Simulink® Desktop Real-Time™ Release Notes

MATLAB®

MathWorks®

How to Contact MathWorks

Latest news: www.mathworks.com

Sales and services: www.mathworks.com/sales_and_services

User community: www.mathworks.com/matlabcentral

Technical support: www.mathworks.com/support/contact_us

Phone: 508-647-7000

The MathWorks, Inc.
3 Apple Hill Drive
Natick, MA 01760-2098

Contents

R2014b

R2014a

R2013b

R2013a

R2012b

R2012a

R2007b

R2007a

R2006b

R2006a

No New Features or Changes

R14SP3

R14SP2

R2018a

Version: 5.6

New Features

Bug Fixes

TCP Protocol: Interface with TCP protocol by using Stream Input and Output blocks

In R2018a, Standard Device drivers have been improved.

- **TCP Protocol** — The TCP driver has been added for Windows® and macOS.
- **UDP Protocol** — The UDP driver has been updated. In addition to IP addresses, you can use host names to specify a remote host for the UDP Protocol.

Encoder Input Block Reset for NI PCIe-6351

In R2018a, the Encoder Input block has an added option to select encoder phase for index pulse to the National Instruments PCI-62xx and PCI-63xx board drivers.

macOS Systems: Real-time performance improvement

In R2018a, real-time performance in external mode on macOS systems has been significantly improved.

2

R2017b

Version: 5.5

New Features

Bug Fixes

Compatibility Considerations

Internet of Things (IoT) Support: Interface with ThingSpeak by using I/O blocks

To access the Internet of Things platform, use the ThingSpeak Input and ThingSpeak Output blocks.

Board Driver Support: Advantech PCI-1723

Simulink Desktop Real-Time supports the Advantech® PCI-1723 for digital I/O and for digital-to-analog conversion.

Functionality Being Removed or Changed

Functionality	What Happens When You Use This Functionality?	Use This Functionality Instead	Compatibility Considerations
Device addresses display as decimal instead of hexadecimal.	Dialog boxes and printed output show decimal values.	N/A	N/A

R2017a

Version: 5.4

New Features

Bug Fixes

Performance Monitoring: Measure execution time and record event timestamps

In external mode, to output the task execution time of a model, use the Execution Time block. To output the time at which a specific portion of the model is executed, use the Timestamp block. In normal and accelerated modes, these blocks output zeros. See Execution Time Measurement and Block Profiling.

R2016b

Version: 5.3

New Features

Bug Fixes

Model Variants: Simulink Desktop Real-Time ERT code generation supports CustomDefines

When using embedded real time (ERT) code generation, you can generate multiple versions of a Simulink Desktop Real-Time model. You can then use CustomDefines to build and run the version you want.

R2016a

Version: 5.2

New Features

Bug Fixes

Data Streaming: Visualize signal data by using Simulation Data Inspector and dashboard blocks

In external mode, you can stream signal data to Simulation Data Inspector and to dashboard blocks. You can also tune parameter values by using the dashboard blocks. See Inspect Signal Data with Simulation Data Inspector.

R2015b

Version: 5.1

New Features

Bug Fixes

Compatibility Considerations

Simulink Fast Restart Support: Quickly run consecutive real-time simulations

To iterate your model more quickly, use Simulink fast restart in normal and accelerator modes. Fast restart compiles the model only in the first iteration and uses the same compiled information for successive runs.

Functionality being removed or changed

Functionality	What Happens When You Use This Functionality?	Use This Functionality Instead	Compatibility Considerations
System target file settings `rtwinert.tlc` and `rtwin.tlc` have been removed.	When you load models with the old settings, the models are converted to `sldrt.tlc` and `sldrtert.tlc`.	`sldrt.tlc` and `sldrtert.tlc`	To complete the conversion, save your models.

