

White Paper RRI-002

Radio Relay International (RRI) Digital Operation Guide

for the Central US Area of RRI

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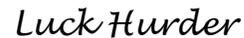
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White Paper RRI-002 for the Central Area
Rev. 1
2 February 2017

REV	DESCRIPTION	REL *	NAME	DATE
-	Initial Draft Contributing Reviewers: L. Hurder, WA4STO; L Jones, WB9FHP; T. Roberson, W5SEG; D. Struebel, WB2FTX; C. Verdon, W5KAV Total Page Count: 47	D	S.R. Phillips	11/15/16
1	Change Digital Traffic Manager and W5SEG Callsign	D	S.R. Phillips	2/2/17

READ: A document stays in the Developmental release state until it is approved by all those listed on the cover sheet. It then becomes Approved and placed under revision control.

* Rel =Release	D	Developmental
	A	Approved

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1 Scope

1.1 General

This document is an update to the NTS-002 white paper entitled NTS Digital Operations. In July, 2016, all digital operations in the Central and Western (formerly Pacific) Areas as well as a portion of the Eastern Area withdrew from affiliation with the ARRL, effectively eliminating the National Traffic System Digital (NTSD) subsystem. In August, 2016, all regional hub operations were reconstituted as a new Digital Traffic Network (DTN). In September, 2016, the DTN affiliated with the Radio Relay International (RRI) organization as part of a reconstitution of the entire traffic handling system at the region and above levels.

The former NTS remains operational at the Section level of ARRL under the cognizance of the Section Managers and their appointed Section Traffic Managers. Some DTN hubs in the Eastern area also preserve their ARRL affiliation and interchange with the DTN hubs in Central and Western, but the system works as DTN, not NTSD. Since the DTN operates at the region and area levels, it is wholly RRI. The lower-level stations that interface with DTN are re-named Digital Traffic Stations (DTS) versus the previous Digital Relay Stations (DRS), since the DRS appointment is ARRL-sponsored.

In discussions with the area digital Managers and new operators wishing to become active in the digital domain of the former National Traffic System, now DTN, it has become clear that there is a lot of confusion about what DTN is, what it does, and how to use it. There is also confusion about the difference between DTN and WINLINK, formerly called WINLINK 2000 or WL2K, and how they may be used together.

This White Paper is intended to provide guidance for digital operations in the Central Area, particularly for new potential Digital Traffic Stations (DTS) coming online. It may also be useful for operators in the other RRI/DTN areas.

1.2 Purpose

The primary purpose of this White Paper is to help new digital operators understand what the Digital Traffic Network operations are and how the system is intended to operate. It describes the difference between DTN and WINLINK operation and how they may be linked together.

This is not intended to be a “how to” guide for setting up digital stations, fully configuring digital software such as AirMail and RMS Express (now named Winlink Express), or connecting computers, Terminal Node Controllers (TNCs), and Radios. Those things are documented elsewhere, and references will be provided for many of them.

Rather, this paper will describe the procedures for using DTN to both send and receive formal radiograms in Standard format, use of WINLINK in conjunction with DTN, limitations on MBO HUB access, and guidelines set forth by the area digital manager and his regional hub stations.

This paper assumes that the readers are already familiar with standard radiogram message format from their experience on manual SSB, CW, or FM nets. Note that as of January 2016, RRI and DTN also handle FEMA ICS-213 forms, as documented in the new RRI Operations Manual and RRI Methods and Practices Guidelines (MPG).

2 Applicable Documents

Note that many of these documents are superceded with the creation of Radio Relay International and the Digital Traffic Network. They will be updated as RRI/DTN specific equivalents become available.

RRI	NTS Manual 2016 (Pre-release version) http://dl.dropboxusercontent.com/u/73013707/NTS%20Manual%202016.pdf
ARRL	NTS Methods and Practices Guide (MPG) (Appendix B of the PSCM) http://www.arrl.org/appendix-b-nts-methods-and-practices-guidelines
ARRL	Chapter 6 of the NTS MPG (MPG6) (NTS Digital) http://www.arrl.org/appendix-b-nts-methods-and-practices-guidelines
K6JT	Central Area Status white paper for the Central US Area of RRI. File Link on http://www.k6jt.com/RRI/
Winlink.org	Winlink System, Airmail Program, Winlink Express Program, Help, FAQ, and additional information. http://www.winlink.org/
K6JT	Pactor-3 Characteristics and Implications for DTN Digital Hub and Digital Traffic Station Operations (RRI-008). http://dl.dropboxusercontent.com/u/73013707/RRI-008.pdf
ADM STAFF	RRI Digital information web site – lots of good information: http://www.nts-digital.net/

3 RRI Digital (Digital Traffic Network)

Much of this section is taken from the Central Area Status white paper, RRI-001, available via the link on the <http://www.k6jt.com/RRI/> website. The diagram below was taken from that white paper, and will be further discussed here.

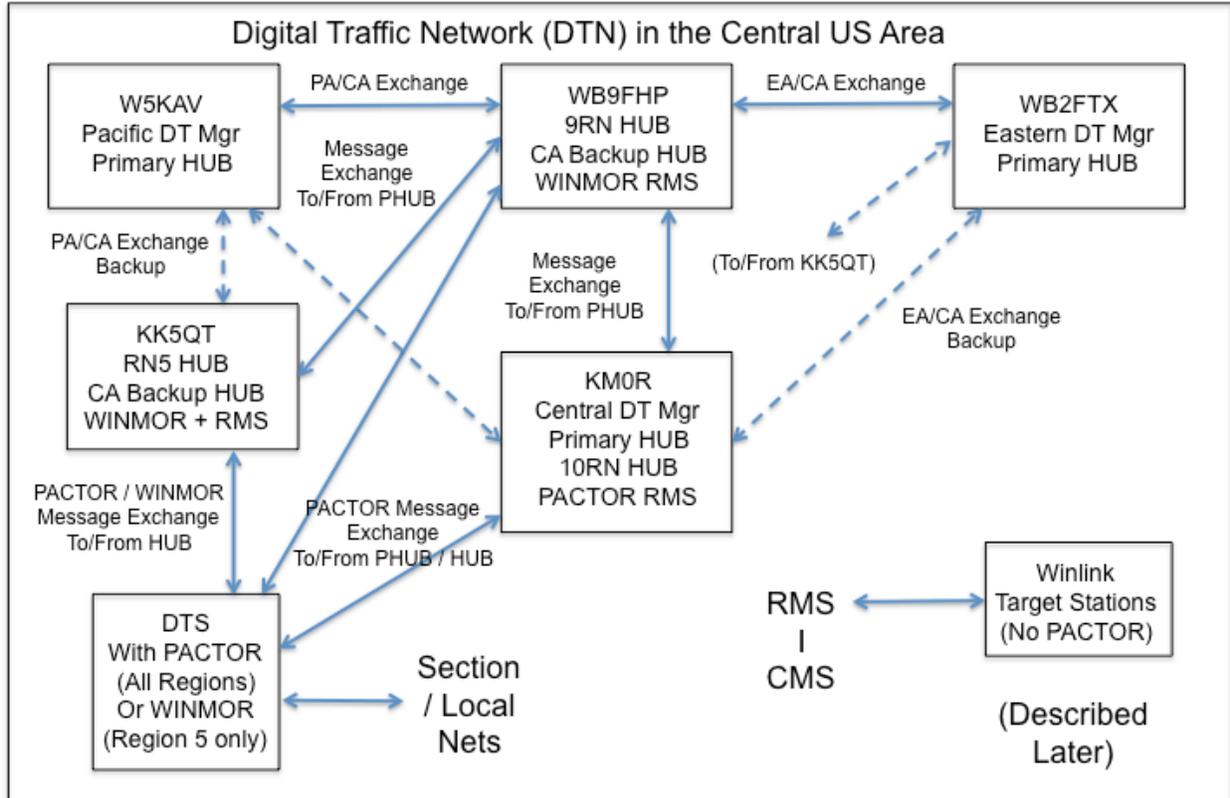


Figure 1 DTN Hierarchy in the Central Area (WINLINK Not Shown)

Let us first put aside all references to WINLINK in the above diagram, including Target Stations. What remains is the structure of DTN as it has existed since before the advent of WINLINK as it now exists. How WINLINK can work with DTN will be described in section 5.

MBO stands for MailBox Operations. It is also used as a noun to describe the station that is running special software in support of DTN Digital operations. The BPQ32 software has many more features than a simple Mailbox, so the preferred nomenclature is HUB. However, in this document, the term MBO may be used interchangeably with the term HUB. Both indicate a station that is capable of automatic store and forward of messages. An MBO is similar to a Bulletin Board System (BBS) where formal messages, termed traffic, can be stored or retrieved. Each of the 3 DTN Areas has a central Hub MBO, run by the Area Digital Manager. The 3 area hubs exchange traffic on a scheduled basis that runs automatically, with timed access attempts among them under control of the MBO/HUB software. Note that connections are NOT initiated unless there are messages waiting to transfer.

The Area MBOs are configured with Regional MBOs, like spokes in a hub/spoke configuration, although it is more properly a "Mesh" since all HUBs can interconnect with each other. There are 2 additional regional hubs in the Central Area (the Area Hub also serves as the Region 10 MBO) to cover the 9th

Region and Region 5. As shown in the figure, KM0R is the Central Area Digital Manager (CADM) and the 10RN MBO. WB9FHP is the 9th Region MBO, and KK5QT is the Region 5 MBO. Several sections / states are part of each region as follows:

Region 5: NTX, WTX, STX (Texas sections), LA, OK, AR, MS, AL, and TN

Region 9: IL, IN, KY, WI

Region 10: IA, KS, MAN, MN, MO, ND, NE, SASK, SD

The system operates automatically, 24 hours a day. Traffic is routed among the MBOs by zip code and state, so all DTN traffic must be identified by zipcd@NTSst, or 75025@NTSTX for example.

As shown in the figure, Digital Traffic Stations (DTS) will connect with their regional MBO to send and receive traffic. The hardware in use by KM0R and WB9FHP will support ONLY PACTOR connections to the MBO (although WB9FHP also supports WINMOR, but only for WINLINK usage as will be described). KK5QT is using special hardware and MBO software called BPQ32. BPQ32 is able to handle both PACTOR and, with additional hardware, a newer waveform protocol called WINMOR connections to the MBO (and also can support WINLINK connections, which are not connected with the MBO). The MBOs also have VHF ports on 2 meters that support AX.25 type packet access to the MBO at 1200 bits per second.

The software controls radios and digital Input/Output devices, called either Modems (Modulator / Demodulator) or in some cases Terminal Node Controllers (TNC). TNCs, which are simply a type of modem, have been in operation for digital radio operations since the late 1970s. They convert digital input (such as keyboard entered messages) into digital data structures, which are further processed to produce audio tones for transmission via a radio. That is the Modulation side. The TNCs also take received audio from the radio and convert it back into digital form for passage to the station operator.

Without going into details about waveforms, let us just say there are many forms of audio tones. These forms result in phase modulation and/or frequency modulation and/or amplitude modulation of the audio tones that are then applied to the audio input of a standard Single Sideband (SSB) or VHF FM transmitter. The primary forms of interest to us are Packet (for VHF radios), PACTOR, and WINMOR, the latter 2 being used on HF. Both PACTOR and WINMOR use error-correction coding and, like normal AX.25 Packet, require acknowledgment of each burst of data sent.

PACTOR originally had a single waveform type, which is now known as PACTOR 1. It is capable of operation at either 100 bits per second or 200 bits per second, depending on signal strength received. There are older TNCs that support PACTOR 1 including many that are no longer in production. The Kantronics company still produces a PACTOR TNC (that supports lots of other modes) termed the KAM-XL for Kantronics All Modes Extra. There are also TNCs produced by the TimeWave Company termed PK-232. There are some older PK-232 TNCs (produced by AEA, from which TimeWave acquired the TNC business) that have been upgraded to run PACTOR-1. The prices for the new ones range from about \$400 for the KAM-XL, to around \$550 to \$600 for the TimeWave PK-232.

There are also modems/TNCs specifically developed for PACTOR that run faster modes, termed PACTOR-2 (or -II) and PACTOR-3 (or -III). There is also a PACTOR-4 waveform, but it is not currently allowed in the U.S. Amateur bands. The PACTOR modes were developed and patented by a German company, Special Communications Systems, GmbH (SCS). Since they have intellectual property rights on these waveforms, and their modems are largely purchased by Marine and commercial radio users who have deep pockets, they are very expensive. The SCS PTC type modems cost \$1200 and up depending on model, but some can be found used for less. The higher PACTOR modes provide much faster throughput, especially on HF, rivaling and exceeding VHF Packet's 1200 baud speed. PACTOR-2 has a maximum channel bit rate of 800 bps and PACTOR-3 supports up to 3600 bps. Throughput is enhanced by use of built-in data compression algorithms.

WINMOR, which stands for WINlink Message Over Radio, is a waveform that was developed by the WINLINK Development Team, primarily for use with WINLINK, as a no-cost alternative to PACTOR. Under good conditions, it yields about the same throughput as PACTOR-2. Information about it can be found on the WINLINK website at <http://www.winlink.org/WINMOR>. This is a software-only (meaning no TNC or modem is needed) mode that makes use of a computer sound card to perform the modulation and demodulation functions. Thus, a computer with a reasonably good sound card may be connected to a radio's microphone (or audio aux) input and speaker (or audio aux) output to operate in DTN with MBOs such as KK5QT and W5KAV (the Western Hub) who are running the BPQ32 software with WINMOR. An outboard sound card using a USB interface such as a Signalink USB or RIGblaster Advantage are a desired configuration since use of a computer's sound card is complicated by the computer's operating system and may not be of high enough quality.

3.1 MBO/HUB Operation

Each MBO is configured to handle specific states and zip code ranges via routing files created by the MBO operator. For each possible zip code range (or all zip codes within a state), the software will automatically (no operator action required) pass along the message either to another MBO or to a Digital Traffic Station that connects with the MBO. Multiple stations can be configured as recipients of the messages in the Mailbox. This is used for MBO to MBO transfers. For example, the Eastern Area Hub, WB2FTX, may have both WB9FHP and KK5QT (and also KM0R) as recipients of the Central Area states traffic. When traffic is available, at the scheduled time and frequency (also in the configuration files), his station will attempt first to connect with KM0R. If that is successful, then all the messages are passed, using PACTOR-3, from his MBO to KM0R's MBO mailbox. If he is unable to contact KM0R after a certain time period, the software automatically tries to connect with WB9FHP, who acts as a backup MBO to KM0R. Failing that, his station will attempt to connect with KK5QT, another backup MBO for the Central Area. Note that the order of connecting to the 3 Central Area HUBs is changeable in the configuration files at WB2FTX.

