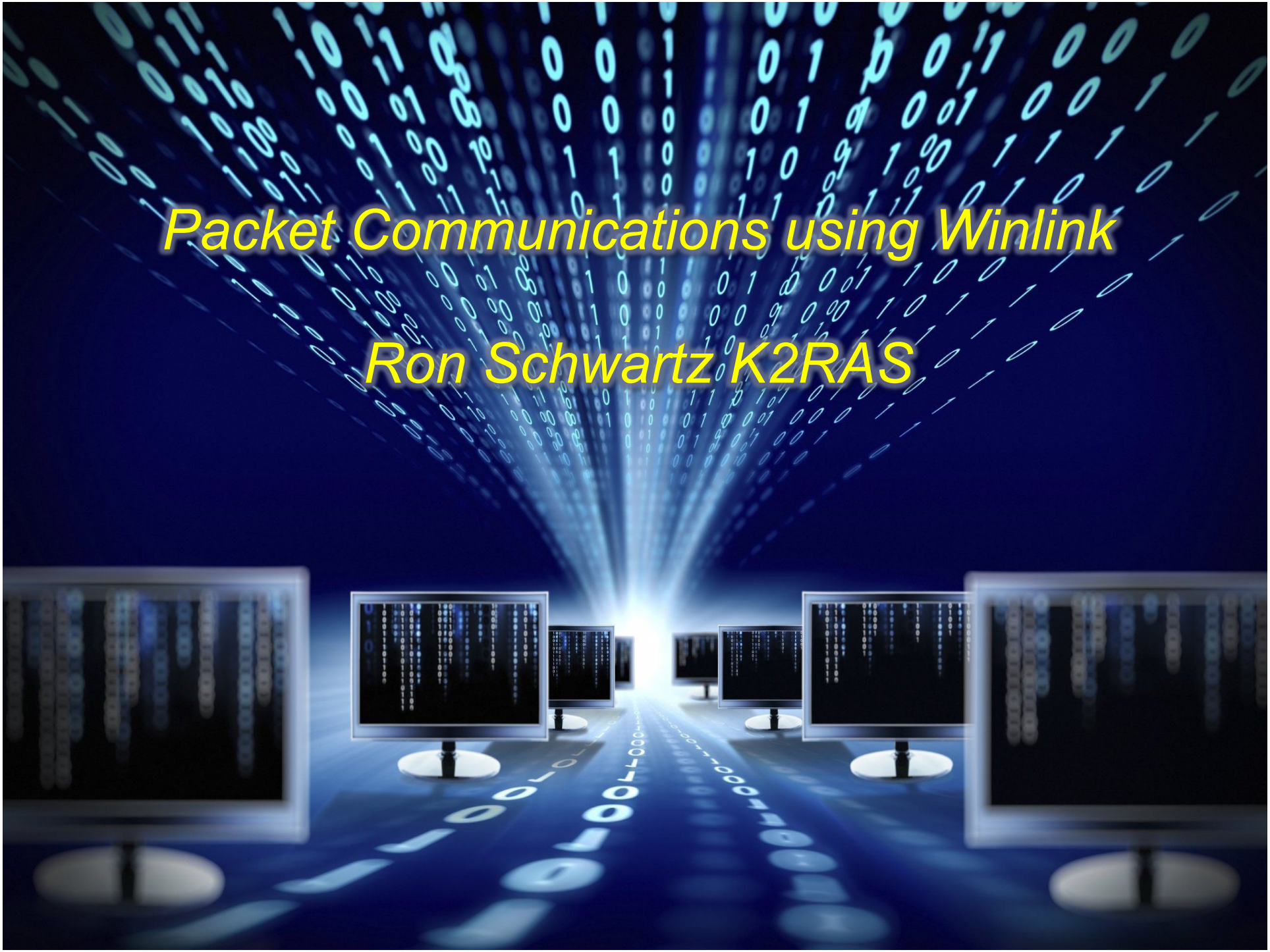
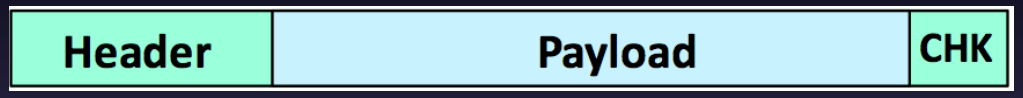

Packet Communications using Winlink
Ron Schwartz K2RAS

What can Packet Radio Do?

- Packet can send emails and data files directly between radios (without the Internet)
- Emails and data can be forwarded worldwide (without the Internet) using radio connected servers
- Emails can be sent from a radio, to normal Internet email accounts (if the destination account is connected to the Internet)

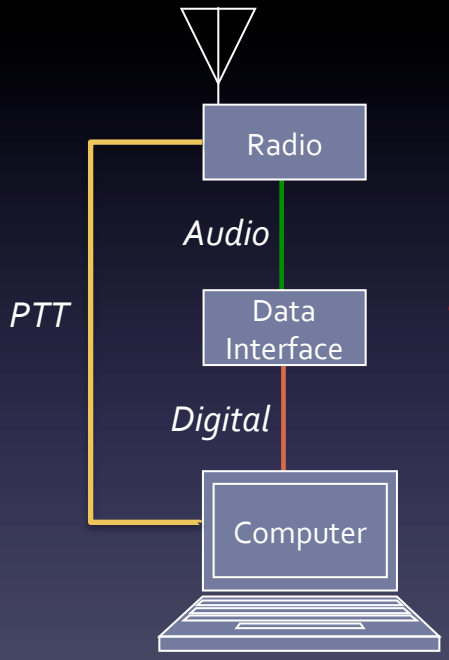
How Packet Radio Works (the only technical slide!!)

- Packet Radio uses the AX.25 protocol
- Sends packets (an 'envelope' containing a data payload)



  - Envelope contains the header at the beginning and a checksum at end
  - Checksum determines if packet is error-free
  - Header contains addressing information (to, from)
  - Modulation is usually Frequency Shift Keying (FSK)
  - Payload contains the data to be sent

Required Hardware Setup
Option 1: Use a Hardware TNC

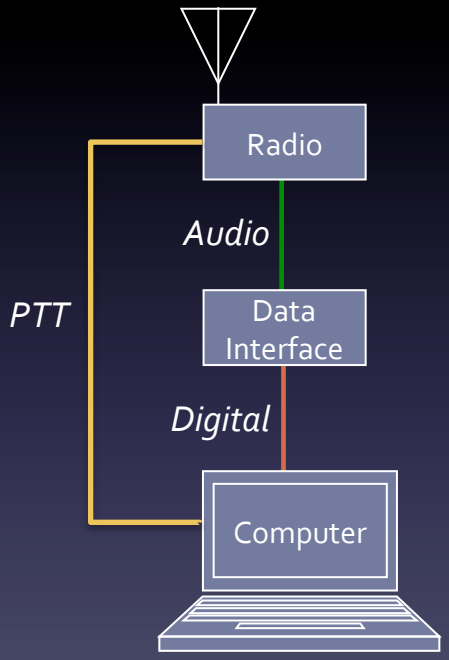


Radio with data and audio-out connections

Terminal Node Controller (hardware TNC) (Kantronics)