R2015a

Version: 5.0

New Features

Bug Fixes

Compatibility Considerations

Support for Mac OS X

MathWorks® has extended Simulink Desktop Real-Time, previously called Real-Time Windows Target™, to run on Mac OS X. I/O support for Mac OS X includes UDP, National Instruments® X-series boards, and HUMUSOFT® boards. For more information, see `www.mathworks.com/hardware-support/simulink-desktop-real-time.html`.

Compatibility Considerations

MathWorks has renamed the following functions, maintaining the same functionality.

- `rtwintgt` as `sldrtkernel`
- `rtwinconfigset` as `sldrtconfigset`

MathWorks has renamed the featured examples. Except as noted, they run on both Windows and Mac OS X.

- Example `rtvdp` ⇒ `sldrtex_vdp`
- Example `rtsiggen` ⇒ `sldrtex_siggen`
- Example `rtctrl` ⇒ `sldrtex_controller`
- Example `rtfilter` ⇒ `sldrtex_filter`
- Example `rtcounter` ⇒ `sldrtex_counter`
- Example `rtwindemo_pwmmeasure` ⇒ `sldrtex_pwmmeasure`
- Example `rtpacketio` ⇒ `sldrtex_packetio`
- Example `rtstreamio` ⇒ `sldrtex_streamio`
- Example `rtwindemo_canio` ⇒ `sldrtex_canio` (Windows only)
- Example `rtwindemo_canmessage` ⇒ `sldrtex_canmessage` (Windows only)

Support for Thunderbolt interface on Mac OS X

Simulink Desktop Real-Time supports data acquisition devices connected via the Thunderbolt interface on Mac OS X.

Functionality being removed or changed

The following functionality is being removed or changed.

Functionality	What Happens When You Use This Functionality?	Use This Functionality Instead	Compatibility Considerations
Support for ISA boards will be removed in a future release.	Existing models using ISA boards function.	PCI, PC/104, Compact PCI, PCMCIA boards	Existing models using ISA boards will cease to function after ISA board support is removed.

R2014b

Version: 4.5

New Features

Bug Fixes

Support for Thunderbolt interface

Real-Time Windows Target supports data acquisition devices connected via the Thunderbolt interface.

Support for HUMUSOFT MF644 board

Real-Time Windows Target supports the HUMUSOFT MF644 data acquisition device for the Thunderbolt interface.

9

R2014a

Version: 4.4

New Features

Bug Fixes

Run button automatically builds target code, connects to target, and runs application in External Mode

You can auto-configure and run Real-Time Windows Target models by setting **Simulation > Mode** to `External` and clicking **Run**.

Support for Windows 8.1

Real-Time Windows Target now runs under Windows 8.1.

Clang compiler upgraded to version 3.2

Real-Time Windows Target now bundles the Clang 3.2 compiler.

R2013b

Version: 4.3

New Features

Bug Fixes

CAN_MESSAGE data type for Packet Input and Packet Output blocks

The CAN_MESSAGE data type is now supported with the Packet Input and Packet Output blocks, for consistency with Vehicle Network Toolbox™, Simulink Real-Time™, and other MathWorks products. Type 'CAN_MESSAGE' in the **Block output data types** box of the Real-Time Windows Target Packet Input block and in the **Output packet field data types** box of the Packet Output block.

National Instruments PCIe-63xx (X series) boards on PCI Express bus

Real-Time Windows Target supports the National Instruments PCIe-63xx (X series) boards on the PCI Express® bus.

HUMUSOFT MF634 board on PCI Express bus

Real-Time Windows Target supports the HUMUSOFT MF634 board on the PCI Express bus.

Real-Time Windows Target Examples

Real-Time Windows Target includes the following CAN examples:

- CAN Input/Output
- CAN Input/Output with Vehicle Network Toolbox

R2013a

Version: 4.2

New Features

Bug Fixes

Compatibility Considerations

Clang LLVM compiler for 32-bit and 64-bit platforms that replaces Open Watcom

The bundled Open Watcom compiler has been replaced with the Clang LLVM compiler, which runs on both 32-bit and 64-bit platforms.

printf function output to MATLAB Command Window when called from real-time application

The `printf` function sends output to the MATLAB® Command Window when it is called from the real-time application.

