



# THE WORLD OF WINLINK

EMAIL COMMUNICATION VIA INTERNET, VHF/UHF, HF

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# LEVEL SET

- Winlink is a large topic
- This is for an overview and hopefully demo – Comprehensive would take a few hours or more...
- I do not consider myself an expert
- I'm here to share my experiences and some basics.



# AGENDA

- Preliminary Thoughts
- Who, What, When, How & Why
- Modes – VHF/UHF & HF & Internet
- Equipment
- Costs?
- Demo

# PRELIMINARY THOUGHTS

- Get some basics here
- Watch some YouTube videos
- Play with it and experiment
- Share your experiences

# WHO, WHAT, WHEN, HOW & WHY

- Who: Ham operators – Recreational, Emergency (ARES/RACES, Red Cross), Experimenters
- What: Email - with or without attachments – Like Packet or Outpost
- When: Whenever, but it gets busy so patience may be necessary
- How: VHF/UHF, HF, or home internet
- Why: To communicate.... Routine or emergency

# WHAT IT IS AND WHAT IT IS NOT

- This is still ham radio – Part 97
- This is not a full substitution for email
- Encryption is not legal
- Large attachments is not practical (or polite)
- Privacy is non existant – open airwaves



# RED CROSS – NOVEMBER 14, 2020 DRILL W/ ARES

- Originally expected a few hundred, expanded to several hundred...
- Final count was over 1000 Winlink messages received in 12 hours.

# MODES

- Telnet – Internet – Existing Internet Connection
- Packet – Using typical VHF/UHF packet nodes
- PACTOR/VARA/ADROP – Using HF nodes

# MODES - INTERCHANGEABLE

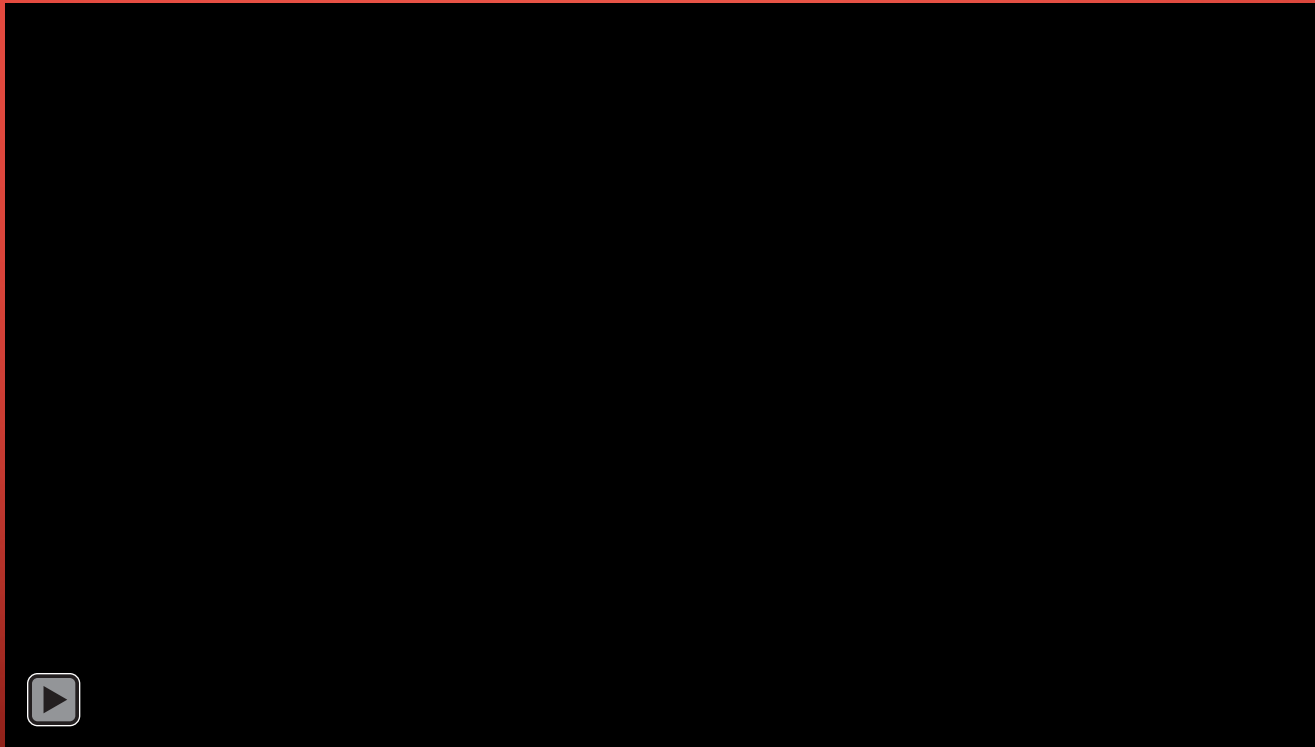
- Common Winlink Program
- Different sub program to go to Telnet, Packet, Winmor/Vera/Adrop

# MODES – TELNET (INTERNET)

- Computer w/ Winlink software
- Internet Connection
- Select “Telnet Winlink” and then “Open Session”
- On the “Telnet Winlink Session” window, select “Start”



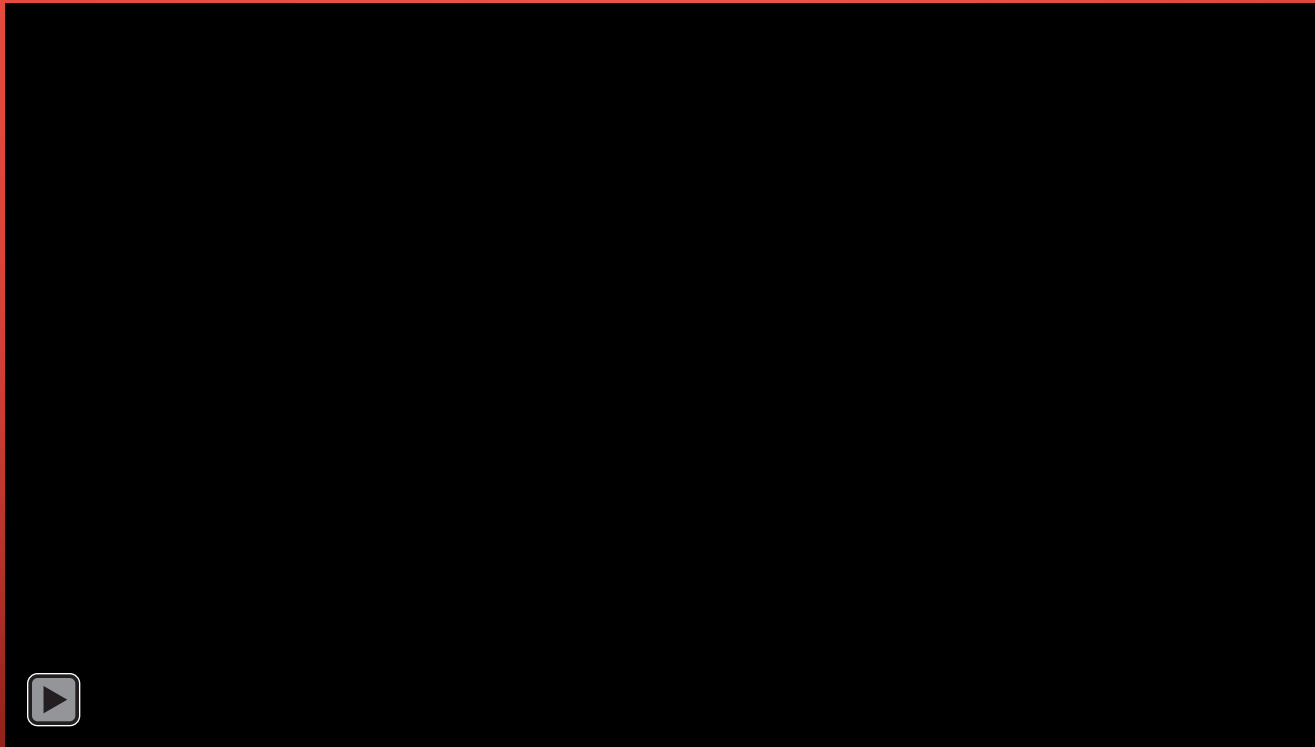
# TELNET EMAIL (2:52)