Software: RMS Express email client

Required Hardware Setup
Option 2: Use a Software TNC



Radio with data and audio-out connections

Direwolf (Software TNC) AND Soundcard with Audio and PTT modem (SignaLink)**

Software: RMS Express email client

** Some newer radios have built-in soundcards (IC-7300)

How to Send Packet Traffic
OPTION 1: Simple Radio to Radio

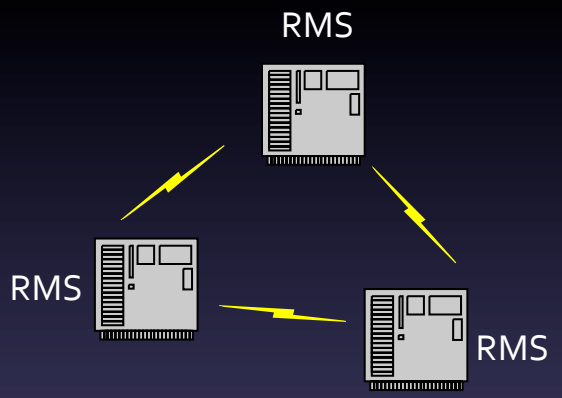
Radio Sent Email
Longmont, CO

Radio Delivered Email
London, UK

How to Send Packet Traffic
OPTION 2: Use the Winlink System

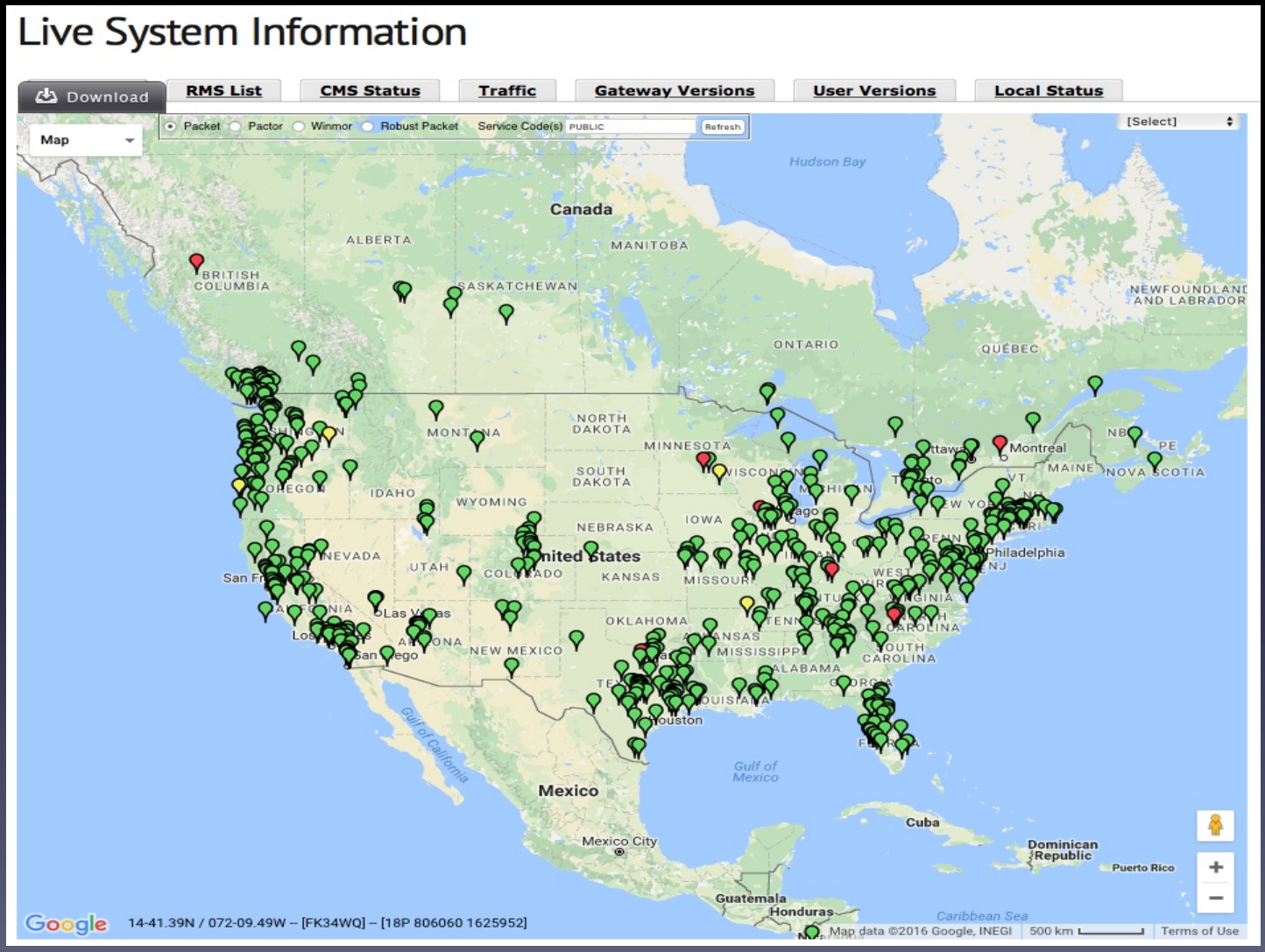
- WinLink is an worldwide system of servers which provide packet email and file forwarding over Ham radio
- Winlink can use VHF (short distance), or HF (worldwide)
- Winlink uses RMS Express software on PC (runs on Macs using a virtual machine)

Your gateway to Winlink is called a Radio Message Server, or “RMS”



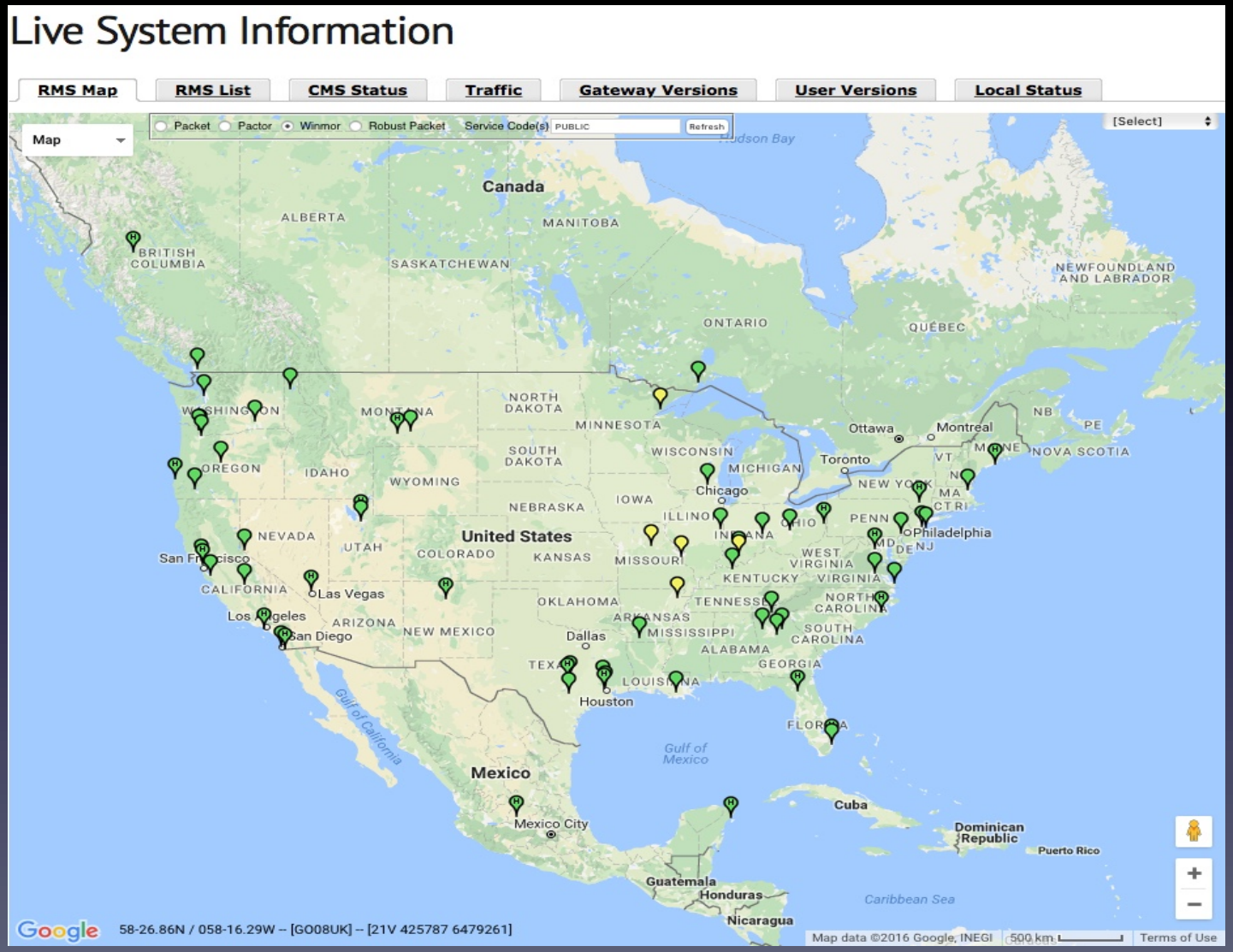
Your radio connects to a Radio Message Server (RMS)