Similarly, WB9FHP's and KM0R's stations regularly connect with WB2FTX to pass Eastern Area zip coded traffic and receive any waiting Central Area zip coded traffic routed to them. These functions are performed many times a day using frequencies selected based on time of day and propagation. This also occurs with the Western Hub, W5KAV. Note that a connection is attempted ONLY when there are messages to be sent.

On the DTS side, it works in a similar manner. Messages to be uploaded to the MBO are prepared and a connection to the Regional MBO made by the station operator. The waiting messages are then accepted by the MBO software, after which any waiting traffic that has been routed to that DTS is automatically sent to the DTS.

All Area Digital Managers have specified that DTS stations connect primarily with their Regional MBO, or the Area MBO if conditions prevent connection to the Region MBO. In no case, except to handle Emergency or Priority traffic, should a DTS connect with an MBO in another Area. There are some exceptions related to Inter-Area Traffic Network messages only (refer to the RRI-001 white paper for information about the Inter-Area Traffic Network, or IATN), but these are special and for routine messages are really not required. See Appendix A for more information about the restrictions.

3.1.1 MBO/HUB Software

WB9FHP uses the AirMail program for his MBO with augmentations that he has custom programmed. He is in the process of converting to the BPQ32 system.

KK5QT has converted his MBO operations to use the BPQ32 system, which supports both PACTOR and WINMOR simultaneously, as noted in the above diagram. KM0R is also running the BPQ32 software, but with PACTOR only.

The following additional information about BPQ32 was submitted by Chuck, W5KAV, the Western Area Digital Manager, who also runs BPQ32. It is truly a versatile system.

BPQ32 also supports 9600 baud VHF and file attachments from one BPQ32 system to another BPQ32, and BPQ32 can also support Clover, thus you can have a station connect with PACTOR 1, 2, 3, WINMOR, High Speed Packet or Clover (depending on hardware complement).

BPQ can run a VHF, UHF and HF RMS linking stations into the WINLINK system all at the same time on the same system without going to the internet; the system stores the incoming VHF messages and then relays them onto an HF RMS outside of the station receiving the traffic. Example, W5KAV receives a message via VHF, it connects to the first available channel that is free that another RMS is on, in my case either BC or NV, thus I never connect to the Internet, only to another RMS and pass my traffic. My HF RMS portals are all on different frequencies than my DTN portals; I also run two radio systems, thus one radio can be taking in DTN traffic while the other is accepting a RMS connect on a different frequency. Another example is I can have a VHF RMS connect, a HF RMS connect, and a HF DTS connect for DTN traffic using another VHF and HF frequency and all will be taken. Once a channel is free it will relay both the WINLINK traffic and the DTN over HF to other stations.

3.2 DTS Software

There are 2 primary programs available for DTN, Airmail and Winlink Express (formerly named RMS Express), and an additional complex program called Paclink, all available via the WINLINK website, <http://www.winlink.org/>. They are all free and run on Windows XP and above, although some versions of Airmail will run on Windows 95 and above. These work with either PACTOR/Packet modems/TNCs or, for Winlink Express only, WINMOR.

Paclink is the original WINLINK Development Team (WDT) client program. It supports PACTOR, packet and Telnet (described later) connections. It can also connect to RMS Relay (described later) as the Telnet connection. In addition, it contains a small POP3 (Internet mail protocol) mail server. Thus, one can have multiple computers, each using a different tactical address, on a Local Area Network (LAN). This one installation supports multiple users at a single site, without messages needing to be brought into the radio room and transcribed. Paclink also has a native interface to AGW, a TNC and application sharing and switching program. AGW allows multiple programs to access multiple TNCs. Each program must have a different callsign-SSID (e.g., N9ACQ-8). There is also a monitor program and a terminal program at the same site. AGWPE is free, AGWPR Pro will require a registration fee after 30 days. Paclink and AGW are recommended for EOC and other agency installations and are more complex than needed for general DTS usage.

The Airmail program is independently developed (i.e., not by the WINLINK Development Team) but still made available free for amateur radio use. It will work on both HF and VHF with appropriate TNCs using PACTOR or Packet protocols. It provides an E-mail type interface and supports all the currently produced TNCs from Kantronics, TimeWave, and SCS, as well as some older ones still in operation, especially for VHF Packet. Automatic frequency control of the radio by these programs is dependent on the specific radio since no standard exists for computer/radio interfaces. Using the radio audio interface with manual control of the radio's frequency is always a viable operational scheme.

Winlink Express, including a WINMOR module, is a WDT-developed client program. It supports PACTOR, WINMOR, Packet, and Robust Packet with the SCS modems and supported TNCs. It can also use RMS Relay as its Telnet connection and is the only WINLINK client that can use the new Radio Only function of the WINLINK system, described later. While it is free, they do ask for donations to support the WINMOR development, but the program can be used without making a donation (you are prompted for a donation every time the program starts the WINMOR mode until you make one and receive a code that will stop the prompts). This program also supports external TNCs, but only the SCS modems and Timewave 232 for HF PACTOR. Other TNCs, such as the Kantronics models, are supported for VHF Packet operation only.

NOTE: Winlink Express, even with a compatible modem/TNC for PACTOR, should NOT be used to connect to a DTN MBO operating the WINLINK Classic software. Some of these MBOs require the use of the B1F compression method but Winlink Express offers only the B2F method. This restriction does not apply to the Central Area since all MBOs support B2F. Note, however, that the frequencies shown by Winlink Express are ONLY for the WINLINK system. DTN frequencies must be manually entered in the program.

There is also a Telnet mode in all programs that is used only with WINLINK. More about that in the Winlink section of this paper.

All programs work with either DTN MBO connections or WINLINK connections, with the limitation to use only WINMOR with Winlink Express for MBO connections, as noted above. See Section 6, Notes on Configuring and Using Airmail and Winlink Express for more information on using those programs.

3.3 Mailbox Operators (PMBO and MBO) HUBs

3.3.1 Primary and 10th Call Area HUB – KM0R

KM0R is the DTN Central Area Digital Manager (CADM) and the Primary HUB Operator in the Central US Area as well as the HUB for the 10th Call Area. Note that the older term MBO, for MailBox Operator, has been replaced by the term HUB since the digital traffic system provides more services than just a mailbox. This station maintains a Pactor-1, 2, and 3 capable station with 24/7 computer controlled scanning of several frequencies on various bands as follows:

HUB Center frequencies: 03591.9, 03593.9, 07100.4, 07102.4, 10140.9*, 10142.9, 14097.9, 14109.9, 14112.4*, 14113.9*, using PACTOR 1, 2, or 3. Those frequencies denoted with an asterisk should be accessed only with Pactor-1 or -2 since they are outside the auto-control sub-bands. DTS can also connect to KM0R (no dash number) on the VHF and UHF frequencies listed in the next paragraph and connect to the MBO instead of Winlink.

KM0R also runs a Winlink RMS. HF center frequencies are 3597.0 KHz and 7104.0 KHz for PACTOR 3 and 7062.9 KHz for PACTOR 1 or 2. There are also VHF RMS ports for KM0R-10 on 144.970 MHz and 145.030 MHz using standard 1200 baud Packet protocols such as provided by most TNC's (e.g., Kantronics KPC-3) under control of a program such as AirMail. There is also a UHF RMS operating at 9600 bps on 441.050 MHz. KM0R does not support WINMOR connections.

A station wishing to connect on HF sends a connect request using a Pactor Modem and one of several programs designed to work with it, such as AirMail or RMS Express. The auto-scanning software pauses briefly on each frequency looking for a signal and stops when it detects a valid Pactor burst.

KM0R is the primary hub for connections with the Western Area PHUB and Eastern Area PHUB. The Eastern and Western Hubs will try to connect with KM0R. If they are not successful after a period of time, they will try to connect with WB9FHP or KK5QT. Thus, a redundant system results between the 3 stations' capabilities should they be out of service due to, for example, a widespread and lasting power failure or severe T-storms in the area forcing disconnection of antennas to protect the equipment.

3.3.2 Region 9 and Backup Area HUB Operator WB9FHP

WB9FHP is the DTN 9th Call Area HUB. The WB9FHP HUB maintains a Pactor-1, 2, and 3 capable station with 24/7 computer controlled scanning of several frequencies on various bands.

WB9FHP has an incoming Winlink service that will auto-route from Winlink into his system for messages with a specific Subject Line content. He also maintains a WINMOR Winlink RMS. His Pactor-1, 2, and 3 capable station auto-scans the following frequencies for connections with the HUB:

Center Frequencies: 03591.90, 03593.90, 07091.4*, 07100.40, 07102.40, 10140.90*, 10142.90, 10145.0, 14097.90, 14104.90, 14113.9*

* These frequencies should be accessed by Pactor-1 or 2 only, since they are not in the auto-control sub-bands

His WINMOR RMS station (WB9FHP-5) monitors the following frequencies for Winlink connections:

From 0200Z to 1300Z 3575.5 KHz (500 Hz mode); From 1300Z to 0200Z 7075.5 KHz (500 Hz).
Additional frequencies are TBD.

**** **NOTE** **** Stations using Winlink Express (formerly RMS Express) should configure it to NOT add //WL2K to the subject line. The presence of //WL2K forces manual-routing of the traffic.

Traffic sent to WB9FHP via Winlink, using any method, will be automatically routed from Winlink into DTN if the subject line contains the following:

RMS>PAC:<space>NTS:xxxxx@NTSyy

Where xxxxx is the 5 digit zip code and yy is the state abbreviation (e.g., 02351@NTSMA). The message body should contain only a standard MPG-format radiogram starting with the preamble.

3.3.3 5th Call Region and Backup Area HUB – KK5QT

KK5QT receives traffic for all 3 Texas Sections as well as the other 5th call area states of OK, LA, AR, MS, AL, and TN from WB9FHP and KM0R when they have traffic for region 5 each day. This HUB also serves as a backup to KM0R and/or WB9FHP if one of them is not operational. Due to the wide geographic separation between these stations, it is unlikely that an outage so large would occur, thus providing assurance of continued operation of DTN in the Central Area via radio-all-the-way.

KK5QT has a multi-mode station setup that provides HF PACTOR 1, 2, and 3 access to the HUB and Winlink, HF WINMOR access to both the HUB and Winlink, and VHF accesses both to the HUB and to Winlink. The station scans the following frequencies on HF, stopping when a valid PACTOR or WINMOR signal is detected. Note that certain frequencies will connect only as a WINLINK RMS while the others will connect with the HUB's traffic forwarding system.

Stations are requested to not use manual mode when connecting with the KK5QT HUB, and any station found using the LT or LN commands will be subsequently prohibited from using the system. All traffic is pre-routed by zip code to specific DRS/DTS from the HUB. WINLINK access is supported normally.

Table 1, KK5QT HF Center Frequencies and Modes

Frequency (KHz)	PACTOR	WINMOR	HUB BBS	WINLINK RMS
3587.5	1,2,*	500 Hz	No	Yes
3589	1,2,3	1600 Hz	Yes	No
3591	1,2,3	1600 Hz	Yes	No
7067.5	1,2,*	500 Hz	No	Yes
7091.5	1,2,*	500 Hz	Yes	No

Frequency (KHz)	PACTOR	WINMOR	HUB BBS	WINLINK RMS
7098.5	1,2,*	500 Hz	Yes	No
10141	1,2,3	500 Hz	No	Yes
10143	1,2,3	1600 Hz	Yes	No
10145	1,2,3	1600 Hz	Yes	No
14098	1,2,3	500 Hz	No	Yes
14111.5	1,2,3	1600 Hz	Yes	No
14112.5	1,2,*	500 Hz	Yes	No

* Only Pactor-1 or -2 should be used with these frequencies since they are outside the auto-control sub-bands. Similarly, the WINMOR bandwidth should be limited to 500 Hz on these frequencies.

VHF HUB access is on 145.090 using KK5QT as the callsign. VHF RMS (Winlink) access is also on 145.090 as KK5QT-10.

There is no connection between the Winlink RMS and the HUB BBS at this time. KK5QT relies on Region 5 stations to connect with the HUB via PACTOR, WINMOR, or the VHF port. The Texas Zip Code ranges of 75xxx, 76xxx, 77xxx, 78xxx, and 79xxx will all have routing tables for specific stations or groups of stations so that upon their connection, all the traffic awaiting them is automatically downloaded from the HUB. Other states are similarly handled where a Pactor 1 or WINMOR station exists. Most other states have only WINLINK Targets, and some have nothing (see Section 6 of RRI-001).

3.4 Digital Traffic Stations (DTS)

For the purposes of this document, a DTS is defined as a station with PACTOR (or WINMOR for KK5QT) capability that accesses one of the MBO servers directly over-the-air to exchange traffic for that station's section or domain (which may encompass more than one section). Current DTS operators are defined in a table in the RRI-001 white paper. They may also be WINLINK Target Stations. Note that KB00FD, a former CADM, expanded the definition of DTS to include WINLINK target stations, even those without PACTOR (or WINMOR). This practice will be continued by the current CADM, KM0R. DTS is an official appointment, made only by the digital managers, similar to the Official Relay Station (ORS) appointment made by Section Traffic Managers.

The PACTOR (or WINMOR) DTS stations, upon connection with the MBO, will download all message traffic for their assigned zip codes or sections. They will also upload any waiting messages to the MBO, as previously described.

3.5 DTN Traffic Formatting for MBO Input

Traffic to be sent to an MBO using either Winlink Express with PACTOR or WINMOR (BPQ32 MBOs only) or Airmail with a PACTOR TNC (All MBOs), should have the following information, in the format shown:

To Line: NTS:zipcd@ntsst (for example, NTS:75025@NTSTX)

NOTE: *There MUST be NO spaces before or after the @ sign or Airmail will send the message addressed only to the zip code as a Personal versus Traffic message. If NTS: is not entered in Airmail, it will automatically add it.*

Subject Line: (flags) City Area_code Prefix (for example, Plano 972 517)

See 5.2.1.4 for the definition of (flags), which are seldom needed with normal Routine messages.

