# Introduction to APRS

Brian Wingate

ZS6/NB7KW

Automated Packet Reporting System

- Two-way tactical real-time digital communications system

- Intended use is sharing information about everything going on in the local area

- Ultimate goal: events and valuable information should show up on your APRS radio

- Callsign-to-callsign messaging, bulletins, objects, email, and a gateway to the Internet
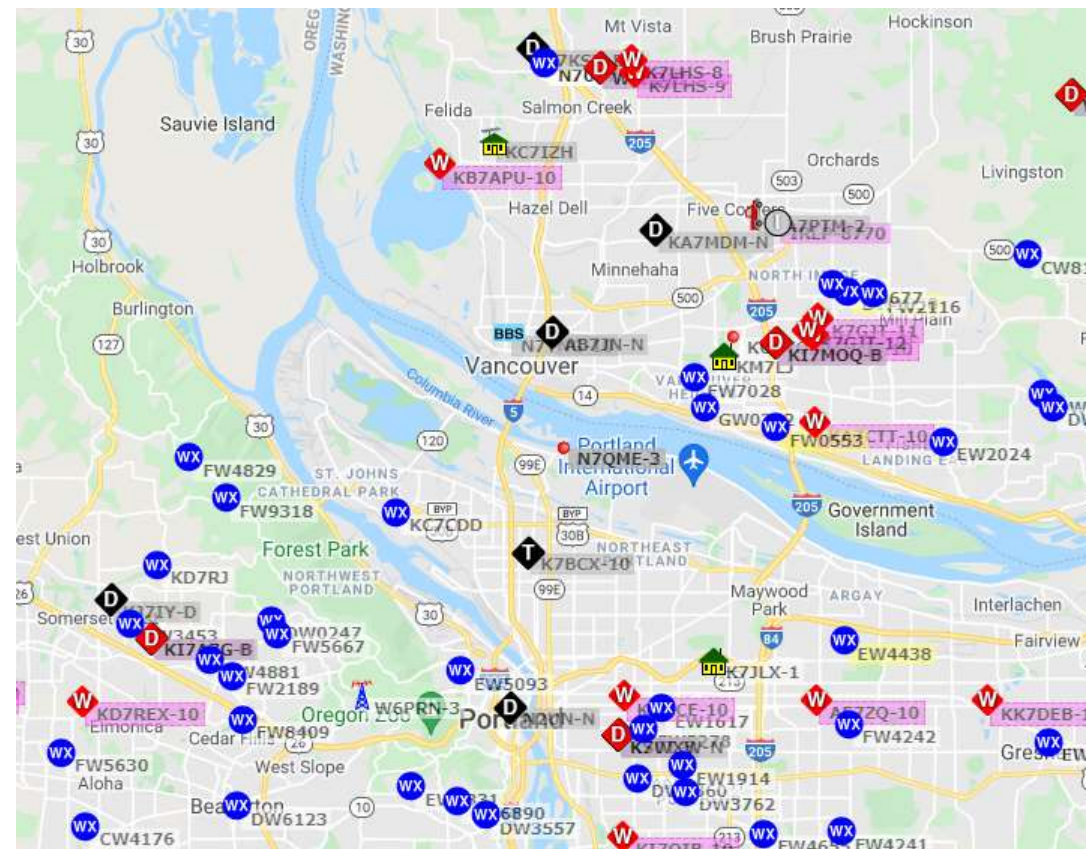
Brief History of APRS

- Bob Bruninga, WB4APR, former professor at the US Naval Academy
- 1982 – developed to track HF reports from US Navy assets
- First amateur use 1984 – tracking horses in 160 km race
- Integrated GPS technology in 1990s to report position data

- Bruninga's intent was two-way local information exchange
- Viability of network achieved in USA in early-2000s when:
  - National frequency widely accepted – 144.39 MHz
  - Major radio manufacturers produced purpose-built radios

How APRS Works

- AX.25 Packet radio-based @ 1200bps

- APRS operates as unconnected packet transmissions (UNPROTO)

- Unconnected means:
  - packet is transmitted without the expectation that it will be received by another station