VHF/UHF Winlink RMS Sites in US



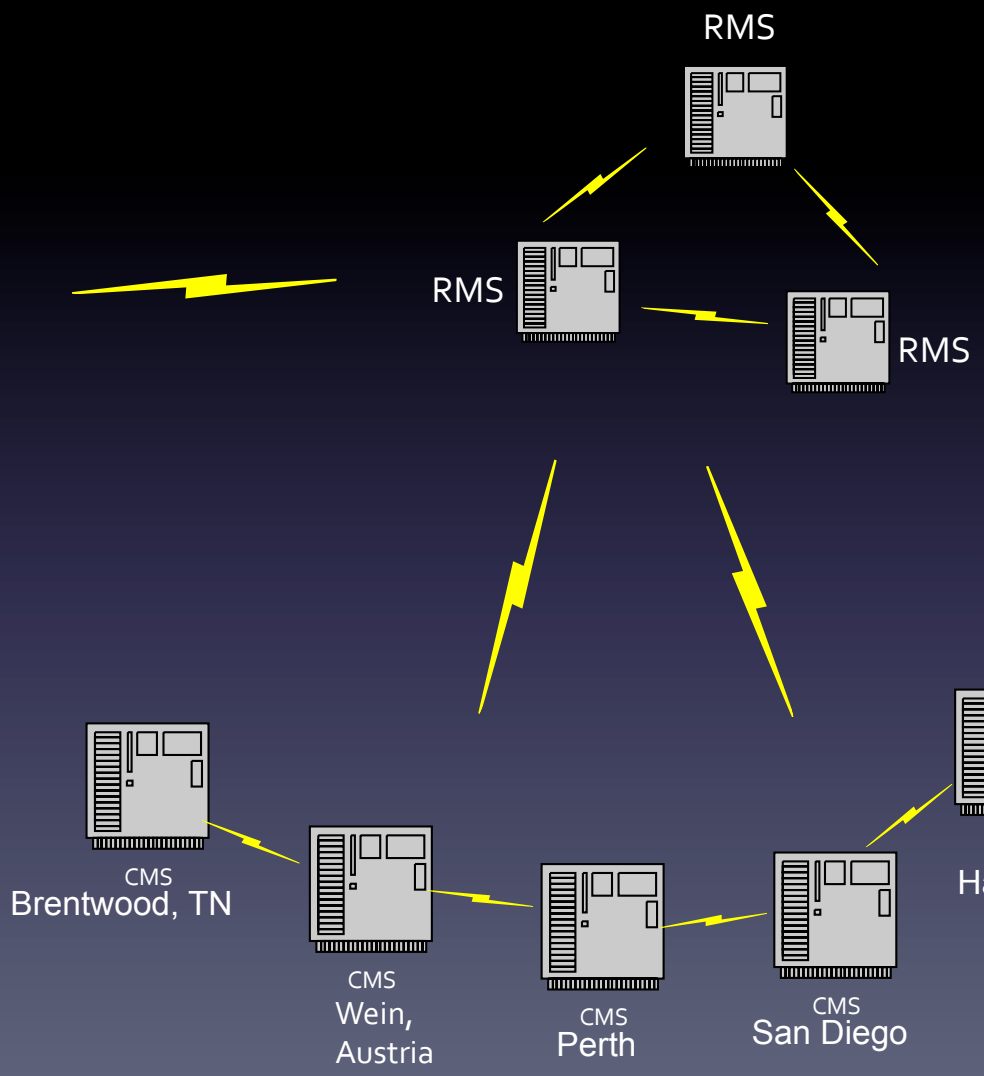
https://winlink.org

HF Winlink RMS Sites in US

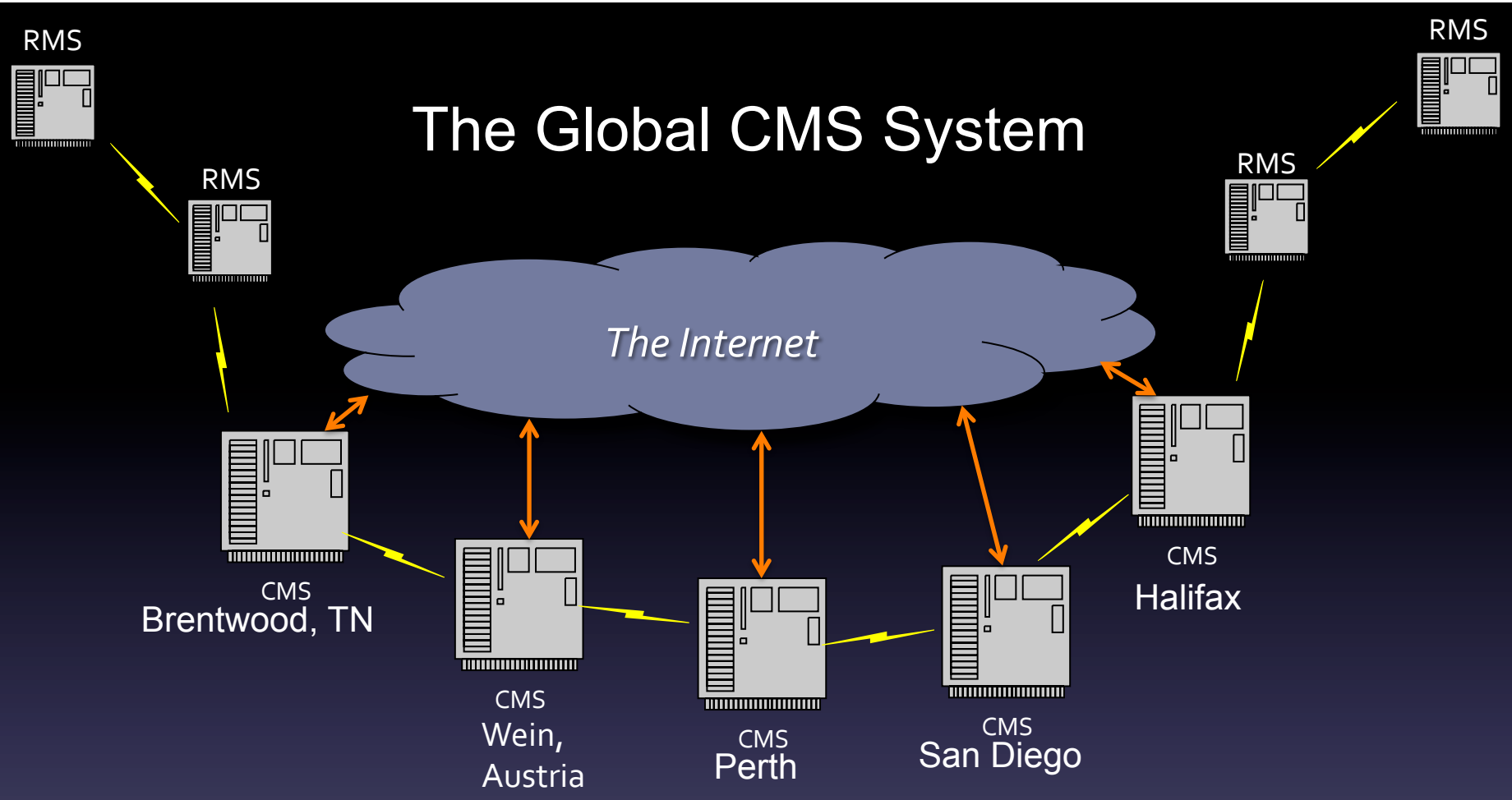


https://winlink.org

RMS stations can link through global Common Message Servers (CMS) Servers

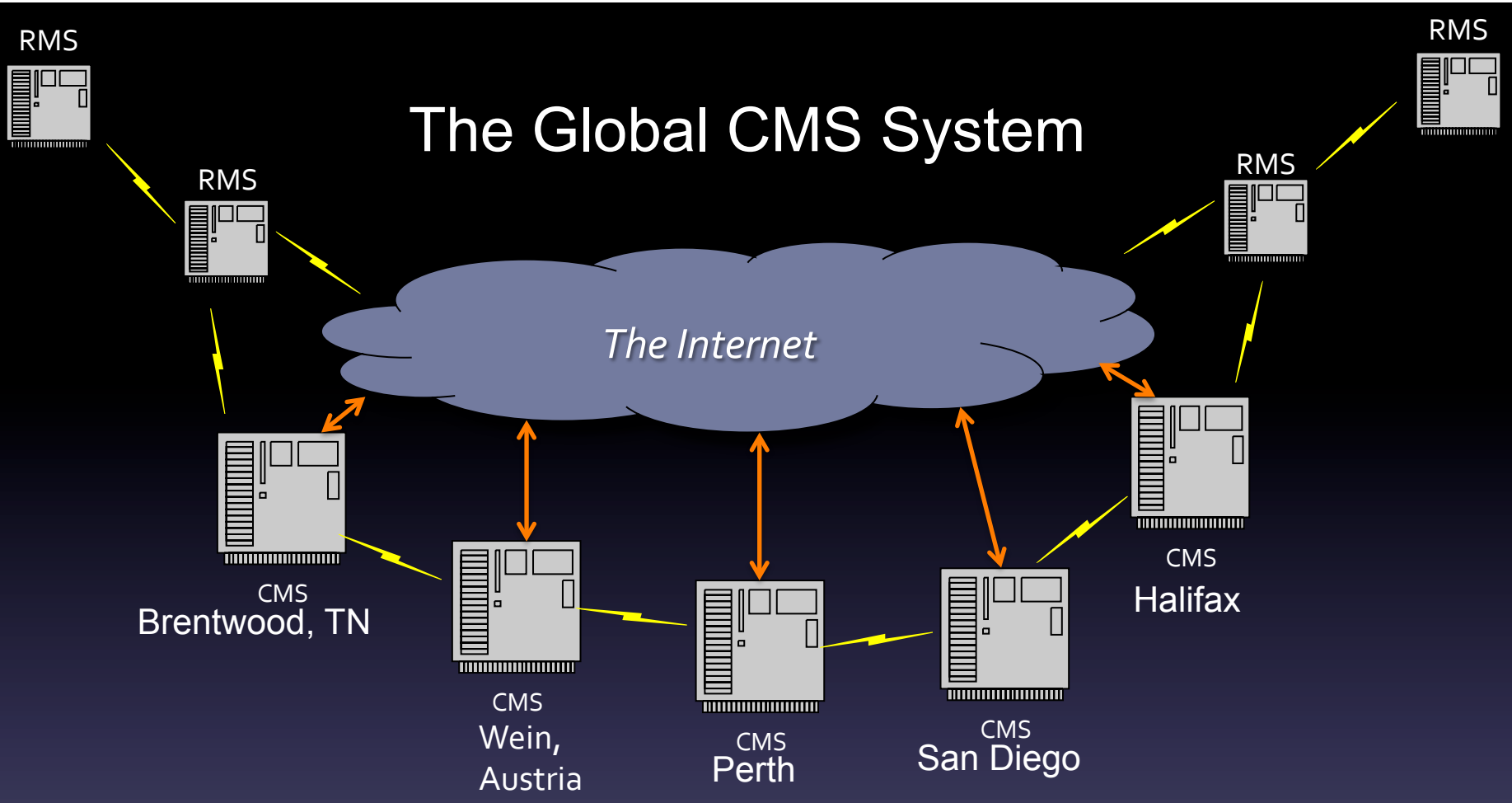


The Global CMS System



