Stamford Amateur Radio Association

http://www.ctsara.org/

WINLINK & WINMOR

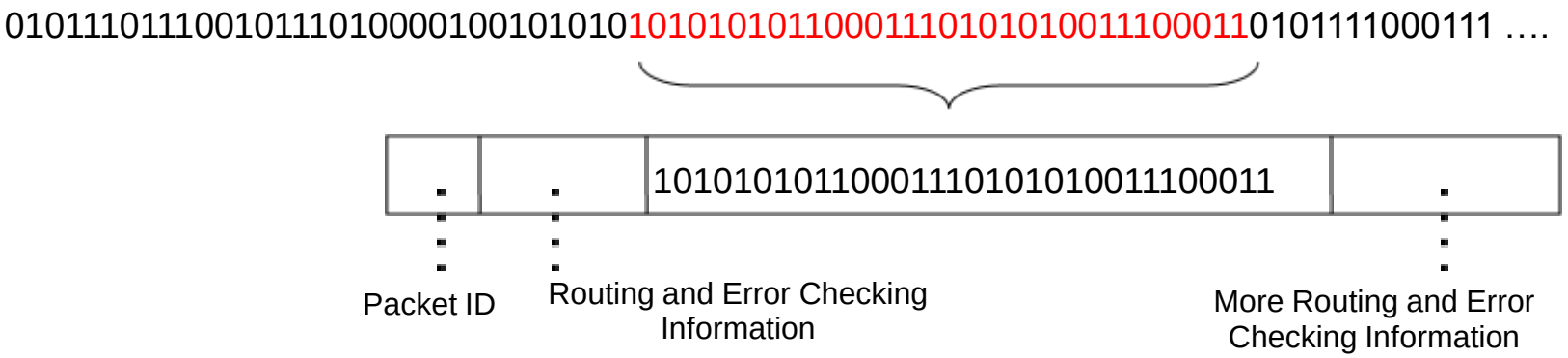
Radio-Based E-Mail

Winlink 2000 (WL2K)

- E-mail by radio
  - Peer-to-peer e-mail
  - Internet e-mail
- www.winlink.org
- Amateur Radio Safety Foundation (ARSFI)
  - Not-for-profit
  - Donations and grants
  - Volunteers
- VHF/UHF packet (AX.25) short haul (up to about 25 miles)
- HF Pactor long haul
- HF Winmor long haul

Winlink uses AX.25 packet

- Standard Internet protocol, additional features for amateur radio
- Data sent in “packets” (a/k/a “frames”) with error detection data
  - Receiver uses the error detection data to determine if it received everything and received it correctly
  - Frame retransmission if errors detected
  - Not perfect, but very very very very very very very good
- Higher throughput than voice traffic
- Better distance than voice

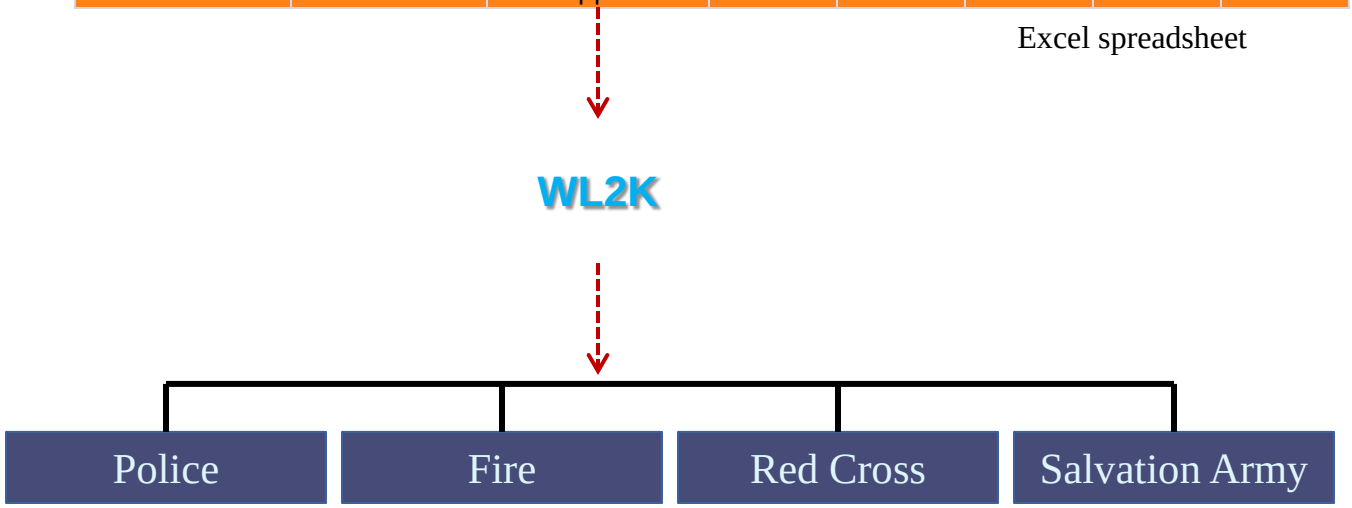


Computer-readable DATA can be sent as e-mail attachment(s)

Shelter

Shelter:	Stamford High	8/31/2011	8:02 PM				
Last	First	Address	City	State	Zip	Age	Sex
AARDVARK	ANTHONY	123 Main St	Stamford	CT	06901	51	M
MOLLOY	DANNEL	897 High Ridge Rd	Stamford	CT	06905	52	M
PAVIA	MICHAEL	1227 Haig Av	Stamford	CT	06907	47	M
TELLA	RONNIE	809 Shippan Av	Stamford	CT	06902	43	F

