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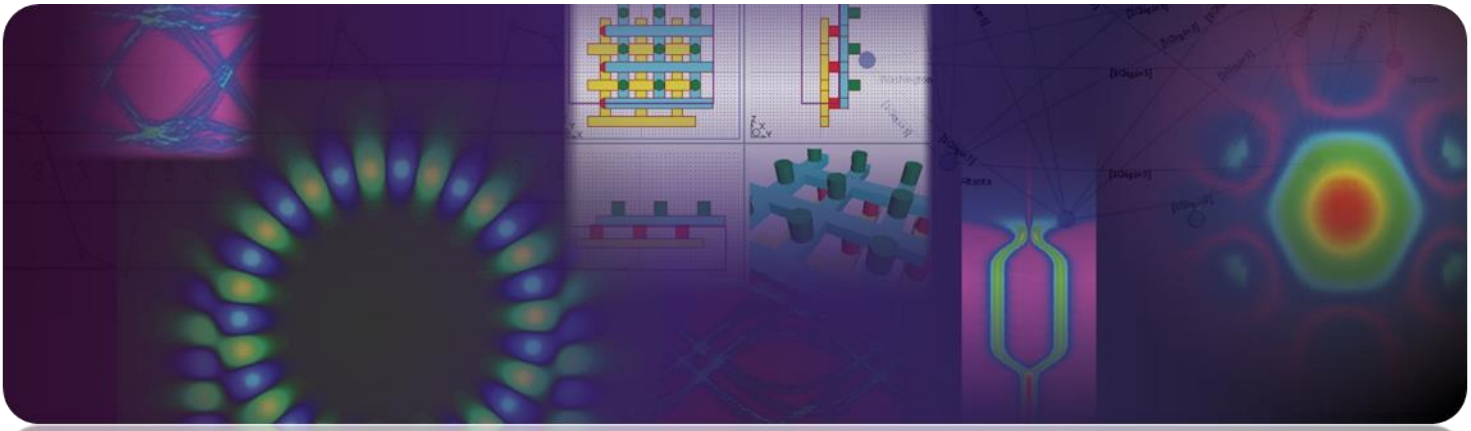

Photonic Solutions

Installation Guide

v2023.03

Synopsys, Inc.

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1

Windows Installation

This chapter describes the Windows installation for Synopsys' Photonic Solutions.

1.A. Getting Started

You will need these items to install Synopsys' Photonic Solutions on a Windows system:

- **Installer:** There is one installer for the following three toolsets:
  - **RSoft Photonic Device Tools**, contains FullWAVE FDTD, BeamPROP BPM, DiffractMOD RCWA, FemSIM FEM, BandSOLVE, GratingMOD, the RSoft CAD, LaserMOD, and various utilities and options
  - **Synopsys OptSim**
  - **Synopsys OptoDesigner**

  You will only be able to use tools that you are licensed for. The required licensing program (Synopsys Common Licensing, or SCL) is included with the installer.
- **License Key File:** This file corresponds to your license and is not needed when installing a network license on a client machine.
- **USB Dongle:** Purchased licenses require a USB dongle that corresponds to your license. For network installations the dongle should be attached to the server machine.

How to Get the Installation Items:

- **Evaluators** will receive instructions via email.
- **Customers who have purchased directly from Synopsys** should create a SolvNetPlus account to download installation files as well as License Key Files at http://solvnetplus.synopsys.com/. Contact us at photonics_support@synopsys.com if you need assistance. The Photonic Solutions tools appear in the product list with name starting with the prefix 'PS'; note that each group contains the same files, you only need to download the installer once.
- **Customers who have purchased through a Distributor** will get these items via their distributor. See https://www.synopsys.com/optical-solutions/support/support-global-contacts.html for a current list of distributors.

System Requirements and Upgrade Notes:

See https://www.synopsys.com/photonic-solutions/product-system-requirements.html for a current list of supported systems.

1.B. Windows Installation Steps

Once you have gathered all the items listed in Section 1.A, log in as Administrator and double-click the installer.

Follow the steps in the setup wizard to complete the installation. If required, you will be prompted to plug in the USB dongle after the drivers have been installed. Note that icons for all Photonic Solutions software will be placed on your desktop, you will only be able to use the tool(s) you are licensed for.

For most cases the default options are sufficient, here are more details about some options.

- **Installation Directory**

  The default installation directory is preferred. Different versions will automatically be installed to separate folders.

- **License Type Setup**
  - *Nodelocked* licenses are standalone software copies that are used on one computer.
  - *Network (Server)* licenses are floating licenses installed on the License Server.
  - *Network (Client)* licenses are floating licenses installed on client computers. You should enter the Synopsys License Server as `port@server` (`SNPSLMD_LICENSE_FILE`). The default port is 27020.
    - Note: If you see a `RSLM_SERVER` setting, consider switching to the standard `SNPSLMD_LICENSE_FILE` setting and removing the `RSLM_SERVER` setting.
- **Select License Key File**

You can leave this blank if updating and a new license key file is not needed (if the installed and new versions have the same first two numbers, i.e., 2022.09 and 2022.09-1). You can install a new license key file after installation via the Configure Licensing Utility described in Section 1.D.

- **Select SCL Installer**

  Use the version that is automatically selected: It will be created by the installer and run automatically.

Running the Software

Once installed, you can open the software via the Start Menu or shortcuts on the desktop:

Note: You can only run software that you have a valid license for. If the software does not start, see Section 1.E for troubleshooting help and/or contact us as described in Section 1.F.

- **Synopsys OptoDesigner:**

  The OptoDesigner shortcut will open OptoDesigner. You may be asked to enter the license server details when first opening OptoDesigner. Use the `port@server` notation; you should see green boxes for the licensed features. You can open this dialog later by selecting Options/License in the OptoDesigner menu.

- **Synopsys OptSim:**

  The OptSim shortcut will open the OptSim CAD

- **RSoft Photonic Device Tools:**
  - The RSoft CAD Layout shortcut will open the RSoft CAD, the main control program for the passive device simulators such as FullWAVE FDTD, BeamPROP BPM, DiffractMOD RCWA, FemSIM FEM, GratingMOD, and BandSOLVE.
  - The LaserMOD shortcut will open the LaserMOD software.

