

LabVIEW™ Real-Time Module Release and Upgrade Notes

Version 8.0

This document provides installation instructions, system requirements, upgrade information, and descriptions of the new features for version 8.0 of the LabVIEW Real-Time Module.

Refer to the *Getting Started with the LabVIEW Real-Time Module* manual for exercises you can complete to familiarize yourself with the new features and enhancements to the Real-Time Module.

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System Requirements

Table 1 describes the system requirements to run version 8.0 of the Real-Time Module. The Real-Time Module system requirements are in addition to the LabVIEW system requirements listed in the *LabVIEW Release Notes*.

Table 1. System Requirements for the Real-Time Module 8.0

Platform	Media and System Requirements	Important Notes
Windows 2000/XP	<p>National Instruments recommends that you have at least 200 MB of disk space for the minimum Real-Time Module installation or 700 MB of disk space for the complete Real-Time Module installation, which includes the Real-Time and Embedded drivers from the National Instruments Device Drivers CD.</p> <p>(RTX) You must install Service Pack 2 for Windows XP.</p>	<p>LabVIEW does not support Windows NT/Me/9x.</p> <p>You might need more memory than the LabVIEW-recommended minimum of 128 MB of RAM depending on the size of the application you design in LabVIEW on the host computer.</p> <p>To use the <i>LabVIEW Help</i>, the NI Measurement & Automation Explorer (MAX) interactive help system, and the NI Example Finder, you must have Microsoft Internet Explorer 5.0 or later.</p> <p>To view and control the front panel of a VI running on an RT target remotely using a Web browser, National Instruments recommends Internet Explorer 5.5 with Service Pack 2 or later.</p>

Installing the Real-Time Module 8.0

This section includes information about installing the Real-Time Module and the Real-Time Module for RTX Targets on a development, or host, computer.



Note You must install LabVIEW 8.0 before attempting to install the Real-Time Module 8.0. Refer to the *LabVIEW Release Notes* for the LabVIEW installation instructions.

LabVIEW Real-Time Module

Complete the following steps to install the LabVIEW Real-Time Module on the host computer.

1. Disable any automatic virus detection programs before you install. Some virus detection programs interfere with the installation program.
2. Log on as an administrator or as a user with administrator privileges.
3. Insert the LabVIEW Real-Time Module installation CD into the CD-ROM drive. The LabVIEW Real-Time Module installation program runs automatically.
4. Follow the instructions that appear on the screen.
5. Install the Real-Time and Embedded drivers and any other drivers that you require from the National Instruments Device Driver CD.

LabVIEW Real-Time Module for RTX Targets

Complete the following steps to install the LabVIEW Real-Time Module for RTX Targets on the host computer.

1. Disable any automatic virus detection programs before you install. Some virus detection programs interfere with the installation program.
2. Log on as an administrator or as a user with administrator privileges.
3. Install the Ardence RTX 6.1 Runtime and restart the computer. Refer to the Ardence RTX 6.1 documentation for information about installing and configuring the RTX 6.1 Runtime on the host computer.
4. Insert the LabVIEW Real-Time Module CD into the CD-ROM drive. The LabVIEW Real-Time Module installation program runs automatically.
5. Follow the instructions that appear on the screen.
6. Install the Real-Time and Embedded drivers and any other drivers that you require from the National Instruments Device Driver CD.

RT Target Configuration

Use MAX to configure RT targets and to install software and drivers on targets.

- **Networked RT Targets**—Refer to the *Remote Systems* section of the *Measurement & Automation Explorer Help*, available by selecting **Help»MAX Help** from MAX, for information about configuring networked RT targets.
- **RT Series Plug-in Devices**—Refer to the *RT Series DAQ Devices (NI PCI-7041/6040E)* topic of the *Measurement & Automation Explorer Help* for information about configuring RT Series plug-in devices.
- **Desktop PC Targets**—Refer to the *Using Desktop PCs as RT Targets with the LabVIEW Real-Time Module* document for information about configuring a desktop PC as a networked RT target.



Note RTX targets do not require configuration.

Upgrade Issues

The following section provides a description of changes to VIs, structures, utilities, dialog boxes, menus, and documentation resources when you upgrade to version 8.0 of the Real-Time Module from a previous version. Refer to the *LabVIEW Help* for more information about the following topics.

Changes to VIs and Structures

Real-Time FIFO VIs

The Real-Time FIFO VIs now support 64-bit signed and unsigned integer data types. Use 64-bit signed and unsigned integer data types to use, view, and store integers with high precision.

Timed Loop

You can set a deadline for the execution of the Timed Loop subdiagram. If the subdiagram does not complete before the deadline, the **Finished Late? [i-1]** output of the Left Data node returns `TRUE` in the next iteration of the Timed Loop. However, missing a deadline does not affect the execution of the Timed Loop.

You can add frames to a Timed Loop that execute sequentially within the loop and use a secondary clock source to control the timing of the frames independent of the structure timing.