Excel spreadsheet



- Data file attachments to the email (e.g., Word, Excel, text, jpg)
- Shelter population lists, logistics requirements, health & welfare messages
- Data can be processed, routed, sorted and summarized, etc.
- ALSO USEFUL FOR PUBLIC SERVICE (E.G., MARATHONS)

DANGER WILL ROBINSON DANGER

- Data file transmission times
  - ➢73K as Word document
  - ➢3K if an ASCII text file
- Winlink compression is good, but …

WL2K compression is no excuse for sending big files that could first be simplified

American Red Cross – Connecticut

DISASTER SITUATION REPORT (SITREP)

SITREP# 1 AREA 1 WEST ARC DARIEN DOC (☒ Initial ☐ Follow-up ☐ Final)

From (unit):	ARC FARMINTION DOC TO ALL ARC AREAS 1-5 OVER VHF AMATEUR BANDS DANBURY PVRA NET
For (incident name and/or DR#):	COMMEX-2 EMERGENCY COMMUNICATIONS
As of (date & time):	6 NOV 2010

PART A. INCIDENT DESCRIPTION. ☐ *There is NO CHANGE in this part from previous reports.*

1	Date & Time:
2	Type: (CLICK to select from list, or describe.)
3	Location affected (address or description if widespread):
4	Unique characteristics (rural/urban, key demographics, etc.):
5	Damage: ☐ Occurring. ☐ Over.
6	Preliminary Damage Assessment: ☐ Underway. ☐ Completed at (date & time):
7	General nature of damage:
8	Estimated number of households affected (including evacuations):
9	Estimated number of deaths/serious injuries and source of information:
Brief description of impact on:	
10	Utilities (electric, natural gas, water, etc.):
11	Communications (telephones, radio, CATV, etc.):
12	Transportation infrastructure (roads, bridges, railroads, etc.):
13	Community infrastructure (grocery stores, gas stations, hospitals, etc.):

PART B. LOCAL RESPONSE. ☐ *There is NO CHANGE in this part from previous reports.*

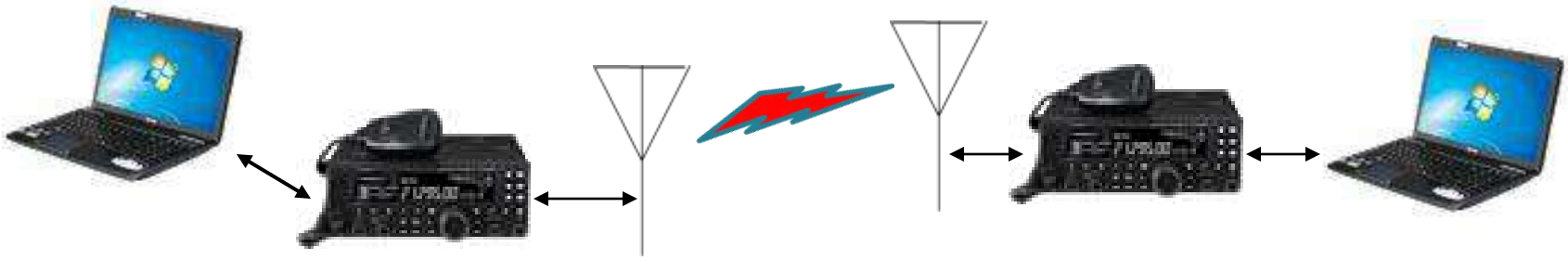
1	Date & Time response initiated: 6 NOV 10 APPROXIMATELY 09:06AM			
2	Response director: STEVE WOODS			
3	HQ address: 39 LEROY RD, DARIEN, CT 06820			
4	HQ phone number(s): 203 655 2586			
5	Radio callsign(s)/frequencies in use: KB1IFX ARC MOBILE 1, KB1QBZ NET CONTROL ARC DARIEN DOC, N1EZT TECH ADVISOR, PVRA DANBURY NET 147.12 + PL 141.3 W1HDN			
6	ARC or ARC-Partner Shelters:	Ready: 1	Total Capacity: 100	☒ NSS updated.
7		Open: YES	Current Census: 7	☒ NSS updated.
8		Total sheltered to date: 2		
9	*Non*-ARC shelters ready/open (number and capacity/census, if known):			
10	Meals/Snacks served to date:			
11	ARC bulk items distributed (type and quantity):			
12	Liaison established with:			
13	Media contacts:			
14	ARC paid and volunteer staff assigned (cumulative total as of this report):			
15	ARC vehicles in use (cumulative total as of this report):			
16	Other ARC disaster services underway:			
17	Total financial commitments to date (all categories of direct costs):			

PART C. ADDITIONAL INFORMATION. ☐ *There is NO CHANGE in this part from previous reports.*