# MODES – VHF/UHF PACKET

- Computer w/ Winlink software
- VHF/UHF Radio
- Interface – Specific to your radio & computer.
  - TNC (Terminal Node Controller) i.e. Kantronics KPC3, TNC-X – RS232 Serial to Audio
  - Special Sounds Card (i.e. Signalink) and Software to translate data to audio (i.e. Direwolf previously AGWPE)
  - Radio that has built in TNC/Sound Card – i.e. Kenwood TM D710 GA
- Select “Packet Winlink” and then “Open Session”
- First time – define settings to match your equipment configuration
- On the “Telnet Winlink Session” window, select “Start”

# PACKET EMAIL (4:51)



# MODES – HF PACTOR / ADROP / VARA

- Computer w/ Winlink software
- HF Radio
- Interface – Specific to your radio & computer.
  - Radio that has built in TNC/Sound Card – i.e. Icom IC7300 or Yaesu FT-991a
  - Special Sounds Card (i.e. Signalink) and Software to translate data to audio (i.e. Direwolf previously AGWPE)
  - TNC (Terminal Node Controller) i.e. Kantronics KAM XL – RS232 Serial to Audio (unknown)
- Select “Winmor Winlink”, “Adrop Winlink” or “Vara Winlink” and then “Open Session”
- First time – define settings to match your equipment configuration
- On the “Pactor Winlink Session” window, wait for the frequency not to be busy and select “Start”



# HF NODE

The screenshot displays the aprs.fi website interface. At the top, there's a navigation bar with options like Mute, Start Video, Security, Participants, New Share, Pause Share, Annotate, and More. Below this is a search bar and a list of bookmarks. The main content area features a map of Oregon and Idaho, with a station marker for KF7RSF-10. A pop-up window provides details for this station, including its frequency (144.950MHz) and location (Winlink Gateway). The right-hand sidebar contains a search bar, a list of other stations, and a section for 'Other SSIDs'. The bottom of the screen shows a taskbar with several open files.

**Map View:** The map shows the state of Oregon and parts of Idaho. A station marker for KF7RSF-10 is located in the northwest corner of Oregon, near the coast. A pop-up window for this station provides the following information:

- Station Name:** KF7RSF-10 (from WINLINK) - center · zoom · info
- Frequency:** 144.950MHz 1200 R5m Winlink Gateway
- Location:** [APWL2K via TCP/IP, qAS, WLNK-1]
- Status:** being tracked · stop tracking · track in Street View

**Right-hand Sidebar:** The sidebar contains a search bar, a list of other stations, and a section for 'Other SSIDs'. The 'Other SSIDs' section lists several stations, including KF7RSF-12, KF7RSF-13, and KF7RSF-14. Below this is a section for 'Other views' with links to Station info, Raw packets, Status packets, APRS/CWOP weather, Telemetry, Messages, Bulletin board, Prefix browsing, Google Earth KML, Data export tool, and Preferences. The bottom of the sidebar contains a section for 'Information' with links to Stations currently moving, User guide, FAQ, Blog, Discussion group, Linking to aprs.fi, AIS sites, Service status, Database statistics, Advertising on aprs.fi, Technical details, API, Change log, Planned changes, Credits and thanks.

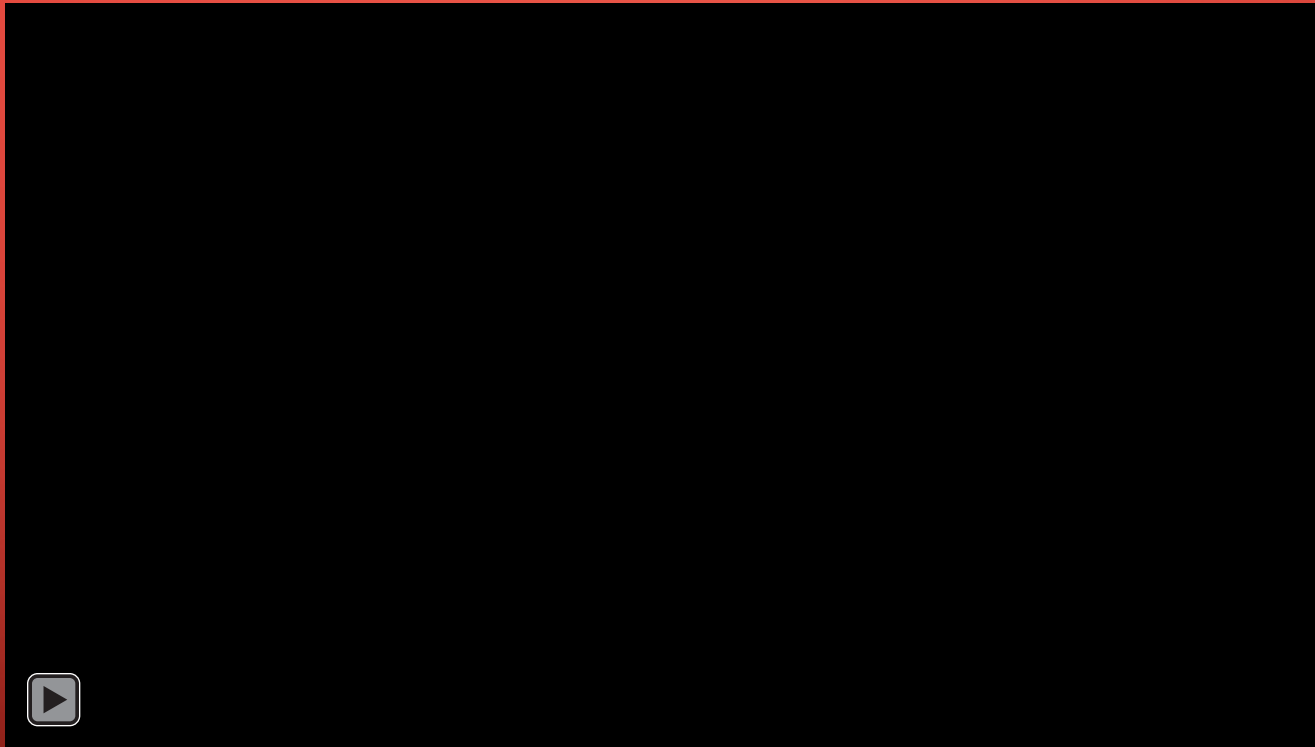
# VERA HF FORM EMAIL (6:54)