Five Common Message Servers (or CMS) organize, synchronize and manage WinLink e-mail traffic. They are connected to the Internet, but they can also directly send messages by radio if an Internet connection is unavailable.

The Global CMS System

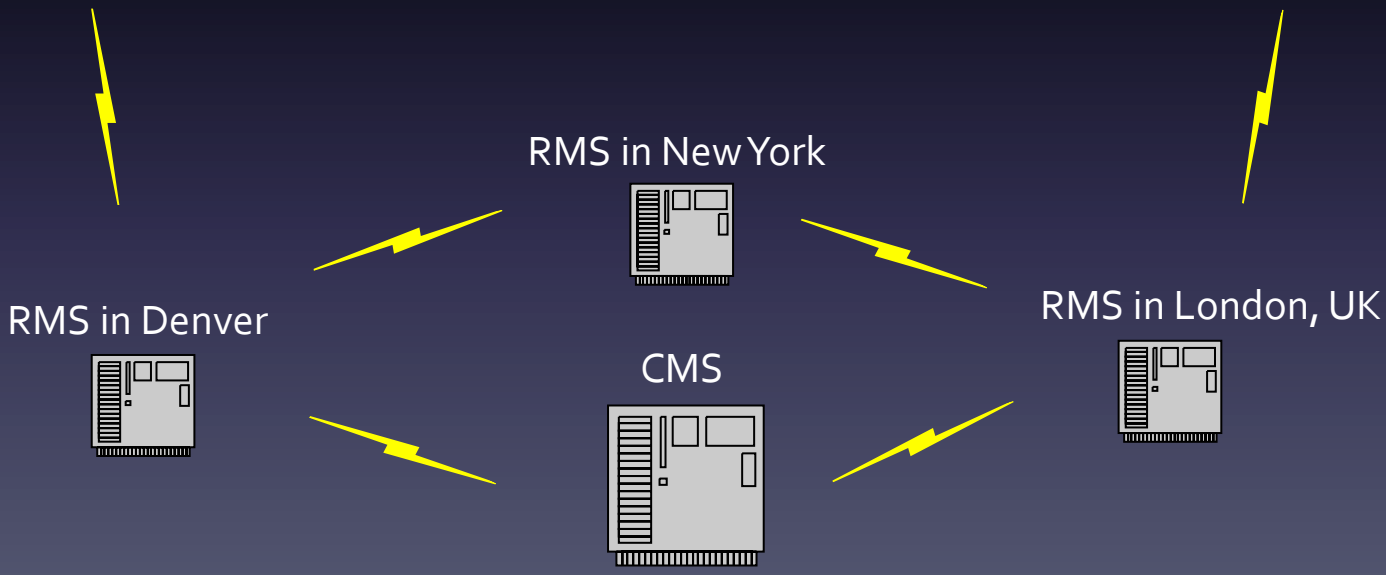


The five CMSs have the same (e.g. redundant) information and individually can run the entire system.