1	Current priorities:
2	Critical issues and needs:
3	Significant actions planned:
4	Other:

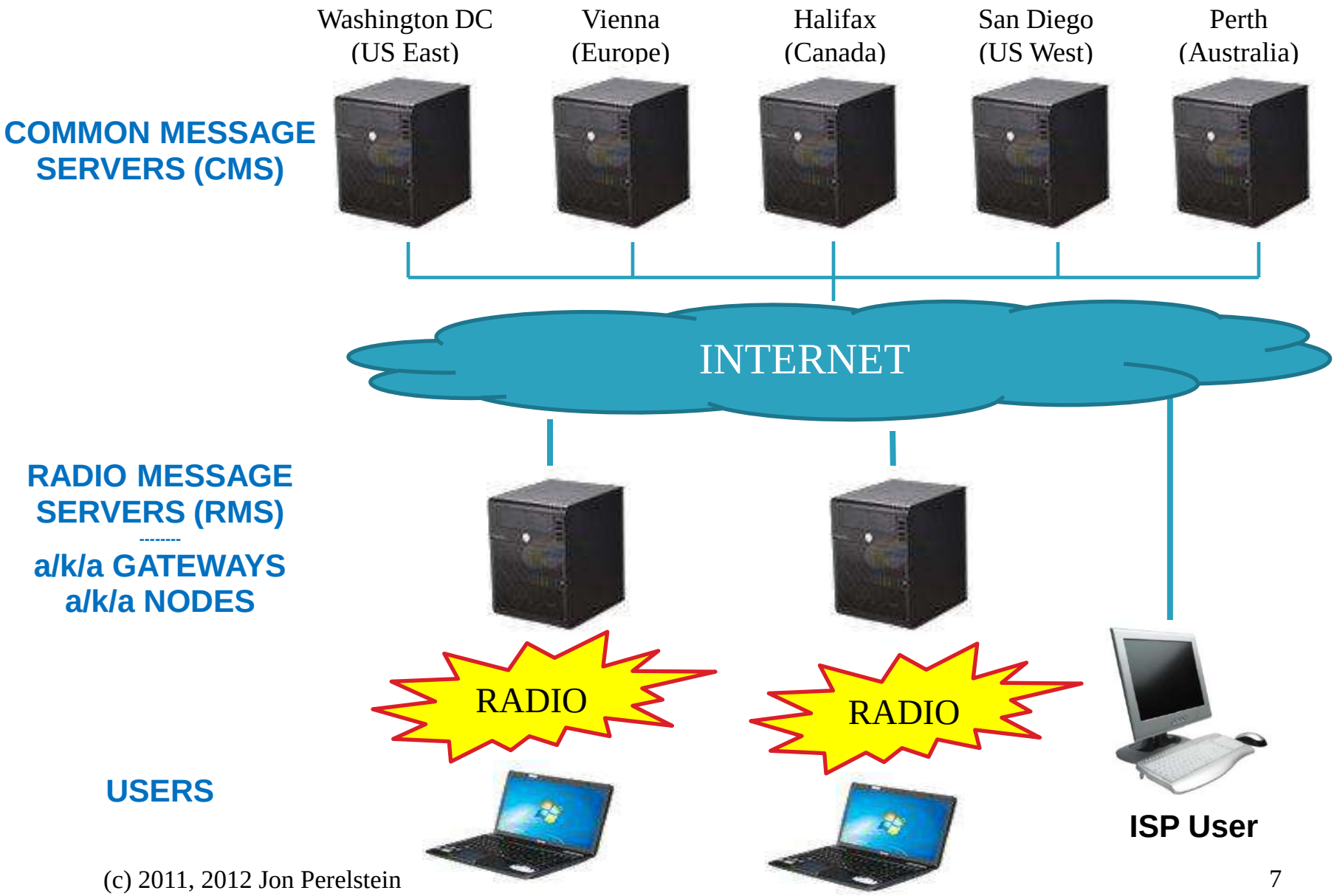
Submitted By:	Date/Time:

Peer-to-Peer (P2P) e-mail

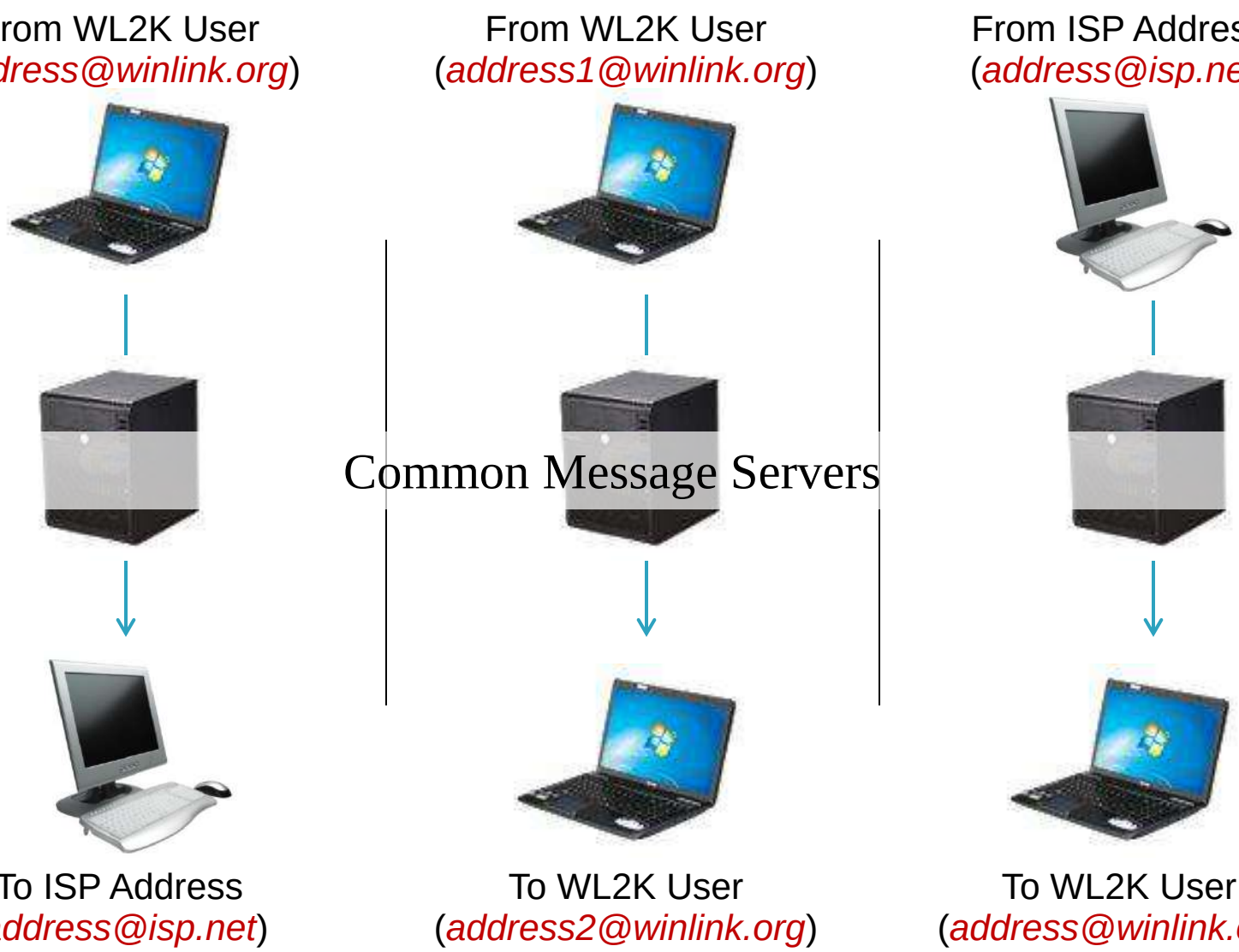


- a/k/a Classic Winlink
- Direct, peer-to-peer messaging via HF Pactor
  - Attended operations
  - Email formats
- HF Pactor
- VHF/UHF packet
- Was in decline, but use growing after Battle of Fort Huachuca

Internet e-mail



All WL2K internet email goes through the CMSs



HF with Pactor

- Proprietary modems (SCS) with proprietary protocols that enable packet on HF
  - Pactor I, II, III, IV (oldest to newest)
  - Pactor IV equivalent to about 9600 baud
- FSK protocol with ARQ
- Expensive modems ($1500-$4000)

Pactor II Sound  

Winmor – Soundcard for HF (new)

- Replaces expensive Pactor modems
- Standard soundcard interface
  - Signalink USB, RIGblaster, etc. ($50-$125)
- Winmor software packet construction/deconstruction
  - *Windows only*
- ***BUT*** – limited throughput relative to Pactor modems
  - 4-to-41 bytes/sec at 500 Hz bandwidth
  - 33-to-164 bytes/sec at 1600 Hz bandwidth
  - Bandwidth used and throughput depend on band conditions

VHF/UHF FM using TNCs

- TNC = Terminal Node Controller
  - Construct and deconstruct packets
  - Digital-to-audio enCOde/DECode (CODEC)
- 1200 baud
  - Vast majority
  - Most radios can handle as-is
- 9600 baud
  - Limited use
  - Very precise tuning and equipment tolerances required
    - Not supported by all radios

Increasing use of soundcard interfaces in place of TNCs

- Standard soundcard interface
  - Signalink USB, RIGblaster, etc. ($50-$125)
  - Digital-to-audio enCOde/DECode (CODEC)
- AGWPE (SV2AGW's Packet Engine) software for packet construction/deconstruction
  - *Windows only* (including Vista and Win 7)
  - Both 1200 baud and 9600 baud supported
  - Not all Winlink software works with AGWPE

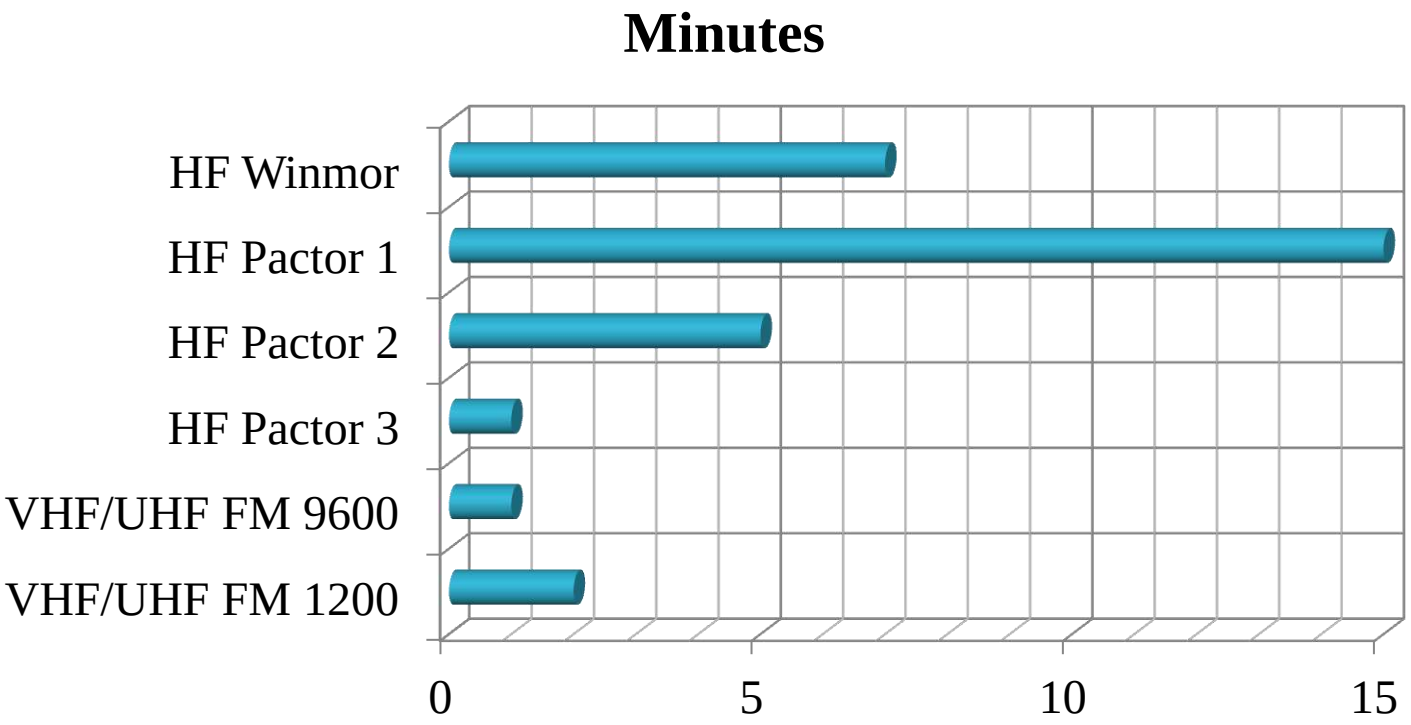
Running AGWPE

Religious schism: TNC vs. Soundcard

- Old-timers cannot believe that soundcard works and works well
  - Actively seek to discourage soundcard use
- Easy to get new participants with soundcard, difficult with TNCs
  - Need for bench strength!!

