dc713 Amateur Radio and SDR

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Outline

Introduction - Background

- Software developer
  - 17+ years professionally
  - 30+ otherwise
  - Security software
  - Design and implement secure APIs
- IT Background
  - Boeing Aerospace Operations
  - ISP (dial-up land)
  - Consulting

- Software Development
  - PentaSafe Technologies
  - NetIQ
  - TheAnimenetwork.com
  - BRS Labs
- CISSP 2005+
- BSD user
- Amateur radio enthusiast

What is Amateur Radio?

- Radio service operated by amateurs, *i.e.* non-professional
  - Not for monetary gain
  - Typically a real person
  - Clubs can organize for amateurs to work together
- Amateur Radio Service
- Established by the International Telecommunications Union
- Regulated by international agreement
  - Regulations implemented through harmonizing of laws by national governments
- Three regions:
  - Region 1 (Europe, Middle East, CIS, Africa)
  - Region 2 (Americas)
  - Region 3 (South and East Asia, Pacific Ocean)

When Did Amateur Radio Start?

- Officially, early 1900s
- However, amateurs have operated since the beginning

Why "Ham"?

- Believed to have begun as pejorative because amateurs were "ham fisted" on their key (Morse Code)
- Adopted by amateurs as badge of honor

Notable Accomplishments by Amateur Radio

- One of the oldest radio associations in the world, American Radio Relay League (ARRL)
  - Begun in 1914 by Hiram Percy Maxim
- Numerous satellite launches
- Led development of packet radio
- Long-distance transmitting around the world using various
  - Skip propagation
  - Moonbounce (Earth-Moon-Earth EME)
  - Meteor scatter
- Development of Slow-Scan and Fast-Scan Television
  - Shortwave radio equipment to send television images using normal voice bandwidth

A Few Radio Notes

- Mhz vs wavelength

Privileges – What Can a Ham Do?

- Transmit in numerous bands
  - Depends on license class
- Transmit using various modes of communication
  - Voice
  - Image
  - Text and Data
    - Continuous Wave (CW) – Morse Code
    - Packet Radio
    - Phase-Shift Keying
    - Spread Spectrum
    - Digital
- Operate stations in other countries
  - If reciprocal licensing in place
  - Limited by country laws, not US

- 3 License classes in US:
    - Technician
    - General
    - Amateur Extra
- Technician
    - 35-multiple-guess-question exam
    - No Morse code required
    - Voice privileges
    - Various modes allowed
    - Limited in high-frequency bands
- General
    - 35-multiple-guess-question exam
    - All privileges of Technician
    - Access to 83% of all amateur HF bands
- Amateur Extra
    - 50-multiple-guess-question exam
    - All privileges allowed to amateurs
- License good for 10 years

- Renewal fee, no additional testing

Hardware – What Do I Need?

- Technically, nothing. . . but that's no fun
- A receiver, better than nothing, but still no fun
- A transceiver. . . ahh
  - A handy talkie like the BaoFeng
  - A mobile rig – not (!!!!) a CB
  - A portable rig
  - A beast
- Handy Talkies
  - Battery powered
  - Typically 1 to 3 bands (70 cm, 2 m, 6 m)
  - 1 to 5 watts
  - 100 or so memories
  - DTMF keypad

Hardware Other

- Antenna
- Antenna tuner
- Computer
- Sky's the limit

SDR

- Software-Defined Radio
- Replaces purpose-specific circuits with general purpose computing and software algorithms

Getting Started

- Shoot for Technician class license first
  - Learn some basic electronics
  - Learn how to use Ohm's Law
  - Memorize some band-plan information
- Get a study guide
  - ARRL books very good helpful
  - Numerous online resources
  - http://hamexam.org

Once You Pass

- Get an inexpensive radio
  - No easier way to lose interest than to not have a radio
  - BaoFeng handy talkies are cheap (~$35.00 on Amazon)
- Look for a club
- Join ARRL
  - QST Magazine has tons of info and articles

SDR

- Get an RTL SDR
    - About $20.00
- Get a HackRF, BladeRF or AirSpy
- Get the software
    - rtl-sdr
    - gqrx
    - GNU Radio

Questions

- Questions - You have them, I may have answers

Contact Details

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Ham Radio Clubs and License Info

- FCC
- ARRL
- ARRL Club Finder
- Gordon West
- HamExam
- QST

Radio Gear

- BaoFeng
- Houston Amateur Radio Supply
- Icom
- Kenwood
- Motorola
- Yaesu

SDR People and Resources

- rtl-sdr
- Great Scott Gadgets
  - Michael Ossmann
  - HackRF
  - YardStick
- BladeRF
- AirSpy

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