Per Vices Corp.

The software-defined radio (SDR) market is seeing tremendous growth in recent years. The reason for the increased interest in this sector can be attributed to the multiple benefits offered by this technology, which include cost efficiency, flexibility, and ability to drive communication. As a result, stakeholders across multiple industries have taken notice and this includes the oil and gas industry.

Traditional radio devices offered very limited flexibility and cross-functionality. This often lead to high production and operation costs. SDR technology on the other hand provides a great solution to these problems with an inexpensive solution.

SDR enables enhanced mobility because the technology allows software Radio Access Network (RAN) solutions. RAN systems are embedded in telecommunication systems and reside between a device (like computers and mobile phones) and a remotely controlled machine that's connected to the core network.

This allows SDR operators to support multiple standards on one hardware platform. This solution also includes backhaul transport and connections between multiple pieces of RF equipment.

When compared to traditional radio systems, SDR also offers the added benefits that hardware focused Digital Signal Processing (DSP) and Field-Programmable Gate Array-based (FPGA) systems cannot offer if used as a stand-alone device.

DSP is used to process an extensive variety of signal processing operations. The digital signals that are processed appear as a sequence of numbers that essentially represent samples of the function of a continuous domain, frequency, or space.

FPGAs are semiconductor devices that built around a matrix of configurable logic blocks or CLBs. These are then connected via programmable interconnects that can be reprogrammed at any time to modify the application or functionality.

SDR is highly portable and can be re-used; therefore, more cost effective to keep up with technological advancements with minimal code required to be re-written.

Further, as oil and gas rigs are becoming increasingly “smart” with sensors transmitting important data in real-time, SDR provides an efficient platform for the next generation of terminals and systems.

Advanced SDR platforms such as Crimson TNG is one example of a perfect solution for the industry as the technology enables remote configuration and upgrades of the base station and handset software with new patches and features.

Software-Defined Radio Defined

SDR can be defined as a wireless communication system where some or all traditional hardware components like filters, detectors, and modulators/demodulators are software defined. It enables the ability to switch dynamically between frequencies and protocols that are under software control. Based on the flexibility, SDR platforms are becoming increasingly more desirable for industries where the standards are evolving or one with multiple standards.

The transmitter modulation and receive demodulation is defined by software and enables data to be processed on board the unit or passed to a host computer for further DSP (digital signal processing). To achieve the desired modulation type, the
FPGA is utilized with custom and dynamically changeable firmware while microcomputers are used to adjust the parameters on the receiver and transmitter radio chains.

In the past, traditional radio chips were hard-wired to only utilize one specific port for communication, so multiple chips were required to handle a wide variety of radio communications. But as SDR enables multiple signals to be received/transmitted and processed, the user can depend on software to implement specific applications and utility.

As a result, SDR is extremely versatile and highly useful for the oil and gas sector. With custom software/firmware, a single SDR platform can perform all the functions of multiple special-purpose radio chips. Further, the added benefit of this technology is that it can be used for non-traditional radio uses including interaction with RFID chips and the ability to be used as a radar platform.

SDR will also allow operators to use the electromagnetic spectrum in new and exciting ways. Unlike most radios that are designed to use a narrow and fixed frequency band, SDR can tune into multiple and different frequencies simultaneously. Further, SDR also allows the user to prototype new communications protocols rapidly.

**Implement Different Protocols with SDR**

Traditional hardware radios utilize physical components which can’t be modified easily. Further, the static nature of traditional radios also adds to the limitations.

Traditional radios on oil rigs will need a lot of space to house all the different hardware setups for each radio. As a result, it can also get considerably more expensive to implement separate hardware protocols to systems that need to use multiple radio standards.

SDR negates the need to stack multiple radios and makes updating much cheaper as each protocol is software defined. So it’s much easier to implement different protocols whenever necessary. Further, it can also be done remotely.

**Intelligent Frequency Use**

The oil and gas industry depends heavily on the unobstructed flow of data. When the team is experiences poor weather conditions in the field, SDR will make it easy to change between frequencies to ensure optimized data transfer.

Further, if the current systems is using multiple sensors where the data needs to be aggregated, SDR will make it easy to set the sensors to operate on Bluetooth or Zigbee and have the collected data rebroadcast over WiFi. As a result, regardless of the situation, SDR can be adapted for quick cost-effective solutions.

**Update Encryption Styles**

Maintaining security by changing encryption styles often is vital for the industry. So it is important that these changes happen quickly and cost-effectively. SDR makes changing encryption styles easy as all you have to do is modify the firmware. This negates the need to purchase additional hardware and the logistics associated with making those changes.

We can conclude that the SDR technology is capable of satisfying all the communication solutions required by the oil and gas industry in one system. With recent systems like Crimson TNG that enables interpretability across multiple networks, we now have a solution that is highly adaptable, flexible, and cost-effective. As the industry operations become more dependent on big data analytics, we can expect to see SDR grow influence to play a vital role within the industry.

*For more information please visit [www.pervices.com](http://www.pervices.com).*