# TELNET EMAIL – READ & PRINT (1:20)



# VERA HF EMAIL – READ & REPLY (1 2:34)





# FORMS

- ICS Forms
- California OES Forms
- Red Cross Forms

# MESSAGE – ICS-213

General Message (ICS 213)		
1. Incident Name: Winlink Demo		
2. To (Name/Position): Tim Takeuchi		
3. From (Name/Position): San Benito County EOC		
4. Subject: Winlink for Emcom Communications	5. Date: 2020-07-16	6. Time: 14:26
7. Message: Hello world!		
8. Approved by: H.T.      Position / Title: IC		
9. Reply: received and understood - QSL! Will wish everyone well!		
10. Replied By: Tim      Position / Title: Field Operator      Date / Time: 7/16/2020 14:44		
		Ver 41.3

[illegible]

# MODES – WINLINK SERVER VS P2P

- Over the air – You can use Winlink through a server much like traditional email or P2P (Point to Point)
- I haven't done much with P2P



# WHAT DO I HAVE?

- Computer w/ Winlink software
- Icom IC-7300 (HF)
  - USB Connection (w/ Antenna & Tuner)
- Kenwood TM-D710GA
  - Serial to USB Connection (w/ Antenna)






# SOFTWARE OPTIONS

- Winlink - \$24
- VARA HF - \$69 (full speed)
  - Reduced demo speed

## Amateur Radio Safety Foundation, Inc.



### Winlink Express Registration

#### Registration

Registration of Winlink Express does not involve licensing. See the help article "License" in the program for information on your license to use Winlink Express. Further details about registration are provided in the help article.

Registration is voluntary and not necessary to use the program. Registration requires that you purchase a digital key to be applied to your program. Your registration key purchase supports all Amateur Radio Safety Foundation projects, the ongoing operations of the Winlink system, and the continuing development of new programs, radio modes, enhancements, and better performance. Key purchases are not considered a tax-deductible "donation" by the US IRS.

Registration keys are unique to callsigns and may not be transferred. However, if you change a registered callsign, you can request a new key at no further cost. Registration keys never expire.

The registration fee is \$24 per callsign, up to 17 callsigns. Multiple callsigns may be registered by individuals or agencies in one transaction. If you require more than 17 registrations, please contact [k4cpx@winlink.org](mailto:k4cpx@winlink.org) for details and bulk pricing.

Please enter your name and one or more callsigns below (being sure to enter callsigns correctly). Then, press the "Register Using PayPal" button to be transferred to the PayPal secure web site where you can provide payment using your PayPal account or any major credit card (no PayPal account required). You will immediately be sent your registration key to the email address you provide in your transaction. Your key can also be found on your account page at <https://winlink.org> for easy copy/paste into your program.

Consult the program help for details on how to apply the key to your program. Once the key is applied, registration reminders from the program will be disabled.


If you have problems obtaining your registration key send a message with your transaction ID and details to [winlink@arsfi.org](mailto:winlink@arsfi.org).

Name

Callsigns  
(one per line)

Register Using PayPal

Free Trial Version Restriction



>>>> This software is currently running in FREE TRIAL mode <<<<

Following is the restriction of Free Trial version:

1. Net Rate is limited to 175 bps

Following are the benefits of a registered user:

1. VARA full, Net Rate unlimited

Buy Now (\$69)

Continue to Evaluate

Technical support: EA5HVK, [nietoros@hotmail.com](mailto:nietoros@hotmail.com)

# WHY?

- Email is reliable under normal circumstances...
- During an earthquake, internet cable cut, power outage?
- You can use Winlink to send an email via HF and bypass all local failing infrastructure.

# The Winlink Radio e-Mail Network

E-mail with or without the Internet  
Phil Sherrod, W4PHS



Developed by  
The Winlink Development Team



Defense Secretary Leon Panetta warns of "Cyber Pearl Harbor".



# What is Winlink

- Worldwide system for sending/receiving e-mail via radio
- Provides e-mail from almost anywhere in the world.
- Mature, well-tested and full featured system.
- Adopted for contingency communication by many federal, state and county government agencies
- Used by the National Guard (14 units in Tennessee)
- 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.

# Winlink Has Been Used in Many Incidents

**TSA Activation**



**Demo for Congress**



**AT&T Disaster Recovery**



# Disaster Assessment Picture – Kentucky Ice Storm



## Kentucky Ice Storm 2009

Cell, Land-line or Fax? NO!

- Air Card? NO!

- Public Safety, Mutual Aid? NO!

- Satellite/Microwave? NO!

- Winlink Radio E-Mail?

*Yes! Mobile from a TEMA vehicle.*

*This picture was one of several sent by TEMA mobile through the Winlink radio email system.*

