HyperLynx SI/PI/Thermal Release Highlights

Software Version 9.4

August 2016

Introduction

This document provides a high-level summary of the HyperLynx® SI/PI/Thermal v9.4 release. Refer to the Release Notes on SupportNet for the list of specific known issues and workarounds.

This document includes a summary of the new features in this release. It also includes, if applicable, any authorization code changes required, any major installation changes, and any transitioning issues you should be aware of before installing. Additionally, any last-minute issues found in the final stages of testing are included.

Changes may be added to this document after the release. Refer to the Release Highlights documents on SupportNet for the most up-to-date release information.

New Features in HyperLynx SI/PI/Thermal v9.4

HyperLynx SI/PI/Thermal v9.4 - Overview

HyperLynx v9.4 is a major release that adds many new features to HyperLynx's signal integrity, SERDES (including 3D electromagnetic), power-integrity, and mixed SI/PI simulation capabilities. The release also offers compatibility with Mentor's latest PCB-design tools and improved integration with the Xpedition® VX.2 PCB flow. Finally, HyperLynx v9.4 includes a large number of defect fixes and improvements.

New Signal Integrity Support for Rigid-Flex Designs

Rigid-flex designs pose a unique signal integrity simulation challenge in that the board stackup changes in different areas of the design. As such, HyperLynx has been enhanced to allow for multiple stackups in different areas of the board. This capability is enabled by the new Multiple Stackup license, which is part of the HyperLynx DDRx and HyperLynx GHZ product tiers.

Multiple Stackups Mode

By default, HyperLynx assumes a single stackup for the board. In HyperLynx v9.4, users have the ability to check a selection in the stackup menu to "Enable Multiple Stackups".

This enables the Stackup Manager which is used to manage the multiple stackups as well as the Add Stackup Area capability.

Stackup Manager

The new Stackup Manager lists all the stackups in the design, allows addition of new stackups, deleting stackups, and editing stackups. When editing a stackup the existing Stackup Editor is launched from the Stackup Manager to make edits. The Stackup Manager also includes a preview showing all the stackups in the design side by side.

Stackup Areas

The stackup areas define outlines of different areas of the board with unique stackups. These areas can be set up as rectangles or complex polygons, and their vertices are completely editable if desired. You can define these areas directly in HyperLynx, and they can also be imported from Xpedition.

Integration with Xpedition Specific to Rigid-Flex designs

Any design being exported from Xpedition VX.2 to HyperLynx v9.4 (through the default .cce analysis export) will include all relevant rigid/flex design data, including the stackup areas (multiple outlines) and multiple stackup definitions. When such a design is imported into HyperLynx the "Multiple Stackups" mode will be automatically enabled to support this design data.

Other New Signal Integrity Features

Component Model Symbol

The new Component model symbol in LineSim allows for much neater schematics when dealing with schematics with a lot of drivers and receivers. Drivers and receivers on the same component can be grouped together in the Component model symbol.

IPC-2581 File Import

Another PCB output file format, IPC-2581, can now be imported into BoardSim.

New Reports for Generic Batch

In HyperLynx v9.4, Generic Batch simulation adds new HTML-formatted reports, similar to those that were introduced in v9.3 in the DDRx Wizard. The new batch-analysis

reports have multiple pages - a Summary page and subsequent pages with details on the individual analyses in the simulations.

ODT Sweeps in DDRx Wizard in LineSim

The ability to sweep on-die termination (ODT) settings in the DDRx Wizard has been added to LineSim in HyperLynx v9.4. Users can set up a series of different ODT settings for the Wizard to sweep through when running the analysis. The settings will include the device, signal group, and ODT status.

New SERDES and 3D-Electromagnetic Features

Automated Support for Series Passive Components in 3D Areas

The 3D Area capability in BoardSim has been enhanced in HyperLynx v9.4 to include better support for series passives, especially DC blocking caps on SERDES links. When a 3D area including a discrete component is created, the ports are adjusted automatically to include the circuit model of the passive in the solved S-parameter model of the entire structure.

New Power Integrity Features

New Reports for DC Drop

In HyperLynx v9.4, DC Drop simulation adds new HTML-formatted reports, similar to those that were introduced in v9.3 in the DDRx Wizard. The new batch-analysis reports have multiple pages - a Summary page and subsequent pages with details on the

individual nets analyzed. The reports will have the same data as the old text reports, organized into tables for easier viewing.

Advanced Decoupling Analysis Down to 10 KHz

The simulation engine used by Advanced Decoupling Analysis has been enhanced in HyperLynx v9.4 to support accurate AC analysis down to 10 KHz.