Functionality Being Removed or Changed

Functionality	What Happens When You Use This Functionality?	Use This Instead	Compatibility Considerations
`rtwho` no longer displays `MATLAB performance` and `Kernel timeslice period` information.	`rtwho` still runs	None	None

R2012b

Version: 4.1

New Features

Bug Fixes

Compatibility Considerations

64-bit Windows support for Simulink external mode simulation

Real-Time Windows Target supports both external mode and normal mode simulation on 64-bit Windows computers as well as on 32-bit computers.

Message identifier entry improvements for Packet Input and Packet Output blocks

With R2012b, you can enter a message identifier for the Packet Input and Packet Output blocks as text. A check box lets you indicate whether to use the standard or extended identifier length.

Block functionality being changed

The following blocks are being changed:

Functionality	What Happens When You Use This Functionality?	Use This Instead	Compatibility Considerations
For Packet Input and Packet Output blocks, out-of-range integer values saturate to their data type.	An out-of-range value is forced to the maximum value for that data type.	N/A	Out-of-range values no longer wrap around modulo the maximum value for the data type.

R2012a

Version: 4.0

New Features

Bug Fixes

Compatibility Considerations

Simulink Normal Mode Simulation in Real Time

Real-Time Windows Target supports Simulink normal mode functionality in library blocks, allowing you to run real-time simulations without Simulink Coder™. Simulink executes the simulation algorithm and the real-time kernel does data acquisition and hardware access. Simulink normal mode functionality covers both 32-bit and 64-bit Windows platforms. See Using Real-Time Applications.

Variable-Step Solver Support for Simulink Normal Mode Simulation in Real Time

Real-Time Windows Target supports variable-step solvers for real-time normal mode simulation only.

Real-Time Windows Target Examples

The following examples have been updated to run in Normal Mode as well as in External Mode:

- `Real-Time Van der Pol Simulation` — Shows a real-time version of the Simulink Van der Pol simulation demo.
- `Real-Time Signal Generator`— Shows how to produce an analog output signal.
- `Real-Time Controller`— Shows how to build a simple closed-loop real-time controller.
- `Real-Time Filter`— Shows how to build a simple real-time filter.
- `Frequency Measurement`— Shows how to measure input signal frequency.
- `PWM Frequency and Duty Measurement`— Shows how to measure PWM signal frequency and duty.
- `Packet Input/Output`— Shows how to transfer data through UDP communication protocol using binary encoding.
- `Stream Input/Output`— Shows how to transfer data through UDP communication protocol using ASCII encoding.

Functionality Being Removed or Changed

Functionality	What Happens When You Use This Functionality?	Use This Instead	Compatibility Considerations
`rtwintgt parameter -forceuninstall`	`rtwintgt` prints a warning message directing the customer to `parameter -uninstall`	`rtwintgt parameter -uninstall`	Use `rtwintgt parameter -uninstall`
The **PCI slot** box in the I/O board dialog box is being replaced with a **Device order** box containing the logical device number of the board.	If more than one board of the same type was previously installed in the computer using the **PCI slot** box, Real-Time Windows Target cannot distinguish them.	**Device order** box in the I/O board dialog box	For blocks referencing two or more boards of the same type, specify the logical device number for each board.

R2011b

Version: 3.8

New Features

Bug Fixes

Support for National Instruments PXIe-6251 and PXIe-6259 boards

The V3.8 block library supports the National Instruments PXIe-6251 and PXIe-6259 boards for the PXI® Express bus.

R2011a

Version: 3.7

New Features

Bug Fixes

Compatibility Considerations

Change in Packet Input and Output Blocks

The Packet Input and Packet Output blocks now let you choose the order in which you can send multibyte values. You can choose little-endian or big-endian format. In previous releases, you were able to send and receive multibyte values in little-endian format only.

