WINLINK
Global Radio Email®

Developed in the late 1990's

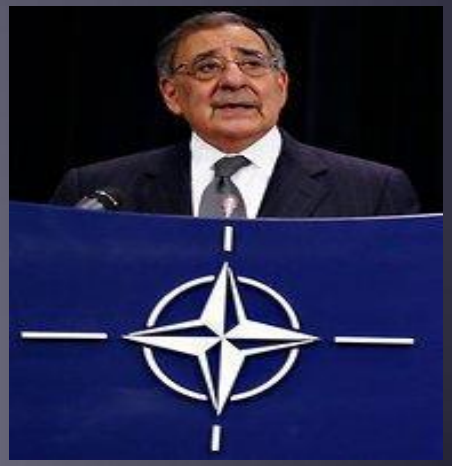
Became Operational in 2000

E-mail with or without the Internet

REALLY!

Developed by Amateur Radio Safety Foundation, Inc. (ARSFI) The Winlink Development Team

www.winlink.org



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

What is Winlink?

- 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.

What is Winlink?

The Types, Paths and Modes of a Radio-Based Global Messaging System

By Rick Frost, K4REF

PLAY VIDEO

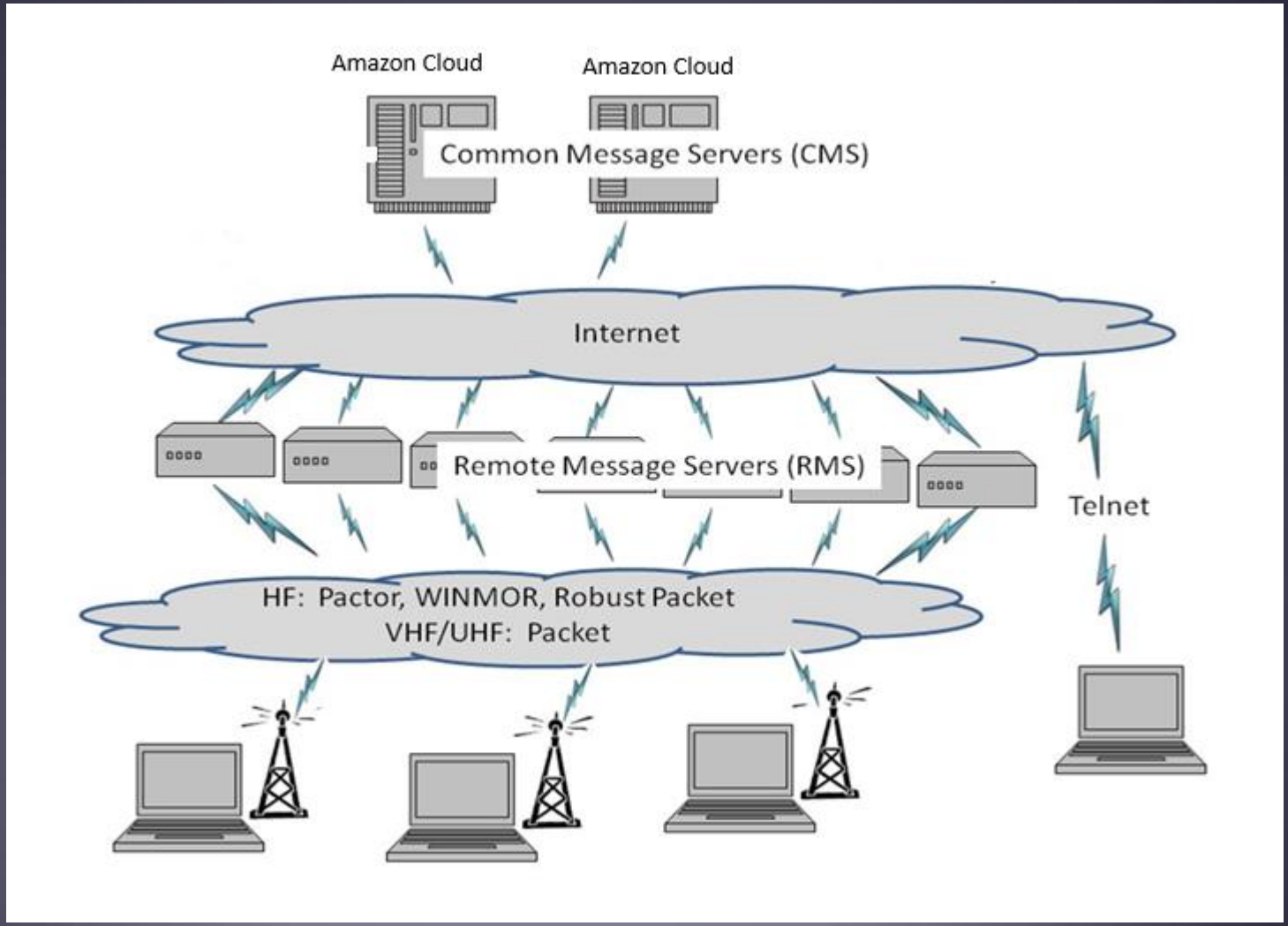
Note: This is an older video that does not talk about VARA.
Also, the CMS is now in the Amazon Cloud

