

Spectre AMS Designer and Xcelium Simulator Mixed-Signal What's New

**Product Version 19.09
September 2019**

Document Last Updated: September 25, 2019

© 2013-2019 Cadence Design Systems, Inc. All rights reserved.
Printed in the United States of America.

Cadence Design Systems, Inc. (Cadence), 2655 Seely Ave., San Jose, CA 95134, USA.

Open SystemC, Open SystemC Initiative, OSCI, SystemC, and SystemC Initiative are trademarks or registered trademarks of Open SystemC Initiative, Inc. in the United States and other countries and are used with permission.

Trademarks: Trademarks and service marks of Cadence Design Systems, Inc. (Cadence) contained in this document are attributed to Cadence with the appropriate symbol. For queries regarding Cadence's trademarks, contact the corporate legal department at the address shown above or call 800.862.4522.

All other trademarks are the property of their respective holders.

Restricted Permission: This publication is protected by copyright law and international treaties and contains trade secrets and proprietary information owned by Cadence. Unauthorized reproduction or distribution of this publication, or any portion of it, may result in civil and criminal penalties. Except as specified in this permission statement, this publication may not be copied, reproduced, modified, published, uploaded, posted, transmitted, or distributed in any way, without prior written permission from Cadence. Unless otherwise agreed to by Cadence in writing, this statement grants Cadence customers permission to print one (1) hard copy of this publication subject to the following conditions:

1. The publication may be used only in accordance with a written agreement between Cadence and its customer.
2. The publication may not be modified in any way.
3. Any authorized copy of the publication or portion thereof must include all original copyright, trademark, and other proprietary notices and this permission statement.
4. The information contained in this document cannot be used in the development of like products or software, whether for internal or external use, and shall not be used for the benefit of any other party, whether or not for consideration.

Disclaimer: Information in this publication is subject to change without notice and does not represent a commitment on the part of Cadence. Except as may be explicitly set forth in such agreement, Cadence does not make, and expressly disclaims, any representations or warranties as to the completeness, accuracy or usefulness of the information contained in this document. Cadence does not warrant that use of such information will not infringe any third party rights, nor does Cadence assume any liability for damages or costs of any kind that may result from use of such information.

Restricted Rights: Use, duplication, or disclosure by the Government is subject to restrictions as set forth in FAR52.227-14 and DFAR252.227-7013 et seq. or its successor.


Contents

1	4
What's New in the Spectre AMS Designer and Xcelium Simulator With Mixed-Signal Option	4
Platform Support	4
Licensing Changes	5
Versions of the Spectre AMS Designer Simulator	5
Setting the Path Variable to Point to the 64-Bit Version	6
Setting the Library Path Environment Variable	6
Setting the CDS_AUTO_64BIT Environment Variable for 64-Bit Mode	7
New Xcelium Simulator Mixed Signal Features	8
Supports Fault Simulation in AMSD Flex Mode	8
Supports Hierarchical UDT to Electrical Connections	9
Automatic Insertion of SV-AMS Connect Modules	9
Supports UPF Supply Connection on SV-UDN with VCT Definition	9
Enhancements to \$SIE_input System Task for RNM Designs	9
Downgrading Domain Conflict Error Messages to Warning	10
Allows Performance Optimization	10
Supports Hierarchical Nets in Common Power Format (CPF) Commands	11
New Features Common to Both Spectre AMS Designer and Xcelium Simulator with Mixed Signal Option	11
Licensing Updates	11
MSV Homepage on Cadence Online Support (COS) Portal	12
Enhancements to TCL-Based Commands	12
Enhancements to SystemVerilog and AMS Connections	12
Process-Based Save-and-Restart for AMS Simulation	13
Deprecated Items	13

What's New in the Spectre AMS Designer and Xcelium Simulator With Mixed-Signal Option

This section contains information about the mixed signal features in the Xcelium simulator and the Spectre AMS Designer simulator in the XCELIUM 19.09 release.

