Amateur Radio on Board

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Local Communications

- **Marine VHF** – 25 watt power limit
  - Not to be used ashore
- **CB** - 4 watt limit / 40 channels
  - Overrun with illegal high power stations
- **FRS** - ½ watt power limit / 14 channels
  - Limited range and can be very crowded
- **GMRS** - 5 watt limit / 23 channels
  - Requires $75 license

Long-Distance Communications

- ## Cellular Phone – ½ watt limit
  - Limited coverage and support outside US
  - Roaming charges can be huge (internationally)
  - May support data

- ## Satellite – International coverage
  - Expensive (large) equipment and connect charges
  - Allows data transmissions for additional $$$

- ## Marine HF SSB – International coverage
  - Requires $155 station license and $55 operator license
  - Supports Sailmail at $250 per year

Why Amateur Radio?

- Reliable, versatile communications
- Low cost
- Several technologies of interest
  - HF SSB – Long distance voice
  - HTs - High power portable radios
  - Autopatch – Telephone connectivity
  - IRLP/Echolink – Voice repeaters connected via the Internet
  - APRS – Amateur Position Reporting System
  - Winlink – Email via HF/VHF
  - D-STAR – Digital voice and data

Amateur HF SSB

- More spectrum/bands available
- More power – 1500 watts!
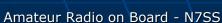- Most nets on amateur frequencies
- Voice and data modes

Verticals vs. NVIS

- Vertical antennas provide low angle radiation to maximize distance
- Near Vertical Incident Skywave (NVIS) is high angle providing regional coverage (about 500 miles)
- Backstay and whip antennas are vertical
- NVIS antennas are generally low dipoles
  - Hamstick dipoles
  - Buddipole

160m ¼ Wave DX Vertical 137' Tall

Amateur HTs

- Up to 7 watts available
- 100s of "channels" on several bands
- Repeaters extend range
- Better antennas available
- Can be used anywhere
- Repeater-based nets

Amateur Autopatch

- Adds access to phone lines
- Must "subscribe" to repeater
- Generally inexpensive $15-$50 per year
- No business messages
- 911 available on most machines without membership
- http://www.k7pp.com/
  - 147.200MHz

IRLP / Echolink

- Links repeaters via the Internet
- Allows "worldwide" coverage on VHF
- Thousands of nodes available
- Echolink allows connecting via computer directly – no radio required
- More information at
  - http://www.echolink.org/
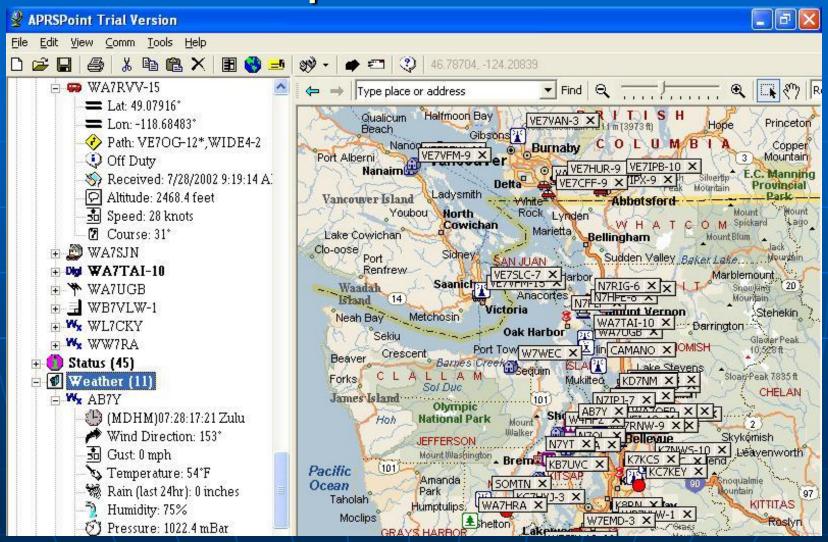 - http://www.irlp.net/

Automatic Position Reporting System (APRS)