Loop Inductance Report from Advanced Decoupling Wizard

The Advanced Decoupling Wizard now has the option to output a loop inductance report which details the quality of the connection of the IC pins to the PDN. This report is generated in HTML format.

New Decoupling Capacitor Model Libraries

The HyperLynx v9.4 installation now features a library of models for common capacitor types. These are available in the LIBS directory in the install.

DC Drop Simulator Performance Improvement

The DC Drop simulator has been enhanced to simulate faster. Noticeably faster simulation times; up to 2x for very large boards.

GUI Improvements

Improved Panning Capability

In HyperLynx v9.4, users can now pan in BoardSim and LineSim by holding down the middle mouse button and moving the mouse in the desired direction of panning. The same panning and zooming scheme is used in the board viewer, schematic editor, PDN editor, and DC Drop board viewer.

New Measure Feature in BoardSim

A new feature has been added to the board viewer to allow users to measure between two objects. A crosshair is snapped to a specific location and the cursor moved to measure distances to other objects. This feature works in conjunction with the new panning capability to facilitate measuring large distances on a board.

HyperLynx v9.4 Compatible PCB Flows

HyperLynx v9.4 is fully compatible with the following Mentor PCB flows:

- Xpedition Enterprise VX.2
- Xpedition Package Integrator VX.2
- PADS-Pro VX.2
- PADS VX.2

Generally, if you integrate to your layout tool (Mentor or 3rd-party) only through .HYP, CCE, or ODB++ layout files, then HyperLynx v9.4 is very likely to work in all respects with your designs. This is also applicable to BSXE V.10. If you use a Mentor PCB tool (Xpedition, PADS-Pro, or PADS) and rely on "deeper" integration between HyperLynx and the PCB flow (for example, passing of data between Constraint Manager and LineSim / BoardSim), you should use HyperLynx v9.4 only with one of the specific tool versions listed above.

One integration feature, use of the Analysis Control plug-in to run DC-drop simulations from directly within Xpedition Layout, is limited to the following two flows and versions:

- Xpedition Enterprise VX.2
- Xpedition Package Integrator VX.2

Note: When Analysis Control is used for DC-drop simulation in Xpedition, both Xpedition and HyperLynx must match in bit count, i.e., only the combinations of 32-bit Xpedition and 32-bit HyperLynx –or- 64-bit Xpedition and 64-bit HyperLynx function properly together.

HyperLynx v9.4 Platform Support Changes

Added Platform Support

- Linux RHEL 7 (7.0 to 7.2)

- SLES 11 (11.2 & 11.3 only)

Licensing

The HyperLynx v9.4 release updates the Mentor Standard Licensing to v2015_1. This version requires a FLEXnet license server running at version v11.13.1.2 or higher. If you use floating licenses and your license server is not at FLEXnet v11.13.1.2 or higher, you will need to update the license server. If you see an error message that says "vendor daemon too old," that is usually an indicator that the license server needs to be updated to run this version of the client software. For additional information on licensing, refer to the Licensing Mentor Graphics Software manual.

Authorization Codes

To use HyperLynx v9.4, you must be on support contracts for these products as of May 2016. For more information about "Exact Access" authorization code formats, see the explanation on SupportNet at:

http://supportnet.mentor.com/about/other-info/exact_access.cfm

You may download your site's existing authorization codes from SupportNet at:

http://supportnet.mentor.com/myaccount/index.cfm?fa=user.licenses

For additional information on licensing, refer to the *Licensing Mentor Graphics Software* manual.

> **Note:** The HyperLynx v9.4 release contains some license features changes. In order to full utilize all the new features in some HyperLynx v9.4 products and bundles, ***Customers must update their licensing keys prior to installing HyperLynx v9.4:***
>
> - HyperLynx GHz-3D EM Bnd SW, PN: 250825
>
> - HyperLynx SI DDRx AP SW, PN: 239999
>
> - HyperLynx SI LSim GHz Ap SW, PN: 239983
>
> - HyperLynx SI GHz Bnd SW, PN: 239985
>
> - HyperLynx SI PI Bnd SW, PN: 239986

Installation Information

This release uses the Mentor Graphics Standard Installation program. For additional information on installation, refer to *Managing Mentor Graphics PCB Systems Software* manual and the help system within the installation software. You can view this manual at the top level of the CD and on SupportNet.

