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● ● Per Vices' Crimson SDR is an example of the latest COTS SDR units that are being optimized for mission-critical operations, including to strengthen radar and spectrum monitoring capacity. Their modular design gives them added power, flexibility and value over traditional SDRs.

A global communications crisis ● ●

Offering next generation communications capabilities, Software Defined Radio (SDR) has delivered an increasingly sophisticated solution for the defence, governmental and commercial sectors. Where today, communications methods have become fragmented, SDR offers a complete solution, as outlined by Brandon Malatest, one of the founders and COO of Per Vices Corporation.

As the technology powering wireless devices becomes increasingly sophisticated across both the defence and commercial sectors, communications across those devices is more fragmented than ever.

The hardware in most wireless devices and communications systems limits them to only send and receive on specific bands of the wireless spectrum. This creates restrictions for the devices to only communicate with similar devices (Figure 1). For example, the frequency that a satellite sends and receives on is different from that of a VHF radio, or a cellular phone. Today, WiFi, 3G, and 4G networks are commonly used to bridge communication across devices (so that we can use dedicated applications to call a cell phone from a laptop), but these bands are increasingly over-crowded, and nowhere near robust enough to meet the growing demands of new users and devices, let alone mission-critical activities.

What this means for military communications is that there is a constant risk of inefficient, and unreliable communications across teams and missions. Software defined radio (SDR) meets the challenges of this communications crisis by offering a unified communications platform capable of seamlessly communicating across the wireless spectrum.

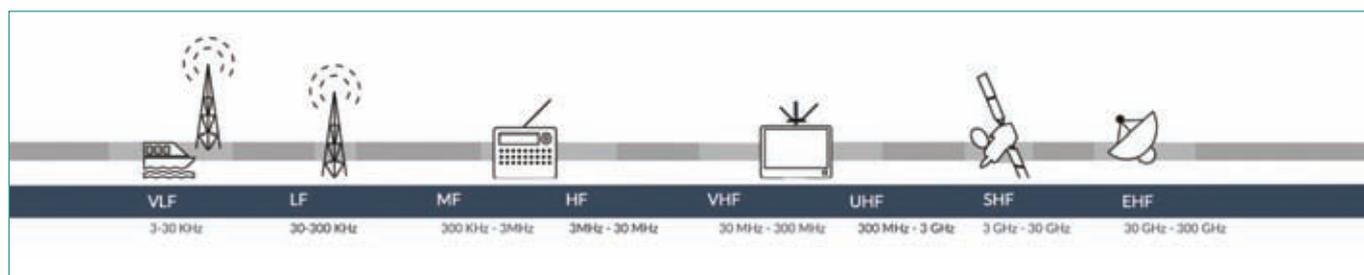
Software Defined Radio: A unified communications platform

Software Defined Radio (SDR), is a wireless communication technology capable of sending and receiving across a broad range of bands in the wireless spectrum. This is made possible by using flexible wireless hardware to tune to a specific frequency but pushing the encoding/decoding and use to software (Figure 2). This enables a truly application agnostic hardware platform, capable of tuning to any frequency, to be paired with various software applications to communicate with any wireless device and bridge communications between disparate devices.

The software that powers SDR is flexible, extendable, and most critically, able to be adapted over the life of the hardware, making it resilient to evolutions in technology over time and also capable of incorporating new functionality enabling it to do far more than initial requirements.

Commercial solutions leading growth and lowering prices

More than ever before, commercial innovations in technology are leading military solutions. This is particularly evident in some field devices that now compete pound-for-pound (or gram for gram) with commercial cell phones for processing power, battery life, size and weight. It is not uncommon for some commercial



● ● Figure 1: The Wireless Frequency Band. Sample of wireless devices communicating at different points of the wireless frequency band



● ● Figure 2: Comparison between the traditional approach for wireless devices, where all functionality is done in hardware, compared to SDR where only the tuning is done in hardware and the decode and use is done in software giving a much more flexible system.

off the shelf devices to be directly integrated into military solutions. This crossover brings both challenges and opportunities for military development, and creates a new standard of performance for military communications devices and systems. Today's military communications systems must be capable of both outperforming and intercepting civilian devices, while seamlessly communicating across a diverse range of devices and systems.

The automotive industry is a strong example of a sector where companies have leveraged a presence in both the commercial and defence markets, combining the low cost and fast technological development of commercial production with the specialized purpose required by military users. We can predict a similar trend to follow in the military radio sector, where increased commercial competition for high-tech communication devices has brought prices down and has substantially reduced development time. The cost of a fully programmed commercial SDR unit has dropped dramatically, and companies are leveraging the most recent advancement in semiconductor technology to offer the most performant solutions on the market as commercial off the shelf solutions that are able to meet and exceed the superior performance and specialized capabilities demanded by the defence market.

Flexibility and performance

The constant acceleration of technology means that high-performance military radio systems must be capable of constant upgrades to keep up with the most recent advances in both software and hardware. The downside of the commercial/defence technology crossover is that most commercial products are designed for a short shelf-life, to support only one generation of technology. Conversely, SDR platforms are powered by a

combination of hardware and software, where the software can be upgraded to add new applications and capabilities without substantial change to the hardware platform and at a marginal cost. Modular designs in some SDRs (see Figure 2) mean that key components can be changed without requiring entirely new replacement devices, again prolonging shelf-life.

Military applications

The current state of the art in SDR technology not only eliminates the challenge of multiple devices to engage in military communication, it also provides a powerful monitoring tool. Even a single portable SDR unit, when well-programmed, can be used to monitor communications across various frequencies, including VHF, UHF, and HF. Moreover, multiple protocols including CDMA, GSM, Bluetooth, WiFi, and LTE can be used simultaneously in conjunction with this monitoring ability.

Due to the flexibility of SDR, many communications applications are enabled by the high bandwidth, multiple inputs and multiple outputs (MIMO), and the customizable software. Combining these powerful features allows communications for the defence market to reach new levels of performance and new use cases that were not previously supported.

When building an SDR, it is necessary to select the right hardware for the necessary applications, and some companies have created transparent design tools to allow engineers to plan and price their units based on their specific needs. For example, Per Vices Corporation has released a tool that allows users to select the specifications that they require and receive real-time cost estimates. These types of transparency are crucial for industry to provide as it allows the end users of SDR to better understand the costs and complexities associated with supporting different applications.

GMC

The advertisement features three magazine covers: 'Satellite Evolution EMEA' with the headline 'Is shipping ready for the big data revolution?', 'Satellite Evolution Asia' with '5G Exploring the world of 5G', and 'Global Military Communications' with 'Three steps to powering defence'. The background shows a satellite in space and a globe. The text at the bottom reads '...the No.1. information resource...' and 'www.satellite-evolution.com'.