Amateur Radio and SDR

BSDCan – BOF

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Outline

Introduction - Background

- Software developer
  - 19+ years professionally
  - 30+ otherwise
  - Security software
  - Design and implement secure APIs
- IT Background
  - Boeing Aerospace Operations
  - ISP (dial-up land)
  - Consulting
- Software Development
  - ExxonMobil
  - BRS Labs/Giant Gray
  - TheAnimeNetwork.com
  - NetIQ
  - PentaSafe Technologies
- CISSP 2005+
- BSD user
- Amateur radio enthusiast

Introduction - Background Radio

- First ham license, Novice in late 70s
  - 5 wpm CW (w00t!)
- Technician at DefCon22
- General Class 2 weeks later
- Working on Amateur Extra

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

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

Privileges – What Can a (US) Ham Do?

- Build and use unlicensed equipment
  - Within regulation
  - It's the operator who's licensed in amateur, not the equipment!!!
- Help license other hams!
  - Volunteer Examiner
- Help enforce FCC regulations and volunteer band plans

Getting a US License

- 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

Getting a US License

- License good for 10 years
  - Renewal fee, no additional testing

Getting a License in Other Countries

- [Audience participation]
- Canada
  - RAC - Radio Amateurs of/du Canada
- France
- Germany
- UK
- Other

Getting Started in the US

- 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

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

What is SDR?

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

SDR - What Do I Need?

- Get an RTL SDR
  - About $20.00
- Get a HackRF, BladeRF or AirSpy
  - (US)$150 - (US)$650
- Get the software
  - rtl-sdr
  - fldigi
  - gqrx
  - GNU Radio

State of SDR on BSD: OpenBSD

- fldigi
- rtl-sdr (v 0.20130412) <- very old version
  - Newer version requires USB async
- Why so few, *i.e.*, what's the limiting factor?
  - Lack of software (GNU Radio, gqrx)
  - Principal reason: No USB async
  - In work

State of SDR on BSD: FreeBSD

- [Audience participation]

State of SDR on BSD: NetBSD

- [Audience participation]

Conclusion

- Questions - You have them, I may have answers

Support OpenBSD

- Support OpenBSD
- `http://www.openbsdfoundation.org/`

Contact Details

- Aaron Poffenberger
- akp@hypernote.com
- `http://akpoff.com`
- @akpoff
- This presentation, look for blog post on `http://akpoff.com`
- KG5DQJ

Ham Radio Clubs and License Info - US

(Links – Click to follow)

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

Ham Radio Clubs and License Info - Canada

(Links – Click to follow)

- Government of/du Canada
- Canada Ham FAQ
- RAC - Radio Amateurs of/du Canada

Radio Gear

- BaoFeng
- Icom
- Kenwood
- Motorola
- Yaesu

SDR People and Resources

(Links – Click to follow)

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