1.C. Support, Upgrades, and Resources

The software typically has one year of maintenance, including support, updates, and resources.

- *Technical Support & Product Updates.*

  Technical support is handled by Synopsys (photonics_support@synopsys.com), except in countries where we have international representatives. For information about support or for product updates, go to: https://www.synopsys.com/photonic-solutions/support.html.

- *Product Manuals and README Files*

  Manuals can be accessed via menus and toolbar buttons in each program. For the RSoft tools, online help files are in the `\help` subdirectory; printable PDF versions are in the `\docs` subdirectory, and

README files are in the `\readme` subdirectory and contain the latest information about new or improved features and options.

- *Example Design and Tutorial Files*

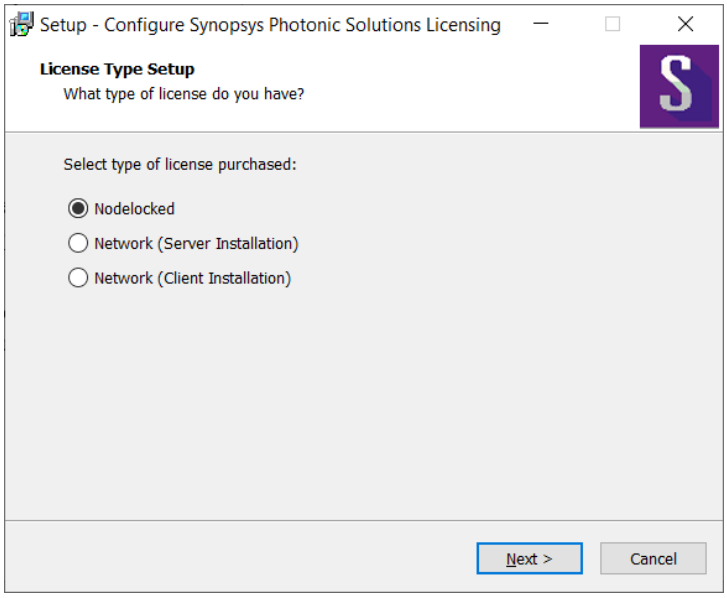
  The RSoft software comes with an extensive set of examples and tutorial files in the `\examples` subdirectory. It is recommended to back up this directory as it is easy to accidentally overwrite these files when experimenting. See the OptoDesigner manual for details about OptoDesigner examples.

- *Resources on the Web*

  Visit https://www.synopsys.com/optical-solutions/support.html for information about how to access training resources, knowledge articles, product downloads/updates, documentation, how to open support cases, and other resources. Many of these resources are in Synopsys' SolvNetPlus portal (https://solvnetplus.synopsys.com/), eligible users can find information about how to create an account at the main support link above, as well as links to collections of useful material.

1.D. Configure Licensing Utility

The Configure Licensing utility can be used to easily change licensing options after installation. To open it, select **Configure Licensing** from the Start Menu. This utility can be used for the following functions (you will need admin rights):



- **Restarting SCL:** Simply click **Next** for all screens.
- **Installing a New License Key File:** Select the new license key file in the appropriate screen; click **Next** for other screens.

- **Installing a New Version of SCL:** Select the new SCL installer in the appropriate screen; click **Next** for other screens. Note this should only be done at the direction of the support team.
- **Changing License Type:** Select the new license mode (nodelocked, network server, or network client). Enter any new network information required; click **Next** for other screens.

1.E. Troubleshooting a Windows Installation

If you have followed the installation procedure above and one or more steps were unsuccessful, or if you get a licensing error when the software is opened, here is a list of basic things to check:

If you are unable to find a solution, please contact us as described in Section 1.F.

- **Error Message:** Follow any instructions in the error message, particularly instructions about collecting data to email photonics_support@synopsys.com for additional help.
- **Check License Key File:** Make sure that you are using the correct license key file. Use the Configure Licensing Utility (Section 1.D) to install a new license key file.
- **Check USB Dongle:** If required, make sure the USB dongle is plugged in, that the light in the dongle is continuously lit, and that Windows has recognized it. See Section 1.G.7 for more instructions.
- **SCL Server Not Running:** The Synopsys Common Licensing (SCL) package is required to use the Photonic Solutions software. If the SCL server is not running you will be instructed to restart it via the Configure Licensing Utility (Section 1.D). If this fails, there may be a problem with SCL configuration. Contact us as described in Section 1.F.
- **Check Flexlog:** The `\rsoft\licenses\flexlog.txt` file can contain useful information to help solve installation problems. Some things to look for are:
  - If the flexlog is not present, or if the timestamps in the file are old, SCL is not running correctly. Contact us as described in Section 1.F.
  - If the USB dongle is not recognized or if it does not match the license file, you will get a -97 SCL error message and the flexlog will contain a message like '`SERVER line says XXXX, hostid is…`'. See Section 1.G.7 for further instructions.
- **Firewalls & Antivirus/Security Software:** Ensure firewall(s) are opened as described in Section 1.G.4. Note firewall issues can occur for both Nodelocked and Network licenses.

1.F. Contact Us for Help!

Contact support for help with installing Photonics Solutions products by emailing photonics_support@synopsys.com; if you have obtained the software through a distributor, contact your distributor. See https://www.synopsys.com/optical-solutions/support/support-global-contacts.html for a

list of current distributors. Please provide a description and screenshot of the problem, as well as a copy of the `flexlog.txt`, `rsoft.lic`, and `rslmdlog.txt` files (all in `\rsoft\licenses`) if applicable.

1.G. Manual Windows Installation Steps

These steps are automatically performed by the installers or the Configure Licensing Utility. You should only manually perform these steps if needed.

1.G.1. Setting the PATH for RSoft

The `bin` directory (`C:\Synospys\PhotonicSolutions\XXXX.XX\RSoft\bin` by default, where `XXXX.XX` is the version number) must be in the systems' `PATH`. Contact your IT Department to assist you in modifying the `PATH`. Note that the installer does this by adding this to the PATH:

```
%PHOTONIC_SOLUTIONS_ROOT%\%PHOTONIC_SOLUTIONS_VERSION%\RSoft\bin
```

where `PHOTONIC_SOLUTIONS_ROOT` is set to the installation root directory (`C:\Synopsys\PhotonicSolutions` by default) and `PHOTONIC_SOLUTIONS_VERSION` is set the version number. To change versions, simply change the `PHOTONIC_SOLUTIONS_VERSION` variable.