- UNPROTO routing data:
  - ZS6WIN, ZS6HI-7, ZS6BKW-11

APRS Path Protocols

- Typical APRS routing packet:
  - WIDE, WIDE1-1

- Called the New-N Paradigm
  - Digipeater callsign substitutes WIDE when packet is retransmitted
  - WIDE1-1 or WIDE2-2 – numbers decremented until no generic WIDE routing data left, ending retransmission.
  - Call sign substitution prevents retransmission of same packet by many stations

APRS Internet Gates

- iGate listens to APRS network connects to internet
- Can be receive only or bi-directional
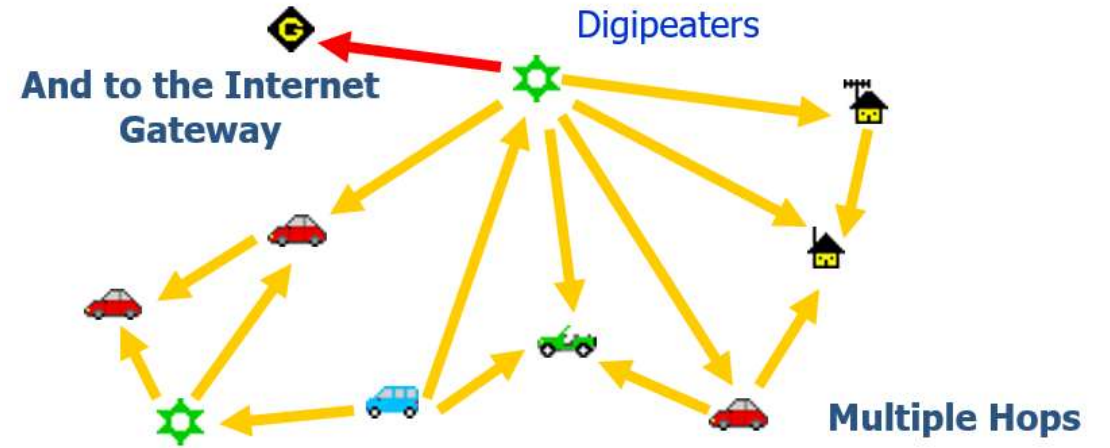
Types of data on APRS

- 10 Main Types
  - Position
  - Direction Finding
  - Objects and Items
  - Weather
  - Telemetry
  - Messages, Bulletins, and Announcements
  - Queries
  - Responses
  - Status

- Objects & Items – tell network:
  - Name
  - Time of transmission
  - Lat/Long location
  - Course/Speed
  - A codified symbol showing nature of object
- Position communicates all of the above with NEMA GPS coordinate

Scope of APRS

- Tens of thousands of worldwide users
- Goal is for digipeaters every 32 to 48 km
- Linked by iGate stations

- Use objects, items, positions, and bulletins to communicate useful data to all on network
  - Time of the weekly net
  - Location of the swap meet
  - Weather conditions
  - Road conditions

APRS Two-way Messaging and Info Services

- RF direct or RF – Internet – RF links callsign to callsign
- Short emails
- WinLink email system
- Chat groups via ANSRVR
- SMS (in some regions)

- Weather forecasts WXYO
- QRZ lookups
- Position, distance, approach alarm for selected callsigns
- Tweet
- ISS or AMSAT pass information based on location

Needed equipment

- Basic:
  - Smartphone w/ APRS Droid
  - APRS audio cable
  - HT

- Intermediate:
  - Smartphone w/APRS Droid
  - Mobilnkd Bluetooth TNC3
  - HT/mobile/base station

- Advanced:
  - TNC – PC – iGate software – GPS

- Many APRS capable radios out of the box:
  - Yaesu FTM-400XDR
  - AnyTone 878VUIIPlus
  - Yaesu FT5DR

Voice Alert

- Enables APRS equipped stations to know when another station is near without the use of a computer or smartphone
- Mobile stations or home stations with operator present transmit CTSS encoded packets
- Enable CTSS decode for receiving

- Squelch opens when proper CTCSS tone is received
- The sound of this packet alerts operators to proximity of another ham
- Allows for brief voice contact on APRS frequency to QSY for a QSO.

HF APRS with JS8Call

- Overcomes the weaknesses of HF packet APRS with robust FT8
- Excellent use case for remote stations or mobiles who travel into the bush

- Requires a small computer, a soundcard interface, and an HF rig

Questions