Galileo before the Holy Office by Joseph-Nicolas Robert-Fleury

Time to transfer a 4K message



- After compression, ideal conditions
- Winlink user software provides excellent compression
  - Paclink, RMS Express

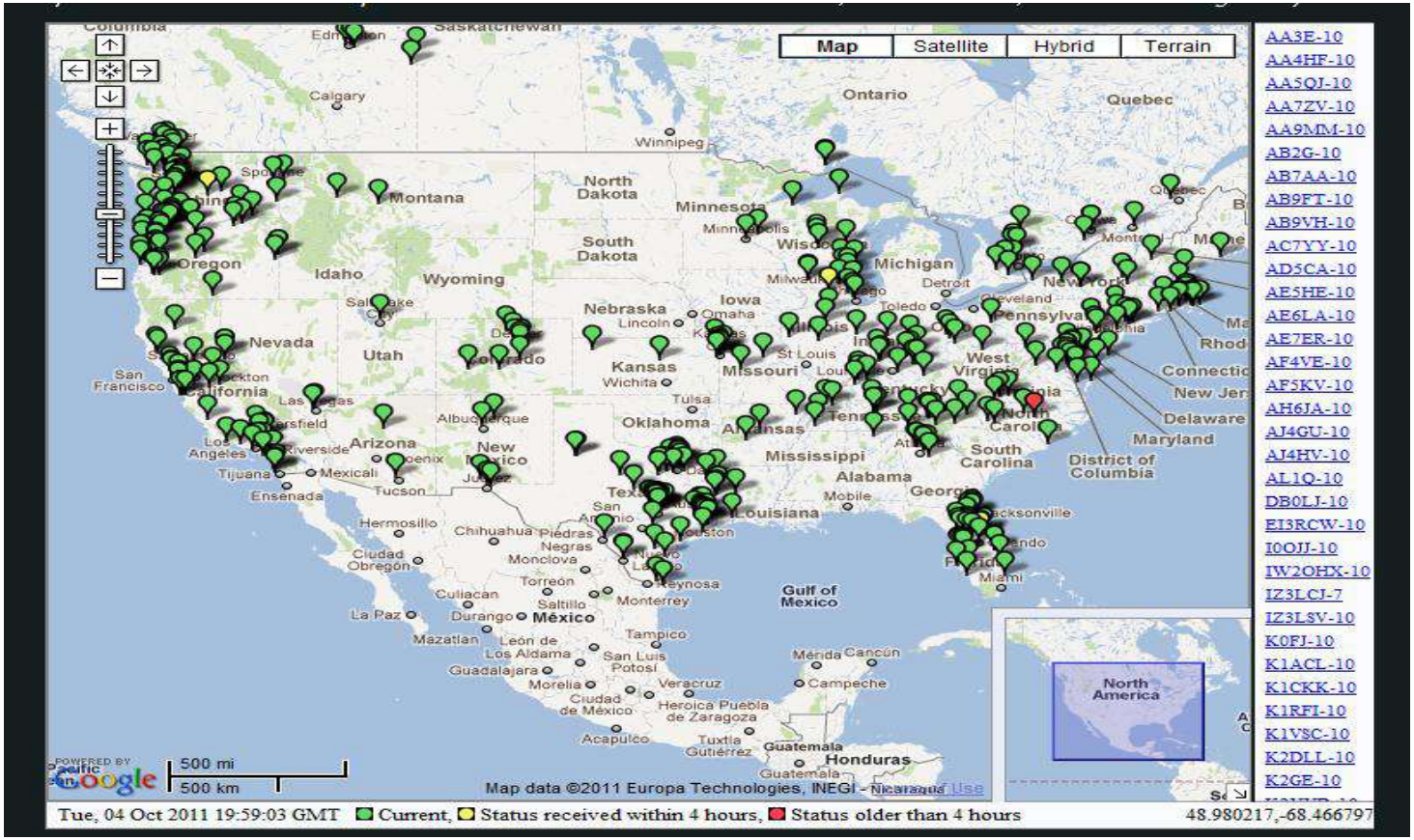
HF RMS stations

HF RMS Nodes: www.winlink.org/RMSHFPositions

- Wilderness/at sea position reporting
- Long-haul communications
- Modem type depends on node