Open Watcom Upgrade to 1.9

The Real-Time Windows Target software now uses Version 1.9 of the Open Watcom C/C++ Compiler.

Real-Time Windows Target Product Now in Simulink Start, Help, and Demos Category

The Simulink category now contains the Real-Time Windows Target software product.

Compatibility Considerations

This change impacts you in the following ways:

*   Finding and viewing this product through the MATLAB Desktop **Start** button and in the Help browser **Contents** and **Demos** panes
*   Using the `demo` command to access the product demos

R2010b

Version: 3.6

New Features

Support for Simscape and SimDriveline Environments

Real-Time Windows Target software now enables you to generate and download models created or edited with the Simscape™ and SimDriveline™ environments.

Enhanced Serial Port Drivers

- The serial port drivers for the Packet Output and Stream Output blocks now support higher sample rates (up to 10 kHz). In previous releases, these blocks supported sample rates up to 500 Hz.
- The serial port drivers for the Packet Output and Packet Input blocks can now support higher baud rates. You can enter a custom baud rate using the `Other` option. In previous releases, these drivers supported baud rates up to 256000.

R2010a

Version: 3.5

New Features

Support for National Instruments PCI/PXI-660x Boards

The Real-Time Windows Target product now supports the National Instruments PCI/PXI-660x boards.

Change in UDP Packet and Stream Blocks

The UDP Packet and Stream blocks now require port addresses to be in decimal format. In previous releases. these blocks required port addresses to be in Hex format.

R2009b

Version: 3.4

New Features

Support for File I/O Using Packet and Stream I/O Blocks

The Packet Input, Packet Output, Stream Input, and Stream Output blocks now support a file I/O driver. To access the driver, click the **Install new board** button of one of these blocks and select **Standard Devices > File**. This driver reads and writes data from/to files on a local file system. For example, you can use this driver to import arbitrarily formatted data from a file without recompiling the model. In previous releases, importing such data with the From Workspace block required model recompilation.

New PWM Frequency and Duty Measurement Demo

The Real-Time Windows Target software now includes a demo that shows how to measure pulse width measurement (PWM) signal frequency and duty. See the `PWM Frequency and Duty Measurement` demo.

Support for Pulse Width Measurement with Counter Input Block

The Real-Time Windows Target software now supports pulse width measurements. The Counter Input block has the following new options to support this ability:

- **Clock input source**

  - `internal clock`
- **Gate input functionality**

  - `enable when high, latch & reset on edge`
  - `enable when low, latch & reset on edge`

The National Instruments PCI/PXI-60xx and National Instruments PCI/PXI-62xx drivers have been enhanced to work with this block for pulse width measurement.

Open Watcom Upgrade to 1.8

The Real-Time Windows Target software now uses Version 1.8 of the Open Watcom C/C++ Compiler.

R2009a

Version: 3.3

New Features

Support for Vector CAN Boards

The Real-Time Windows Target product now supports Vector Informatik CAN devices supported by the Vector XL driver library, including CANcardX, CANcardXL, CANboardXL, and CANboardXL pxi.

Support for Counter and Encoder Blocks for National Instruments Boards

Counter and encoder support have been added for the following National Instruments boards:

* National Instruments boards:

  * PCI-6220
  * PCI-6221
  * PCI-6221 37-pin
  * PCI-6224
  * PCI-6225
  * PCI-6229
  * PCI-6250
  * PCI-6251
  * PCI-6254
  * PCI-6259
  * PCI-6280
  * PCI-6281
  * PCI-6284
  * PCI-6289
  * PCIe-6251
  * PCIe-6259
  * PXI-6220
  * PXI-6221
  * PXI-6224

- PXI-6225
- PXI-6229
- PXI-6250
- PXI-6251
- PXI-6254
- PXI-6259
- PXI-6280
- PXI-6281
- PXI-6284
- PXI-6289

R2008b

Version: 3.2

New Features

Support for Model Referencing

The Real-Time Windows Target product now supports model referencing. See Model Referencing in the Real-Time Windows Target User's Guide.

