SimEvents® Release Notes

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SimEvents® Release Notes

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Summary by Version

This table provides quick access to what's new in each version. For clarification, see "Using Release Notes" on page 1.

Version (Release)	New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems	Related Documentation at Web Site
Latest Version V2.3 (R2008b)	Yes Details	No	Bug Reports Includes fixes	Printable Release Notes: PDF Current product documentation
V2.2 (R2008a)	Yes Details	No	Bug Reports Includes fixes	No
V2.1 (R2007b)	Yes Details	Yes Summary	Bug Reports Includes fixes	No
V2.0 (R2007a)	Yes Details	Yes Summary	Bug Reports Includes fixes	No
V1.2 (R2006b)	Yes Details	Yes Summary	Bug Reports Includes fixes	No
V1.1 (R2006a)	Yes Details	Yes Summary	Bug Reports Includes fixes	No
V1.0 (R14SP3+)	Yes Details	Not applicable	Bug Reports	No

Using Release Notes

Use release notes when upgrading to a newer version to learn about:

- New features
- Changes
- Potential impact on your existing files and practices

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Review the release notes for other MathWorks™ products required for this product (for example, MATLAB® or Simulink®) for enhancements, bugs, and compatibility considerations that also might impact you.

If you are upgrading from a software version other than the most recent one, review the release notes for all interim versions, not just for the version you are installing. For example, when upgrading from V1.0 to V1.2, review the release notes for V1.1 and V1.2.

What's in the Release Notes

New Features and Changes

- New functionality
- Changes to existing functionality

Version Compatibility Considerations

When a new feature or change introduces a reported incompatibility between versions, the **Compatibility Considerations** subsection explains the impact.

Compatibility issues reported after the product is released appear under Bug Reports at the MathWorks Web site. Bug fixes can sometimes result in incompatibilities, so you should also review the fixed bugs in Bug Reports for any compatibility impact.

Fixed Bugs and Known Problems

The MathWorks offers a user-searchable Bug Reports database so you can view Bug Reports. The development team updates this database at release time and as more information becomes available. This includes provisions for any known workarounds or file replacements. Information is available for bugs existing in or fixed in Release 14SP2 or later. Information is not available for all bugs in earlier releases.

Access Bug Reports using your MathWorks Account.

Version 2.3 (R2008b) SimEvents Software

This table summarizes what's new in Version 2.3 (R2008b):

New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems	Related Documentation at Web Site
Yes Details below	No	Bug Reports Includes fixes	Printable Release Notes: PDF Current product documentation

New features and changes introduced in this version are described here:

New Demos for Modeling Architectures and Manufacturing Processes

Version 2.3 (R2008b) introduces these new demonstrations:

Tutorial Demos

- Translating Events to Functions Calls

Advanced Technique Demos

- Asynchronous Execution of a Stateflow® Chart

- Building an Arrival Rate Estimator

- Interfacing with External File Formats

- Resource Allocation from Multiple Pools

Application Demos

- FIFO Buffer: Functional Model

- FIFO Buffer: Architectural Model

- Anti-Lock Braking System (ABS) Overview

- Batch Production Process

- Kanban Production System

Attribute Name Incrementing in Set Attribute and Get Attribute Blocks

The Add button in the Set Attribute and Get Attribute blocks adds an attribute named Attribute*N* where *N* is a positive integer. In earlier versions, the button always adds an attribute named Attribute1.

Change in Parameter Name of Event-Based Entity Generator Block

The **Type of value change** parameter in the Event-Based Entity Generator block has been renamed as **Type of change in signal value** to be consistent with other blocks that have a parameter by that name.

Version 2.2 (R2008a) SimEvents Software

This table summarizes what's new in Version 2.2 (R2008a):

New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems	Related Documentation at Web Site
Yes Details below	No	Bug Reports Includes fixes	No

New features and changes introduced in this version are

- "Initial Value Block in Signal Management Library" on page 5

- "Discrete Event Subsystem Supports Complex and Nonscalar Values" on page 5

- "Seed Management for Random Number Generators" on page 6

- "Configuration Parameters for Diagnostics" on page 6

- ""What's This?" Context-Sensitive Help Available for Simulink Configuration Parameters Dialog" on page 6

- "New Demos" on page 7

Initial Value Block in Signal Management Library

The new Initial Value block is in a new library called Signal Management. This block sets a signal value before the first event occurs.

Also, the Signal Latch block has moved from the Gates library to the new Signal Management library.

Discrete Event Subsystem Supports Complex and Nonscalar Values

In Version 2.2 (R2008a), input signals to the Discrete Event Subsystem block can be real or complex signals of any dimension. In earlier versions, input signals to the block must be real scalars. For details about discrete event subsystems, see "Working with Discrete Event Subsystem Blocks".

Seed Management for Random Number Generators

New functions and diagnostics help you ensure uniqueness of seeds of random number generators and manage sets of seeds in a series of simulation runs. For details, see these sections:

- "Varying Simulation Results by Managing Seeds"

- se_getseeds function reference page

- se_setseeds function reference page

- se_randomizeseeds function reference page

- "Identical seeds for random number generators"

Configuration Parameters for Diagnostics

The Configuration Parameters dialog box has a new SimEvents® Diagnostics pane to advise you of race conditions and help you manage seeds of random number generators.

For more information, see "SimEvents Diagnostics Pane".

"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.

New Demos

SimEvents software Version 2.2 (R2008a) introduces these new demos:

- Managing Race Conditions

- Avoiding Identical Seeds for Random Number Generators

- Seed Management Workflow for Random Number Generators

- Asynchronous Clock Domains

- Rate-Based Shared Processor

Also, the demo formerly named "Explicit Routing for Distributed Processing" has been renamed as "Distributed Processing for Multi-Class Jobs."

