

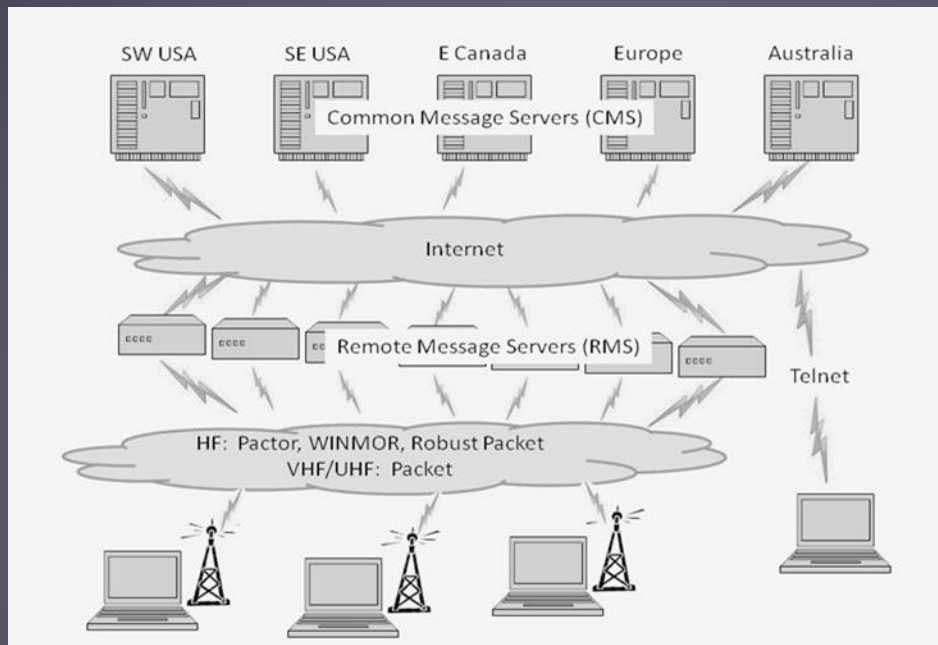
Winlink 2000 E-mail via Radio Emergency Communication

Phil Sherrod – W4PHS



Organization of This Presentation

- Brief review of Winlink 2000 architecture



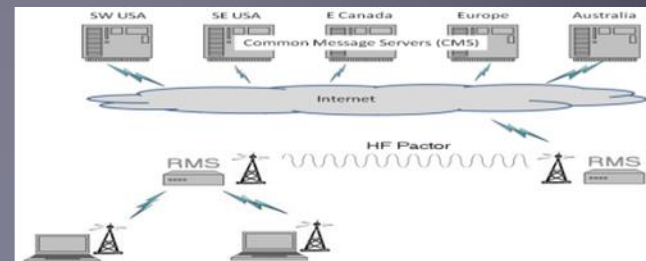
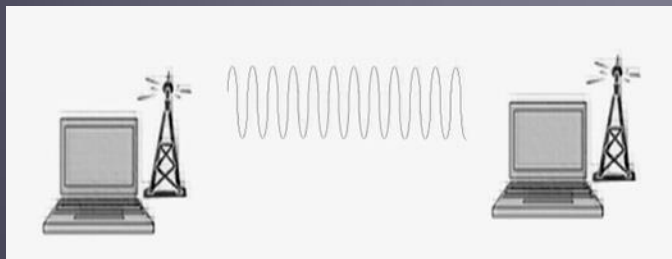
Organization of This Presentation

- Brief review of Winlink 2000 architecture
- Features of Winlink 2000 that make it well suited for EmComm use.



Organization of This Presentation

- Brief review of Winlink 2000 architecture
- Features of Winlink 2000 that make it well suited for EmComm use.
- Recent enhancements to the Winlink system to adapt to new requirements by the EmComm community.



What is Winlink 2000

- Worldwide system for sending e-mail via radio
- Provides e-mail from almost anywhere in the world.
- Provides vital support for 10,000+ sailors
- Adopted for contingency communication by many government agencies
- Used by infrastructure-critical NGOs such as International & American Red Cross, Southern Baptist Disaster Relief, DHS Tiered AT&T Disaster Response & Recovery, FedEx, Bridgestone Emergency Response Team, etc.

Emergency Communication

- “... we got nothing when we tried calling out on HF. We tried calling the Maritime Mobile Net, but nothing was out there. As a last-ditch effort, we used Winlink to e-mail the Coast Guard for help. Within an hour, we heard a C-130 plane, and later, a helicopter overhead.”
- *Doug Faunt, N6TQS*
- (Bounty survivor)
- 14 of 16 Crew rescued



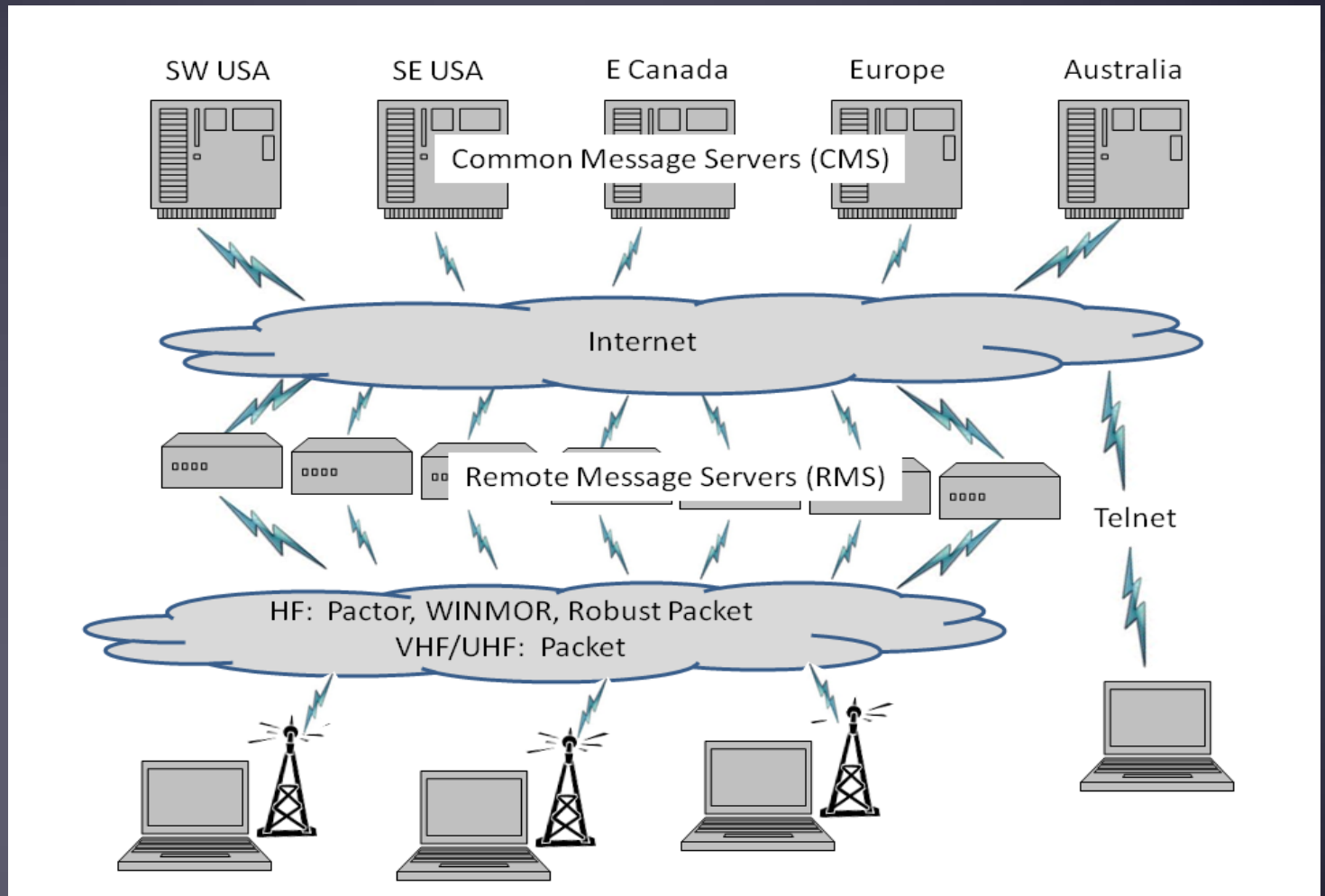
Winlink 2000 System Architecture

Hierarchical levels of the Winlink 2000 system:

1. ***Client system*** – Radio, computer with Winlink software, TNC (or sound card) and you, the end-user!
2. ***Radio Message Server (RMS)*** – Radio gateway between the client (end-user) and the Winlink system backbone.
3. ***Common Message Servers (CMS)*** – Winlink backbone.
 - 5 CMS locations,
 - redundant, fault-tolerant,
 - located on 3 continents.
 - One CMS sufficient for operation.

