WinLink Training

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Agenda

- Inside work
  - Slides
  - Demos/training:
    - Telnet
    - Peer-to-peer
- Outside work
  - Demos/training
    - Gateways
    - Digipeaters
    - HF?

What

- Winlink is e-mail over amateur radio
  - Real e-mail with attachments and multiple recipients
- Addresses:
  - Winlink addresses
  - Regular internet email addresses
- Compression is used for efficient transmission
- Regular amateur radio rules apply
  - No swearing
  - No selling (no commercial use)
  - Comms are public

WHO, By Whom

- Who: Comms without phones, internet
  - Emergency Communications
  - Sailors, etc.
- By: Volunteer hams (Winlink.org)
  - Sys Admins
  - Gateway stations (radio -> internet links)

WHY

- Emergency Communication:
  - E-mail (data) is faster and more accurate than voice
  - Standard forms built into Winlink clients
    - Incident Command System (ICS), many others
  - Some protocols (VARA) optimized for weak signals
    - Data may get through when voice is difficult
- Provisions for local, widespread or total Internet outage
  - Mirrored global mail servers (Amazon Web Services)
  - Support for regional mail servers, store and

How

- Delivery methods:
  - **Internet** (when available)
    - Winlink calls it “Telnet” session
  - Ground Station VHF/UHF, HF
    - **Packet** (local area)
    - **VARA FM** (local area)
    - Pactor, Robust Packet (HF) (distant area)
    - WINMOR, ARDOP, **VARA** (HF) (distant area)
  - Microwave link (local area)
  - Satellite (distant area)

How Fast?

- Time to transfer 4K file:
  - PACTOR 1 15 min
  - WINMOR 500 10 min
  - PACTOR 2 4 min
  - WINMOR 1600 3 min
  - Packet (1200 baud) 2 min
  - ARDOP, VARA 2 & 3 Between PACTOR
  - PACTOR 3 30 seconds
  - PACTOR 4 15 seconds
  - Telnet zip

Components

- Winlink clients
  - Windows: Winlink Express most common
  - List: https://winlink.org/ClientSoftware
  - Connect to Winlink gateways
    - Connected to mail servers
  - Connect directly other clients
    - “Peer-to-peer”

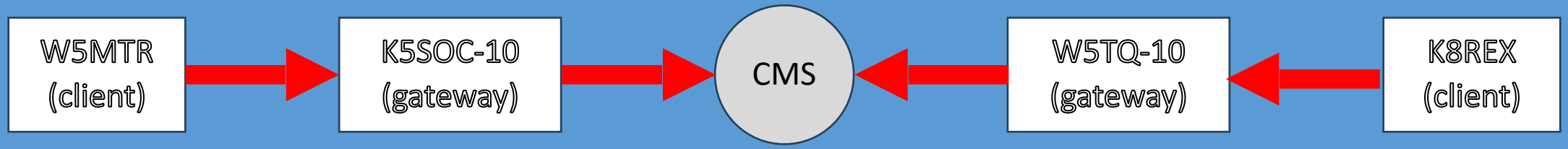
Components

- Winlink gateways:
  - Connect radios to Common Message Servers (CMS)
    - Centralized mailboxes
    - Amazon Web Service redundant servers
  - Listen for connections on registered frequencies
  - Gateway software (for reference):
    - RMS Trimode: HF, multiple protocols
    - RMS Packet: VHF/UHF, packet and VARA FM
    - RMS Relay: store-and-forward (if internet down)
    - [”RMS” = Radio Mail Server]

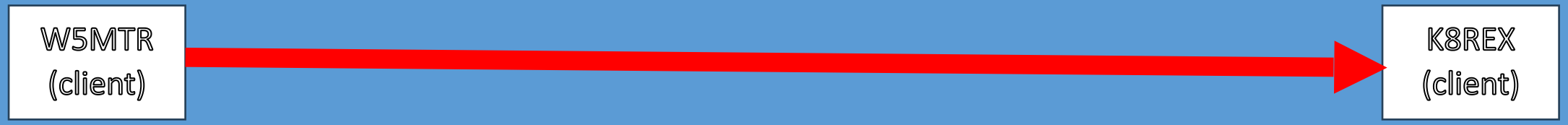
Components

- Digipeaters: stations that relay Winlink radio traffic (no internet)
  - To gateways
  - To peer-to-peer stations

