

Wind River® VxWorks® 653 Platform

GETTING STARTED

2.2

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Contents

1	Overview	1
1.1	Introduction	1
1.2	Features	2
1.2.1	VxWorks 653	2
1.2.2	Wind River DO-178B Network Stack for VxWorks 653	2
1.2.3	Configuration and Build Tools	3
1.2.4	Wind River Workbench	3
1.2.5	Wind River Workbench for On-Chip Debugging	3
2	Using the Documentation Set	5
2.1	What Documentation Do You Have?	5
2.1.1	Locating Documentation in Workbench Help	6
2.1.2	Accessing Context-Sensitive Help	6
2.1.3	Platform Documentation	7
2.1.4	Host Tools Documentation	7
2.1.5	Operating System Documentation	11
2.1.6	Connectivity Documentation	12

- 2.1.7 Eclipse Documentation 13
 - 2.1.8 Ada Documentation 13
- 2.2 Deciding Which Documentation to Use 14**
 - 2.2.1 Documentation for Application Developers 14
 - 2.2.2 Documentation for Platform Providers 15
 - 2.2.3 Documentation for System Integrators 17

1

Overview

1.1 Introduction 1

1.2 Features 2

1.1 Introduction



NOTE: Wind River VxWorks 653 Platform was previously called Wind River Platform for Safety Critical ARINC 653. Names of products that make up the Platform have not changed.

Wind River VxWorks 653 Platform (VxWorks 653 Platform) includes the Wind River Workbench development suite, associated tools, and the VxWorks 653 real-time operating system and optional Wind River DO-178B Network Stack for VxWorks 653 for developing safety-critical applications that can be certified to Level A of the DO-178B avionics software standard.

The Platform supports development in C and C++. Through Wind River partnership with another vendor, the Platform optionally supports development in Ada. This support is through a product that must be ordered separately from VxWorks 653 Platform.

VxWorks 653 complies with the *Avionics Application Software Standard Interface* ARINC 653 specification, Supplement 2, Part 1: *Required Services*.

This documentation briefly describes Platform features and suggests how to use the Platform's documentation.

1.2 Features

VxWorks 653 Platform includes the following products.

1.2.1 VxWorks 653

VxWorks 653 is a high-performance, protected, real-time operating system that complies with ARINC 653 Supplement 2, Part 1: *Required Services*. In addition, VxWorks 653 includes a subset that is certifiable to Level A of the DO-178B avionics software standard.

VxWorks 653 includes a core OS and one or more partition OSs. A partition OS can be a vThreads OS or a scaled-down OS (called COIL) that offers the minimum services for an application to communicate with the core OS. Support for creating APEX and POSIX applications is included. Each application domain contains a partition OS that provides OS services to the application. Application domains are controlled by the core OS, which provides time and space partitioning, as well as memory management. VxWorks 653 provides complete separation between applications and between applications and the core OS.

1.2.2 Wind River DO-178B Network Stack for VxWorks 653

The Wind River DO-178B Network Stack for VxWorks 653 (DO-178B Network Stack) is a UDP/IPv4 network stack that is certifiable to Level A of the DO-178B avionics software standard. The DO-178B Network Stack supports the BSD sockets API, various application-layer protocols, debugging utilities, and the ability to add support for various additional protocols. It can be configured as part of the VxWorks 653 core OS. The DO-178B Network Stack is optional and must be ordered separately.

1.2.3 Configuration and Build Tools

The configuration and build tools support the XML-based configuration and build of VxWorks 653 modules.

1.2.4 Wind River Workbench

Wind River Workbench (Workbench) is an Eclipse-based collection of tools that provides an end-to-end software-development suite. Workbench supports establishing and managing host-target communications, and developing, running, debugging, monitoring, analyzing, testing, and managing VxWorks 653 modules.

1.2.5 Wind River Workbench for On-Chip Debugging

The Workbench plug-in that supports on-chip debugging is optional and must be ordered separately.

The plug-in adds support for the following products:

- Wind River ICE SX emulator
- Wind River Probe emulator
- Wind River Trace tool

The products can be used to bring up boards, program flash, and test. This emulation system is effective during the entire development process, even before board-level peripherals are stable. The system is useful for board designers as they create new target boards, write device drivers for them, and write BSPs.