Support Information

If you have questions about this software release, please log in to SupportNet. You may search

the KnowledgeBase with thousands of technical solutions or open a Service Request online at:

http://www.mentor.com/supportnet

If you do not have a SupportNet login, you may easily request one by filling out a short form:

http://www.mentor.com/supportnet/quickaccess/SelfReg.do

For phone support in the United States or Canada, please call 1-800-547-4303. For phone support in other locations, please contact your local sales office or distributor. All Customer Support contacts can be found on our web site at:

http://www.mentor.com/supportnet/support_offices.html

Supported Platforms

Overall Notes

- Specified patches below are minimum levels. Later versions of the patches are valid, supported configurations.
- Except as noted, all products are supported on all platforms.
- Processor and Memory requirements vary based on the mix of applications being used, the design complexity, and infrastructure requirements. Individual needs may vary from those published below.

Processor Note for Intel/AMD Processors

All Windows and Linux OS variants run on Intel or AMD x86 or x64 processors. In the past, the processor GHz speed determined the performance, but recent changes in the internal architecture of both Intel and AMD processors have made these comparisons difficult. Therefore, the following recommendations are being made for **all** Windows and Linux systems:

- Supported processors and systems are those manufactured since 2008 which conform to the subsequent requirements
- Intel Celeron processors are not recommended
- Minimum requirement is a dual-core (or dual processor) system. A quad core is recommended for improved overall system performance. A hyper-threaded processor should be considered a single processor, not a dual processor.
- For best results, maximize processor speed and L1/L2/L3 processor cache memory.
- Typically, cost is the best indicator of performance, and extra investment in processor capability returns better system performance.

HyperLynx-Specific Recommendations

The following are general recommendations, based on typical usage. Memory consumption varies significantly depending on the size and other details of your designs.

If you plan to use the following features, it is recommended that you install at least **8 GB of RAM in your machine:**

- Simulation sweeps (if a large number of parameter variations are enabled simultaneously)

- DDRx batch simulation under certain circumstances (especially with the "power-aware" option enabled)

For these features, 8 GB and preferably 16 GB are recommended:

- Power-integrity analysis of post-layout designs in BoardSim

- 3D EM simulation in the HyperLynx Full-Wave Solver (from either LineSim or BoardSim)

For this feature, 16 GB and possibly 32 GB are recommended:

- "Advanced decoupling analysis" using the new 2.5D power-integrity engine

On a 32-bit Windows system, even basic signal-integrity analysis of large boards may require you to boot Windows in the "/3GB mode" (see Microsoft documentation for details), to force Windows to allow applications to access more than 2GB of the 4GB total memory. Advanced analysis features (like the power-integrity and 3D EM features listed above) are not likely to run at all; a 64-bit OS and the 64-bit version of HyperLynx are recommended instead.

In the sections below, the memory requirements do *not* assume use of these memory-intensive features.

Red Hat Enterprise Linux WS 6 (RHEL6)

This release supports both the 32-bit and 64-bit versions of RHEL6 Update 7 through Update 7. Customers running AMD64-based systems or Intel Pentium4 or Xeon-based systems with EM64T capabilities should use 64-bit operating systems together with 32-bit applications support.

> **Note 1:** Given the recent announcement from RedHat to end support for RHEL6 Update 5 and prior Update versions, we have adjusted our test and support strategy to support the following RHEL6 OS release versions:

- RHEL6.6
- RHEL6.7

We strongly urge you to make plans, if you have not already, to move forward to one of the supported RHEL OS releases. In the meantime we have not changed our environment check routine to preclude you from running on the RHEL OS versions supported in our prior releases in order to provide you the time to migrate your environment forward.

Note 2: The version numbers of the packages shown below as output of the uname or rpm command are for the RHEL Update noted in parentheses, and are included as examples of the output. For RHEL Updates supported but whose package versions are not shown below, the version information may vary, but the package is required, and must be the version that is delivered with that RHEL Update.

OS Version:

```
$ uname –rs
Linux 2.6.32-71    (RHEL6 Upd1 or newer up to 6 Upd7)
```

Recommended Installation:
Select the following options on the Package Groups offered from the interactive install:

Install set - Software Development Workstation

Package group selection
- Base System
    - o Base
        - dos2unix
        - unix2dos
    - o Compatibility libraries
    - o Debugging Tools
    - o Directory Client
    - o Java Platform
    - o Legacy UNIX compatibility
        - rsh
        - rsh-server
        - telnet
        - telnet-server
        - ksh
    - o Network file system client
    - o Performance Tools
    - o Perl Support
    - o Printing client
- Servers

- o CIFS file server
- o FTP server
- o NFS file server
- o Server Platform

- Web Services
  - o PHP Support
  - o Web Server
- Databases
  - o (nothing)