Scenario 1
Sending Winlink messages without the Internet

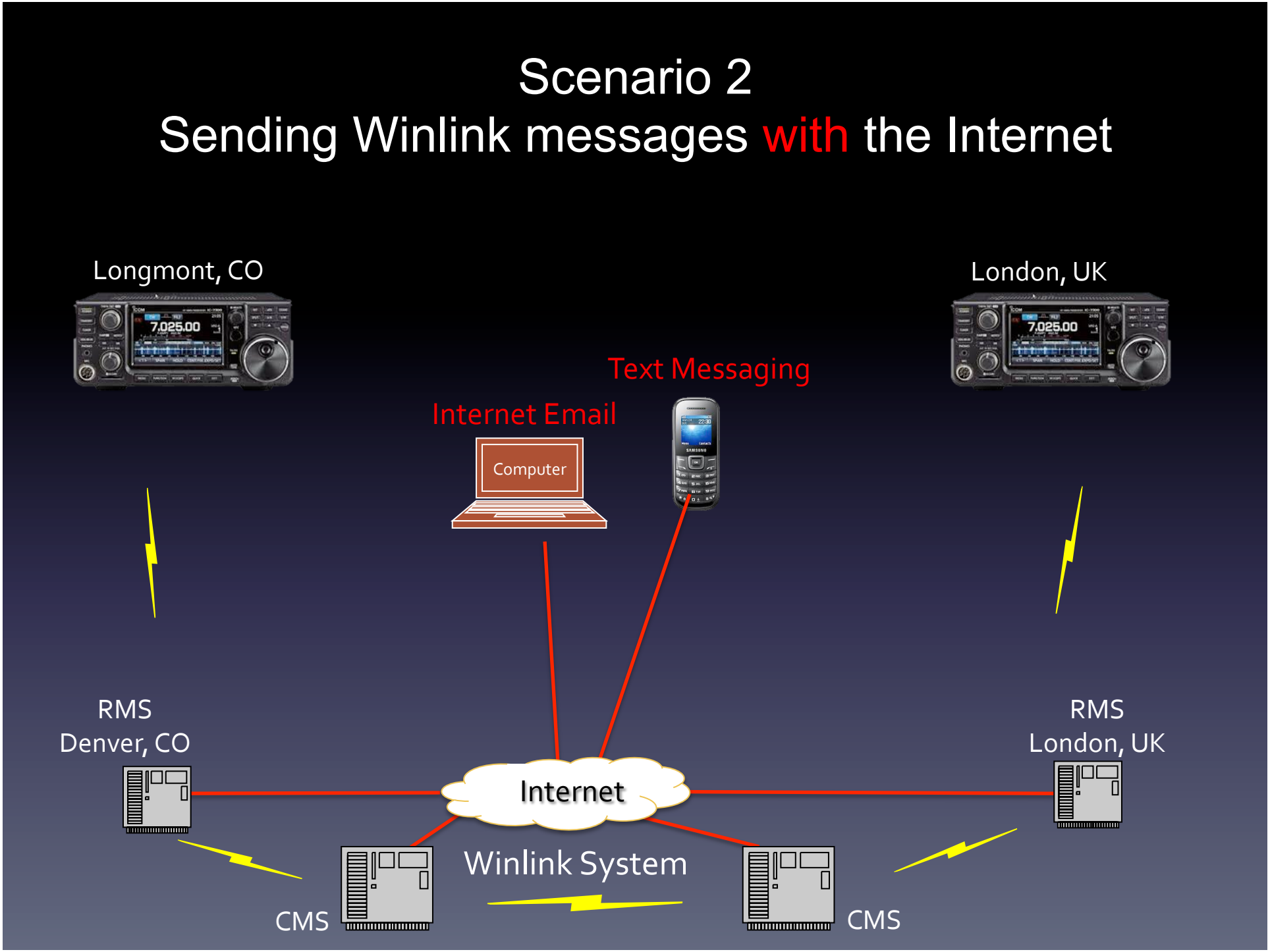
Radio Sent Email
Longmont, CO

Radio Delivered Email
London, UK



The Winlink System

Scenario 2
Sending Winlink messages with the Internet



Registering for Winlink

The first time you send a message using RMS Express, you will be registered in the Winlink system and will have a callsign@winlink.org address.

Your account remains active as long as you use it regularly. Inactive accounts will be purged after about 1 year

Advanced Topic: Hybrid Winlink Mode

- Hybrid mode sends Winlink traffic worldwide, bypasing the Internet**
- Radio Message Servers (RMSs) switch automatically to radio-only network mode when forwarding *radio-only messages*
- Worldwide network uses HF forwarding
- Message routing is dynamic and fully automatic
- Hybrid mode requires Winmor (HF), or Pactor (NOT VHF PACKET)
- Pactor is used for backbone links between RMSs

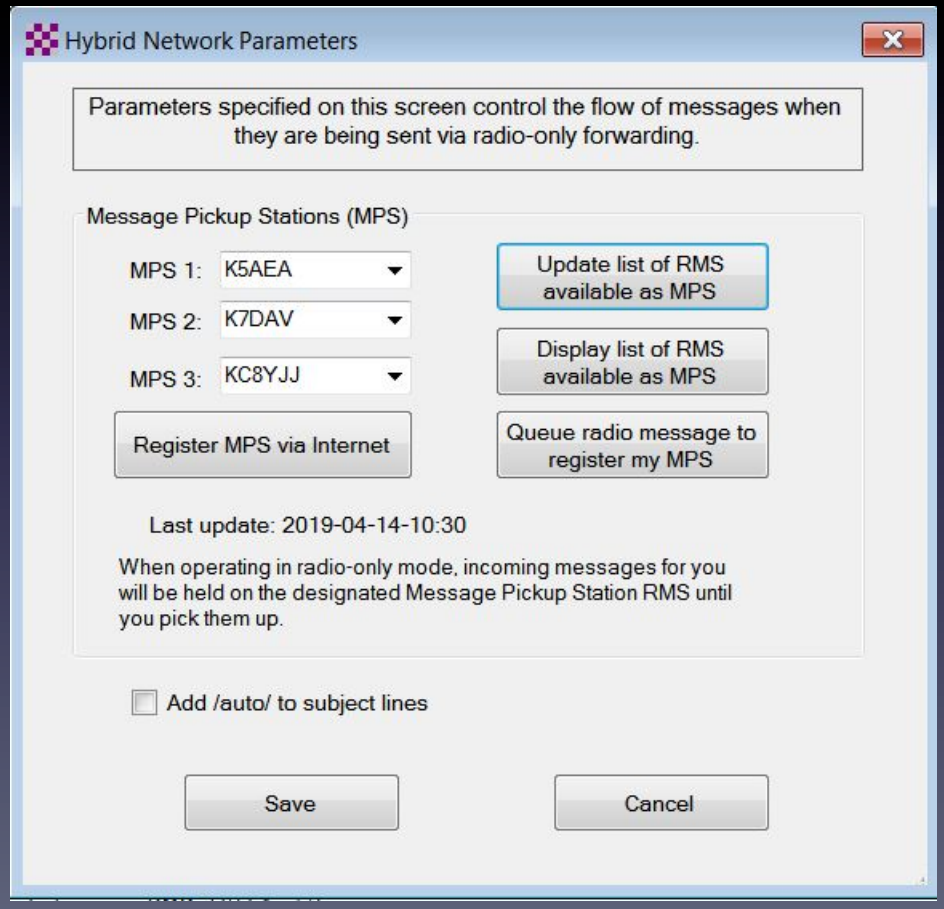
** Normal (non-hybrid) mode utilizes Internet connections when available

Advanced Topic: Hybrid Winlink Mode

During radio-only (Hybrid) operation, messages sent to you will be stored on the RMS(s) you select as your Message Pickup Stations (MPS).

- Up to 3 MPS's can be selected, but to reduce network traffic, it is recommended that only 2 MPS be used.
- A duplicate copy of the message is delivered to each MPS, and you can pick up your messages from any MPS.
- Once a message has been downloaded from one MPS, the message will not be downloaded from another MPS.
- You can register your MPS using an Internet connection or a radio message.