- [Platform Support](#)
- [Licensing Changes](#)
- [Incisive Executable/Option Names Changed](#)
- [Versions of the Spectre AMS Designer Simulator](#)
- [New Xcelium Simulator Mixed Signal Features](#)
- [New Features Common to Both Spectre AMS Designer and Xcelium Simulator with Mixed Signal Option](#)

 In an effort to reduce the size of Cadence software downloads, this MAIN release installation does not contain document PDF files. User guides can be accessed using the Cadence Help viewer, or for access to PDF files for this and all releases, please visit [Cadence Online Support](#).

Platform Support

The XCELIUM 19.09 release includes 32-bit and 64-bit versions of the Spectre AMS Designer simulator, as shown below.

Platform and Architecture	Linux (32/64) x86_64 (lnx86)
Development OS	RHEL 6.5

Additional Supported OS	RHEL 7
	SLES 11 (64-bit only)
	Ubuntu 14.04

For information on how to run the simulator in 32-bit and 64-bit mode, see [Versions of the Spectre AMS Designer Simulator](#).

Licensing Changes

AMS licenses have been updated to support the new Xcelium simulator. Two new products, Spectre AMS Connector and Spectre AMS Designer have been introduced in this release. Spectre AMS Connector enables mixed-signal simulation by connecting the Spectre and Xcelium simulators. Spectre AMS Designer contains the Spectre AMS Connector and can be used to run basic mixed-signal simulation features, such as Verilog 1364, VHDL 1076, Verilog-AMS based modeling (including Verilog-AMS Wreal), and VHDL-AMS.

A new MMSIM token, Spectre MMSIM token with AMS, 9005, has also been introduced in this release. It is backward compatible with the existing MMSIM token, 90004. In addition, the new MMSIM token, 90005, can access Spectre AMS Connector and Spectre AMS Designer.

For more information on licensing, refer to the [Product and Licensing Information](#) chapter in the *Spectre AMS Designer and Xcelium Simulator Mixed-Signal User Guide*.


Versions of the Spectre AMS Designer Simulator

The Spectre AMS Designer simulator supports 32-bit and 64-bit operations on all platforms that are officially supported by Cadence. You must run all software in one mode or the other; you cannot mix modes. For example, if you run `xmvlog` in 64-bit mode, you must also run the 64-bit versions of `xmelab` and `xmsim`.


To run the Spectre AMS Designer simulator in 32-bit mode, you need to set only the library path environment variable. For details, see [Setting Library Path for 32-Bit Mode](#).

To run the Spectre AMS Designer simulator in 64-bit mode, do one of the following:

- Set the path variable and the library path environment variable to point to the executable files that enable the software to run in 64-bit mode (see [Setting the Path Variable to Point to the 64-Bit Version](#) and [Setting the Library Path for 64-Bit Mode](#)).
- Use the `-64bit` command-line option when you run each executable (`xmvlog`, `xmelab`, `xmsim`, or `xrun`).

 When you use the `-64bit` command-line option, the software sets the `PATH` variable and the library path environment variable to run the software in 64-bit mode. Do not use this command-line option when linking the software to 64-bit applications, such as PLI, VPI, or VHPI. Set the path variable and the library path environment variable, instead.

- Set the `CDS_AUTO_64BIT` environment variable.

 Use the `xmbits` command, as shown below, to see the bit mode that has been set up to run the software:

```
xmbits
64
```

The `-version` command-line option also reports the version of the simulator being used. For example:

```
xrun -version
TOOL: xrun 17.04-...
```

For additional information, see *Running the Simulator in 64-Bit Mode* in the *Overview of Running the Xcelium Simulator* book.

Setting the Path Variable to Point to the 64-Bit Version

You will find 64-bit executables installed in `install_dir/tools/bin/64bit`.

To set the path variable to point to the 64-bit executables, use one of the following commands (depending on the shell that you are running):

```
set path = (install_dir/tools/bin/64bit $path)
set PATH = (install_dir/tools/bin/64bit:$PATH)
```

Setting the Library Path Environment Variable

You need to set the `LD_LIBRARY_PATH` environment variable before you can use the three-step method to run the simulation. However, setting this path is not required if you are using the `xrun` command to run the simulation.