1.G.2. MPI Installation Steps

This section is only applicable to FullWAVE FDTD and MOST when used for network clustering. See Chapter 3 for details about configuring and running clustered simulations.

Clustering is used by the RSoft device tools by FullWAVE FDTD and MOST. The Hydra service is used for clustering between machines, and to avoid conflicts with other software, this service is not started by default during installation. Note that this server is not required if clustering within one machine (local clustering).

To manually install the Hydra service, first check with the system administrator if it may conflict with any other tools. If not, you can start it by logging on as administrator, open a Command Prompt (DOS window), and type the command:

```
hydra_service –install
```

Note that you will have to stop this service before updating the software. If this is not done, you will get a warning during installation that you can ignore in most cases. You can stop/remove the service with the command:

```
hydra_service –stop
```

You will have to manually start it again after the update.

1.G.3. RSoft License Manager (rslmd.exe)

There are several commands can be used to interact with this process:

```
options:
    -? or -help  prints this message
    -install     installs the service (Windows only)
    -remove      removes  the service (Windows only)
    -start       starts the server as a background process
    -stop        stops the currently running server
    -restart     restarts the currently running server
    -restartall  restarts both rslmd and rslmgrd (i.e. LMGRD)
    -status      lists the running programs
    -version     displays the local and server version
```

The `rslmd` program keeps a log (`\licenses\rslmdlog.txt`), which may contain useful information for debugging licensing problems.

Notes:

- Newer versions of rslmd will automatically remove themselves after a period of activity. You can stop these old versions using `rslmd -stop`, the new version will autostart when needed.
- If using a version older than v2020.03, and using the `RSLM_SERVER` variable, this process must be running on the RSoft License Server. This is automatically done by the installer, but can be manually installed by logging on as administrator, open a Command Prompt (DOS window), and typing the command `rslmd –install`.

1.G.4. Firewall Configuration

Firewall(s) must be configured to allow the SCL Server (`lmgrd.exe` and `snpslmd.exe`) to communicate on ports 27020 and 27021. If you get an error such as a -96 SCL error, make sure both ports are open in any firewalls.

Using a Custom SCL Ports

While it is recommended to use the default SCL ports (27020, 27021), you can use other ports by hand editing the license file `rsoft.lic` to use the new ports on the `SERVER` and or `VENDOR` lines. You will have to restart SCL to make any changes take effect. You will have to restart SCL to make any changes take effect.

1.G.5. Installing Network Licenses

All tools use the environment variable `SNPSLMD_LICENSE_FILE` to point to the SCL License Server. The installer and Configure Licensing Utility will set this automatically. It should be set to `port@server`, i.e.`27020@servername`). The port is defined in the license file (`27020` by default). You can use multiple servers separated by colons as `port1@server1:port2@server2`. Contact your IT department to assist you in adding environment variables.

Note that OptoDesigner users can set the license server details (`port@server`) directly via the Options/License menu item. This setting overrides any other settings.

Older Device/System Versions:

Older versions (older than v2020.03) of the RSoft Photonic Device Tools and Photonic System Tools use the `RSLM_SERVER` variable to point to the RSoft License Server. The RSoft License Manager must also be able to communicate via port 8988.

1.G.6. Installing the License Key File

License key files have start and end dates and will not work outside this range. License key files are not needed when installing on network client. See Section 1.A for details about obtaining license key files.

License key files are most easily installed with the installer or the Configure Licensing Utility (Section 1.D). For additional help with SCL contact us as described in Section 1.F.

To manually install a license key file, use the `rsfixlic` utility (semi-automated) or manually edit the license key file:

- *Using rsfixlic:*

  Copy the license key file (represented by `<lkf>`) to `rsoft/licenses` and run the command `rsfixlic <lkf> rsoft.lic`. Use the `-vport` option to set the SCL vendor port described Section 1.G.4. You will have to restart SCL for the change to take effect, most easily done with the Configure Licensing Utility (Section 1.D).

- *Manually Edit License Key File:*
  - Change '`hostname1`' on the `SERVER` line to the name of the License Server
  - Set the port on the `SERVER` line, it is `27020` by default
  - Change '`path/to/snpslmd`' on the `VENDOR` line to '`snpslmd`'
  - Optional: Set the vendor port by adding port=`27021` (or any other port) to the end of the `VENDOR` line
  - Save the file as `licenses\rsoft.lic` and restart SCL with the Configure Licensing Utility (Section 1.D)

1.G.7. USB Dongle Drivers & HOST ID

The USB dongle driver is installed by the installer. Also, in most cases, Windows will automatically locate an appropriate driver for the USB Dongle via Windows Update (requires internet access) when it is first plugged into the computer.

Dongle Issue Symptoms

If your license requires a dongle and the correct USB dongle is not recognized, you will get a -97 SCL error message and the flexlog (`licenses\flexlog.txt`) contains a message like '`SERVER line says XXXXX, hostid is…`' (where `XXXXX` is your actual Host ID).

You can check that the dongle is working correctly by using the commands '`rslmd -rsoftid`' (RSoft dongles) or '`lmhostid -flexid`' (FLEX dongles). Both commands will return the Host ID of the dongle which should match what is physically written on the side of the dongle. Note that the `lmhostid` command must be run from its location (`c:\synopsys\scl\VVV\win32\bin\` by default, where `VVV` is the SCL version).

After fixing a dongle issue, use the Configure Licensing Utility to restart SCL (Section 1.D).

What to Check

- Make sure that the dongle is attached and that the red light inside the dongle is continuously lit. If it is not lit, try installing the dongle driver as described below or try another USB port. If the dongle is blinking, contact us as described in Section 1.F.
- If using the software on a virtual machine, make sure that the emulation software is set so that the virtual machine sees the dongle attached to the parent machine.
- If using a FLEX dongle and you get a '`Can't get hostid of type 15 []`' error in the flexlog (`licenses\flexlog.txt`), install the `SCL_FLEXID9_Installer.exe` package as described below.
- Make sure the dongle driver is installed as described below.