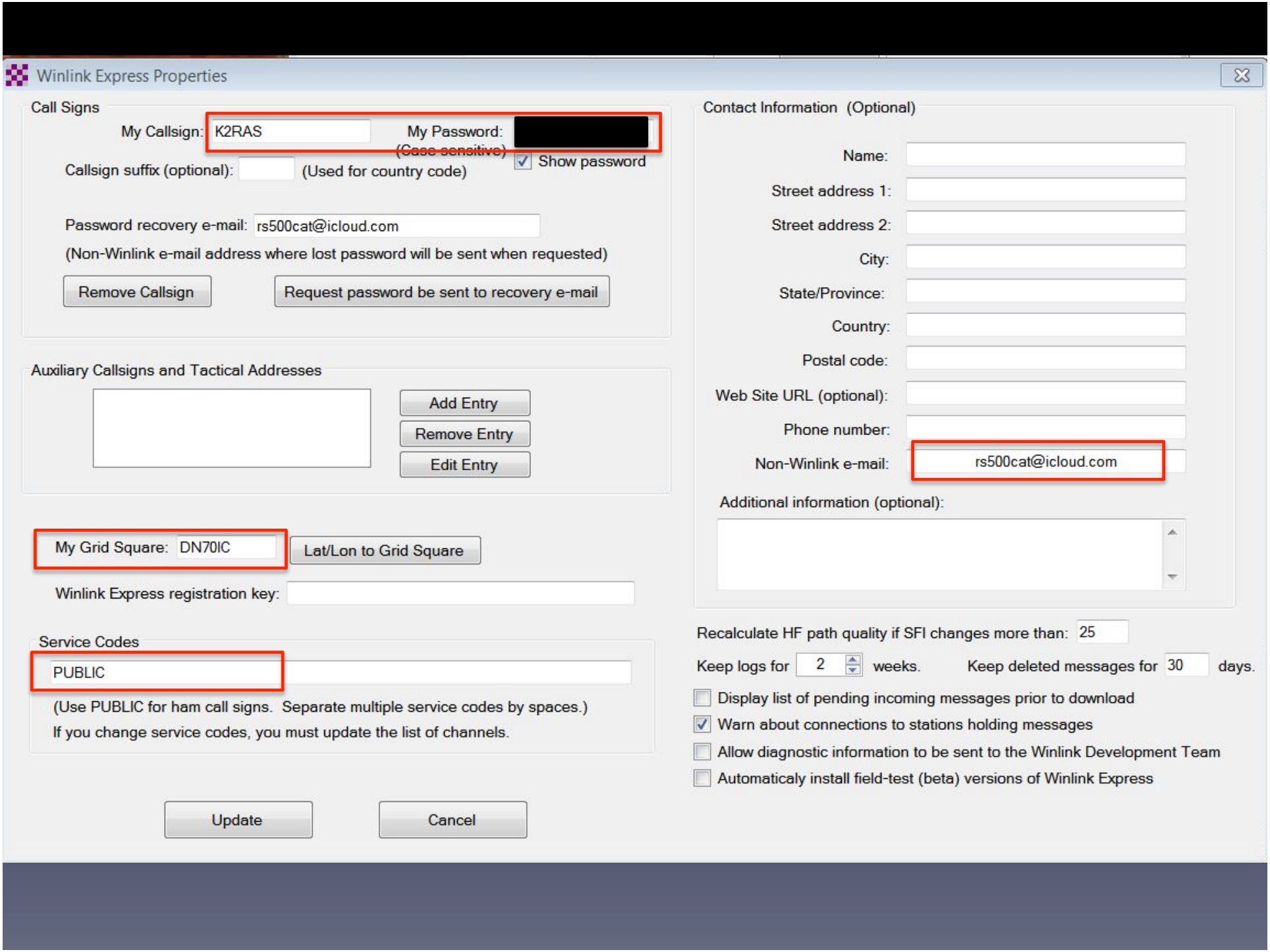
Advanced Topic: Hybrid Winlink Mode

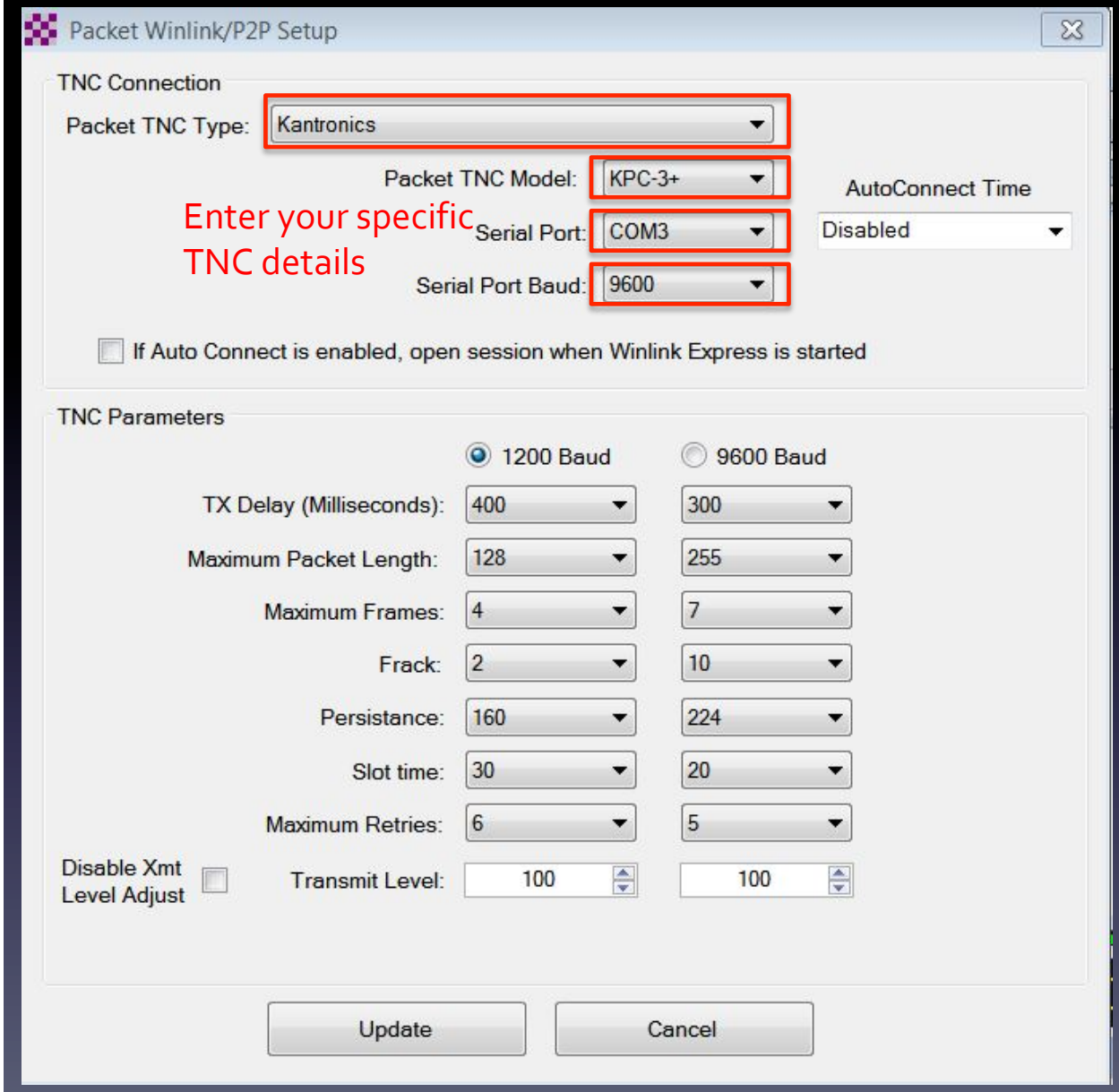


Advanced Topic: Hybrid Winlink Mode

- Hybrid mode uses adaptive MESH network routing.
- If a direct link is not available to the destination MPS, an 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.
- 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.

