E-MAIL VIA HAM RADIO:
1. WinLink 2000 System
2. New WINMOR HF Mode

“The Last Mile”

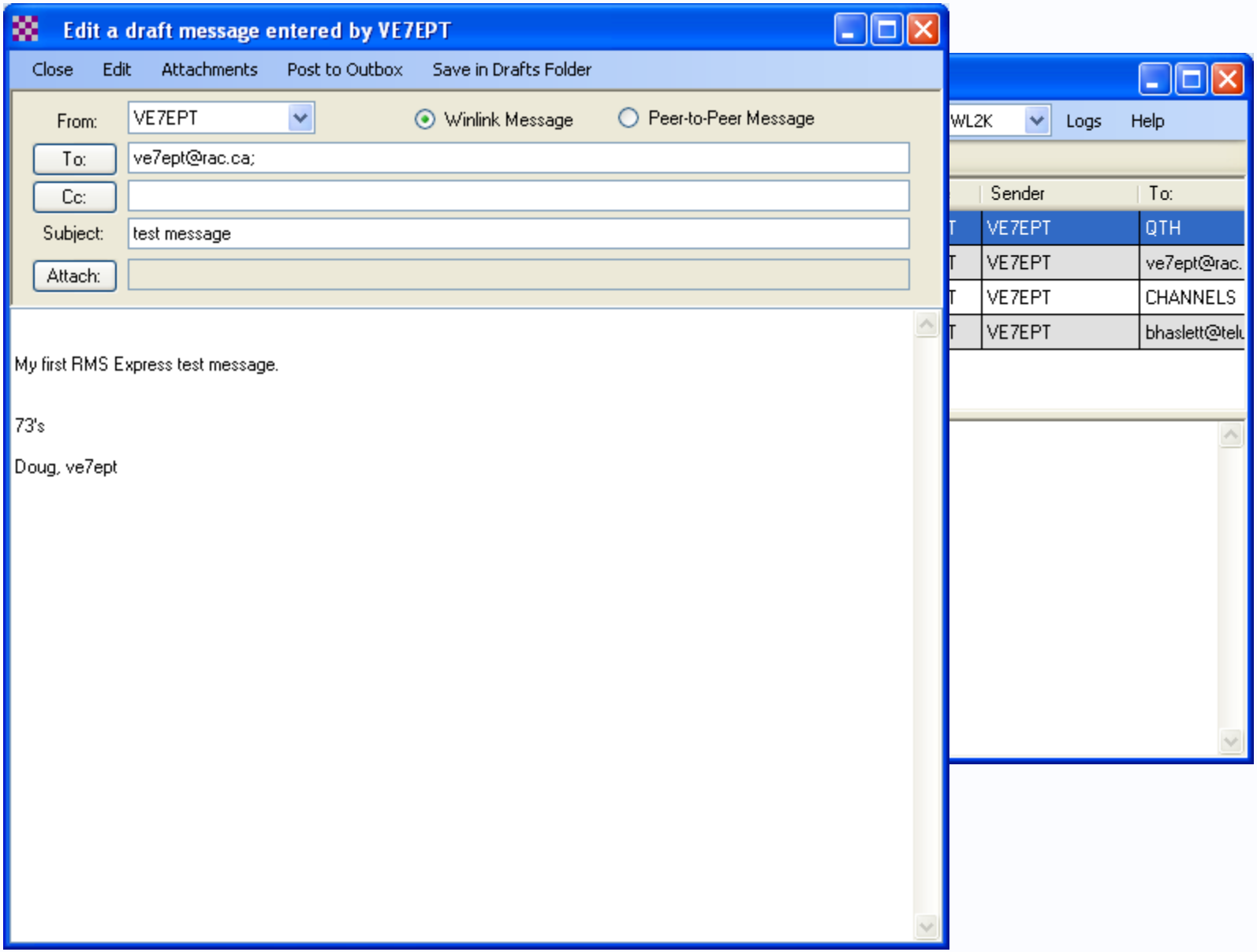
The “last mile” is the path across an area **where conventional communications are not available** (or do it just for fun !)