Manually Installing Dongle Drivers

For cases where you must manually install the USB dongle drivers, log on as Administrator, open a Command Prompt (DOS window), move to the `hardlock` subdirectory, and type the command:

```
haspdinst -install
```

If previous versions of the drivers were installed, use the command '`haspdinst -fremove`' to uninstall them. You can check what driver version is installed with the '`haspdinst -info`' command. If needed, you can download the latest driver from the manufacturer's website. Go to http://www.safenet-inc.com/sentineldownloads/ and select Sentinel HASP/LDK – Command Line Run-time Installer.

If manually installing the dongle drivers for a FLEX dongle the `SCL_FLEXID9_Installer.exe` package must be installed. This package can be found in the Synopsys/SCL folder in the Start Menu after SCL has been installed. Once the dongle drivers have been installed, you must configure and restart SCL with the Configure Licensing Utility (Section 1.D).

1.G.8. Installing and Configuring SCL

SCL is not required when installing network license on a client machine. For additional help with SCL contact us as described in Section 1.F.

SCL (Synopsys Common Licensing) is required to run the software and is automatically installed and configured by the installer. It is recommended to use the Configure Licensing Utility (Section 1.D) to manually install and configure SCL.

SCL can be manually restarted using the '`rslmgrd -restart`' command. Other commands can be used to interact with the SCL server to install, stop, start, or remove the server. To see a complete list of options, use the command '`rslmgrd -help`'.

1.G.9. Headless Installation for Network Clients

To install silently for network clients, use the following options:

- Set the temporary environment variable `LICENSE_SETUP_OPTION` to `2` (use network client licensing)
- Run the installer with the following options:

```
photonicsolutions_vYYYY.MM.exe /VERYSILENT /NORESTART
       /LOG=photonicsolutions_vYYYY.MM_install.log
```

- Be sure to set the environment variable `SNPSLD_LICENSE_FILE` to `port@server` for all users that will use the software.

1.H. SCL Error Codes

SCL error codes indicate the type of error that has occurred. Additional information is shown in the SCL error dialog and, in some cases, more detailed information can be found in the `flexlog.txt` log file (in `\licenses` by default).

The error code refers to the first number in the SCL error; look under '-97' for a '-97,234' error.

Error Code	Description
-97	*The desired vendor daemon is down* This class of errors occurs when the SCL license server has gone down. Check `flexlog.txt` for additional details about your specific error. The error is usually due to one of the following: • The USB dongle is not connected or recognized (see Section 1.G.7).

	• All products licensed in the license key file have expired. In this case, `flexlog.txt` will indicate '*No features to serve, exiting.*' Contact your account representative for more details. • The computer was woken from hibernation/sleep and SCL did not come back online. Restart SCL using the Configure Licensing Utility (Section 1.D). • The license key file was modified or edited incorrectly. Try re-installing it with the Configure Licensing Utility (Section 1.D).
-96	*License server machine is down* This error occurs when the client computer (where the software is being used) is not able to contact the license server. Check that the server is running, and that the client can access the server machine. See Section 1.G.4 for suggested firewall configurations.
-88	*System clock has been set back* This error indicates that the system clock may have been changed. Make sure the system time is correct, and, if the problem persists, contact RSoft support as described in Section 1.F.
-18	*License server system does not support this feature* If this error mentions the feature '`RSOFT_LMGRD_CHECK`', the SCL Server is most likely not running correctly. Try restarting SCL with the Configure Licensing Utility (Section 1.D) or look `flexlog.txt` for additional details. In all other cases, this error occurs when an unlicensed feature is attempted to be used. If you get this error while using a feature that you should be licensed for, please check your license key file and contact your account representative.
-15	*Cannot connect to license server system* This class of errors occurs when the SCL license server did not successfully start, or has not finished starting. Check `flexlog.txt` for additional details about your specific error. The error is usually due to one of the following: • If there are no errors in `flexlog.txt` then the SCL server has not finished starting. Wait 30 seconds and try to open the software again. If the error persists, wait a few minutes, check `flexlog.txt` again. If there are no errors contact us (Section 1.F).

	• If `flexlog.txt` contains an error, the usual cause is that the USB dongle is not connected or recognized or the license key file was not installed correctly. Make sure the USB dongle is recognized (Section 1.G.7), and the license key file has been installed (Section 1.D), and then try restarting SCL (Section 1.D).
-9	*The hostid of this system does not match the hostid specified in the license file* This class of errors can occur in the following cases: • The USB dongle is not recognized (see Section 1.G.7). • The software is being used through Remote Desktop. If this is the case, contact RSoft support as described in Section 1.F.

2

Linux Installation

This chapter describes the Linux installation for Synopsys' Photonic Solutions.

2.A. Getting Started

You will need these items to install Synopsys' Photonic Solutions tools on a Linux system:

See the OptoCompiler installation guide for OptoCompiler installation help.

- **Installer:** There is one installer for the following three toolsets:
  - **RSoft Photonic Device Tools**, contains FullWAVE FDTD, BeamPROP BPM, DiffractMOD RCWA, FemSIM FEM, BandSOLVE PWE, GratingMOD CMT, the RSoft CAD, LaserMOD, and various utilities and options
  - **Synopsys OptSim**
  - **Synopsys OptoDesigner**

  You will only be able to use tools that you are licensed for. We recommend installing to a shared location that all users of the software will be able to access.
- **License Server:**
  - **Synopsys Common Licensing (SCL):** You must run SCL on the license server. You may use an existing SCL server if your Photonic Solutions licenses have the same Host ID and

Site ID as your existing licenses. See notes in the ‘Running the Installers’ section for SCL installation options.

  - **License Key File:** This file corresponds to your license.
  - **USB Dongle:** Purchased licenses require a USB dongle corresponding to your license.
- **User Configuration:** Each user’s environment must be configured to use the tools, either through a module or several environment variables.

How to Get the Installation Items:

- **Evaluators** will receive instructions via email.
- **Customers who purchased directly from Synopsys** should create a SolvNetPlus account to download installation files as well as License Key Files at http://solvnetplus.synopsys.com/. Contact us at photonics_support@synopsys.com if you need assistance. The Photonic Solutions tools appear in the product list with name starting with the prefix ‘PS’; note that each group contains the same files, you only need to download the installer once.
- **Customers who purchased through a Distributor** will get these items via their distributor. See https://www.synopsys.com/optical-solutions/support/support-global-contacts.html for a list of distributors.