VHF/UHF FM RMS stations

VHF/UHF RMS nodes: www.winlink.org/RMSPacketPositions



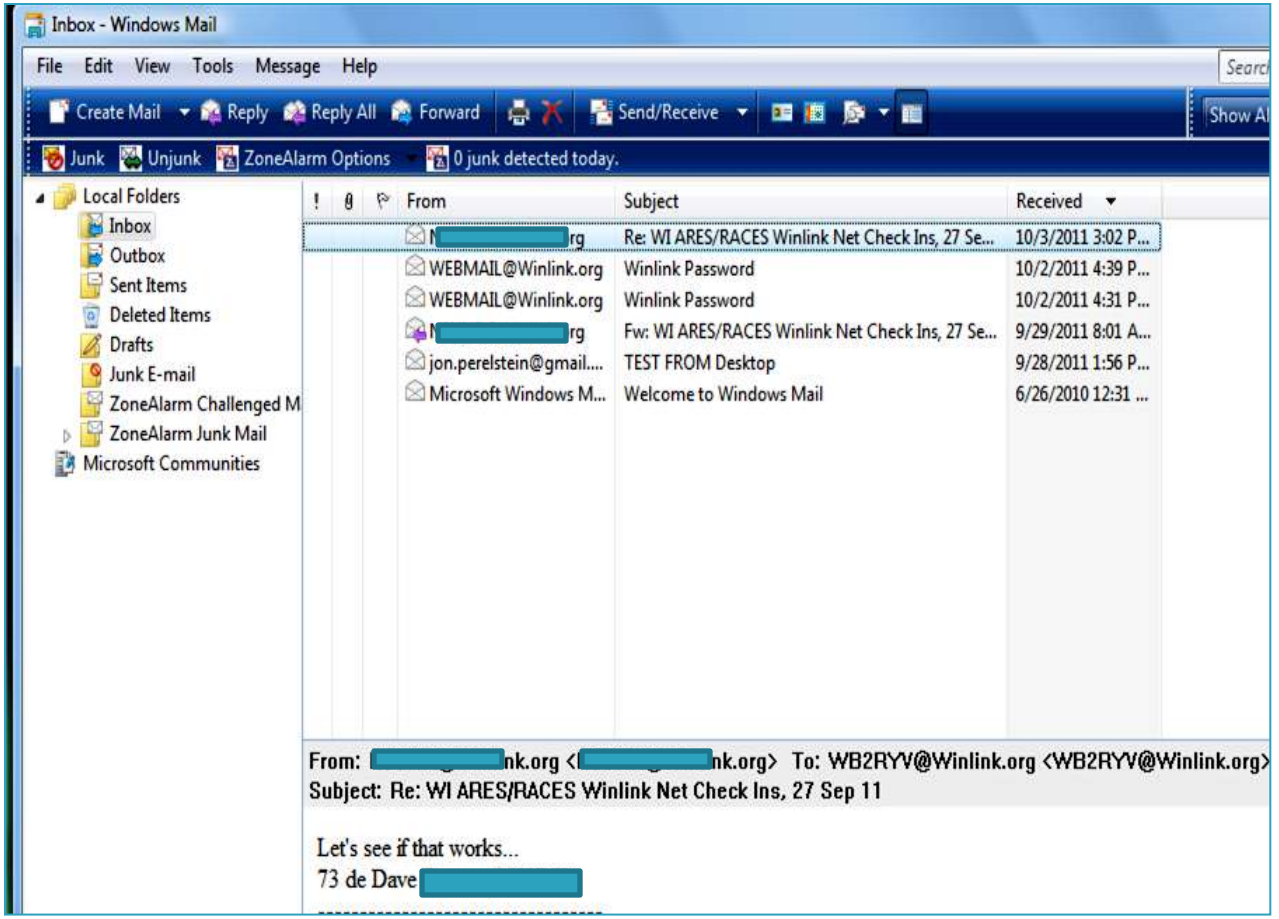
- Mostly U.S./Canada, limited use in Europe, almost no use elsewhere
- Many stations not shown

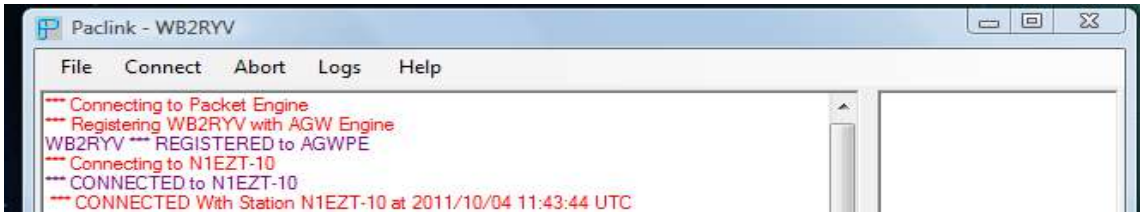
Two choices for user software

- Paclink or RMS Express
- Windows only (XP, Vista, Win7)
  - Linux versions available from third parties
- Maintained by Winlink organization
  - Airmail and Outpost are older software being phased out

