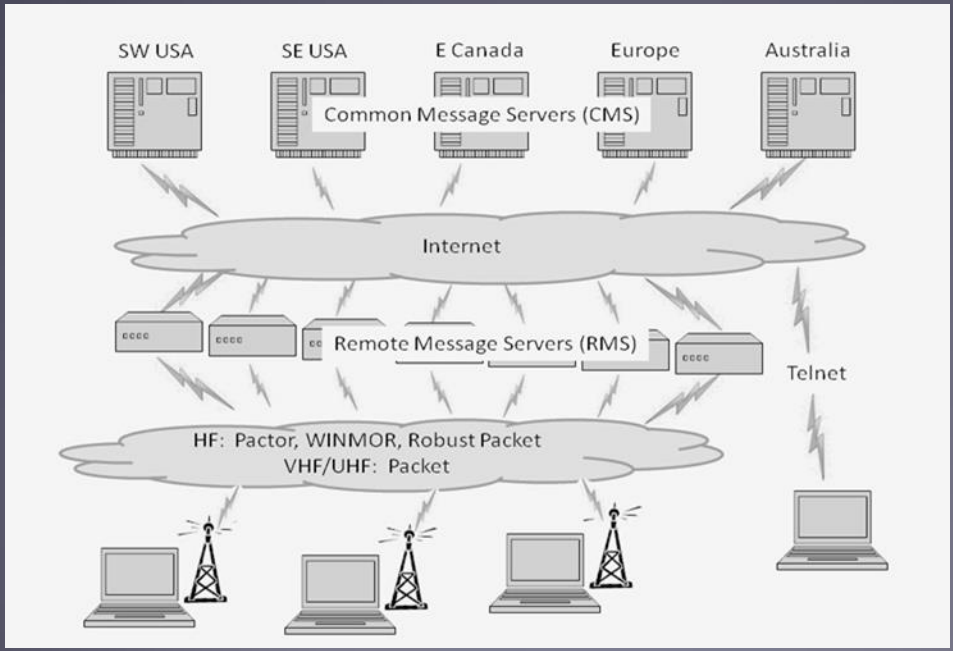
Winlink 2000
E-mail via Radio
Emergency Communication

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.

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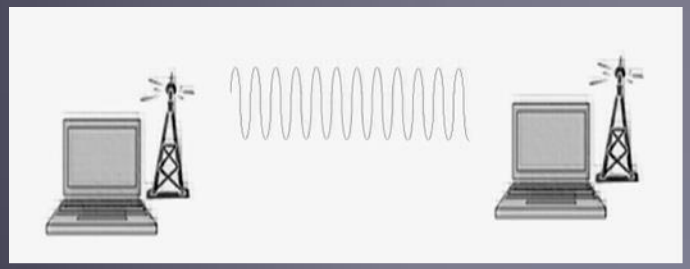
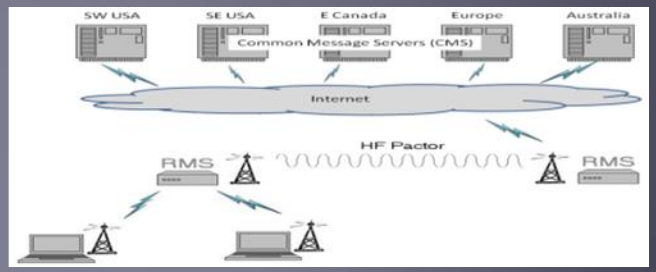
- Brief review of Winlink 2000 architecture
- Features of Winlink 2000 that make it well suited for EmComm use.
- Recent enhancements to the Winlink system to adapt to new requirements by the EmComm community.





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

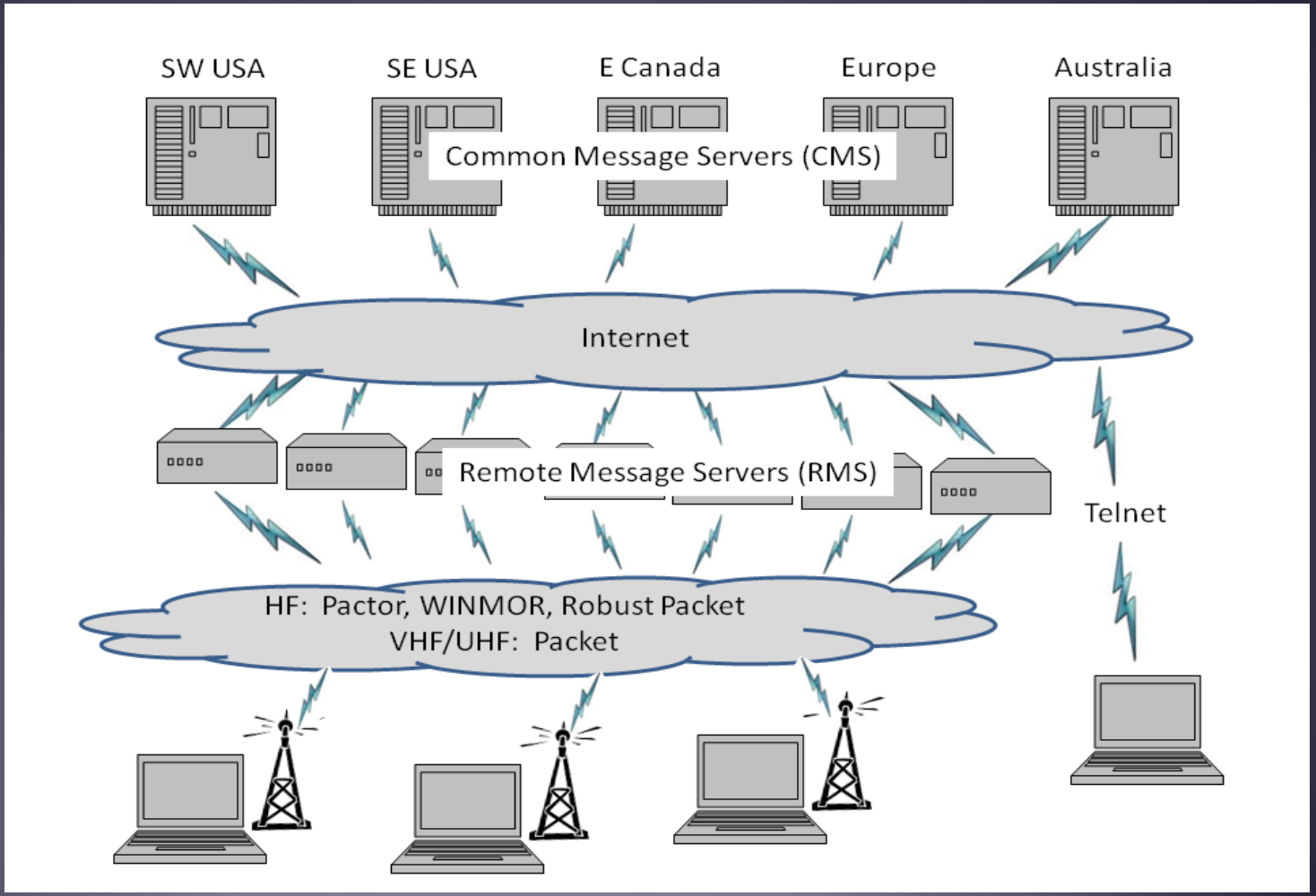
Winlink 2000 System Architecture

Hierarchal 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.

