



ACCELERATING FUNCTIONAL SAFETY CERTIFICATION FOR TIME-SENSITIVE NETWORKING (TSN) ON VXWORKS

HARNESS WIND RIVER TSN INTELLECTUAL PROPERTY AND EXPERTISE

Time-Sensitive Networking (TSN) enables mission-critical systems to transmit and receive data over Ethernet networks in real time with high reliability, redundancy, and security. These and other capabilities have made TSN a compelling option for a broad range of use cases in aerospace and defense, industrial automation, automotive systems, and other sectors.

But developers of embedded systems are finding it difficult to exploit the full potential of TSN — to keep up with the rapid evolution of TSN standards while dealing with the inherent complexities and specific requirements of safety compliance.

Wind River® Professional Services offers solutions that leverage the company's considerable experience as an active participant in TSN innovation and evolution, and as an industry leader in the high-performance real-time operating system (RTOS) market for 40 years.

RTNET CERT FOR VXWORKS 7

RTnet (Real-Time Networking) is a framework and protocol stack used in real-time systems and applications where deterministic behavior is essential. RTnet Safety Certification (RTnet Cert) certifies the software to DO-178C DAL A — the highest level of certification recognized by the FAA, EASA, and Transport Canada for the approval of commercial avionics systems.

RTnet Cert is available for use with VxWorks® 7 from Wind River, the world's most widely deployed RTOS. As a guest operating system on Wind River Helix™ Virtualization Platform, VxWorks 7 gives users the ability to consolidate multi-OS and mixed-criticality applications onto a single platform. With RTnet Cert, developers can accelerate safety certification for a broad range of use cases.

WIND RIVER PROFESSIONAL SERVICES

Deep Expertise, Broad Offerings in TSN and Safety Certification

- More than 600 safety-certified projects across multiple industry sectors
- 40 years of experience in mission-critical embedded systems
- Leadership in development and evolution of TSN
- Certification IP (intellectual property) across multiple RTOSes, BSPs, and more
- Broad spectrum of services:
 - Certifiable IP blocks and artifacts
 - Safety design/certification assessments and audits
 - Safety certification and compliance artifacts and defensible support
 - Information assurance framework
 - Services enabling real-time and deterministic systems
 - Simulation and modeling for any hardware system
 - Lifecycle and long-term support options
 - Education and training
 - Managed services

Learn More

[Wind River Professional Services](#)

Artifacts:

- RTnet Cert code
- Integration-ready DO-178C DAL A certification evidence

Supported protocols:

- Internet Protocol version 4 (IPv4), including Ethernet protocol
- Internet Control Message Protocol (ICMP)
- Address Resolution Protocol (ARP)
- User Datagram Protocol (UDP)
- Transmission Control Protocol (TCP)

RTNET TSN ADD-ONS*

The RTnet TSN Add-on service updates the RTnet Cert code base with TSN capabilities and provides integration-ready DO-178C DAL A certification evidence for TSN for the following sub-protocols:

Synchronization

- IEEE 802.1AS-2020 – Timing and Synchronization for Time-Sensitive Applications
- For use with profile IEEE P802.1DP – TSN for Aerospace Onboard Ethernet Communications

Latency

- IEEE 802.1Qav – Forwarding and Queueing Enhancements for Time-Sensitive Streams
- IEEE 802.1Qbv – Enhancements for Scheduled Traffic

Reliability

- IEEE 802.1CB – Frame Replication and Elimination for Reliability

Figure 1. RTnet add-ons

* Coming soon

BENEFITS SUMMARY

Table 1: Benefits of TSN on VxWorks

Benefit	TSN Role Enabled by VxWorks
Accelerated safety certification, saving time, effort, and expense	<ul style="list-style-type: none">• RTnet Cert: Real-time network stack pre-certified to DO-178C DAL A standards• RTnet TSN Add-on: Updates the RTnet Cert codebase with TSN and provides certification evidence for TSN
Access to Wind River safety certification expertise and IP through a broad range of services	<ul style="list-style-type: none">• Pre-certification work• Assessment (software/hardware/architecture, security, other)• Implementation (design, code, test)• Certification artifacts• Long-term support• Certification support/defense
Applicability to additional sectors and use cases	RTnet Cert is the first offering resulting from the extensive and ongoing Wind River investment in services to support safety certification in a broad range of industry sectors. RTnet TSN Add-on and other services are in development and will be commercially available in the near future.

LEARN MORE

The adoption of TSN is likely to accelerate in the months and years ahead. Make sure your safety-certification efforts can keep pace. Download the white paper “[Hitting the Moving Target with Time-Sensitive Networking](#),” read more about [the TSN capabilities of VxWorks 7](#), and contact [Wind River Professional Services](#) to learn more about RTnet Cert, TSN Add-on, and other upcoming TSN-related capabilities and services.