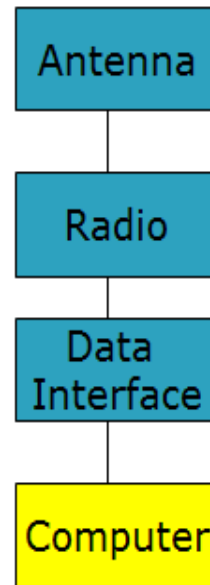
Winlink 2000 Architecture

- CMS
- RMS (gateway)
- Client (you)



Client Winlink Stations

A typical WL2K user's station is composed of familiar components.

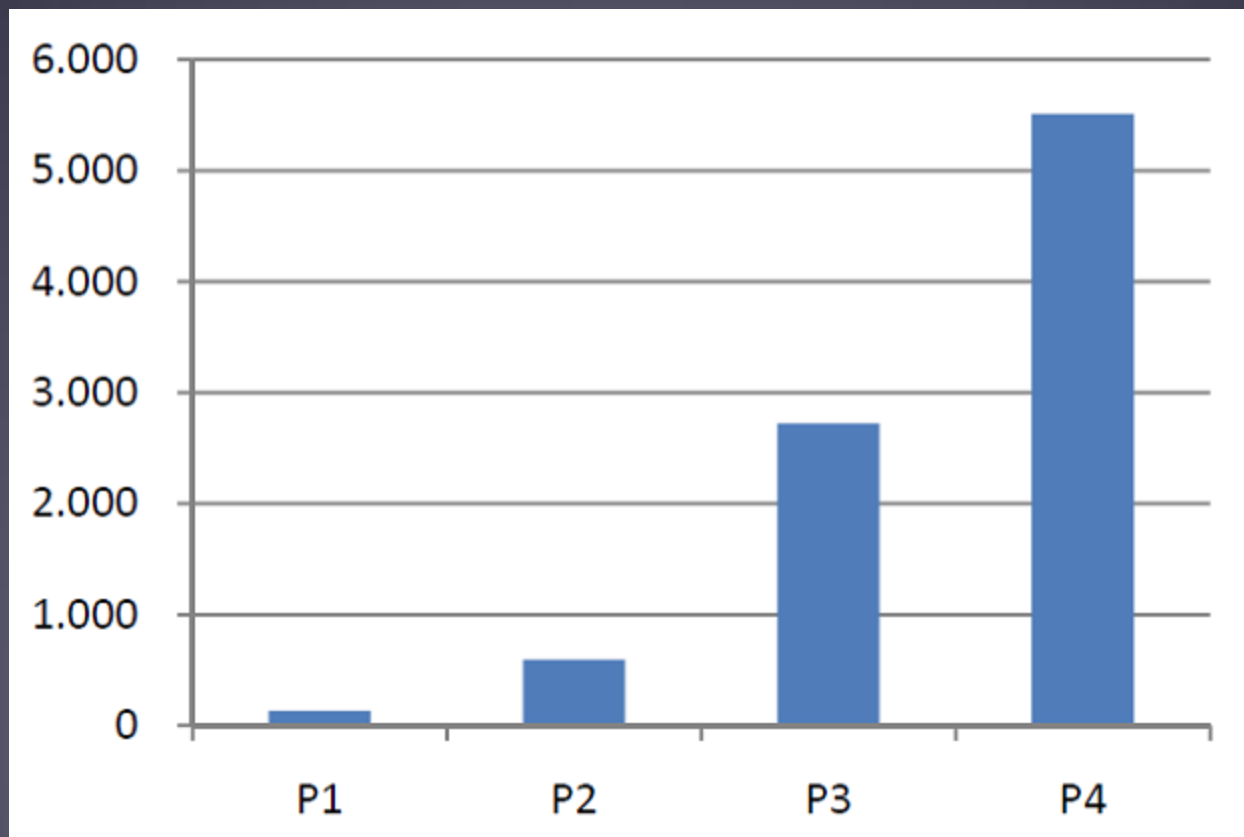


Your computer is equipped with WL2K client software.

Winlink Connection Modes

- **HF Pactor 1, 2, 3 and 4** – Fast and reliable but requires an expensive modem (\$1500+).
- **HF WINMOR** – “Poor man’s Pactor”. Not as good as Pactor, but operates with inexpensive sound card device (\$100). Speed between Pactor 2 and 3.
- **VHF/UHF Packet**
 - **9600 baud** – Fast, reliable, range limited and requires \$400 modem (Kantronics or SCS Tracker).
 - **1200 baud** – Slower, but can use inexpensive Byonics TinyTrak-4 modem.
- **Telnet** – Non-radio connection through the Internet. Good for training and use if radio is down or network is busy.

Pactor Speeds (HF)

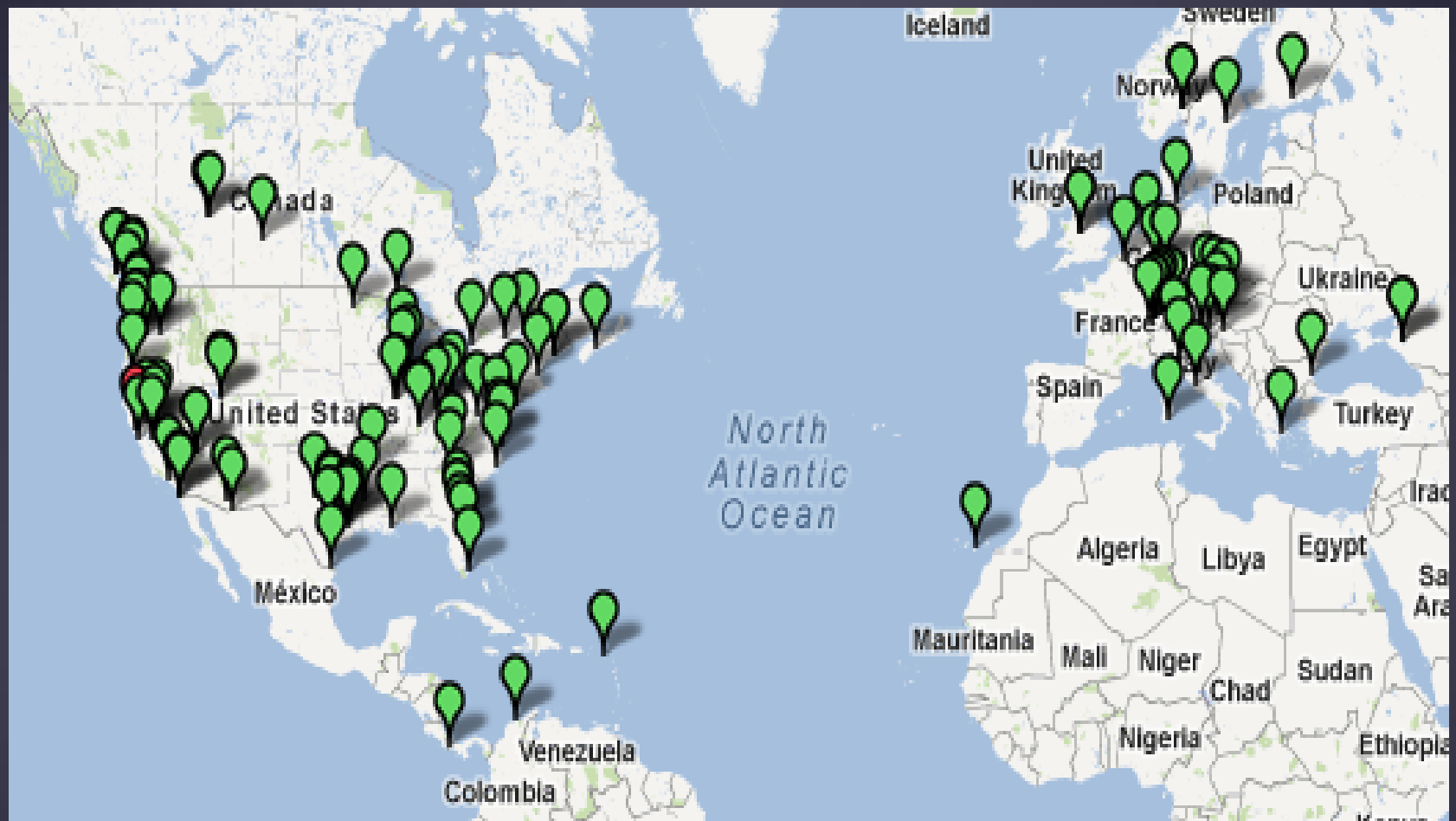


Signalink External Soundcard for Winmor

- External Signalink soundcard costs about \$100 and works well for Winmor and all other digital modes.
- Connect to computer via USB and radio data port.