Winlink2000

Winlink - www.winlink.org

- **Features**
  - **Integrated with internet email system, can send (small) attachments for photos and documents**
  - **Redundant network utilizing both radio and internet connectivity. Secure and has Spam control**
  - **Based on SMTP E-mail (i.e., familiar to most users)**
  - **Modest equipment requirements for radio access – radio, computer, interface, MS Outlook Express and Paclink, or RMS Express or Airmail (RMS Express recommended)**
  - **Most emergency agencies rely on email for information transfer**
  - **Position reporting, information/weather bulletins on request, etc.**
  - **Has proven effective for emergency communications (e.g., hurricane Katrina aftermath)**

Client Software Example: RMS Express



A Typical WINLINK 2000 *HF FIELD STATION*

You will need the following equipment:

- Amateur Radio High Frequency (HF) Transceiver.
- Pactor capable modem: Pactor 2 @ 800 bps. Pactor 3 @ 3600 bps. Pactor 4 @ 7200 bps **Or now the WINMOR Sound Card Virtual TNC**
- VHF and/or HF multi-band (mobile/portable) antenna, and (perhaps) an auto-coupler.
- Power source.
- Laptop Computer (Windows 7 or 8 recommended) and RMS Express.

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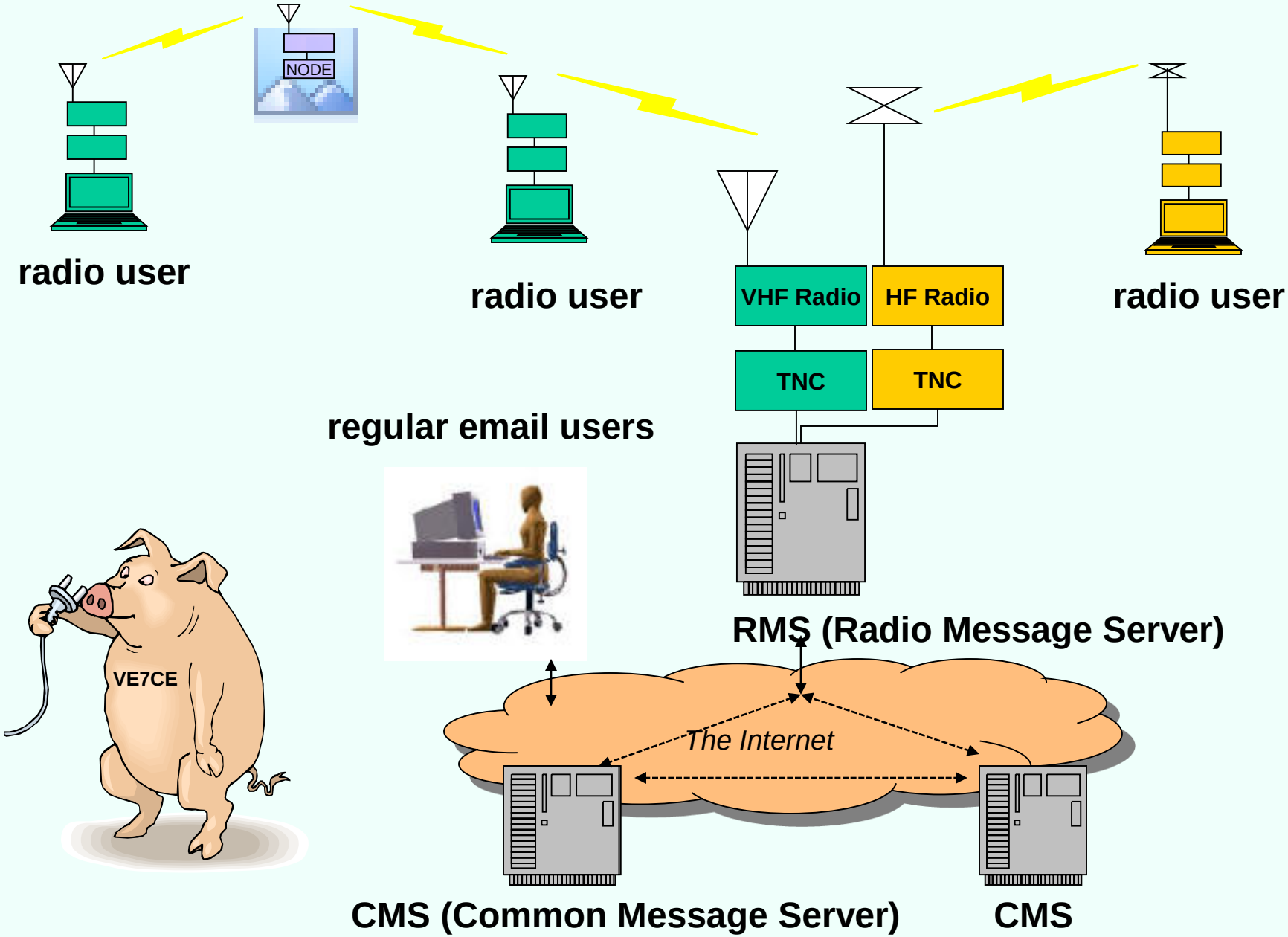

