



VXWORKS FOR AEROSPACE AND DEFENSE

VxWorks Solutions Have Been Used in More than 600 Safety Certification Programs by More than 350 Customers Across Industries

SECTOR CHALLENGES

- Reduce development costs across multiple projects
- Streamline regulatory compliance
- Satisfy real-time performance requirements
- Implement robust system and data security
- Simplify software integration
- Manage risks associated with obsolescence of components throughout the product lifecycle
- Hire talented software developers

WHY VXWORKS

- Software reuse and portability support
- Comprehensive packages of certification evidence
- Hard real-time performance, determinism, and low latency
- Best-in-class, pre-integrated security capabilities
- Secure application software isolation
- Modern software development environment

INDUSTRY SNAPSHOT

With most governments aiming to streamline procurement processes and spending, aerospace and defense OEMs are feeling the pressure to cut costs. One avenue is to maximize software reuse. Another cost-saving opportunity is to reduce the resources and time needed for system certification. Despite ever-increasing system complexity, key requirements still need to be met, such as delivering real-time performance, securing systems against escalating security threats, safely integrating software from a wide variety of sources, and recruiting enough software developers to get the job done right and on time.

These challenges and others are why many companies turn to Wind River®. With more than 25 years of experience in space missions and more than 35 years in the aerospace and defense market, Wind River solves the challenges of developing today's modern systems by relying on a legacy of successful projects and ongoing product innovations. VxWorks®, the most widely deployed real-time operating system (RTOS), rode on a NASA probe as part of one of the avionics packages—a star scanner—that helped keep the spacecraft Clementine on course. VxWorks is also part of many active space-bound projects, including NASA's InSight Mars lander.

Wind River invests heavily in its VxWorks software portfolio, adding new features while maintaining its very high level of security, safety, and reliability.



Figure 1. VxWorks: The number-one commercially deployed RTOS

VXWORKS: PIVOTAL TO SUCCESS

Save Money by Protecting Software Investments

One of the biggest investments in most aerospace and defense systems is in application software, so finding ways to reuse it in future systems can significantly reduce development costs. To maximize portability, VxWorks is designed to be backward compatible; therefore, the latest version is capable of running applications written for earlier releases.

Streamline Certification with Pre-certified RTOS

Using a pre-certified RTOS can significantly reduce the effort and cost to certify safety-critical applications running on avionics and defense systems. Likewise, VxWorks Cert Edition provides all the information needed to obtain a range of certifications, including EN 50128, IEC 61508 SIL 3, ISO 26262 ASIL-D, DO-178C DAL A, ED-12C, and IEC 62304. When using a subset of the VxWorks code base, developers can easily run validation and obtain proof of test, giving them certification evidence. VxWorks Cert Edition also includes expanded support

for ARINC 653 (Part 1, Supplement 4; Part 2, Supplement 3), extended services, symmetric multiprocessing (SMP) guests, and FACE™ 3.0 for the safety base and security profiles.

Deliver Proven Real-Time Performance

Real-time performance is crucial for safety-critical systems, such as a digitally connected aircraft that requires deterministic and low-latency performance. Leading the industry in this area for more than 25 years, Wind River has provided NASA with the most proven software platform to bring dozens of unmanned systems to space. VxWorks has been certified in more than 600 safety programs and more than 100 civilian and military aircraft, demonstrating the performance, determinism, reliability, safety, and security capabilities needed to satisfy the highest standards for mission-critical systems.

In addition, VxWorks has enhanced real-time features for the Portable Operating System Interface (POSIX®), Precision Time Protocol (PTP), and Time-Sensitive Networking (TSN).

Protect Systems and Data from Boot-Up to Shutdown

Digitally connected systems increase the risk of malicious hacking, requiring avionics and defense OEMs to carefully consider system and data security at various product life phases, including design, testing, and ongoing maintenance. Designed with comprehensive, built-in security capabilities, VxWorks safeguards devices and data during boot-up, app execution, data transmission, idle, and power down. Developers can implement protection at every stage of operation by taking advantage of secure boot, data encryption, kernel hardening, updated OpenSSL, enhanced Trusted Platform Module (TPM2), trusted software stacks TSS, tools for optimizing security, and many other features.

Prevent Ill-Behaving Software from Compromising Performance

Many avionics and defense systems have a mix of safety-critical and non-safety-critical applications—some homegrown and others from third parties. Helping to prevent reliability and performance issues due to unintended interactions between applications, the enhanced scheduler in VxWorks prevents any single application from overloading the CPU, thus keeping applications from overusing shared computing resources.

Inspire Software Developers with Modern Tools and Ease Engineering Onboarding

There is fierce competition for talented software developers who want to apply the latest techniques they learned in school and not be forced to use outdated software environments. VxWorks can help attract software developers by leveraging low-level virtual machine (LLVM) as a tools foundation to support current popular languages and libraries such as C++17, Rust, Boost libraries, and Python. One can easily write high-performance, safety-critical code in a modern language without knowing the inner workings of VxWorks.

TRUSTED SOFTWARE SOLUTIONS

VxWorks and its tools suite provide system developers with a complete solution for developing advanced and innovative solutions. With more than 30 years of experience building safe and secure embedded systems, Wind River is well versed in satisfying the real-time requirements of the aerospace and defense industry and enabling the next generation of computing technology.