In the text field, enter the standard format radiogram, starting with the message number and preamble. For example:

```
1 R N5RL 5 SAN ANTONIO TX JAN 30
STEVE PHILLIPS K6JT
637 OAKDALE DR
PLANO TX 75025
972 517 3332
BT
THIS IS A TEST MESSAGE
BT
RANDY N5RL
AR
```

(Note there are no blank lines, no punctuation, all capital letters and the ending AR is optional)

That is all that is needed if using Winlink Express – simply connect with KK5QT on WINMOR (or PACTOR if the modem is supported) and the message will be uploaded to the MBO.

Note that Winlink Express works ONLY with BPQ32 or AirMail MBOs, not WINLINK Classic MBOs.

For Airmail, however, it is necessary to change the “Post via” field from WINLINK to KK5QT (or the callsign of the MBO to which it is being sent). Then, using the HF Terminal module, start a PACTOR connection to KK5QT (or the desired MBO). The reason changing the “Post via” is necessary is that Airmail provides additional capabilities for forwarding messages as defined in routing tables that the user can set up. A normal DTS has no use for these capabilities, but must still remember to change the Post Via field. Otherwise the message will be sent via WINLINK, which does not know how to handle the DTN addresses, and the message will go into the “bit bucket” and not be delivered (with no notification from WINLINK, by the way).

See Section 6, Notes on Configuring and Using Airmail and Winlink Express for more information on using those programs. Note that the “NTS:” in the “To:” line is not added by Winlink Express so it MUST be manually entered or the message will be marked Personal and not Traffic, thus will not flow through DTN without manual MBO operator intervention.

While there is a manual Keyboard Mode that is supported by Airmail and the MBOs, in order to take the minimum amount of on-air time, it is recommended to use the “handshake” mode that will automatically upload messages, formatted as shown above, and then automatically download any messages waiting on the MBO that are routed to your station. Some MBOs also forbid the use of some manual keyboard commands, as mentioned in the KK5QT section previously.

3.6 CAT Radio Control Notes

Both Winlink Express and Airmail support control of certain models of transceivers. They are capable of setting the frequency of the radio to what is entered in the connection screens as well as other parameters such as transmit power for some radios. Appropriate cabling from the computer to the radio must be provided.

However, in several years of using them both, I have never found it necessary to use CAT control, which is not supported by either program for my Ten Tec Omni VII. Manually entering the dial frequency on the radio that is shown in Winlink Express or Airmail is very simple and easier than worrying about how to configure a serial control cable to the radio.

That said, Airmail is also capable of scanning multiple frequencies if it is desired to use it for an MBO. WB9FHP does use Airmail in this manner, in fact, to run his MBO. In that case, CAT radio control is mandatory and a radio that is supported by Airmail must be used.

3.7 DTN Equipment Bank

The DTN Equipment Bank, managed by Dave, WB2FTX, the Eastern Area Digital Manager, is available for all three DTN areas. A new operator wishing to become active in DTN can obtain the loan of a PACTOR-1 capable modem/TNC for a flat shipping charge of \$15.

Along with the loan of the equipment, Dave will provide personal assistance in getting the equipment operational through the first connection to the "home" MBO/hub for the station. This includes helping to get the right cables for both TNC to radio and the needed serial cables and optional add-on serial ports or USB to serial converters as needed to control the TNC from the station computer.

Dave has the following advice for new operators: "I've seen people planning to spend \$400 to \$500 on the current models of the KAM XL and the PK-232 MBX DSP, but for DTN use it still will only give them PACTOR 1 and a very poor implementation of the original PACTOR 1 protocol... For an investment of a \$15 shipping charge they have essentially the same thing to operate. Or they could buy a used one for the typical prices the Equipment Bank lays out to acquire them. If they really like the borrowed TNC/modem, the Bank will sell it to them for the typical acquire price of \$50.

If they have the money to spend \$500 on a current Kantronics or Timewave product, I advise them to not do that. Rather save up a little more money so they can purchase a used fully PACTOR 3 capable SCS modem when we find them on sale. As part of managing the DTN Equipment Bank, I search the classified ham ads and Ebay looking for equipment to acquire. When I find a PACTOR 3 modem or an upgradable PACTOR 2 modem, I circulate this information to my entire Eastern Area DTN email distribution list with a note asking Chuck and Larry to forward it to their DTN operators in Western and Central. The Equipment Bank is always looking for donations both of equipment and cash to keep it operational.

73, Dave WB2FTX (WB2FTX at optonline dot net)

4 WINLINK (Formerly WINLINK 2000 or WL2K)

While DTN is somewhat like a hub/spoke configuration, WINLINK is totally a Mesh configuration, as illustrated in the following figure.

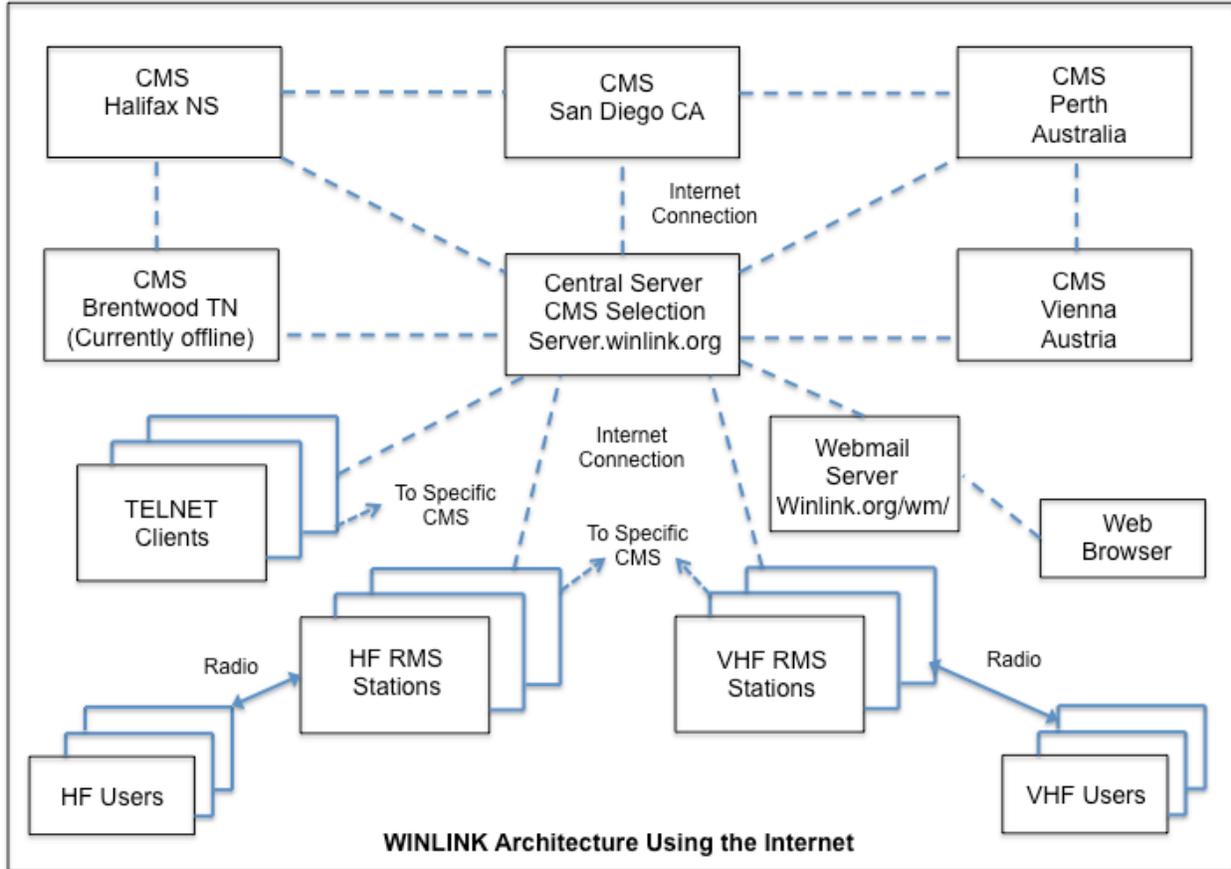


Figure 2 WINLINK Hierarchy and Connections

WINLINK makes use of the Internet to provide what has been termed “radio E-mail” capability world-wide. As shown in the figure, there are currently 4 active central message server sites, termed CMS (which stands for Common Message Server, as previously defined). These CMS sites hold all messages sent via WINLINK, and they correlate their message database among each other, using the Internet.

The primary method of injecting messages into WINLINK via radio connections is through the remote message servers, termed RMS (which stands for Radio Mail Server, as previously defined).

It is also possible to inject messages via the Internet using a protocol called TELNET. The RMS stations use TELNET to access either a CMS selection service or one of the CMS sites directly.

There is also a webmail function, hosted on the winlink.org website, that provides access to the CMS constellation and may be used to view, edit, reply, or forward WINLINK messages using any common web browser, even those on mobile devices such as smart phones or tablets.

Messages sent via WINLINK can be anything that is sent via regular Internet E-mail, including file attachments. They can be sent either to other WINLINK users or to standard Simple Mail Transfer

Protocol (SMTP) Internet E-mail addresses. DTN messages can also be sent, of course, using the standard radiogram format.

“Registering” to use WINLINK involves simply sending a message using one of the available programs (Winlink Express or Airmail, for example) with your callsign entered in the program’s configuration. So the first step is to get one of those programs working and then send a message, for example to your Internet E-mail address. This may be done using TELNET if your radio is not yet configured for use. Callsigns registered are valid for 400 days if no other activity occurs. After that time with no use, they are purged from the WINLINK system.

One might ask the question, “why bother with DTN, why not just use WINLINK for everything?” There are 2 major reasons why DTN is still a better choice for most general radiogram traffic:

1. The weak point of the original WINLINK system is the Internet. The WINLINK Development Team has developed a radio-backup system that is capable of being used in the case of Internet failure, and it has been “rolled out” in many areas, but is not yet deployed in all parts of the country (see <http://www.winlink.org/HybridNetwork>). Since this Hybrid Network can only route messages to nearby RMS stations for relay along the way, a given message will reach a CMS only after reaching an RMS Relay node that has Internet connectivity, so a given message may not be available throughout the network, only within reach of intermediate relays, and messages addressed to Internet E-mail addresses cannot be delivered without an Internet connection.
2. WINLINK is essentially a client-to-client system. Messages may be sent to multiple recipients, but those recipients must have WINLINK access and know to check for them (or check their Internet E-mail for SMTP addressees). DTN is a “general delivery” type of system where multiple DTS stations may be addressed to handle messages, as described in the previous section. There is no need for the specific recipient to be “online”.

An example of how point 2 is important would be trying to send service messages to N1IQI regarding delivery status of one of his license renewal messages. N1IQI has access only to a local VHF Bulletin Board System (BBS), he does not have WINLINK direct access. Messages sent to him via DTN will be picked up by a DTS in that area and put on the BBS for Loren to pick up (or delivered to him via phone, just like any other message through DTN).

The widespread section and local nets of RRI/NTS are capable of delivering messages to recipients that have neither Internet nor radio capabilities. DTN and even WINLINK are only transport mechanisms. Amateur Radio Operators are still needed to bring the messages to Section and Local nets for ultimate delivery.

4.1 RMS Gateway and CMS Operations

The CMS sites are essentially computer server banks with backup and redundant storage systems, much like any Internet Service Provider (ISP). They accept incoming messages and service requests for messages in their database via standard Internet protocols (TCP/IP). There are 5 spread over the world. Messages are distributed from the receiving CMS to all the others. They will also share message status among them.

The RMS sites, which are also called Gateways for user connections to WINLINK, interface with one of the CMS sites to send and receive messages. This can be either through a central CMS selection service at server.winlink.org or by directly addressing one of the CMS servers. The central selection process is the recommended way of operating since a specific CMS may be down for maintenance or other reasons while the central selector will find any available CMS. However, the central selection service, which is actually a multiple IP address registry, sometimes “hangs” on a CMS that is not operational for a time. It generally recovers after a timeout period, moving to another CMS address.

4.1.1 Types of RMS Gateways

RMS Trimode - Gateway for HF modes which include PACTOR and WINMOR. Also supports Robust Packet, which only certain SCS modems support.

RMS Packet - Gateway for packet stations, usually VHF and UHF.

All gateways will accept WINLINK messages and pass them to one of the 5 CMSs, as long as the Internet is available to at least one of the CMS.

RMS Relay - This program will hold messages in a local Message Store if the Internet is not operational at that site. It is mainly used with RMS Packet, or for HF forwarding using RMS Trimode.

BPQ32 - May also be used as a gateway, even without a Telnet connection (see W5KAV's description in 3.1.1).

NOTE: All gateway programs, except BPQ, require XP or above and recommend Windows 7 (or above) as Microsoft has announced support for 7 will continue until 2020.

Many RMS Gateway sites provide multiple paths on multiple frequencies, both HF and VHF. For HF, they use RMS Trimode. For VHF they use RMS Packet with standard AX.25 TNCs, such as the (lower cost) Kantronics KPC-3. Multiple radios are part of these stations for HF and VHF use under computer control.

Note that the BPQ32 MBO software, described in the DTN section, will also provide many functions of Tri-Mode RMS operations within the same station by dedicating separate frequencies for RMS versus MBO access, as previously described in sections 3.1.1 and 3.3.

There are also tools available to MBO operators to take "batch file" radiograms from WINLINK and inject them into the MBO. This will be further described in Section 5, "Using WINLINK in DTN".

The VHF RMS stations are widely used by the ARES for their operations and are also available for RRI use (with permission of the ARES EC or SEC in control of them). These stations consist of a 2 meter transceiver, a standard AX.25 TNC, and RMS Packet software that is available via the Winlink.org website. When the RMS Relay software package is installed along with RMS Packet, that station has the capability to run the RMS Gateway in "stand alone" mode, so that messages can still be left on that server (and retrieved by local stations) even if the Internet connection has failed. They will be forwarded via TELNET as soon as the Internet again becomes available.

