-way trackers*, etc
- 13 Weather stations
- 14 Truckers or generally full time drivers
- 15 generic additional station, digi, mobile, wx, etc

To Enter the Menu

1. Press the [F] key
2. Press the Tuning button
3. Esc to return to normal mode

Enable Repeater Tone

1. Press [TONE] until the "T" icon appears
2. Press [F] [T.SEL] and rotate tuning control to select tone frequency

Memory Storage

1. Press [VFO] to enter VFO mode and select the frequency of 144.390 MHz.
2. Press [F] and a memory channel appears, rotate tuning control to select
3. Press [M.IN] to store in memory.

Cross Band Repeater Operation

1. Set the transceiver for dual band mode with 440 on the left and make sure the TNC is off
2. Enter Menu 403
3. Set to Cross Band
4. Turn transceiver off
5. Press [TONE] + [Power On], the PTT icon blinks
6. To return to normal operation, repeat step 5.

Setting Time

1. Enter menu 525 and set time
2. Enter menu 526 to set the time zone UTC Offset (New York: EDT=-4.00 hrs, EST=-5.00 hrs)

Monitoring Packets

Press [PMON] to monitor individual packets

Basic Settings

1. Enter menu 600 and enter your station call sign, eg: WB2LUA-10
2. Beacon type should be APRS in the USA.

Setting the Internal TNC

1. Enter menu 601 and set as follows:
 - Data Band: A-Band
 - Packet Transfer Rate: 1200 BPS
 - DCD Sense: D or RxD Band
 - Tx Delay: 200 ms

Setting GPS Port

1. Enter menu 602
2. If you don't have a GPS receiver or weather connected, set the input and output to OFF
If this is set to on, the My Position data will not be used.
3. To set for an external Byonics GPS:
 - Baud Rate: 4800
 - Input: GPS (the Kenwood manual has this backwards)
 - Output: Off

Setting Way Point

1. Enter menu 603
2. Format: NMEA
3. Name: 67-Char
4. Output: All

Com Port On/Off

1. Enter menu 604
2. Leave this off if not connected to a computer or have other output use .

Programming Position Data

1. Enter menu 605
2. Enter name such as WB2LUA-1
3. Enter Longitude
4. Enter Latitude

Set Beacons Information

1. Enter menu 606
2. Speed: On
3. Altitude: Off, unless you have a GPS receiver connected.
4. Position Ambiguity: Off, unless you want to suppress part of your coordinates.

Setting a Position Comment

1. Enter menu 607
2. Enter "In Service" or anything else you would like.

Setting Packet Filter

1. Enter menu 609
2. You can limit of distance of received packets if you are receiving too many packets from outside of your area.
3. You can also limit the types of stations received. In my area, we have weather stations as close as 1 mile apart. So, I suppressed receiving weather stations.

Selecting Your Station Icon

1. Enter menu 610
2. Select the icon that is appropriate for you station. In this case, select the Digipeater Star

Setting Beacon TX Algorithm

1. Enter menu 611
2. Packet Transmit Method: Auto
3. Initial Interval: 30 min

Programming a Packet Path

1. Enter menu 612
2. Type: *New-N Paradigm
3. Wide1-1: On
4. Total Hops: 2
5. Path is Via: Wide1-1, Wide2-1

Network

1. Enter menu 613
2. Select *APRS

Weather Station Data Output

1. Enter menu 515
2. TX: off or on if you have a weather station connected.
3. TX Interval: 30 minutes

Setting as a Digipeater (My Call)

1. Enter menu 616
2. Adds your call sign to the path if you are the first to receive the beacon
3. Digipeat: On

UICheck

1. Enter menu 617
2. Leave it set to the default 28 sec

UIDigi

1. Enter menu 618
2. Unidigi: On
3. Alias: Wide1-1

UIFlood

1. Enter menu 619
2. When activated, it keeps the beacons within a specified geographical area
3. I set mine to off

UITrace

1. Enter menu 620
2. To view special messages. I set mine to off

Setting Sound

1. Enter menu 624
2. If you don't want to hear beeps for each receive, switch RX Beep: Off

Enable APRS12 Beacons

1. Press [TNC] on the right side of the panel to enable APRS12
2. Press [Beacon] on the bottom of the screen
3. Decay Algorithm: On
4. Proportional Pathing: On

Setting Screen Brightness Level

1. Aux, Enter Menu 501
1. If the rig is on 24/7, set the brightness level to 1.

Enable Repeater Tone

1. Press [TONE] until the "T" icon appears
2. Press [F] [T.SEL] and rotate tuning control to select tone frequency

Set the squelch high enough to block the background noise, but not too high to block beacons.

Note: in an emergency, the airwaves may be so saturated with beacons, it may be difficult to impossible to track a vehicle. In this case, try an alternate frequency and UI View to track them.

Resources

www.wb2lua.com for plans and connector diagrams and HyperTerminal software.

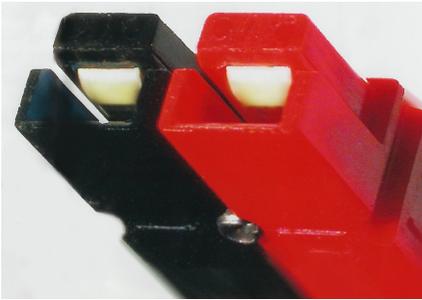
<http://www.siriuscyber.net/ham> for Airmail software

<http://www.ui-view.org> for UI-View 32 software

<http://aprs.fi/?lat=40.8287&lng=-73.3962&timerange=86400> for APRS Google Maps for Long Island, NY

<http://www.findu.com/cgi-bin/find.cgi?call=wb2lua-3&terra=4> for APRS Maps at findu.com

Anderson Power Poles



Anderson Power Poles are universal connectors that are often used so that components can be interchanged with other systems. Soldering these connections works better than crimping. Make sure the polarity is correct - Red on the right and metal pin on top.

Parts List

PC Laptop Computer - \$600

Kenwood TM-D710a UHF/VHF Transceiver - \$540

Kantronics KPC3 plus TNC - \$200

Kenwood PG-5A cable - \$18

Belkin Model F2L088-06, RS 232 Serial cable, DB25 male to DB9 female, 6' - \$30

Keyspan USB to male DB9 RS-232 serial adapter, model USA-19W, \$39

Samlex SEC-1223 23 amp switching power supply - \$100

Power Sonic PS-1270, 12 volt, 7 amp hour sealed acid battery - \$22

Power Sonic PSC-12800A 12 volt, 0.8 amps, automatic batter charger - \$47

Smith-Victor, RS10, 10 ft. Aluminum Light Stand, Folds to: 32 in., Footprint: 47 in., Weight: 3.0 lbs. - \$45

Davis & Sanford, DATC Tribag, 36", Padded Tripod Case - \$20

Diamond, C211, SO239 mount with RG8X extension cable for 16.5 feet total - \$50

Diamond, CRM, Right Angle Bracket with U Bolts - \$17

Diamond AZ507RSP Dualband w/ Spring Mobile 1/2 wave, Antenna, 27.5" - \$47

Cable Xperts, CXP08XC50, 50 FT RG8X CABLE with PL259 plugs - \$39

Power Worx Anderson Power Poles, model PP30-25, kit of 25 power poles, \$20

Rockland Luggage 20" The Bullet II Hardside Spinner Carry-On \$60

Reliance Best Power Peg Plastic Stakes-12 inch, www.campmor.com, Item Number: 21768, 6/\$4

Tent Mallet, www.campmor.com, Item Number: 26006, \$4

1/8" nylon cord for guying

Total: \$1,902