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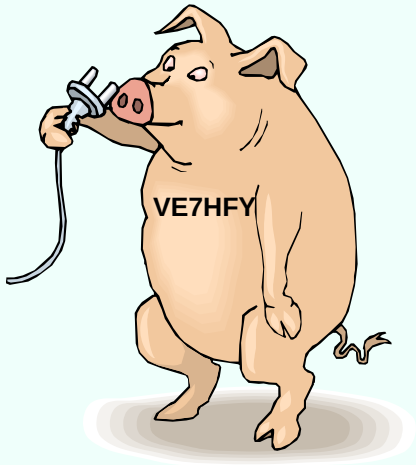
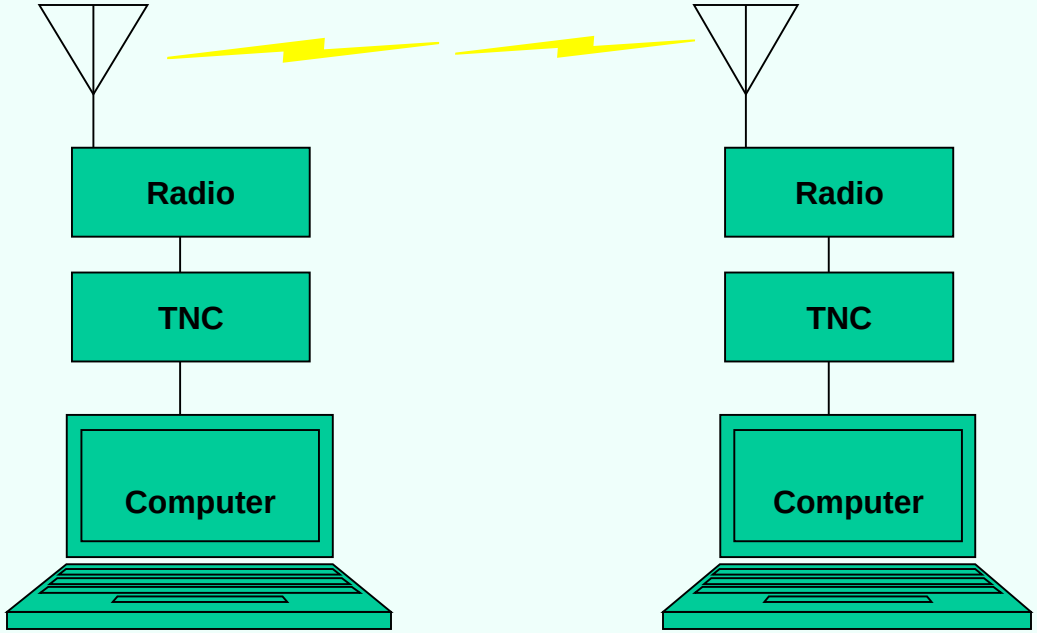
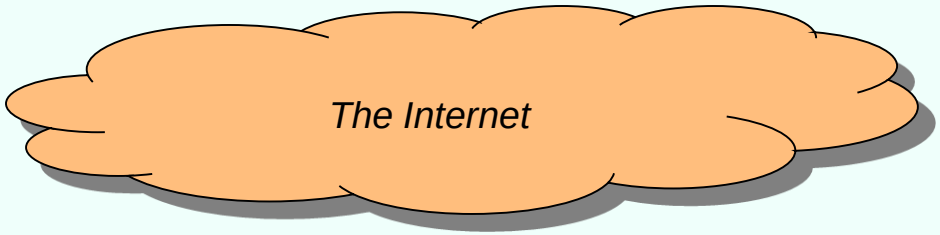
“Peer to Peer” (P2P)

And you can send radio e-mail directly to other Paclink, Airmail, RMS Express stations like yours (no internet).