Winlink Operating Modes

- For efficiency, reliability and flexibility, the Winlink system provides three modes for transferring messages:
  - Conventional system that stores messages on CMS "backbone" servers.
  - Hybrid MESH network that transfers messages over long distances using radio-only HF forwarding.
  - Peer-to-Peer direct connections between two client stations without any use of Internet or infrastructure.

Winlink Architecture (Conventional Mode)

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



Winlink Connection Modes

- **HF Pactor 1, 2, 3 and 4** – Fast and reliable but requires an expensive modem ($1500+).
- **VARA HF** – High Performance HF modem based on OFDM modulation. VARA Modem, brings state of the art Military grade technology to new and existing HF data
- **VARA FM – VHF/UHF** - an alternative to Packet and Pactor
- **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.

Are there any guidelines concerning the size of messages that WL2K will accept and process? What are the relative speeds of the various protocols?

120,000 bytes is the largest “compressed” message size that will be accepted for Winlink. Due to the much slower transfer speeds of radio paths (compared to dial-up, etc.) it is better if messages are kept as small as practical, while still accomplishing the communications objectives of both users.

Peer-to-Peer messages are limited in size only by hardware memory size and equipment thermal limits.

Following are approximate air times needed to transfer a 4K message (after compression) for several modes of operation, under ideal conditions: Note: Unlicensed VARA is capped at 177bps. Licensed Vara $69 is not capped. On small messages the speed differences are less pronounced than on large messages due to the ACK and NACK overhead.

Pactor 1 = 15 minutes
Pactor 2 = 4 minutes
Packet (1200) 1 Node = 2.5 minutes
Packet (1200) direct = 2 minutes
Packet (9600) direct = 1 minute
ARDOP = faster than Packet 2, slower than Packet 3
Pactor 3 = 30 seconds
VARA = similar to Pactor 3 and 4, depending on conditions
VARA FM = 15 seconds
Pactor 4 = 15 seconds
Telnet (Internet Access) = seconds