# Winlink System Components

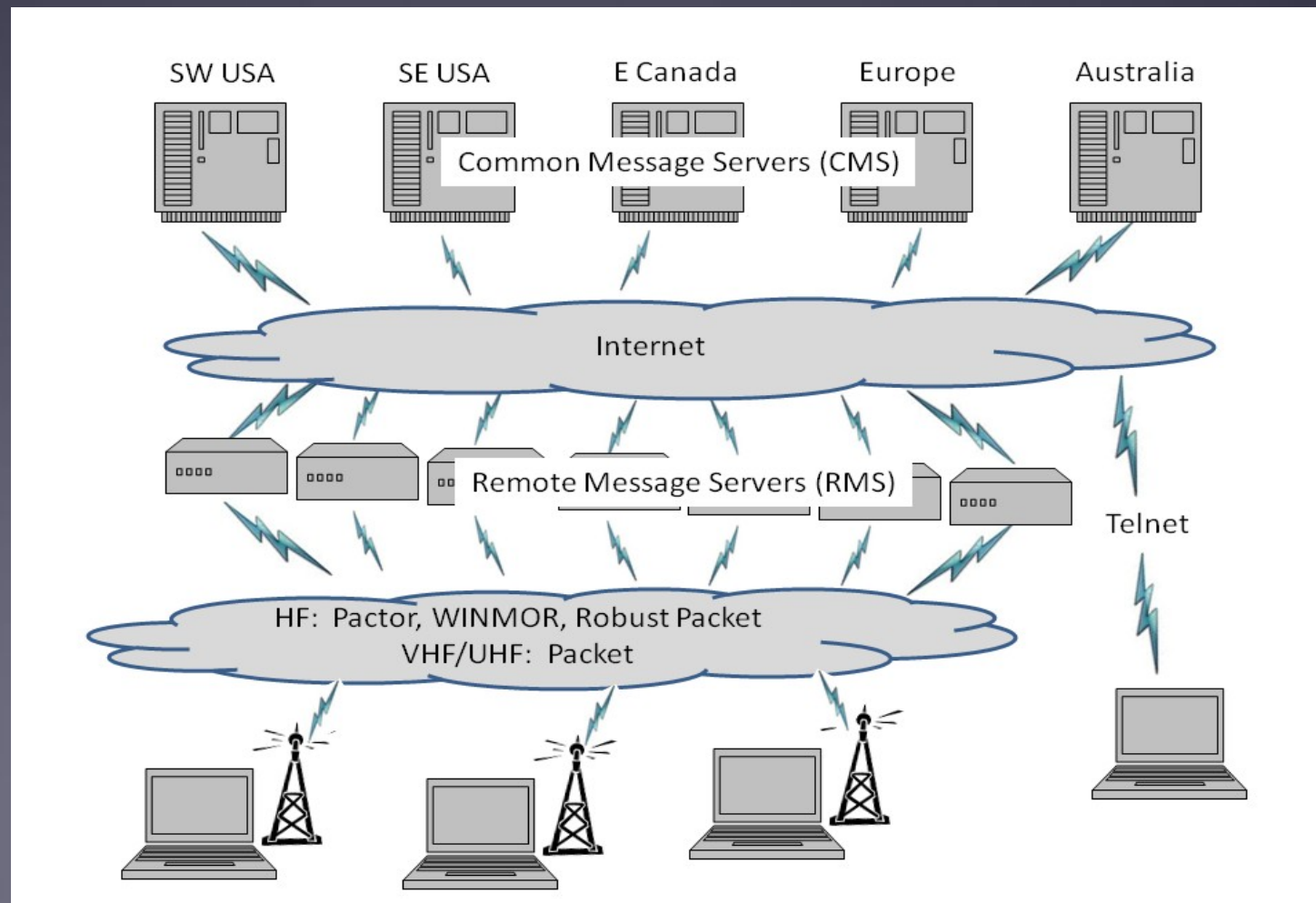
Hierarchical levels of the Winlink system:

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 is sufficient for normal system operation.



# Winlink Architecture (Conventional Mode)

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



# Winlink Connection Modes

- **HF Pactor** – Fast but expensive - \$1,500.
- **HF WINMOR** – “Poor man’s Pactor”. \$100 or \$0.
- **VHF/UHF Packet** – **9600 baud**, \$400. 1200, \$100.
- **Telnet** – Non-radio connection through the Internet.  
Good for training or if no radio.
- **Iridium GO!** – Satellite phone connection.
- **MESH network** to Winlink “Post Office” (RMS Relay).
- **Telnet peer-to-peer** between Expressusers.

# Winlink Express E-mail Client Program

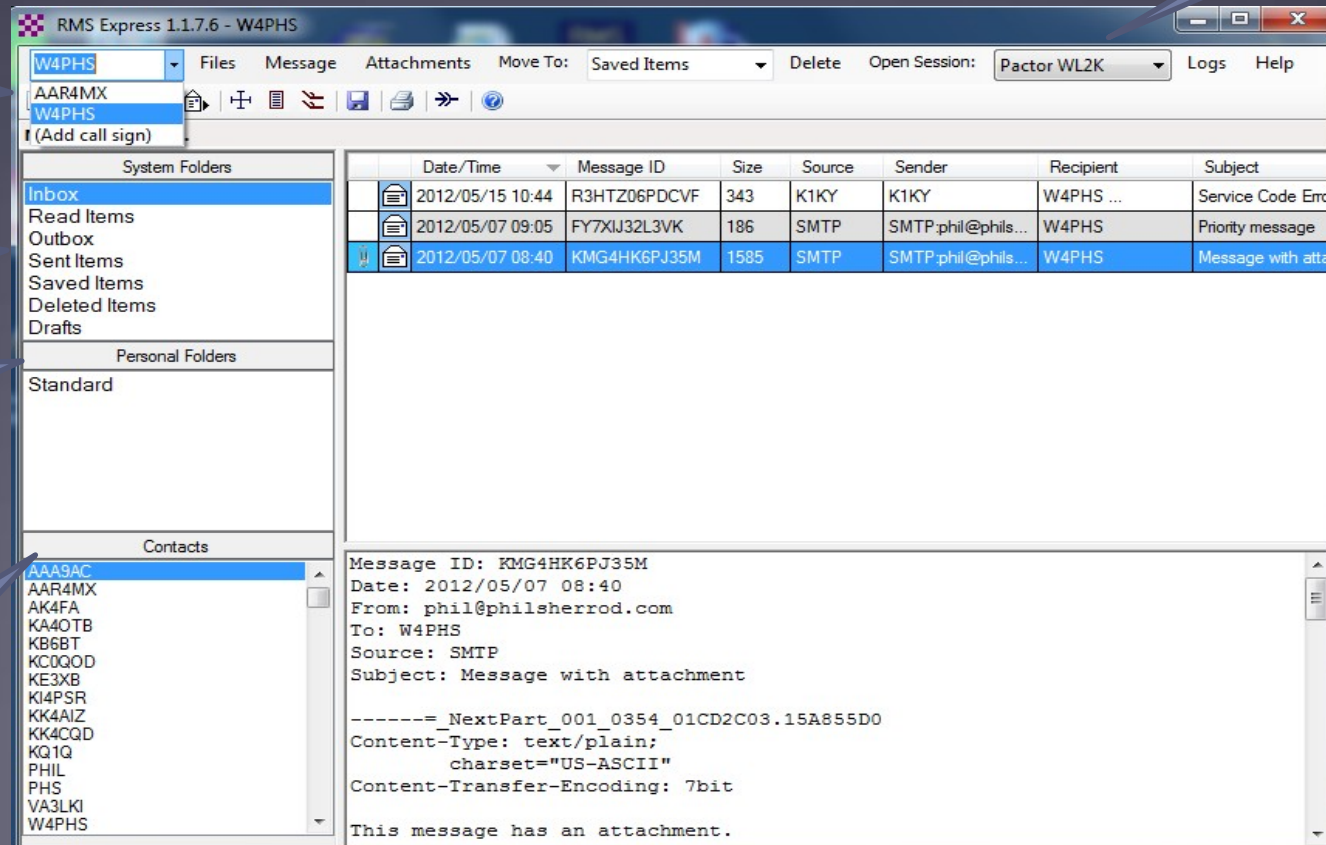
Multiple call signs

In-box, Out-box, etc.