Paclink uses your preferred e-mail client

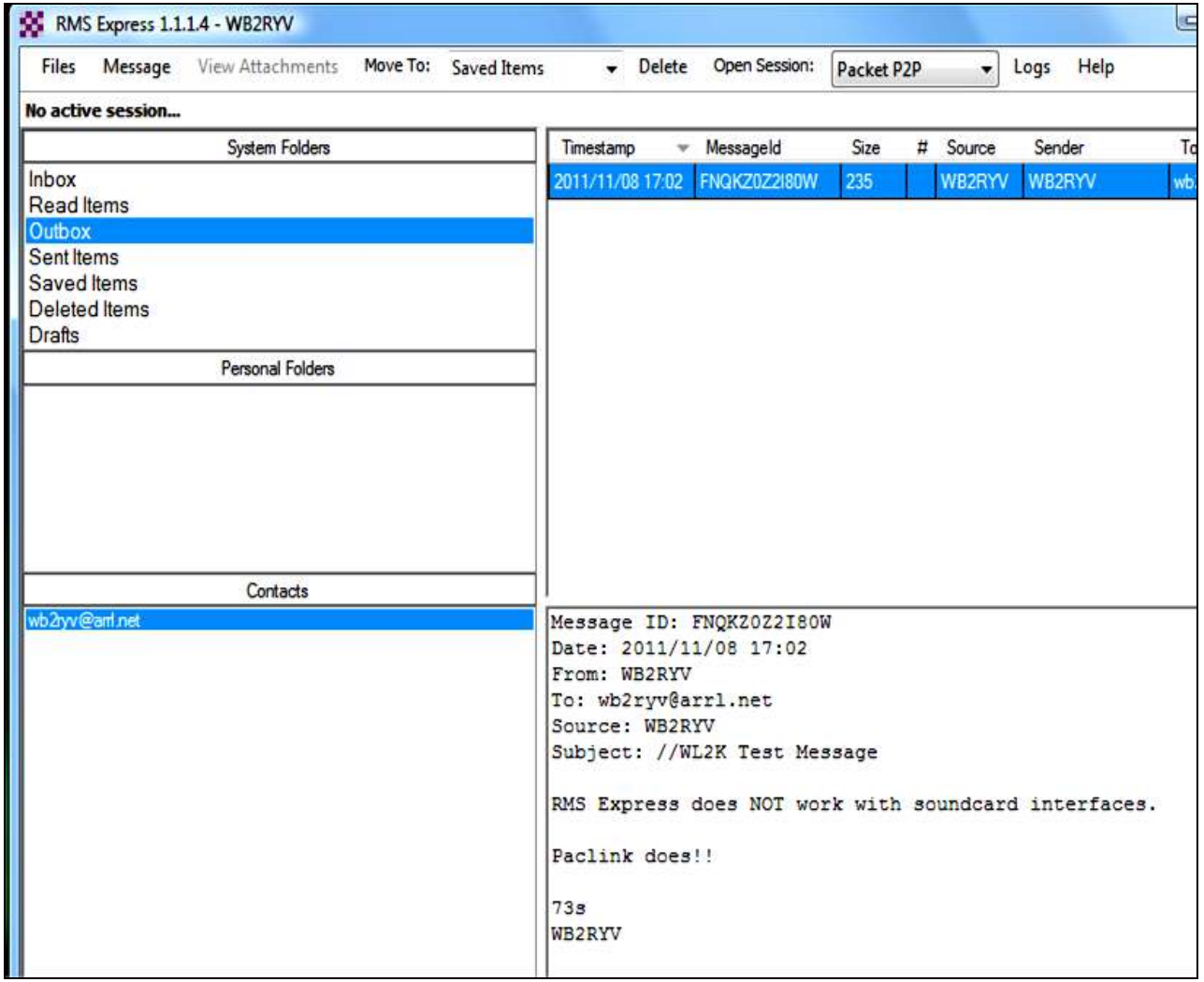
- Advantages
  - Use the e-mail client I'm used to
  - All my e-mail in one place
  - My entire address book available
  - *Works with soundcard interface*
- Disadvantage
  - ALL my e-mail, including personal e-mail
  - No P2P
  - No Winmor





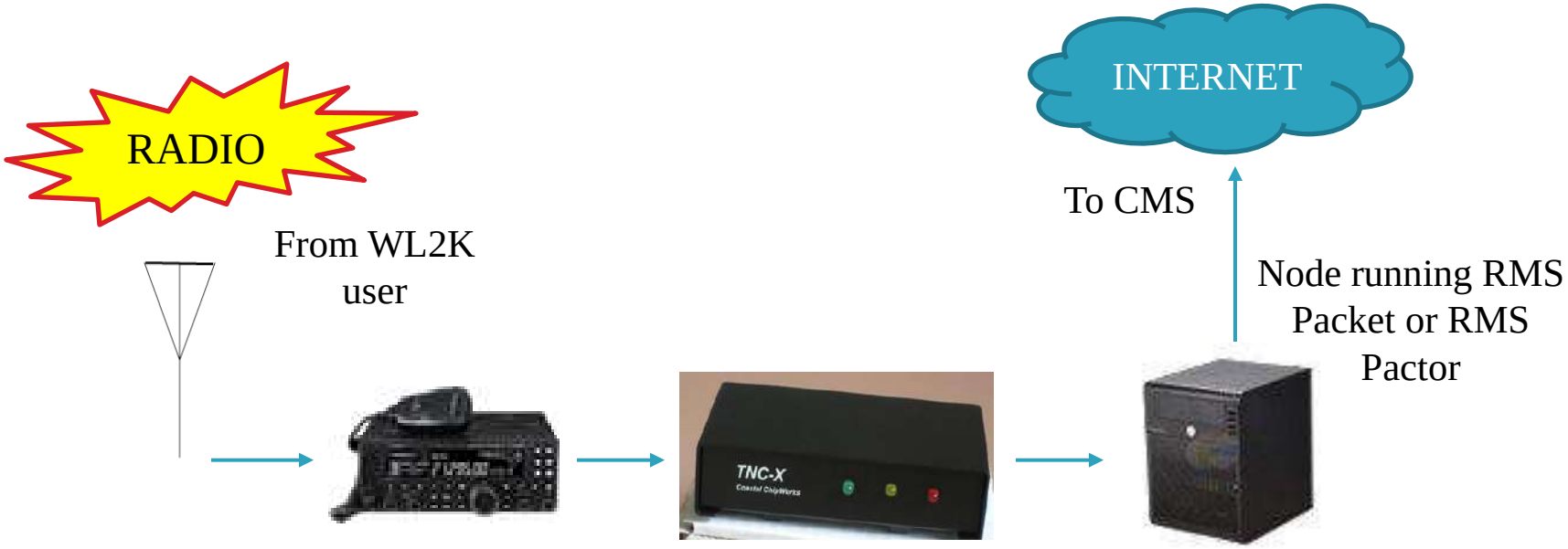
RMS Express provides its own built-in email client