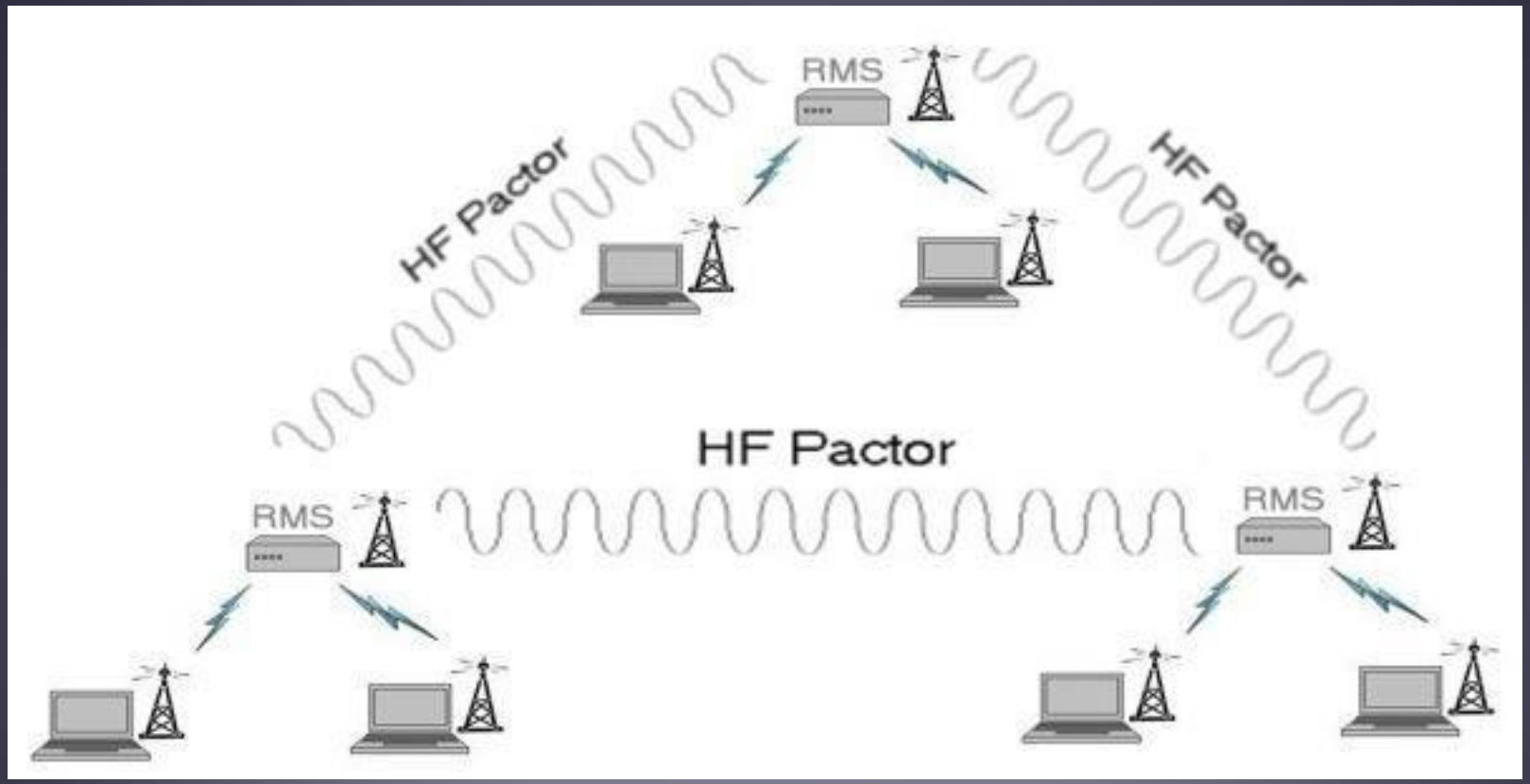
What Winlink Offers for EmComm

- 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
  - 100% accurate transmissions
- Interoperability: Connect different types of systems
  - Bridge different radio capabilities (VHF/UHF/HF)
  - Bridge protocols: Pactor, Winmor, 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
- Time independence (except for peer-to-peer)
- 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