System Requirements and Upgrade Notes:

See https://www.synopsys.com/photonic-solutions/product-system-requirements.html for a current list of supported systems. Most required dependencies are typically included on Linux systems by default; see Section 2.F.2 for required packages and distribution-specific instructions.

2.B. Linux Installation Steps

Gather the necessary items listed in Section 2.A and consult your System Administrator before following these steps. These instructions are for a typical RedHat system, see Section 2.F.2 for notes about installing on other distributions. Commands are for a bash shell; modify as appropriate for other shell types.

Note on installation locations:

- The default Synopsys installation directory is `/usr/synopsys` and is referred to in these instructions as `<synopsys-root>`. Use the actual installation directory if installing elsewhere. All Synopsys Photonic Solutions tools should be installed to the same Synopsys installation directory; we recommend installing to a shared location that all users of the software can access.

- Photonic Solutions software is installed to `<synopsys-root>/photonicsolutions`, referred to as `<ps-root>` in these instructions. Software is installed in versioned sub-directories. The version is referred to as `<ps-version>` and so the path of an individual version will be `<ps-root>/<ps-version>`.

Step 1: Running the Installers

There are two methods to install Photonics Solutions software on Linux:

- *Using Synopsys 'spf' files:*

  Use this method if you are familiar with installing Synopsys spf files with the Synopsys Installer and either have an existing SCL license server or are familiar with setting up a SCL server manually.

  You should install the required `photonicsolutions` spf files using the Synopsys Installer. The installation directory corresponds to `<synopsys-root>` described above. Additional steps are required to install OptoCompiler, see the OptoCompiler manual for more details.

  If not using an existing SCL installation, you will have to download and set up an SCL server manually. We assume that you have done this before proceeding further.

- *Using a binary installation file:*

  Use this method it you are not familiar with installing Synopsys spf files, or if you want guided installation for SCL. The binary file is named `photonicsolutions_<VER>.bin` and can be installed with the following commands:

  ```
  chmod +x <path>/<installer-bin>
  <path>/<installer-bin>
  ```

  The installation directory corresponds to `<synopsys-root>` described above. SCL will automatically be installed. You can skip the Site ID questions.

Step 2: Configuring the SCL License Server

You may host Photonic Solutions licenses on an existing SCL server if the Host ID and Site ID of all licenses match. If not, you will have to create a new SCL server.

There are two methods you can use to configure SCL and install the license file:

- *SCL Method 1: Manual Configuration:* Choose this method if you have an existing SCL installation, see the SCL documentation for more details.
- *SCL Method 2: Guided Configuration:* Choose this method if you do not have an existing SCL installation and want a guided SCL configuration. See Section 2.F.1 for more details.

Step 3: Configuring User's Environment

All users must set these environment variables to use the software, this can be done via a module or via setting the variables in the user's login script (this is bash syntax, convert as needed):

```
export PHOTONICS_SOLUTIONS_ROOT=<ps-root>
export PHOTONICS_SOLUTIONS_VERSION=<ps-version>

export RSOFT_PROGRAMPATH=
    $PHOTONICS_SOLUTIONS_ROOT/$PHOTONICS_SOLUTIONS_VERSION/
    rsoft/bin
export OPTO_LINK_BASE=
    $PHOTONICS_SOLUTIONS_ROOT/$PHOTONICS_SOLUTIONS_VERSION/
    optodesigner/bin

export PATH=$OPTO_LINK_BASE:$PATH
export PATH=$RSOFT_PROGRAMPATH:$PATH
export LD_LIBRARY_PATH=$LD_LIBRARY_PATH:$RSOFT_PROGRAMPATH

export SNPSLMD_LICENSE_FILE=<port>@<server-name>
```

In addition to the above required variables, several other variables may need to be set:

- If you are using FullWAVE or MOST clustering between machines, set the `P4_RSHCOMMAND` variable as described in Chapter 3.
- Additional variables are required if using OptoCompiler, see the OptoCompiler manual.

Step 4: Running the Software

See Section 2.D for troubleshooting help if the software does not start.

- **Synopsys OptoDesigner:**

  The command `OptoDesigner` opens OptoDesigner. Note that you can use the following wrapper script to set the correct environment variables and start OptoDesigner:

  ```
  $<ps-root>/<ps-version>/optodesigner/bin/optodesigner.sh
  ```

  You may be asked to enter the license server details when first opening OptoDesigner. Use the `port@server` notation; you should see green boxes for the licensed features. You can open this dialog later by selecting Options/License in the OptoDesigner menu.

- **Synopsys OptSim:**

  The command `OptSim` opens the OptSim CAD.

- **RSoft Photonic Device Tools:**

  - The command `xbcad` opens the RSoft CAD, the main control program for the passive device simulators such as FullWAVE FDTD, BeamPROP BPM, DiffractMOD RCWA, FemSIM FEM, GratingMOD, and BandSOLVE.
  - The command `xlasermod` opens the LaserMOD software.

2.C. Support, Upgrades, and Resources

RSoft software normally comes with one year of maintenance that includes technical support, product updates, and resources.

- *Technical Support & Product Updates.*

  Technical support is handled by Synopsys (photonics_support@synopsys.com), except in countries where we have international representatives. For information about support or for product updates, go to: https://www.synopsys.com/photonic-solutions/support.html.

- *Product Manuals and README Files*

  Manuals can be accessed via menus and toolbar buttons in each program. For the RSoft tools, online help files are in the `/help` subdirectory; printable PDF versions are in the `\docs` subdirectory. README files are in the `readme` subdirectory and contain the latest information about new or improved features and options.

- *Example Design and Tutorial Files*

  The RSoft software comes with an extensive set of examples and tutorial files in the `/examples` subdirectory. As it is easy to accidentally overwrite these files when experimenting, it is recommended to back up this directory such as home directory. See the OptoDesigner manual for details about OptoDesigner examples.