Personal message folders

Contacts address book

Multiple modes



# Composing a Message in Winlink Express

Click to  
start a  
message

The screenshot shows the Winlink Express 1.2.24.4 - W4PHS application window. The main window has a menu bar with 'Files', 'Message', 'Attachments', 'Move To:', 'Saved Items', 'Delete', and 'Open Session:'. Below the menu bar is a toolbar with icons for 'New', 'Open', 'Save', and 'Print'. The left sidebar shows a list of folders: 'Inbox', 'Read Items', 'Outbox', 'Sent Items', 'Saved Items', 'Deleted Items', and 'Drafts'. The main area displays 'No active session' and 'Standard'. A dialog box titled 'Enter a new message' is open, showing fields for 'From:', 'To:', 'Cc:', 'Subject:', and 'Attach:'. The 'From:' field is set to 'W4PHS'. The 'To:' field is set to 'KD4VVC;'. The 'Subject:' field is set to 'Test message from Phil'. The 'Attach:' field is empty. The 'Winlink Message' radio button is selected. The 'Request read receipt' checkbox is unchecked. The message body contains the text: 'Scott, This is a test message from Phil. W4PHS'.

RMS Express 1.2.24.4 - W4PHS

W4PHS Files Message Attachments Move To: Saved Items Delete Open Session: Telnet WL2K

No active session

Inbox  
Read Items  
Outbox  
Sent Items  
Saved Items  
Deleted Items  
Drafts

Standard

Enter a new message

Close Select Template Attachments Post to Outbox Save in Drafts Folder Spell Check

From: W4PHS ☒ Winlink Message ☐ Peer-to-Peer Message ☐ Request read receipt

To: KD4VVC;

Cc:

Subject: Test message from Phil

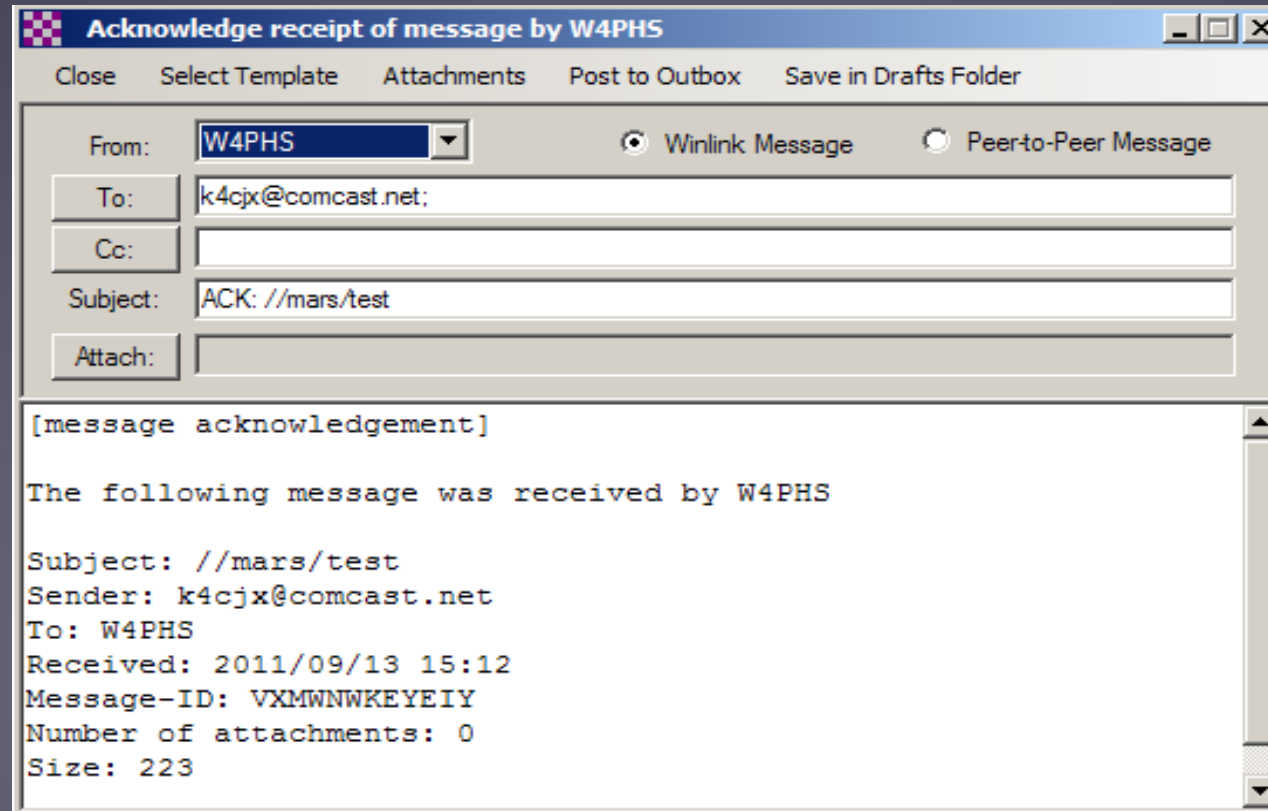
Attach:

Scott,  
  
This is a test message from Phil.  
  
