The New Generation of HF SDR

Barrett Communications has developed a new HF Software-Defined Radio (SDR) transceiver, the Barrett 4050 HF SDR, which incorporates a new generation of technology. It provides secure digital voice, email and data transfer, has an intuitive touchscreen operator interface and can be controlled and operated from anywhere with internet access.

Covering a transmit frequency range of 1.6MHz-30Mhz and a receive range of 250KHz-30MHz, the 4050 is intended as a static base station or as a vehicle-borne radio. It is aimed at a broad cross-section of the market, including such users as the UN for peacekeeping or humanitarian assistance; non-government organisations (NGO); security organisations and the police; and commercial businesses such as oil exploration. The radio is not intended for the tactical market, although there could be some crossover if used as a base station; a tactical version is under development.

All the hardware and software in the 4050 is newly developed, resulting in an increased performance with a slight reduction in size and weight over its predecessor, the 2050. It provides complete software control of RF modulation and bandwidths and implements large sections of the receive and transmit paths using complex mathematics. RF signals are represented as a pair of phase and quadrature components and sophisticated numerical techniques are employed to replicate and enhance traditional functions of analogue transceivers.

The 4050's digital voice, provides telephone quality communications over an HF network. It uses a vocoder to digitise the analogue voice signal and transmit it with a data waveform. In order to overcome the problems of variable path quality the vocoder has variable data rates from 2400 bits per second (bps) down to 600 bps. It offers both Digital and Advanced Encryption Standards (DES and AES) up to 256 bit. Both the variable vocoder and the 256 bit AES are subject to export controls. A number of different data waveforms are available with throughput rates up to and beyond 19200 bps.

Also offered as an option is Barrett's patented GPS synchronised secure frequency hopping system, which does not need a central synchronisation station, has no entry or late entry time delay and does not require handshaking. Available hopping rates are 5 or 25 hops per second using an 8 digit hopping encryption key with a user selectable hopping bandwidth to suit a variety of antenna types.

The 4050 includes as standard multiple 4 & 6 Digital Selective calling protocols. Available options include ARINC Selcall standard, second generation (2G) Automatic Link Establishment (ALE) to JITC certification, but more significantly in a possible first for a HF radio in its targeted market, it also offers the latest 3G ALE standard based on STANAG 4538.

With a 24V supply the 4050 can achieve 150W Peak Envelope Power (PEP) which is greater than many equivalent transceivers. This reduces to 125W PEP with a 12V supply. The cooling is particularly effective such that a number of waveforms do not activate the cooling fan; this is a considerable improvement on legacy models.

The key feature of the 4050 is its intuitive touch screen operator interface, which resembles a smart phone. The touchscreen is mounted in a 350gram detachable wireless remote control head which also includes the handset connection and enables the radio to be operated remotely. The operator interface is multi-language, which can be easily changed. Installed standard language libraries include English, French, Spanish, Russian, Arabic and Chinese but others can be added as required.

Barrett's design premise for its interfaces has been that they should mimic those on a mobile phone with which an inexperienced radio operator will be familiar and its legacy radio controls resemble those of an earlier generation of mobile phones. The 4050 24-bit colour touch screen control brings this premise up to date by using the same type of icon and swipe interface as a smartphone, thus providing the modern user with the same familiar environment. Functionality is directly available through identifiable icons rather than step-through menus

The intention is to make HF radio, which may be the only viable communications infrastructure in some of the areas where the 4050 could be employed, easily accessible. The radio has been developed in response to customer feedback which indicated that there is a need to make it easy to use for the inexperienced operator and remove the fear of the unknown. The user will still need to have some understanding of the basic principles involved, but ease of use is key.

The radio can also be controlled from a number of different remote platforms providing they are Internet Protocol (IP) capable. The 4050 handset "app" can be installed on smartphones, tablets, laptops or PCs running iOS, Android or Windows, and provides full remote control of the radio. A smartphone with the app installed can therefore, for example, be used as the radio handset. This could either be locally using Wi-Fi or from a remote location providing IP connectivity is available. A user in a headquarters office could connect to the radio using the internet and thence to a user deployed in the field over the HF link.

This facility also allows multiple users in different locations to access the radio. One or more transceivers can be controlled centrally by an administrator to support equipment settings and network configuration.

A separate Breakout Box (BoB) can be connected to the radio to provide additional RF output sockets for multiple antenna connections, Ethernet and additional Wi-Fi connectivity, although this is not needed for most applications. A GPS receiver interface is integrated into the radio and the antenna is connected externally.

About Barrett Communications:
Barrett Communications is the specialist Australian designer and manufacturer of commercial and tactical HF and VHF radio communication systems.

The Company's global distribution to over 150 countries and customer support network in over 65 countries allows it to provide both OTS and turnkey network solutions to meet their clients' exact requirements.

For 40 years Barrett Communications has provided HF communications solutions for government, business, humanitarian and AID organisations around the world.

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