- *Resources on the Web*

  You can go to our website (https://www.synopsys.com/photonic-solutions.html) for additional product resources, such as how to contact technical support, the latest product news, and more.

  Synopsys provides the SolvNetPlus portal exclusively for customers, including resources to help our software users become even more productive, including downloads, documentation, knowledge articles, training, user group presentations, past webinar recordings, example models, and more. Many of these resources are in Synopsys' SolvNetPlus portal (https://solvnetplus.synopsys.com/), eligible users can find information about how to create an account at the main support link above, as well as links to collections of useful material.

2.D. Troubleshooting a Linux Installation

If you have followed the installation procedure above and one or more steps were unsuccessful or if you get a licensing error when the software is opened here is a list of basic things to check:

If you are unable to find a solution, please contact us as described in Section 2.E.

- **Error Message:** Follow any instructions in the error message, particularly instructions about collecting data to email photonics_support@synopsys.com for additional help.
- **Check License Key File:** Make sure that you are using the correct license key file.
- **Check Distribution-Specific Instructions:** See Section 2.F. for instructions related to the specific type of Linux you are using.
- **Check USB Dongle:** If required, make sure the USB dongle is plugged in, that the light in the dongle is continuously lit, and that the driver has been installed. See Section 2.F.2 for additional distribution-specific instructions and Section 2.F.7 for dongle troubleshooting.
- **SCL Server Not Running:** The Synopsys Common Licensing (SCL) package is required to use Photonic Solutions software. If the SCL server is not running, you will have to start it as described in the installation steps above or in Section 2.F.. If this fails, there may be a problem with SCL configuration. Contact us as described in Section 2.E.
- **Check Flexlog:** The `rsoft/licenses/flexlog.txt` file can contain useful information to help solve installation problems. Some things to look for are:
  - If the flexlog is not present, or if the timestamps in the file are old, SCL is not running correctly. Contact us as described in Section 2.E.
  - If the USB dongle is not recognized or if it does not match the license file, you will get a -97 SCL error message and the flexlog will contain a message like '`SERVER line says XXXX, hostid is…`'. See Section 2.F. for further instructions.
- **Firewalls & Antivirus/Security Software:** Ensure firewall(s) are opened as described in Section 2.F.. Note firewall issues can occur for both Nodelocked and Network licenses.

2.E. Contact Us for Help!

Contact support for help by emailing photonics_support@synopsys.com; if you have obtained the software through a distributor, contact your distributor. See https://www.synopsys.com/optical-solutions/support/support-global-contacts.html for a list of distributors. Please provide a description and screenshot of the problem, as well as a copy of the `flexlog.txt`, `rsoft.lic`, and `rslmdlog.txt` files (all in `rsoft/licenses`) if applicable.

2.F. Additional Linux Installation Information

If after performing the installation an error message appears when the program is opened, review the instructions above and the notes in this section. If a solution cannot be found, contact us.

2.F.1. Manually Configuring SCL

These instructions are for manually configuring SCL, only use them if you do not have an existing SCL installation:

1. **Copy Library (if using a FLEX USB dongle only)**

   If using a FLEX dongle (your HOSTID has "`FLEXID=`") you must copy a file to `/usr/lib`:

   ```
   cd <synopsys-root>/scl/<version>/linux64/drivers
   copy libhasp_linux_x86_64.so /usr/lib
   ```

2. **Install License Key File:**

   If your license file `<lkf>` needs to be updated, run these commands:

   ```
   cd <ps-root>/<ps-version>/rsoft/licenses
   ../bin/rsfixlic <lkf> rsoft.lic
   ```

3. **Start Licensing Daemons:**

   See Section 2.F.2 *for Linux distribution-specific pre-requisites that may be needed before running these commands. For example, some distributions have additional requirements before using rc.local, running the USB dongle daemon, etc.*

   The RSoft License daemon (`rslmd`), the SCL daemons (`lmgrd`/`snpslmd`), and, if required, the USB driver daemon (`aksusbd`) must be run on the license server. This is done by a sequence of commands in your system startup script (e.g., `/etc/rc.d/rc.local`), which can be configured by executing the following command once during installation:

   ```
   <ps-root>/<ps-version>/rsoft/etc/setup_rsoft <ps-root>/<ps-version>
   ```

   For reference, the above will add the following commands to the startup script:

   ```
   export RSOFT_PROGRAMPATH=<ps-root>/<ps-version>/rsoft/bin
   #export RSOFT_LICENSEPATH=$RSOFT_PROGRAMPATH/../licenses
   #export SCL_PATH=<synospys_root>/scl/<version>
   $RSOFT_PROGRAMPATH/../hardlock/hldinst_usb
   $RSOFT_PROGRAMPATH/rslmgrd -install
   $RSOFT_PROGRAMPATH/rslmd &
   ```

   If you did not install SCL and/or the license file to the default directory, you will need to uncomment and edit the commented-out lines above as appropriate. Run these commands manually or source the startup script to ensure that the proper daemons are running.

   See Section 2.F.8 for more information about starting/stopping `lmgrd` and see Section 2.F.4 for information about starting/stopping `rslmd`. Note that firewalls may need to be configured to allow both `lmgrd` and `rslmd` to communicate. See Section 2.F.5 for details.

2.F.2. Required Packages, Distribution-Specific Requirements, & Missing Libraries

Most required dependencies are typically included on Linux systems by default. However, depending on your exact configuration, some additional steps might be required.

Missing Libraries and Required Packages:

This is a list of general requirements, see next section for distribution-specific requirements.

- If you get a message about a missing library, Use the command '`ldd <binary>`' to see which libraries required by a file. If libraries are missing, check your distribution's repository first. If no library is available check the `etc` subdirectory in the RSoft installation directory. These libraries can be installed by moving to the `/bin` subdirectory and using the command '`tar zxf ../etc/libXXX.taz`', where `XXX` corresponds to the library name.
- SCL (Synopsys Common Licensing) requires several packages:
  - The LSB (Linux Standards Base) package is required. If you get error messages such as '*No such file or directory*' or '*bad ELF interpreter*,' when running `lmgrd`, check to see if the LSB package is installed; on RedHat/CentOS, try the `redhat-lsb` package and on Ubuntu try the `lsb` package.
  - The `csh` package is required.
- If installing the USB dongle driver you will need your distribution's 32-bit compatibility package. Errors include '*...aksusb: not found*' or '*bad ELF interpreter*'. See Distribution Specific Instructions below for more details for RedHat/CentOS and Ubuntu.
- 75dpi and 100dpi font packages are required for the RSoft tools. Some distributions also require a font server. See Distribution-Specific Notes in the next section.
- The `openmotif` package is required for the RSoft tools.
- If using SE Linux and you get messages about a needed library (but not that it is missing), move to the `bin` subdirectory and give the command '`../etc/chconlib *.so*`'.
- OptoDesigner requires the `lsb_release` command available, this is a part of the redhat-lsb-core package on CentOS, the lsb-core package on Ubuntu, and the lsb-release package on openSUSE.