W4PHS



# Message Receipt Acknowledgements

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



**Acknowledge receipt of message by W4PHS**

Close   Select Template   Attachments   Post to Outbox   Save in Drafts Folder

From: **W4PHS**   ☒ Winlink Message   ☐ Peerto-Peer Message

To: k4cjsx@comcast.net;

Cc:

Subject: ACK: //mars/test


Attach:

[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

# Built-in ICS-309 pdf Message Log Generator

 **Generate ICS-309 Communication Log**

**Generate an ICS-309 Communication Log as a pdf File**

Select Message Mailboxes

☒ Inbox ☐ Outbox ☐ Drafts ☐ Personal 1: Standard ☐ Personal 2: High Priority

☒ Read ☒ Sent ☐ Deleted

☒ Saved

Message Date Range

☐ Limit start date/time: 2017-08-01 08:15 (Local time)

☐ Limit end date/time: 2017-09-02 14:15 (Local time)

Options

☐ Separate entry for each recipient

☒ Combine recipients into a single entry

Set Page Layout

Task ID: Winlink Training

Task Name: Winlink Training

Operational period: Training period

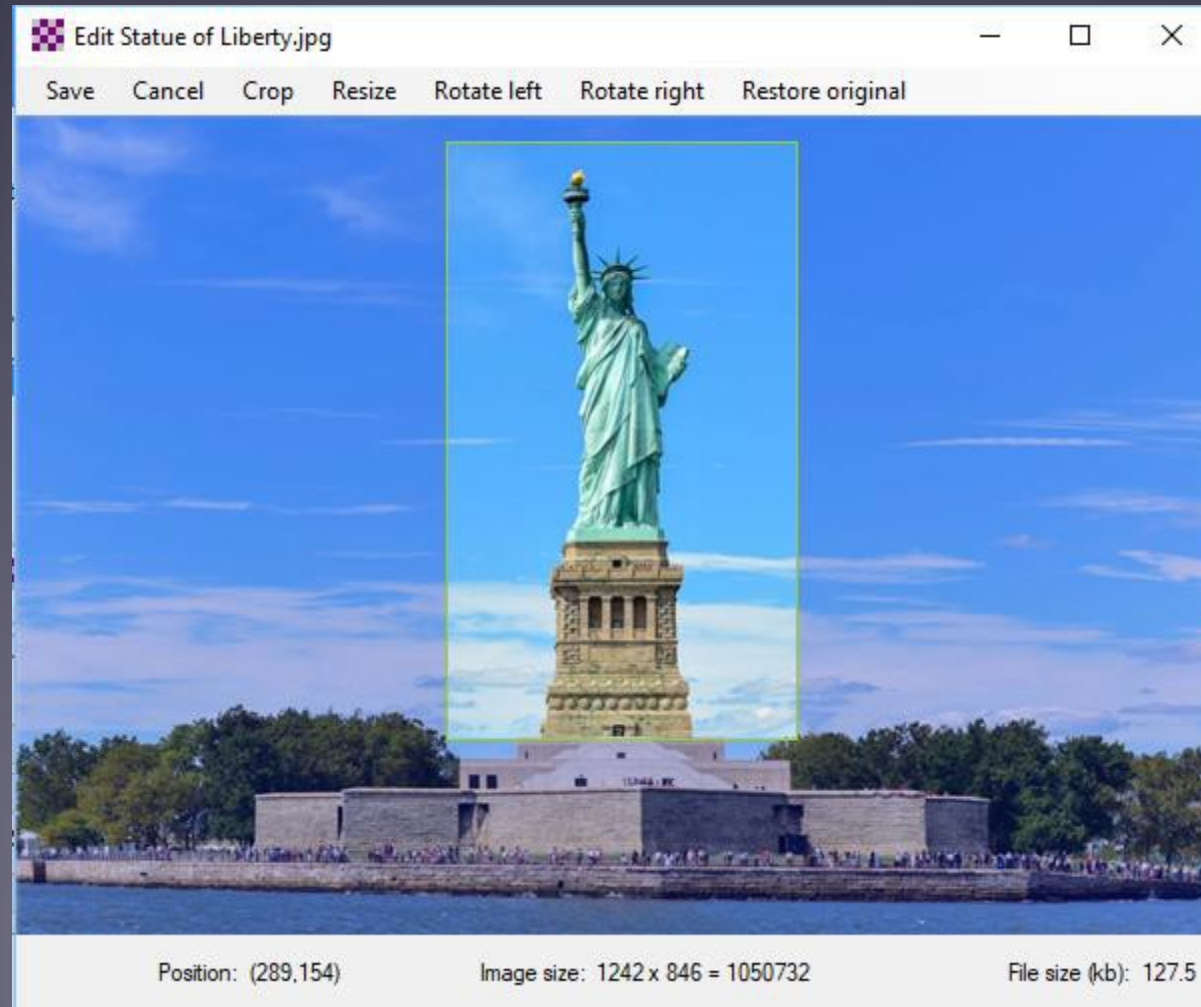
Operator name: Phil

Station ID: W4PHS

Output pdf file: c:\test\309.pdf

COMMUNICATIONS LOG		TASK # Winlink Training	DATE PREPARED: 2017-09-13 TIME PREPARED: 08:02
OPERATIONAL PERIOD # Training period		TASK NAME: Winlink Training	
RADIO OPERATOR NAME: Phil		STATION ID: W4PHS	
LOG			
TIME	FROM	TO	SUBJECT
2014-11-19 19:35	sub-server@satdocs.com	W4PHS	GF5:31N,19N,086W,074W
2014-12-01 19:38	K4DK	W4PHS	/JWL2K Net announcements 12-01-14
2014-11-19 10:00	phil@philsherrod.com	W4PHS	Test
2014-11-19 10:28	phil@philsherrod.com	W4PHS	Test 3
2014-11-21 09:13	HB9DSE	W4PHS	/JWL2K P2P Scanning for Favorites
2014-12-03 15:16	N6KZB	W4PHS	/JWL2K FW: Unable to route message to W0NRC
2014-11-22 19:35	sub-server@satdocs.com	W4PHS	GF5:31N,19N,086W,074W
2014-11-25 08:10	NNS4UR	W4PHS	Test folder
2014-11-24 19:22	K4DK	W4PHS	/JWL2K Net announcements 11-24-14
2014-12-01 15:52	judgefornesen@yahoo.com	W4PHS	Re: /JWL2K Winlink message with attachments from Phil Sherrod
2014-12-16 19:23	K1KY	W4PHS	P2P Message Test from K1KY-T2
2014-12-16 19:26	K1KY	W4PHS	Re: Greetings from Phil
2014-12-19 12:18	K1KY	W4PHS	Twist P2P Message test to 2 addys
2014-12-19 12:33	W4CAT	W4PHS	Test message from W4CAT - Galatin over the MESH
2014-12-18 22:32	W4CAT	W4PHS	P2P Test from LaVergne K1KY-CP1 station via MESH to SMYRNA to Internet
2014-12-18 22:31	k4qg@comcast.net	W4PHS	Re: /JWL2K FW: K1KY-CP1 MESH Winlink Message to K1KY-T2
2014-12-11 17:09	K1KY	W4PHS	/JWL2K K1KY-10 9600 BAUD WINLINK RMS BACK ON THE AIR
2014-12-18 17:48	K1KY	W4PHS	/JWL2K K1KY KPC 9612+ Winlink Settings in my RV
2014-12-19 00:48	K1KY	W4PHS	/JWL2K FW: P2P test Message from Galatin to Smyrna via MESH - Winlink
2014-12-18 19:15	k4qg@comcast.net	W4PHS	Re: /JWL2K K1KY KPC 9612+ Winlink Settings in my RV
2014-12-16 21:39	K1KY	W4PHS	/JWL2K FW: K1KY-CP1 MESH Winlink Message to K1KY-T2
2014-12-31 12:07	ADMIN	W4PHS	New Web App: Sysop's Message Monitor
2015-01-07 08:02	W4CAT	W4PHS	/JWL2K RMS Post Office Test
2015-01-08 09:14	W4CAT	W4PHS	/JWL2K Delivery time
2015-01-08 10:44	K1KY	W4PHS	/JWL2K Re: Greetings from Phil
2015-01-08 09:08	W4CAT	W4PHS	/JWL2K 1MB File - RMS Post Office
2015-01-08 09:11	W4CAT	W4PHS	/JWL2K Here are 2 files - nearly 2MB total
2015-01-08 12:03	W4CAT	W4PHS	/JWL2K 2 Mb transmit time 1:30
2015-01-08 12:30	K1KY	W4PHS	/JWL2K 2mb receive time 1:40
2015-01-08 18:31	K1KY	W4PHS	/JWL2K 3.13MB File received via MESH
2015-01-08 12:11	W4CAT	W4PHS	/JWL2K 3.13 MB transmitted 2:15
2015-01-08 18:23	K1KY	W4PHS	/JWL2K 3.13 MB file transfer time over MESH
2015-01-08 13:03	W4CAT	W4PHS	/JWL2K 3.2MB Max tested successful
2015-01-08 18:45	K1KY	W4PHS	/JWL2K 2nd test via MESH 3.13 mb file upload time 8:11
2015-01-08 19:07	K1KY	W4PHS	/JWL2K RMS Relay View Log status issue
2015-01-08 12:00	W4CAT	W4PHS	/JWL2K Large file test 2Mb
2015-01-08 12:07	W4CAT	W4PHS	/JWL2K 3 Mb file transfer test
2015-01-08 13:01	W4CAT	W4PHS	/JWL2K 3.2 MB File attempt
Page 1 of 28			ICS 309
ICS-309 report generated by Winlink Express 1.5.8.0			