Winlink Ham HF Gateways in America & Europe



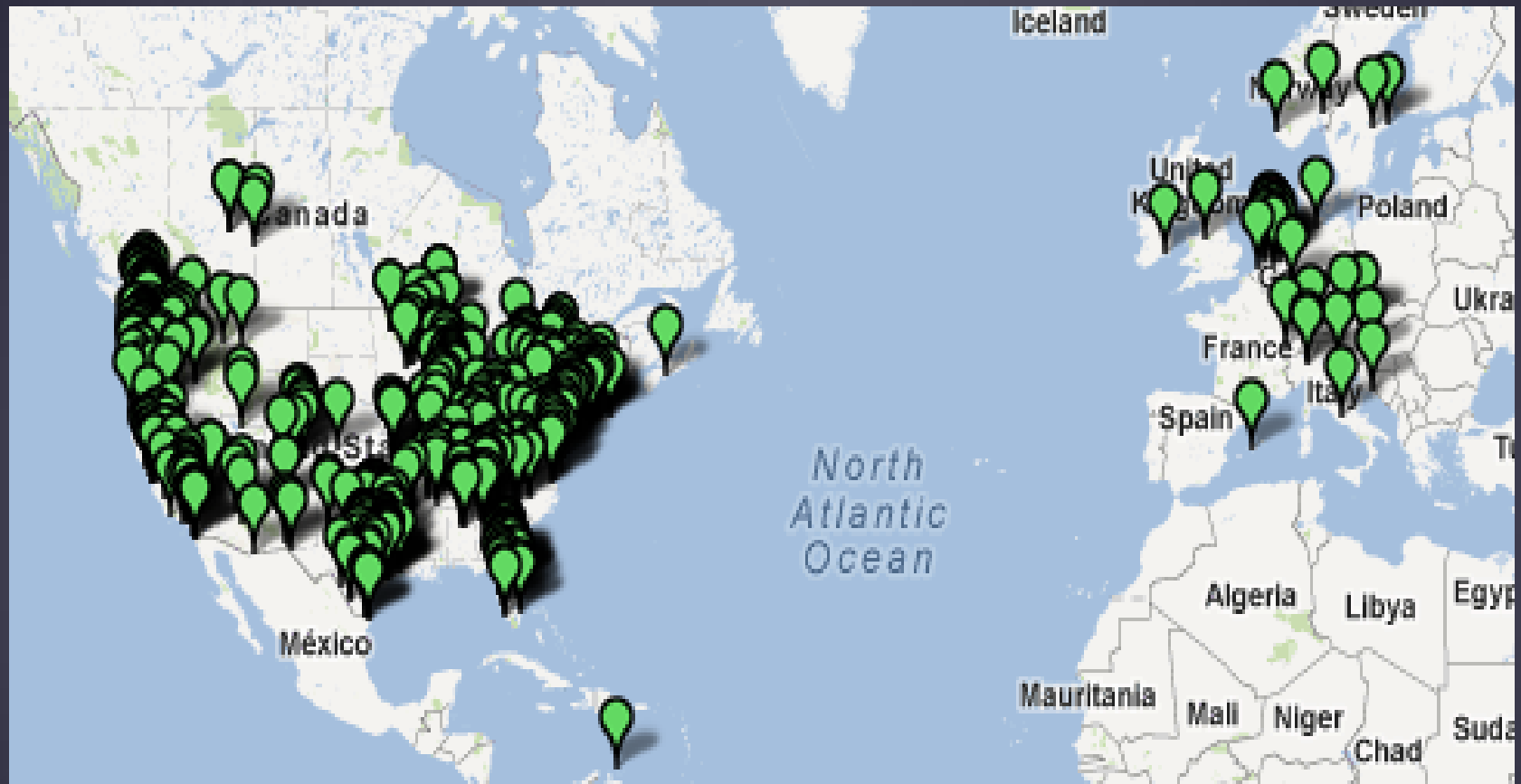
Advantages of VHF/UHF Packet

- Much smaller and more convenient antenna for VHF/UHF. Excellent for drop-kits.
- Less expensive modem than Pactor.
- High speed – 9600 baud over UHF using SCS Tracker or Kantronics KPC-9612+ modem (about \$400).
- FM connections are usually reliable and static-free.

Disadvantages of VHF/UHF Packet

- Requires local VHF/UHF RMS site. May locations don't have access to a VHF/UHF RMS.
- Usual limitations of VHF/UHF – line of site, limited range, possible blockage by hills or buildings.
- If the local infrastructure is down, the local RMS will probably be down too.
- HF is a better choice for backup communications in major emergencies.

Winlink Ham VHF/UHF Gateways in America & Europe



What Winlink 2000 Offers for EmComm

- Flexibility:
 - Internet-only (Telnet) direct connections to Winlink.
 - Radio link bridge to Internet e-mail
 - Radio-only store and forward messaging
 - Peer-to-peer connections between radio end-users
 - Various levels of security including message encryption
- Interoperability: Connect different types of systems
 - Bridge different radio capabilities (VHF/UHF/HF)
 - Bridge protocols: Pactor, Winmor, Packet, Robust Packet
 - Seamless integration with Internet e-mail
- Geographical dispersion and redundancy for reliability

What Winlink Offers for EmComm (more)

- Standard e-mail format with many features
 - Binary file attachments (pictures, pdf, spreadsheets)
 - Automatic message compression/decompression
 - Encryption capabilities available to Agencies on non-ham channels
- Time independence
- Ability to collect messages while unattended
- Good operation at most power levels
- Not limited by station-to-station propagation
- Message logging, and ICS report generation
- Wide adoption by EmComm related agencies

Levels of Message Validation & Correction

- **No validation or correction** – RTTY, BPSK-31.
- **Forward Error Correction (FEC)** – Redundant information transmitted so minor errors can be corrected: MT63, Olivia, QPSK-31.
- **Automatic Repeat Request (ARQ)** – Positive or negative packet acknowledgements from receiving station: Pactor, Winmor, Packet, TCP/IP.
- Pactor and Winmor use both FEC and ARQ.
- Only ARQ provides 100% accurate message delivery.
- Accuracy is essential for EmComm.

Disaster Assessment Picture Sent Via Winlink 2000

Public
safety
systems
do fail.

Kentucky
ice storm
pix from
TEMA
recon
vehicle.



Good Operation at Most Power Levels

- QTH: Nashville, TN
- **0.5 watts Pactor 3:** South Carolina, New York, Michigan, Texas, Canada, Massachusetts, Pennsylvania, Florida, and Iowa.
- **0.5 watts Winmor:** Wisconsin, Maine, Ohio, Texas, Indiana, South Carolina, and North Carolina.
- **5 watts Winmor:** California and Canada
- Excellent for field operations on battery power.
- 100 watts is recommended for normal operations.