- Advantages
  - If you don't already have an email client
  - Isolation from your personal e-mail
  - *Provides for P2P connections*
- Disadvantages
  - *Does not work with soundcard interfaces*
  - No access to your other e-mail



RMS node software

- RMS Packet for VHF/UHF packet
- RMS Pactor for HF Pactor
- Requires registration and agreement with Winlink organization
- *Full-time Internet connection required*
- Unattended operation
- ***RMS Packet/Pactor useless if Internet connection is down***



RMS Relay at the RMS for loss of Internet connection

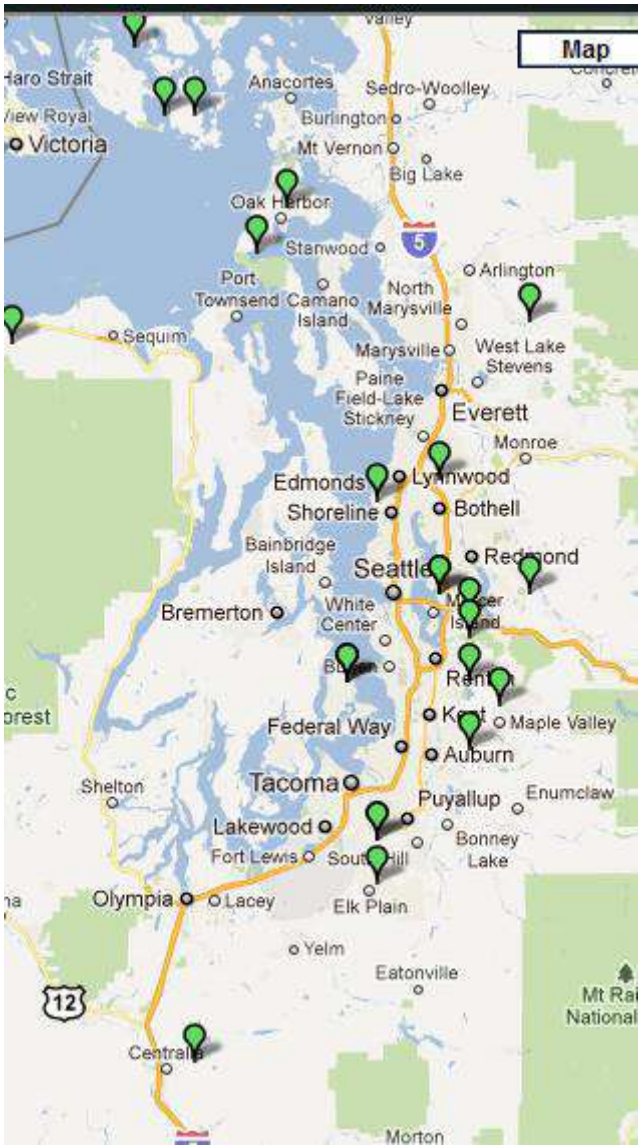
- Temporary storage of messages while Internet unavailable
  - Sits on top of RMS Packet
  - Stores messages until Internet again available
  - Can also forward to another node via HF Pactor
- ***Many RMS stations do not run RMS Relay***
  - May not tell user that message is in limbo
  - "I won't lose Internet at the gateway because it's in the EOC" (huh?????)

Why didn't they reply?

Why didn't they send?

Many/most RMSs do not have Pactor

A planned network of sites can support each other



1 inch = 20 miles

- Seattle: overlapping coverage so each shelter can hit at least two (2) RMS gateways
- Protocol and doctrine
- Most gateways have RMS Relay with HF Pactor

WL2K's greatest strength is its greatest weakness

- Reliance on the Internet
  - Provides Internet e-mail
  - BUT – Internet access needed at gateways
  - BUT – Is Internet sufficiently secure?
  - BUT – Messages have to wing their way around the world
    - 80% (+?) of messages are local to the gateway
- Winlink Development Team (WDT) fixated on use of Common Message Servers and Internet e-mail
- WDT fixated on high volume EOC-to-EOC communications in the weeks after a disaster
  - Ignoring the fact that communications needs are very different during the disaster and in the 3-5 days after the disaster before major relief organizations like Red Cross, Salvation Army, FEMA (U.S.), etc. arrive

The Battle of Fort Huachuca

- Late 2011, U.S. Army announced that Army Military Auxiliary Radio System (MARS) operators were not allowed to use Winlink
  - "In accordance with Department of Defense Instruction 4650.02, the Army must ensure that MARS not rely on the Internet"
  - 4650.02 prohibits use of Internet for secure communications
- Riot by WL2K-obsessed MARS operators ("Winlinkians")
- Army eventually "relented"
  - Army MARS may use Internet-based Winlink
  - BUT … may not use Internet-based Winlink for messages sent on behalf of the U.S. Army
    - Sending messages on behalf of the U.S. Army is the main function of Army MARS
  - May use Winlink P2P functionality (quite good for Army purposes)

Alternatives

	PBBS	NBEMS	BPQ32	PSKmail
	• Classic packet • Short-haul	• Narrow Band Emergency Messaging System • Soundcard digital modes	• New packet with better user interface • Short-haul	• High-speed soundcard digital mode
Pro	• ARQ • Unattended	• FEC *and* ARQ • HF, VHF/UHF • Same software HF or VHF • Flexible • Many users	• ARQ • Unattended • Reasonable interface into long-haul (Pactor, Winlink)	• FEC *and* ARQ • HF, VHF/UHF • Same software HF or VHF/UHF • High speed • Unattended
Con	• User *UGLY* • Daisy chain for long-haul is fixed, fragile, resource intensive	• Peer-to-peer only • Attended only	• Peer-to-peer only • Relatively unknown, few users	• Relatively unknown, few users