Version 2.1 (R2007b) SimEvents Software

This table summarizes what's new in Version 2.1 (R2007b):

New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems	Related Documentation at Web Site
Yes Details below	Yes—Details labeled as **Compatibility Considerations**, below. See also Summary.	Bug Reports Includes fixes	No

New features and changes introduced in this version are
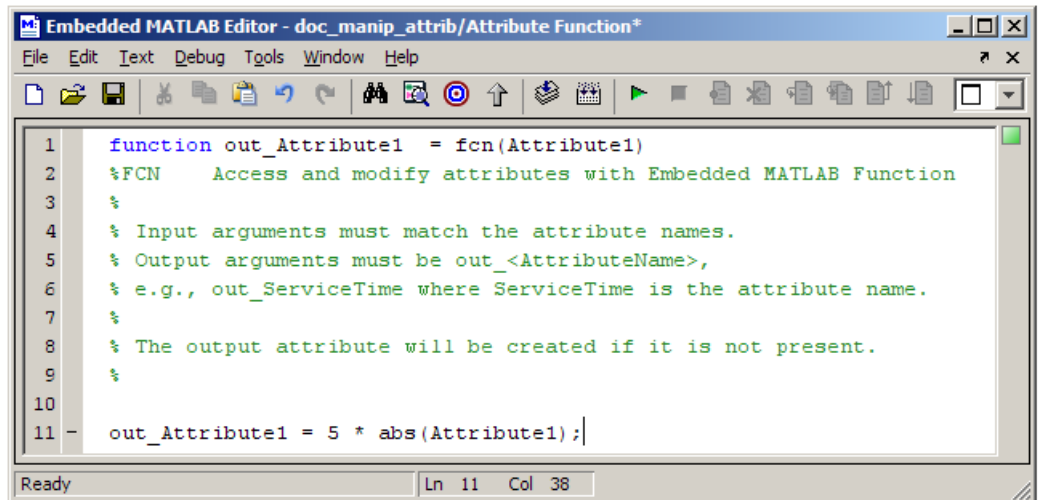
- "Attribute Computations Using Embedded MATLAB Code" on page 8
- "Attributes Support Complex Values" on page 10
- "Enhanced Visibility and Logging of Events" on page 10
- "New Demos for Shared-Resource Applications and Advanced Techniques" on page 12
- "Subsystem Connection Port for Entity Paths" on page 13
- "Configuration Parameters to Control Livelock" on page 13
- "Processing Events Via the Event Calendar Instead of Immediately" on page 14
- "Enhanced Support for Multiple Simultaneous Transitions in Switches and Gate" on page 17
- "Change in Indexing in Attribute Scope Block" on page 18

Attribute Computations Using Embedded MATLAB Code

The Attribute Function block lets you conveniently set and modify attributes using Embedded MATLAB™ code. For details, see "Writing Functions to Manipulate Attributes".

Simplifying a Model Using the Attribute Function Block

The figures below indicate recommended ways to multiply the absolute value of an attribute by a constant in SimEvents software Version 2.1 (R2007b) and earlier versions. The earlier version is more complicated because of necessary steps to ensure correct timing. By contrast, the Attribute Function block ensures correct timing automatically.
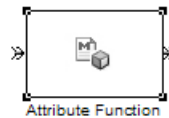
Manipulating Attribute Value Using Attribute Function Block
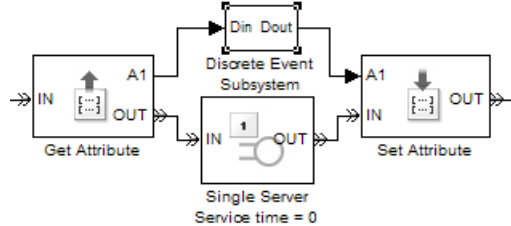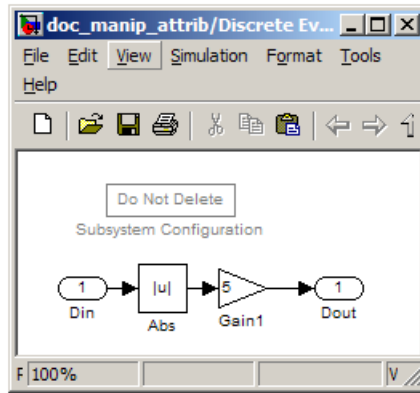
Manipulating Attribute Value in Earlier Versions

Attributes Support Complex Values

In Version 2.1 (R2007b), attributes can assume complex values, not just real values.

Enhanced Visibility and Logging of Events

In Version 2.1 (R2007b), SimEvents software changes the set of events that appear in event logs:

- Event logs show a new kind of event, called an *entity request* event. This event is a notification that an entity input port of a block has become available. It is called an entity request event because you can think of the block as requesting an entity from a preceding block. For example, upon becoming empty, a single server requests an entity from a preceding block. A preceding block's response to the notification might result in an entity advancement.

In earlier versions, entity request events do not appear in event logs.

- Event logs show a new kind of event, called a *storage completion* event. This event exists only in an Output Switch block with the **Store entity before switching** parameter selected. When an entity arrives at the block, the block schedules a storage completion event at the current simulation time. Upon execution of the storage completion event, the block determines whether the entity can advance to a subsequent block.

  In earlier versions, storage completion events do not appear in event logs.

- Event logs always show the events listed in the table below, regardless of how you set the **Resolve simultaneous signal updates according to event priority** parameter in the corresponding blocks. This parameter determines whether the event priority is a number you specify in the block's dialog box or a system-level category denoted by SYS1.

Events That Affect Entities and Are Caused By Signal-Based Events

Event	Block
Entity generation	Event-Based Entity Generator
Counter reset	Entity Departure Counter
Gate event (gate opening or gate closing)	Enabled Gate
Release	Release Gate
Port selection	Input Switch, Output Switch, Path Combiner

In earlier versions, event logs show these events only if you select the **Resolve simultaneous signal updates according to event priority** parameter in the block's dialog box.

Also, event logs and entity logs in Version 2.1 (R2007b) are more readable and contain hyperlinks that highlight the corresponding blocks.

For details about event logs, see "Viewing the Event Calendar". For details about entity logs, see "Viewing Entity Locations".

New Demos for Shared-Resource Applications and Advanced Techniques

SimEvents software Version 2.1 (R2007b) introduces these new demonstration models:

Tutorial Demos

- Server Blocks and Service Time
- Input and Output Switching
- Schedule Timeout and Cancel Timeout Blocks

Advanced Technique Demos

- Buffering for Variable-Size Messages
- Delayed Function Calls in Pulse Width Modulation
- Explicit Routing for Distributed Processing
- Markov-Modulated Poisson Process
- Queue with Flushing Capability
- Variable Entity Replication
- Variable-Capacity Queue

Application Demos

- Shared Communication Buffer Management
- Processor Sharing Via Time Slicing

Consolidation and Removal of Some Tutorial Demos

The new Server Blocks and Service Time demo replaces these earlier demos:

- Service Time from Attribute
- Specifying Service Time in Single Server
- Specifying Service Time in Infinite Server Block
- Single Server Block Versus Infinite Server Block

The new Input and Output Switching demo replaces these earlier demos:

- Input Switching Using Signal

- Output Switching Using Signal

Changes in Categorization, Titles, and Content of Some Demos

SimEvents demos have been recategorized in the Help browser. Some demos have changed their titles or content.