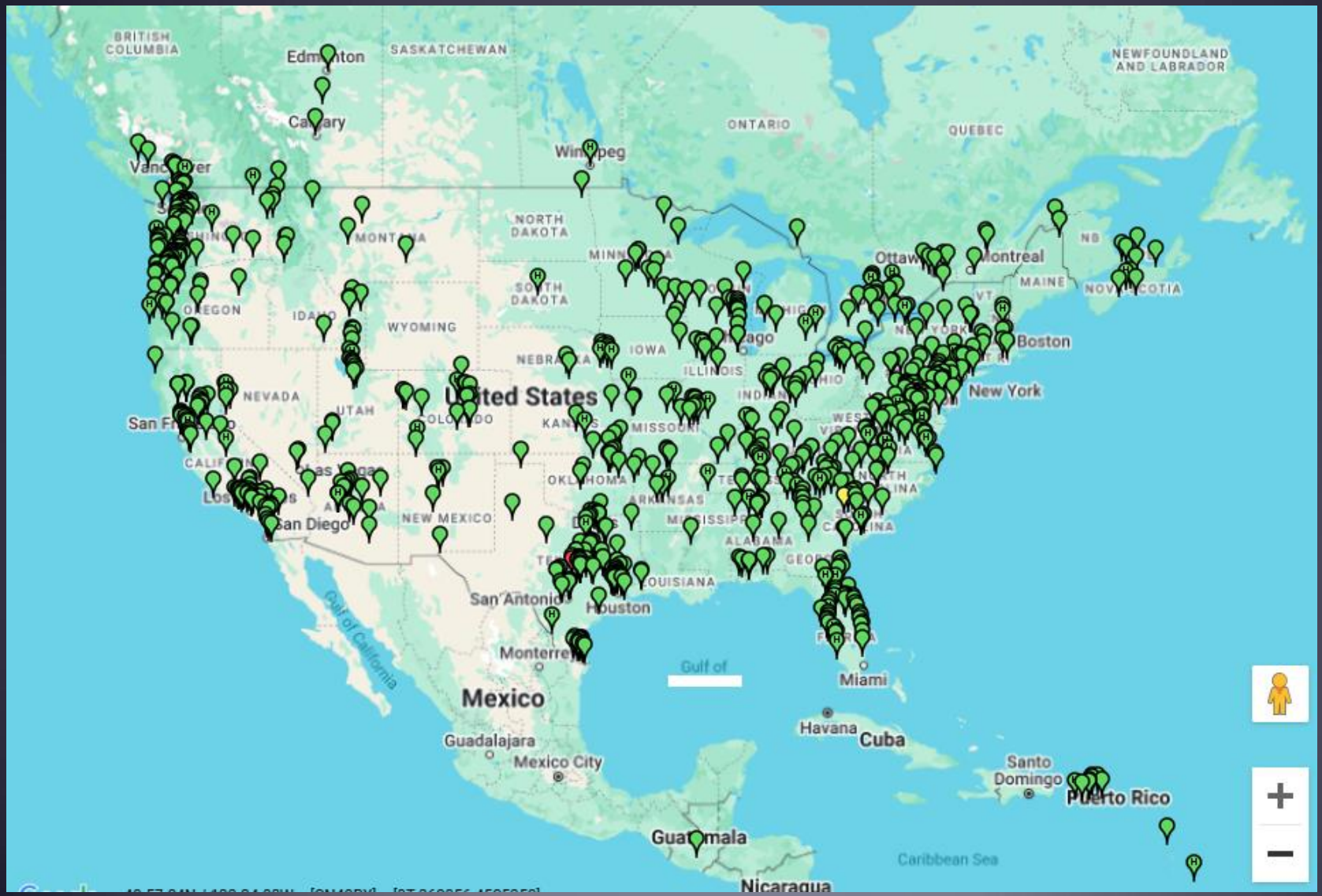
Radio-Only Winlink Network (No Internet)



VARA Stations

VARA FM (VHF/UHF)Stations

VARA FM (VHF/UHF) USA



Key Points About the Winlink Hybrid Network

- Wide-area, MESH network using HF forwarding.
- Currently providing nation-wide e-mail support for MARS, SHARES and civil agencies.
- Satisfies DoDI requirement for radio-only operation.
- Uses standard Winlink client e-mail programs.
- Supports standard e-mail with file attachments.
- Message routing is dynamic and fully automatic.
- Radio Message Servers (RMSs) run in normal Winlink Internet mode and switch automatically to radio-only network mode to forward radio-only messages.
- Users can connect using Pactor, VARA, Winmor or Packet.
- Pactor is used for backbone links between RMSs.

Selecting Message Pickup Stations

- During radio-only (no Internet) operation, messages sent to you will be stored in databases on the RMSs you select as your *Message Pickup Stations* (MPS).
- Each person can select up to 3 MPS, but to reduce network traffic, it is recommended that only 2 MPS be used.
- A duplicate copy of each message is delivered to each MPS, and you can pick up your messages from either MPS.
- Once a message has been downloaded from one MPS, RMS Express will not download the same message from another MPS.
- You can register MPS with RMS Express using an Internet connection or a radio message.

Which Protocol is most used?