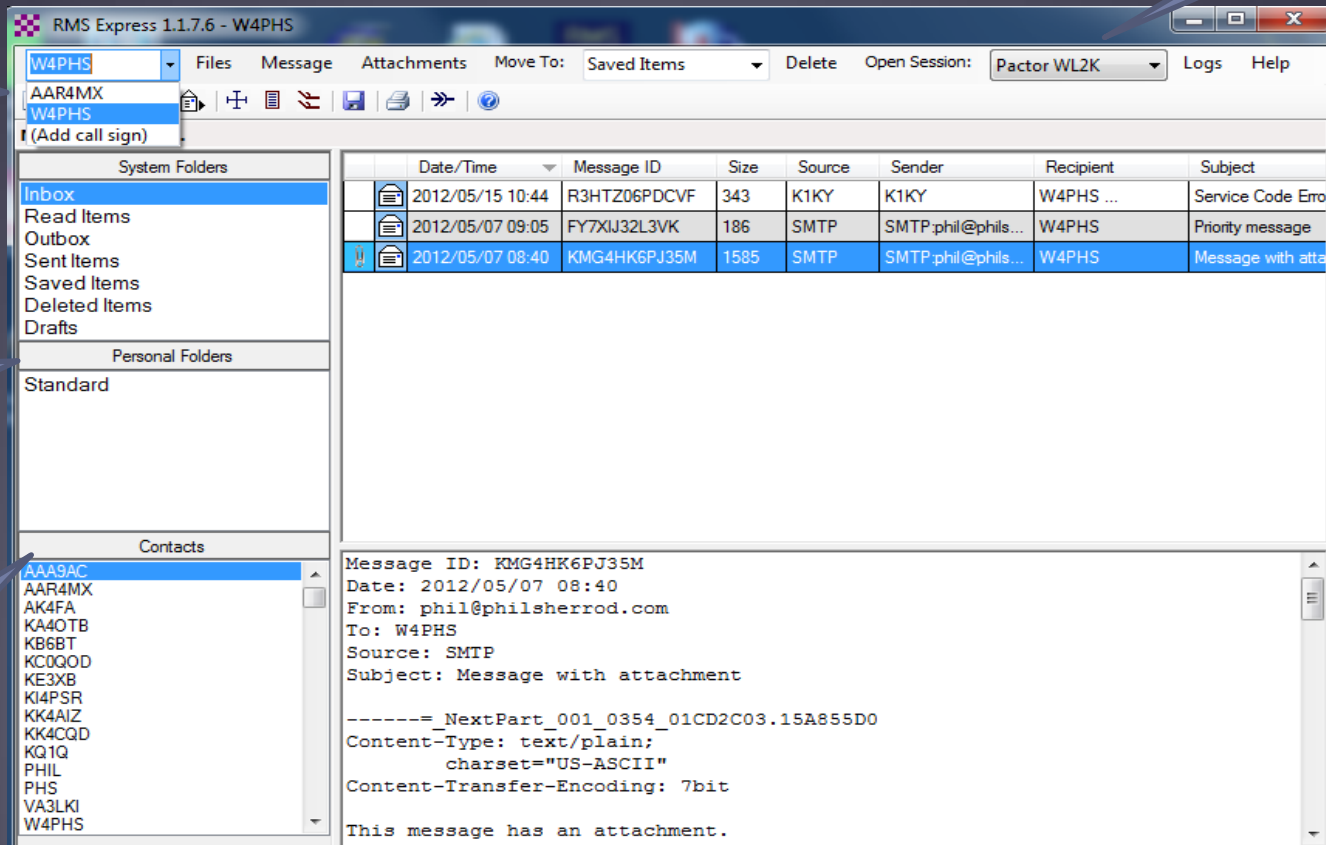
RMS Express E-mail Client Program

Multiple modes

Multiple call signs

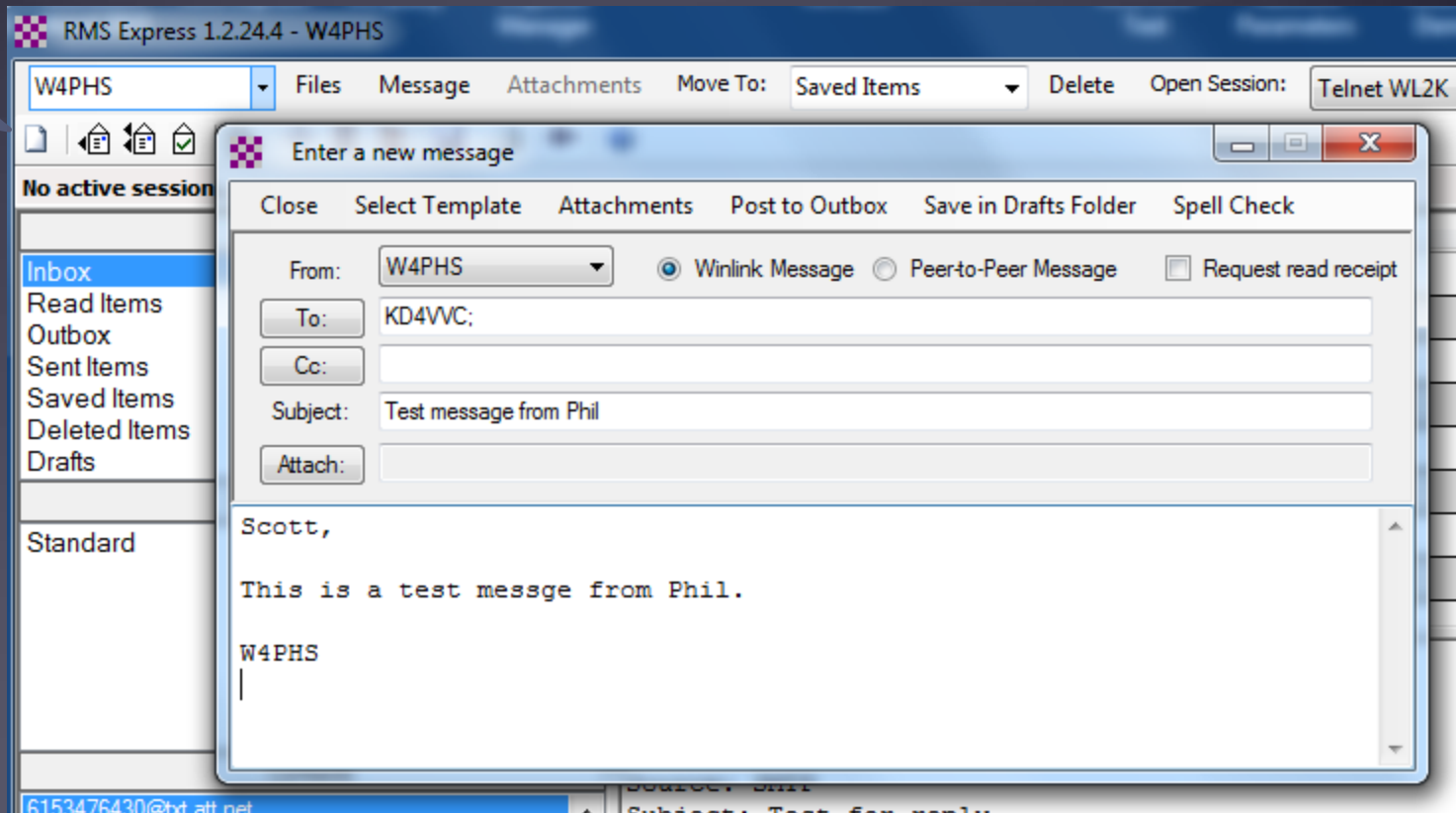
Personal message folders

Contacts address book



Composing a Message in RMS Express

Click to
start a
message



RMS Express Channel List

HF Channel Selector

Exit	Filter	Select	Update Table	Update Table Via Radio	SSN			
Factor channels available at 1200Z, Up to 20000 Kilometers, Q >= 12								
Callsign	Frequency (kHz)	Mode	Grid Square	Hours	Group	Distance (Kilometers)	Bearing (Degrees)	Path Quality Estimate
N0IA	7063.900	P1, P2, P3	EL98JV	00-23	PUBLIC	952	145	48
HP2XBA	21102.900	P1, P2, P3	EJ88RK	00-23	PUBLIC	3095	171	48
AE5R	10141.200	P1, P2, P3	EL16DE	00-23	EMCOMM	1499	226	48
KN6KB	7083.000	P1, P2	EL98PF	00-23	PUBLIC	1041	144	48
W5SEG	7098.500	P1, P2, P3	EL19AN	00-23	EMCOMM	1258	238	47
HP2XBA	18119.000	P1, P2, P3	EJ88RK	00-23	PUBLIC	3095	171	47
W0MAC	7101.200	P3	EM20GB	00-23	EMCOMM	1037	233	47
W0MAC	7066.900	P1, P2	EM20GB	00-23	EMCOMM	1037	233	47
KB5HCD	7096.000	P1, P2	EL29FU	00-23	PUBLIC	1058	232	47
W5SEG	7067.500	P1, P2, P3	EL19AN	00-23	EMCOMM	1258	238	47
KK5AN	7103.400	P3	EM11CC	00-23	PUBLIC	1147	245	47
KJ6VW	21122.500	P1, P2, P3	FK87ML	00-23	PUBLIC	3125	125	47
VE1YZ	14114.000	P1, P2, P3, P4	FN04BQ	00-23	PUBLIC	2102	030	47
VA3LKI	7092.000	P1, P2, P3, P4	FN04CR	00-23	PUBLIC	1137	030	47
KB5HCD	7065.300	P1, P2	EL29FU	00-23	PUBLIC	1058	232	47
KF5JJK	7105.900	P3	EM02DK	00-23	EMCOMM	1243	255	46
WB0TAX	10143.700	P3	EM32GI	00-23	PUBLIC	729	238	46
K6IXA	14063.900	P1, P2	CM97QI	00-23	PUBLIC	2994	283	46
K6CYC	14108.500	P3	DM03SX	00-23	PUBLIC	2870	275	46
K6IXA	14102.700	P3	CM97QI	00-23	PUBLIC	2994	283	46