# Built-in Picture Cropping/Resizing



# Winlink Express RMS Channel List

HF Channel Selector

Exit Select Update Table Via Internet Update Table Via Radio Forecast SFI All RMS

Callsign	Frequency (kHz)	Mode	Grid Square	Hours	Group	Distance (mi)	Bearing (Degrees)	Path Reliability Estimate	Path Quality Estimate
NCS508	3348.500	P4, P3	EM66OC	00-23	SHARES12...	7	042	100	100
NCS508	4523.500	P4, P3	EM66OC	00-23	SHARES12...	7	042	100	100
NCS508	5345.000	P4, P3	EM66OC	00-23	SHARES12...	7	042	100	100
NCS508	9065.500	P4, P3	EM66OC	00-23	SHARES12...	7	042	100	100
NCS508	6786.500	P4, P3	EM66OC	00-23	SHARES12...	7	042	100	100
NCS387	5860.000	P4, P3	EM36KH	00-23	SHARES12...	349	275	83	54
NCS504	5295.500	P4, P3	EM57MO	00-23	SHARES12...	158	314	82	54
NCS509	4937.000	P4, P3	EM55MO	00-23	SHARES12...	120	257	84	54
NCS511	5155.000	P4, P3	EM65UH	00-23	SHARES12...	59	146	83	54
NCS509	3350.500	P4, P3	EM55MO	00-23	SHARES12...	120	257	83	54
NCS359	5295.500	P4, P3	EM75MW	00-23	SHARES12...	107	092	82	54
NCS361	3383.500	P4, P3	EM57QB	00-23	SHARES12...	121	307	83	54
NCS504	3383.500	P4, P3	EM57MO	00-23	SHARES12...	158	314	84	53
NCS511	3383.500	P4, P3	EM65UH	00-23	SHARES12...	59	146	82	53
NCS359	3383.500	P4, P3	EM75MW	00-23	SHARES12...	107	092	82	53
NCS375	6801.500	P4, P3	EM37LK	00-23	SHARES12...	355	288	78	53
NCS520	4523.500	P4, P3	EM85WX	00-23	SHARES12...	265	089	81	52

Estimate of  
Signal Path  
Quality



# Current Amateur (Ham) HF Pactor RMS Stations



## Concern About “Cyber-Pearl Harbor” Attack

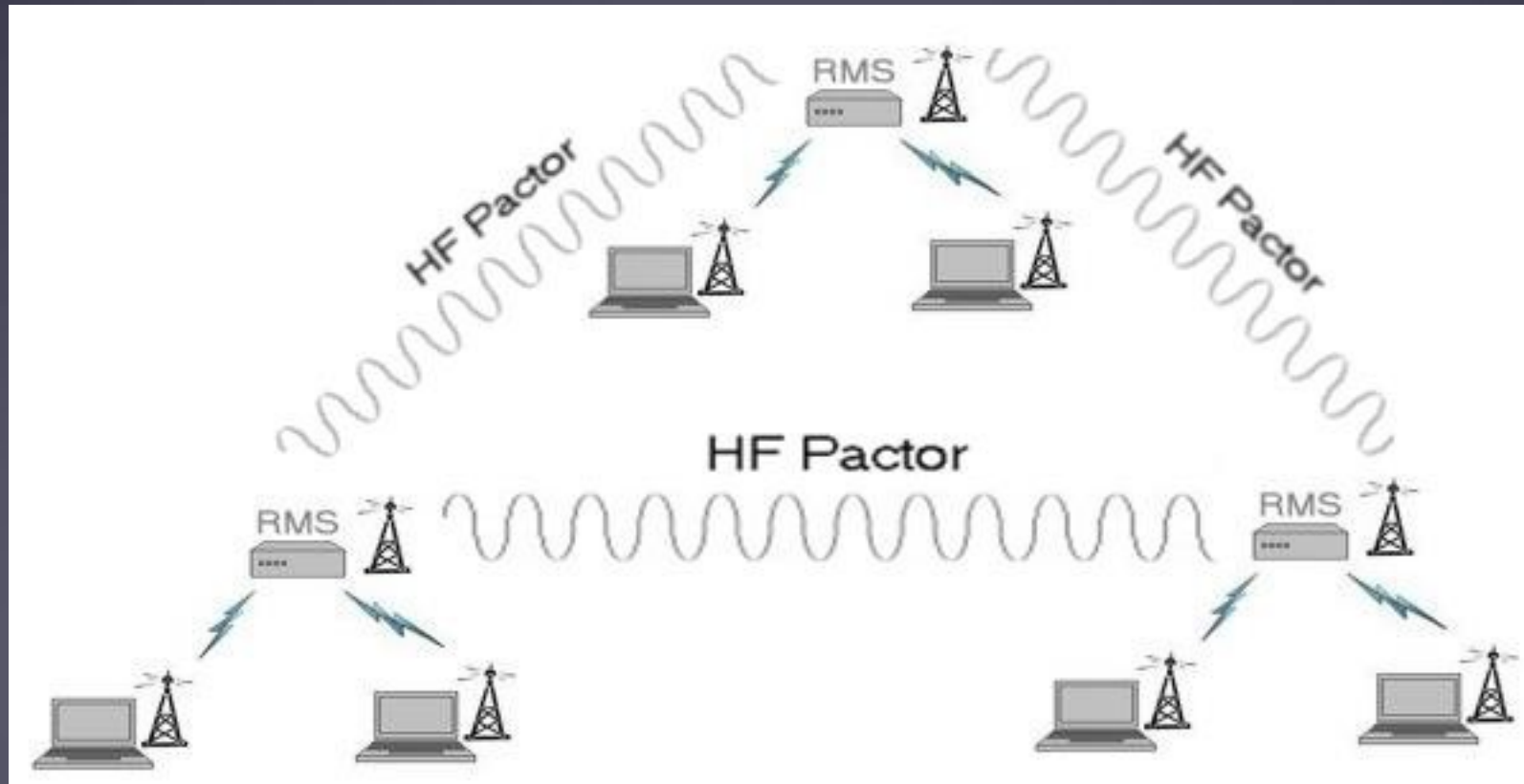
- “The most destructive possibilities, Mr. Panetta said, involve ‘cyber-actors launching several attacks on our critical infrastructure at one time, in combination with a physical attack.’ He described the collective result as a ‘cyber-Pearl Harbor that would cause physical destruction and the loss of life, an attack that would paralyze and shock the nation and create a profound new sense of vulnerability.”