Title in Version 2.1 (R2007b)	Title in Earlier Versions
Task Sharing with Two Levels of Priority and Preemption	Preemptive Operating System with Two Levels of Priority
Multitasking with Dependent Tasks	Multitasking Model with Dependent Tasks
Operating System with Prioritized Task Execution	Operating System Model with Prioritized Task Execution
Entity Combiner for Assembling Components (with simpler design using the Entity Combiner and Attribute Function blocks)	Aggregation: Assembling a Vehicle Chassis

Also, the G/G/1 Queuing System and Little's Law demo has a simpler design using the Attribute Function and Embedded MATLAB Function blocks.

Subsystem Connection Port for Entity Paths

The Conn block represents an entity input port or entity output port in a virtual subsystem. While the model window's **Edit > Create Subsystem** menu option automatically creates connection ports, copying the Conn block from its library is a convenient way to add more entity ports to an existing subsystem.

Configuration Parameters to Control Livelock

The SimEvents pane of the Configuration Parameters dialog box offers new parameters for setting thresholds related to livelock. Also, the **Execution**

order of simultaneous events parameter has been renamed **Execution order**.

New Parameter	Description
Maximum events per block	Limit the number of entity generation, service completion, subsystem execution, and function-call events that each SimEvents block performs at each fixed time instant.
Maximum events per model	Limit the total number of events scheduled via the event calendar at each fixed time instant.

For more information, see "Livelock Prevention" or the configuration parameter descriptions.

Processing Events Via the Event Calendar Instead of Immediately

In Version 2.1 (R2007b), SimEvents software changes its processing of each event in the next table when you do not select the **Resolve simultaneous signal updates according to event priority** parameter in the corresponding block. In this case, the event has a system-level event priority denoted by SYS1, and the application processes the event via the event calendar. Using the event calendar decouples the scheduling and the execution of events. "Event Sequencing" describes how the application processes multiple simultaneous events.

Events That Affect Entities and Are Caused By Signal-Based Events

Event	Block
Entity generation	Event-Based Entity Generator
Counter reset	Entity Departure Counter
Gate event (gate opening or gate closing)	Enabled Gate
Release	Release Gate
Port selection	Input Switch, Output Switch, Path Combiner

Also, each entity request event has a system-level priority denoted by SYS2, and the application processes the event via the event calendar.

In earlier versions, the application applies "immediate" processing for entity requests by storage blocks, as well as for events in the table when you do not select the **Resolve simultaneous signal updates according to event priority** parameter in the corresponding block.

For details about supported events and the processing of simultaneous events, see "Working with Events" and "Managing Simultaneous Events".

Compatibility Considerations

Most models are unaffected by the change in event processing. However, some models might behave differently, because events processed immediately in earlier versions are deferred to the event calendar in SimEvents software Version 2.1 (R2007b). Models that behave differently tend to involve cycles in simulation processing and cascades of simultaneous events (for example, an event has multiple consequences that occur at time T, each of which has further consequences also at time T).

Example Showing Change in Behavior

The model below attempts to simultaneously advance one entity from each queue, whenever both queues are nonempty.
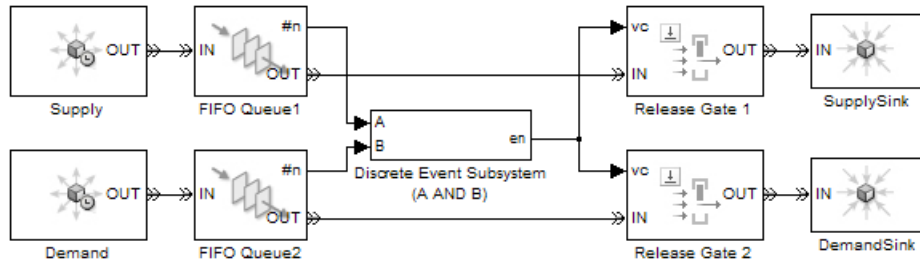
Suppose that the top queue contains one entity and an entity arrives at the previously empty bottom queue. Assuming that no block in the model has its **Resolve simultaneous signal updates according to event**

priority parameter selected, the entity arrival has the following cascade of consequences:

1 The bottom queue updates its **#n** output signal to 1.

2 The discrete event subsystem evaluates the condition (A AND B) and returns a value of 1. The previous value of this signal was 0.

3 Each of the two Release Gate blocks detects a value-change event at its **vc** signal input port. In SimEvents software Version 2.1 (R2007b), each of the two gates schedules a release event on the event calendar.

4 One gate opens, which has these consequences:

   a An entity advances from the corresponding queue to the sink.

   b The corresponding queue updates its **#n** output signal to 0.

   c The discrete event subsystem reevaluates the condition (A AND B) and returns a value of 0.

5 In Version 2.1 (R2007b), the other gate opens, which has these consequences:

   a An entity advances from the corresponding queue to the sink.

   b The corresponding queue updates its **#n** output signal to 0.

   c The discrete event subsystem reevaluates the condition (A AND B) and returns a value of 0.

In earlier versions, the gates do not schedule release events on the event calendar if the corresponding **Resolve simultaneous signal updates according to event priority** parameter is not selected. As a result, step 4c negates the value-change event at the other gate and step 5 does not occur. This example involves cycles in simulation processing, because an event at the gate affects the value of the **#n** signal of a preceding block. This example involves cascades of simultaneous events, because the new value of 1 for the condition (A AND B) causes two release events, each of which causes the condition (A AND B) to assume the value 0.

Enhanced Support for Multiple Simultaneous Transitions in Switches and Gate

The blocks in this table model the effects of all transitions in their input signals, even if multiple transitions occur simultaneously.