There is also an option in the newest RMS Relay, in conjunction with RMS Trimode software, to use an HF PACTOR modem (one of the SCS types) and radio to access a remote RMS HF server in the event of local Internet failure. It may be manually activated at a given site, such as an Emergency Operations Center (EOC) when needed.

As an aside, none of the VHF RMS gateways in Collin County, Texas, have either the standalone or HF backup relay functions enabled. If the Internet is not functional (or a CMS server cannot be reached for whatever reason) the software informs the connected user of that fact and simply disconnects. There are also gateways in the metro Austin, Houston, and San Antonio areas. Their functionality is not known by the author, but it is known that those in San Antonio will not accept connections from unknown stations not in their database. The Collin County gateways allow any station to connect. Naturally, if there is an ARES exercise or situation in progress, these gateways should NOT be used by DTN operators.

4.1.2 Finding RMS Gateways on HF and VHF

The winlink.org website keeps a list of active Public RMS HF and VHF gateway stations that is accessible at <http://www.winlink.org/RMSPacketStatus> . This includes stations running all modes including PACTOR, WINMOR, Packet (VHF), and Robust Packet (HF). Non-public gateways, such as those run by various ARES groups, are generally not found in these lists.

Note that you can save a complete list for each mode in CSV (Comma Separated Values) files, which can then be opened by Microsoft Excel (and other programs) to search for specific stations, locations, etc.

Additionally, the Winlink Express program is able to access the list of RMS HF stations (via the local Internet connection) and, upon station selection, move the frequency into the connection window for PACTOR or WINMOR usage.

4.1.3 Using RMS Gateways

Connecting with an RMS Gateway on HF is identical to connecting with an MBO such as KK5QT, if using WINMOR. Many HF Tri-Mode PACTOR stations do NOT accept connections from PACTOR-1 users, only PACTOR 2 and 3, so WINMOR is the best mode on HF for those with only PACTOR-1, and the Winlink Express program must be used for WINMOR.

The Winlink Express Channel selection function will show the modes by frequency that any specific station uses. Paclink will show the modes by frequency when a specific station call sign is selected.

Winlink Express does support PACTOR modems, but only the higher speed SCS types and the Timewave 232 for HF. Winlink Express will also accept many AX.25 TNCs when operating on VHF. Winlink Express, including the WINMOR protocol software, is available from the winlink.org website via links at <http://www.winlink.org/ClientSoftware> .

The Airmail program, also available from the winlink.org website at the above link, supports many more TNC and modem types, including the lower cost AX.25 TNCs that can also run PACTOR-1. This is much more like a standard E-mail client program, so is a little easier to use than Winlink Express, and it is my preferred program for VHF RMS access and HF PACTOR to DTN. However, configuring it may be a little more involved than Winlink Express for some modes. More about that in Section 6.

Both Winlink Express and Airmail have all the necessary logic to connect with and pass messages to and from RMS servers. As mentioned in the DTN section, this logic is the same as that used to connect with an MBO using WINMOR and PACTOR. This is fortunate, and understandable, considering WINLINK protocols were based on what is now known as Classic WINLINK (or WINLINK 3), developed in the 1990s. Some of the MBOs are still running Classic Winlink, and BPQ32 is compatible.

4.1.4 Using TELNET WINLINK Access

TELNET is a user command and an underlying [TCP/IP protocol](#) for accessing remote computers. It is built into both Winlink Express and Airmail programs, although the Airmail mode may require configuration (see Section 6).

TELNET works directly over the Internet, so your own computer must be connected to the Internet. After composing a message, it may be sent directly to a CMS server by starting the TELNET option in either program. If there are any messages waiting for your station, they will also be downloaded and appear in the message list like any other received message.

TELNET is particularly convenient for sending non-DTN messages and may be viewed as just another form of E-mail using WINLINK as the Internet Service Provider.

Note that per the MPG (see references in Section 2), formal DTN Traffic that is sent using a means other than Radio, which would include TELNET, cannot be included in the traffic count reported to the STM or Digital Manager. Only messages sent using a radio connection (either HF or VHF) may be counted.

One other directive that appears in the MPG is that when a true emergency situation exists, whenever possible, TELNET should be used to move message and other traffic, leaving the Radio access points more readily available to users who have no Internet capability.

4.1.5 Using WINLINK Webmail

WINLINK Webmail is essentially TELNET with a Web interface. After “registering” with the WINLINK system (by sending a message, which may be done using TELNET if your radio is not yet configured for use), you are then eligible to sign up for WINLINK Webmail.

Webmail is a limited feature offered to established radio email users for when they are separated from their stations or email client software. Webmail access becomes available to users only after they have first established a radio e-mail account, and after they request a password at the webmail portal online. Accounts with webmail- or server-only access are not available. Go to <http://www.winlink.org/wm/Login.aspx> and enter your callsign, then click the “Send my password” button. A standard WINLINK message will be sent to your callsign, which you must receive using one of the WINLINK clients. You then use that password to log in again at the Web portal link. Once logged in, there are options to change the password and configure other user settings via buttons at the top of the screen.

Note that starting in April of 2016, the WINLINK system *requires* the use of a password in order to use the system. This is the same password that would be used for WebMail. It must be entered in Airmail and Winlink Express.

I have found Webmail to be especially handy when used from a mobile device, in particular my iPad, even when using cellular data connections. I am able to check if any traffic is waiting and then go turn on the radio and start the client software to receive it. I can also answer quick non-traffic messages or acknowledge receipt of messages directly via Webmail. It is never (in my case) used to actually handle formal traffic unless I will not be home for an extended time (e.g., on vacation). As with TELNET, any messages handled via WebMail cannot be counted in reports to the STM or ADM.

4.1.6 Internet “Spam” Filtering in WINLINK

Messages may be sent from a WINLINK account to standard Internet SMTP addresses, as previously mentioned. Messages may also be sent to a WINLINK account from Internet users with an address of Callsign@winlink.org. However, unless that Internet user address is on a “white list”, or it contains //WL2K as the first characters in the subject line, it will be rejected.

Internet users are automatically placed in the white list if a WINLINK user sends a message to them. Other addresses can also be manually entered using the Webmail service Configuration options.

4.2 WINLINK Message Formatting

Formatting of formal radiogram traffic to be sent using WINLINK is defined in the MPG, Chapter 6. There are numerous options depending on the situation, and MPG6 can be quite confusing to a new user, so this section will summarize what is needed for sending routine traffic.

Sending WINLINK messages that do NOT contain live radiograms is identical to sending them via standard SMTP Internet E-mail. If a message is to go from WINLINK to an SMTP address, Airmail is smart enough to detect that. However, for both Airmail and Winlink Express, it does not hurt to put

SMTP:name@isp.com (prefix with SMTP and colon) for those addresses. Regular WINLINK user addresses need only the callsign as an address, nothing more.

Per MPG6A8 (see the links in Section 2), when a message contains live radiograms, the subject line should contain: **RRI [destination] [quantity]; pse QSL this email**

The RRI indicates any plain text Radiogram content (even if most messages are included in Batch File format). This warns DTN MBOs that direct import is not possible.

- The [destination] [quantity] is entered as desired to denote the general area to which the Radiograms are addressed. This may be a Section or county abbreviation, the abbreviation for a Region or Area RRI net, a zip code, etc., as in: MDC 3, RRIE 4, 1RN 2, etc.
- Multiple [destination] [quantity] entries may be entered when sending a number of Radiograms for different areas, as in: EPA 2 WPA 3, or 1RN 3 2RN 4, etc.
- The “; pse QSL this email” requests that the recipient originate a Radio-email back to the sender confirming receipt of the Radio-email carrying active Radiograms. The date and time received was also requested by ARES groups.

The message body may contain any number of standard format radiograms (see the example in section 3.5), separated by at least one blank line.

While I had been using both upper and lowercase for messages for years, the MPG calls out a different method for radiograms. In particular, it says:

The Radiograms entered must each meet the requirements for formal text Radiograms as shown in the MPG, Chapter 1.

- Radiograms are typed into the body text or an attached file (created with Notepad™ or a similar text editor) using only capital letters, figures and slant bars (/). The preamble, address lines, telephone numbers, address op notes, the text in 5 or 10 groups per line framed by breaks (BT), signature, and signature op notes, are all entered as new lines beginning on the left margin. NR is not required ahead of a message number. The group SVC, followed by a space, should be entered ahead of the message number in service messages.
- Use only single spaces between the groups of the parts of the Radiogram. Note also that there is a space required between the ARL and the check figures, as in: ARL 10; and between the filing time (if used), the month abbreviation and date figures. Tabs are not permitted. Punctuation symbols are not permitted, except for the slant bar (/), and other punctuation is handled as in standard Radiograms.
- A blank line is inserted between the end of one Radiogram and the beginning of the next.
- A blank line is inserted after the last message's signature, and may be followed on the next line by the characters “/EX” or “AR” (without the quotes). The <enter> key must be pressed after either one, thus creating one more blank line below.
- Booking is permitted in plain text Radiogram entry except when messages are to ultimately be sent to DTN MBO Target Stations.
- It is customary to put only a few Radiograms in the body text of a Radio-email (which requires copying and pasting to process). Larger quantities should be entered in an attached text file which can be saved to disk from the Radio-email. *(Note that attachments now work with the new WINLINK Webmail, too).*

- Messages entered in plain text format may be of any service status (such as Routine, Welfare, Priority, HXD, or Service messages) mixed as desired. It is often a better choice to group them by status in separate submissions, however, to assist the recipient with special handling required.
- Messages entered in Batch File format may also be mixed in with plain text Radiograms, although booking Batch File formatted messages is not practical unless the Batch File headers are removed. Since some Batch File information may be lost in so doing, it is better to include Batch File formatted messages as individuals.
- Operators receiving plain text Radiograms in Radio-email may easily present such traffic on manual nets, reading from the body text of the email or opening the attached text file in a suitable editor, or copy the Radiograms to be sent via other means.

Attached Radiogram plain text files may be assigned filenames of choice, limited only by the requirements of the user's computer operating systems at each end of the connection, and using the ".TXT" extender. The originator's embedded call sign or suffix, and a destination and/or quantity, are helpful. (DTN MBOs expect the short 8 by 3 filename for attached Batch Files.)

The next major section will describe the message formatting to be used when a message (or group of messages) is to be sent to a DTN MBO for insertion into DTN. There are additional items that must be added to the front of each message and after each.

Note that messages sent to WB9FHP using the RMS>PAC: subject line (see 3.3) should have only a single radiogram per message, and no additional information in the text block; otherwise the format is the same as described in this section, not in the following section.

require the use of a dash Sub-ID (generally -10) when connecting to them. Don't confuse that with the content of the "To:" line.

When radiograms are to be sent using WINLINK to an MBO for insertion to DTN, it is common courtesy to format them in a manner that minimizes the effort required of the MBO operator. They can then be submitted as a batch file into the software program (batch file parser) that interfaces with the MBO BBS and be on their way through DTN with minimal additional effort for the MBO operator. **Note that a batch file may be submitted to any area or region MBO, not just the primary area MBO.**

5.2 Message Formatting for MBO Input

Formatting is similar for single messages, sent just in the normal text body, and multiple messages sent in either an attached text file or in the body of the WINLINK message. The following subsections describe how to do either, followed by a description of a software program that can save time and assist in making sure the messages are correctly formatted, especially beneficial to new and ARES traffic handlers.

5.2.1 Batch File Formatting

The format of multiple messages to be sent to an MBO is similar to single messages described for transmission via WINLINK to another WINLINK user. However, 2 additional lines and a blank line are required before the message text, finishing with a blank line and /EX on a line by itself followed by another blank line after the message text. Additionally, the Subject line has other requirements, but for Routine messages is essentially the same as described in 4.2.

A Batch file may consist of multiple messages, with one following the previous, immediately starting after the /EX line (see example to follow). These may be created using any plain text editor (Notepad, for example, in Windows). ONLY a plain text editor should be used. RTF files and those created by exporting from another application (such as MS Word) to a "plain text" file may NOT work properly.

The Batch file is then attached to the WINLINK message or the content is simply copied into the body of the WINLINK message. The latter option requires the MBO operator to do extra work and copy / paste into a plain text file before submitting to the MBO tool that will parse it into discrete messages for transmission. When attached files are used, they should only use the (old) DOS 8 by 3 format for their names because of operating system limitations at some MBOs. For example, MYFILE01.TXT, and the file extension should ALWAYS be .TXT.

The "To:" line of the WINLINK message should have the callsign of the MBO operator to whom the batch file is being sent.

Much of the following was taken from the MPG, in particular MPG6A8, so that source should be consulted if there are any issues noted.

5.2.1.1 Subject Line

The subject line should be:

RRI [destination] [quantity] [flags]; pse QSL this email

· The RRI indicates that the entire Radiogram content and/or attached file is in Batch File format suitable for direct MBO importing.

· The [destination] [quantity] is entered as desired to denote the general area to which the Radiograms are addressed. This may be a Section or county abbreviation, the abbreviation for a Region or Area RRI net, a zip code, etc., as in: MDC 3, RRIE 4, 1RN 2, WAN 23, etc. Multiple [destination] [quantity] entries

may be entered when sending a number of Radiograms for different areas, as in: EPA 2 WPA 3, or 1RN 3 2RN 4, etc.

· The [flags] entry denotes the service precedence class of all the Radiograms carried in the attached Batch File, all of which must be the same type. See the Flags explanation to follow. No flag is used for plain Routine traffic without HXD.

· The “; pse QSL this email” requests that the recipient originate a Radio-email back to the sender confirming receipt of the Radio-email carrying active Radiograms. If the date and time of receipt by the MBO is desired, then HXC may be used instead of QSL.

Flags are used to alert the MBO operator of other possible actions that must be performed. In particular, HXD on a message indicates that the MBO operator must manually generate a service message back indicating where the message came from and where it was sent, just like for voice/CW RRI operation.

5.2.1.2 Send Traffic (ST) Line

The first 3 lines of the batch file radiogram consist of an “ST” line, a “Town” line, and a blank line, for example:

```
ST 75025@NTSTX < WA4STO  
PLANO 972 517  
<Blank line>
```

The content of each line is as follows:

ST LINE

ST [zip code] @ NTS[st] < [stn of orig]

as in: ST 21201@NTSMD < W1AW

ST (followed by a space, denotes “Send Traffic”)

[zip code] First 5 digits of the address zip code from the Radiogram address. Canadian zips of two 3 character groups separated by a space must be entered as 6 characters with the intermediate space removed.