2

Using the Documentation Set

2.1 What Documentation Do You Have? 5

2.2 Deciding Which Documentation to Use 14

2.1 What Documentation Do You Have?

Documentation for VxWorks 653 Platform falls into the following categories:

- [2.1.3 Platform Documentation](#), p.7
- [2.1.4 Host Tools Documentation](#), p.7
- [On-Chip Debugging Documentation](#), p.8
- [2.1.5 Operating System Documentation](#), p.11
- [2.1.6 Connectivity Documentation](#), p.12
- [2.1.7 Eclipse Documentation](#), p.13
- [2.1.8 Ada Documentation](#), p.13

2.1.1 Locating Documentation in Workbench Help

The Platform-level documentation (release notes, getting started guide, and installation guides) is not available from Workbench help. All other documentation is available from the Workbench menu bar by doing the following:

1. Click **Help > Help Contents**.
2. From the left pane of the help system that opens, click **Wind River Documentation**.
3. Click **Guides** or **References**.
4. From either of the above categories, click one of the following:
 - **Operating System**
 - **Host Tools**
 - **On-Chip Debugging**
 - **Connectivity**
5. Select the appropriate documentation.

Locating Reference Entries

Reference entries refer to libraries, routines, commands, utilities, or **errno** codes that are in API reference documentation. To find a reference entry, do the following:

1. On the Workbench **Help** menu, click **Search**.
2. In the right **Help** pane that opens, type the reference entry name in the **Search** box.
3. Click **Go**.

If the entry exists, at least one of the matches will be in the API reference documentation.
4. To open the reference entry, click the **Open link in a Help window** icon beside the appropriate match.

2.1.2 Accessing Context-Sensitive Help

In Windows, to access context-sensitive help in Workbench, press **F1**. In Solaris, on the Workbench **Help** menu, click **Dynamic Help**.

2.1.3 Platform Documentation

- **Wind River VxWorks 653 Platform Release Notes**

Includes a list of supported hosts and targets, information on compatibility with the previous release, an outline of new features, and an explanation of any usage caveats. This documentation is available from the Wind River Online Support Web site only. Information on the optional Workbench plug-in for on-chip debugging that would normally be in Platform release notes is in the release notes for the plug-in, also available from Online Support.

- **Developer Install Guide**

Describes how to install the Platform with a temporary license and permanently with a product activation file. This documentation is shipped in print with the Platform.

- **Licence Administrator Install Guide**

Describes how to use license administrator tools and create a product activation file for the Platform. This documentation is shipped in print with the Platform.

- **Wind River VxWorks 653 Platform Getting Started**

This documentation. It suggests how to use the documentation set, based on a person's development role. It is available as a PDF file on its own CD, called *Wind River VxWorks 653 Platform Getting Started*, 2.2.

2.1.4 Host Tools Documentation

Except as noted below, host tools documentation is under the **Host Tools** help category.

Workbench Documentation

- **Wind River Workbench User's Guide (VxWorks 653 Version)**

Provides information on running, monitoring, and debugging VxWorks 653 modules using Workbench. Configuration and build information is in the *VxWorks 653 Configuration and Build Guide* and its companion *VxWorks 653 Configuration and Build Reference*.

- **Wind River Workbench User Interface Reference**

Provides a reference of Workbench GUI features, including wizards, views, dialog boxes, and perspectives. In addition, it includes the event legend, event dictionary, and networking event dictionary for the Wind River System Viewer for VxWorks 653.

- **Wind River System Viewer User's Guide**

Describes how to set up and use the System Viewer, which is the software logic analyzer that is integrated with Workbench.

- **Wind River System Viewer API**

Provides interfaces and classes for constructing and accessing the contents of System Viewer event directories. It also provides controlled access to the System Viewer event log through a Java interface.

On-Chip Debugging Documentation

If you purchased and installed the optional Workbench plug-in for on-chip debugging, the following documentation is available under the **On-Chip Debugging** help category.



NOTE: Information on the on-chip debugging plug-in that would normally be in Platform release notes is in separate release notes: the *Wind River Workbench for On-Chip Debugging Release Notes*. They are available from Online Support.

- **Wind River Workbench for On-Chip Debugging Board Bring-Up Guide for PowerPC**

Describes how to use Workbench with the Wind River ICE SX and Wind River Probe emulators to bring up a target board from initial power-up, through running application code and debugging it.

- **Wind River Workbench for On-Chip Debugging User Tutorials**

Describes common use cases for the Wind River ICE SX and Wind River Probe emulators, such as, setting up OS-independent projects, working with registers, programming flash, tracing running code, examining target cache, performing statistical profiling analysis on running code, flashing a VxWorks 653 boot ROM on a target, and downloading an image to a target without using a boot ROM or boot loader.