- System Management
  - o SNMP Support
- Virtualization
  - o (nothing)
- Desktops
  - o Desktop
  - o Desktop Debugging and Performance
  - o Desktop Platform
  - o Fonts
  - o General Purpose Desktop
  - o Graphical Administration Methods
  - o Input Methods
  - o KDE Desktop
  - o Legacy X Window System compatibility
    - ▪ libXp
    - ▪ openmotif
    - ▪ openmotif22
  - o Remote Desktop Clients
  - o X Window System
- Applications
  - o Emacs
  - o Internet Applications
  - o Internet Browser
  - o Office Suite and Productivity
- Development
  - o Additional Development
    - ▪ openmotif-devel
  - o Desktop Platform Development
  - o Development tools
  - o Eclipse
  - o Server Platform Development
- Languages
  - o (nothing)

Native File Sets

The following additional RPMs are required for this product. Note that these must be the 32-bit or 64-bit versions of these file sets, corresponding to the platform version of RHEL6 being set up (32-bit or 64-bit). If the above Package Groups were selected interactively, these RPMs will be loaded. If the system was otherwise configured, verify that these RPMs are loaded.

```
# Individual RPMs (Install the version for the RHEL6 platform version)
dos2unix
gdm-2
ksh
libXp
openmotif
openmotif22
unix2dos
xorg-x11-server-Xorg
xorg-x11-server-Xvfb (Must be downloaded from Red Hat directly.)
```

32/64-bit File Sets on 64-bit RHEL6

The following additional 32-bit file sets and rpms are required for this product.
Note that on 64-bit RHEL6, both the 32-bit and 64-bit versions of these file sets must be installed. The *package groups* listed previously and installed interactively will install these RPMs for the instance of the OS being installed (32-bit or 64-bit). However, because in RHEL6 Red Hat no longer loads the 32-bit versions by default on a 64-bit machine, these additional 32-bit RPMs must be separately installed on a 64-bit machine.

```
#32-bit packages
atk.i686
audit-libs.i686
avahi-libs.i686
cairo.i686
compat-expat1.i686
compat-libcap1.i686
compat-libstdc++-33.i686
cracklib.i686
cups-libs.i686
db4.i686
dbus-libs.i686
expat.i686
fontconfig.i686
freetype.i686
gamin.i686
glib2.i686
```

gnutls.i686
gtk2.i686
jasper-libs.i686
keyutils-libs.i686
krb5-libs.i686
libattr.i686
libcap.i686
libcom_err.i686
libdrm.i686
libgcrypt.i686
libgpg-error.i686
libICE.i686
libjpeg.i686
lib-png.i686
libselinux.i686
libSM.i686
libstdc++.i686
libtalloc.i686
libtasn1.i686
libthai.i686
libtiff.i686
libuuid.i686
libX11.i686
libXau.i686
libxcb.i686
libXcomposite.i686
libXcursor.i686
libXdamage.i686
libXext.i686
libXfixes.i686
libXft.i686
libXi.i686
libXinerama.i686
libXmu.i686
libXp.i686
libXrandr.i686
libXrender.i686
libXt.i686
libXtst.i686
libXxf86vm.i686
mesa-dri-drivers.i686
mesa-libGL.i686
mesa-libGLU.i686
ncurses-libs.i686
nspr.i686
nss.i686

nss-softokn.i686
nss-util.i686
openmotif22.i686
pam.i686
pango.i686
pixman.i686
readline.i686
redhat-lsb.i686
sqlite.i686
zlib.i686

IT Administration Notes:
Optionally disable firewall and SELinux.

1. Applications->SystemSettings-> Security Level

2. Firewall Options tab select Security Level: Disable firewall ☐

3. SELinux tab uncheck "Enabled (Modification Requires Reboot)"

4. Reboot the system

Minimum Required OS Patches: None

Processor: Dual-core Intel or AMD processor minimum. See <u>Processor Note for Intel/AMD Processors</u> above.

Memory: 8 GB Minimum
Swap Space: 2X the amount of RAM
Kernel Parameters: No changes required.

Red Hat Enterprise Linux WS 7 (RHEL7)

This release supports the 64-bit versions of RHEL7 (baseline version through Update2). Customers running AMD64-based systems or Intel Pentium4 or Xeon-based systems with EM64T capabilities should use 64-bit operating systems together with 32-bit applications support.

Note: The version numbers of the packages shown below as output of the uname or rpm command are for the RHEL Update noted in parentheses, and are included as examples of the output. For RHEL Updates supported but whose package versions are not shown below, the version information may vary, but the package is required, and must be the version that is delivered with that RHEL Update.

OS Version:

```
$ uname –rs
Linux 2.7.xx-xx    (RHEL7 Baseline or newer up to Upd2)
```

Recommended Installation:
  Select the following options on the Package Groups offered from the interactive install:

Install set - Software Development Workstation

Minimum Required OS Patches: None

Processor: Dual-core Intel or AMD processor minimum. See Processor Note for Intel/AMD Processors above.