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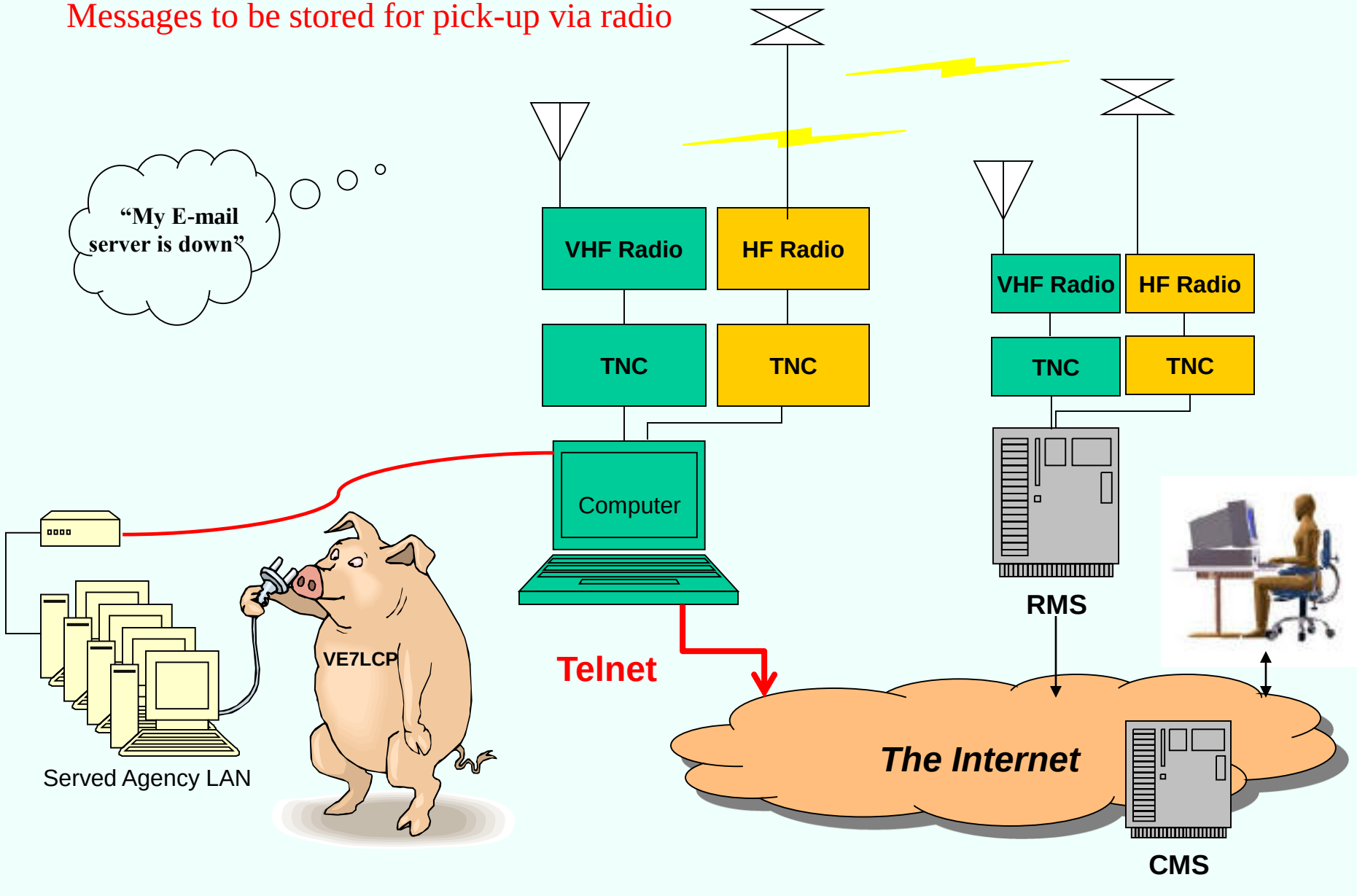
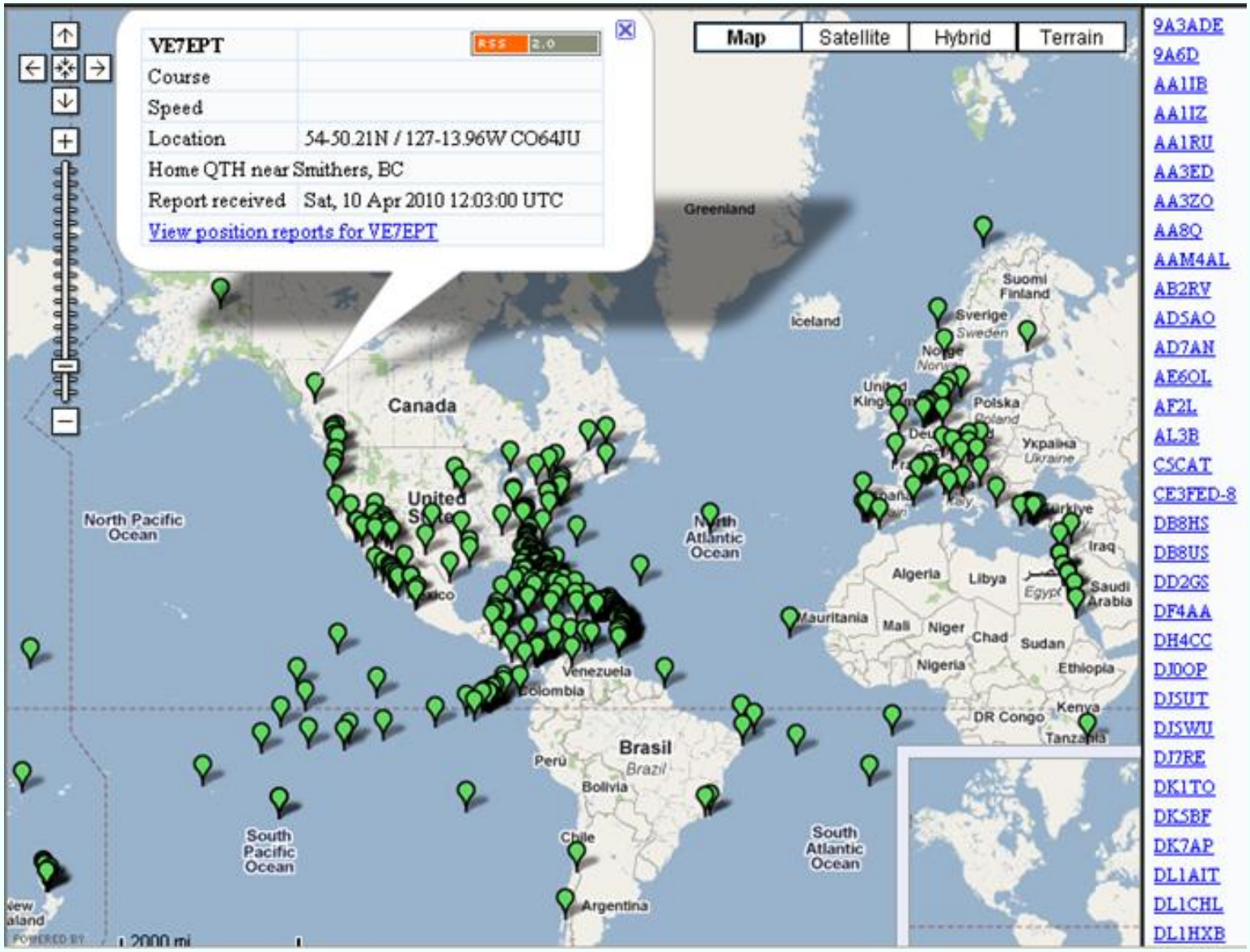