- **Wind River Workbench for On-Chip Debugging Configuration Options Reference**
Provides general information on the configuration options that are available for each target architecture that Workbench supports.
- **Wind River Workbench for On-Chip Debugging Command Reference**
Provides an alphabetical list of Wind River ICE SX and Wind River Probe low-level commands. Each entry includes a description, syntax information, and examples.
- **Wind River ICE SX for Wind River Workbench Hardware Reference**
Describes the physical ICE unit. It also describes how to connect to a host and target, configure the ICE for use on a network, and use the ICE with Workbench.
- **Wind River Probe for Wind River Workbench Hardware Reference**
Describes how to make physical connections between Wind River Probe, a target, and a host computer; how to install Wind River Probe drivers; and how to use Workbench to connect to Wind River Probe and the target.
- **Wind River Trace for Wind River Workbench Hardware Reference**
Describes Wind River Trace features, provides safety and contact information, provides connection information, describes how to connect power, and describes how to use Wind River Trace from Workbench.

GNU Compiler and Tools Documentation

- **GNU Make User's Guide**
Describes the GNU **make** utility.
- **Wind River GNU Compiler Using the GNU Compiler Collection**
Describes how to use the Wind River GNU Compiler, as well as incompatibilities and how to report defects.
- **Wind River GNU C Preprocessor**
Describes how to use the Wind River GNU C **cpp** preprocessor.
- **Wind River GNU Binary Utilities**
Describes the Wind River GNU binary utilities collectively known as version 031125. They include **addr2line**, **ar**, **c++filt**, **dlltool**, **nlmconv**, **nm**, **objcopy**, **objdump**, **ranlib**, **readelf**, **size**, **strings**, **strip**, and **windres**.

- **Wind River Compiler Using as**

Describes how to use the Wind River GNU **as** assembler.

- **Wind River Compiler Using ld**

Describes how to use the Wind River GNU **ld** linker, which combines a number of object and archive files, relocates their data, and ties up symbol references.

WTX Documentation

WTX (Wind River tool exchange) is a protocol that lets host applications communicate with the target server. WTX can also be used to connect third-party applications to the Workbench GUI.

- **WTX C Library Reference**

Provides an alphabetical list of WTX C libraries (high-level WTX library, message-level WTX library, and library of Wind River Registry WTX-related library) and their routines.

- **WTX Errors Reference**

Provides an alphabetical list of WTX protocol errors.

- **WTX Events Reference**

Provides an alphabetical list of WTX events.

- **WTX Tcl Library Reference**

Provides an alphabetical list of WTX Tcl libraries and their routines.

Miscellaneous Host Tools Documentation

- **Wind River Host Utilities VxWorks 653 API Reference**

Provides an alphabetical list of host utilities, including utilities to generate and build VxWorks 653 shared libraries, applications, and platforms.

- **Wind River VxWorks 653 Shell**

Provides an alphabetical list of VxWorks 653 routines that can be called from the host shell.

- **Wind River WDB Protocol API Reference**

Provides an alphabetical list of routines in the WDB protocol.

- **Wind River Host Shell API Reference**

Provides an alphabetical list of libraries and routines that make up the host shell API.

- **Wind River Host Tools API Reference**

Provides an alphabetical list of Wind River host tools, for example the target server, multi-protocol proxy, console tool for the target server, and Wind River service registry.

2.1.5 Operating System Documentation

VxWorks 653 documentation is under the **Operating System** help category.

- **VxWorks 653 Configuration and Build Guide**

Describes how to configure and build VxWorks 653 modules. It also includes a reference process that you can use as a starting point.

- **VxWorks 653 Configuration and Build Reference**

Describes elements and attributes used in the XML-based configuration of VxWorks 653 modules. It also includes component-reference information.

- **VxWorks 653 Programmer's Guide**

Provides information for using VxWorks 653 to develop APEX, COIL, POSIX, and vThreads applications in C and to develop vThreads applications in C++. It also provides information about programming in the core OS.

- **VxWorks 653 Partition OS API Reference**

Provides an alphabetical reference of partition-level libraries and routines for APEX, COIL, POSIX, and vThreads. Each library entry lists its routines and includes a synopsis of each routine and a general description of its use.

- **VxWorks 653 Partition OS Errno Code List**

Provides a reference of partition-level **errno** error codes associated with APEX, POSIX, and vThreads. Error codes can be sorted numerically, alphabetically, or by the routine that sets them. (Error codes associated with the COIL partition OS are in the *VxWorks 653 VAL Errno Code List*.)

- **VxWorks 653 Core OS API Reference**

Provides an alphabetical reference of core OS libraries and routines. Each library entry lists its routines and includes a synopsis of each routine and a general description of its use.

- **VxWorks 653 Core OS Errno Code List**

Provides a reference of **errno** error codes associated with the core OS. Error codes can be sorted numerically, alphabetically, or by the routine that sets them.