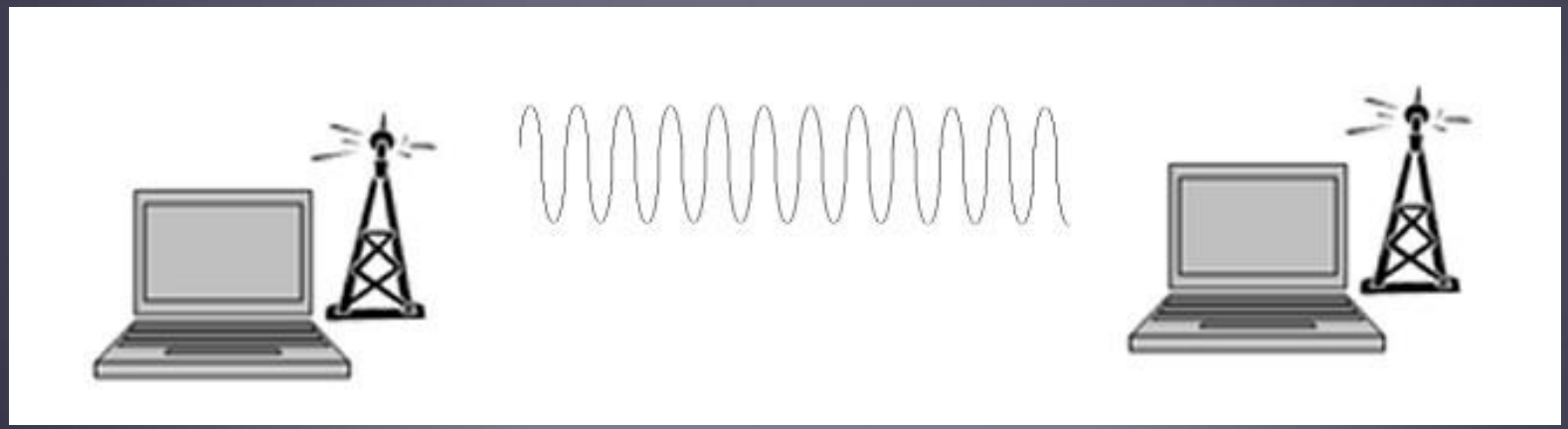
Winlink Message Activity (Worldwide)	Jan 2025	Feb 2025
HF Activity		
Pactor 1	0	5
Pactor 2	87	56
Pactor 3	568	425
Pactor 4	2,369	1,932
Robust Packet	9	38
ARDOP 200	0	1
ARDOP 500	139	52
ARDOP 1000	0	1
ARDOP 2000	86	69
VARA	10,391	6,915
VARA 500	5,315	3,247
VARA 2750	6,467	4,230
Total Connections	25,431	16,971
Total Messages Received	33,277	21,068
Total Messages Sent	40,691	23,931
Message Size Accumulation	439,904 KB	270,897 KB
Average Message Size	5,947 Bytes	6,020 Bytes
FM Activity		
ARDOP 2000 FM	0	0
VARA FM	11,330	6,624
VARA FM WIDE	27,508	19,144
Packet Activity		
Messages Received	8,980	5,798
Messages Sent	10,510	6,422
APRS Gateway Activity		
Messages Received	133	94
Messages Sent	79	49
WebMail Activity		
Messages Received	9,507	7,569
Messages Sent	2,157	1,813
Total Message Activity	**105,334**	**66,744**

Adaptive Message Routing Through MESH Network

- Fully automatic, wide-area MESH network routing.
- Not limited by source-to-destination propagation.
- If a direct link is not available to the destination MPS, intermediate RMS will relay the message.
- The optimum path is computed by each RMS based on HF propagation estimates, time of day, Pactor speed, message size and other factors. This is *Adaptive Routing*.
- Each intermediate RMS recomputes the optimum path.
- If a RMS is unavailable, the system will route around it.
- Busy RMS are tried a few times and then routed around.
- Radio messages can be relayed through RMS that are or are not connected to the 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.



Conclusion

- Winlink uses automatic spam protection. If the person sending you an email to your Winlink account from outside winlink and they are not in your approved list, it will be rejected. Inbound messages with //WL2K in the subject line will be allowed through the spam filter regardless if they are in your approved list.
- Winlink use continues to grow, especially for EmComm.
- The Winlink Development Team continues to enhance capabilities to adapt to changing needs.
- Winlink has three modes of operation:
  - Conventional connections to a CMS backbone server
  - Hybrid (Radio-only) MESH network with HF relaying
  - Peer-to-Peer connections between client stations
- The new Winlink Hybrid Network allows Winlink to continue handling messages via HF forwarding if the Internet is down.
- Steady improvements are being implemented.

- Information about Winlink can be found at www.winlink.org

- YouTube – MANY videos on Winlink, Setup and radio use.

  - Great YouTube video on Introduction to Winlink: https://www.youtube.com/live/h4HQDXmItdU?si=YYgBdtc7vmpr2dSF

WINLINK
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- Practice – Practice – Practice. Winlink is much more than plain email.
- Join a Winlink training group.
- https://emcomm-training.org/Winlink_Thursdays.html
- See attached FAQ document
- Thank you!
- Questions?

WINLINK
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- **Please give to ARSFI** if you use Winlink radio email or correspond regularly with someone who does. By donating $25 each year you will do your part to improve this system and keep it running. *Donations are tax-deductible by most US federal taxpayers.* This is the best way to say "thank you" to Winlink volunteers! You can also **purchase a registration key** for your Winlink Express software. *That's different than a donation! And is another way to contribute.*