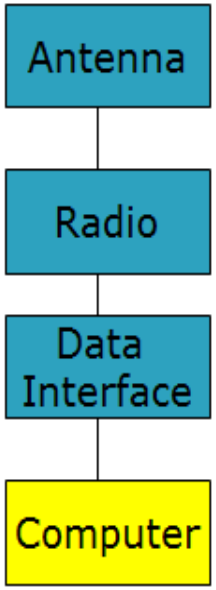
Winlink 2000 Architecture

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



Client Winlink Stations

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

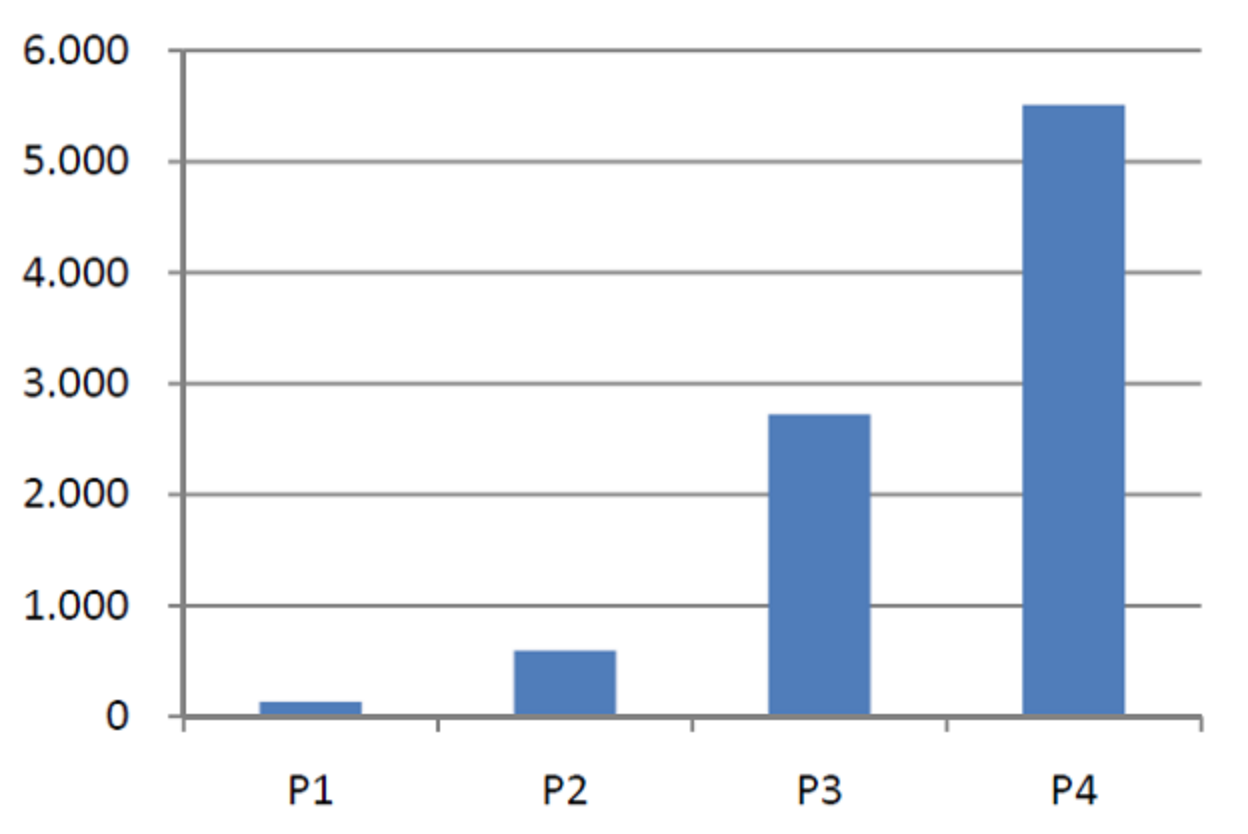


Your computer is equipped with WL2K client software.

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

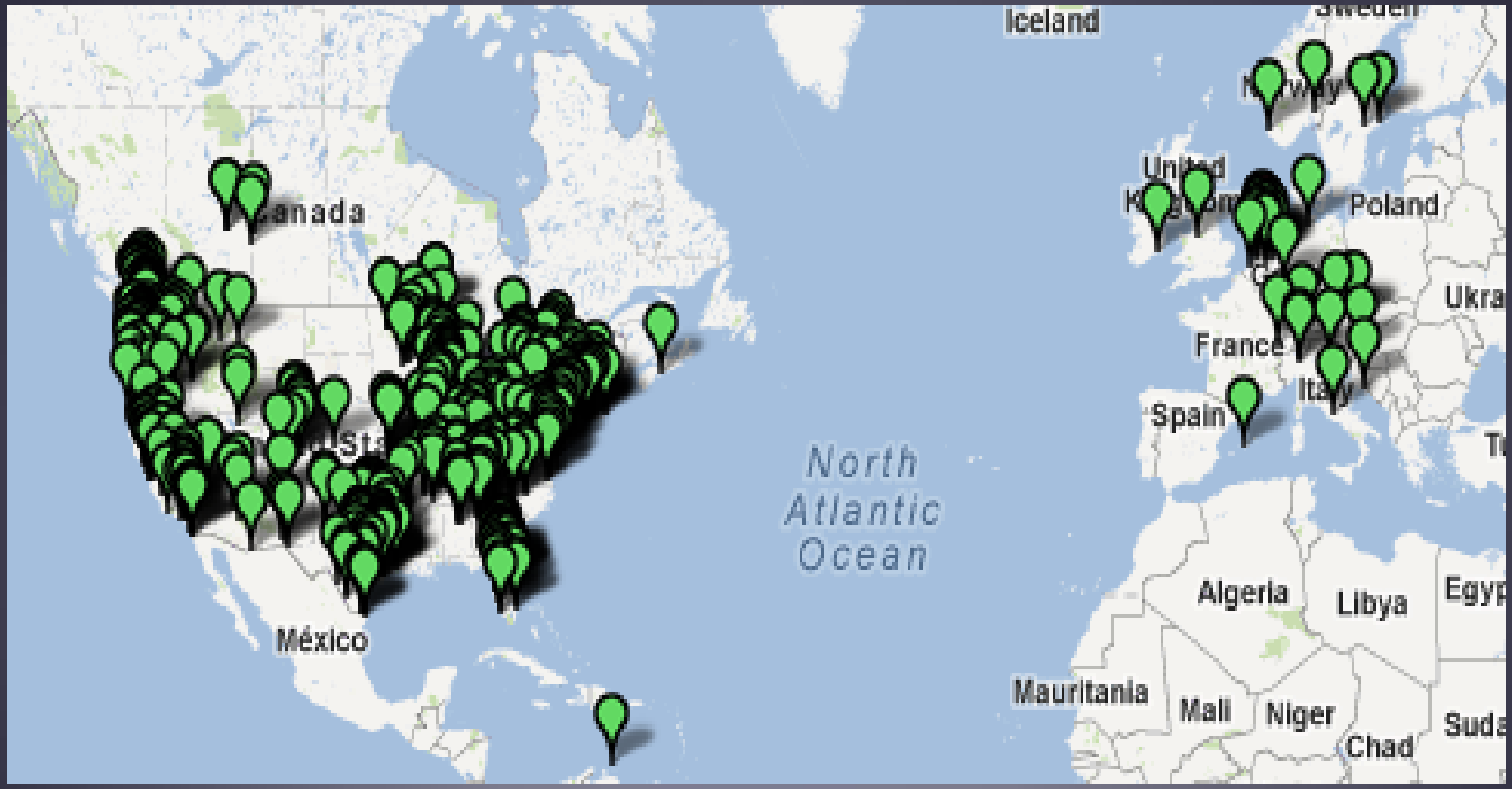
Advantages of VHF/UHF Packet

- 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 propogation
- 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