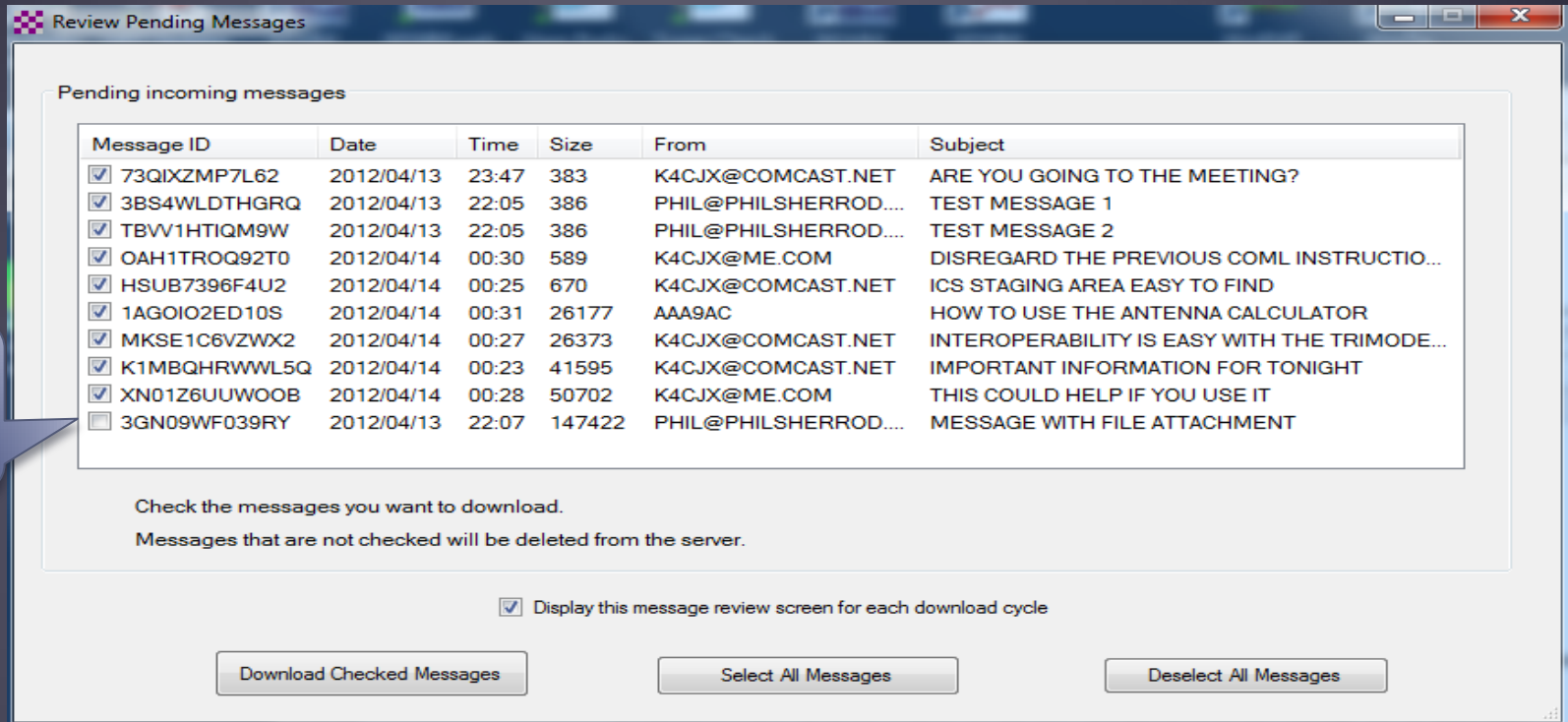
Estimate of
Signal Path
Quality

Service Code
Group

Factor Modes

RMS Express Message Review

- Review pending messages before downloading.
- Select which messages to download.



Review Pending Messages

Pending incoming messages

Message ID	Date	Time	Size	From	Subject
<input checked="" type="checkbox"/> 73QIXZMP7L62	2012/04/13	23:47	383	K4CJX@COMCAST.NET	ARE YOU GOING TO THE MEETING?
<input checked="" type="checkbox"/> 3BS4WLDTHGRC	2012/04/13	22:05	386	PHIL@PHILSHERROD....	TEST MESSAGE 1
<input checked="" type="checkbox"/> TBV1HTIQM9W	2012/04/13	22:05	386	PHIL@PHILSHERROD....	TEST MESSAGE 2
<input checked="" type="checkbox"/> OAH1TROQ92T0	2012/04/14	00:30	589	K4CJX@ME.COM	DISREGARD THE PREVIOUS COML INSTRUCTIO...
<input checked="" type="checkbox"/> HSUB7396F4U2	2012/04/14	00:25	670	K4CJX@COMCAST.NET	ICS STAGING AREA EASY TO FIND
<input checked="" type="checkbox"/> 1AGOIO2ED10S	2012/04/14	00:31	26177	AAA9AC	HOW TO USE THE ANTENNA CALCULATOR
<input checked="" type="checkbox"/> MKSE1C6VZX2	2012/04/14	00:27	26373	K4CJX@COMCAST.NET	INTEROPERABILITY IS EASY WITH THE TRIMODE...
<input checked="" type="checkbox"/> K1MBQHRWWL5Q	2012/04/14	00:23	41595	K4CJX@COMCAST.NET	IMPORTANT INFORMATION FOR TONIGHT
<input checked="" type="checkbox"/> XN01Z6UUWOOB	2012/04/14	00:28	50702	K4CJX@ME.COM	THIS COULD HELP IF YOU USE IT
<input type="checkbox"/> 3GN09WF039RY	2012/04/13	22:07	147422	PHIL@PHILSHERROD....	MESSAGE WITH FILE ATTACHMENT

Check the messages you want to download.
Messages that are not checked will be deleted from the server.

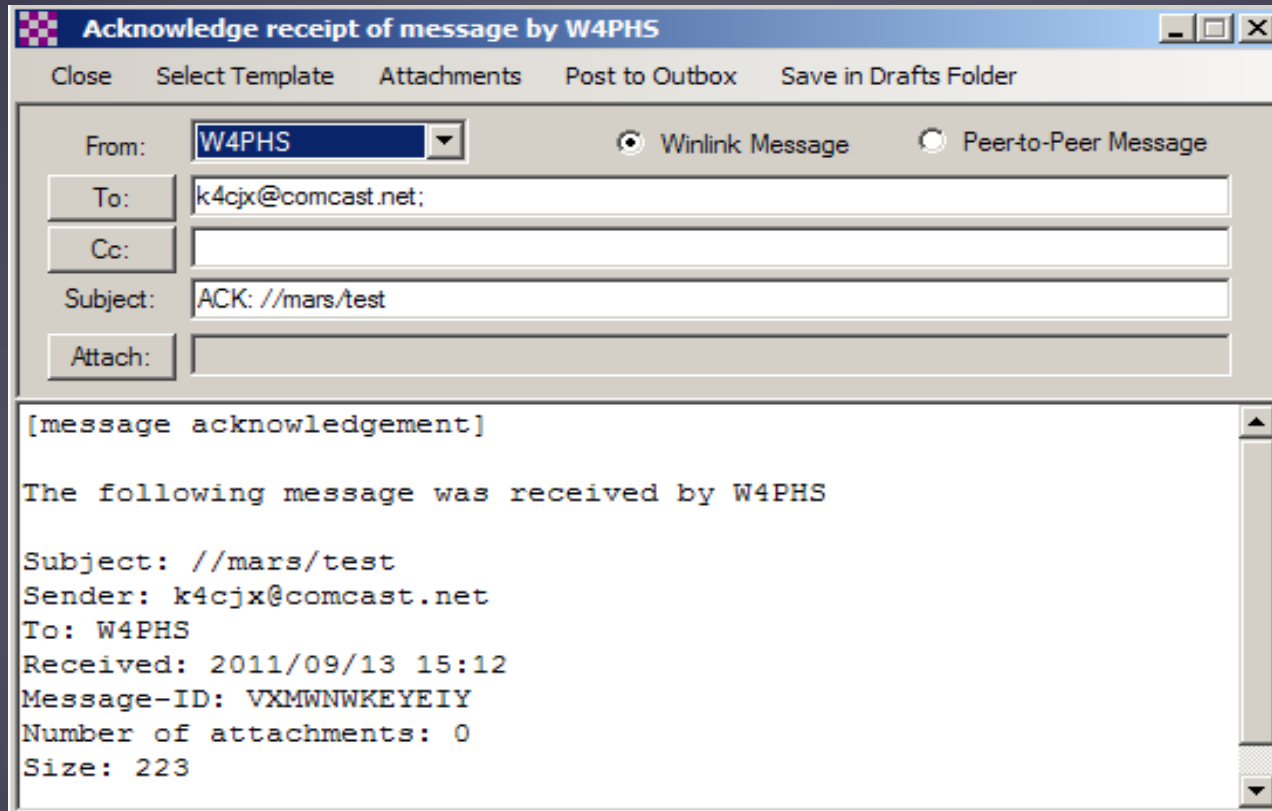
☒ Display this message review screen for each download cycle