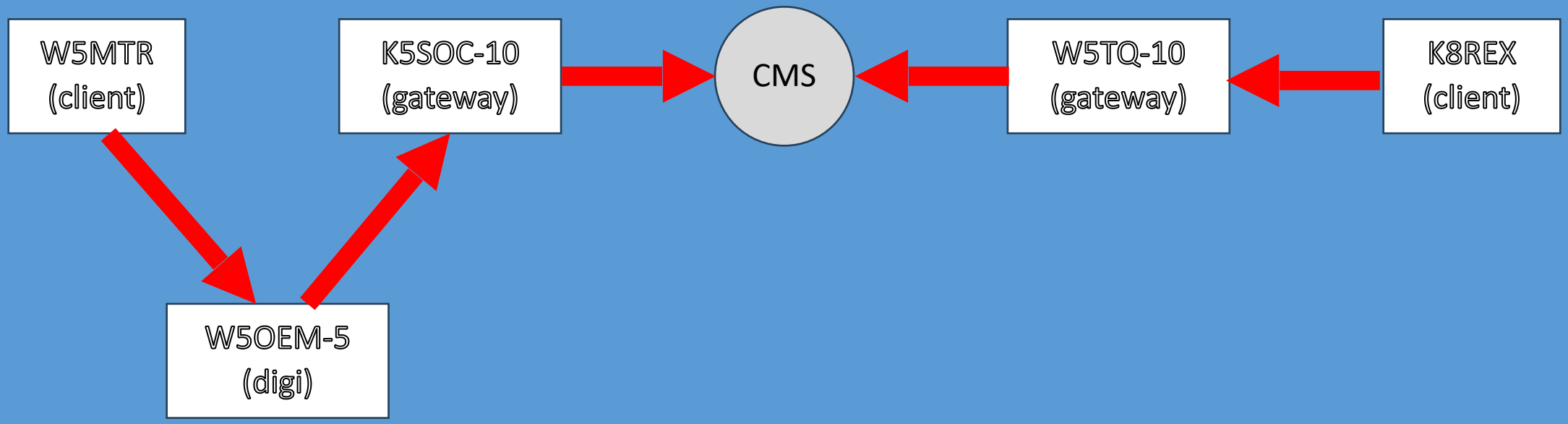
Sending Winlink Messages



Sending Peer-To-Peer Messages



Sending Winlink Message via Digipeater



Telnet Vs Radio

- ”Telnet” Session
  - Uses internet connection direct to CMS
  - When:
    - Have internet connection
    - Sending/receiving
      - Large files
      - Many messages
    - Getting started: Radio+ system not yet dialed in
- Radio Sessions
  - Connect to gateway or peer
  - When:
    - No internet connection
    - Practice for outages

Packet vs VARA

- Packet
  - Free
  - AX.25 protocol sends data “a note at a time”
  - Multiple simultaneous connections
- VARA
  - $69/license: good for mult stations, HF & VHF-UHF
    - Digipeaters
    - Faster speeds (if hardware allows)
  - Faster: Sends data in “chords: mult notes at a time”
    - Better connection -> more notes
  - One connection at a time
  - Works in weak signal conditions
  - Auto-tune hints to help set TX/RX levels

Requirements

- Radio, ham license
- Way to convert data <-> sound
  - Terminal Node Controller (TNC): Hardware all-in-one solution for data <-> sound. Packet.
    - May be built into radio: some Icon, Yaesu, etc.
    - Or external: Kantronics
  - Sound card: hardware driven by software. Different software supports different protocols (packet, VARA)
    - SignalLink, Masters Communication DRA

Requirements

- Computer
- Cable(s)
  - Computer -> TNC/SoundCard or Radio
  - TNC/SoundCard -> Radio (unless Radio has TNC)
- Software
  - Winlink client
  - Protocol support:
    - VARA, VARA FM: recommended for speed
    - SoundModem: if using packet with sound card

