Software Defined Radio

Introduction

Software Defined Radio is an emerging technology that is becoming a key part of all new radio developments. It promises several advantages over conventional radio design technology resulting in benefits to manufacturers, service providers and users alike. It is predicted that soon all new radio designs and systems will be based on this technology; so access to a credible and accomplished capability in this area is vital. Roke Manor Research can provide this access, having many years of experience in all aspects of Software Defined Radio.

The principle feature of Software Defined Radio is that the capabilities and operation of the radio can be reconfigured efficiently at time of use, rather than at time of design. In this way a common hardware platform can be used to provide multiple modes and bands of operation, to suit the required application and current environment. This is much more than just using software to implement the baseband signal processing algorithms; it affects all parts of the signal processing chain in both the receiver and transmitter.

To be able to specify and design a successful Software Defined Radio requires in-depth skills in all aspects of radio design:

- Radio Systems
- Antennas
- Radio Frequency Circuits
- Modulation and Demodulation
- Error Control Coding
- Analogue to Digital Conversion
- Digital to Analogue Conversion
- DSP and FPGA/ASIC Design
- Digital Signal Processing
- Control and Management Software
- Communications Protocols
- Multiple Access Techniques
- Application Software

Roke Manor Research can offer unrivalled experience in all of these areas for both military and commercial services and applications. However, Software Defined Radio requires more than this! Two aspects are presented here.

Conventional radio design usually optimises the circuit design for a limited range of carrier frequencies and bandwidths. With Software Defined Radio, the challenge is to provide a wide range of carrier frequencies and bandwidths, together with disparate performance requirements, such as receiver sensitivity and dynamic range, transmitter power and linearity, etc. We have studied these requirements in detail, specifying and building innovative and efficient circuits to implement them.

In a single mode, conventional radio design, the baseband signal processing algorithms and control software are programmed at time of manufacture. For a Software Defined Radio, efficient and reliable mechanisms must be provided to allow new software to be downloaded into the radio and installed.
For this to be successful, the hardware and software architectures and their interface must be appropriate for the task. Further, the download method and its regulation must be properly understood to ensure that correct operation is achieved meeting safety and type approval requirements. Roke Manor Research has contributed several innovative concepts and solutions in this area, being amongst the first to realise that these are key to technology acceptance.

Our expertise in the field of Software Defined Radio is recognised worldwide, having worked with the SDR Forum, international military groups, European Commission funded research programmes, etc. We have presented a number of papers at international conferences and hold several patents in this fundamental technology.

If you have a need for a radio product that would benefit from the features and advantages that Software Defined Radio can deliver, Roke Manor Research are the ideal choice to meet your requirements.