Changes to Real-Time Utilities and Dialog Boxes

LabVIEW Application Builder

Use **Build Specifications**, located under an RT target in the **Project Explorer** window, to create build specifications for and to build stand-alone real-time applications that can run automatically when you power on an RT target.

Version 8.0 of the Real-Time Module does not support creating installers for stand-alone real-time applications. You must use LabVIEW to deploy a stand-alone real-time application to an RT target.

RT Communication Wizard

The RT Communication Wizard supports the LabVIEW shared variable for sending data to and receiving data from RT target VIs. Select **Tools»Real-Time Module»Communication Wizard** to launch the RT Communication Wizard.

Advanced Ethernet Settings Dialog Box (ETS)

Use the **Advanced Ethernet Settings** dialog box in MAX to configure advanced Ethernet settings for networked RT targets and to add a secondary Ethernet device on RT Series PXI targets. Refer to the *Measurement & Automation Explorer Help* for information about the **Advanced Ethernet Settings** dialog box.

Changes to the Real-Time Module Documentation

The *LabVIEW Help* now contains conceptual content from the *LabVIEW Real-Time Module User Manual*. The Real-Time Module therefore no longer ships with a PDF library or with print and PDF versions of the *LabVIEW Real-Time Module User Manual*. Refer to the *Real-Time Module Concepts* book on the **Contents** tab of the *LabVIEW Help* for information about the Real-Time Module features.

Refer to the *Getting Started with the LabVIEW Real-Time Module* document for exercises you can complete to familiarize yourself with the new features and enhancements to the Real-Time Module.

Menu Reorganization

Menu items have moved or been renamed for version 8.0 of the Real-Time Module. Table 2 lists the menu items that have changed.

Table 2. LabVIEW Menu Changes for the Real-Time Module

LabVIEW 7.1 Menu Item	Equivalent LabVIEW 8.0 Menu Item
File»Exit without closing RT Engine VIs	Use the Project Explorer window to disconnect from RT targets and then exit LabVIEW. Right-click an RT target and select Disconnect from the shortcut menu to disconnect from the target.
Operate»Download Application	From the Project Explorer window, right-click a VI and select Deploy from the shortcut menu.
Operate»Switch Execution Target	Use the Project Explorer window to add and connect to RT targets. Right-click the project root and select New»Targets and Devices from the shortcut menu to add RT targets. Right-click an RT target and select Connect from the shortcut menu to connect to the target.
Tools»Build Application or Shared Library (DLL)	From the Project Explorer window, right-click Build Specifications under an RT target and select New»Real-Time Application from the shortcut menu.
Tools»RT Communication Wizard	Tools»Real-Time Module»Communication Wizard
Tools»RT Target Options	From the Project Explorer window, right-click an RT target and select Properties from the shortcut menu.

New Real-Time Module 8.0 Features

The Real-Time Module includes the following new features. Refer to the *LabVIEW Help* for more information about the following new features.

LabVIEW Projects

Use LabVIEW projects to group LabVIEW files and non-LabVIEW files, create real-time build specifications, and deploy files to an RT target. When you save a project, LabVIEW creates a project file (.lvproj), which includes references to files in the project, configuration information, build information, and deployment information.

You can create a new project with the Real-Time Project Wizard, available by selecting **Tools»Real-Time Module»Project Wizard** from the **Getting Started** window. You also can create a project manually by selecting **File»New Project** from the **Getting Started** window and then using the **Project Explorer** window to add RT targets, VIs, and other support files to the project. Refer to the *Getting Started with the LabVIEW Real-Time Module* document for exercises you can complete to familiarize yourself with projects.

Real-Time Project Wizard

Use the Real-Time Project Wizard to create a new project that defines RT targets and includes VIs and other application files. You can create projects using one of three architectures with the Real-Time Project Wizard—continuous communication, state machine, or custom.

- **Continuous communication architecture**—Use a continuous communication architecture to create data acquisition applications that log data to disk and continuously communicate with a host computer or to create applications that perform continuous deterministic tasks.
- **State machine architecture**—Use a state machine architecture to implement complex decision-making algorithms represented by state diagrams or flow charts. A state machine implements any algorithm described by a Moore machine, which performs a specific action for each state in the diagram.
- **Custom project**—Use a custom project architecture to add a blank VI or import existing VIs to run on the host computer or RT target.

Project Explorer Window

The **Project Explorer** window enables you to manage the targets, VIs, and other support files of a project from one location. Use the **Project Explorer** window to connect to RT targets, to set target properties, and to deploy VIs to targets. The **Project Explorer** window includes the following sections.

- **Project root**—Contains the host computer and the RT targets assigned to the current project.
 - **My Computer**—Represents the host computer as a target in the project.
 - **RT Target**—Represents the RT targets in the project. By default, the heading for an RT target is the name of the target as specified in MAX.

VIs and libraries that you add to an RT target appear under the target in the **Project Explorer** window.