Block	Input Signal
Enabled Gate	**en**
Input Switch	**p**
Output Switch	**p**
Path Combiner	**p**

In earlier versions of SimEvents software, selecting the **Resolve simultaneous signal updates according to event priority** option causes the blocks to model only the last transition at a given value of the simulation clock.

Compatibility Considerations

The behavior of some simulations changes depending on whether the application models intermediate transitions in an **en** or **p** input signal in the blocks in the table above.

Example Showing Change in Behavior

In the model below, the **en** signal transitions from 0 to 1 and then from 1 to 0 in the same time instant. Earlier versions model only the latter transition, so the gate does not open. Version 2.1 (R2007b) models both transitions, so the gate opens and then closes in the same time instant.
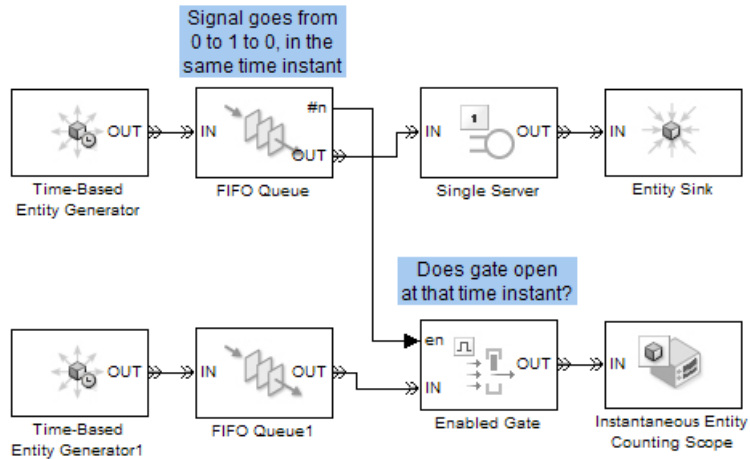
Change in Indexing in Attribute Scope Block

When you set the **X value from** parameter to `Index` in the Attribute Scope block, it creates a plot that reflects 1-based indexing. That is, the first entity corresponds to a data point whose value on the horizontal axis is 1. In earlier versions, the plot reflects 0-based indexing.

Version 2.0 (R2007a) SimEvents Software

This table summarizes what's new in Version 2.0 (R2007a):

New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems	Related Documentation at Web Site
Yes Details below	Yes—Details labeled as **Compatibility Considerations**, below. See also Summary.	Bug Reports Includes fixes	No

New features and changes introduced in this version are

- "Attributes Support Multidimensional Values" on page 19
- "Combining and Splitting Entities" on page 20
- "Timeout Feature Establishes Entity Time Limits" on page 20
- "New Demos for Video Processing, Communications, and Architecture Modeling" on page 22
- "Output Switch Block Options for Storage and Initial Condition" on page 22
- "Entity Departure Counter Block Can Create Attribute" on page 24
- "Changes in Names of Parameters Related to Event Priorities" on page 25
- "Change in Default Entity Type of Entity Generators" on page 27
- "Obsolete Blocks" on page 27

Attributes Support Multidimensional Values

Version 2.0 (R2007a) introduces new versions of the Get Attribute and Set Attribute blocks in a new Attributes library. The new blocks offer these enhancements compared to the earlier versions:

- Attributes can assume values that are vectors, matrices, or multidimensional arrays with up to 32 dimensions, not just scalars. This enhancement facilitates modeling dense payloads via attributes.

- Each instance of a Set Attribute block can assign an arbitrary number of attributes, and each instance of a Get Attribute block can retrieve an arbitrary number of attributes.

- The dialog boxes use a grid on a single tab, making it easier for you to see the entire list of attributes that a block sets or gets.

Compatibility Considerations

If your legacy models contain Get Attribute or Set Attribute blocks from the earlier library, those blocks continue to work in Version 2.0 (R2007a). However, the blocks are considered obsolete, as described in "Obsolete Blocks" on page 27.

Combining and Splitting Entities

The new Entity Combiner block lets you combine entities, analogous to combining components to create a larger whole. The block provides options for managing information (attributes and timers) associated with the component entities, so you can think of the operation as bundling the information that entities carry with them.

You can configure the Entity Combiner block to make the combining operation reversible via the Entity Splitter block.

The Entity Combiner and Entity Splitter blocks reside in the new Entity Management library.

Timeout Feature Establishes Entity Time Limits

You can model point-to-point timing constraints by limiting the amount of time an entity spends during the simulation on designated entity paths. Exceeding the limit causes the entity to depart immediately from the storage block where it resides, such as a queue, when the clock reaches the time limit. To learn how to use this feature, see "Forcing Departures Using Timeouts" in the user guide documentation.

The timeout feature involves new blocks, as well as new parameters in existing blocks.

New Block	Purpose
Schedule Timeout	Schedule timeout event for each entity
Cancel Timeout	Cancel timeout event for each entity

Existing Blocks with New Timeout-Related Parameters

- FIFO Queue
- LIFO Queue
- Priority Queue
- Infinite Server
- N-Server
- Single Server
- Output Switch

New Parameter of Existing Blocks	Purpose
Enable TO port for timed-out entities on **Timeout** tab	Provide a **TO** entity output port through which an entity departs upon timing out
Number of entities timed out on **Statistics** tab	Output a signal, **#to**, that indicates the number of entities that have timed out from the block since the start of the simulation

Compatibility Considerations

If you save a model containing a queue, server, or Output Switch block using V2.0 (R2007a), then opening the model in V1.2 (R2006b) produces warnings like these:

```
Warning: In instantiating linked block 'mysys/FIFO Queue' :
FIFO Queue block (mask) does not have a parameter named
'EnableTOPort'.
Warning: In instantiating linked block 'mysys/FIFO Queue' :
```

```
FIFO Queue block (mask) does not have a parameter named
'StatNumberTimedout'.
```

Saving the model in the earlier version prevents the warnings from reappearing, but causes the block to omit timeout-related ports and behavior if you later open the model in V2.0 (R2007a).