Download Checked Messages Select All Messages Deselect All Messages

Message
too large
& not
wanted

Message Receipt Acknowledgements

- Positive acknowledgment that message was received
- Information about message filled in automatically



The screenshot shows a window titled "Acknowledge receipt of message by W4PHS". It has a menu bar with "Close", "Select Template", "Attachments", "Post to Outbox", and "Save in Drafts Folder". Below the menu bar, there are fields for "From:" (W4PHS), "To:" (k4cjsx@comcast.net), "Cc:", "Subject:" (ACK: //mars/test), and "Attach:". There are also radio buttons for "Winlink Message" (selected) and "Peerto-Peer Message". The main text area contains the following text:

```
[message acknowledgement]

The following message was received by W4PHS

Subject: //mars/test
Sender: k4cjsx@comcast.net
To: W4PHS
Received: 2011/09/13 15:12
Message-ID: VXMWNWKEYEIIY
Number of attachments: 0
Size: 223
```


Information Requests

- Use the “Winlink Catalog Request” feature in RMS Express to request:
 - Weather maps for most areas of the world
 - Weather forecasts
 - Maritime HF nets and frequencies
 - Satellite images
 - Location of closest 30 stations
 - ARRL Newsletter, e-letter, etc.
 - Misc. bulletins

RMS Express Query Catalog

Winlink Query Catalog

Categories	Inquiry ID	Description	Size	Originated
ARCTIC_ICE	ARES_E_LTR	Current ARRL ARES E-Letter	35537	2009-45-06
ARRL	LETTER	Current ARRL Letter	23103	2010-17-04

Selections

ARES_E_LTR

Double click to add or delete query selections...

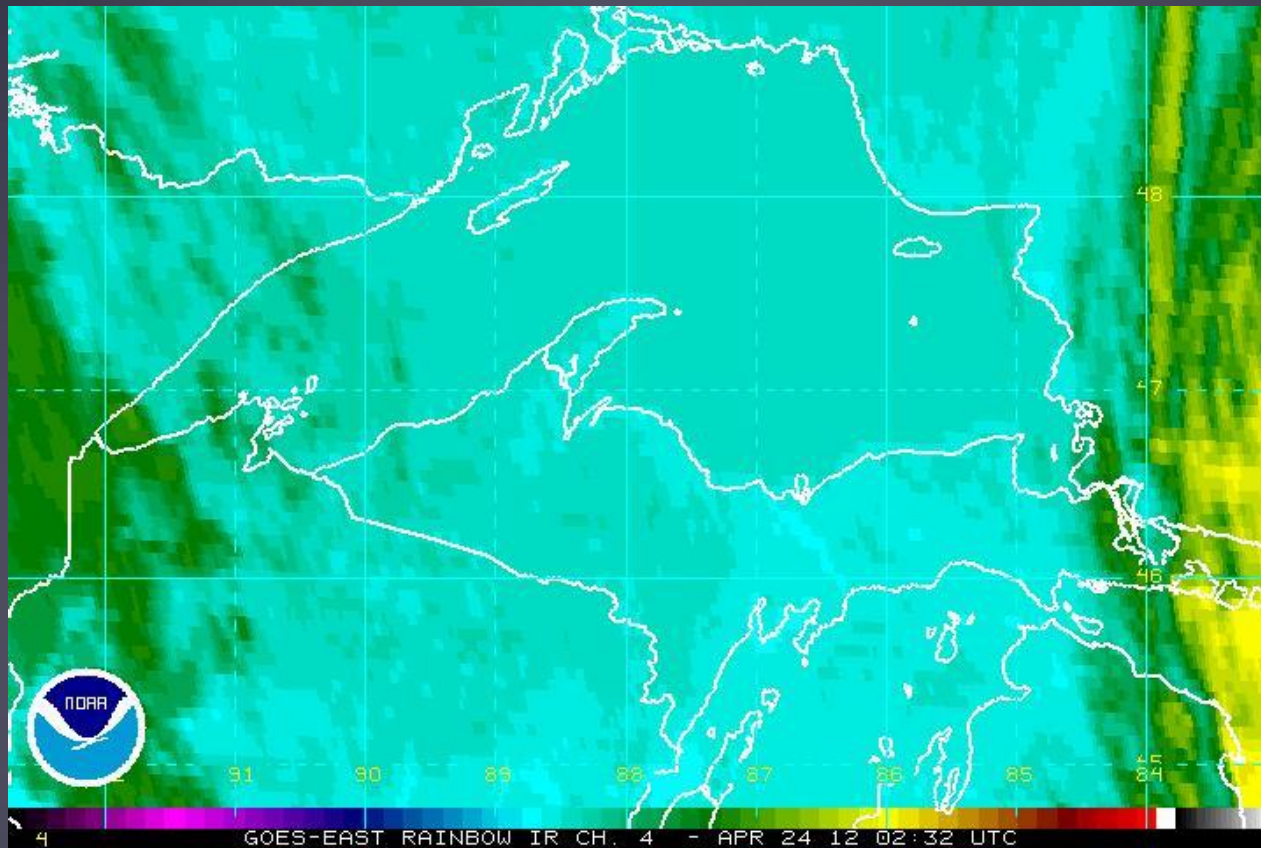
Post Request

Last Update
2012/04/20 11:00

Request Catalog Update

Cancel

Weather Map Image Returned for Request



Winlink Position Reports

- You can send position reports to the Winlink system.
 - Coordinates sent via connected GPS.
 - Otherwise, your position may be entered manually.
- Position Reports are sent to:
 - Winlink system map
 - ShipTrak maps
 - APRS maps
 - YotReps maps
- Extremely valuable for pinpointing locations, especially for maritime operation.

Posting a Position Report

Data from a connected GPS unit.

WX assistance to the NWS Voluntary Marine Observation Program.

GPS / Position Report

GPS Serial Port: GPS Baud Rate:

`$GPRMC,104855.000,A,3604.2206,N,08649.4427,W,0.05,53.91,200412,...A*4E`

Reporting - Last good GPS fix at 2012/04/20 10:48:55 UTC

GPS Latitude: GPS Longitude:

GPS Speed: Knots GPS Course: True

Position Report

Your last position report was posted at 0000/00/00 00:00 UTC

Report Date/Time: UTC

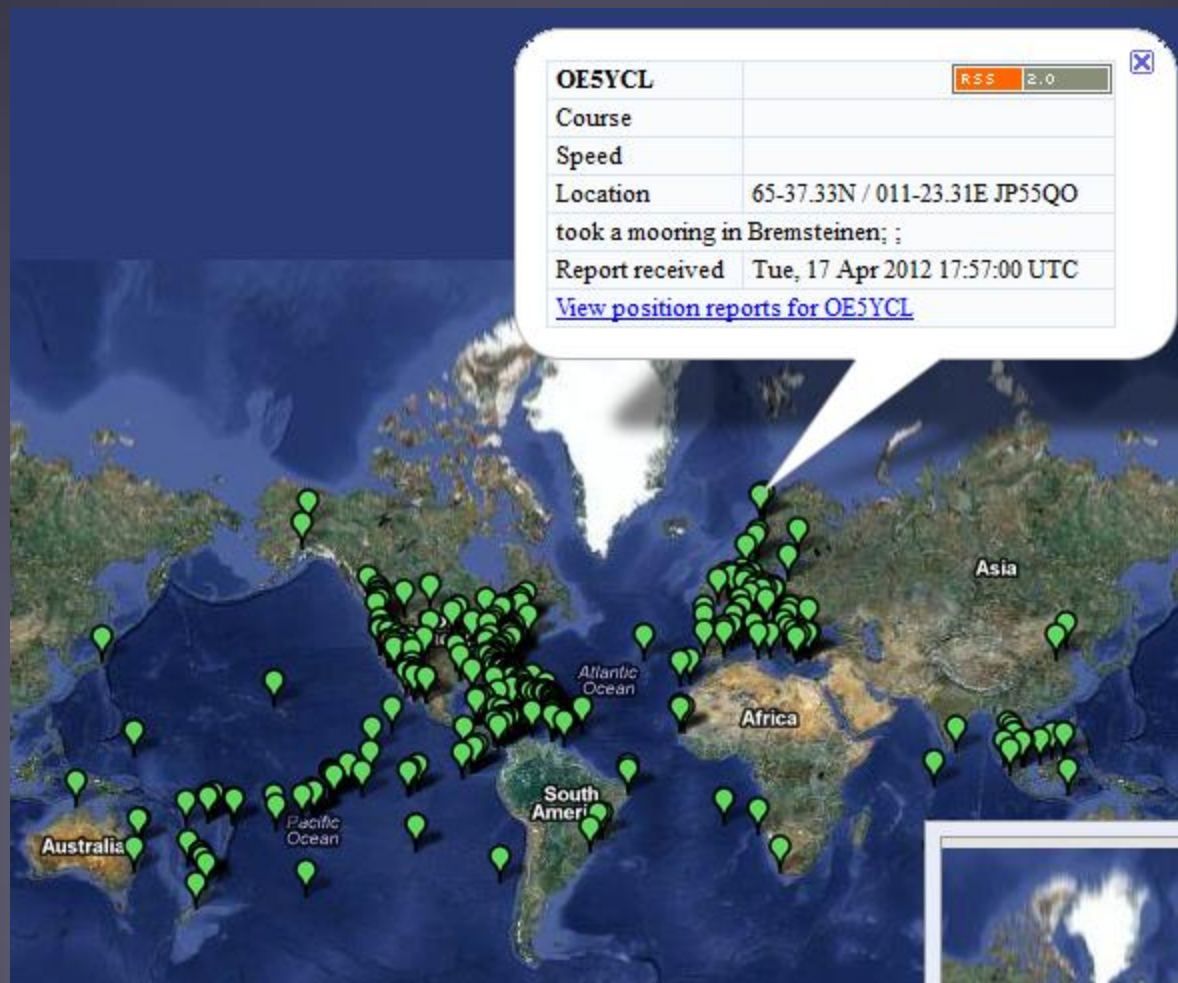
Latitude: Longitude:

Speed: Knots Course: True

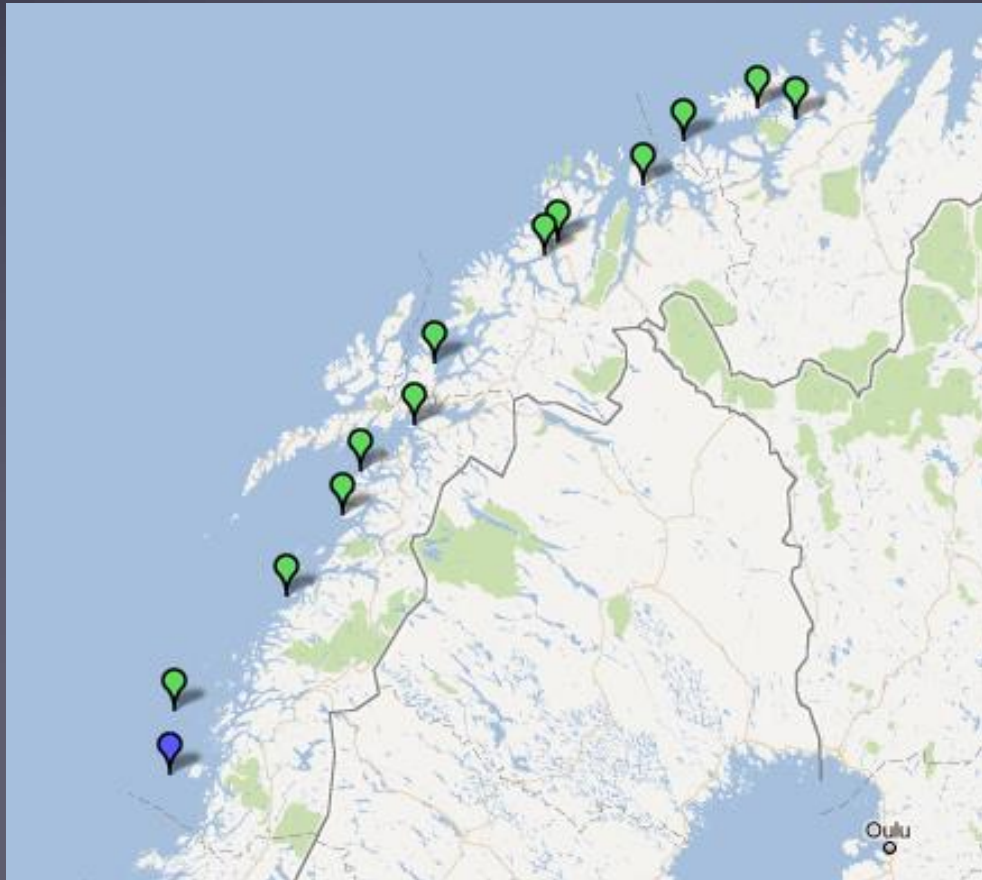
Comment - 148 Characters Maximum:

Useful in tracking with e-mailed disaster assessments.

Winlink.org Real-time Position Report Page




Position Tracking



GRIB File Requests

Select Map Region and Options for GRIB File

Zoom-in Zoom-out Lat: 042° 47' N Lon: 066° 36' W



Selected GRIB Region

029° 32' N
085° 22' W
077° 27' W
024° 02' N

Information

☒ Wind ☐ HGT500
☒ Waves ☐ SFCTMP
☐ Rain ☐ TMP500
☐ PRMSL

Forecast

Days: 2 Hours: 6

Resolution

☐ 0.5 ☒ 1.0 ☐ 2.0

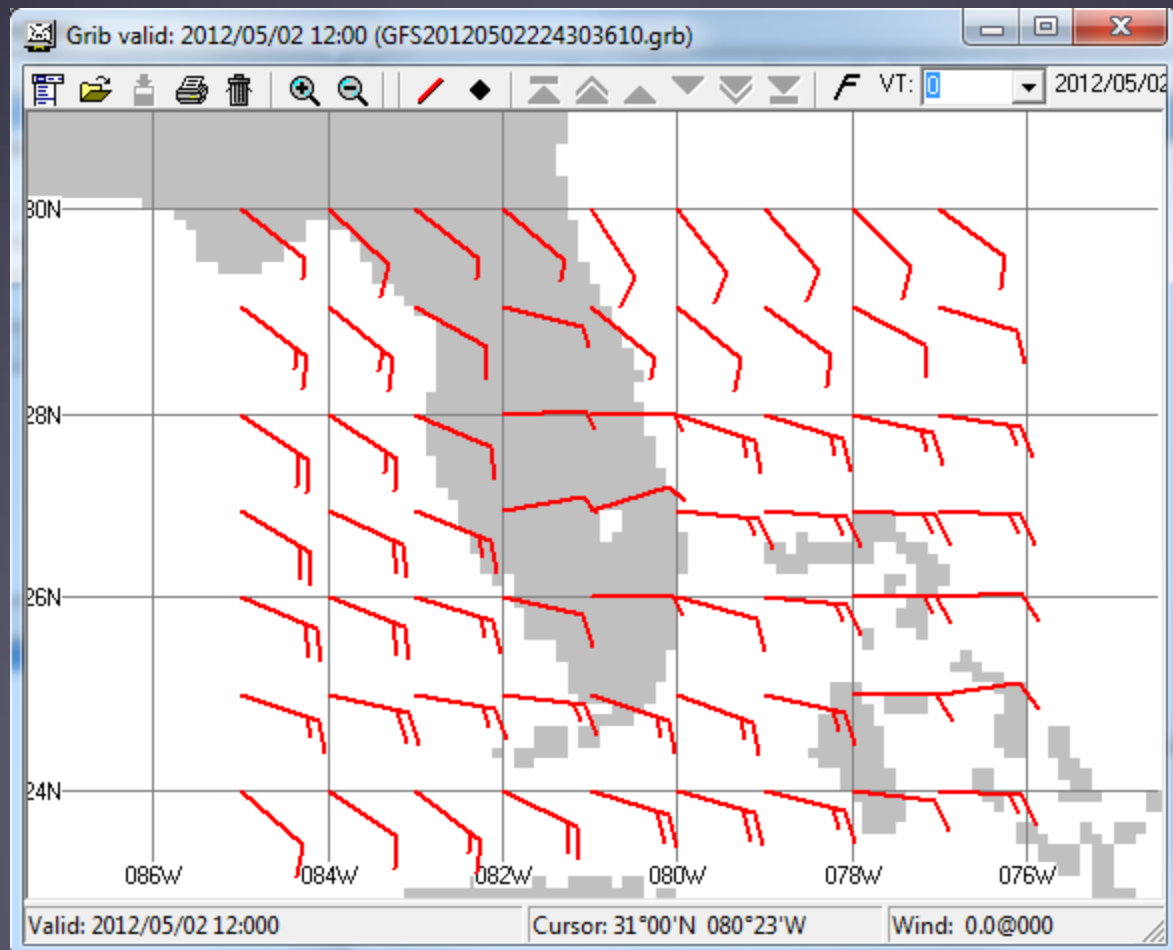
Action

Post Request

Cancel

File size (kb): 6

GRIB Map Returned by Winlink System



RMSMessageLog ICS-309 Generator

RMS Express Message Log Report Generator by W4PHS

RMS Express Message Log

Call sign of station: WC4EOC-2

Log	Time	From	To	Subject
Sent	5-Nov-2011 02:31	WC4EOC-2	KA4OTB	//WL2K Test message from exchange 28
Read	5-Nov-2011 02:31	KA4OTB	WC4EOC-1;C4EOC-2;K...	CP-3 Message5
Read	5-Nov-2011 02:31	KA4OTB	AK4GD-5;I4PSR;C4EO...	CP-2
Read	5-Nov-2011 02:31	KA4OTB	WC4EOC-1;C4EOC-2;K...	CP-1
Sent	5-Nov-2011 02:44	WC4EOC-2	KI4PSR	//WL2K Hi from exchange 28
Read	5-Nov-2011 02:46	KA4OTB	WC4EOC-2	Re: Test message from exchange 28
Sent	5-Nov-2011 03:06	WC4EOC-2	jon@aristoworks.com	//WL2K Test
Read	5-Nov-2011 03:19	jon@aristoworks.com	WC4EOC-2	Re: Test
Sent	5-Nov-2011 03:54	WC4EOC-2	WC4EOC-3	//WL2K Orion