- Similar to AIS
- Beacons position every few minutes
- Allows status text ("Off to Nanaimo")
- Supports outbound 1-liner Emails
- NWS weather warnings
- Location available via radio or Internet almost instantaneously
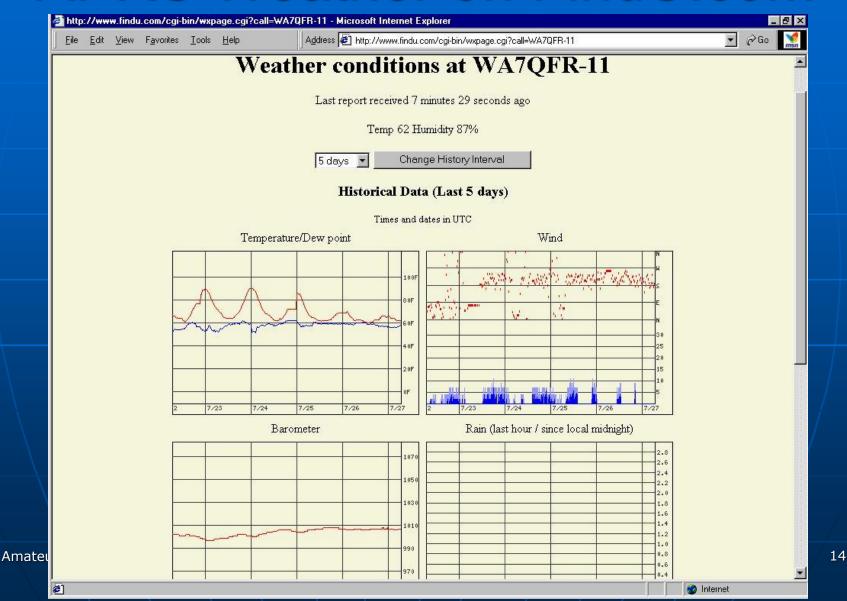 - http://map.findu.com/*callsign*

APRS Continued

- Real-time weather from local stations
- Supported on multiple computer platforms
- Available via satellite/ISS and HF
- More information at
  - http://www.aprs.org
  - http://nwaprs.info
  - http://web.ew.usna.edu/~bruninga/pcsat.html

APRS Map from APRSPoint

APRS Weather on FindU.com

APRS Trackers

- Simple transmit-only "trackers"
- Hook to any radio
  - Open Tracker – Argent Data Systems
    - http://www.argentdata.com/products/aprs.html
  - Tiny Trak 3 - Byonics
    - http://www.byonics.com/tinytrak/
- Integrated Radio
  - MicroTrak – Byonics
    - http://www.byonics.com/microtrak/

Winlink 2000

- Designed as HF Email system for boaters
- Similar to subscription Sailmail service
- Longer daily transmission time-limit than Sailmail
- No service fees required but no business traffic allowed
- Includes APRS-style position reporting
- Downloadable "bulletins" with weather, news, instructions, piracy information, etc.
- Worldwide coverage

Winlink 2000 Mailbox Nodes

Winlink 2000 - Continued

- Uses Airmail Email client software or pipe messages to Outlook/Outlook Express
- Can also be used with dial-up or direct Internet connection in port
- Allows binary attachments
- Best performance requires SCS radio modem at nearly $1000

Winlink Station

Digital voice and data = DSTAR

- Digital Smart Technology for Amateur Radio
- Joint venture between Japanese government and Japanese Amateur Radio League (JARL)
- Open specification
- Icom is the only current vendor although Kenwood announced products coming
- Radio products all offer analog mode for backward compatibility

D-STAR Features

- Radio knows your callsign
- Your callsign appears on other radios when receiving
- Can enter other callsign for "callsign squelch"
- Voice can be sent through repeater or routed through a gateway via RF or the Internet
- DSTAR users are registered with local repeaters for cellular-like service
- DPRS position reports and messages like APRS
- Emergency mode

Emergency Communications

- Aircraft Radios (121.5 MHz)
  - Monitored by aircraft and satellites
- EPIRBs (406/121.5 Mhz)
- VHF Channel 16 (Channel 70 with DSC)
- HF SSB 2182kHz
- Amateur Radio
  - "Multimode" rigs – very versatile
  - APRS – Emergency mode can send position
  - Autopatch allows 911 access

We'll be listening for you…