New Demos for Video Processing, Communications, and Architecture Modeling

Version 2.0 (R2007a) introduces these new demonstration models:

Tutorial Demos

- Transporting Multidimensional Data Using Attributes

- Packet Creation, Transmission and Error Analysis

Application Demos

- Distributed Video Processing

- Distributed Processing Resource Modeling

- Video Streaming Over Bandwidth-Limited Communication Channel

- Bit Timing Recovery Using Fixed-Rate Resampling and SimEvents

Change in ARQ Demo

The Selective-Repeat Automatic Repeat Request demo reverses the interpretation of the CRC check compared to V1.2 (R2006b). The interpretation now matches that of the similar Go-Back-N Automatic Repeat Request demo. In V2.0 (R2007a), both demos use a CRC check value of 1 to correspond to an ACK message.

Output Switch Block Options for Storage and Initial Condition

The Output Switch block offers enhancements that can prevent the need for additional blocks to set initial conditions or to prevent latency. The new parameters apply to signal-based switching and are available only when you set **Switching criterion** to From signal port p. The new parameters are

in the table below. For details, see "Output Switching Based on a Signal" and the block's reference page.

New Parameter	Purpose
Specify initial port selection	Determine whether the block uses an initial port selection from the dialog box.
Initial port selection	The entity output port that the block selects when the simulation begins. The block uses this value instead of the **p** signal until the signal has its first sample time hit.
Store entity before switching	If you select this option, the block can store one entity at a time. Furthermore, the block decouples its arrival and departure processing to give other blocks in the simulation an opportunity to update the **p** signal if appropriate. If you do not select this option, the block processes an arrival and departure as an atomic operation and assumes that the **p** signal is already up to date at the given time.
Status of pending entity on **Statistics** tab	Output a signal, **pe**, that indicates when the block stores an entity after trying and failing to output it. A value of 0 indicates when the storage location is empty.

For other changes in this release that affect parameters of the Output Switch block, see "Timeout Feature Establishes Entity Time Limits" on page 20 and "Changes in Names of Parameters Related to Event Priorities" on page 25.

Compatibility Considerations

In some cases, the block enhancements let you optionally simplify models that you do not need to share with users of earlier versions:

• If your model precedes an Output Switch block with a Signal Latch block to create an initial condition for the **p** signal, and if the **p** signal does not branch to become an input for another block, then you can remove

the Signal Latch block and instead use the new **Specify initial port selection** option in the switch block.

- If your model precedes an Output Switch block with a Single Server block whose **Service time** parameter is zero and whose sole purpose was to ensure an up-to-date **p** signal, then you can remove the Single Server block and instead use the new **Store entity before switching** option in the switch block.

If you save a model containing an Output Switch block using V2.0 (R2007a), then opening the model in V1.2 (R2006b) produces warnings like these:

```
Warning: In instantiating linked block 'mysys/Output Switch' :
Output Switch block (mask) does not have a parameter named
'InitialConditionsOpt'.
Warning: In instantiating linked block 'mysys/Output Switch' :
Output Switch block (mask) does not have a parameter named
'InitialConditions'.
Warning: In instantiating linked block 'mysys/Output Switch' :
Output Switch block (mask) does not have a parameter named
'EntityBufferOpt'.
Warning: In instantiating linked block 'mysys/Output Switch' :
Output Switch block (mask) does not have a parameter named
'StatPendingEntity'.
```

Saving the model in the earlier version prevents the warnings from reappearing, but causes the block to omit ports and behavior related to the V2.0 (R2007a) enhancements if you later open the model in V2.0 (R2007a).

Entity Departure Counter Block Can Create Attribute

If you configure the Entity Departure Counter block to write the count to an attribute, then you can select the new **Create attribute if not present** parameter to have the block create the attribute if it does not already exist. The block then sets the value of the attribute according to the entity count.

In earlier versions, the block sets the value of the attribute but does not create it.

Changes in Names of Parameters Related to Event Priorities

Parameters related to optional priorities of events have been renamed to be more suggestive of how the option works. The name **Resolve simultaneous signal updates according to event priority** replaces names that start with **Specify event priority**. In a subset of affected blocks, the name **Event priority** replaces similar names. For more information about what the prompts mean, see "Choosing How to Resolve Simultaneous Signal Updates".

The table below itemizes the blocks and parameters that have changed.

Block	Parameter Name in V1.2 (R2006b)	Parameter Name in V2.0 (R2007a)
Discrete Event Inport	Specify event priority for executing subsystem	Resolve simultaneous signal updates according to event priority
	Subsystem execution event priority	Event priority
Enabled Gate	Specify event priority for gate opening and closing	Resolve simultaneous signal updates according to event priority
Entity Departure Counter	Specify event priority for counter reset	Resolve simultaneous signal updates according to event priority
Event-Based Entity Generator	Specify event priority for entity generation	Resolve simultaneous signal updates according to event priority
	Generation event priority	Event priority

Block	Parameter Name in V1.2 (R2006b)	Parameter Name in V2.0 (R2007a)
Input Switch	**Specify event priority for port selection**	**Resolve simultaneous signal updates according to event priority**
Output Switch	**Specify event priority for port selection**	**Resolve simultaneous signal updates according to event priority**
Path Combiner	**Specify event priority for port precedence selection**	**Resolve simultaneous signal updates according to event priority**
Release Gate	**Specify event priority for gate opening**	**Resolve simultaneous signal updates according to event priority**
Signal Latch	**Specify event priority for writing to memory**	**Resolve simultaneous signal updates according to event priority** on **Write** tab
	Specify event priority for reading from memory	**Resolve simultaneous signal updates according to event priority** on **Read** tab
Signal-Based Event to Function-Call Event	**Specify event priority for function-call generation**	**Resolve simultaneous signal updates according to event priority**
	Function-call event priority	**Event priority**

Block	Parameter Name in V1.2 (R2006b)	Parameter Name in V2.0 (R2007a)
Signal-Based Function-Call Event Generator	**Specify event priority for function-call generation**	**Resolve simultaneous signal updates according to event priority**
	Function-call event priority	**Event priority**

This change merely renames parameters and does not change the behavior of affected blocks.

Change in Default Entity Type of Entity Generators

The default value of **Entity type** in the Time-Based Entity Generator and Event-Based Entity Generator block is `Blank`. In earlier versions, the default value is `Standard`. This change in default value does not affect blocks in a saved model but only affects new instances of the block that you copy from the library to a model.

Obsolete Blocks

The table below indicates blocks that are obsolete as of the current version or that are planned to be removed in a future version.