Distribution-Specific Instructions:

This section contains distribution-specific instructions that some of our users have found useful. Since every Linux system can be slightly different, the specific steps you need might be slightly different. Please consult your System Administrator before trying these steps; contact us (Section 2.E) with questions.

- **Enabling rc.local for Ubuntu Systems:**

Some Linux distributions use `systemd` instead of `rc.local`. As an example, `rc.local` can be enabled for Ubuntu 16.04 by running the command:

```
systemctl enable rc-local.service
```

and then removing the line `exit 0` in the file `etc/rc.local`. The `setup_rsoft` script in the main installation instructions can then be run to add the required commands to the `rc.local` file.

- **Installing the USB Dongle on RedHat/CentOS 7.x or Ubuntu Systems:**

  Installing the USB dongle driver on RedHat/CentOS 7.x or Ubuntu systems requires additional steps:

  - The 32-bit compatibility package is required (`glibc.i686` for RedHat/CentOS or `libc6-dev-i386` for Ubuntu).
  - Remove the dongle if attached.
  - Stop all '`aksusbd`' daemons: Run '`ps -ef | grep aksusbd`', kill all the processes, and then run the `ps` command again to check that they are gone.
  - Copy the file `rsoft/hardlock/80-hasp.rules` to `/etc/udev/rules.d`. Note that you will have to modify the path to the `aksusbd` daemon in the `80-hasp.rules` file several times.
  - If using a FLEX dongle, you will need to copy the Flex Dongle Library as described in the main installation instructions in Section 2.B.
  - Install the USB driver with the command `rsoft/hardlock/hldinst_usb`.
  - Attach the USB dongle to the computer. It may be necessary to restart `udev` and reload the rules with the commands '`service udev restart`' and '`udevadm control --reload-rules`'.
  - An easy way to check if the dongle is recognized is using the commands: '`rslmd -rsoftid`' (if your Host ID starts with '`RSOFT=`') or '`lmhostid -flexid`' (if your Host ID starts with '`FLEXID=`').
  - If this does not work, try one or more of the following and retry: 1) For older Ubuntu systems you may have to use the archived older `80-hasp.rules` file. 2) Remove the executable bit from `80.hasp.rules` (`chmod -x 80-hasp.rules`). 3) Try renaming the rules file `90-hasp.rules`. This may help the changes become persistent after reboot.

- **Installing Fonts on RedHat and Ubuntu:**

  The software will attempt to use the fonts currently installed on the system. If this is not possible, you will get a message with the required packages and fonts will be substituted. Note that if you remotely accessing the Linux machine, you may have to do this both on the client and server.

  For reference, the require packages are:

  - *RedHat:* install these 75dpi and 100 dpi font packages:

    ```
    xorg-x11-fonts-75dpi
    xorg-x11-fonts-100dpi
    ```

```
xorg-x11-fonts-ISO8859-1-75dpi
xorg-x11-fonts-ISO8859-1-100dpi
```

- *Ubuntu:* install the packages `xfonts-100dpi` and `xfonts-75dpi`. Additionally, it may be necessary to tell the X server where to find these fonts:

```
xset +fp /usr/share/fonts/X11/100dpi,/usr/share/fonts/X11/75dpi
```

- **Use BandSOLVE and DataBROWSER from command line on CentOS 7:**
  - The packages `compat-libtiff3` and `libpng12` are required.

2.F.3. DOS Format RSoft *.ind & other text files

The Windows and Linux versions of Synopsys' RSoft products are functionally identical and input files can be interchanged between platforms. However, input ASCII files transferred between Windows and Linux should be converted to the native format of the new platform. This is easily accomplished using the `dos2unix` and `unix2dos` utilities which are most likely included with your Linux distribution but if not are widely available on the Internet.

2.F.4. RSoft License Manager (rslmd)

There are several commands can be used to interact with the daemon:

```
options:
    -? or -help  prints this message
    -install     installs the service (Windows only)
    -remove      removes  the service (Windows only)
    -start       starts the server as a background process
    -stop        stops the currently running server
    -restart     restarts the currently running server
    -restartall  restarts both rslmd and rslmgrd (i.e. LMGRD)
    -status      lists the running programs
    -version     displays the local and server version
```

The `rslmd` program keeps a log (`rsoft/licenses/rslmdlog.txt`), which may contain useful information for debugging licensing problems.

Note that newer versions of rslmd will automatically remove themselves after a period of activity. You can stop these old versions using `rslmd -stop`, the new version will autostart when needed.

2.F.5. Firewall Configuration

Firewall(s) must be configured to allow the SCL Server (`lmgrd` and `snpslmd`) to communicate on two ports, 27020 and 27021 by default. If you get an error such as -96 SCL error, make sure both ports are open in any firewalls. The RSoft License Manager (`rslmd`) must also be able to communicate via port 8988, and the

Using Custom SCL Ports

While it is recommended to use the default SCL ports (27020, 27021), you can use other ports by editing the license file to use the new ports on the `SERVER` and or `VENDOR` lines. You will have to restart SCL to make any changes take effect. You will have to restart SCL to make any changes take effect. You can also use the `rsfixlic` utility with `-vport` option to force the vendor port to +1 more than the SCL port. See Section 2.F.6 for more details. You will have to restart SCL to make any changes take effect.

2.F.6. Installing the License Key File

License key files have start and end dates and will not work outside this range. License key files are not required for network client installations. See Section 2.A for details about obtaining license key files.