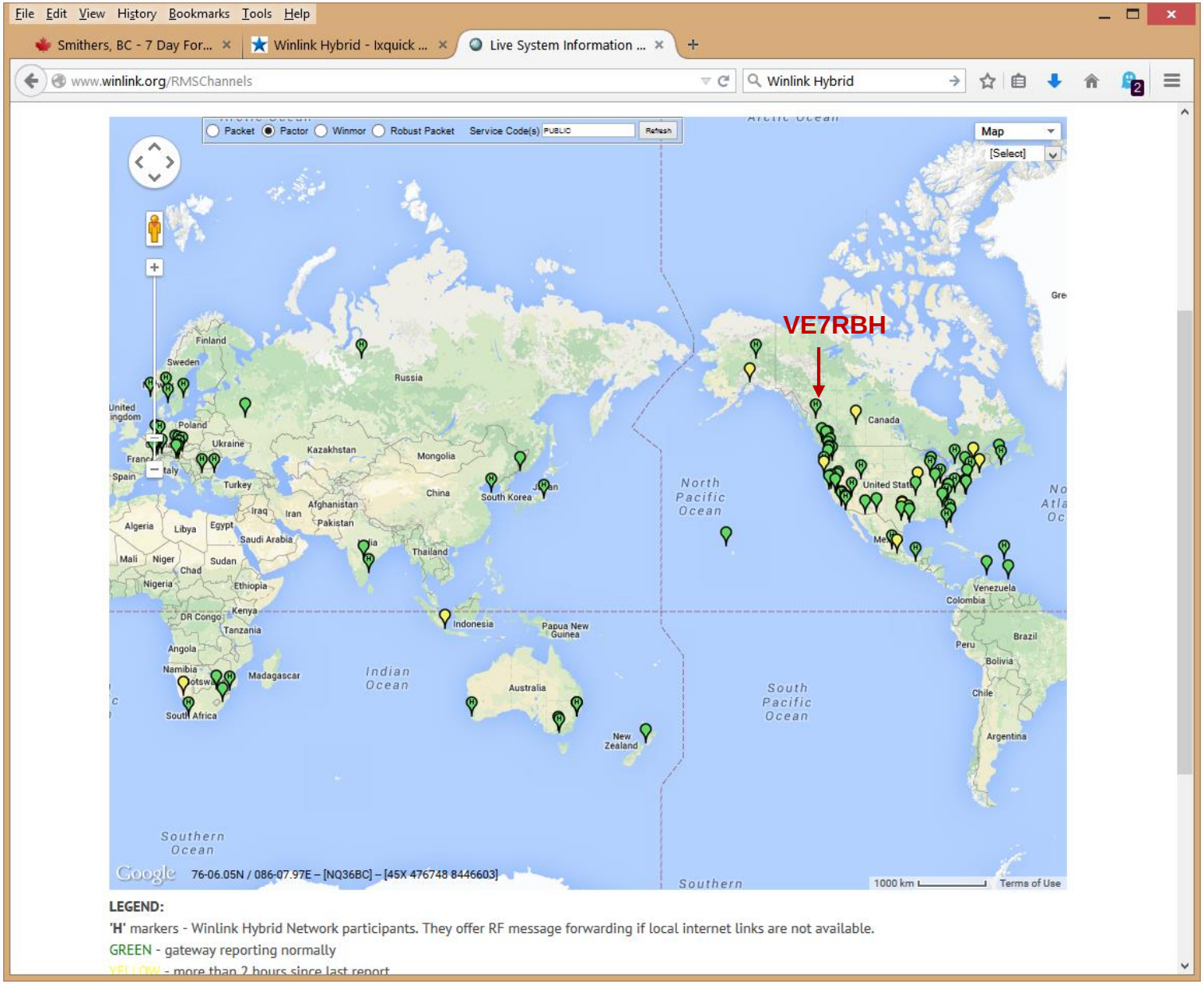
´Hybrid´ RMS stations will relay traffic to another RMS if internet is lost, or allow Messages to be stored for pick-up via radio