Shared Variables for Deterministic Communication

Use shared variables to read and write data from VIs in a project or across a network. Shared variables are configured software items that can send data between two locations in a block diagram that cannot be connected with wires, between two VIs running on an RT target, or between two VIs across a network running on different targets.

Use single-process shared variables to share data between two locations in a block diagram or VIs running on an RT target. Use network-published shared variables to share data between VIs running on different targets. Right-click an RT target in the **Project Explorer** window and select **New»Variable** from the shortcut menu to open the **Shared Variable Properties** dialog box.

The Real-Time Module adds a real-time FIFO—first in, first out buffer—to the shared variable. By enabling the real-time FIFO of a shared variable, you can deterministically share data without affecting the determinism of VIs running on an RT target. From the **Real-Time FIFO** page of the **Shared Variable Properties** dialog box, place a checkmark in the **Enable Real-Time FIFO** checkbox to enable the real-time FIFO for a shared variable.

RT Target Properties Dialog Box

Use the RT target **Properties** dialog box to configure the project settings of an RT target. You can configure general, VI Server, Web Server, access, and miscellaneous target settings. For example, you can enable the VI Server on the RT target from the RT target **Properties** dialog box.

Right-click an RT target in the **Project Explorer** window and select **Properties** from the shortcut menu to open the RT target **Properties** dialog box. After configuring the settings of an RT target, you must deploy the settings to the target by right-clicking the target and selecting **Deploy** from the shortcut menu.

LabVIEW Timed Structures (ETS)

Use the Timed Structures, located on the **Timed Structures** palette, when you want to develop VIs with precise timing, execution feedback, timing characteristics that change dynamically, or several levels of execution priority.

Timed Sequence

The Timed Sequence consists of one or more task subdiagrams, or frames, that execute sequentially. You can control the execution of the Timed Sequence using an internal or external clock source.

You also can use a secondary clock source to control the timing of the frames independent of the structure timing.

Timed Loop with Frames

You can add frames that execute subdiagrams sequentially for every loop iteration to a Timed Loop. You can control the execution of each iteration of a Timed Loop using an internal or external clock source.

You also can use a secondary clock source to control the timing of the frames independent of the structure timing.

Real-Time Benchmarking VIs

Use the Real-Time Benchmarking VIs, located on the **Real-Time Utilities** palette, to benchmark the performance of VIs and sections of VIs running on an RT target. You can use the benchmark information to optimize the design of RT target VIs.

RT Get Timestamp VI

Use the RT Get Timestamp VI to return a 64-bit timestamp value from a high-precision timing source.

RT Timestamp Analysis VI

Use the RT Timestamp Analysis VI to analyze the timestamp values returned by the RT Get Timestamp VI.

RT Target Errors Dialog Box

Use the **RT Target Errors** dialog box to view error logs for the RT sessions of an RT target. An RT session begins when you power on an RT target and ends when you reboot the target. The **RT Target Errors** dialog box displays LabVIEW errors, real-time operating system errors, and crash logs for an RT target. Right-click an RT target in the **Project Explorer** window and select **Utilities»View Error Log** from the shortcut menu to view the error logs of the target using the **RT Target Errors** dialog box.

Dual Ethernet Device Support for NI PXI Targets (ETS)

The **Advanced Ethernet Settings** dialog box in MAX was updated to support configuration of multiple Ethernet devices for RT Series PXI targets. You can create applications that use multiple Ethernet devices to send multiple copies of data over different networks from an RT target and to prioritize or isolate network traffic. In MAX, click the **Advanced Ethernet Settings** button on the **Network Settings** tab of an RT target to open the **Advanced Ethernet Settings** dialog box.

Real-Time Module Examples

Use the NI Example Finder, available by selecting **Help»Find Examples** from LabVIEW, to browse or search for example VIs. You also can access the example VIs from the `labview\examples\Real-Time` directory. The Real-Time Module includes examples of multithreaded communication, network communication, and shared memory access.

- **Multithreaded Communication**—Example VIs that use functional global variables, Real-Time FIFO VIs, and shared variables to communicate between the sections of a multithreaded application.
- **Network Communication**—Example VIs that use shared variables, TCP, UDP, and the VI Server to communicate between the host computer and an RT target.
- **Shared Memory**—Example VIs that use the Real-Time Shared Memory VIs to communicate between a host computer and an RT Series plug-in device or RTX target.

Known Issues with the Real-Time Module 8.0

Refer to the `readme_RT.html` file on the LabVIEW Real-Time Module 8.0 installation CD for information about known issues with the Real-Time Module 8.0.

You also can launch the `readme_RT.html` file from Windows after you install the Real-Time Module. Complete the following steps to access the `readme_RT.html` file from Windows.

1. Select **Start»All Programs»National Instruments»LabVIEW 8.0»Readme** to open the `labview\readme` directory.

The `labview\readme` directory contains the HTML readme files for LabVIEW, the LabVIEW modules, and add-ons installed on the computer.

2. Double-click `readme_RT.html` to open the *LabVIEW Real-Time Module Readme*.

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