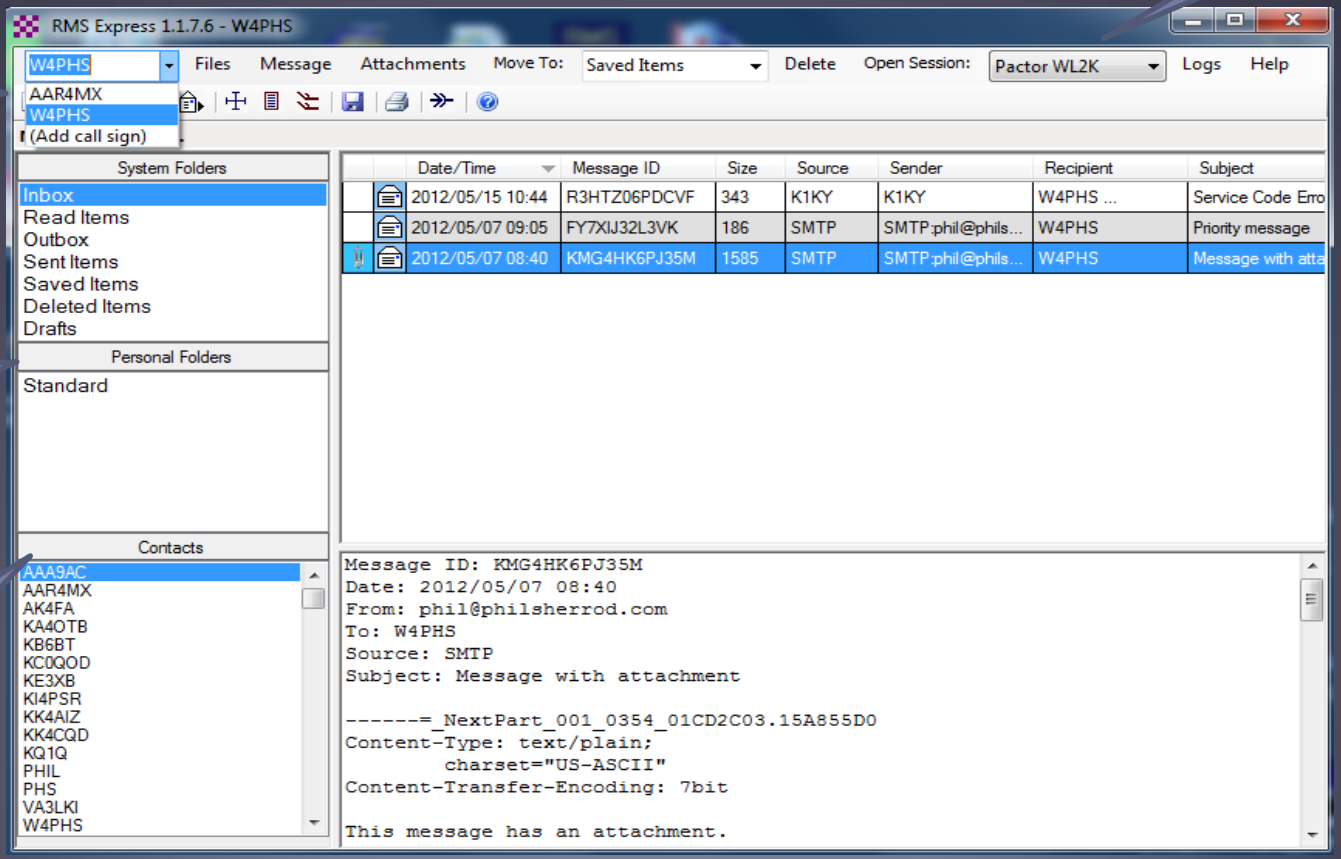
-

Multiple call signs

Multiple modes

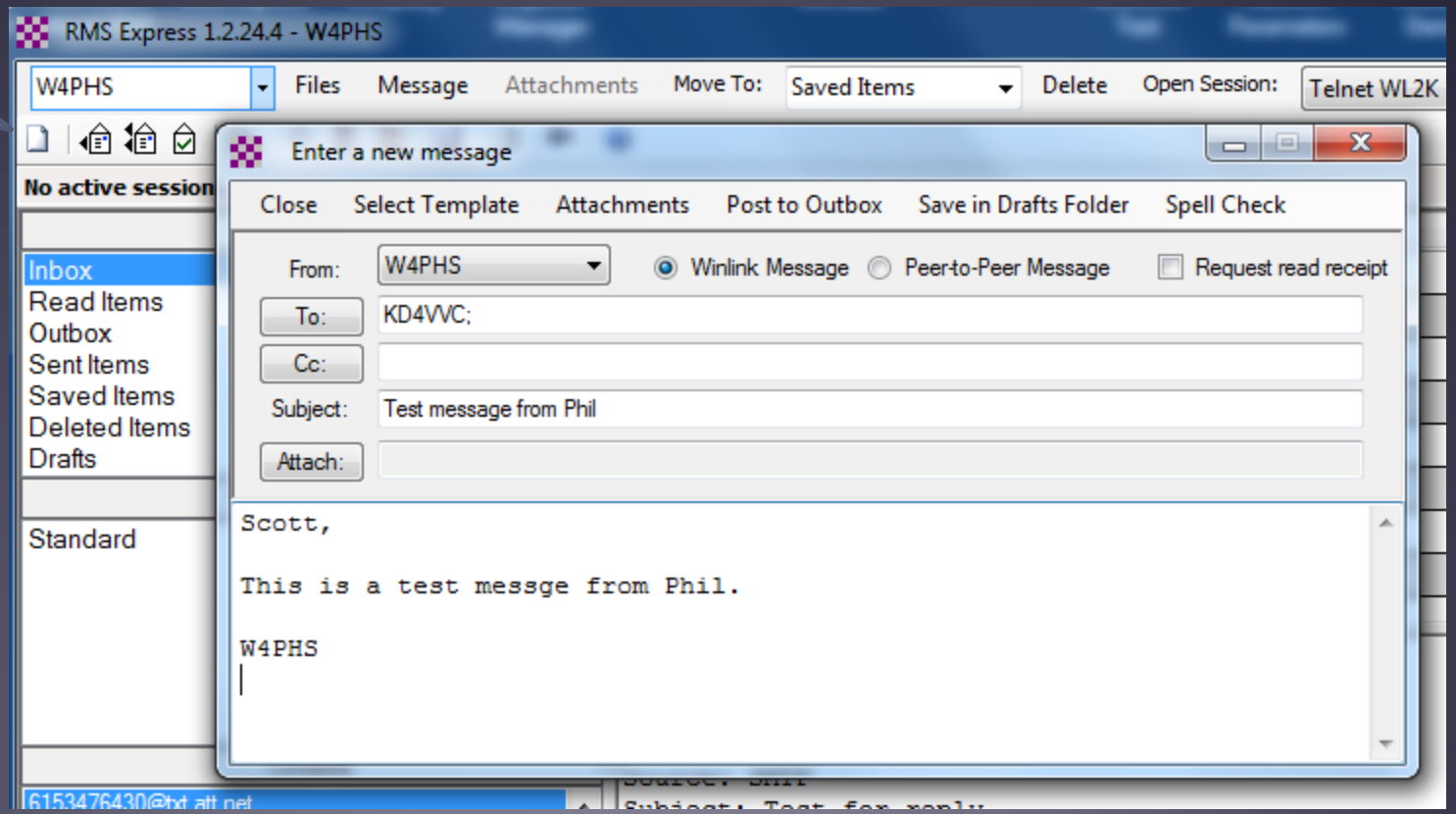
Personal message folders

Contacts address book

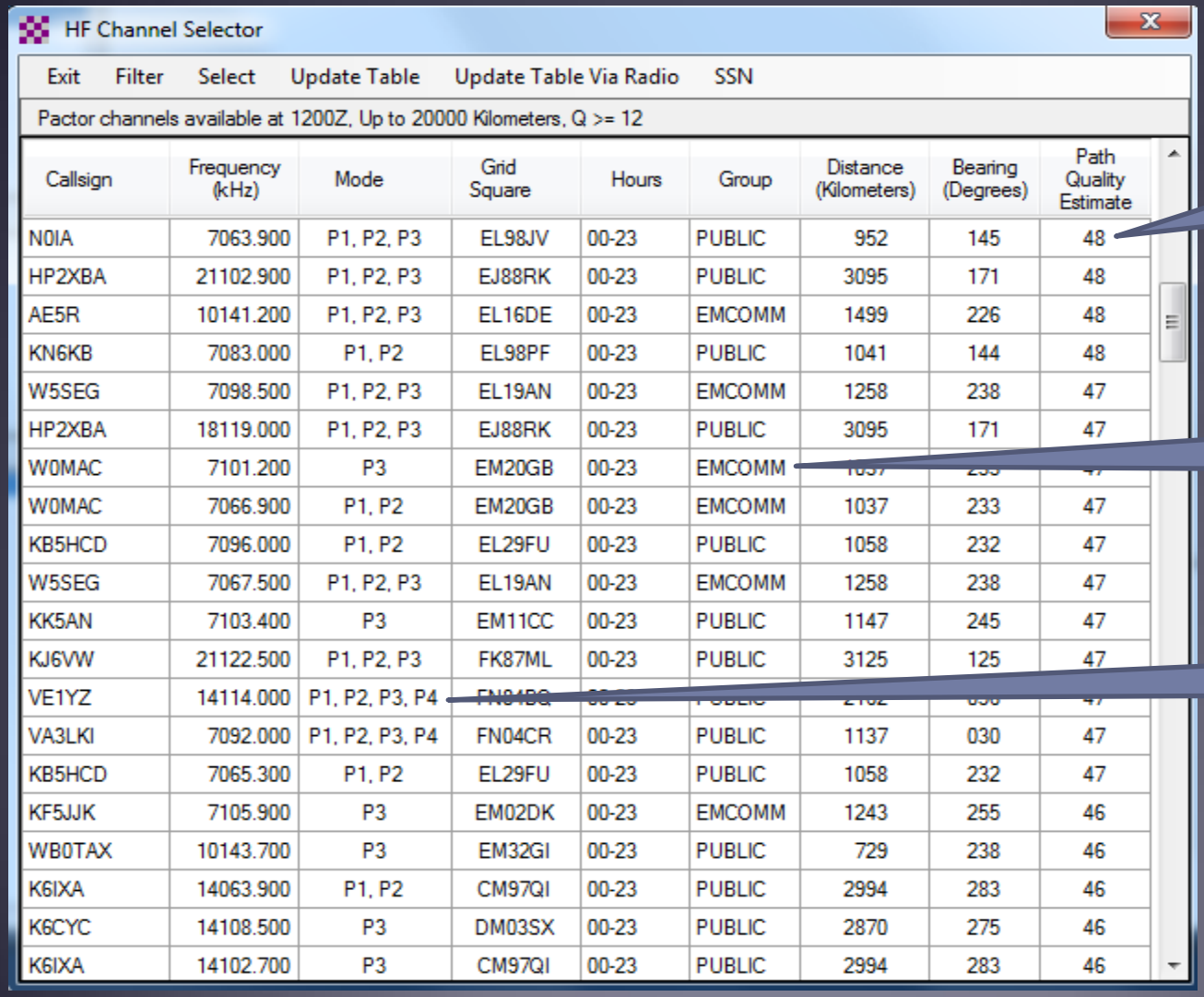


Composing a Message in RMS Express

Click to start a message



