WIND RIVER VxWORKS 653 PLATFORM

To be competitive in the aerospace and defense avionics market, device manufacturers must deliver increasingly complex products at or below budget, within constantly shrinking time frames, and often with stricter constraints on device space, weight, and power (SWaP). In avionics applications, human lives are often at stake—so devices must be reliable, durable, and certifiably safe.

Most legacy avionics systems are federated systems, designed to support a single isolated application on a dedicated microprocessor in a dedicated location on an aircraft. As constraints on application SWaP have grown stricter, however, engineers need to deploy applications on consolidated hardware platforms. To be competitive, modern avionics systems designers often cannot use federated platforms—they must create a new integrated platform that enables the robust scheduling of many applications on a single device.

To meet this need, the avionics industry has a specification for Integrated Modular Avionics (IMA) systems ARINC Specification 653. Use of this internationally accepted specification enables avionics vendors and hosted-function suppliers to safely deploy multiple applications on a single hardware platform, while maintaining complete system compliance with rigorous avionics safety standards such as RTCA DO-178C, DO-254, and DO-297.

Wind River® offers the most complete ARINC 653 product that safely and reliably delivers an ARINC 653–compliant platform to the IMA marketplace. Wind River VxWorks® 653 Platform is fully compliant with ARINC Specification 653, providing robust partitioning in time and space to ensure fault containment in accordance with strict IMA and ARINC 653 requirements. VxWorks 653 Platform enables reduction of SWaP requirements, as well as reduction of the bill of materials (BOM), on the industry's most advanced aircraft.

FEATURES AND BENEFITS

- Reduced BOM with high performance
  - High performance and low jitter due to two-level virtual machine architecture
  - Scalability, supporting up to 255 partitions
  - Simultaneous support of multiple levels of safety criticality

- High portability for lower upgrade costs
  - Simultaneous support for ARINC 653 APEX, VxWorks, and POSIX® partitions
  - Language support for Ada, Java, C, and C++ APIs
  - Certified conformance to the Future Airborne Capability Environment (FACE™) Technical Standard Operating System Segment (OSS) Safety Base Profile, supporting all ARINC 653 and POSIX® capabilities required by the FACE Conformance Test Suite
  - Ease of portability for legacy VxWorks applications

WHEN IT MATTERS, IT RUNS ON WIND RIVER

- Reduced development time and cost
  - Separation based on RTCA DO-297 role-based development for platform supplier, application developers, and system integrator
  - Wind River Workbench development suite based on standard Eclipse, enabling wide integration of industry toolchains
- Reduced DO-178C platform certification time and cost
  - Complete application independence
  - Separate build, debug, test, certification, and recertification of applications
  - True RTCA DO-297 role separation via DO-178- and DO-330-qualified development and verification tools
  - Complete sealed DVD with all DO-178C and ED-12C DAL A evidence
- More than 70,000 files, hyperlinked for easy traceability and examination
- Independent build process, reducing the impact of code changes across multiple development teams
- Proven on the world's most challenging aircraft
  - Airbus MRTT and A400
  - Boeing C-130 AMP, KC-767 Tanker, 787 Dreamliner, P-8A Multimission Maritime Aircraft

Development Suite

GNU Compiler	System Viewer
DO-178 and DO-330 Qualified Verification Tools	Wind River Workbench
Integrated Simulator (Windows host)	XML Configuration Suite

Software Partners

Ada 95/2005 Compilers for VxWorks	Integrated Graphics Drivers
Data Distribution Service (DDS)	

OS

VxWorks 653
DO-178 Network Stack and Highly Reliable File System
DO-178C DAL A Certification Evidence*

* Optional

Hardware Partners

COTS Boards

Services

Education and Installation		Platform Customization
System Design	Hardware/Software Integration	Design Services
DO-178C Certification Service		

Figure 1. Wind River VxWorks 653 Platform

RTCA DO-178C/EUROCAE ED-12C CERTIFICATION EVIDENCE

VxWorks 653 Platform is backed by the avionics industry's most comprehensive set of certification evidence, available as an optional product that supports all RTCA DO-178C and EUROCAE ED-12C DAL A requirements. The certification evidence is provided on a hyperlinked, browsable DVD to simplify safety verification and auditing. This DVD contains more than 70,000 support files, including all requirements, designs, tests, reviews, source code, build files, test results, annotated object-level code coverage, and tool qualification data.

Whether your avionics application is legacy or new, VxWorks 653 Platform enables you to optimize your development process. Having a certifiable ARINC 653 commercial off-the-shelf solution eliminates the risk of creating and certifying an operating system and related tools for each new project.

