



Radio-Forwarding Winlink Network e-mail With or Without Internet Winlink Development Team Military Auxiliary Radio System

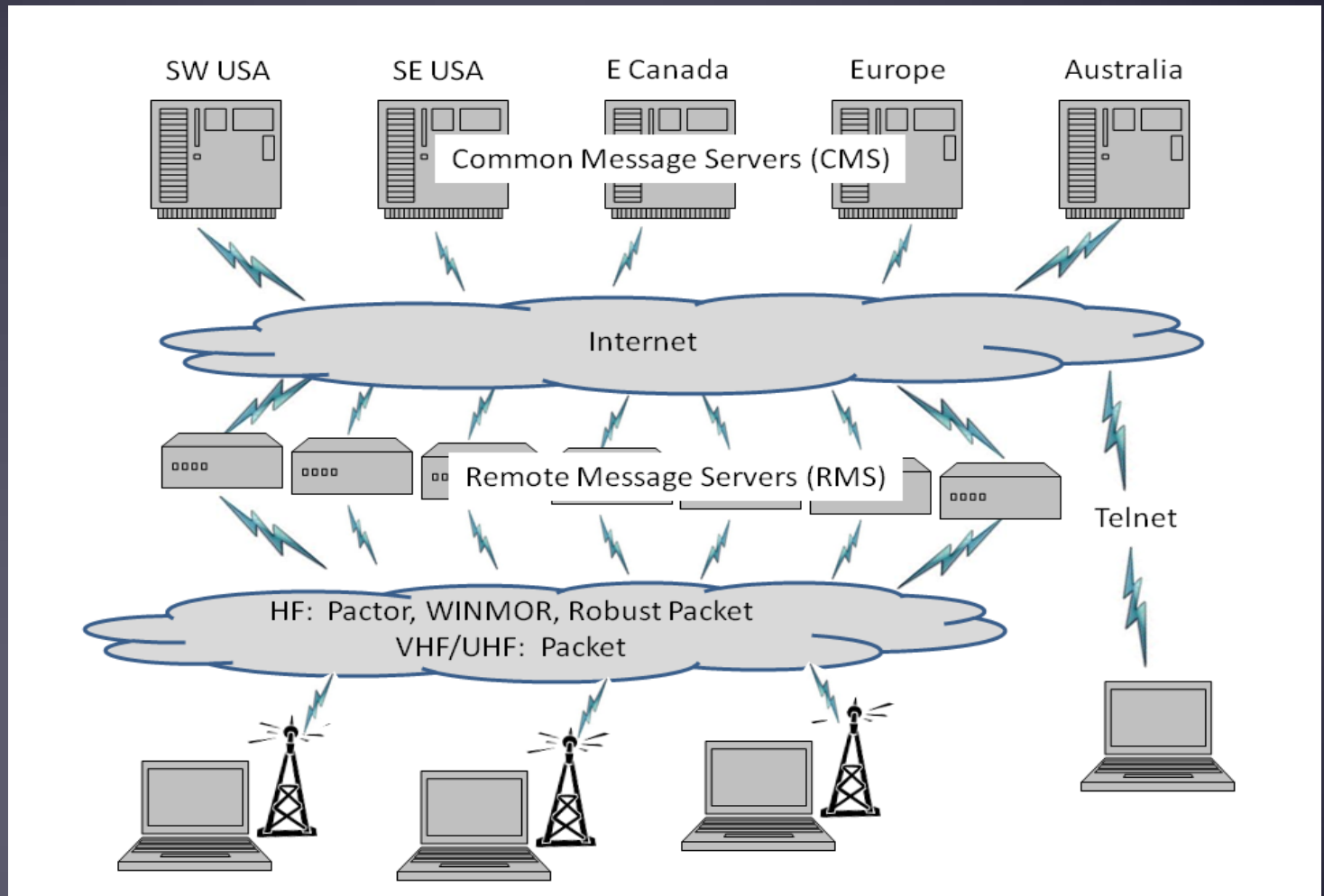


Key Points About Radio Network

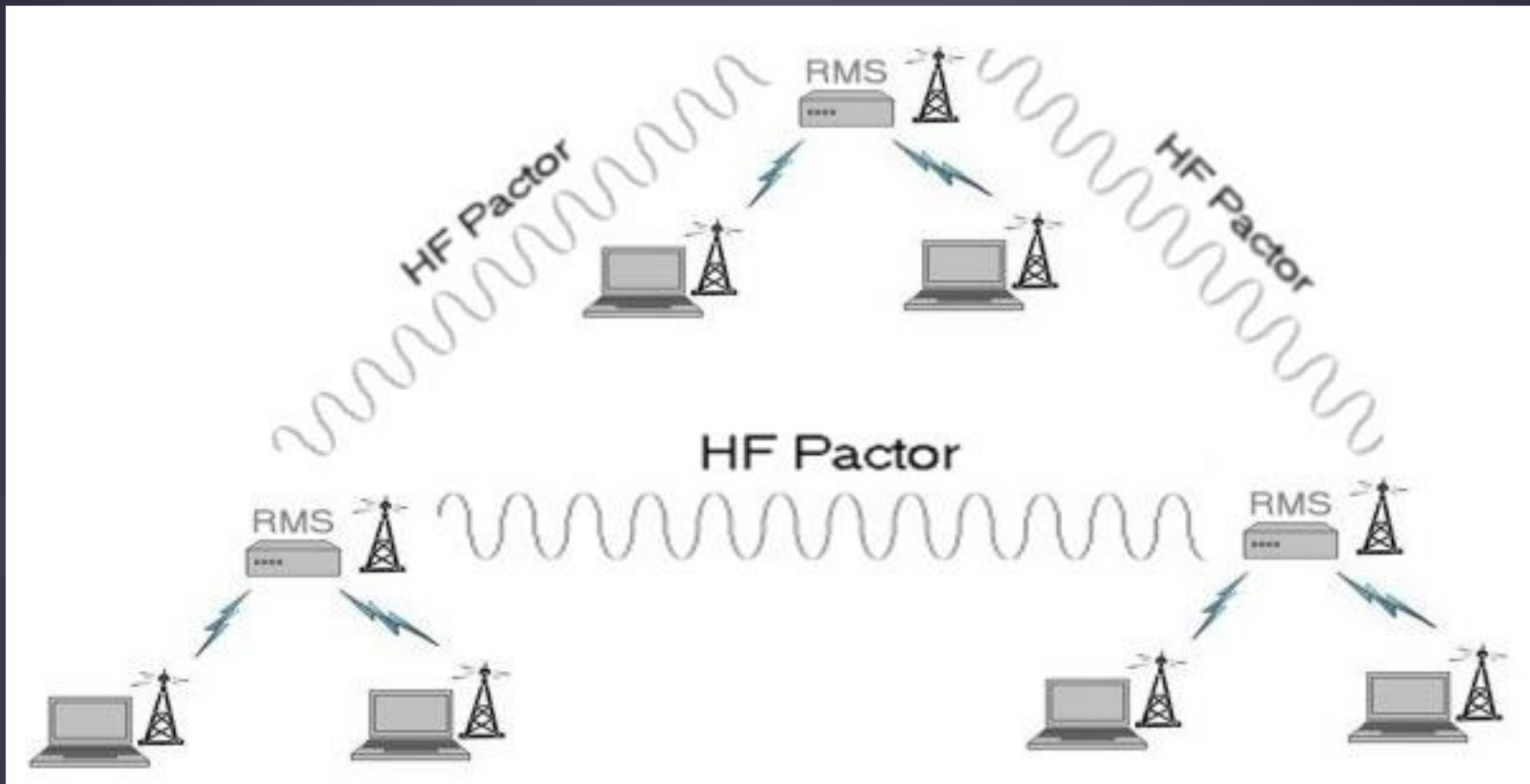
- Capable of providing nation-wide e-mail support for agencies and MARS if the Internet is not available.
- Satisfies DoDI requirement for radio-only operation
- Uses standard Winlink client e-mail programs
- Supports standard e-mail with file attachments
- Message routing is dynamic and fully automatic
- 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, Winmor or Packet
- Pactor is used for backbone links between RMSs