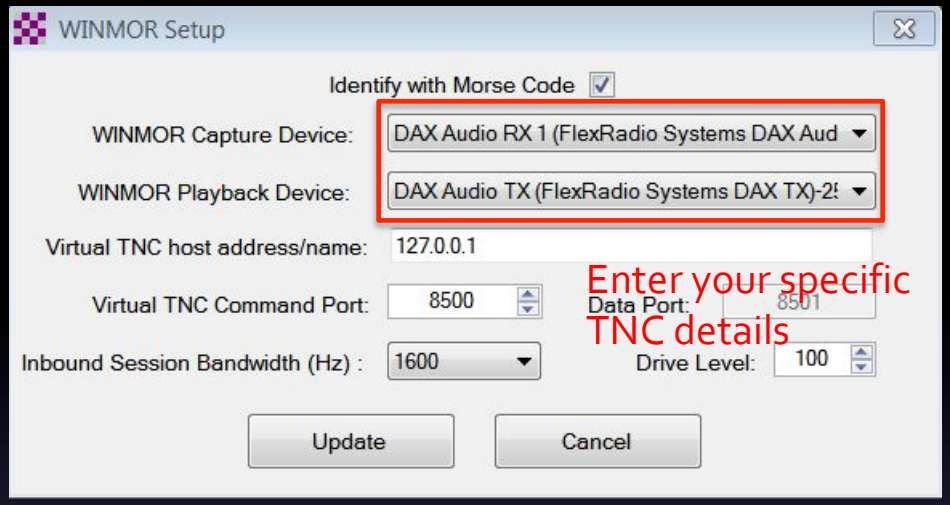
RMS Express Setup

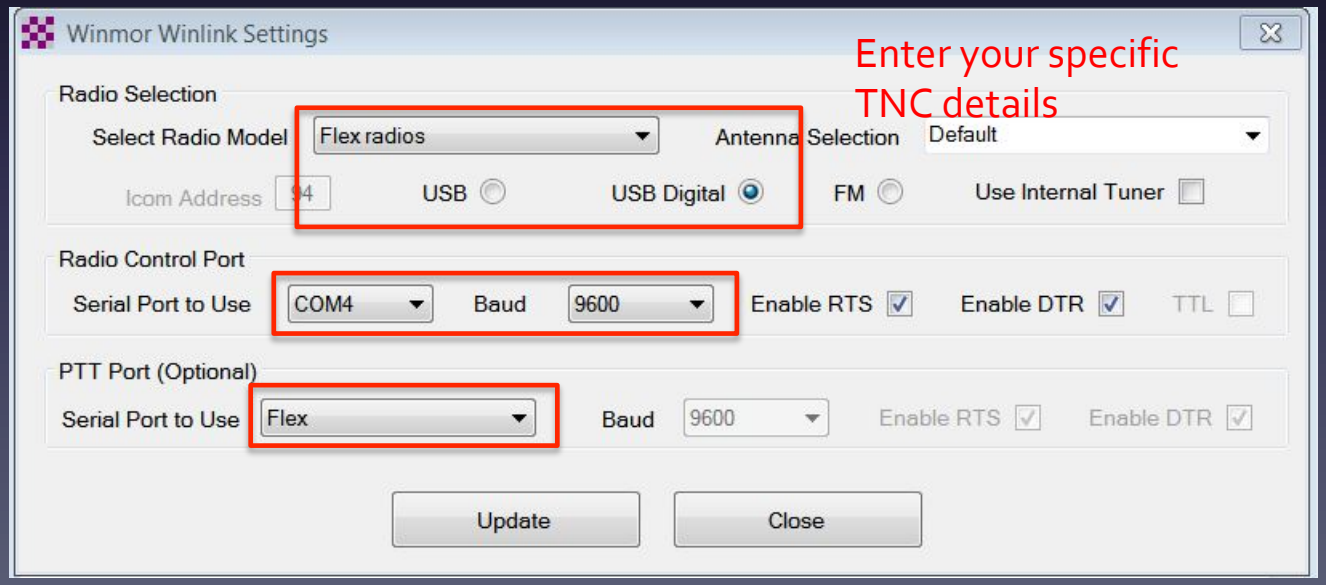

Winlink Express Properties
Call Signs
My Callsign: K2RAS
My Password:
(Case sensitive)
Show password
Callsign suffix (optional):
(Used for country code)
Password recovery e-mail: rs500cat@icloud.com
(Non-Winlink e-mail address where lost password will be sent when requested)
Remove Callsign
Request password be sent to recovery e-mail
Auxiliary Callsigns and Tactical Addresses
Add Entry
Remove Entry
Edit Entry
My Grid Square: DN70IC
Lat/Lon to Grid Square
Winlink Express registration key:
Service Codes
PUBLIC
(Use PUBLIC for ham call signs. Separate multiple service codes by spaces.)
If you change service codes, you must update the list of channels.
Update
Cancel
Contact Information (Optional)
Name:
Street address 1:
Street address 2:
City:
State/Province:
Country:
Postal code:
Web Site URL (optional):
Phone number:
Non-Winlink e-mail: rs500cat@icloud.com
Additional information (optional):
Recalculate HF path quality if SFI changes more than: 25
Keep logs for 2 weeks.
Keep deleted messages for 30 days.
Display list of pending incoming messages prior to download
Warn about connections to stations holding messages
Allow diagnostic information to be sent to the Winlink Development Team
Automaticaly install field-test (beta) versions of Winlink Express



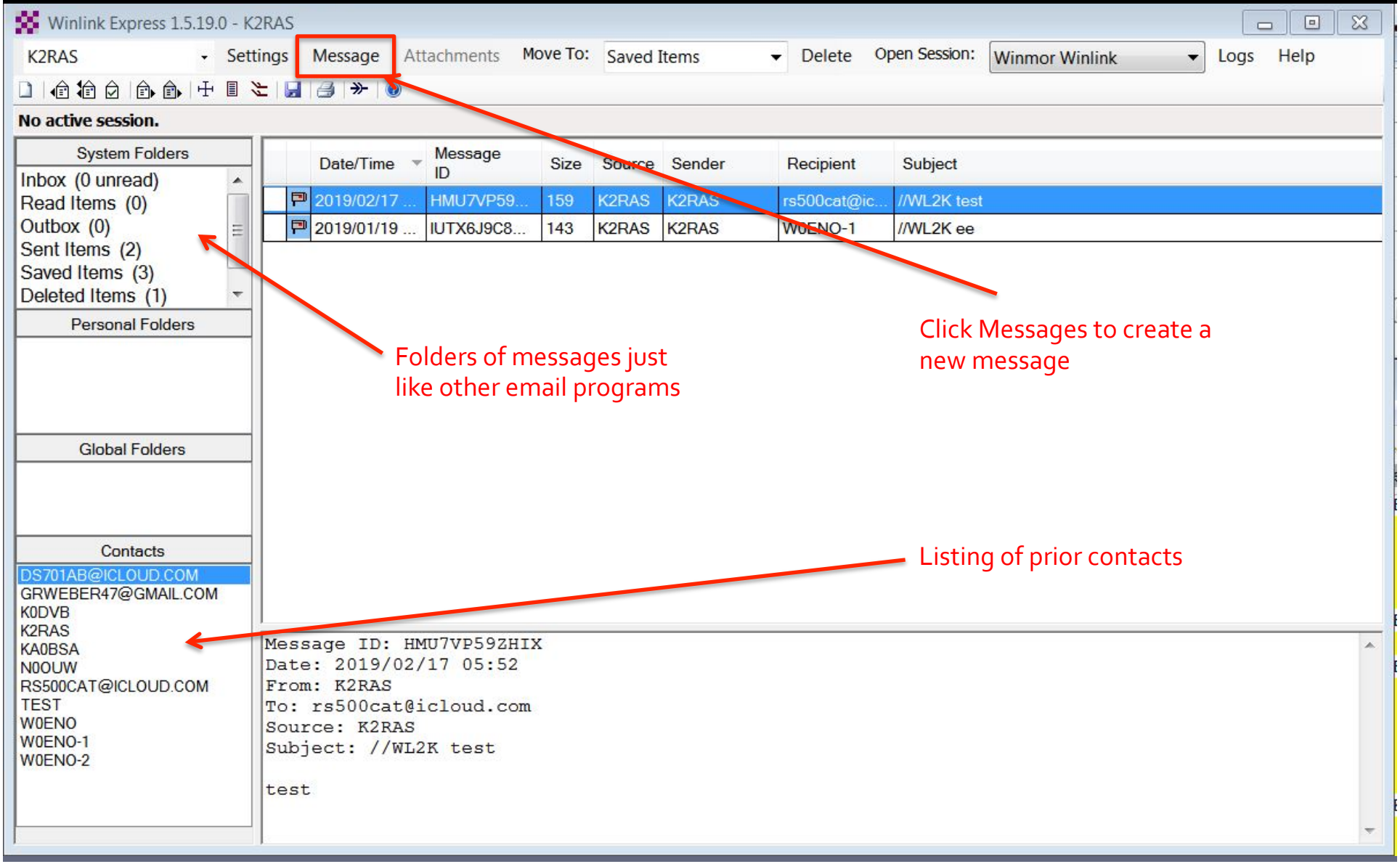
Setup Packet Winlink (VHF operation)

Setup Winmor Winlink (HF operation)

