iDirect Government

RESILIENT. SECURE. INNOVATIVE.

450 SDR Tech Brief

Today's militaries operate in increasingly dispersed environments. They require a single modem platform that is flexible, resilient and secure with the ability to change personalities expanding resiliency for users at the tactical edge.

iDirect Government's 4-Series SDR platform allows users flexibility in utilizing state-of-the-art technology that also incorporates government standards including FIPS 140-2 Level 3, WGS, ZTA and TRANSEC technology.

The 4-Series Suite of SDR modems are multi-purpose, multi-orbit, and multi-waveform platforms with support for the following waveforms and technology:

- Evolution Defense ATDMA
- SES mPower
- Telesat Lightspeed (Future)
- Stand-Alone Digitizer
- MIL-STD-188-165B (EBEM) (Future)
- DVB-S2X SCPC
- DVB-S2X SCPC Return
- LPx
- Anti-Jam (CSIR)
- MXDMA MRC (future)

Flexible

The 450 utilizes an open standards architecture that supports multiple waveforms. Based on the latest FPGA technology, it optimizes performance, cost, and SWaP.

A single 450 SDR can be configured to operate any waveform while simultaneously a second demodulator can be configured to receive a GBS broadcast signal using the DVB-S2 one-way TRANSEC waveform. Multiple 450 SDRs can be combined to support simultaneous multi-waveform Tx/Rx capabilities, thus making the platform SWaP friendly but also scalable as capacity demands increase.

By using FPGA-based technology for the common compute, users have the benefit of off-the-shelf hardware that has the flexibility to host multiple waveforms as well as the ability to upgrade over time. Porting new waveforms to the 450 SDR will become even more efficient with the launch of iDirectGov's Waveform Development Kit. With the proliferation of the DIFI protocol, the ease and flexibility of using this platform will only increase.

The 450 SDR's FPGA-based technology will deliver a significant reduction in overall power consumption compared to other CPU-based approaches for multi-waveform support.

Breaking Down the Board

iDirect Government's SDR architecture consists of three core components – radio module, compute platform and the carrier board.

Radio Module*
- Responsible for amplifying, filtering and converting the RF signal to and from digital form between the RF and compute platform.

- Also includes a MUX that couples DC power for the BUC/LNB together with control tones and reference clocks to create the IFL.

*Can be replaced with a DIFI compliant interface for increased interoperability.

Compute Platform
- Performs digital signal processing, security and management at the tactical edge.

Carrier Board
- Acts as a physical mounting structure, bringing all the modules together by routing the signals between one another and external I/O (ex. Ethernet).

The radio and FPGA are designed to communicate using a standards-based VITA 47.2 compliant JESD204B interface, providing the flexibility to use a different radio or FPGA module without the need to redevelop a custom interface. The VITA 47.2 interface also allows for seamless support of DIFI compliant terminals.

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450 SDR Tech Brief (continued)

The 450 SDR increases system flexibility while minimizing sustainment costs, providing users with increased resiliency. Users can select the best available waveform to meet mission requirements while benefitting from the most efficient SWaP.

The all FPGA-based design of the 450 establishes it as a true SDR in a SWaP friendly form factor. The 450 SDR is approximately 16 square inches in size requiring less the 20W of power. For more complex systems that require additional transmit/receive capabilities or processing power, additional radio and/or FPGA modules can be added to the system without compromising the overall SWAP. For example, a two radio/two FPGA module will support twice the amount of capacity and a single radio/FPGA solution, allowing the system to grow seamlessly based upon user demand.

Resilient

The 450 SDR multi-mode feature allows users to switch between service providers seamlessly. By storing an encrypted archive file for each mode, each archive contains all the configurations necessary to connect to that specific network. This allows the simplification of the commissioning process as all the calibration and commissioning measurements are stored securely within the modem. The 450 SDR supports Evolution Defense, WGS certified and GBS waveforms with planned waveforms including SES mPower as well as a MIL-STD-188/165B and a DVB-S2X FDMA waveform. Additional waveforms are easily integrated when provided with the ICDs and/or SDKs.

Secure

The 4-Series SDR product line is designed around a Zero Trust Architecture (ZTA). In addition to common ZTA practices including micro watermarks and a fabrication process to ensure wafers have not been tampered with through packaging, the 450 SDR also employs a unique 2D barcode device DNA. The unique process provides instant verification of the device delivered back to the actual wafter it was manufactured from. Combined, these practices ensure the trusted supply chain needed for ZTA.

The FPGA-design allows for the ability to implement a “digital fence” to define a border between the secure and non-secure environments contained within the FPGA, further reducing the overall SWaP. By implementing a “digital fence” FIPS 140-2 Level 3 certification to the secure environment is maintained should any modifications be made outside the secure environment.

The 450 SDR implements our TRANSEC-compliant network architecture that exceeds the requirements outlined by the U.S. government while still maintaining the quality of service needed to support voice, video and data over a satellite link. The platform secures VSAT transmissions from interception and exploitation by incorporating encryption inherent in COMSEC; conforming to 256-bit AES as specified by the Federal Information Processing Standard (FIPS) 140-2-2 Level 3*, while masking traffic types, volumes and acquisition of remote terminals. Through a combination of hardware and software, TRANSEC ensures data blocks are a uniform size. This conceals traffic activity while incorporating a Certificate Authority (CA) issued x.509 digital certificate to authenticate the remote terminal.