Normal Winlink Operation With Internet

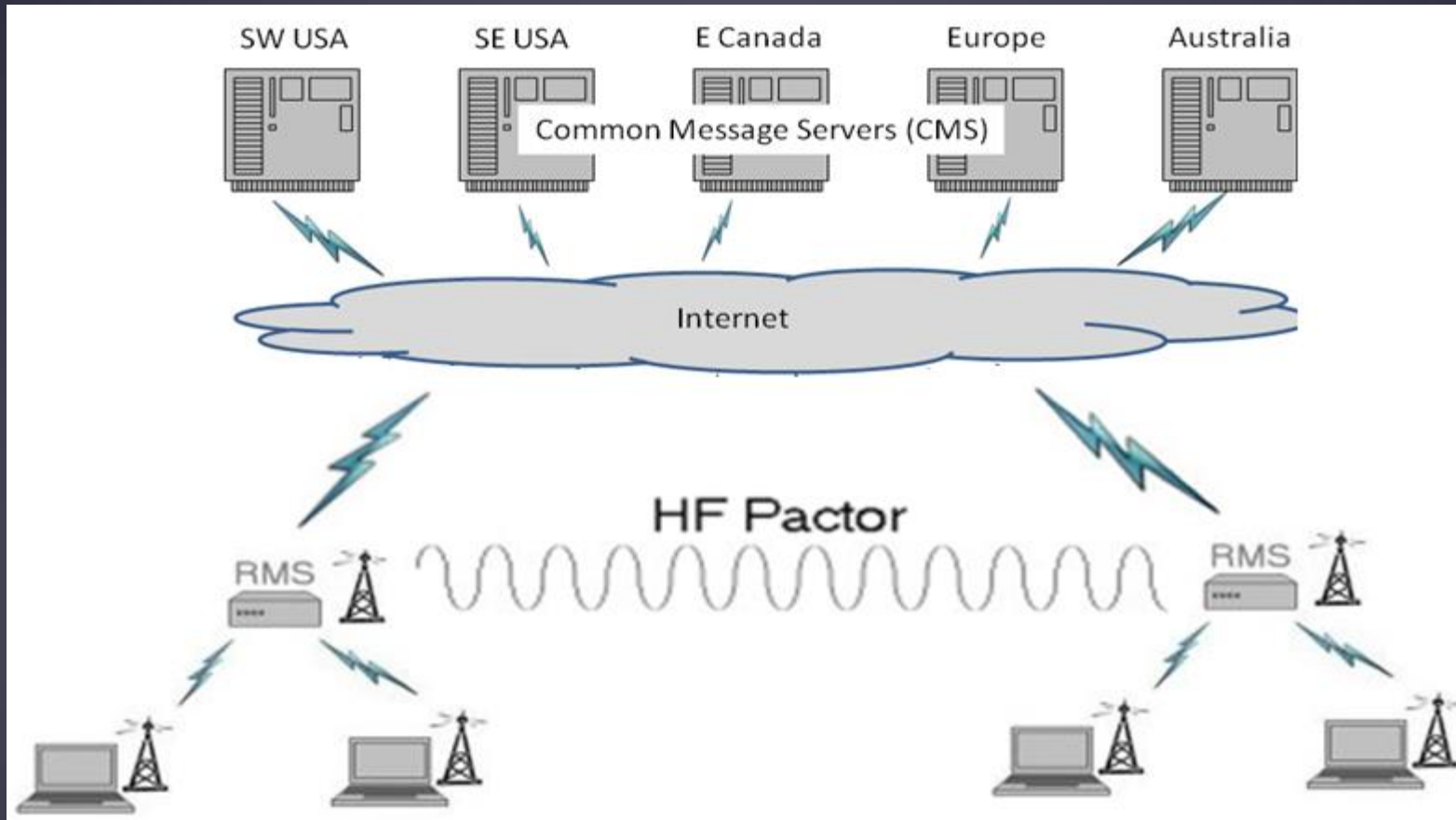
- CMS
- RMS (gateway)
- Client (you)



Radio-Only Winlink Network (no Internet)



Hybrid Radio-Only/Internet System



Combined Radio and Internet Operation

- The system seamlessly integrates Internet operation with radio message forwarding.
- RMS can operate as normal, Internet-connected stations and also participate in the radio-only network.
- If an RMS is connected to the Internet, traffic from a connecting client is passed through the Internet.
- If an RMS is *not* connected to the Internet, message traffic is forwarded via HF radio to its destination.
- If a message being forwarded by radio passes through an RMS connected to the Internet, the message is uploaded through the Internet to a CMS *and* the RMS also forwards it via radio.

End-user Operation

- Use standard RMS Express and Paclink client programs
- Connect via Pactor, Winmor, Packet or Robust Packet
- Message origination may be through any RMS.
- Users register multiple “Message Pickup Stations” (MPS) where incoming mail will be held for pickup.
- A copy of each message is sent to each MPS for reliability.
- Messages are addressed using callsigns. No routing information is required by the sender.
- All standard features of e-mail are supported including file attachments, encryption and read receipts.
- Path through network shown in delivered message header

New Features in RMS Express

- Selection of Message Pickup Stations

Parameters specified on this screen are used only when Winlink is operating in a radio-only mode. They have no effect when Winlink is operating in its normal mode.

Message Pickup Stations (MPS)

MPS 1: ▼

MPS 2: ▼

MPS 3: ▼

Last update: 2013-04-03-09:59

When operating in radio-only mode, incoming messages for you will be held on the designated Message Pickup Station RMS until you pick them up.