Obsolete Block	Removed from Version	Replacement
Get Attribute block from `simeventsattributes1` library	Future version	Get Attribute block from `simeventsattributes2` library
Set Attribute block from `simeventsattributes1` library	Future version	Set Attribute block from `simeventsattributes2` library

Version 1.2 (R2006b) SimEvents Software

This table summarizes what's new in Version 1.2 (R2006b):

New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems	Related Documentation at Web Site
Yes Details below	Yes—Details labeled as **Compatibility Considerations**, below. See also Summary.	Bug Reports Includes fixes	No

New features and changes introduced in this version are

- "Event-Based Sequence Generator Block" on page 28

- "New Tutorial and Application Demos" on page 29

- "Event Translation Block Supports Delay from a Signal" on page 29

- "Routing Blocks Support Unlimited Entity Ports" on page 30

- "Initial Outputs of SimEvents Blocks" on page 31

- "History Options and Other Changes in Scope Blocks" on page 33

- "Parameters for Lognormal Distribution" on page 34

- "SimEvents Blocks Compatible with Accelerator Mode" on page 35

- "Livelock Detection" on page 35

Event-Based Sequence Generator Block

The new Event-Based Sequence block provides data to an event-driven process by producing a scalar event-based output signal whose values come from a vector. The block selects the next value from the vector upon each notification from a port of a subsequent block. For example, if you connect the Event-Based Sequence block to the **t** input port of a Single Server block, the values in the vector become the service times for the entities arriving at the server. You provide the values in the vector, but do not need to know in advance when the entities arrive at the server.

New Tutorial and Application Demos

Version 1.2 (R2006b) introduces these new demonstration models:

Tutorial Demos

- Entity Combiner for Assembling Components

- Task Sharing with Two Levels of Priority and Preemption

- Multitasking with Dependent Tasks

Application Demos

- Go-Back-N Automatic Repeat Request

- Operating System with Prioritized Task Execution

- Ethernet Local Area Network

- Anti-Lock Braking System (ABS) Model

- Anti-Lock Braking System (ABS) Model with Queuing Delay

- Anti-Lock Braking System (ABS) Model Using CAN Communications

Event Translation Block Supports Delay from a Signal

The Signal-Based Event to Function-Call Event block can delay its generation of a function call by an amount of time that you specify using either an input signal or the **Function-call time delay** parameter. In V1.1 (R2006a), the block lets you specify the delay amount using the parameter, but not an input signal.

To access the new feature, select **Specify event priority for function-call generation** (or, in V2.0 (R2007a), select **Resolve simultaneous signal updates according to event priority**). Then set the new **Function-call delay from** parameter to Signal port t, as shown. Then connect a nonnegative-valued signal to the **t** signal input port that appears on the block.
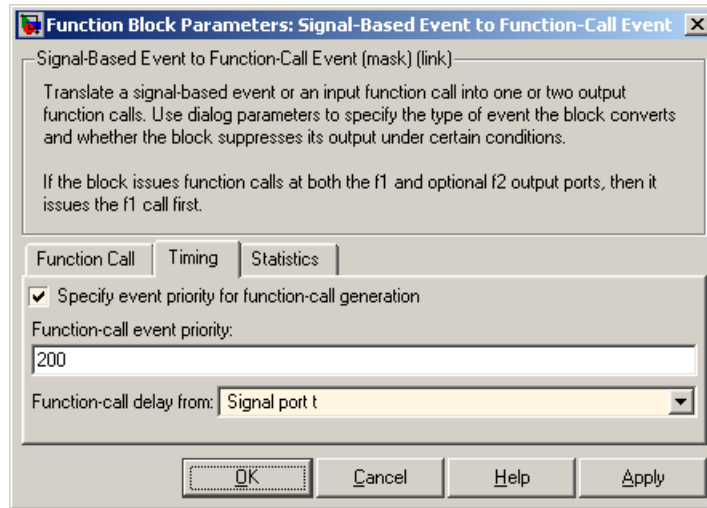
Compatibility Considerations

If you save a model containing the Signal-Based Event to Function-Call Event or Discrete Event Subsystem block using V1.2 (R2006b), then opening the model in V1.1 (R2006a) produces warnings like these:

```
Warning: In instantiating linked block 'mysys/Signal-Based
Event to Function-Call Event' : Signal-Based Event to Function-
Call Event block (mask) does not have a parameter named
'FunctionCallDelayFrom'.
```

Saving the model in the earlier version prevents the warnings from reappearing, but causes the Signal-Based Event to Function-Call Event block to omit the **t** input port if you later open the model in V1.2 (R2006b).

Routing Blocks Support Unlimited Entity Ports

The **Number of entity input ports** parameter of the Input Switch and Path Combiner blocks can be any positive integer. The **Number of entity output ports** parameter of the Output Switch and Replicate blocks also can be any positive integer. In V1.1 (R2006a), these parameters can assume only the values 1, 2, 3, and 4.

Compatibility Considerations

If you save a model in which one of the blocks listed above has more than four entity input ports or more than four entity output ports, then the model will not work in V1.1 (R2006a).

Initial Outputs of SimEvents Blocks

All SimEvents blocks now have well-defined initial values for any numerical output signals they produce.

The initial value of an output signal of a SimEvents block is in effect from the start of the simulation until the block updates the output signal for the first time during the simulation. For example, if an N-Server block is configured to produce a **#n** output signal representing the number of entities in the server, then **#n** has a well-defined initial value of 0 at the start of the simulation. The initial value persists until the first arrival of an entity at the N-Server block, which could occur well after the start of the simulation, if at all.

The block reference pages indicate the initial values of the block output signals.

Compatibility Considerations

If you connect the Signal Latch block to a **ts**, **tr**, or **vc** signal input port of a SimEvents block, the input port might detect an event at the start of the simulation in V1.1 (R2006a) that no longer occurs in V1.2 (R2006b). This is because the Signal Latch block assumes its initial condition in a true initialization stage in V1.2 (R2006b) rather than slightly after the simulation start in V1.1 (R2006a). If your model relies on an event at the start of the simulation (to invoke a discrete event subsystem or generate an event or an entity, for example), then you might see a change in simulation behavior between the two versions.