Requirements

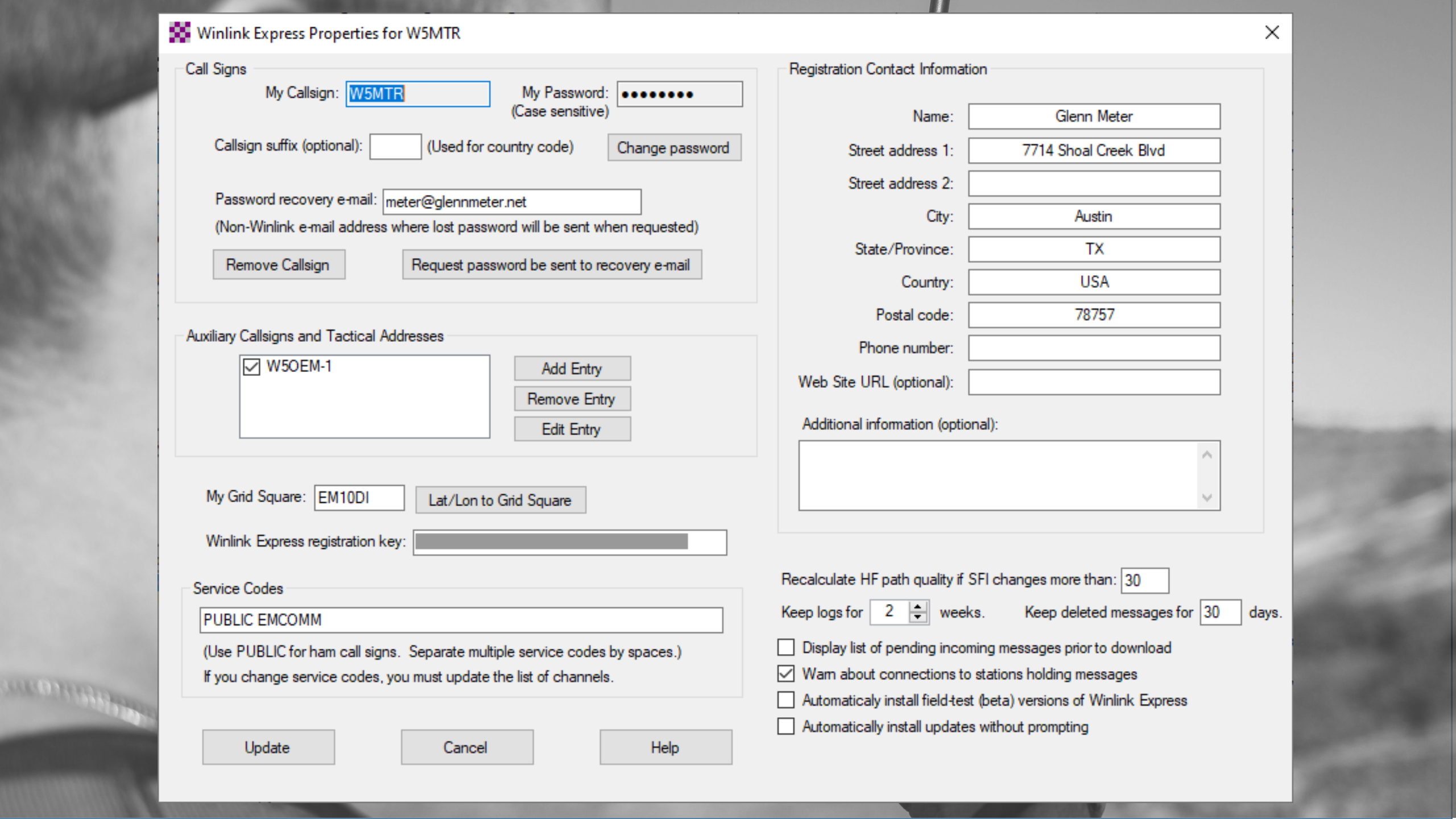
- Patience
  - So many settings in so many places!
    - Radio: inputs and data settings
    - TNC/Soundcard: TX and RX levels
    - Computer: Sound levels, protocol settings
- Good news:
  - Once things are running, they're rarely changed.