Setting the Library Path for 64-Bit Mode

For non-SUSE Linux, set the library path environment variable, as shown below.

```
setenv LD_LIBRARY_PATH install_dir/tools/lib/64bit:install_dir  
/tools/lib:${LD_LIBRARY_PATH}
```

For SUSE Linux, set the library path environment variable, as shown below.

```
setenv LD_LIBRARY_PATH  
install_dir/tools/lib/64bit/SuSE:install_dir/tools/lib/64bit:install_dir/tools/lib/SuSE  
:install_dir/tools/lib:${LD_LIBRARY_PATH}
```

Setting Library Path for 32-Bit Mode

For non-SUSE Linux, set the library path environment variable, as shown below.

```
setenv LD_LIBRARY_PATH install_dir/tools/lib:${LD_LIBRARY_PATH}
```

For SUSE Linux, set the library path environment variable, as shown below.

```
setenv LD_LIBRARY_PATH install_dir/tools/lib/SuSE:install_dir/tools/lib:${LD_LIBRARY_PATH}
```

Setting the CDS_AUTO_64BIT Environment Variable for 64-Bit Mode

To set the `CDS_AUTO_64BIT` environment variable to run the Spectre AMS Designer simulator in 64-bit mode, use the following command:

```
setenv CDS_AUTO_64BIT INCLUDE:INCA
```


Setting `CDS_AUTO_64BIT` has the same effect as using the `-64bit` command-line option when you run each executable. The advantage of setting `CDS_AUTO_64BIT` is that you do not have to use the command-line option every time you run an executable.

The following table shows how you can set the `CDS_AUTO_64BIT` environment variable to run the Spectre AMS Designer simulator and IC applications in all modes.

CDS_AUTO_64BIT Setting	AMS	IC apps
setenv CDS_AUTO_64BIT ALL	64-bit	64-bit
setenv CDS_AUTO_64BIT NONE	32-bit	32-bit

setenv CDS_AUTO_64BIT EXCLUDE:ICbinaryName	64-bit	32-bit
setenv CDS_AUTO_64BIT EXCLUDE:INCA ¹	32-bit	64-bit

¹ You can use the `-64bit` command-line option to override this setting for AMS

 Because you must run all Spectre AMS Designer simulator executables in one mode or the other, do not exclude the individual XM executables, such as `xmelab`. For example:

```
setenv CDS_AUTO_64BIT EXCLUDE:xmelab <<<---THIS IS NOT ALLOWED
```

Also, for XM executables, the `XCELIUM_64BIT` environment variable overrides the `CDS_AUTO_64BIT` setting such that if `XCELIUM_64BIT` is set, all XM executables will run in 64-bit mode.

New Xcelium Simulator Mixed Signal Features

The following new feature is available in the XCELIUM 19.09 release:

- [Supports Fault Simulation in AMSD Flex Mode](#)
- [Supports Hierarchical UDT to Electrical Connections](#)
- [Automatic Insertion of SV-AMS Connect Modules](#)
- [Supports UPF Supply Connection on SV-UDN with VCT Definition](#)
- [Enhancements to \\$SIE_input System Task for RNM Designs](#)
- [Downgrading Domain Conflict Error Messages to Warning](#)
- [Allows Performance Optimization](#)
- [Supports Hierarchical Nets in Common Power Format \(CPF\) Commands](#)

Supports Fault Simulation in AMSD Flex Mode

From this release, AMSD supports the analog fault analysis of the Legato Reliability Solution. The fault analysis provides a transistor-level simulation capability that can be enabled in an analog test methodology to improve test coverage by identifying critical test patterns.

For more information, see the [Fault Analysis](#) section in the *Spectre AMS Designer and Xcelium Simulator Mixed-Signal User Guide*.

Supports Hierarchical UDT to Electrical Connections

From this release, the Xcelium simulator with mixed-signal option allows you to connect hierarchical UDTs to electrical nets using the `-sv_ms` option. Hierarchical UDT including arrays of packed structure nettype, logic bit types (logic single type and bit select of logic bus), and L2E/E2L connect modules are supported.