RMS Express Channel List



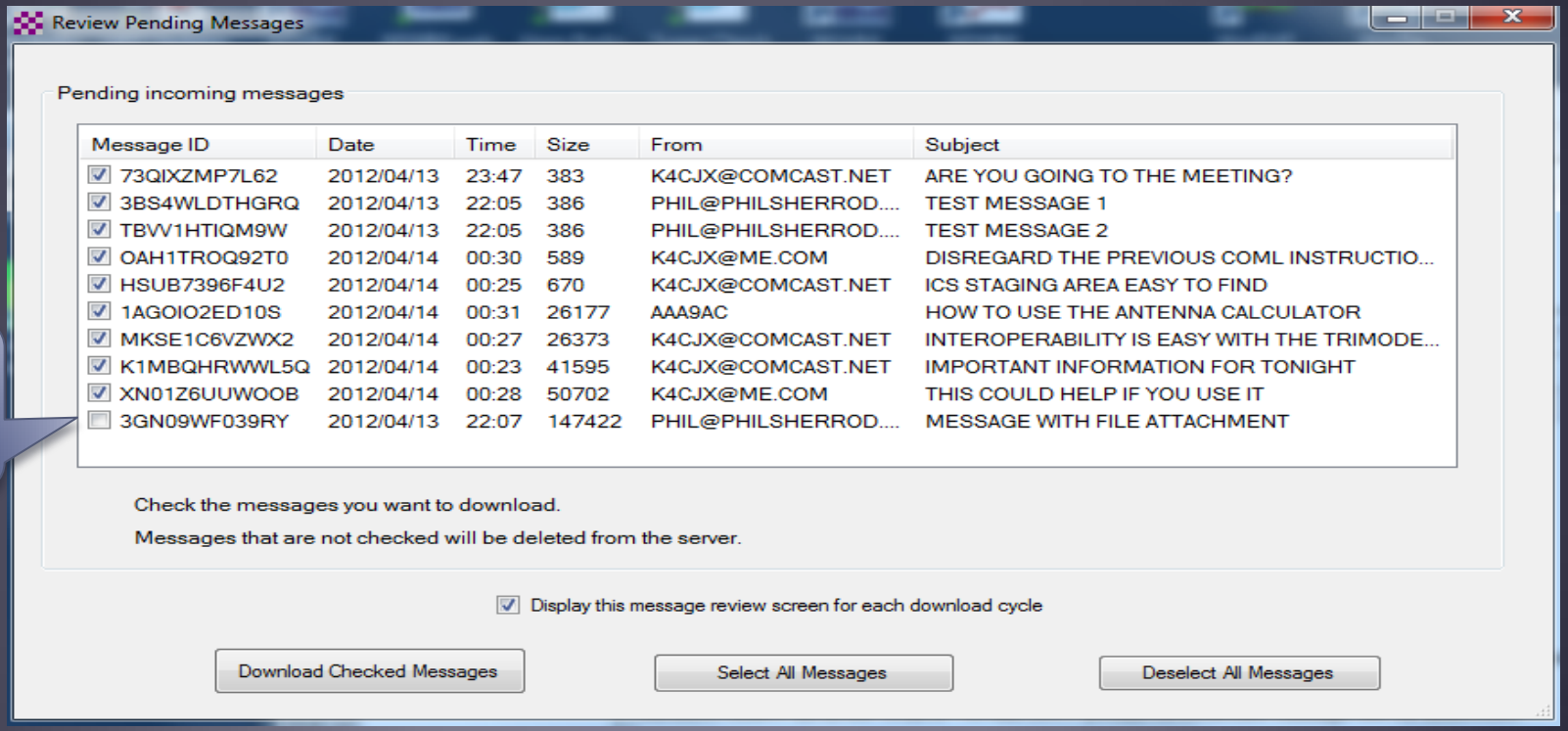
Estimate of Signal Path Quality

Service Code Group

Pactor Modes

RMS Express Message Review

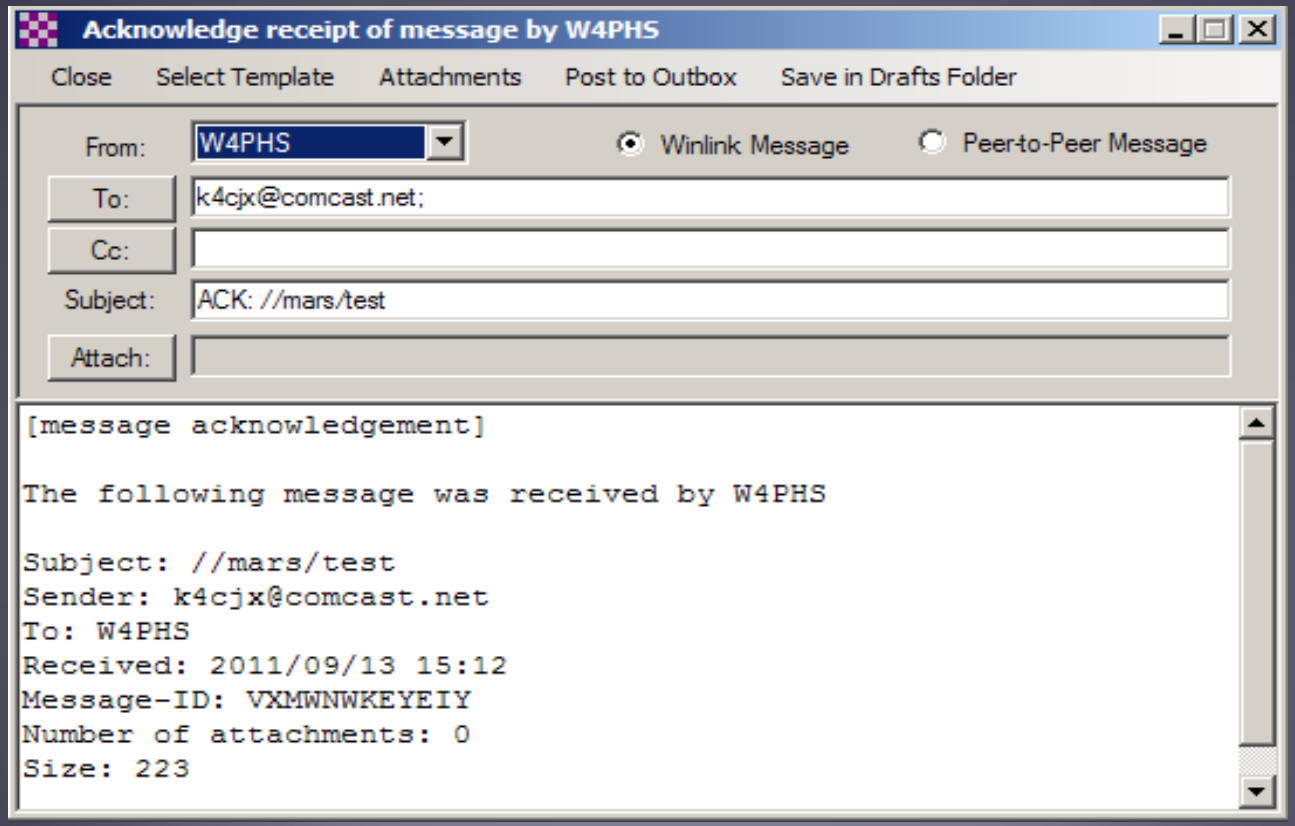
- Review pending messages before downloading.
- Select which messages to download.