Refresh message list

Logs to include

☒ Inbox ☒ Read Items ☒ Outbox ☒ Sent Items ☐ Saved items ☐ Drafts ☐ Deleted items

Date-time range for log entries

☒ Limit start date/time: 5-Nov-2011 00:00 Set start date ☐ Limit end date/time: Set end date

Generate message log reports

Generate ICS-309 report Generate CSV file

Program settings and information

Program settings Help Program information

Exit

Messages
during
period

Select
folders

Starting &
ending
report
period

Generate
ICS-309
pdf file

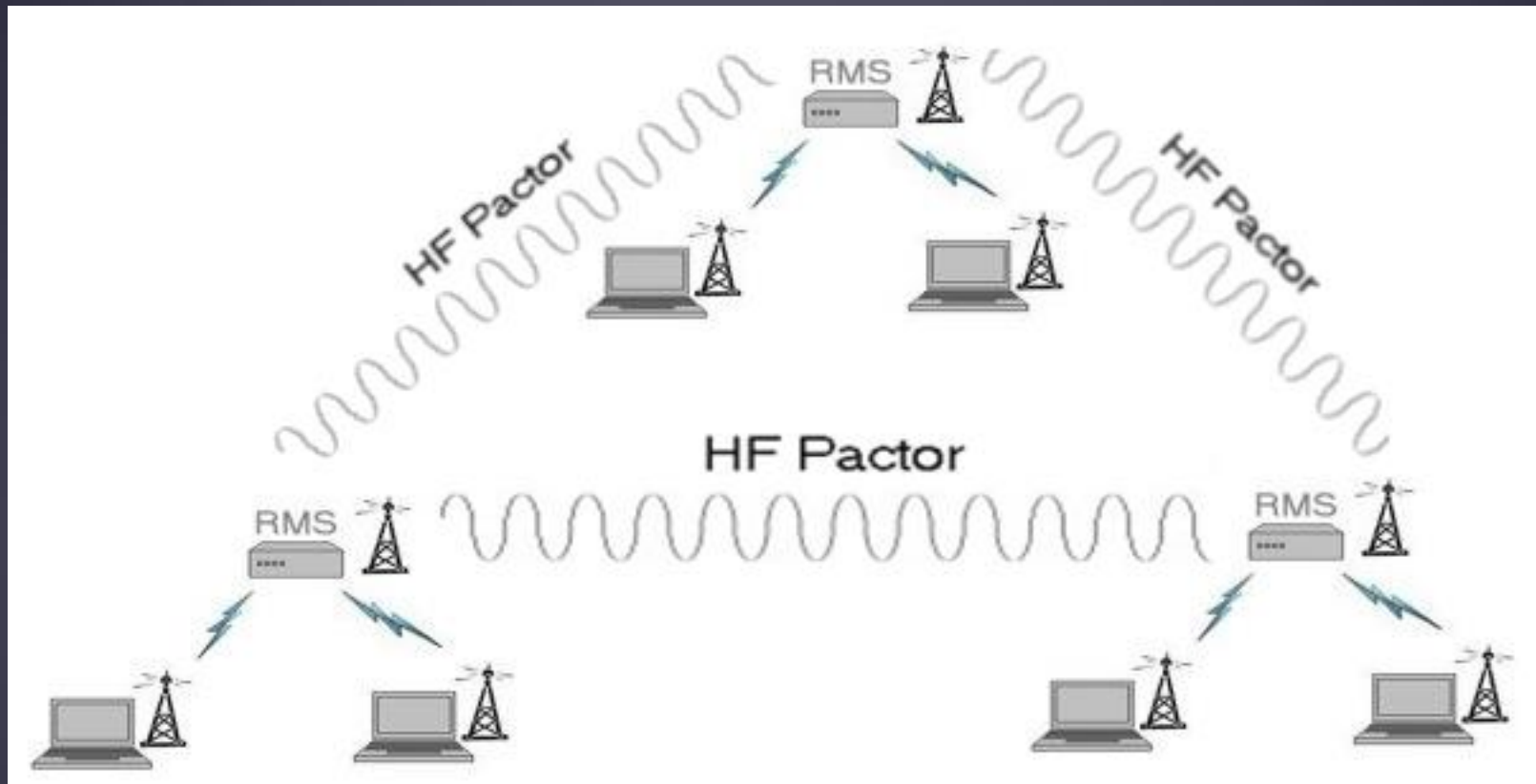
Generated ICS-309 PDF Message Log Report

[illegible]

Winlink Hybrid Network

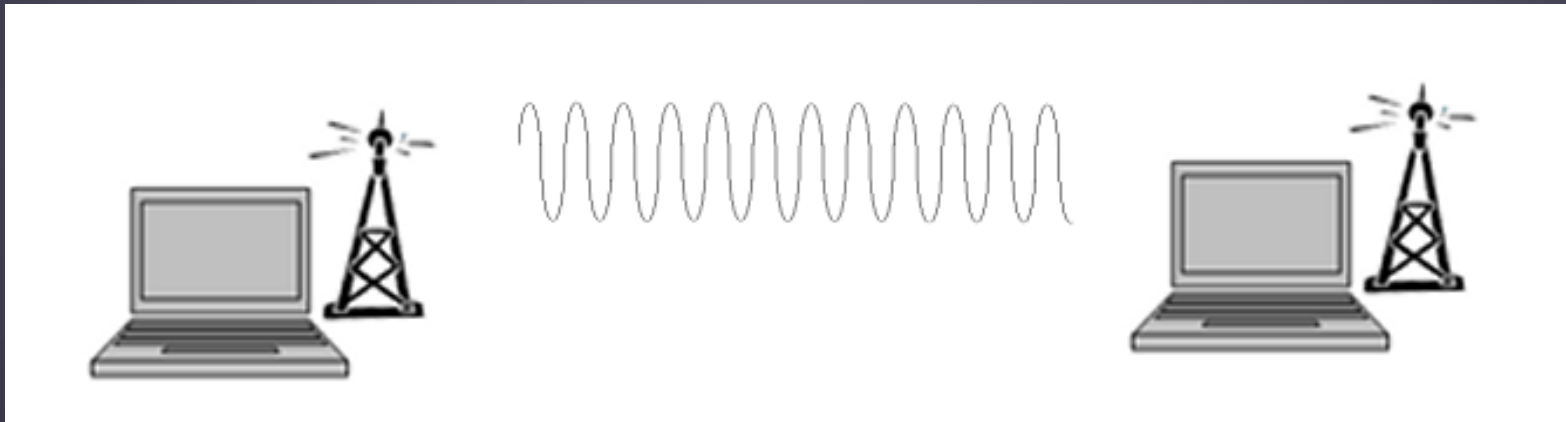
- New capability for Winlink system.
- Radio-only: No Internet connection is required.
- RMS node running the *RMS Relay* program acts as a standalone message hub for multiple users.
- Messages are stored in a local database on the hub until picked up by the recipient.
- Any number of stations can communicate as long as they all connect to the same hub.
- Standard e-mail format is used and file attachments are supported.
- Option to hold messages until Internet available.
- HF forwarding to a RMS station via Pactor.

Radio-Only Winlink Network (no Internet)



Winlink Peer-To-Peer Radio-Only Operation

- Peer-to-peer: direct radio connection between end-users
- The Internet is not used, all communication by radio.
- Only the two client stations are involved.
- 100% error-free transmission and file attachments.



Winlink Drop Kits for Field Operation



Conclusion

- Winlink use continues to grow, especially for EmComm.
- The Winlink Development Team continues to enhance capabilities to adapt to changing needs.
- The new Winlink Hybrid Network allows Winlink to continue handling messages via HF forwarding if the Internet is down.
- Steady improvements are being implemented.



- Thank you!
- Questions?
- Information about Winlink can be found at www.winlink.org
- Information about presenter at www.qrz.com – W4PHS