@ atsign - space before and after is optional for readability but not required

[st] 2 letter state abbreviation to make a 5 letter group as in NTSMD

< [stn of orig]

Callsign of the station that originated the message for RRI/DTN handling (same as in the message preamble). Note there **must** be a space after the less-than sign for compatibility with BPQ32 MBOs. The older Winlink Classic MBOs will accept it with or without a space, and MPG6 was updated to show the space.

5.2.1.3 TOWN Line

[flags] [town] [area] [exchange]

For example, for a service message: S NEWINGTON 860 555

or for a routine message: NEWINGTON 860 555

[flags] See flag table below. All messages in the Batch File must be of the same service precedence class - the same flag type.

[town] Town name from message address

[area] Telephone area code from message address

[exchange] Telephone exchange from message address

(For some amateur radio recipients, area + exchange may be the call sign if the area/exchange are unknown, for example "Plano K6JT".)

Batch Files may contain only messages with a common service status, precedence, and/or HXD handling instruction, shown by the flag characters, so that each type of Batch File may be handled separately by the DTN MBO. Flag combinations are entered at the start of the TOWN line (followed by a space) for each message in the Batch File. The flag is also entered after the quantity in the Subject line of the transporting Radio-email. A Batch File must contain only messages in one of the following categories:

5.2.1.4 FLAGS

No flag is used for regular Routine messages.

Table 2, Message Flags

Flag	Meaning
S	Service Routine messages
D	Routine messages with HXD
SD	Service Routine messages with HXD
W	Welfare messages
SW	Service Welfare messages
WD	Welfare messages with HXD
SWD	Service Welfare messages with HXD
P	Priority messages
SP	Service Priority messages
PD	Priority messages with HXD
SPD	Service Priority messages with HXD

Although MPG chapter 6 does not specify what to use for Emergency messages, to be consistent with procedures used in voice or CW nets, the word "EMERGENCY" should be spelled out completely in all places where a flag is used, both in the TOWN line and in the message preamble. Of course, one may want to handle Emergency messages more expeditiously than via DTN, which has an unknown and variable delay moving through the MBO hierarchy.

Example of ST and TOWN with FLAGS:

ST 06111@NTSCT < W3YVQ

WD NEWINGTON 806 594
<Blank line>
2 W HXD W3YVQ 10 BALTIMORE MD FEB 10

...

Following the Message itself, there should be an additional <Blank line> followed by “/EX” on a line by itself, followed by an additional <Blank line> if there are no more messages in the Batch file or followed immediately by the next ST line if there are more. The following example of 2 messages illustrates the format and also the use of the precedence flag. Note that only messages of the same precedence and type should be in a given batch file.

ST 52548@NTSIA < K6JT
P CHILLICOTHE N0JL
(BLANK LINE)
100 P K6JT 14 PLANO TX FEB 14
JAMES LASLEY N0JL
MANAGER CAN
218 HIGH STREET
CHILLICOTHE IA 52548
BT
NEED EXTENDED CAN EVENING SUPPORT
FOR FLOOD TRAFFIC MOVEMENT X
PLEASE ADVISE SCHEDULE 73
BT
STEVE K6JT RRIC COORDINATOR
(BLANK LINE)
/EX

ST 54457@NTSWI < K6JT
P NEKOOSA NX9K
(BLANK LINE)
101 P K6JT 14 PLANO TX FEB 14
KRIS BATKA NX9K
MANAGER 9RN
8271 HOLLYWOOD RD
NEKOOSA WI 54457
BT
NEED EXTENDED 9RN DAYTIME SUPPORT
FOR FLOOD TRAFFIC MOVEMENT X
PLEASE ADVISE SCHEDULE 73
BT
STEVE K6JT RRIC COORDINATOR
(BLANK LINE)
/EX
(BLANK LINE FOLLOWING LAST MESSAGE – very important or last message may not be included)

As previously mentioned, this “batch” could be included in the textual portion of a WINLINK message, but is better as a plain text attached file. When sending a WINLINK message with an attachment, the Text of the message should indicate inclusion of the file.

For Example, with the messages shown above saved to a plain text file named K6JTMSG1.TXT, since they are of Priority precedence, it may be more expedient to send them to the Central Area Hub rather than the regional MBO. The WINLINK message might be something like the following:

To: KM0R
Cc:
Subj: RRI TEN 1 P 9RN 1 P; PSE QSL THIS EMAIL
[Text:] RRI TEN 1 P 9RN 1 P

FILE ATTACHED: K6JTMSG1.TXT
TNX AND 73, STEVE
[TEXT ICON]
K6JTMSG1.TXT 1KB

5.2.1.5 Service (SVC) Messages

The Service (SVC) types of messages are used to inform the message originator of the status of that message, either delivered or not delivered and why.

The MPG specifies putting the letters SVC in front of the message number and using the appropriate Flag in the Town line. This practice is rarely used on voice and CW nets now. It was common 20 years ago, but in the author's opinion really serves no meaningful purpose over simply sending the message with Routine precedence, as 99% of those received via CW nets in recent years have been.

Of course, it could be used to prioritize the handling of a large number of messages, and this is likely what an MBO operator or DTS might use it for, to handle Service Routine messages that may be requesting additional information before regular Routine messages. Because the vast majority of service messages simply inform the originator that the message was successfully delivered or that it could not be delivered due to a disconnected phone, etc., discussion is underway to possibly eliminate this archaic practice from the digital domain along with all the flag types that include it.

5.2.2 Individual Message Formatting

If there is only a single message, it could be simply included in the text portion of the radio-email. The format is identical to the last message that is to be placed in a Batch file, including the "wrapper" around the standard radiogram and blank line following the /EX.

5.2.3 DTN Parser Software

The following information was received from Dave, WB2FTX, the Eastern Area Digital Manager.

The Parser software will format messages entered in a text file into the proper format batch file for direct reading into a DTN MBO by the MBO operator using a companion program on the MBO side. The DTN Parser software is now available for use.

One good use for the entry level Parser can be with an ARES operator at an emergency shelter who is preparing health and welfare traffic. The Parser automatically corrects many common errors found in radiogram preparation.

This project has been under development for several years through the efforts of Joe KB3LNM under the guidance of AI W3YVQ with input from the RRI Winlink Committee. Joe has put a lot of hard work and his money into this project.

It is intended for use by ARES and other radio operators originating messages to format standard radiogram messages for submission into the DTN system. This software will generate the DTN message header and footers based on address information in each message and place the messages in output files sorted by precedence and special handling (e.g., HXD). The user can then attach the DTN parser message output text files to Airmail, Winlink Express or other DTN mail software for transmission into the DTN. The use of this software assures correctly formatted DTN headers for reliable delivery by the DTN system.

This program provides a lookup table for commonly used call signs. If the call sign of an addressee is in the lookup table, then this software will fill in the zip code, city, state, and phone number fields in the DTN

message header from the call sign lookup. Note that the proper radiogram address format for this abbreviated address form is call sign, city, state and zip code. The call sign lookup table can be customized by the user.

The program also has lookup tables for zip codes for both the US and Canada. There is a popup window allowing one to enter either a zip code or city and state. This lookup is used in generating the DTN header where the zip code is absent using the city and state to find the zip code for the DTN header. *(Editorial note: For cities with multiple zip codes, this may not be the correct zip code for a particular addressee, but it will still assure the message is routed to the correct DTS for handling).*

The DTN parser software does some basic checks of the standard radiogram structure. It checks for the presence and order of required fields in the preamble line. It will verify and correct the check value. Punctuation should not be used in radiograms, but where encountered, this software will replace or remove the punctuation. The message number, time filed, and date filed fields will be reformatted if needed.

The original message and the revised message are presented to the operator to decide to accept the changes or correct format problems in the messages first.

The program is for the Windows 95 to Windows 7 operating systems. It may work on Windows 8 and above as well. The primary operator interface is an edit window similar to Microsoft Notepad that works with the Windows clipboard supporting cut and paste operations. A separate text file may also be used as input directly. A help file is provided that interacts with the software to provide users with help and additional information.

Another version of the DTN parser software is available for MBO operators only. The MBO software version parses messages the same as the basic DTN parser, but is designed to run unattended sorting messages by state or zip code, generating E-mail messages with the output files as attachments and forwarding of the E-mail directly into a mail server for delivery. Messages that are undeliverable are put into an error file directory for manual handling.

A log file is maintained for all messages received. The forwarding and sorting functions are configurable by the MBO operator.

The user version of the DTN Parser comes in a zipped executable file about 8 MB in size. In some cases this can be sent as an email attachment. If you are interested in receiving a copy of this software please contact your Area Digital Manager (KM0R for Central, W5KAV for Western, and WB2FTX for Eastern). Your ADM will supply you with the program and also answer any questions you may have.

5.2.3.1 Additional Notes About the Parser

I installed the released version 1.2.12 of the Parser software (a new one is in Beta testing as of February, 2014, and additional updates may have occurred since then) and ran several different messages through it, some of which were generated by new traffic handlers and were not correctly formatted for Digital use (they were fine for voice nets). I quickly discovered that the Parser could not handle spelled out State names in either the preamble or in the address lines. Only the appropriate 2 character State abbreviation was acceptable. It could not correct those and the error messages provided sometimes did not quite point to the true problem. Joe, KB3LNM, has been advised and is considering possible changes.

The installed version also could not handle messages addressed to DL4FN in care of another station, which have become quite common as service messages are needed to indicate problems with Peter's message deliveries. I resolved this problem by adding DL4FN to the call sign lookup table, which was easy to do, but I have been informed that a new version already has this function included.

If the program detected an ARL Forty Seven or ARL Sixty Seven in the text, it automatically added "SVC" in front of the message number and split out that message from others into a separate output file. Per the MPG guidelines, this is correct since a given batch file should contain only messages of the same precedence, and SVC is considered different from Routine.

The program can accept multiple messages, each separated by a blank line, in a given input file. When there were significant problems in one or more of the multiple messages, I found that the program would not save the corrected output until later message errors had been corrected. Sometimes it was necessary to exit the program and re-launch it for it to save the corrections in new files. It could also not deal with BTs in the wrong place or if there were more than 2 per message. That had to be corrected before the program would continue parsing the messages.

The corrected text file's name(s) are shown at the bottom of the main Parser window. They are created using an underscore and character(s) indicating the precedence of messages in the file, appended to the original text file's name. For example, _R for Routine messages, _SR for Service Routine messages, etc.

The program will also save the original text if messages are entered in its own main window via keyboard, using the File : Save menu option.

Overall, the program worked very well with reasonably formatted inputs, removing unneeded punctuation and adding the 2 additional ST and Town lines before the message itself and also adding the /EX and any needed blank lines after the message, while concatenating multiple messages of the same precedence (same FLAGS as defined in 5.2.1.4) into a single file. Multiple output files are created when the source messages are of different precedences. The program appeared to be fully compliant with the MPG Chapter 6 guidelines.

6 Notes on Configuring and Using Airmail and Winlink Express

A lot of help is available through several Yahoo groups, as submitted by Bill, N9ACQ. You will need to have a Yahoo ID, which is free, to subscribe to any of these. Suggest obtaining one with your callsign at yahoo dot com if you don't already have one. At this time, it appears the first 2 groups have migrated away from Yahoo. The third is still active.

<https://groups.yahoo.com/neo/groups/wl2kemcomm/info>

https://groups.yahoo.com/neo/groups/winlink_programs_group/info

and,

https://groups.yahoo.com/neo/groups/Loading_WL2K_user_Programs/info

The first is for those operators interested in Emergency Communications (EMCOMM), while the other 2 have information about using WINLINK and the user programs. There are other groups as well for specific application of WINMOR using Winlink Express.

The primary source of information and help files (and Frequently Asked Questions – FAQ) is the winlink.org website. The above, and other groups, are listed there under the Support tab. Also check the Files tab for other documents such as How-to and particularly Training_aids, where various documents are available such as “Getting Started on Packet Airmail” and other setup assistance documents.

6.1 Airmail

The Airmail website is found at <http://www.siriuscyber.net/ham/> . The program may be downloaded from there and installed in Windows. As previously mentioned, Airmail will work on Windows 95 and up.

After installing the software, it needs to be configured. But before starting the configuration, if Airmail is to be used for DTN messaging, not just for WINLINK, then an additional file should be obtained from the Area Digital Manager. There are 3 of these files, named system.DTNxx.ini, where xx is WA for the Western (formerly Pacific) Area (W5KAV ADM), CA for the Central Area (KM0R ADM), or EA for the Eastern Area (WB2FTX ADM).

The file should be placed into the same directory where Windows installs Airmail. For Windows XP that is C:\Program Files\Airmail. Windows 7 and 8 install Airmail in slightly different directories. The best thing to do is to search for the System.HAM.ini Airmail file and then put the DTN file into the same directory.

Then start Airmail. A window will pop up asking for your DTNCA callsign. Enter the same one as you use for the HAM system. This will also create two separate systems under the Tools : Options menu selection, as described next.

The following window appears when the Tools : Options menu item is selected in the Airmail main window. The Connections, Settings, and Modules tabs will be described in this document. In all cases, be sure to click “Apply” before closing the window.

The window shown next is accessed by the “Settings” tab. This is where the station callsign is set along with other parameters. Of course, enter your call in the space shown. It is recommended to use only your callsign, no dash numbers entered in the next field.

The Station Location information may be obtained by looking up your callsign on QRZ.com. Enter the data from QRZ into the fields shown.

The Current Message number should start with 1 for a new installation. Other fields on this screen in the Keyboard Mode and Messages sections should be left at their default values, as shown in the figure. Make sure the B2F item is selected in the BBS Forwarding Protocol section, since this is the default and always used with WINLINK. Also, fill in the Radio Password field if Airmail is to be used with WINLINK.