Message too large & not wanted

Message Receipt Acknowledgements

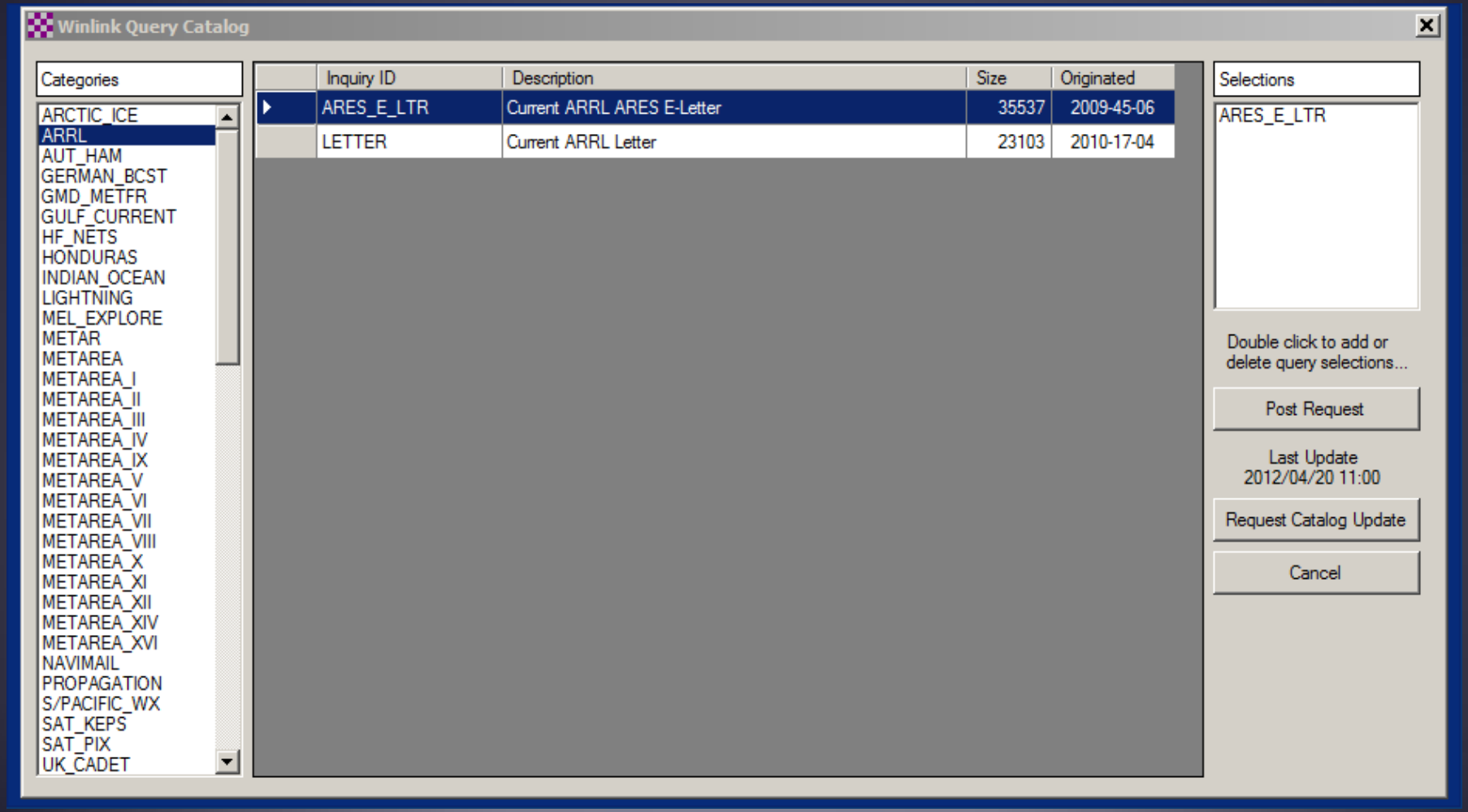
- Positive acknowledgment that message was received
- Information about message filled in automatically