- **VxWorks 653 VAL Errno Code List**

Provides a list of **errno** error codes associated with the vThreads abstraction layer (VAL) in the core OS. (VAL is the layer that the vThreads partition OS uses to communicate with the core OS). It also includes **errno** error codes associated with the COIL partition OS. Error codes can be sorted numerically, alphabetically, or by the routine that sets them.

- **VxWorks 653 BSP Reference**

Consists of an alphabetical reference of BSP-specific libraries and routines for all installed BSPs.

2.1.6 Connectivity Documentation

If you purchased the optional Wind River DO-178B Network Stack for VxWorks 653 (DO-178B Network Stack), the following documentation is available under the **Connectivity** help category.

- **Wind River DO-178B Network Stack for VxWorks 653 Guide**

Provides information for configuring, building, using, and debugging the DO-178B Network Stack in the core OS. (Reference information on configuration components is in the *VxWorks 653 Configuration and Build Reference*.)

- **Wind River DO-178B Network Stack for VxWorks 653 RFC Compliance Reference**

Lists the RFCs that the DO-178B Network Stack supports and provides associated compliance information.

- **Wind River DO-178B Network Stack for VxWorks 653 Sockets API Reference**
Provides an alphabetical reference of the sockets API and associated utilities. Each entry includes a synopsis of the routine and a general description of its use.
- **Wind River DO-178B Network Stack for VxWorks 653 Protocols API Reference**
Provides an alphabetical reference of the API for supported application protocols. Each entry includes a synopsis of the routine and a general description of its use.
- **Wind River DO-178B Network Stack for VxWorks 653 Utilities API Reference**
Provides an alphabetical reference of the API for debugging utilities. Each entry includes a synopsis of the utility and a general description of its use.

2.1.7 Eclipse Documentation

Wind River Workbench is based on the Eclipse Platform. Eclipse is an open-source community that provides this vendor-neutral, open development platform and application framework for building software. For more information, see eclipse.org.

The *Eclipse Workbench User Guide* (produced by the Eclipse Foundation) provides information about general Eclipse concepts and procedures. It is available from **Help > Help Contents > Wind River Partners Documentation**.

2.1.8 Ada Documentation

For information on how to access Ada documentation, click **Help > Help Contents > Wind River Partners Documentation > Ada Support**.

2.2 Deciding Which Documentation to Use

This section identifies the documentation you may need, based on your development role of application developer, platform provider, or system integrator.

NOTE: This section is a guideline only.

It is impossible to list which documentation is relevant to your particular work. Review [2.1 What Documentation Do You Have?](#), p.5, and ensure you consider all the documentation described there.

2.2.1 Documentation for Application Developers

Application developers develop applications that run in partitions. They may also develop databases for applications to use.

This section describes some of the tasks that application developers may need to complete and some of the tools they may need to use. It lists the associated documentation in suggested reading order.

- **Installing VxWorks 653 Platform**
 - *Wind River VxWorks 653 Platform Release Notes*
 - *Developer Install Guide*
- **Configuring Applications**
 - *VxWorks 653 Configuration and Build Guide*
 - *VxWorks 653 Configuration and Build Reference*
- **Developing APEX Applications**
 - *VxWorks 653 Programmer's Guide: Developing APEX Applications*
 - *VxWorks 653 Partition OS API Reference*
- **Developing vThreads Applications**
 - *VxWorks 653 Programmer's Guide: Developing vThreads Applications*
 - *VxWorks 653 Partition OS API Reference*

- **Developing POSIX Applications**
 - *VxWorks 653 Programmer's Guide: Developing POSIX Applications*
 - *VxWorks 653 Partition OS API Reference*
- **Developing C++ Applications**
 - *VxWorks 653 Programmer's Guide: Developing C++ Applications*
- **Compiling**
 - *Wind River Workbench User's Guide (VxWorks 653 Version): Build*
 - *GNU Make User's Guide*
 - *Wind River GNU Compiler Using the GNU Compiler Collection*
 - *Wind River GNU C Preprocessor*
- **Communicating with Target Hardware**
 - *Wind River Workbench User's Guide (VxWorks 653 Version): Tools*
- **Loading Images onto Target Hardware**
 - *Wind River Workbench User's Guide (VxWorks 653 Version): Tools*
- **Debugging Applications**
 - *Wind River Workbench User's Guide (VxWorks 653 Version): Debug*
 - *Wind River Workbench User's Guide (VxWorks 653 Version): Debugger Tutorial*
- **Monitoring Port Activity**
 - *Wind River Workbench User's Guide (VxWorks 653 Version): Tools*

2.2.2 Documentation for Platform Providers

Platform providers develop the hardware and software that make up a computing platform. They may also design and deliver tools that application developers or system integrators need in order to develop configuration items for the platform.

