WHAT COULD THE NEXT GENERATION OF HAM TRANSCEIVERS BE LIKE?

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September 2007

This article is an attempt to identify the features of my dream ham transceiver. The technology involved is mostly available now or is "just around the corner". A black box connected to a PC can be a ham transceiver and certainly the performance of such SDR radios is excellent, but my perfect transceiver will certainly have a front panel, with buttons and switches and a well-balanced tuning knob. I like the feeling of pushing the buttons and knowing what they do and of tuning across the band and discovering the signals out there, so for me a transceiver can't just be a display on a PC screen. <That said I have now purchased a Flex-1500 SDR transceiver… and it is great>

DC to Daylight: I believe that the next generation transceivers should be modular, not all in one box on the desk of your shack. The box on your desk will be a control head, like the removable face on a car stereo or a mobile rig. The control head will include the front panel controls, tuning, memories, display, DSP filtering, modulator, demodulator, Ethernet, PC & soundcard interfaces and audio stages. It will talk to the RF module(s) via data cable, fibre optic cable or wireless "Bluetooth" technologies. You will be able to buy separate RF modules for all of the bands you are interested in; HF, VHF, UHF and Microwave. The RF modules will be located at the base of your antenna mast to minimise coax feeder loss. The HF module would have an automatic antenna tuner and an output power of at least 1kW PEP or 500W AM/CW (by this the time this transceiver is on the market this power will hopefully be legal in New Zealand). <NZ limit has now been raised to 1kW>. The HF receiver will have direct conversion to digital at the front end, no mixers or local oscillator. All of the VHF, UHF and SHF modules will be designed for masthead mounting and will have low noise amplifiers for EME, low signal and satellite operation. Use of separate modules each connected to their own antennas or combined via duplexers, will allow simultaneous operation on multiple bands, improved receiver noise figure and eliminates coax losses.

Remote Operation: As each RF module will be controlled via Ethernet connection, it will be a simple matter to arrange for your transceiver to be controlled remotely. Just connect all of your RF modules to an Ethernet switch and plug it into to your Broadband router. Then you can take the control head away on holiday or business and use your home station from an Internet connection anywhere in the world. You could use software on your PC instead of the control head. Of course a password would be required before you could connect to your rig. This may sound far-fetched but there are already receivers and transceivers, which can be controlled over the Internet. The latest Ten-Tec transceiver has an Ethernet port for direct connection to a Broadband Internet connection for remote operation, so this technology is definitely available today. Remote operation could just mean operating from inside your house instead of going out to a cold shack in the middle of winter.

So my dream transceiver will work all of the bands I want, and will offer great VHF and UHF performance as the transmitter and receiver are connected directly to the antennas, there will be lots of power on HF with an automatic antenna tuner built in. Also I can operate the station remotely from anywhere in the world, so what else do I want? The answer is functionality and performance. I want the transceiver to be able to work on any mode and I want to be able to upgrade to try out new modulation methods, DSP filtering and display modes as they are developed. The rig must have world class performance and be easily upgradeable to take advantage of advancements.

Functionality:

- DSP filtering, full adjustable bandwidth, shape control, remembers settings for each band segment.
- DSP auto-notch filtering
- DSP manual notch filtering
- Digital Modes PSK-31, RTTY, MFSK16 plus CW, SSB, FM
- Audio i/o for soundcard modes
- PC mouse, keyboard & monitor connections
- I/Q output for external SDR software
- USB connection to PC
- Ethernet connection to Internet

- Dual receive in-band, to monitor transmit and split frequencies at the same time, or listen out on a sked frequency while working another station.
- Both HF receivers to have the same performance, DSP filtering etc.
- At least one HF receiver to be selectable to cover wide band or ham bands only
- Scan repeaters or memory banks on several bands at once
- Intelligent squelch mode: open squelch on CQ or call for my station but not other QSOs
- Digital modes on board – download new digital modes
- Colour display of waterfall & filter shapes, frequencies, spectrum display, band scope, settings & performance, which can also be displayed on external monitor.
- Antenna rotator control (several antennas)
- Download new firmware from manufacturer or even 3rd party software
- Banks of memories with alpha tags.
- Full duplex operation on VHF, UHF & microwave modules for Satellite operation.
- Cross band repeat for operation of rig via handheld transceiver
- HF modules with 100W and 1kW PEP and internal automatic antenna tuner
- VHF and UHF modules 100W PEP or 50W FM
- L band SHF module 35W
- Microwave modules 5 – 10W

One of the big advantages of a software-defined radio (SDR) is that if someone develops a new way of creating modulation, better filters, or a better noise reduction system, they can be up-loaded from the Internet onto the transceiver. The software running on the dream transceiver may not even be written by the manufacturer. You could store different profiles of DSP settings and filters so that your rig could be a SSB contest rig one-day and the next could be reconfigured as a CW station. Certainly the control head would be loaded with software for each installed RF module.

Well dreams are free!

73 Andrew ZL3DW