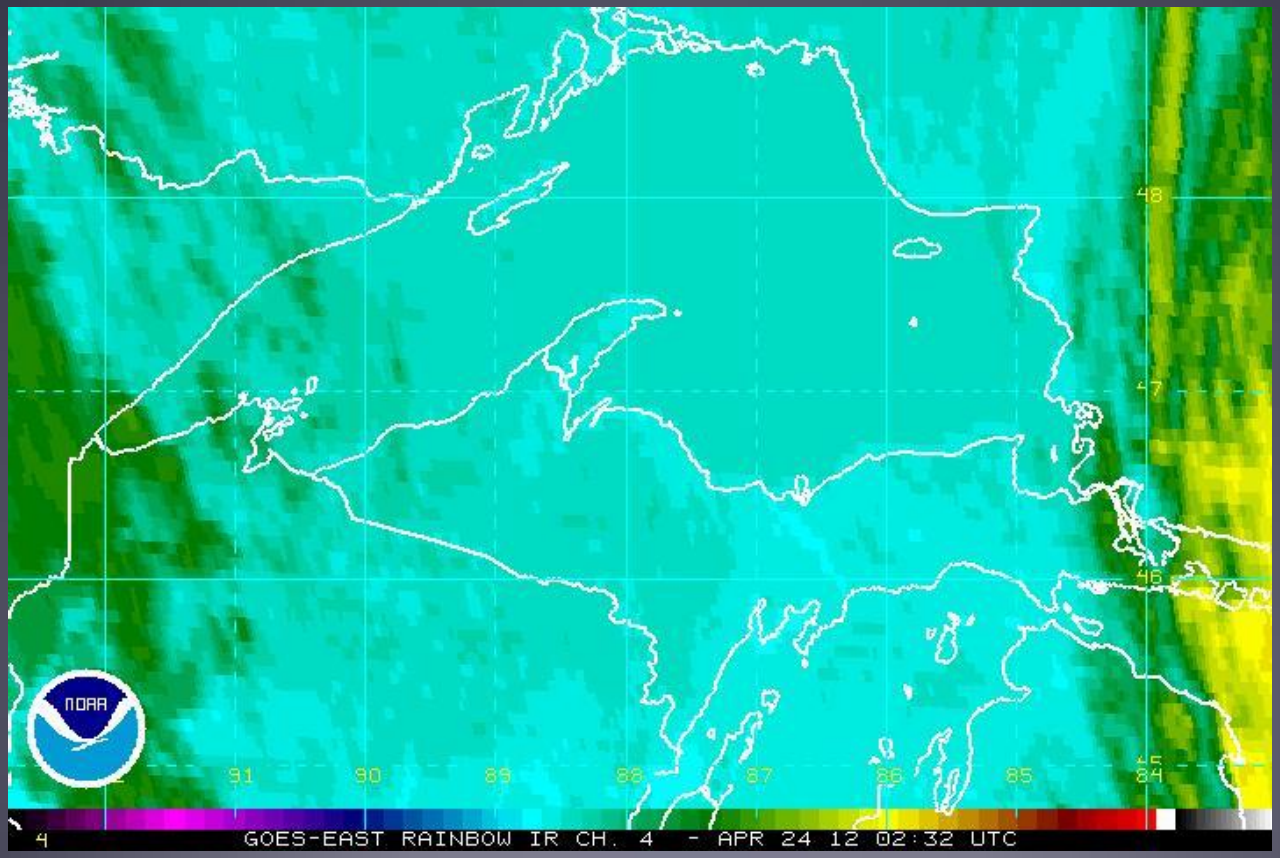
Information Requests

- 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



Weather Map Image Returned for Request



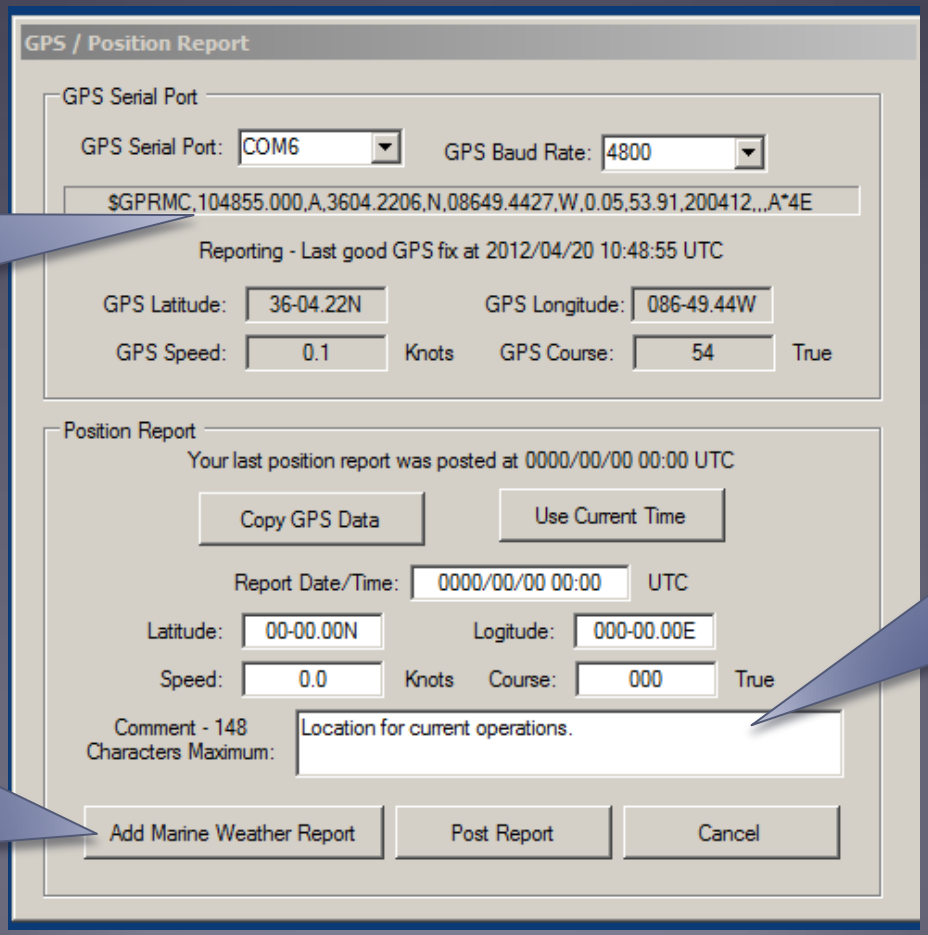
Winlink Position Reports

- 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

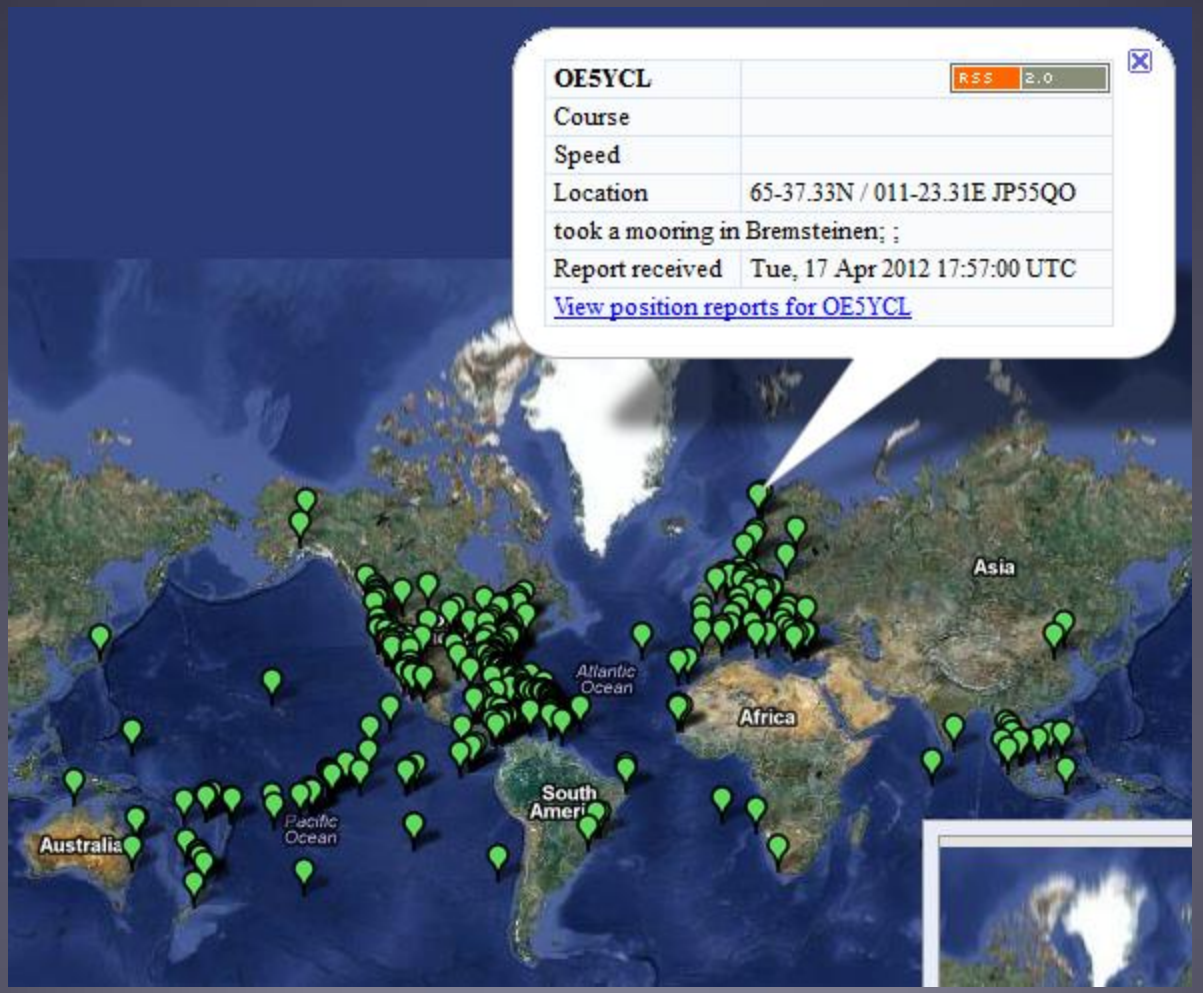
Data from a connected GPS unit.

WX assistance to the NWS Voluntary Marine Observation Program.

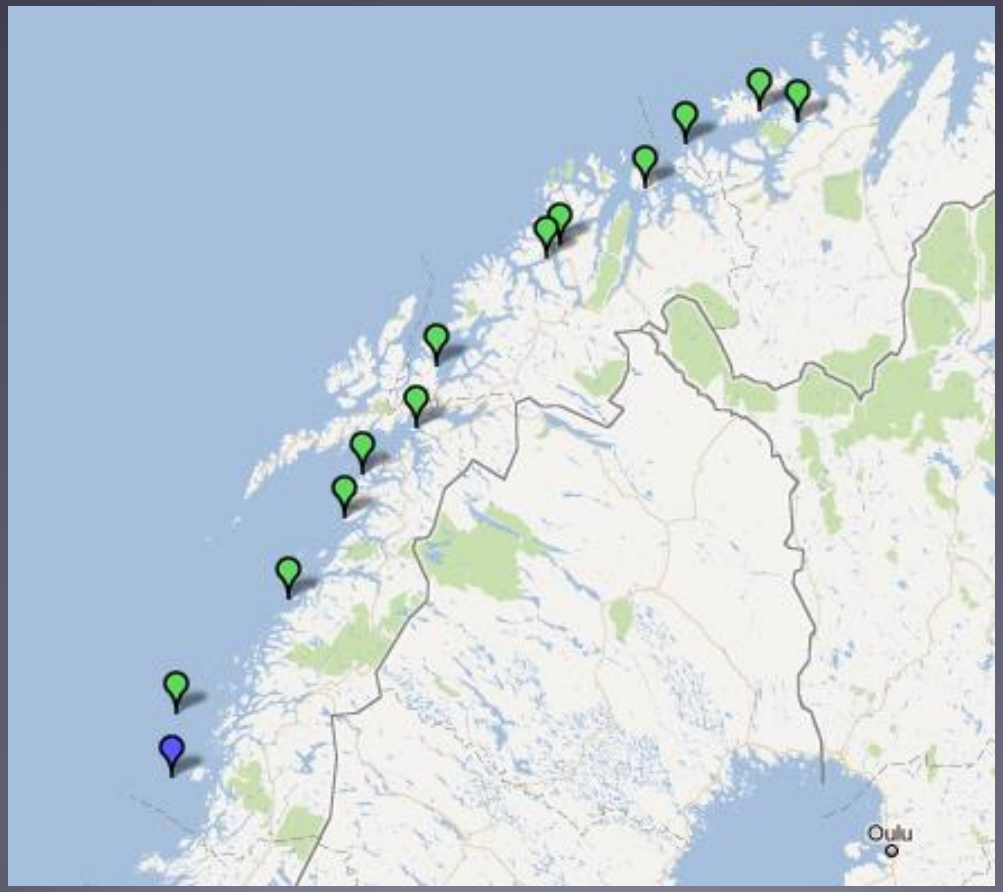


Useful in tracking with e-mailed disaster assessments.

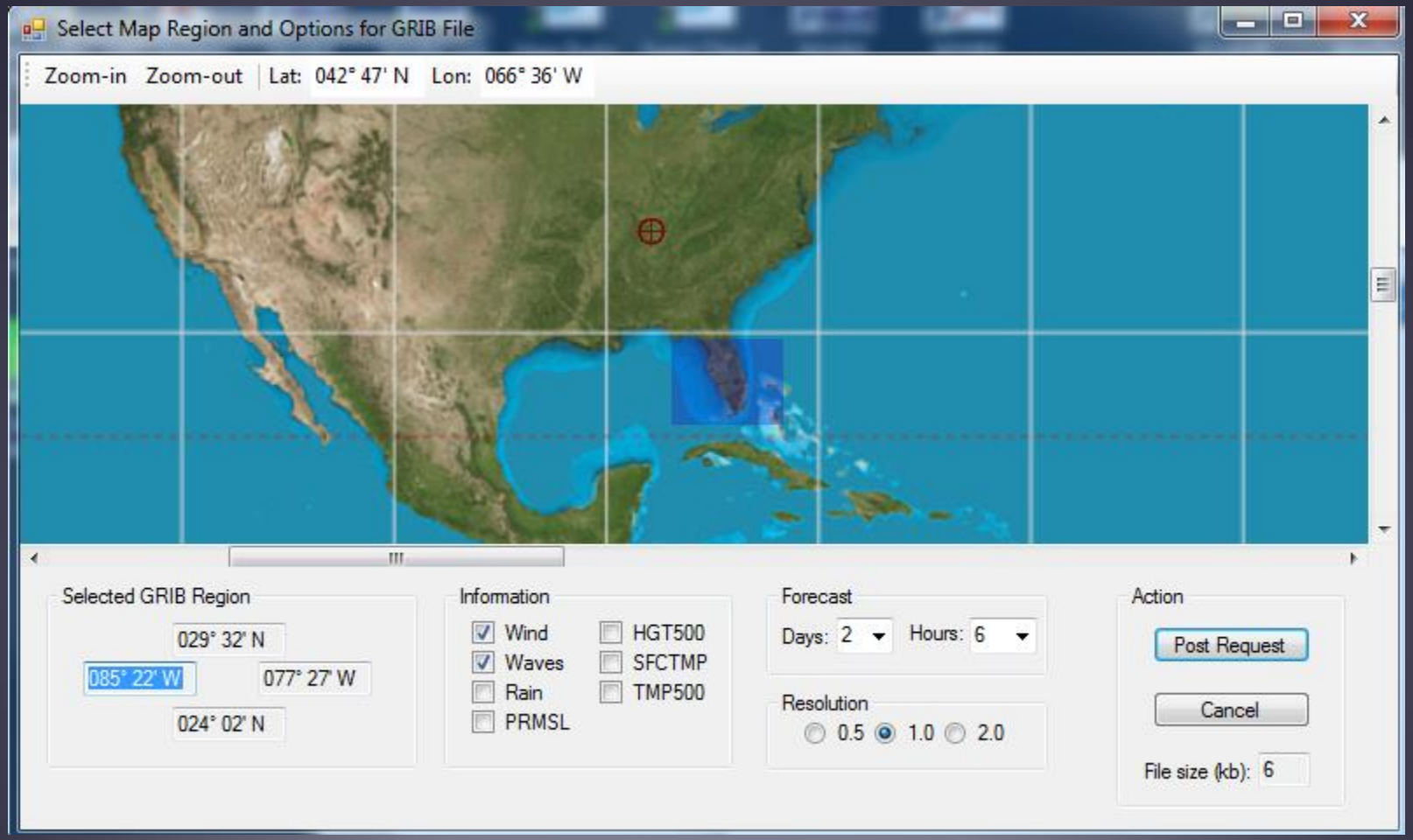
Winlink.org Real-time Position Report Page