For more information, see the [Connecting SystemVerilog Hierarchical UDT to Electrical](#) section in the *Spectre AMS Designer and Xcelium Simulator Mixed-Signal User Guide*.

Automatic Insertion of SV-AMS Connect Modules

From this release, you can enable automatic insertion of SV-AMS connect modules for designs where both port connections are discrete nettypes such as wire, SV wreal and UDN. To insert custom SV-AMS connect modules, you must specify the connect modules along with the `-rnm_dmsie` option in the `xrun` command-line.

For more information, see the [Configuring SV-AMS Connect Modules for UDN-UDN, UDN-Logic, and UDN-Real Connections](#) section in the *Spectre AMS Designer and Xcelium Simulator Mixed-Signal User Guide*.

Supports UPF Supply Connection on SV-UDN with VCT Definition

You can now enable support for VCT definitions in UPF for SV-UDN connections using the `-lps_ams_supply_vct` option. You can also apply VCTs on multiple SV-UDN fields with same datatype.

For more information and examples, see the [Power-Aware Analog/RNM Blocks](#) section in the *Spectre AMS Designer and Xcelium Simulator Mixed-Signal User Guide*.

Enhancements to \$SIE_input System Task for RNM Designs

- [Renamed \\$SIE_input System Task](#)
- [Supports SIE Models with Mixed-Language Net Connections](#)

Renamed \$SIE_input System Task

The `$SIE_input` system task has been renamed to `$cds_get_external_drivers` in the RNM flow. You can also use its abbreviated name, `$cged`.

For more information, see the [Writing Bidirectional Model Behavior](#) section in the *Spectre AMS Designer and Xcelium Simulator Mixed-Signal User Guide*.

Supports SIE Models with Mixed-Language Net Connections

From this release, bidirectional behavior of WTRAN models is supported with mixed-language (Verilog/VHDL) net connections. So, you can instantiate Verilog SIE model inside VHDL (VHDL on parent and Verilog SIE model on child).

For more information, see the [Writing Bidirectional Model Behavior](#) section in the *Spectre AMS Designer and Xcelium Simulator Mixed-Signal User Guide*.

Downgrading Domain Conflict Error Messages to Warning

During elaboration, the AMS Designer simulator checks and issues an error when multiple power domains connecting to the same connect module on the digital or analog side result in a voltage conflict. From this release, you can direct the elaborator to downgrade this error to a warning by using the `-xmwarn` option.

The `-lps_ams_relax_pdchk` command-line option used earlier to downgrade the error to a warning for the above scenario will be deprecated in future releases.

For more information see the [Checking Conflicting Power Domains on Mixed-Signal Boundary](#) section in the *Spectre AMS Designer and Xcelium Simulator Mixed-Signal User Guide*.

Allows Performance Optimization

A new `xrun/xmelab` command-line option, `-ms_perf` has been added to enable performance optimizations in some mixed-signal designs.

Supports Hierarchical Nets in Common Power Format (CPF) Commands

From this release, hierarchical nets are supported in the Common Power Format (CPF)


Commands: `create_power_nets` and `create_ground_nets` commands.

For more information, see the [Connecting Design Supply Net to CPF Power Domain and Design Net](#) section in the *Spectre AMS Designer and Xcelium Simulator Mixed-Signal User Guide*.

New Features Common to Both Spectre AMS Designer and Xcelium Simulator with Mixed Signal Option

The following enhanced features are available in the Spectre AMS Designer and Xcelium simulator with mixed signal option:

- [Licensing Updates](#)
- [MSV Homepage on Cadence Online Support \(COS\) Portal](#)
- [Enhancements to TCL-Based Commands](#)
- [Enhancements to SystemVerilog and AMS Connections](#)
- [Process-Based Save-and-Restart for AMS Simulation](#)
- [Deprecated Items](#)

 The above common features work in both the simulators; Spectre AMS Designer for Verilog-AMS modules and Xcelium Simulator with mixed signal option for SystemVerilog + Mixed Signal.

Licensing Updates

To specify the license checkout order of mixed-signal verification (MSV) license packages, the following two options have been to the Xcelium Simulator command, `-license_order`:

- `XCELIUM_SC_ONLY`: Checks out only Xcelium Single Core as the main Xcelium license.