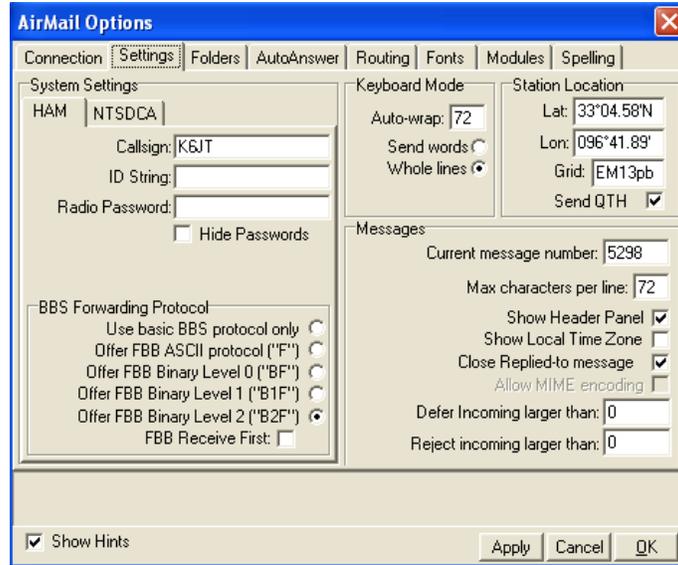


Figure 4 Airmail HAM System Settings (WINLINK Usage)

Next, click the “DTNCA” tab under System Settings. The following screen will appear (with the tab named DTNCA instead of NTSDCA, which was the older name).

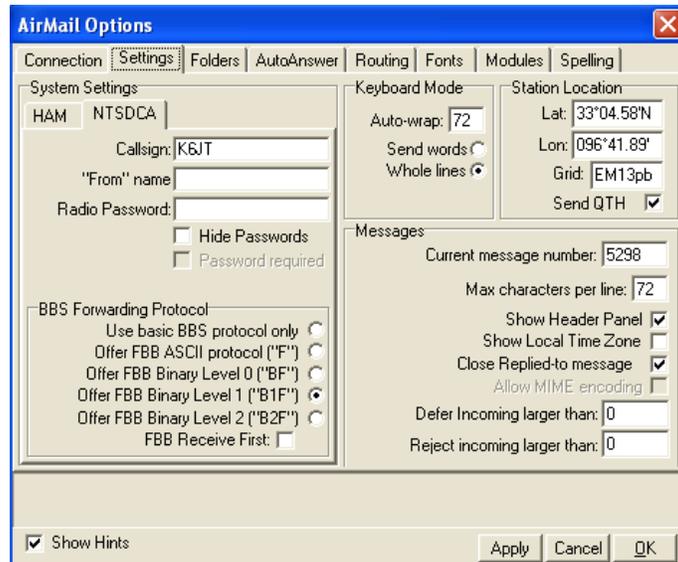


Figure 5 Airmail DTNCA System Settings (DTN Usage)

All the settings except the BBS Forwarding Protocol section are the same as for HAM. It is very important to select the B1F item as shown in the figure if you are in the Eastern area since this will be used for DTN connections and some MBOs running Winlink Classic *must* have B1F selected or message garbling and errors will result. This does not apply to the Central Area MBO's, however, since all can support B2F, so

B2F should be selected. It is not necessary to enter a Radio Password for DTN-only usage, but it will not hurt to do so, using the WINLINK password.

The next window is accessed via the Modules tab. It is here that the 3 primary modules needed for HF PACTOR, VHF Packet, and TELNET must be enabled by clicking the circled check boxes. Configuring the various options is a bit tricky since the windows needed for each are distributed among several different places.

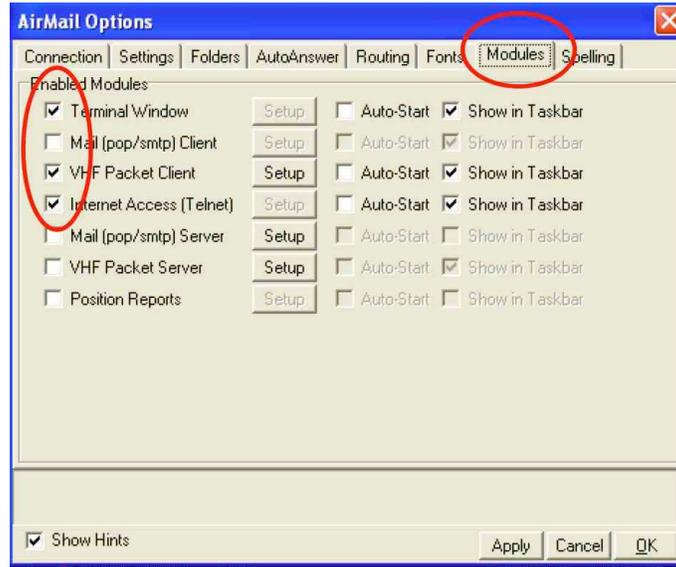


Figure 6 Airmail Module Options

The Terminal Window options will be set via the Connection tab selection. The VHF Packet client settings are accessed from this window by clicking the Setup button. The Internet Access options must be set after selecting that module from the main Airmail screen, as will be shown later.

To configure the VHF Packet client, click the "Setup" button to the right of that check box. The following screen will appear:

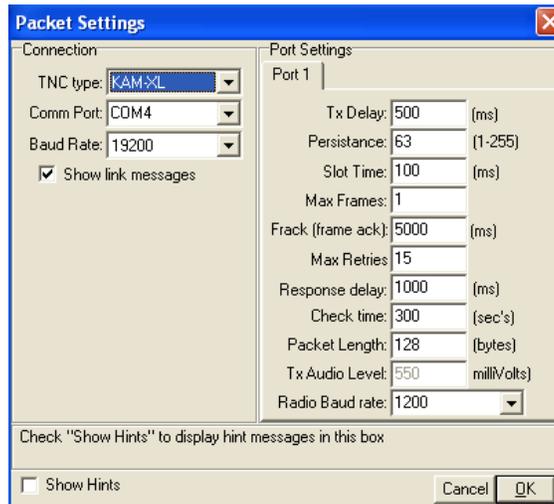


Figure 7 VHF Packet Settings

The information to be entered depends on the type of Modem/TNC that is being used, the Virtual (or Real) COM port to which it is connected, and the speed of that port. There are pull-down selection boxes from which each of these items is chosen. The values under Port Settings use the built-in Airmail defaults, which are generally good enough to use with no changes for standard 1200 baud packet. Some of them may vary depending on the type of TNC used. Select "OK" to save the changes.

Next, the Connection options will be set by clicking on the "Connection" tab of the Airmail Options screen. This configures the HF PACTOR system for use. Selecting that tab will display the following window.

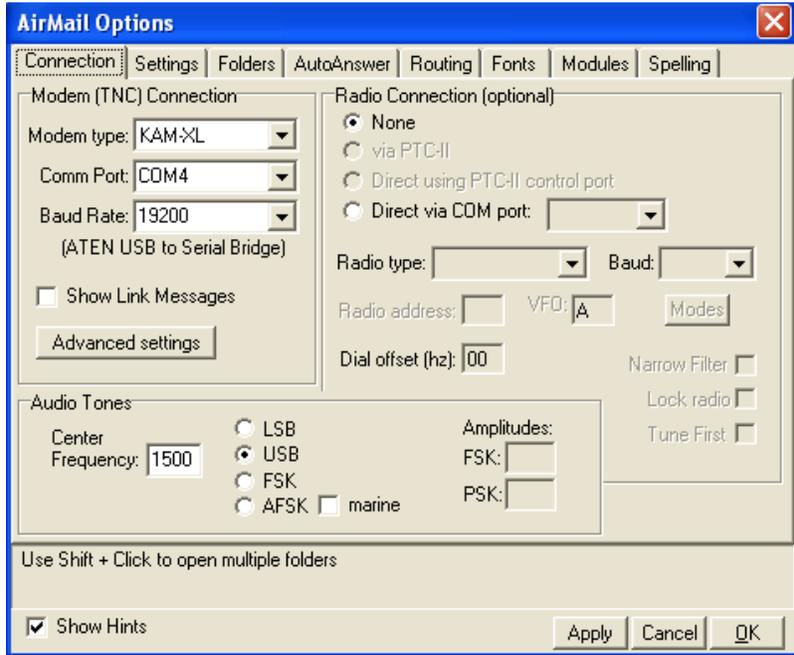


Figure 8 HF PACTOR Configuration Options

Again, the values entered will depend on the type of modem/TNC being used, and the values are selected from the pull-down boxes. This is an old screen shot with an older modem but suffices as an example. I currently use an SCS modem for Pactor-3, but still with USB and 1500 Hz offset.

The Radio Connection will not be dealt with in this paper. Only certain types of radios are supported. Refer to the documentation or Airmail help files if it is desired to use Airmail to configure the radio.

The Audio Tones section is available for those modems that support configuration of these items. Some do not and a fixed center frequency is used (believe the PK-232 is like that). The KAM-XL provides for setting the center frequency and sideband. Historically, PACTOR had used Lower Sideband (LSB) for correct sense of the mark and space tones. However, since WINMOR uses Upper Sideband (USB) and a 1500 Hz tone offset, I chose to configure the KAM-XL's PACTOR system to use the same. This allows leaving the dial frequency of the radio on exactly the same frequency when switching between PACTOR and WINMOR at my station. Note that Airmail is smart enough to configure "reverse" tones when USB is selected. The use of USB means that the radio dial frequency is set BELOW the published MBO center frequency. For the values shown above, that is going to be 1.5 KHz.

To configure the TELNET settings, first click "Apply" and then "OK" to exit the Airmail Options setup. From the main Airmail window, select the "Modules : Internet Access" pull-down menu. This will bring up the following screen(s). The main screen is the outer one and will appear first. Then click the "Settings" button (shown highlighted in the figure). The Telnet Settings dialog window will then appear. If any of the values are not as shown in the figure (other than callsign), change them to match those shown-click "OK".

To use TELNET, make sure the “Handshake” icon is selected (as shown) and not the Keyboard icon. Then click the Green button to start the connection with a CMS. If any messages were previously composed, they will be sent and any waiting WINLINK messages will be received. If a problem occurs, click the “Stop” button to abort the connection. At times, when a CMS is not operational, an error message will appear or progress will appear to “hang”. Wait a little while and try the Green button again. If all is well, the CMS name will be shown along with the messages exchanged.

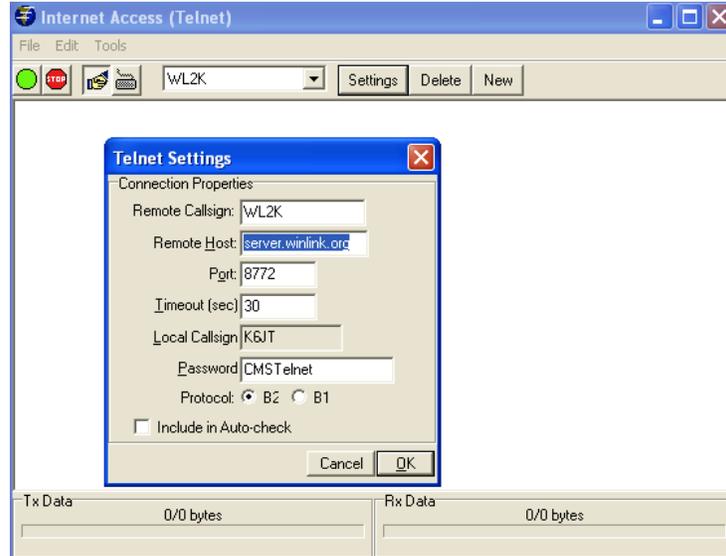


Figure 9 TELNET Settings

Upon selecting the Modules : Packet Client menu item from the main Airmail Message Index screen, the following window will open. The controls are similar to those on the TELNET screen. The TNC must be powered on and connected to the computer before selecting this module or an error will occur. While keyboarding is permitted with VHF RMS gateways, and is described in the MPG, it is suggested to always use the handshake mode, which is the one selected below. Keyboarding ties up the gateway, making it unavailable for others to use, while the handshake mode will quickly send and then receive any waiting messages. Enter the callsign of the VHF RMS (K5PRK-10 shown below) and your call should be in the Connect As window. A sample connection is illustrated.

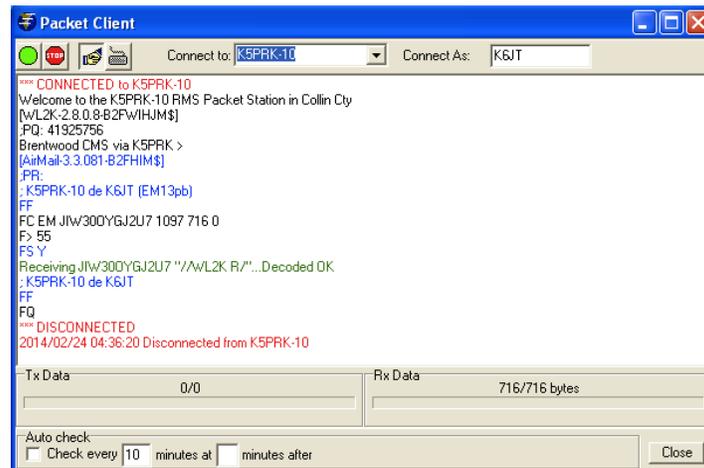


Figure 10 Packet Client Module Window

As messages are sent or received, the TxData (send) and RxData (receive) bars will go green showing the approximate status. But the TNC will buffer transmit data, so this is not really a good indicator.

Wait for the status to show disconnected before closing the window. There is often a delay after the final "FQ" status is sent before the disconnect occurs.

When the Modules : HF Terminal menu item is selected, the screen shown below will open. This is similar to the Packet Client window, but there are more options. Again, note the use of the handshake mode. Keyboarding should never be used on HF because of the slow transfer speeds and some keyboarded commands are absolutely forbidden, as previously discussed.