*The New York Times, October 11, 2012*

# Growing Threat to USA Infrastructure

- “WASHINGTON — The Obama administration has warned the nation’s power companies, water suppliers and transportation networks that sophisticated cyberattack techniques used to bring down part of Ukraine’s power grid two months ago could easily be turned on them.” New York Times, Feb. 29, 2016
- Power grid threats and vulnerabilities extensively researched in Ted Koppel’s book *Lights Out*.
- Cyber-attacks can be devastating, and they are *much* easier to launch than physical attacks.

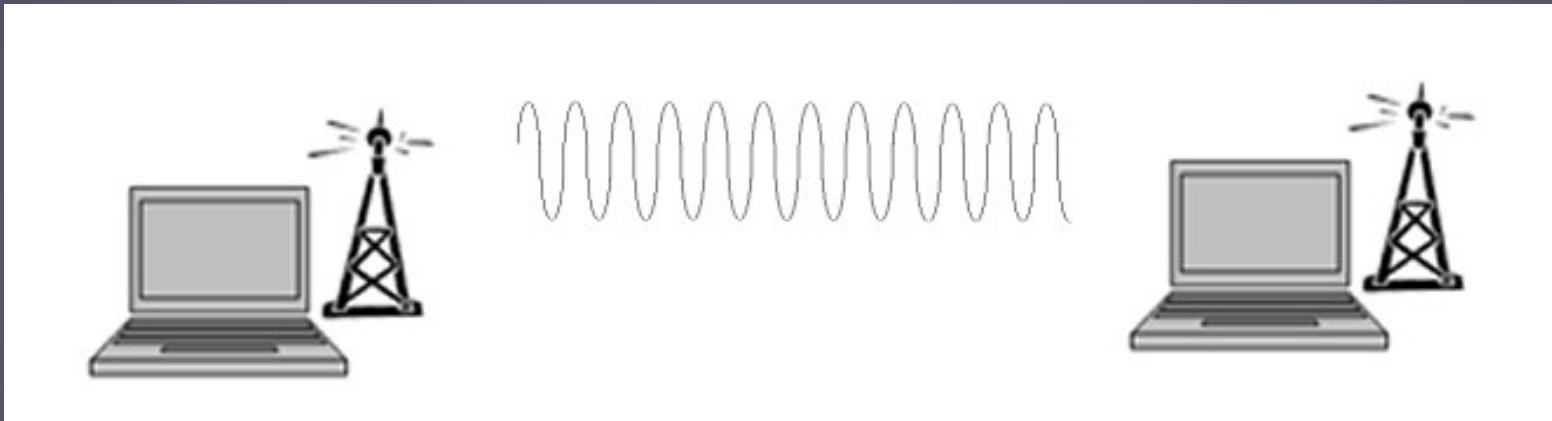
# Radio-Only Winlink Network (No Internet)





# 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.



# GETTING STARTED

- <http://winlink.org>
- Download the software, register your call sign and emails under settings
- Confirm your email
- Start with TELNET
- Move to VHF/UHF or HF as you desire and your license allows

# WINLINK IS NOT STATIC

- Things are always changing!
- Watch when doing research – PACTOR is currently out of favor of Vara – that could easily change.
- Don't read standards, programs, utilities or techniques as static and check the dates of the material you read.

# LINKS FOR FUTURE STUDY

- Discussions: <https://sbcara.groups.io/g/Tech/>
- Site: <https://www.winlink.org/>
- How 2 Series: [https://www.winlink.org/content/k4ref\\_how\\_to\\_video\\_series\\_winlink\\_winlink\\_express](https://www.winlink.org/content/k4ref_how_to_video_series_winlink_winlink_express)
- Radio e-Mail Network: [http://www.philsherrod.com/Winlink/Winlink\\_PowerPoint.pdf](http://www.philsherrod.com/Winlink/Winlink_PowerPoint.pdf)
- Winlink Express – Installation and Configuration: [http://wiki.oevsv.at/images/c/c2/14-Winlink\\_Express\\_Install\\_and\\_Configure-Currie.pdf](http://wiki.oevsv.at/images/c/c2/14-Winlink_Express_Install_and_Configure-Currie.pdf)
- Using Forms with RMS Express in Winlink  
2000: <https://clallamates.org/library/Using%20Forms%20with%20RMS%20Express%20in%20Winlink%202000.pdf>
- Winlink for Emcom: [https://www.youtube.com/watch?v=3gdwsV9\\_ca0](https://www.youtube.com/watch?v=3gdwsV9_ca0)
- Winlink for Hospital Communication: <https://www.youtube.com/watch?v=tGbHMgRL5ZM>
- How To Send/Receive Emails Over Ham Radio Using IC-7300 And Winlink: <https://www.youtube.com/watch?v=ijxkqvqkOyw>
- VARA HF, Email Over Ham Radio, Winlink Express Tutorial, Military Grade!! <https://www.youtube.com/watch?v=SegKxnJSmiM>



# CONCLUSION

- Learn
  - Study
  - Follow Up
  - Share
- 
- [http://sbcara.org/winlink001 /](http://sbcara.org/winlink001/)