Resources

- Winlink.org
  - Winlink Express client software, list of other clients
  - Gateway and digipeater maps/lists
    - Especially list of TX gateways/digipeaters on Tools -> Local page (thanks N5TW!)
  - Propagation maps (HF)
- Winlink groups.io mailing list
- @Wavetalkers on YouTube
- Web search: someone's probably already figured out the settings for your gear

Using WinLink

- Winlink Settings
  - Call Sign, password, registration key
  - Suffix: Pending license upgrade, out of country
  - Grid Square: Maidenhead grid square
    - Find lat/long via GPS, maps program, etc. -> Ask Winlink to convert it for you
    - Online Maidenhead grid square locators
  - Service Codes:
    - PUBLIC: general amateur radio, maritime
    - EMCOMM: restricted for emergency use
    - Others: private use


Winlink Express Properties for W5MTR
Call Signs
My Callsign: W5MTR
My Password: ••••••••
(Case sensitive)
Callsign suffix (optional):
(Used for country code)
Change password
Password recovery e-mail: meter@glennmeter.net
(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
W5OEM-1
Add Entry
Remove Entry
Edit Entry
My Grid Square: EM10DI
Lat/Lon to Grid Square
Winlink Express registration key:
Service Codes
PUBLIC EMCOMM
(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
Help
Registration Contact Information
Name: Glenn Meter
Street address 1: 7714 Shoal Creek Blvd
Street address 2:
City: Austin
State/Province: TX
Country: USA
Postal code: 78757
Phone number:
Web Site URL (optional):
Additional information (optional):
Recalculate HF path quality if SFI changes more than: 30
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
Automaticaly install field-test (beta) versions of Winlink Express
Automatically install updates without prompting

Using WinLink

- Compose message(s)
  - Specify address(es)
  - Compose body, or use a form
- Post message(s) to Outbox
- Make a connection
  - Open session by mode (Telnet, Packet, VARA, etc.)
  - Unless Telnet:
    - Select/specify receiving station, dial radio to freq
      - Some radios have Computer Aided Transceiver (CAT) control to dial frequency automatically
    - Check that frequency is clear (!)
  - Start session: sends Outbox messages, receives messages for you

DEMO

- Show Winlink.org website
  - MyAccount page
  - Client software list
  - Downloads page
  - Show Tools page
    - Maps
    - Local -> TX page
- Send a message using Telnet
- Show session settings
- Send a peer-to-peer message

Message Types

- Message Types
  - Winlink message:
    - Send/receive via Common Message Servers (CMS)
    - Connect to a Winlink gateway
      - Gateway uses internet to communicate with CMS
  - Peer-to-peer message:
    - Send to/from individual station
    - Stations have to be in same “peer-to-peer” mode
    - Stations have to be on same frequency
- Message type specified when the message is created (!)
- Message type and session type have to match (!!)

Winlink Addresses

- Addresses are **<station>@winlink.org**
- Winlink Express turns “<station>” -> “<station>@winlink.org” automatically
  - For example: ”To: W5KA” goes to “W5KA@winlink.org”
  - Don’t need to add “@winlink.org” for other Winlink addresses

Winlink Addresses

- Winlink <station> = <callsign> + optional ID
  - Only one radio? <callsign> is ok
  - Multiple radios? IDs differentiate stations (radios)
    - For example:
      - W5TQ-10: Austin EOC gateway on 145.730
      - W5TQ-12: Austin EOC gateway on 145.070
    - By convention:
      - Gateway: -10
      - Digipeater: -5
    - Borrowed from APRS SSIDs. Usually <= 15.
    - Station IDs set in protocol software settings (Soundmodem, VARA, etc.)