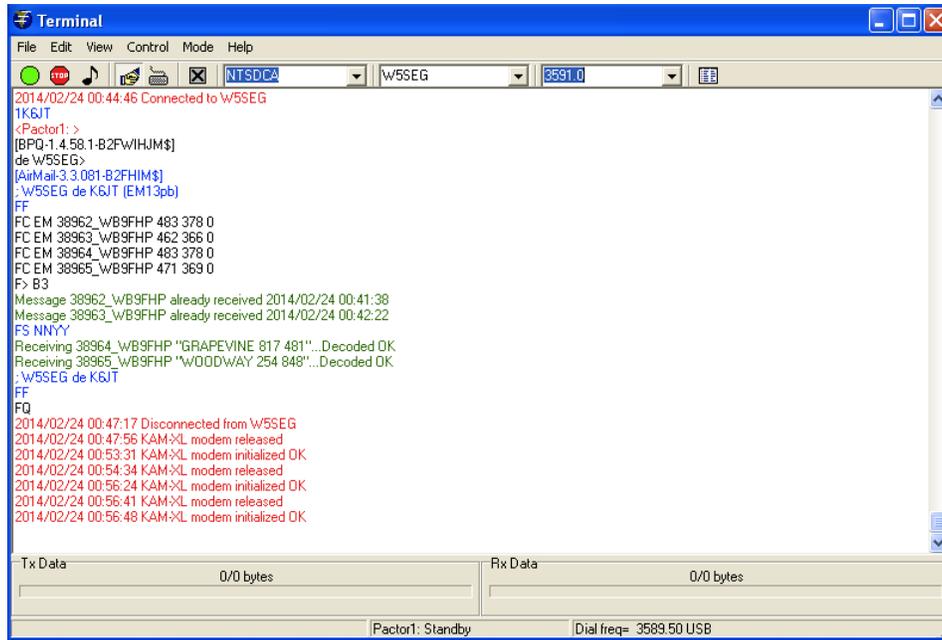


Figure 11 Terminal Module Window

Note that there is a field to select either the DTNCA or HAM systems (ignore the NTSDCA name – it has changed). This will determine the B1F or B2F protocol used and also a different set of stations will be available in the following entry box. For DTN use, always have the DTNCA selected first. After the station call is selected, then all available frequencies for that station will be available in the next entry box.

There are also some features that can help set transmit levels. The Control menu item has an "Output Command" selection. Any TNC command can be entered in the pop-up dialog box and it will be sent to the TNC. For those TNCs with configurable output levels (like the KAM-XL), the xmitlvl command value can be entered, even while in a connection with the RMS or MBO, to change the tone amplitude (hence output power). The level can be tested before initiating a connection with the Green button by clicking the "Musical Note" icon next to the Stop button. There are also other possible uses for this window as shown under the Mode menu item, but they will not be discussed here. Normal RMS and MBO connections do not need to use any of them.

Note that the dial frequency is shown at the bottom of the window corresponding to the TNC settings and the selected center frequency. This is handy and is similar to the feature provided in Winlink Express, which will be described next.

6.2 Winlink Express

Winlink Express, including WINMOR, is available from the Winlink.org website at:

<http://www.winlink.org/ClientSoftware> . If you are asked for a password to the Winlink FTP Site, just change it to “Guest” and log in that way. You then have access to autoupdate.winlink.org and will see file folders, one of which is User Software. You will need the RMS_Express_Setup... zip file and you should also install the itsfhbc_... (ITS HF Propagation) program, which will allow you to obtain propagation estimates for all WINMOR (and PACTOR) sites from within Winlink Express. You will also need to install Microsoft .NET Framework 2.0 from MicroSoft’s website if you do not already have it installed in your version of Windows.

You do not need to separately download the WINMOR program files – they are included with the RMS_Express_Setup... file.

Once all programs have been installed (Windows XP minimum system due to the use of the .NET framework), starting Winlink Express will result in display of the following window:

*** NOTE *** All screen captures were created before the name change of RMS Express. Also, I did not have Pactor-3 at the time so only WINMOR is shown. PACTOR is similar using a modem that is supported (such as the PK-232MBX or SCS modems).

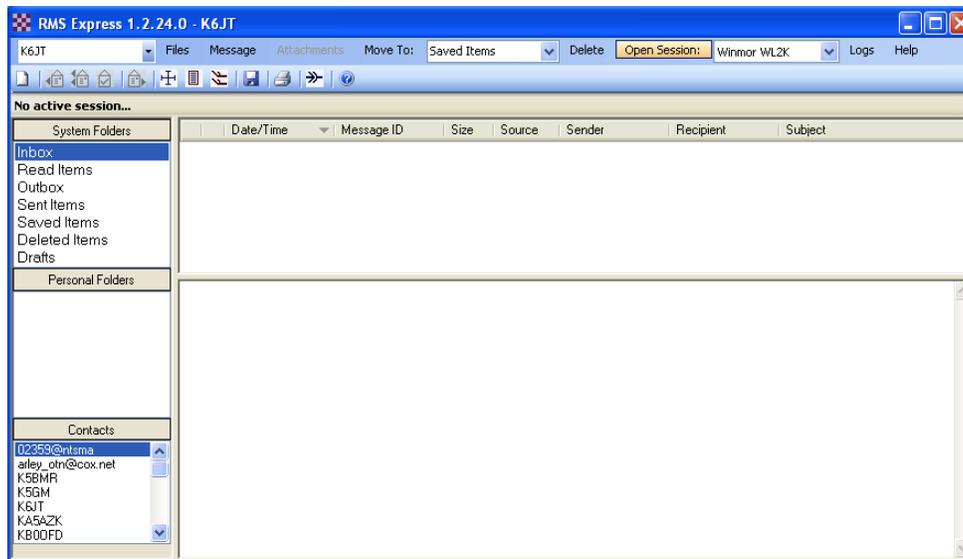


Figure 12 Winlink Express Main Window

You may be prompted to install an update. These seem to come out quite frequently, so expect them each week or even more often. The program automatically downloads and installs all updates (assuming you have an active Internet connection).

Under Files : Winlink Express Setup, you will find the window to enter your callsign and your grid square (same as for Airmail). Get your grid square from QRZ.com if you don’t know it. All other items may be left at their defaults.

Referring to the Open Session item in the above figure, first select the Winmor WINLINK option as shown and then click the Open Session button. The following screen will appear. An additional Sound Card TNC window will appear (not shown here) to provide status on the connection once it is made.



Figure 13 WINMOR Main Window

The above window is where options for the WINMOR software TNC are to be set by clicking the (highlighted) Setup menu item. Before describing that, note that some of the other menu items have useful functions. In particular, the Channel Selection menu item will (if ITSHF is installed) download a list of all the currently active WINMOR RMS sites and give an indication of the Path Reliability and Path Quality estimates for them. Selecting one (after the download update finishes) will place that station and its center frequency and Dial Frequency values in the above main window. You can also store MBO frequencies that are not otherwise in the RMS site listings. Note the “Favorites” one shown for W5SEG (who is now KK5QT) and the frequency. By clicking “Select” to the right of that field, the values will be placed in the main window fields.

*** NOTE *** For DTN, do NOT use the Channel Selection menu item – it shows ONLY WINLINK stations

Before “Start” can be selected, the Setup menu item should be selected, which results in the following window being displayed.

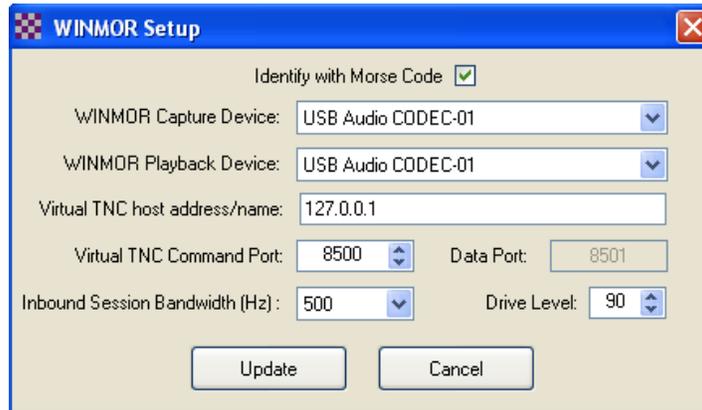


Figure 14 WINMOR Setup Window

The Capture and Playback devices will depend on what audio hardware is being used. The values shown above are for a SignalLink USB interface, which contains sound card and PTT circuitry. The TNC host address of 127.0.0.1 is the default and is the address of your internal computer for most installations. Leave the other values set to their defaults and it should work fine. I suggest always checking the “Identify with Morse Code” box. Although an ID in WINMOR encoding is sent at sign-off, and is legal by itself, it is nice to also have the Morse identifier.

A word about bandwidths. Some RMS stations (and MBOs) operate only in 2 carrier mode (using 4-ary FSK and QAM modulation), which occupies about a 500 Hz bandwidth (shown above). Others have an 8 carrier mode that occupies 1600 Hz bandwidth. Throughput of the 8 carrier V4PSK/8QAM modulation mode rivals that of PACTOR 2, and exceeds it under good conditions. When conditions are less than ideal, WINMOR will “downgrade” its modulation to a more robust version, starting with the most robust 8 carrier type, going to a 4-ary FSK 8 carrier, and finally down to 4-ary FSK, 2 carrier, which is about as

slow as PACTOR 1 at 100 bits per second. The mode in use will appear in the Sound Card TNC window that also opens. 1600 Hz bandwidth is legal ONLY in the auto-control sub-bands.

Once the "Update" button is selected, assuming the audio sound card logic is functional, the Start menu item on the WINMOR Main Window may be selected to attempt a connection. There is a busy detector that will not allow transmission if another signal is detected on the frequency. Always listen first, anyway, before transmitting.

One other note about WINMOR setup. I found that the trickiest part about getting it to work, especially on transmit, was properly setting the Windows output volume level. So if problems are experienced, check that the audio input and output are routed to the device(s) specified in the WINMOR Setup Window and that the output volume level is of sufficient amplitude. You can download the Signalink USB manual from the Tigertronics website at <http://www.tigertronics.com/slusbmain.htm> . It gives some good information even if you are using some other sound card or device.

A final reminder: Winlink Express with WINMOR may be used with MBOs running BPQ32 and all WINLINK RMS stations. If a supported PACTOR modem is installed in the station, Winlink Express should NOT be used for connections with MBOs running the Winlink Classic software. Some of those require the use of the B1F forwarding protocol, but WINLINK uses the B2F protocol and Winlink Express was developed for WINLINK use. There is no way to configure it to use B1F. BPQ32 MBOs can support the B2F protocol, so supported PACTOR modems may be used to connect with them using Winlink Express.

Be sure to turn off the automatic addition of //WL2K to the subject line in the Winlink Express options as well as enter your password for operation. Failure to do so causes extra work for a DTN HUB operator.

7 Document Specifics

This document composed with Microsoft Word 97-compliant settings. Left and right margins are set at 1". Font is Arial, 10 point.

7.1 Acronyms

Acronym	Definition
CAN	Central Area Net
Cycle 2	Indicates daytime nets meeting primarily before 1700 local
Cycle 4	Indicates nighttime nets meeting primarily after 1700 local
CMS	Common Message Server (WINLINK Central Server)
DRS	Digital Relay Station (now Digital Traffic Station)
DTN	Digital Traffic Network (formerly NTSD)
DTS	Digital Traffic Station (formerly DRS)
Hub	Primary MBO for an DTN Area or for a Region / State
IATN	Inter-Area Traffic Network (formerly TCC)
ISP	Internet Service Provider
MBO	Mail Box Operations (DTN Node)
MPG	Methods and Practices Guide (Appendix to the PSCM)
NTS	National Traffic System
NTSD	National Traffic System, Digital (now DTN)
PSCM	Public Service Communications Manual
RMS	Radio Mail Server (WINLINK Remote Server)
RN5	Fifth Region Net
SMTP	Simple Mail Transfer Protocol (Internet E-mail)
TBD	To Be Defined
TBR	To Be Reviewed or To Be Revised
TBS	To Be Specified
TCC	Transcontinental Corps (now IATN)
TCP/IP	Transmission Control Protocol / Internet Protocol
TEN	Tenth Region Net (CW)
TEX	Texas CW multi-section Net (WTX, NTX, STX)
9RN	Ninth Region Net
10RN	Tenth Region Net (SSB)

Acronym	Definition
WDT	WINLINK Development Team
WINLINK	WINLINK digital system

8 Appendix A – MBO Usage Guidelines and Restrictions

The following guidelines and restrictions have been published by the Area Digital Managers. The first one, for the Central Area, comes from Gary, KB0OFD (SK). Gary was replaced by Larry, WB9FHP, when he had to resign due to health issues and Don, KM0R is the current CADM. The second one, which has additional information that is applicable to the Western (formerly Pacific) Area but also of value for Central and Eastern comes from Chuck, W5KAV.

8.1 Central Area Guidelines

1. DTN MBOs and Digital Traffic Stations (DTS) should only poll their Regional Hub to receive or send traffic if using a manual system such as Airmail. If you cannot connect to your Regional Hub then connect to the Central Area Hub or alternate Central Regional Hub.
2. If you cannot connect to the Central Regional Hub or the alternate Hub, DTN digital stations may connect to the next Regions Hub or Alternate to send outgoing traffic. This is only on a temporary basis and does not apply to "TELNET" over the WINLINK System for messages or batch files, which may be sent to the regional MBO or Central MBO.
3. DTN MBOs or Digital Traffic Stations (DTS) may not connect to out of Area Digital Hubs/MBOs unless they are instructed to do so by a designated local, county, state or federal official or in an emergency or disaster. This also includes using "TELNET" over the WINLINK System.
4. Heath and Welfare traffic for the affected area will be held for 48 hours before being sent to reduce interference and maintain clear frequencies for emergency traffic unless told otherwise by either the local served agency official or Area Digital Manager (ADM).
5. If a DTN Digital station goes down for any reason, that station needs to advise the Central Area Digital Manager ASAP. The Central Area Digital Manager will then advise all other stations as required or needed.
6. Stations will send in a monthly report before the 5th of the month, consisting of a traffic count of received, sent and total number handled for the past month via digital.
7. All Central Area DTN Digital stations must read and be familiar with the New Chapter 6 of the MPG found at the reference given in Section 2 .
8. If you have questions, please contact the Central Area Digital Manager.
9. Central Area Digital MBOs:

CENTRAL AREA HUB - 10RN MBO – KM0R

ALTERATE CENTRAL AREA HUB - 9RN MBO – WB9FHP

ALTERNATE CENTRAL AREA HUB - RN5 MBO – KK5QT

8.2 WESTERN AREA DIGITAL STATION AND TARGET STATION GUIDELINES

1. Western Area Automated DTN Regional HUB/MBOs will NOT periodically poll any Automated DTN HUBs for traffic. If a Hub/MBO has traffic destined for a station, a connect should be initiated by the MBO/HUB having that traffic. This should be the only time another HUB/MBO should connect to one another, and each forwarding file should reflect this. The only time a Regional Hub should poll for traffic on an hourly or more frequent basis is when told by the Region Hub that it is receiving large amounts of traffic destined for that DTS's area or the DTS has outbound traffic. You should never ask for that DTN HUB/MBO to list traffic ("LT") on a DTN HUB/MBO. If a DTN HUB/MBO has traffic for said station it will be forwarded at the time of the connection.
2. All forwarding files within the Automated DTN MBOs in the Western Area will be set up only to connect to another station if they have traffic for that station. This also applies to connections outside the Western Area.
3. State and Regional Hubs may not connect to out of Area Digital Hubs/MBOs unless they are instructed to do so by the Area Digital Manager or, the local, county, state, or a federal official in an emergency or disaster. However, Regional Hubs within the Western Area may connect to each other to pass traffic meant for another Region within the Western Area. This rule only applies to DTN type traffic and not personal Correspondence going from one friend to another, even though the DTN staff would like you to use a message to keep the system operational and oiled.