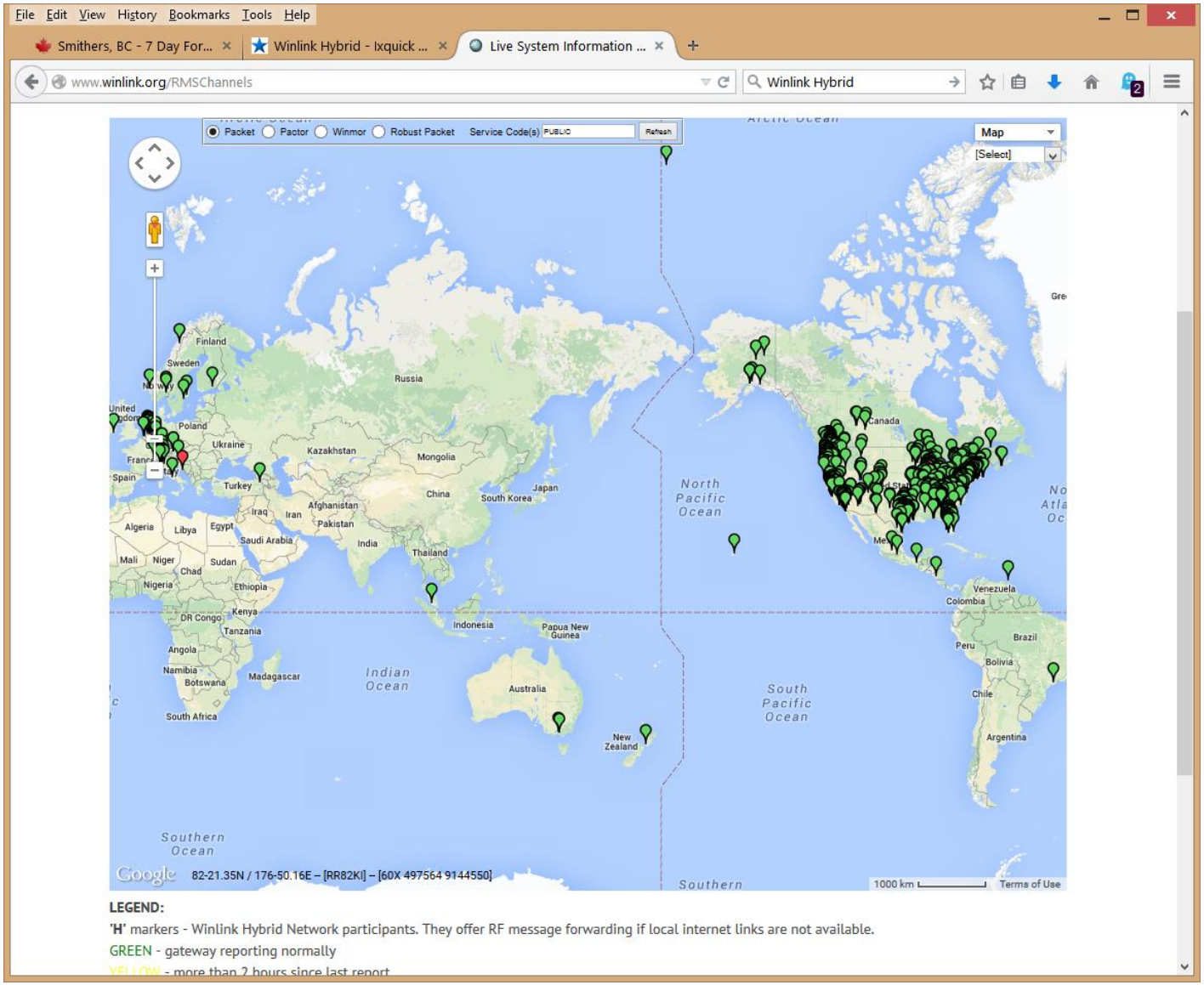
Position Reports



HF PACTOR RMS Locations



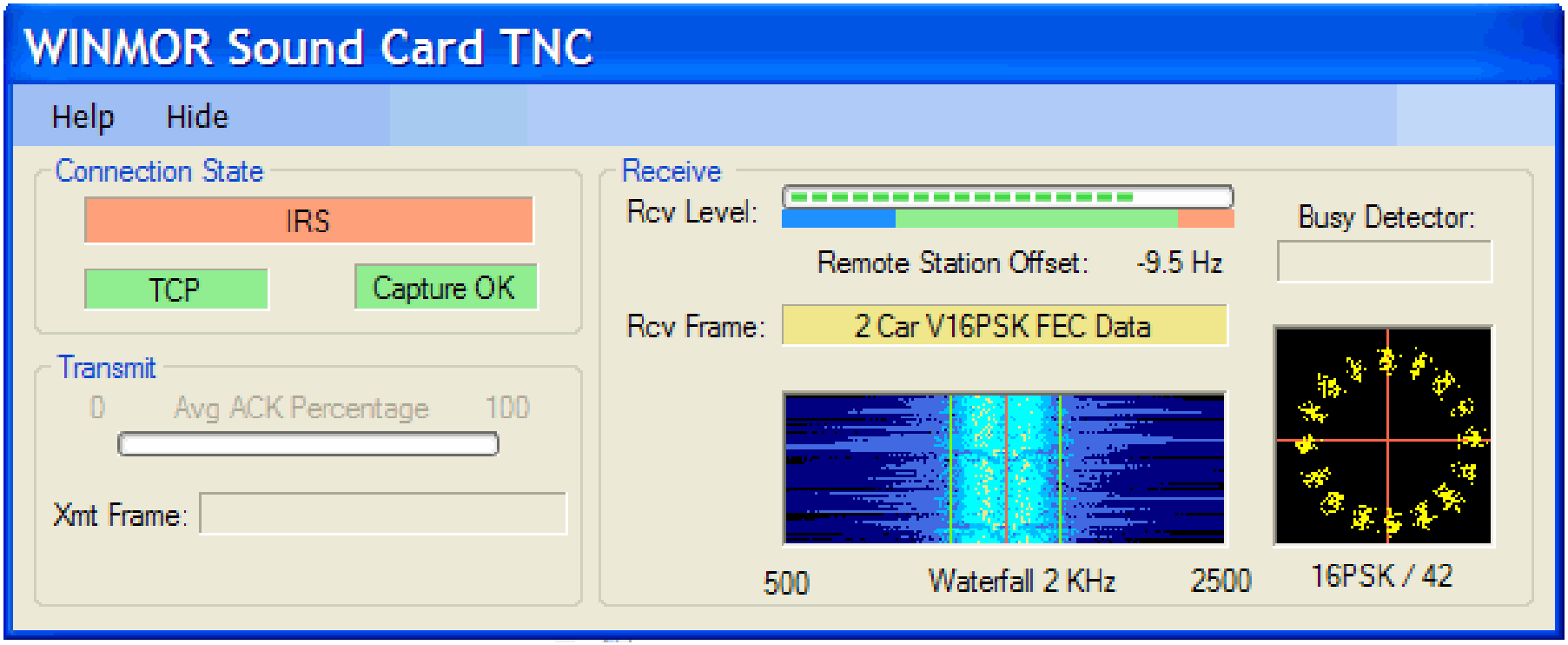
VHF/UHF RMS locations



New HF Mode: WINMOR

VIRTUAL HF MODEM (TNC) Using PC Sound Card

Low cost alternative to PACTOR



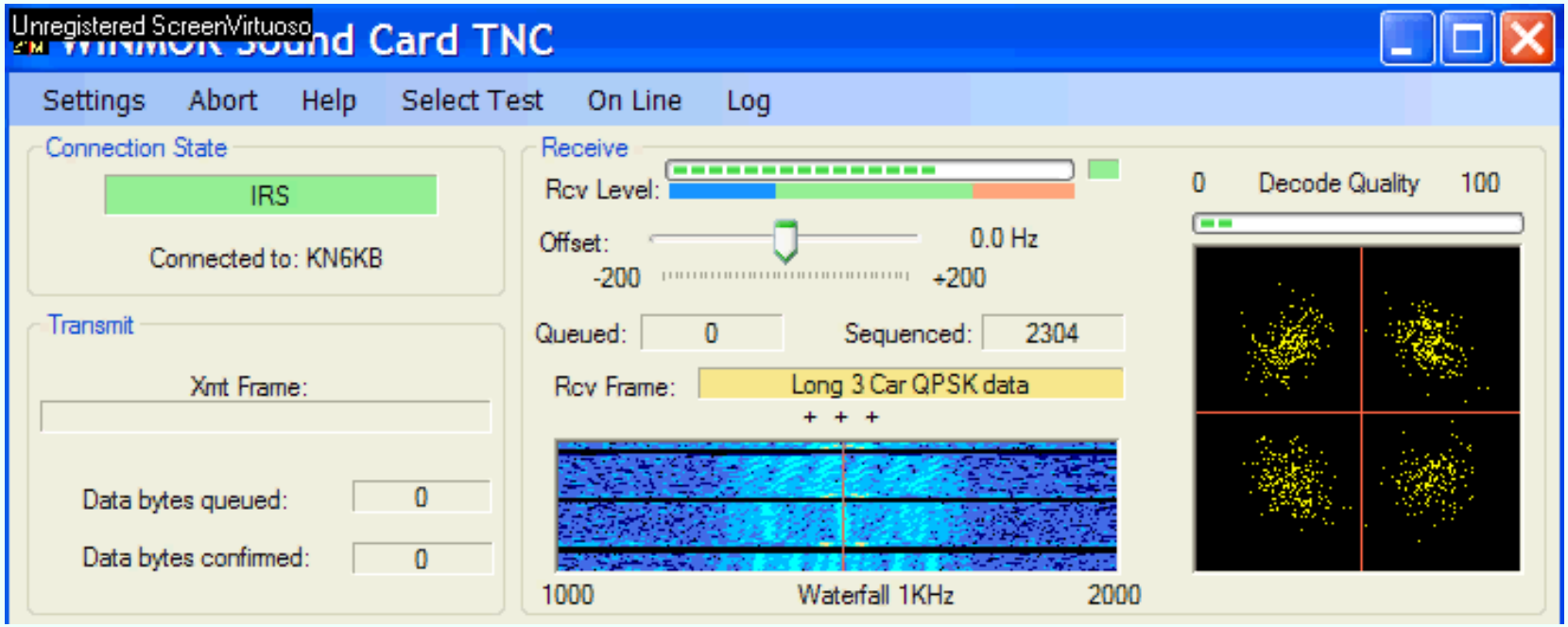
Requirements for a Message Oriented HF Sound Card Protocol

Absolute Requirements

- Standard SSB Radio hardware
- Automatic connections (no manual tuning)
- Error-free transmission/confirmation
- Fast lock for reasonable ARQ cycles
- Auto adapt to wide range of HF channels
- Support true binary with compression
- “Loose” ARQ timing to accommodate
- OS and sound card latency.
- All packets tagged with session ID

Desirable (and achieved !)

- Modest OS and CPU demands
-500Hz, 1600Hz bandwidths
- Adjusts throughput to conditions
- Compatible with most sound cards
- Good bits/sec/Hz (>.5 target)
- Efficient Mod/Demod for low latency
- Selective ARQ and Memory ARQ for throughput & robustness
- Near Pactor ARQ efficiency (70%)
- Effective busy channel detection


Unregistered ScreenVirtuoso
Card TNC
Settings
Abort
Help
Select Test
On Line
Log
Connection State
IRS
Connected to: KN6KB
Transmit
Xmt Frame:
Data bytes queued:
0
Data bytes confirmed:
0
Receive
Rcv Level:
Offset:
0.0 Hz
-200
+200
Queued:
0
Sequenced:
2304
Rcv Frame:
Long 3 Car QPSK data
1000
Waterfall 1KHz
2000
0
Decode Quality
100

That's All ! 73's……