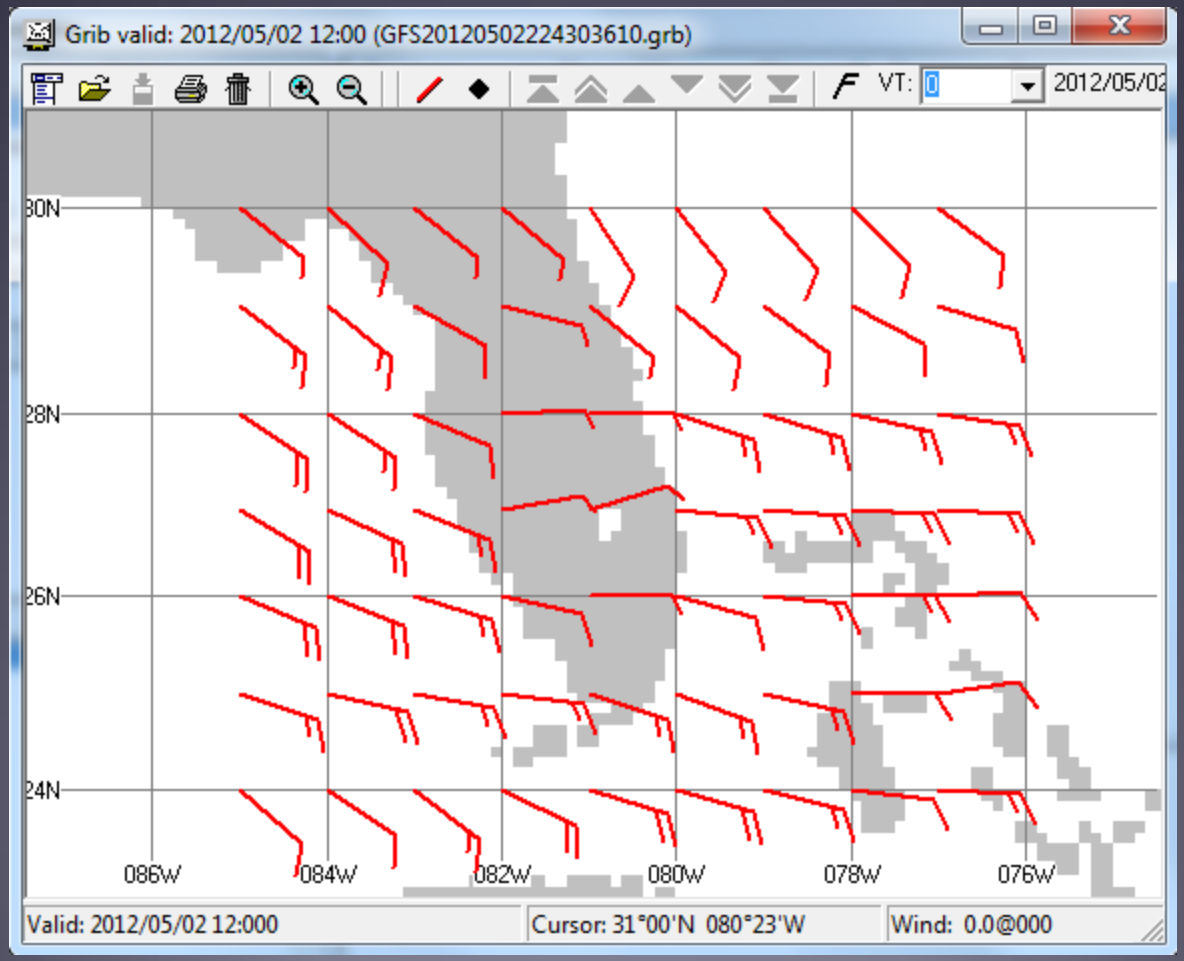
Position Tracking



GRIB File Requests



GRIB Map Returned by Winlink System



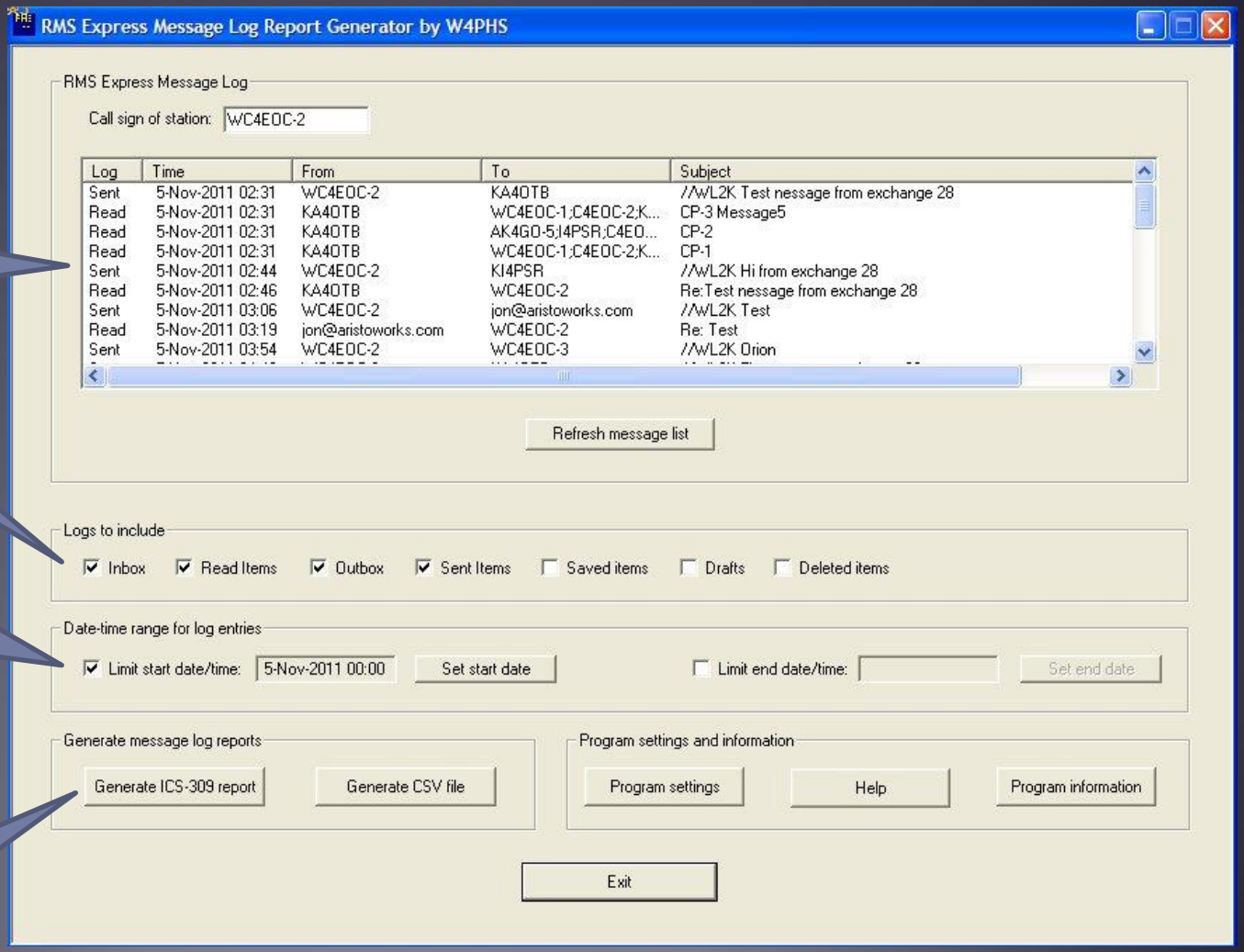
RMSMessageLog ICS-309 Generator

Messages during period

Select folders

Starting & ending report period

Generate ICS-309 pdf file



Generated ICS-309 PDF Message Log Report

COMMUNICATIONS LOG	TASK #	DATE PREPARED: 10-Sep-2011 TIME PREPARED: 15:31
OPERATIONAL PERIOD # 0800 - 1100 Sep. 10, 2011	TASK NAME: HOW-100 bike ride	
RADIO OPERATOR NAME: W4PHS	STATION I.D. Rest Stop # 3	