Memory: 8 GB Minimum
Swap Space: 2X the amount of RAM
Kernel Parameters: No changes required.

SuSE Linux Enterprise 11 (SLES 11.2 – 11.3)

OS Version:

  $ uname –rs

      Linux 2.6.16.32 (SuSE Linux Enterprise Server 11 or later

  Linux 3.0. (SuSE Linux Enterprise Server 11 or later)

Windowing System:

  $ /bin/rpm –q gdm
  gdm-2.24

  $ /bin/rpm –q xorg-x11-server
  Xorg-x11-server-6.9
  Xorg-x11-server-7.4

RPMs Required
  Gnome Desktop Mgr – RPM gdm-2.24 or higher
  X Windows – RPM xorg-x11-server
  32-bit Compat C++ Libraries (for 64-bit SLES11) – RPM libstdc++33-32bit
  Compat C++ Libraries – RPM libstdc__33-3
  Open Motif – RPM openmotif22
  Libexpat0 Library – RPM libexpat0

  NOTE: The OpenMotif and libexpat0 RPMs are not delivered with SLES11, and must be separately downloaded from opensuse.org.

Individual files required – These are provided by the above RPMs
32 bit libXm.so - /usr/lib/libXm.so
32 bit libexpat.so.0 - /usr/lib/libexpat.so.0

Minimum Required OS Patches: None
Processor: Dual-core Intel or AMD processor minimum. See <u>Processor Note for Intel/AMD</u>
<u>Processors</u> above.

Memory: 4 GB Minimum, 8 GB Recommended
Swap Space: 2X the amount of RAM
Kernel Parameters: No changes required.

Microsoft Windows 7 SP1

Microsoft Windows 7 (32 and 64 bit versions), Professional Edition, Ultimate Edition, and
Enterprise Edition are supported with SP1.

While there is no known issue with running Microsoft Windows 7 Starter Edition and
Microsoft Windows 7 Home Premium Edition, the product has not been tested with these
editions, and therefore is not supported.

Kernel Configuration: N/A

Processor: Dual-core Intel or AMD processor minimum. See <u>Processor Note for Intel/AMD</u>
<u>Processors</u> above.

Memory: 4GB Minimum, 8GB recommended.

Swap Space: 2x the amount of RAM.

Microsoft Windows 8.1

Microsoft Windows 8.1 (32 and 64 bit versions), Professional Edition, Ultimate Edition, and
Enterprise Edition are supported.

Kernel Configuration: N/A

Processor: Dual-core Intel or AMD processor minimum. See <u>Processor Note for Intel/AMD</u>
<u>Processors</u> above.

Memory: 8GB recommended.

Swap Space: 2x the amount of RAM.

Microsoft Windows 10

Microsoft Windows 10 (32 and 64 bit versions), Enterprise Edition and Pro Edition are supported.

While there is no known issue with running Microsoft Windows 10.0 Home Edition or Educational Edition, the product has not been tested with these editions, and therefore is not supported.

> **Warning:** The new Microsoft Edge Browser delivered with Windows 10 is not supported with HyperLynx. Users should continue to use the default browser Internet Explorer delivered with Windows 10, or download and install Firefox or Chrome Browsers.

Kernel Configuration: N/A

Processor: Dual-core Intel or AMD processor minimum. See Processor Note for Intel/AMD Processors above.

Minimum RAM: 8GB recommended

Swap Space: 2x the amount of RAM

Windows Server 2008 R2

Additional OS Patches (the following configurations are supported):

- Microsoft Windows Server 2008 R2, Standard Edition with all current updates via Windows Update, on 64-bit versions.

- While we expect no issues unique to Microsoft Windows Server 2008 R2, Enterprise Edition or Datacenter Edition, they have not been tested and therefore are unsupported.

Processor: Dual-core Intel or AMD processor minimum. See Processor Note for Intel/AMD Processors above.

Minimum RAM: 8GB (per simultaneously logged in user)

Swap Space: 2X the amount of RAM

Windows Server 2012 & 2012 R2

Additional OS Patches (the following 64-bit configurations are supported):

- Microsoft Windows Server 2012, with all current updates via Windows Update

- Microsoft Windows Server 2012 R2, with all current updates via Windows Update

Processor Minimum: Dual-core Intel or AMD processor minimum. See Processor Note for Intel/AMD Processors above.

Minimum RAM: 8GB (per simultaneously logged in user)

Virtual Memory: 2X the amount of RAM