For example, the model below uses a Discrete Event Subsystem block to compute a signal that indicates whether a gate is open or closed.
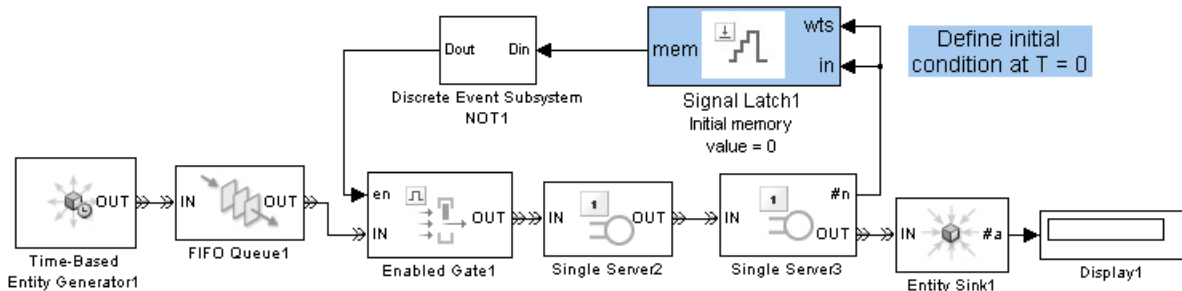
Subsystem Invoked at Simulation Start in V1.1 (R2006a), but Not V1.2 (R2006b)

In V1.1 (R2006a), the Signal Latch block's output signal has a sample time hit at the start of the simulation. This sample time hit invokes the subsystem, which initializes the gate's **en** input signal to 1. As a result, the gate is open at the start of the simulation. In V1.2 (R2006b), the Signal Latch block does not have a sample time hit at the start of the simulation, so the initial condition of the subsystem's outport determines the initial condition of the gate's **en** input signal. As a result, the gate is closed at the start of the simulation.

An alternative approach that works in both versions is to move the Signal Latch block so that it follows the Discrete Event Subsystem block. The Signal Latch block directly provides the gate's initial condition.
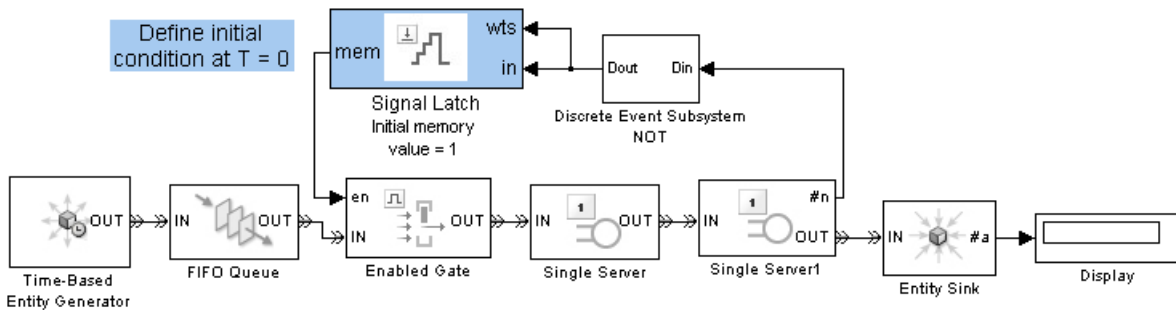
Correct Gate Initialization in Both V1.1 (R2006a) and V1.2 (R2006b)

History Options and Other Changes in Scope Blocks

The following blocks include new **Store data when scope is closed** and **Limit data points to** parameters on the new **Data History** tab of the dialog box:

- Attribute Scope

- Instantaneous Entity Counting Scope

- Instantaneous Event Counting Scope

- Signal Scope

- X-Y Attribute Scope

- X-Y Signal Scope

The parameters determine how much data the blocks cache, letting you balance data visibility with simulation efficiency. Caching data lets you view it later, even if the scope is closed during part or all of the simulation. Caching less or no data accelerates the simulation and uses less memory. In V1.1 (R2006a), if you have the scope closed for the first T seconds of simulation and then open the scope, you can view only the data for t>T.

Other Changes in Scope Blocks

Version 1.2 (R2006b) changes some aspects of the way you interact with the scope blocks:

- A Pan toolbar button lets you move your view of a plot.

- A Parameters toolbar button opens the block dialog box.

- Double-clicking on the block opens the plot if it is not already open. In V1.1 (R2006a), double-clicking on the block opens the block dialog box. To open the block dialog box in V1.2 (R2006b), click the Parameters toolbar button on the plot.

- The autoscale feature no longer changes the initial axis limits that you specify in the block dialog box. A new **Save axes limits** menu option lets you update the initial axis limits to match the plot's current limits. The current limits might differ from their initial values due to stretching, shifting, panning, zooming, or autoscaling operations that occurred since the initial values were last set.

- The former **Open at start of simulation** parameter is now called **Open scope at start of simulation** and has moved from the **Figure** tab of the dialog box to the **Plotting** tab.

The scope blocks also plot initial conditions without a plotting marker. In V1.1 (R2006a), initial conditions typically do not appear in plots.

Finally, the scope blocks run significantly faster in V1.2 (R2006b).

Compatibility Considerations

If your legacy models contain scope blocks that plot more than 1000 points, then the default values of the new **Store data when scope is closed** and **Limit data points to** parameters cause the scope to retain only the last 1000 points. To plot all points, set **Store data when scope is closed** to Unlimited.

If you save a model containing a scope block using V1.2 (R2006b), then opening the model in an earlier version produces warnings about the parameters that are not in the earlier block. For example,

```
Warning: In instantiating linked block 'mysys/Attribute
Scope' : Attribute Scope block (mask) does not have a parameter
named 'DataStoreOption'.
Warning: In instantiating linked block 'mysys/Attribute
Scope' : Attribute Scope block (mask) does not have a parameter
named 'DataPointsLimit'.
```

Saving the model in the earlier version prevents the warnings from reappearing, but also causes the block to use default values for the new parameters if you later open the model in V1.2 (R2006b).

Parameters for Lognormal Distribution

The Event-Based Random Number block produces random numbers from a lognormal distribution when you set the **Distribution** parameter to Lognormal. Different texts use different parameterizations of the lognormal distribution. V1.2 (R2006b) renames some parameters in this block to clarify the relationship between a lognormal random variable X and the normal random variable log(X).