LOG

TIME	FROM	TO	SUBJECT
10-Sep-2011 08:21	KA4OTB	AK4GO KI4PSR WC4EOC-2 WC4EOC-1	HOW-100
10-Sep-2011 08:23	WC4EOC-2	KA4OTB	//wl2k Rest Stop # 3
10-Sep-2011 08:31	WC4EOC-2	KI4PSR WC4EOC-1	//wl2k Rest Stop 3
10-Sep-2011 09:11	WC4EOC-2	KA4OTB KI4PSR	//WL2K Test from Rest Stop 3
10-Sep-2011 09:12	KA4OTB	WC4EOC-2	Re:Rest Stop # 3
10-Sep-2011 09:12	KA4OTB	WC4EOC-2	Re:Rest Stop # 3
10-Sep-2011 09:12	KI4PSR	WC4EOC-2 KI4PSR WC4EOC-1	Re:Rest Stop 3
10-Sep-2011 09:14	WC4EOC-2	KI4PSR	//WL2K Re:Rest Stop 3
10-Sep-2011 09:14	KA4OTB	WC4EOC-2	Test Message
10-Sep-2011 09:16	WC4EOC-2	KA4OTB	//WL2K Re:Test Message
10-Sep-2011 09:34	KI4PSR	KA4OTB AK4GO KI4PSR WC4EOC-2 WC4EOC-1	Re:HOW-100
10-Sep-2011 09:50	WC4EOC-2	KA4OTB	//WL2K Water received at Rest Stop 3
10-Sep-2011 10:00	WC4EOC-2	KA4OTB	//WL2K Rest Stop 3 has riders
10-Sep-2011 10:12	KA4OTB	WC4EOC-2	Re:Rest Stop 3 has riders
10-Sep-2011 10:23	WC4EOC-2	KI4PSR	//WL2K Winlink--vhf or hf
10-Sep-2011 10:51	KI4PSR	WC4EOC-2	Re:Winlink--vhf or hf
10-Sep-2011 10:53	WC4EOC-2	KI4PSR	//WL2K Re:Winlink--vhf or hf
10-Sep-2011 11:02	WC4EOC-2	KA4OTB KI4PSR	//WL2K Rest stop 3 shutting down

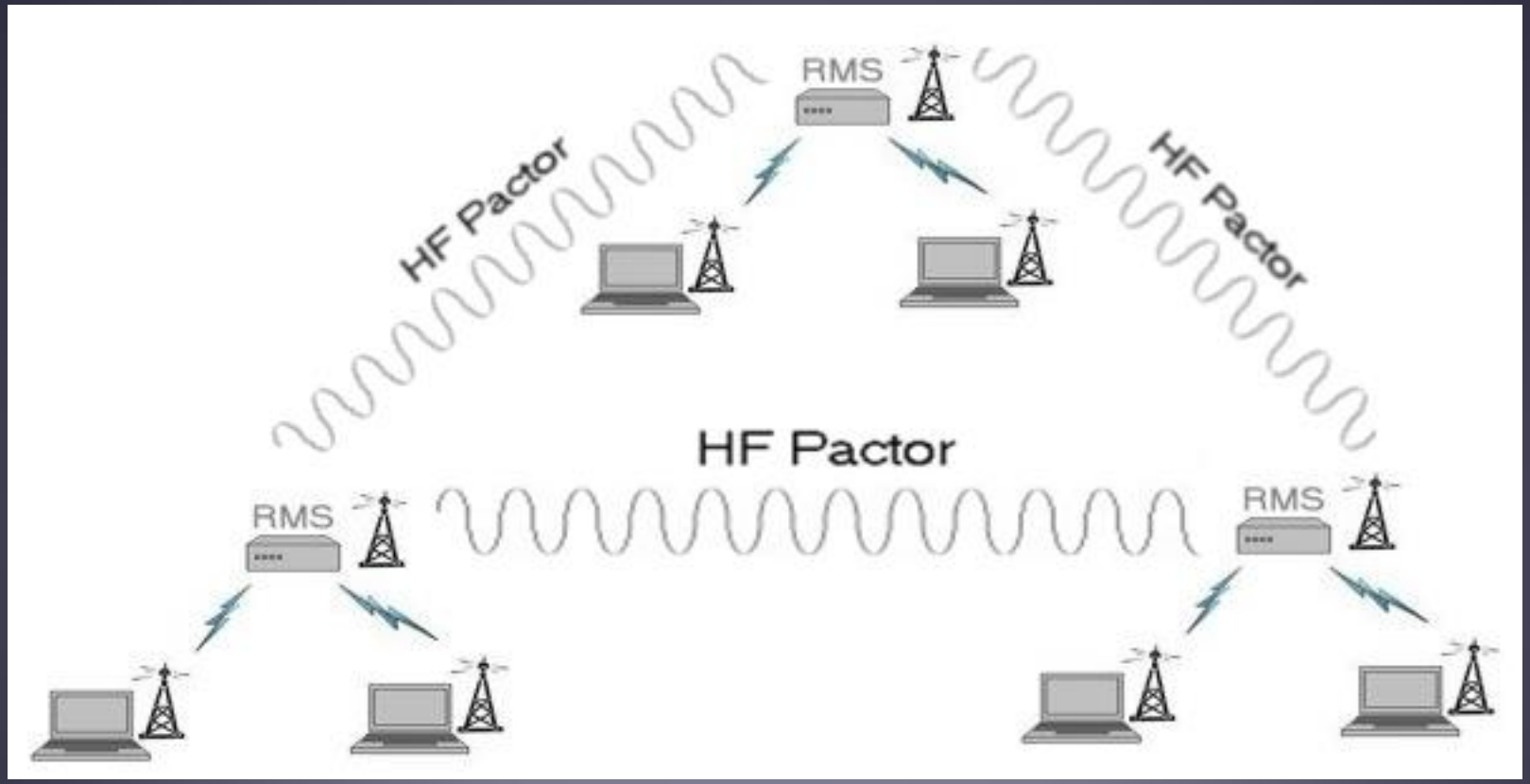
Page 1 of 1 — ICS 309

ICS-309 report generated by RMSMessageLog version 1.2.0 on 10-Sep-2011 15:31

Winlink Hybrid Network

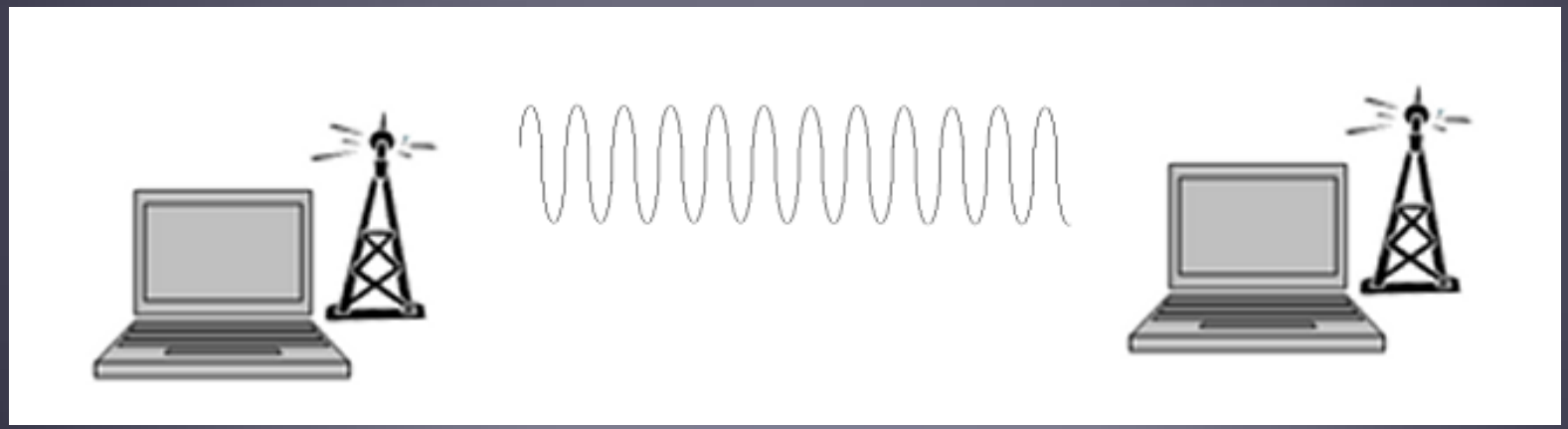
- New capability for Winlink system.
- Radio-only: No Internet connection is required.
- RMS node running the *RMS Relay* program acts as a standalone message hub for multiple users.
- Messages are stored in a local database on the hub until picked up by the recipient.
- Any number of stations can communicate 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