Non-winlink E-mail Addresses , Whitelists

- Send to non-Winlink address:
  - Just put the address(es) on the “To:” line
  - Adds the address(es) to the Winlink White List (approved outside senders)
- Send e-mail to Winlink address from outside WinLink:
  - Send to <station>@winlink.org
  - If on White List, will go through
  - If not on White List (bounces), add “//WL2K” (for Winlink 2000) at the start of the subject line
    - No spaces, case sensitive
    - For example: “Subject: //WL2K Needed Equipment”

Non-winlink E-mail Addresses

- Served agencies with “regular” e-mail addresses can be served through Winlink
  - This is often an eye opener for served agencies
- Fun game (soon to disappear):
  - Get someone’s phone number and carrier
  - Look up the carrier’s e-mail address format from National Interoperability Field Organizations Guide (NIFOG)
  - Send an e-mail to their phone, wait for text message

Multiple Accounts

- Winlink Express & other clients support multiple user accounts
  - Use same computer with different accounts
  - For example:
    - Personal Winlink account
    - ARES club account for EmComm operations
    - Served agency account when embedded (hospitals, etc.)

Multiple Accounts

- Warning: If a Winlink account is shared across multiple computers, first station to download a message “wins”
  - Each Message only downloaded once
  - Other stations using same account will not see the message (!)
- Best practice: If a Winlink account is shared, coordinate outside of Winlink which station is “live” for a Winlink account

Routing

- Internet message routing is automatic:
  - Specify an (e-mail) address -> internet finds the best route to get it there
- Winlink routing is manual:
  - If need to use multiple relays to get to a gateway or final peer-to-peer station, must specify the digipeaters manually
    - Done when starting a session connection

More Peer-to-peer

- Have to coordinate:
  - Who listens and who sends?
  - What frequency?
  - What protocol (packet, VARA FM, etc.)?
  - When?
- Can coordinate:
  - Via radio, usually on another frequency
    - Individual operators
    - Net Control
  - Per a schedule: For example, Rally Plan
- Addresses:
  - Must be P2P station, or those that connect to it using P2P (you're sending P2P messages)

More Digipeater

- Winlink express allows up to two (2) digi stations
- All stations must be on the same frequency
  - Digi passes traffic on its frequency
- Each digi station used adds to the time to send the message:
  - Digi plays a game of “telephone”:
    - Receives a message
    - Re-sends it to the next station
    - Gets a response back
    - Re-sends response to the original station

FORMS

- Send a (pre-defined) set of data
- Only form data (content) is sent in the message
- Formatting is shown on each client using form templates
- Need to have common set of forms on each station for matching data/formatting
  - Winlink Express: startup check looks for Winlink & forms updates. Asks for permission to update.
- Can create custom forms
  - For example: Critical Infrastructure Status

FORMS

- Using a form:
  - Create a New Message
  - Select Template: select a form
  - Form will open in your default browser
  - Enter the form data in the browser
  - Submit button: transfers form data back to the new message
    - Browser window can now be closed
  - Post message to Outbox
    - Check addresses, etc.
  - Open and Start a session to send the message

DEMO

- Send an ICS-213 form
- Send a Winlink Checkin form

Good Connections

- What to look for:
  - Packet: “+++” in output
  - VARA: lots of green dots
    - Green > white > red
    - More squares = more simultaneous data

Winlink HF

- Winlink has propagation info, to help find best connections
  - Update through internet connection
- Winlink HF gateways may listen for connections on multiple frequencies (one at a time)
  - HF clients usually set for more connection attempts than VHF/UHF (~10).
    - Gives gateway time to switch to the frequency to the one you're using.
- Using auto-tuner?
  - Remember to tune for frequency (low power) before starting session (higher power)

Best Practices

- Check for clear frequency before starting session
- Keep it short/small
  - Crop/downsample pictures
  - Check with recipient before sending large files
- Use Winlink regularly to keep Winlink & forms up-to-date
  - Do updates before deployments, drills
- Remember: all comms are public
  - CMS data open to SysAdmins
  - Radio messages can be decoded
  - Follow served agency directions:
    - Use IDs as requested instead of names (patient ID, rider ID, etc.)
    - Use names if directed (emergency medical, etc.)

DEMO (Outside)

- Send a message via a Gateway
- Send a message to a phone
- Send a message to a non-Winlink address
- Send a message through a digipeater

DEMO (Outside)

- Winlink HF session


TRAVIS COUNTY
Amateur Radio Emergency Service