Dynamics of the Future of Amateur Radio (AR)

- Background
  - AR is 100+ years old
  - Is it time to retire?
- AR in the past
  - CW->AM->SSB->FM->Video->Digital->EME->Advanced studies (E.g. propagation and earth sciences)
  - Build our own equipment (Receivers/Transmitters, etc)
- Continue from last weeks talk…

- Goals – Why do we have AR?
  - Pushing radio art forward
    - Along with other related disciplines
  - STEM (Science, Technology, Engineering and Mathematics)
  - Comms development & support
  - Emergency Communications
  - Volunteerism

Why…So what of this presentation is that hopefully by talking About where the hobby fits in our lives, it will cause us to think about how to improve the hobby

Factors affecting the future of AR

- Hobby represents many disciplines, but the focus is on radio
- Each discipline has its own space (marketing term)
- AR Operator come from all walks of life
- Very diverse hobby

- To try to understand how AR fits, review from the following perspectives
  - Technology
  - Policy & Regulation
  - Economics
  - Societal Evolution

Technology

- Further merging of programming, computers and hardware
- Programming (assembler, Fortran, C, Java & Python)
  - Linux (UNIX)
  - Windows
- Single board computers
  - Raspberry Pi
  - Arduino
- Smart phones, desktops laptops & handhelds
- Receivers/Transmitters/Transceivers
  - More & more circuits developed in software
  - More features
  - Greater performance
  - Smaller & portable
- Circuit changes
  - Silicon improvements
  - Digital circuits
  - Power supply improvements
- Microwave occupancy more pervasive

Regulation & Policy

- Spectrum
  - WW demand
  - World Radio Conference (WRC) 300+ countries USA has 1 vote
    - US hams as a percentage of hams in the world is decreasing
  - Demand for spectrum
    - AR needs to continue to justify
      - Commercial interests going after GPS/gov't freq.
      - Microwave frequencies
- Internet of Things/5G
  - What does this have to do with AR?
  - 5G & IoT are in their infancy
    - A lot of money behind it.
  - Major Vendors
    - Carriers – Vz, T & T-Mobile
    - Suppliers – Qualcomm, Ericssion, Nokia
    - How many AR vendors on that list?
- Covenants
  - Antenna relief 3 paragraph piece of legislation – STALLED!
- Policy
  - Encryption
  - Emergency support

Economics

- For investment, a profit motive is needed
- More adaptation of existing electronic equipment (Consumer and specialized)
  - DMR adapted to AR
  - Wifi repeater with high gain antennas
- Standards are needed
  - not the wild west
    - ICOM DSTAR
    - Yaesu Fusion
    - DMR European
- Cost of AR equipment
  - Downward push on prices
    - Useable across the entire spectrum
- Need a healthy hobby to have healthy economics

Societal Evolution Impact

- Social Norms
  - Only thing that has been constant over my lifetime is CHANGE
  - Dramatic changes in AR over time
  - My perspective may or may not be correct…
  - AR has changed with the environment, but not as fast in many cases
- People impact
  - Older generation
    - Need to know the basics
    - Flux soldering hand tools etc
    - Knowing computer architecture and circuit knowledge
      - Ex: shift registers, half adders, hartley oscillators. amplifier classes
  - Younger generation
    - Higher level not component level
    - Program, comfortable with software & current technology
  - Just like society we need everybody

Young hams (defined as new hams) aren't just the future they are the NOW of the hobby!

Surprises

- No one right answer
  - Problems solved from many perspectives
- Amazed at innovation and resourcefulness
  - Using wifi equipment for broadband ham networks
  - 122 Ghz transceiver (QEX article)
- Astonished by advanced work achieved without lengthy study for understanding and preparation
  - Some of the recently developed software and utilizing computers as test equipment
- See continued evolution from open source and modular projects that can lead to revolutionary ideas
  - GNU, Raspberry Pi and AR apps

Conclusion

- What is the so what of all of this?
- Future – Don’t know
- Guesses
  - Ham apps on smart phones
  - More remote access to devices
  - IoT will impact ham radio
  - Software will continue to replace discrete circuits.
    - SDR is only the beginning
  - Single board computers will morph to play a larger role in ham radio
  - Digital will continue to pervasive
    - DMR, Fusion & DSTAR
  - More utilization of microwave frequencies
  - Video will become MUCH more commonplace