Real-Time Workshop Embedded Coder Support

The Real-Time Windows Target product now supports the Real-Time Workshop® Embedded Coder™ product. This feature requires the Real-Time Workshop Embedded Coder software.

For information on how to configure your Real-Time Windows Target model to work with the Real-Time Workshop Embedded Coder software, see Entering External Mode Code Generation Parameters in the *Real-Time Workshop User's Guide*.

R2008a

Version: 3.1

New Features

New Features and Changes

Microsoft Windows 2000 Operating System Not Supported

As of R2008a, Real-Time Windows Target does not support the Microsoft® Windows 2000 operating system. Real-Time Windows Target supports only the Windows XP 32-bit operating system and the Windows Vista™ 32-bit operating system.

Increased Memory for Local Variables

The memory available for storing local variables has increased from 4 KB to 1 MB. The increased memory better supports blocks like the Lookup Table block, Embedded MATLAB Function block, and others with large local data requirements.

Additional Supported I/O Boards

The 3.1 I/O library supports these boards in addition to those previously documented in Real-Time Windows Target release notes and documentation:

- Measurement Computing™ boards:

  - PCI-DDA02/12
  - PCI-DDA04/12
  - PCI-DDA08/12
  - PCI-DDA02/16
  - PCI-DDA04/16
  - PCI-DDA08/16

For a complete list of supported I/O boards, see `www.mathworks.com/hardware-support/simulink-desktop-real-time.html`.

Documentation Changes

The Real-Time Windows Target documentation now includes a separate Reference Manual, which contains:

- The information on blocks and parameters that previously appeared in the User's Guide
- Documentation of the `rtwinconfigset` function, which previously had no reference page

See Real-Time Windows Target Reference.

"What's This?" Context-Sensitive Help Available for Simulink Configuration Parameters Dialog

R2008a introduces "What's This?" context-sensitive help for parameters that appear in the Simulink Configuration Parameters dialog. This feature provides quick access to a detailed description of the parameters, saving you the time it would take to find the information in the Help browser.

To use the "What's This?" help, do the following:

1   Place your cursor over the label of a parameter.

2   Right-click. A **What's This?** context menu appears.

For example, the following figure shows the **What's This?** context menu appearing after a right-click on the **Start time** parameter in the **Solver** pane.

3   Click **What's This?**. A context-sensitive help window appears showing a description of the parameter.

R2007b

Version: 3.0

New Features

Compatibility Considerations

New Features and Changes

I/O Blocks Support Non-Double Data Types to Conform to Simulink Software

Previously, Real-Time Windows Target data input and output was of type `double`. Input blocks could produce only `double` data, and Output blocks could accept only `double` data. In R2007b, Input and Output blocks support data types other than `double`. See Blocks — Alphabetical List for details about each block.

New Blocks and Drivers Provide Serial Port and UDP Support

Four new blocks, Packet Input, Packet Output, Stream Input, and Stream Output provide serial port and UDP support. For serial port support, use the blocks with the new driver **Standard Devices > Serial Port**. For UDP support, use the blocks with the new driver **Standard Devices > UDP Protocol**. See the documentation of the new blocks in Blocks — Alphabetical List.

New Frequency Output Block Is Available

A Frequency Output block is available in the Real-Time Windows Target library. The block generates a pulse-width-modulated square wave that alternates between low (0) and high (1) with a specified frequency and duty cycle. For details, see the Frequency Output block documentation.

New Counter Input Block Demo

The Real-Time Windows Target software now includes a demo that shows the operation of the Counter Input block. To see this demo, type `rtcounter` in the Matlab Command Window, or launch MATLAB Online Help and choose **Real-Time Windows Target** > **Demos** > **Real-Time Counter**.