FACE SUPPORT

VxWorks 653 Platform supports open standards by allowing customers to choose from a variety of APIs when developing their applications. As stated above, applications can be written to ARINC 653, VxWorks, or POSIX APIs. Wind River commitment to open standards and portability is strengthened by supporting the FACE Technical Standard managed byThe Open Group.

VxWorks 653 Platform 2.5 is the first RTOS to be certified conformant to the FACE Technical Standard OSS Safety Base Profile, supporting all ARINC 653 and POSIX capabilities required by the FACE Conformance Test Suite.

OPTIMIZED, INTEGRATED DEVELOPMENT SUITE

VxWorks 653 Platform includes Wind River Workbench, a fully integrated Eclipse-based development suite optimized to support design, development, test, and certification of applications to meet RTCA DO-178C and EUROCAE ED-12C DAL A. The development suite consists of a project facility to define application resources, an integrated simulation tool, and an XML configuration tool to easily define the static configuration records required for ARINC 653 applications. The development suite also offers DO-330-qualified development and verification tools that assist in the application test for credit and also enable the insertion of new applications into a tested environment without forcing a retest of the entire platform. This facilitates faster deployment of ARINC 653 systems, conserving certification testing resources and significantly reducing the cost of change.

The DO-330-qualified XML configuration tool suite allows developers to make changes to application or system configuration information without rebuilding and retesting the entire system. Changes to independent applications can be made without the need to retest or recertify other applications or the underlying OS in the system. This significantly reduces the time to achieve initial certification as well as the cost of change and maintenance throughout the device lifecycle. In addition, this tool fully complies with the RTCA DO-297 IMA Development Guidance and Certification Issues Document, enabling intellectual property and security separation between the platform supplier, the application supplier, and the system integrator.

Unique to this platform are three high-performance tools that aid in the deployment of certified applications. They allow developers to measure CPU use by individual applications or all applications; report memory usage of various areas of the OS, including heaps, stacks, ports, and health monitoring memory use; and monitor traffic across sampling and queuing ports. Along with the OS, the interfaces to these tools are DO-330-qualified, enabling testing of the exact deployment environment for certification.

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INTELLIGENT LICENSING MODEL

VxWorks 653 Platform is available to companies under both Wind River licensing models: perpetual (paid upfront) licensing, and Enterprise License Agreement (ELA) subscription-based licensing, which gives businesses unprecedented flexibility in project budgeting and ease in license management across the enterprise. Two modes of production licensing (production license or production license–free) offer the option of capturing license fees in research and development or manufacturing.

PROVEN, RELIABLE PARTNER

The right technology partner can greatly increase your odds of success in a highly competitive marketplace. As the industry leader, Wind River has met and exceeded the requirements of our customers and their markets for more than 30 years, and our technology is found in nearly 2 billion devices. A vibrant, wholly owned subsidiary of Intel® Corporation, Wind River is positioned to stay the course with established device manufacturers and new companies alike.

COMMERCIAL-GRADE SUPPORT AND SERVICES

VxWorks 653 Platform includes full access to the Wind River worldwide support organization, with 24/7 product support and training available through multiple channels. We also offer a specialized aerospace and defense services practice—a team of Wind River Professional Services engineers with extensive experience in delivering design, integration, and optimization services tailored to the needs of your industry. We are fully equipped to protect International Traffic in Arms Regulations (ITAR) technical data and meet government accounting needs.
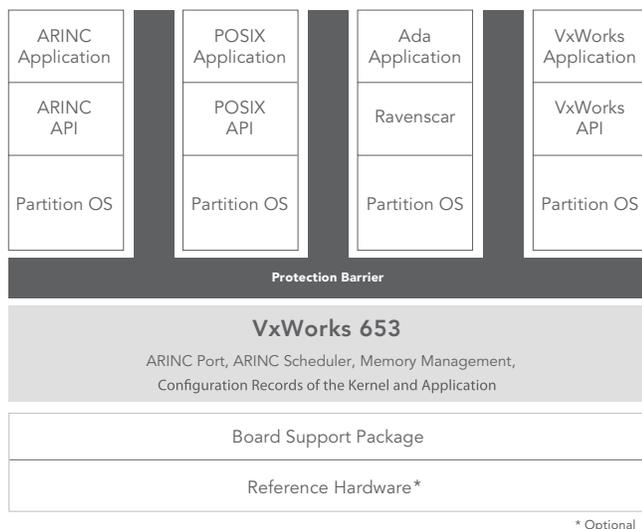

Figure 2. IMA design with Wind River VxWorks 653 Platform