- Routing information displayed in message header

```
RMS Originator: NNA4SW  
RMS Destination: NNS4UR-1  
RMS Path: NNA4SW@2013-03-30-19:39:56 NNS4UR@2013-03-30-19:48:54 NNS4UR-1@2013-03-30-19:49:54
```


Message Routing

- If direct links are not available to the destination MPSs, 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.
- Each intermediate RMS recomputes optimum path
- If a RMS is unavailable, the system will route around it
- Busy RMS are tried a few times and then routed around

Simulated Routes

- KN6KB (Florida) → VE1YZ (Canada)

KN6KB → W1EO (Freq. = 14104.200 MHz, Quality = 42, Reliability = 70, Pactor 3, Arrival time = 00:08)
W1EO → VE1YZ (Freq. = 7096.500 MHz, Quality = 50, Reliability = 81, Pactor 3, Arrival time = 00:13)

- KC4TVO (North Carolina) → K4XV (Hawaii)

KC4TVO → K0SI (Freq. = 7105.900 MHz, Quality = 46, Reliability = 82, Pactor 3, Arrival time = 00:05)
K0SI → KE7XO (Freq. = 10147.000 MHz, Quality = 42, Reliability = 71, Pactor 3, Arrival time = 00:14)
KE7XO → K4XV (Freq. = 14098.700 MHz, Quality = 38, Reliability = 60, Pactor 3, Arrival time = 00:26)

- K1SGA (New Hampshire) → K6CYC (California)

K1SGA → K5AEA (Freq. = 14097.500 MHz, Quality = 36, Reliability = 52, Pactor 3, Arrival time = 00:14)
K5AEA → K6CYC (Freq. = 14108.500 MHz, Quality = 45, Reliability = 81, Pactor 3, Arrival time = 00:20)

System Operation

- Fully distributed system with no central server
- RMSs operate in normal mode and switch to radio-only network mode automatically if the Internet becomes unavailable. Radio messages can be forwarded through RMSs that are, or are not, connected to the Internet.
- RMS network operation is completely automatic.
- Standard, well-tested Trimode and RMS Packet programs communicate with end-user programs.
- An enhanced version of RMS Relay does routing.
- Typical time to transfer a small message from the originating RMS through an intermediate, relay RMS to the destination RMS is about 90 seconds. (Time may vary depending on message size and traffic load.)

RMS Relay Operating Mode

Operating Mode

Normal -- Only accept connections if Internet is available

Radio-only, local message hub -- Store messages locally. Do not upload messages through Internet

Hold for Internet access -- Store messages locally until Internet is available, then upload them

HF Message Forwarding Control

Do not forward messages via HF

Forward messages via HF to another RMS connected to the Internet

Operate as a node in the Winlink radio-only HF-relay network (Trimode must run)

Minutes to delay after Internet loss before starting radio-only network operation:

Automatic Sending Control

Enable automatic, scheduled operation
(May not be used on USA ham bands)

Seconds before starting:

Minimum seconds between sends:

Maximum minutes sending:

Check for busy channel before transmitting

Emphasize Pactor signals for busy detection
(Requires P4 modem with 1.17.8 or later firmware)

Ignore busy after this many minutes:

Trimode Control

Automatically start and stop Trimode

Start Trimode minimized

Folder where Trimode is stored:

IP: Port:

Factor Level for Forwarding

Minimum: Maximum:

RMS Relay Network Control

Parameters specified on this screen control the operation of RMS Relay when it is functioning as a station in a radio-only Winlink network.

Propagation and Routing Control Files

Propagation matrix file date: 2013-05-07-10:04

Message Pickup Station file date: 2013-05-07-10:04

Make Propagation Matrix

Make Message Pickup
Station File

Automatically generate files every day

Time of day (hh:mm, 24 hour, local time): 04:30

Excluded Frequency Ranges

Specify one range per line in kHz

XXXX.XXX-XXXX.XXX

Blocked RMS

Callsigns of RMS that should not be called

Specify one callsign on each line

Save

Cancel

Phase 1 Radio-Only Test April 22-25

- 6 radio-only RMS operated exclusively in that mode.
- 9 participating users exchanged messages.
- Routing system performed well in selecting frequencies and delivering messages to MPS.
- Most messages were delivered with 3 minutes, and some messages were delivered in less than 1 minute.
- Messages were delivered to multiple MPS for each recipient, and multiple recipients were tested.
- No major problems were found.

Summary and Conclusion

- The radio-only Winlink project provides a much-needed national contingency e-mail system for Internet outages.
- RMSs pass traffic through the Internet or via radio.
- Satisfies the DoDI requirement for radio-only operation
- By using intermediate, relay RMS, the system is capable of covering CONUS and Hawaii
- Provides 100% accurate transmission of messages & files
- Reliability provided by routing around unavailable RMS and allowing multiple message pickup stations
- Currently in test operation at a limited number of stations. Wide-scale testing is planned for summer.