



CONSOLIDATE MISSION-CRITICAL CAPABILITIES ONTO A COMMON PLATFORM THAT DELIVERS INTEGRATED END-TO-END C4ISR SOLUTIONS

Virtualization for Heterogeneous Applications, from Sensors to Systems and System-to-System Communications

SYSTEM-OF-SYSTEMS CHALLENGES

- **Standardization:** Lack of interoperability of distributed components, making data sharing and communication difficult, if not impossible
- **Cybersecurity:** Requirement that the system cannot be breached
- **Cost:** Software reuse and the need to integrate legacy systems without redeveloping capabilities

WIND RIVER SOLUTIONS

- **Wind River Helix Virtualization Platform:** An edge compute platform that can manage unmodified guest operating systems running in virtual machines, consolidating heterogeneous applications for C4ISR systems
- **VxWorks:** The world's leading RTOS, enabling deterministic applications scaling from very small compute packages
- **Wind River Linux:** Industry-leading open source operating system for connecting, securing, and running embedded systems and applications
- **Wind River Simics:** Software that allows developers to simulate anything, chip to system, and get the access, automation, and collaboration tools required for agile development practices
- **Wind River development tools:** Powerful tools to save developers time and increase quality

THE CHALLENGE

The defense industry is broadening its focus from connected warfighters to connected operational environments that integrate air, space, land, sea, and cyber capabilities. This system-of-systems (SoS) approach brings together heterogeneous capabilities from across complex combat environments. The seamless interoperability between systems and applications is key, from ground stations all the way to the aircraft and beyond.

How can the military system suppliers standardize all links in the command, control, communications, computer, intelligence, surveillance, and reconnaissance (C4ISR) chain, from sensors to system-to-system communications? How can they secure the overall platform against cybersecurity threats? And how can they upgrade capability depending on operational requirements?

THE APPROACH

At the center of an integrated C4ISR system are cutting-edge virtualization technologies, processors, and sensors that seamlessly integrate connectivity, smart situational awareness, and enhanced decision-making for the connected warfighter. They provide the backbone of efficient operations, acting like a binding agent for all distributed components. This means integrating legacy systems with noncompatible interfaces alongside new capabilities such as enhanced computer vision and machine learning.

Wind River® Helix™ Virtualization Platform can consolidate multiple applications and capabilities onto a single compute platform. This open virtualization solution provides the needed interoperability coupled with robust cybersecurity capabilities to create a comprehensive picture of the battle space.

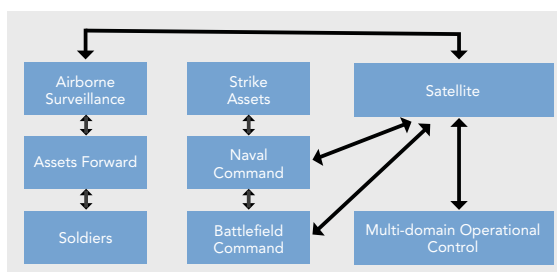


Figure 1. System-to-system communications

Wind River Helix Virtualization Platform

Helix Platform is an adaptive software environment for aerospace and defense systems that enables support for multiple applications, from in-vehicle integrated intercom systems to satellite command systems. Applications can be legacy or new capability, based on industry standards such as POSIX® or FACE™, or based on operating systems such as Linux, VxWorks®, containers, and other technologies.

Helix Platform provides a real-time, embedded, Type 1 hypervisor that runs on Arm® or x86 multi-core processors. Helix Platform's hypervisor can manage independent virtual machines (VMs) running VxWorks, Wind River Linux, and other unmodified guest operating systems such as Windows and Android. The open architecture design allows for the integration of legacy and future applications without system redesign.

Additionally, the hypervisor can securely partition the systems to ensure that a VM running a safety-critical application has no interference or conflict from any other application or function running in another VM. Helix Platform includes VxWorks, Wind River Linux, and Wind River Simics®.

VxWorks

VxWorks is a real-time operating system proven in more than 2 billion devices worldwide. It supports C11 and C++14 programming languages as well as standards-based virtualization of common devices, including serial, networking, and storage. When used within a VM managed by Helix Platform, it can run safety-critical applications, essential applications that require real-time or deterministic functions to operate an important system.

Wind River Linux

Wind River Linux is the embedded Linux distribution that provides the perfect balance between open source flexibility, commercial grade security, reliability, and support to help minimize development complexities and total cost of ownership. As a guest operating system within a Helix Platform solution, a Wind River Linux VM can be established to run Linux applications, such as communications, UI, graphics, and more.

Wind River Simics

Simics enables software to run on virtual platforms just as it does on physical hardware. Along with its capabilities for

scripting, debugging, inspection, and fault injection, Simics enables manufacturers to define, develop, and integrate systems without the constraints of physical target hardware. This software simulation environment enables unmodified target binaries to run on a virtual platform, supporting very early prototyping before physical hardware is designed and built.

Wind River Development Tools

To enhance developer productivity, Helix Platform provides an integrated development environment with the Eclipse-based Wind River Workbench development suite. This state-of-the-art environment includes project configuration, code browsing and build, target debugging, and the Wind River System Viewer analyzer. Wind River Diab Compiler helps boost application performance; reduce memory footprint; and produce high-quality, standards-compliant object code for embedded systems.

THE RESULT

Using Helix Platform together with VxWorks, Wind River Linux, and other general-purpose OSes, military system suppliers can successfully develop safety-critical C4ISR systems with robust cybersecurity enhancements. The support for heterogeneous Ada, POSIX, FACE, and VxWorks applications in a C4ISR platform facilitates maximum software reuse and porting of legacy applications. A typical configuration is shown below:

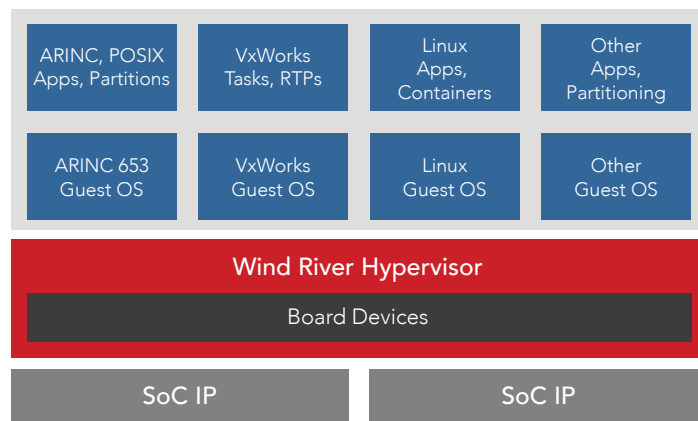


Figure 2. Application consolidation via virtualization

To learn more about VxWorks, virtualization, or Helix Platform, visit www.windriver.com or contact salesinquiry@windriver.com.