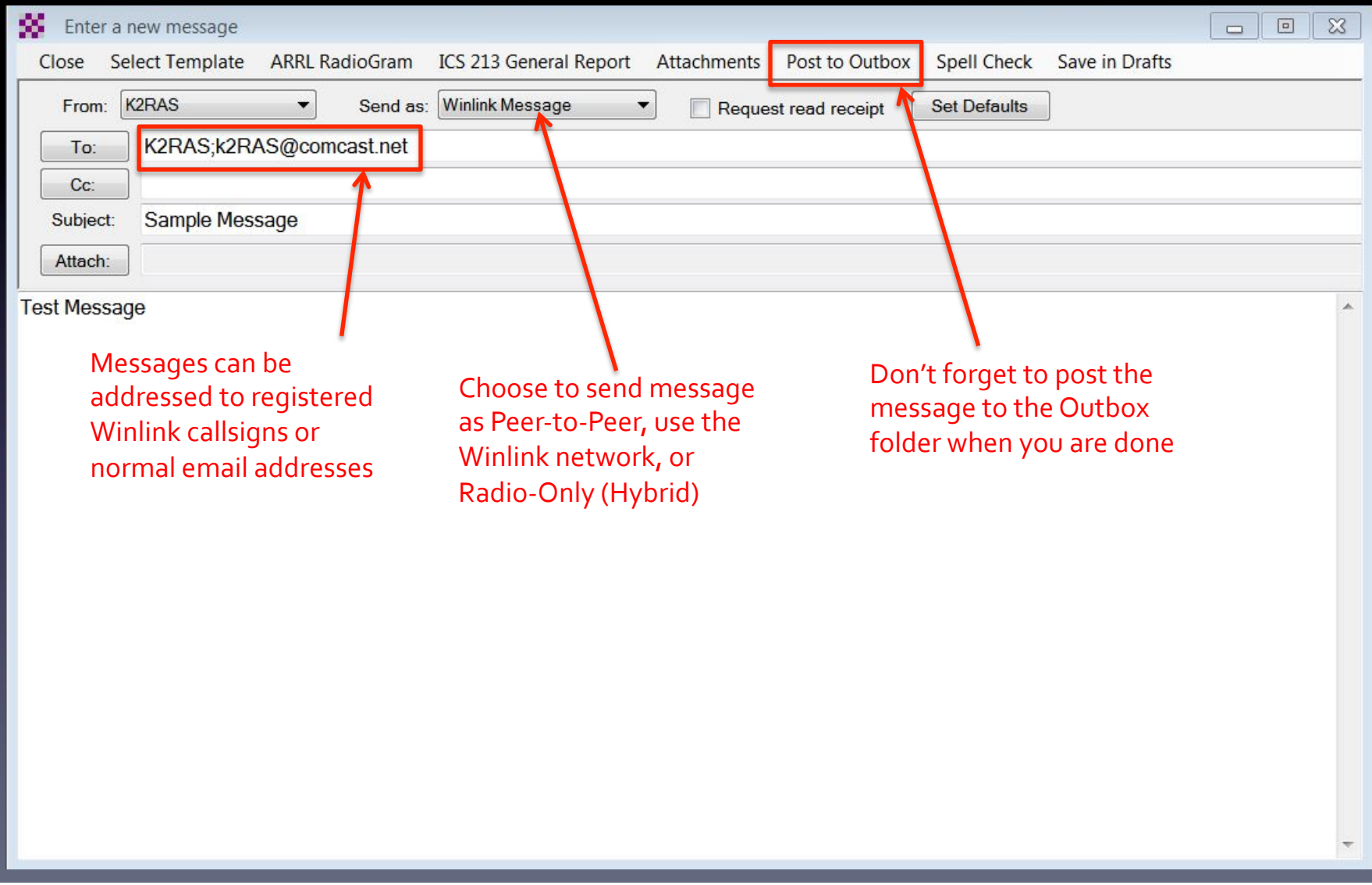




Running the Winlink Program



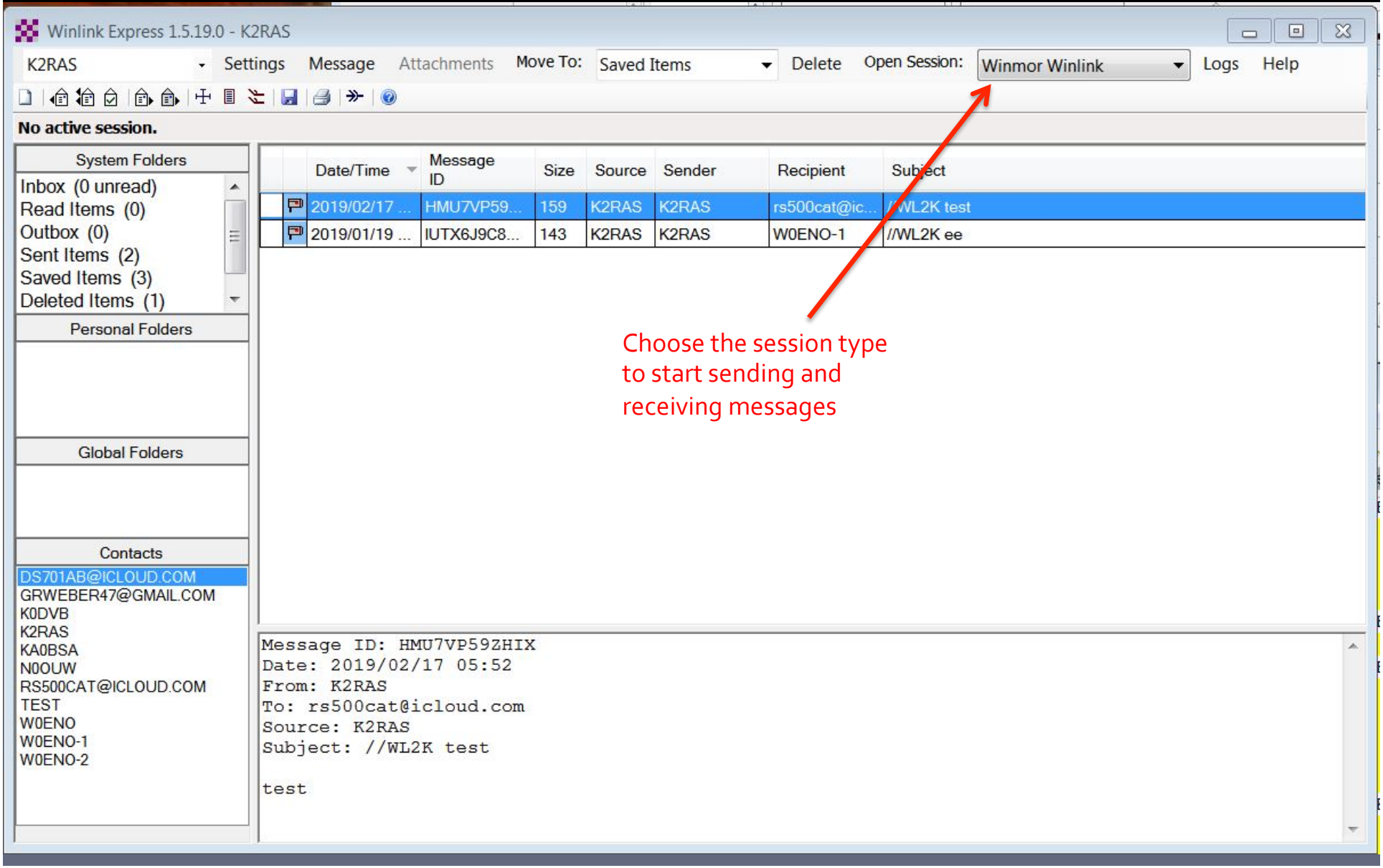
Creating a Winlink Message



Opening a Winlink Session Type To Send / Receive Messages

- Packet Winlink (VHF packet)
  - Requires a hardware or software (Direwolf) TNC
  - Pactor Radio-only (sends using Hybrid mesh, with no Internet)
- Winmore Winlink or Winmor Radio-only (HF packet)
  - Does not require a TNC (Winmore includes a software modem)
- Telnet Winlink (direct connection to the Internet)
  - Sends email without using a radio
  - Does not require a TNC (uses your Internet connection)

Open a session type (Packet Winlink or Winmor Winlink)



Regional Winlink Nodes

Winlink VHF RMS Internet-connected local nodes

WØIA-10	145.090	Boulder
WØNED-10	145.070	Nederland
KØNTS-10	145.050	Denver (Squaw)
NVØN-10	145.030	Longmont (north)
KAØBSA-10	144.930	Broomfield

Regional Winlink HF RMS Internet-connected nodes

KD6OAT	14.110	Sandy, UT
N5TW	14.110	Austin, TX (Hybrid)
XE1CRG	14.085	Irapuato, Mexico (Hybrid)
K5AEA	14.097.5	Austin, TX (Hybrid)
K5AEA	7.100	Austin, TX (Hybrid)
N5TW	7.091.5	Austin, TX (Hybrid)
K7DAV	3.597	Ogden, UT (Hybrid)
W5PDO	3.592	Santa Fe, NM (Hybrid)
KE7XO	3.587	Las Vegas, NV (Hybrid)
K6JGL	3.595	Los Angeles, CA (Hybrid)
N5TW	3.596	Austin, TX (Hybrid)
KB5HCD	3.595	Houston, TX (Hybrid)
KC8YJJ	3.589.5	Pittsburgh, PA (Hybrid)

Red locations use Hybrid Mesh forwarding

On to the demonstration…

References

http://www.winlink.org

http://www.winlink.org/content/e_mail_or_without_internet
http://www.kantronics.com/products/kpc3.html
http://www.tigertronics.com/slusbmain.htm (signalink modem)