- `XCELIUM_SC_DMS`: Checks out only Xcelium Single Core and Xcelium DMSO (or `Digital_Mixed_Signal_Option`) licenses for simulation.

For more information, see the [License Checkout Order](#) section in the *Spectre AMS Designer and Xcelium Simulator Mixed-Signal User Guide*.

MSV Homepage on Cadence Online Support (COS) Portal

A new [MSV product homepage](#) is now available on the Cadence Online Support (COS) portal. The MSV homepage serves as a unified one-stop shop for all the latest MSV resources, including Rapid Adoption Kits (RAKs), application notes, training videos, and user guides.

Enhancements to TCL-Based Commands

In this release, improvements have been made to the following TCL-based debugging commands:

- The `-strobe` command supports User-Defined Nettypes (UDNs)
- The `-stop` command supports User-Defined Nettypes (UDNs)
- The `-stop` command supports setting ``wrealXState` and ``wrealZStates` as a condition for RNM nets. You can set this condition to trigger breakpoint when the specified state is true.
- The `-probe` command supports RNM nets. You can now probe only the set of RNM nets in a specified scope by using the `-rnmnets` option with the `probe -create` command.

For more information, see [Appendix B: Tcl-Based Debugging](#) in the *Spectre AMS Designer and Xcelium Simulator Mixed-Signal User Guide*.


Enhancements to SystemVerilog and AMS Connections

To allow users to make use of the various SV-AMS features more efficiently, the existing SV-AMS features have been consolidated into two new `xrun` options: `-sv_ms` and `-adv_ms`.

The following connections can be enabled using the `-adv_ms` options:

- SystemVerilog logic ports to electrical connection using wire/interconnects
- SystemVerilog variable logic to SPICE electrical output bus connections

And, the advanced SV-AMS functionalities such as SystemVerilog hierarchical UDT to electrical connections can be enabled only using the `-sv_ms` option.

 The `-sv_ms` option is a super-set of the `-adv_ms` option; so, all features enabled using the `-adv_ms` option can be enabled using the `-sv_ms` option also.

For more information, see the following sections in the *Spectre AMS Designer and Xcelium Simulator Mixed-Signal User Guide*:

- [Features Enabled Using the -adv_ms Option](#)
- [Features Enabled Using the -sv_ms Option](#)

Process-Based Save-and-Restart for AMS Simulation

From this release, the process-based save-and-restart approach has been supported for AMS designs also. You can enable process-based save-and-restart in the checkpoint enable mode and process save mode. For AMS design simulations, it is recommended that you perform the process save mode using the `-process_save` command-line option with `xmsim/xrun`.

For more information, see the [Using the Save-and-Restart Feature](#) section in the *Spectre AMS Designer and Xcelium Simulator Mixed-Signal User*.

Deprecated Items

The prop.cfg file

The property file (`prop.cfg`) has been deprecated. Instead, the alternate and recommended flow is to use `xrun` and the AMSD control block to configure your data and control the operation of the software.

If you have a `prop.cfg` file from a previous release, you can migrate to an `amsd` block using one of the following methods:

- Manually migrate to an `amsd` block. For more information, see [Appendix F: Migrating to an amsd Block from prop.cfg](#) in the *Spectre AMS Designer and Xcelium Simulator Mixed-Signal User Guide*.
- Enable the internal translator to convert your `prop.cfg` file to an `amsd` block file, `prop.cfg.scs` using the AMSCB environment variable: `setenv AMSCB YES`

The `-lps_ams_relax_pdchk` option

The `-lps_ams_relax_pdchk` command-line option will be deprecated in the future release. This command is used to downgrade an error to a warning when multiple power domains connecting to the same connect module on the digital or analog side result in a voltage conflict.

From this release, instead, you can use the new option, `-xmwarn`. For more information see the [Checking Conflicting Power Domains on Mixed-Signal Boundary](#) section in the *Spectre AMS Designer and Xcelium Simulator Mixed-Signal User Guide*.