Added NOTE: Only in a proclaimed emergency or time of disaster can this rule be broken. During a proclaimed emergency, stations may contact any digital station to send and receive emergency traffic.

4. In an emergency, DTN stations are to advise the Regional Hub if #3 above is in effect. The Regional Hub will inform the Western Area Hub. The Western Area Hub is responsible to manage all available Western Area assets to support emergency traffic.
5. Health and Welfare traffic inbound to an affected area will be held for 48 to 72 hour hours before being sent to reduce interference and maintain clear frequencies for emergency traffic unless told otherwise by either the Area Digital Manager (ADM) or RRI Area Staff Coordinator.
6. Bulletins will only be forwarded on VHF or Telnet, not over HF circuits. The mission of DTN stations is to only send and receive traffic.

Added Note: The name of the game is to expedite emergency traffic; bulletins tie up frequencies which are then not available to process emergency or Health and Welfare traffic.

7. During normal operations, traffic will be sent to the proper Regional Hub for distribution within that Region. If there is more than one station in a Region that receives traffic, it is the responsibility of the Regional Hub to divide the traffic among those stations either by zip code or by daily, weekly or monthly appointment or a combination of all the above. This rule only applies to DTN type traffic and not personal correspondence going from one friend to another through the WINLINK system, even though the DTN staff would like you to use a message to keep the system operational and oiled.
8. If you cannot connect to your Regional Hub OR that Regional Hub's alternate, digital stations may connect to the next Region's Hub or Alternate to send outgoing traffic. If a DTN digital station cannot receive any traffic on an ongoing basis, that station should notify the Regional Hub's Sysop or the Area Manager, or both, so they can make arrangements for that digital station to receive traffic.

Added Note: Alternate Regional Hubs should follow the statement in Rule 5 above regarding the breakup of traffic for other Regions or Areas.

9. Stations will send in a monthly report to that Region's Hub Sysop before the 5th of the month. That Region's Hub Sysop will forward all reports from his/her Region to the Area Digital Manager consisting of a traffic count of sent and received for the past month.
10. If a DTN Digital station goes down for any reason that station needs to advise the Area Digital Manager ASAP. The Area Digital Manager will then advise all other stations in the Western Area as well as the other two Digital Managers East and Central.
11. For "HAM" or "TELNET" over the WINLINK System, the forwarding protocol should be B2F. For forwarding over "HF" or "VHF" over the DTN System, the forwarding protocol should be B1F.
12. All Western Area DTN Digital stations must be familiar with the PSCM, MPG and New Chapter 6 of the MPG found as specified in Section 2.
13. Stations operating on HF with manual software such as Airmail, Paclink, or WINMOR must listen at least 15/20 seconds on the frequency before transmitting or attempting to connect to their State or Regional Hub.
14. All Regional Hub Sysops should have SKYPE software. Alternates are not required to have said software but it is highly recommended so they might join in Area conferences regarding the DTN Western Area. This software is free and can be downloaded at <http://www.skype.com/intl/en-us/get-skype>
15. Target stations must be able to connect, send, or receive radio email and traffic from any served agencies or other Target stations. Section Target Stations are required to check the WINLINK system at least once a day or more if possible for traffic. Target Stations should have the ability to connect to a VHF RMS if possible or to TELNET. Target Stations at the State or Sections Target must have or be able to link to a RMS on HF due to the fact in some areas VHF links are too far apart and thus can not connect to a VHF RMS.
16. Regional Target Stations/Digital Hubs must be able to connect to the WINLINK System via HF if their internet/Telnet fails, this is a must. DTN Hubs must have software running twenty four hours a day that is connected to the WINLINK system and is able to receive radio email over the WINLINK system via Telnet. It is paramount that the Regional Hubs be able to reach into VHF or section networks at the lowest level with either HF, VHF or Telnet in a emergency or disaster.
17. These Guidelines are recommended for the Western Area Digital and Target Stations only, and not for any other Area, since other Areas may differ in their operation. These Guidelines follow the revised Chapter 6 MPG which should be read and followed for good operation of a DTN Station.
18. "Unattended" USA stations should not operate PACTOR 3 (P3) outside the 7100-7105 segment. It is my understanding that "attended" P3 operation outside that segment is legal. (For "best practice") scan P3 only in the 7100-7105 segment, and scan P1, P2, and WINMOR outside that segment. It is my understanding that "attended" P3 operation outside that segment is legal if used to pass traffic if the operator is present. **** Note ** No P3 operation is allowed outside the auto-control sub-bands per FCC regulations.**
19. There is a little known WINLINK limit regarding Attachment names. fifty (50) character maximum, including spaces and file extension type. See WINLINK FAQ 360. There is no "error message" that shows up....the Attachment is just not received by the WINLINK recipient!

Chuck Verdon W5KAV Western Area Digital Manager DTN

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9 Appendix B – PACTOR History and Information

The following information was received from Dave, WB2FTX, the Eastern Area Digital Manager. It is interesting so is included here for general information.

The two German hams who developed PACTOR licensed the protocol to the TNC manufactures like AEA (now Timewave), Kantronics, and MFJ. These builders of PACTOR 1 TNCs took many shortcuts that cheapened the product and undermined the original specifications to the point that some TNCs were so inferior as to hurt the reputation of the mode itself. Many written articles of the time were devoted to the inferior performance of the PACTOR 1 mode itself, when in fact the units under test themselves did not meet and undercut specifications.

Because of this, the company they founded, SCS, clamped down on letting others make inferior copies of their products. The bad experience of marketing PACTOR 1 led to the high cost (for a fantastic unit) for newer products to grow even higher. In addition, the tight control of the source code and the shielding of technical aspects caused the "freebee" software writers to be essentially "shut out" of attempting to write inferior copies of software-only applications of first PACTOR 2 following through PACTOR 3 and 4. SCS invested a significant sum in R&D to develop these protocols and did not want to see them spoiled by inferior imitations. Hence they totally control the source code and a lot of the technology involved in producing these products.

That being said, with the possible exception of some of the digital technology developed for the military and other quasi government use, the upper PACTOR modes, and especially PACTOR 3 and now 4 represent the best solution to sending data on the HF bands.

I have heard presentations where representatives from groups like FEMA are backing the development and use of PACTOR 4 and urging the amateur community to petition the FCC to eliminate the archaic symbol rate restriction which only applies to US amateurs and nowhere else in the world. This artificial speed barrier is reducing the probability of the US amateur community being able to contribute to the development of robust high speed data protocols.

That it the main reason why the ARRL submitted their rule making petition on this topic... One of the things the ARRL Board of Directors did was to order the construction of a more fact driven explanation of what their petition is attempting to accomplish. There has been a lot a nay saying from other groups who do not understand that PACTOR 4 is the same bandwidth as PACTOR 3 but two times faster, hence the amount of time a PACTOR 4 message takes is one half that of a PACTOR 3 transmission within the same bandwidth.

Others are afraid that this will mean the entire bands will be overrun with wide bandwidth automatic digital signals. There is definitely an anti-automatic control group out there who would like to see every form of automatic and manual digital transmission be prohibited. Reference the digital stone age petition of several years ago. Others operate under the mistaken idea that the HF RMS gateways initiate transmissions automatically on their own. That is not true, they only respond when queried by a human operator. All of the newer Sysop software developed by the Winlink Development Team has effective frequency busy detectors built in, which will not allow a gateway to transmit if the frequency is already in use.

DTN operates almost exclusively in the very narrow automatic control band segments on 80, 40, 30, 20, 17, 15, 12 and 10 meters... Many hams don't even know these exist under the FCC regulations.

In addition, the Scanner module on a Winlink Classic MBO also has a busy frequency detector, which cannot be disabled. By protocol, a DTN MBO/hub will only initiate a call out to another station if it has traffic for that station. There is no periodic polling of stations looking for traffic.

Also see the RRI-008 white paper (listed in Section 2) for detailed internal information about PACTOR 3.

9.1 Need for more Digital Stations

In my view, the Central Area DTN does not have very many DTS who are RF capable. There are a lot who use WINLINK and that is fine, but it should be at least a second choice.

We try to use this order of priority for traffic:

1. The cyclic standard RRI system of nets
2. DTN
3. WINLINK

That first choice is so not to starve the nets, although I will admit that anything I originate goes via DTN because that is my primary interest.

So anything I can do to increase the number of RF capable DTS in Central Area will be undertaken. That also includes the establishment of any other MBO/hub in Central Area. Winlink Classic can operate using a PK-232 MBX at PACTOR 1. Obviously that is not the optimum configuration since the main MBO/hubs operate at PACTOR 2 and 3, but a new MBO/hub could be put on the air with a PK-232 MBX from the Equipment Bank. Later the operator could then upgrade to PACTOR 2 or PACTOR 3 as they gain some operating experience and their finances permit. As you have seen, I circulate information on used PACTOR 2 and PACTOR 3 modems that become available.

A PACTOR 2 modem will range from \$250 to about \$450 and the PACTOR 3 one is in the \$500 to \$750 range. Also, most PACTOR 2 modems can be upgraded to PACTOR 3 for an investment of another \$288.

Here is their web site if you have never seen it: <http://www.farallon.us/webstore/> Note that most of the used SCS modems are the PTC-II series which was discontinued last year. The direct replacement for one of those is the PTC-III USB. The rest of the modems on this web page are PACTOR 4 units which are fully backward compatible with PACTOR 1, 2, and 3. And also quite expensive... but then so were the PTC-II series when they were new. About 8 years ago, SCS came out with the PTC-IIe followed by the PTC-IIex, which are smaller and have fewer features than the other models, which were the PTC-II USB (with a USB connector as opposed to a serial port) and the PTC-II Pro. The "E" in the PTC-IIe and ex models was supposed to indicate "economy."

That means, for example, a MBO/hub might be able to afford a PACTOR 2 modem and then later save up for the upgrade, going back to the PACTOR 1 PK-232 MBX during the period, they would have to send the PACTOR 2 modem to Farallon Electronics in CA for the upgrade. Farallon is the primary US distributor for the SCS modems. The upgrade to PACTOR 3 involves two different things. The first is the installation of what is called the electronic serial number board. This installation is what requires the modem to be sent to Farallon for the upgrade. The electronic serial number board allows the callsign associated with a particular modem to be changed by the user. That part of the upgrade is \$119. The second part is the purchase of the PACTOR 3 license for \$169. The total of that comes to the \$288 quoted above. Actually PACTOR 2 modems do have a limited 20 connection trial of PACTOR 3 standard so you can try it out to determine whether you want to invest in the higher speed. Upgrading from PACTOR 2 to PACTOR 3 is certainly worth the investment, not only for the increase in actual data transfer speed, but the PACTOR 3 signal is a more robust protocol and able to tolerate more noise and interference.

For example, it is very difficult to interrupt a PACTOR 3 connection in progress from interference, but it is easier to have a PACTOR 2 connection interrupted by interference. On the other hand, under some conditions, PACTOR 2 works better. For instance, hams living up north in Finland and Sweden have found that PACTOR 2 will get through when there is a lot of ionospheric action like an aurora when PACTOR 3 will not.

Here are the approximate maximum speeds in bits per second obtainable with each of the PACTOR modes:

PACTOR 1 200 bps (also has a 100 bps mode),

PACTOR 2 800 bps,

PACTOR 3 3200 bps,

And PACTOR 4 5500 bps.

The graph below illustrates how large a difference there really is among the modes.

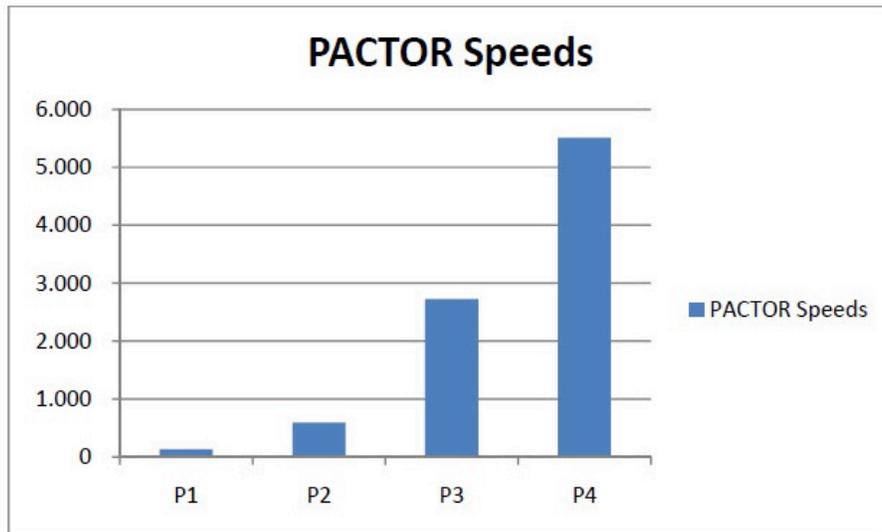


Figure 15 PACTOR Mode Speed Comparison (Bits per Second)

You can see why PACTOR 4 is a great advantage over PACTOR 3, while occupying the same bandwidth.

73 Dave WB2FTX