Open Watcom Version 1.6 Is the Standard Bundled Compiler

The Real-Time Windows Target software now uses Version 1.6 of the Open Watcom C/C++ Compiler. The Open Watcom source code is available under the terms of the Open Watcom License. For more information, visit `www.openwatcom.org`.

Link and Target Products Regrouped in New Start, Help, and Demos Category

A new product category, Links and Targets, now contains MathWorks software products that link, target, or cosimulate code.

Compatibility Considerations

This change impacts you in the following ways:

- Finding and viewing these products through the MATLAB Desktop **Start** button and in the Help browser **Contents** and **Demos** panes.
- Using the demo command to access the product demos.

For more about this new product category, see Demos and Help Browser Contents Now Include New Category for Links and Targets, in the *MATLAB Release Notes*.

R2007a

Version: 2.7

New Features

New Features and Changes

Enhanced External Mode Communication Protocol

The External Mode communication protocol has been reworked and streamlined. The upgrade increases communication reliability and removes some capacity-related restrictions. Existing applications do not require changes in order to take advantage of these improvements.

Additional Supported I/O Boards

The V2.7 I/O library supports these boards in addition to those previously documented in Real-Time Windows Target release notes and documentation:

- Measurement Computing boards:

    - PC104-DI48
    - PCI-DAS6013
    - PCI-DAS6014
    - PCI-DAS6023
    - PCI-DAS6025
    - PCI-DAS6030
    - PCI-DAS6031
    - PCI-DAS6032
    - PCI-DAS6033
    - PCI-DAS6034
    - PCI-DAS6035
    - PCI-DAS6036
    - PCI-DAS6040
    - PCI-DAS6052
    - PCI-DAS6070
    - PCI-DAS6071
    - PCI-DAS6402-12
    - PCI-DAS6402-16
    - PCI-DIO24LP

- PCI-DIO24S
- PCI-PDISO16
- PCI-PDISO8
- PCIDAS64-M1-16
- PCIDAS64-M2-16
- PCIDAS64-M3-16

For a complete list of supported I/O boards, see www.mathworks.com/hardware-support/simulink-desktop-real-time.html.

R2006b

Version: 2.6.2

New Features

New Features and Changes

Additional Supported I/O Boards

The V2.6.2 I/O library supports these boards in addition to those previously documented in Real-Time Windows Target release notes and documentation:

- National Instruments boards:

  - M-series boards for analog and digital I/O, but not for counters
  - PCI-6220
  - PCI-6221
  - PCI-6221 37-pin
  - PCI-6224
  - PCI-6225
  - PCI-6229
  - PCI-6250
  - PCI-6251
  - PCI-6254
  - PCI-6259
  - PCI-6280
  - PCI-6281
  - PCI-6284
  - PCI-6289
  - PCIe-6251
  - PCIe-6259
  - PXI-6220
  - PXI-6221
  - PXI-6224
  - PXI-6225
  - PXI-6229
  - PXI-6250
  - PXI-6251

- PXI-6254
- PXI-6259
- PXI-6280
- PXI-6281
- PXI-6284
- PXI-6289
- Humusoft® boards:

    - AD622
    - MF624

For a complete list of supported I/O boards, see www.mathworks.com/hardware-support/simulink-desktop-real-time.html.

R2006a

Version: 2.6.1

No New Features or Changes

R14SP3

Version: 2.6

New Features

New Features and Changes

C++ Code Generation

Version 2.6 supports generating C++ code, which previous versions did not.

R14SP2

Version: 2.5.2

New Features

Compatibility Considerations

New Features and Changes

Bidirectional Counters

Version 2.5.2 supports bidirectional counters for National Instruments 60XX and 67XX boards.

C++ Code Generation

Although Real-Time Workshop software Version 6.2 supports generating C++ code, Real-Time Windows Target software Version 2.5.2 does not.