iDirect Government

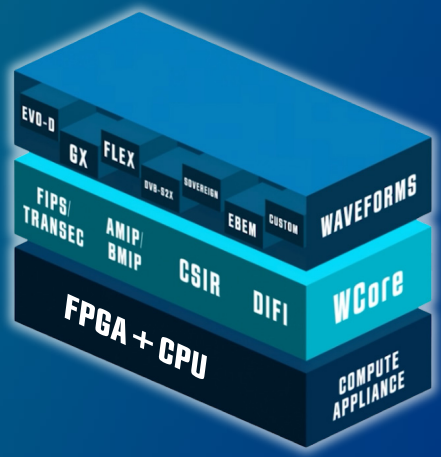
RESILIENT. SECURE. INNOVATIVE.

WCore Tech Brief

Resiliency and security are essential to maintaining a trusted and effective SATCOM environment. A key element to achieve resiliency is the ability of a single satcom modem to support and seamlessly switch between multiple waveforms. iDirect Government (iDirectGov) has developed the WCore, a hardware abstraction tool that transforms any compute appliance into a software defined modem (SDM) creating a unified, flexible platform able to operate multiple waveforms and constellations.

Advancing Hardware Virtualization:

- **Reduced development time**
- **Increase scalability**
- **Maintain control of intellectual property**
- **Monetization through licensing**



Three-Layer Architecture

WCore enables the integration and management of third-party waveforms through a published waveform development kit (WDK) interface. This approach allows integrators to efficiently develop and deploy waveforms while preserving control of their intellectual property (IP) and enabling monetization through licensing. Once the WCore has been developed for a specific hardware variant integrated waveforms can seamlessly be integrated into other variants of the same platform with a WCore architecture reducing development time and increasing scalability.

Three-Layer Architecture

WCore is the central layer to our three layer approach of a virtualized software defined platform designed for flexibility, scalability, and performance. The WCore provides interaction to the platform hardware, through a simplified instruction set and ICD for waveform or other technology development. This waveform/application is developed in the form of a Docker container that runs on the WCore. These containers are referred to as WStacks.

Layer 1: WStacks

WStacks host individual waveforms and containerized applications. The number of WStacks supported is dependent on the waveform footprint, a 4-Series SDM with 32GB storage can support 16-20 waveforms. Only one waveform operates at a time, but switching between waveforms occurs within seconds and does not require a modem reboot, ensuring operational continuity.

Once WStacks are developed and available in an ecosystem they can be ported seamlessly to new hardware platforms. This provides efficiency in porting waveforms to a new platform via a virtualized environment.

Layer 2: Feature Layer - WCore

The Feature Layer provides shared services and critical capabilities accessible to all WStacks. This currently includes the following technologies:

- **FIPS/TRANSEC Core**
  All waveforms have access to the FIPS portion of the WCore. This allows waveform developers to take advantage of an already certified encryption algorithm residing within the black side of the FGPA and eliminates the need for FIPS recertification with each waveform development.
- **OpenAMIP/BMIP**
  The WCore provides a single AMIP/BMIP interface to the antenna system regardless of the WStack that is running. This ensures a single version of OpenAMIP/BMIP for the platform developer to manage.
- **iDirectGov's CSIR Technology**
  All WStacks can have their demodulator protected using iDirectGov's Communication Signal Interference Removal (CSIR) technology. This provides resiliency in the communications system regardless of the waveform that is operating.

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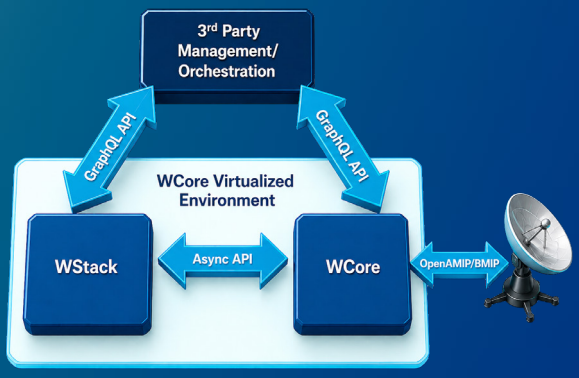
WCore Tech Brief (continued)

- **User Interface/GraphQL API**
  WCore provides a web UI environment and AsyncAPI-based interface that enables WStack developers and third-party systems to monitor, control, and orchestrate configuration and waveform selection within a unified user experience.



This centralized layer enhances efficiency while ensuring consistency across waveform implementations.

Layer 3: Compute Appliance

The WCore is natively available on iDirectGov's 4-Series SDMs but is not limited to this platform. It can also be deployed within a cloud environment or on an XBB appliance. The WCore is designed to simplify the process of adding third party waveforms and content onto a compute appliance making a single tool for use on multiple waveforms a reality.

WCore represents a significant advancement in SATCOM architecture by enabling a modular, scalable, and vendor-agnostic approach to waveform integration. By abstracting hardware complexity, accelerating third-party development, and enabling rapid switching between waveforms, WCore enhances both resiliency and operational agility. Its ability to unify multiple waveforms and platforms into a single, flexible framework designates it as a critical enabler for next-generation SATCOM environments.

The WCore and the 4-Series

WCore provides a standardized approach for both iDirectGov and third-party companies to integrate waveforms onto the iDirectGov 4-Series SDMs through abstraction and virtualization. WCore provides the abstraction layer for the waveforms, eliminating the need for in-depth hardware knowledge.

All hardware interactions are managed through a unified set of simple APIs and FPGA interfaces allowing developers to work with this simplified set of APIs to integrate the waveform without needing extensive knowledge of the hardware platform itself. Waveforms are deployed in containerized environments known as WStacks, which operate on top of the WCore framework.

Supported Waveforms and Features:

- **Evolution Defense**
- **GX**
- **Flex**
- **DVB-S2X (mPower capable)**
- **EBEM (MIL-STD-188/165B)**
- **FIPS 140-3 Level 3**
- **Open AMIP**
- **Open BMIP**
- **Interference Mitigation (CSIR)**