V1.1 (R2006a) Parameter Name	V1.2 (R2006b) Parameter Name
Scale	Mu
Shape	Sigma

Compatibility Considerations

The block behaves the same in V1.1 (R2006a) and V1.2 (R2006b) because the change merely renames parameters. However, the parameter names in V1.2 (R2006b) more accurately reflect the block's behavior.

SimEvents Blocks Compatible with Accelerator Mode

All SimEvents blocks are compatible with accelerator mode. Version 1.1 (R2006a) does not support simulating models in accelerator mode if the models contain the Event-Based Random Number block.

Livelock Detection

SimEvents software can detect livelock during a simulation. When it detects livelock, it halts the simulation with an error message that indicates too many simultaneous events. In V1.1 (R2006a), livelock can potentially cause MATLAB software to crash.

For details, see "Livelock Prevention".

Compatibility Considerations

It is possible for the application to consider a situation to be livelock when it is actually a large but finite loop. Such simulations might work in V1.1 (R2006a) but not in V1.2 (R2006b).

Version 1.1 (R2006a) SimEvents Software

This table summarizes what's new in Version 1.1 (R2006a):

New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems	Related Documentation at Web Site
Yes Details below	Yes—Details labeled as **Compatibility Considerations**, below. See also Summary.	Bug Reports Includes fixes	No

New features and changes introduced in this version are described here.

Replicate Block Supports Partial Replication

The Replicate block supports partial replication and offers more flexibility when you choose complete replication. New parameters in the block's dialog box are in the table below.

Parameter	Description
Replicate entity when	Lets you choose whether the block accepts arriving entities for replication only when all entity output ports are not blocked or whenever at least one entity output port is not blocked. The first option is the default.
If an output port becomes blocked during replication	Determines how the block responds if a departure through one entity output port causes another entity output port to become blocked.
Number of entities departed	Toggles the optional output signal **#d**, representing the number of departed entities.

Compatibility Considerations

By default in V1.1 (R2006a), when a departure through one entity output port causes another entity output port to become blocked, the result is a discarded entity with no error or warning message. If this phenomenon occurs in your legacy models, then the result in V1.0 (R14SP3+) might be an error message or incorrect behavior. If you want to learn when this phenomenon occurs in your legacy models that you simulate using V1.1 (R2006a), then set **If an output port becomes blocked during replication** to either `Warn and discard entity`, or `Error`.

The default values of the other new parameters added in V1.1 (R2006a) are consistent with the block's behavior in V1.0 (R14SP3+), so legacy models need no changes to accommodate these new features.

If you save a model containing the Replicate block using V1.1 (R2006a), then opening the model in V1.0 (R14SP3+) produces warnings about the parameters that are not in the V1.0 block. For example,

```
Warning: In instantiating linked block 'mysys/Replicate' :
  Replicate block (mask) does not have a parameter named
  'ReplicateEntityWhen'.
Warning: In instantiating linked block 'mysys/Replicate' :
  Replicate block (mask) does not have a parameter named
  'ActionUponBlocking'.
Warning: In instantiating linked block 'mysys/Replicate' :
  Replicate block (mask) does not have a parameter named
  'StatNumberDeparted'.
```

Also, simulating that model under V1.0 causes the block to exhibit its V1.0 behavior, which is to omit a **#d** output signal and to replicate the arriving entity only when all entity output ports are not blocked. Saving the model in V1.0 prevents the warnings from reappearing in V1.0 but also causes the block to exhibit its V1.0 behavior if you later open the model in V1.1.

Version 1.0 (R14SP3+) SimEvents Software

This table summarizes what's new in Version 1.0 (R14SP3+):

New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems	Related Documentation at Web Site
Yes Details below	Not applicable	Bug Reports	No

New features introduced in this version are described here.

Introduction to SimEvents

SimEvents software extends Simulink software with tools for modeling and simulating discrete-event systems using queues and servers. With SimEvents software you can create a discrete-event simulation model to simulate the passing of entities through a network of queues, servers, gates, and switches based on events. The software provides an integrated environment for modeling hybrid dynamic systems containing continuous-time, discrete-time, and discrete-event components.

A key concept that SimEvents software adds to the Simulink environment is that of *entities*, which are discrete items of interest in a discrete-event simulation. For example, entities could represent messages to be communicated or parts to be assembled. Entities can carry data in one or more scalar structures called *attributes*. For example, attributes could represent destinations of messages or dimensions of parts.

The libraries in SimEvents software contain blocks that can

- Create entities

- Store entities in a queue

- Serve or delay entities

- Forbid or allow entities to depart, depending on specified criteria

- Manipulate the paths on which entities travel

- Attach data or timers to entities

- Create plots using data from entities or statistics gathered during simulation

- Manipulate or generate discrete events that can affect the behavior of blocks and entities

- Control the simulation timing in situations where event-driven behavior and time-driven behavior interact

Compatibility Summary for SimEvents Software

This table summarizes new features and changes that might cause incompatibilities when you upgrade from an earlier version, or when you use files on multiple versions. Details are provided in the description of the new feature or change.

Version (Release)	New Features and Changes with Version Compatibility Impact
Latest Version 2.3 (R2008b)	None
V2.2 (R2008a)	None
V2.1 (R2007b)	See the **Compatibility Considerations** subheading for each of these new features or changes: • "Processing Events Via the Event Calendar Instead of Immediately" on page 14 • "Enhanced Support for Multiple Simultaneous Transitions in Switches and Gate" on page 17
V2.0 (R2007a)	See the **Compatibility Considerations** subheading for each of these new features or changes: • "Attributes Support Multidimensional Values" on page 19 • "Timeout Feature Establishes Entity Time Limits" on page 20 • "Output Switch Block Options for Storage and Initial Condition" on page 22

Version (Release)	New Features and Changes with Version Compatibility Impact
V1.2 (R2006b)	See the **Compatibility Considerations** subheading for each of these new features or changes: • "Event Translation Block Supports Delay from a Signal" on page 29 • "Routing Blocks Support Unlimited Entity Ports" on page 30 • "Initial Outputs of SimEvents Blocks" on page 31 • "History Options and Other Changes in Scope Blocks" on page 33 • "Parameters for Lognormal Distribution" on page 34 • "Livelock Detection" on page 35
V1.1 (R2006a)	See the **Compatibility Considerations** subheading under "Replicate Block Supports Partial Replication" on page 36.
V1.0 (R14SP3+)	Not applicable