This section describes some of the tasks that platform providers may need to complete and some of the tools they may need to use. It lists the associated documentation in suggested reading order.

- **Installing VxWorks 653 Platform**
 - *Wind River VxWorks 653 Platform Release Notes*
 - *License Administrator Install Guide*
 - *Developer Install Guide*
- **Configuring the Core OS and System Libraries**
 - *VxWorks 653 Configuration and Build Guide*
 - *VxWorks 653 Configuration and Build Reference*
- **Configuring and Building the DO-178B Network Stack**
 - *Wind River DO-178B Network Stack for VxWorks 653 Guide*
 - *VxWorks 653 Configuration and Build Guide*
 - *VxWorks 653 Configuration and Build Reference*
- **Using the DO-178B Network Stack**
 - *Wind River DO-178B Network Stack for VxWorks 653 Guide*
 - *Wind River DO-178B Network Stack for VxWorks 653 Sockets API Reference*
 - *Wind River DO-178B Network Stack for VxWorks 653 Protocols API Reference*
 - *Wind River DO-178B Network Stack for VxWorks 653 Utilities API Reference*
 - *VxWorks 653 Programmer's Guide: Programming in the Core OS*
- **Setting up Health Monitoring**
 - *VxWorks 653 Programmer's Guide: Health Monitoring*
- **Compiling**
 - *Wind River Workbench User's Guide (VxWorks 653 Version): Tools*
 - *GNU Make User's Guide*
 - *Wind River GNU Compiler Using the GNU Compiler Collection*
 - *Wind River GNU C Preprocessor*
- **Communicating with Target Hardware**
 - *Wind River Workbench User's Guide (VxWorks 653 Version): Tools*
- **Loading Images onto Target Hardware**
 - *Wind River Workbench User's Guide (VxWorks 653 Version): Tools*

- **Debugging the Platform**
 - *Wind River Workbench User's Guide (VxWorks 653 Version): Tools*
 - *Wind River Workbench User's Guide (VxWorks 653 Version): Debugger Tutorial*
 - *Wind River DO-178B Network Stack for VxWorks 653 Guide: Debugging*
- **Using the Host Shell**
 - *Wind River Workbench User's Guide (VxWorks 653 Version): Tools*
- **Using the WTX Console**
 - *WTX C Library Reference*
- **Monitoring Performance**
 - *Wind River Workbench User's Guide (VxWorks 653 Version): Tools*
 - *Wind River DO-178B Network Stack for VxWorks 653 Guide: Debugging*
- **Monitoring Port Activity**
 - *Wind River Workbench User's Guide (VxWorks 653 Version): Tools*
- **Monitoring Memory Usage**
 - *Wind River Workbench User's Guide (VxWorks 653 Version): Tools*

2.2.3 Documentation for System Integrators

System integrators integrate the pieces delivered by application developers and platform providers and add additional components that might be required to create the final platform. For example, a system integrator might be required to develop an OS configuration binary that includes memory allocation, the configuration of interpartition communication, and any other OS-specific parameters.

This section describes some of the tasks that system integrators may need to complete and some of the tools they may need to use. It lists the associated documentation in suggested reading order.

- **Installing VxWorks 653 Platform**
 - *Wind River VxWorks 653 Platform Release Notes*
 - *License Administrator Install Guide*
 - *Developer Install Guide*

- **Configuring the Platform So That Applications Are Integrated**
 - *VxWorks 653 Configuration and Build Guide*
 - *VxWorks 653 Configuration and Build Reference*
- **Setting up Interpartition Communication**
 - *VxWorks 653 Programmer's Guide: Developing APEX Applications*
- **Compiling**
 - *Wind River Workbench User's Guide (VxWorks 653 Version): Tools*
 - *GNU Make User's Guide*
 - *Wind River GNU Compiler Using the GNU Compiler Collection*
 - *Wind River GNU C Preprocessor*
- **Communicating with Target Hardware**
 - *Wind River Workbench User's Guide (VxWorks 653 Version): Tools*
- **Loading Images onto Target Hardware**
 - *Wind River Workbench User's Guide (VxWorks 653 Version): Tools*
- **Debugging the System**
 - *Wind River Workbench User's Guide (VxWorks 653 Version): Debug*
 - *Wind River Workbench User's Guide (VxWorks 653 Version): Debugger Tutorial*
 - *Wind River DO-178B Network Stack for VxWorks 653 Guide: Debugging*