

4-Series SDR Waveform Abstraction

iDirectGov's Waveform Development Kit (WDK) provides a means for both iDirectGov and third-party companies to integrate waveforms onto the 4-Series SDR through abstraction and virtualization. iDirectGov's WCore provides the abstraction layer for the waveforms, eliminating the need for in-depth hardware knowledge. All hardware interactions are abstracted through a unified set of simple APIs and FPGA interfaces. Waveform developers then work with this simplified set of API's to integrate the waveform without needing much knowledge of the hardware platform itself. The waveforms reside in containers that sit on top of the WCore. These containers are referred to as WSlices. The WCore orchestrates the spinning up and down of these WSlices.

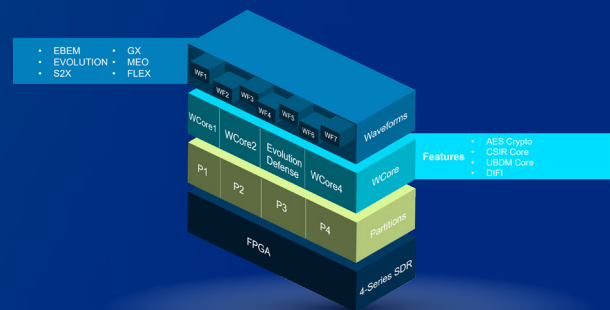
The 4-Series SDR is divided into five partitions. One partition contains a factory image, the SDR can be reset to a known state by resetting it to a known state. The remaining four partitions are designed for waveform support. Evolution Defense and One-way TRANSEC waveforms can be installed directly onto any of the partitions. Additional waveforms are implemented into the WSlice "containers" that are hosted on top of an abstraction layer.

A WCore can be installed onto any of the four usable partitions. Each WCore has access to one or more WSlices depending on the waveform footprint. These WSlices will be activated on the WCore when the specific waveform is selected to be used. A single 4-series compute module (450D) can run a single waveform at a time, however, more compute modules (450D) can be added to support simultaneous operations of multiple waveforms. Switching between waveforms is done in the matter of seconds and does not require a modem reboot.

At a minimum, the 4-series SDR will support six waveforms. The maximum number of waveforms installed onto a single 4-series compute module (450D) depends upon the size of each waveform.

In addition to providing the abstraction layer for the containerized waveforms, the WCore can provide core features that any WSlices can use. Initially, the WCore will give WSlice containers access to the FIPS 140-3 Level 3 certified crypto engine as well as the DIFI core. In the future, iDirectGov will add additional features such as iDirectGov's interference excision capability (CSIR™).

iDirectGov's waveform development kit (WDK) provides a means for both iDirectGov and third-party companies to integrate waveforms onto the 4-series SDR as WSlices that sit on the WCore. The WCore eliminates the need for in-depth hardware knowledge. All hardware interactions are abstracted through a unified set of simple APIs and FPGA interfaces. This allows for waveforms to be ported onto the 4-Series SDR to function as a stand-alone analog modem or as a DIFI modem.



The iDirectGov 4-Series Suite of SDR modems uses an FPGA MPSoC (MultiProcessor System-on-Chip) architecture. The architecture provides maximum flexibility to host multiple waveforms while still maintaining state-of-the-art security including Zero Trust Architecture, FIPS 140-3 Level 3, and TRANSEC. The real-time and parallel processing capabilities of this architecture make it the ideal platform for complex tasks like multi-waveform support. FPGAs are designed to perform specific functions, which makes them extremely efficient resulting in reduced SWaP compared to CPU-based SDR platforms. FPGAs also maintain flexibility for reprogramming that ASIC designs do not offer.

The WDK provides a means for third-party waveforms to be integrated into the 4-series SDR platform while maintaining the third party's intellectual property and revenue stream. The integration process also ensures the integrity of the 4-series SDR by aligning its zero-trust architecture.



Development of software/FPGA code can be done without impacting the FIPS 140-3 Level 3 certified crypto boundary on the 450mp, allowing for additional waveforms to be integrated into the platform without impacting the 4-Series certifications. When the waveform integration is complete, iDirectGov tests and validates the integration and digitally signs the compiled WSlice package. The WSlices are then offered as a licensable feature on the 4-series platform.