Installing a license key file involves editing the file and copying it to the correct location. This process is documented in the SCL documentation, or can be automatically done by the `rsfixlic` utility described in Section 2.F.1. Note you will have to restart SCL for changes to take effect.

You can also manually edit the license file by making the following changes:

- Change '`hostname1`' on the `SERVER` line to the name of the License Server
- Set the port on the `SERVER` line, it is `27020` by default
- Change '`path/to/snpslmd`' on the `VENDOR` line to '`snpslmd`'
- Optional: Set the vendor port by adding port=`27021` (or any other port) to the end of the `VENDOR` line
- Save the edited file and (re)start the SCL server

2.F.7. USB Dongle Drivers and HOST ID

If your license requires a dongle and the correct USB dongle is not recognized, you will get a -97 SCL error message and the flexlog (`<ps-root>/<ps-version>/rsoft/licenses/flexlog.txt`) contains a message like '`SERVER line says XXXXX, hostid is…`' (where `XXXXX` is your actual Host ID).

You can check that the dongle is working correctly by using the commands '`rslmd -rsoftid`' (RSoft dongles) or '`lmhostid -flexid`' (FLEX dongles). Both commands will return the Host ID of the dongle which should match what is physically written on the side of the dongle.

What to Check

- Make sure that the dongle is attached and that the red light inside the dongle is continuously lit. If it is not lit, try installing the dongle driver as described below or try another USB port. If the dongle is blinking, contact us as described in Section 2.E.
- If using the software on a virtual machine, make sure that the emulation software is set so that the virtual machine sees the dongle attached to the parent machine.

- If you get errors like '*aksusb: not found*' or '*bad ELF interpreter'*, make sure you have your Linux package's 32-bit compatibility package installed. See Section 2.F. for distribution specific instructions.
- If using a FLEX dongle and you get a '`Can't get hostid of type 15 []`' error in the flexlog (`rsoft\licenses\flexlog.txt`), make sure the `libhasp_linux_x86_64.so` library is copied as described in the installation steps.
- Make sure the dongle driver is installed as described in the installation steps.
- If needed, you can download the latest driver from the manufacturer's website http://www.safenet-inc.com/sentineldownloads/.

2.F.8. Manually Stopping & Starting SCL

If the license key file has been installed and the SCL server has been started, most SCL errors occur when the SCL server is not running. While ensuring that the USB dongle is attached and restarting the computer will fix most problems, this is not the preferred solution. The `rslmgrd` utility can be used to easily interact with the SCL Server. To stop and start the SCL server, use these commands:

```
rslmgrd –restart
```

Note that the server can take several seconds to completely start. Other commands can be used to interact with the SCL server to install or remove the server. To see a complete list of options, use the command `rslmgrd –?`.

You can check if the SCL server has correctly started by looking at the `<ps-root><ps-version>/rsoft/licenses/flexlog.txt` log file. Additional information can be found in the `rslmdlog.txt` file in the same directory.

Alternatively, you can start the SCL server with a command like:

```
<scl_path>/linux64/bin/lmgrd
   -c /<ps-root>/<ps-version>/rsoft/licenses/rsoft.lic
   -f /<ps-root>/<ps-version>/rsoft/licenses/flexlog.txt
```

where `<scl_path>` is the SCL installation path. You may have to modify this command based on the license file location.

2.G. SCL Errors

SCL error codes indicate the type of error that has occurred. Additional information is shown in the SCL error dialog and, in some cases, more detailed information can be found in the `flexlog.txt` file (in `rsoft/licenses` by default).

The error code refers to the first number in the SCL error; look under '-97' for a '-97,121' error.

Error Code	Description
-97	*The desired vendor daemon is down* This class of errors occurs when the SCL license server has gone down. Check `flexlog.txt` for additional details about your specific error. The error is usually due to one of the following: • The USB dongle is not connected or recognized. • All products licensed in the license key file have expired. In this case, `flexlog.txt` will indicate '*No features to serve, exiting.*' Contact your account representative for more details. • The computer was woken up from hibernation/sleep and the SCL server did not come back online. • The license key file was modified or edited incorrectly.
-96	*License server machine is down* This error occurs when the client computer (where the software is being used) is not able to contact the license server. Check that the server is running, and that the client can access the server machine. See Section 2.F.5 for details about firewall configuration.
-88	*System clock has been set back* This error indicates that the system clock may have been changed. Make sure the system time is correct, and, if the problem persists, contact RSoft support as described in Section 2.E.
-18	*License server system does not support this feature* If this error mentions the feature '`RSOFT_LMGRD_CHECK`', the SCL Server is most likely not running correctly. In all other cases, this error occurs when an unlicensed feature is attempted to be used. If you get this error while using a feature that you should be licensed for, please check your license key file and contact your account representative.
-15	*Cannot connect to license server system* This class of errors occurs when the SCL license server did not successfully start,

	or has not finished starting. Check `flexlog.txt` for additional details about your specific error. The error is usually due to one of the following: • If there are no errors in `flexlog.txt` then the SCL server has not finished starting. Wait 30 seconds and try to open the software again. If the error persists, wait a few minutes, check `flexlog.txt` again, and if no errors, try to open the software. • If `flexlog.txt` contains an error, the usual cause is that the USB dongle is not connected or recognized or the license key file was not installed correctly. Make sure the USB dongle is recognized, and the license key file has been installed correctly, and then try starting SCL.
-9	*The hostid of this system does not match the hostid specified in the license file* This class of errors can occur in the following cases: • The USB dongle is not recognized. • The software is being used through Remote Desktop. If this is the case, contact RSoft support as described in Section 2.E.

3

Cluster Installation

This chapter describes the configuration of a cluster for both Windows and Linux systems.

3.A. Pre-Install Checklist

Please read this section before starting to use clustering features.

- *Licensing*

  Clustering allows simulations to use multiple cores, CPUs, or machines utilizing the message passing interface (MPI). Clustering is included with every license of FullWAVE and each machine to be used in the cluster must be licensed for FullWAVE.

- *Basic Software Installation*

  Before configuring a cluster installation, the software should be installed on all nodes (computers) as described in the previous chapters.

- *Cluster Installation and Testing*

  It is recommended that all cluster users first configure and test a standalone cluster. Users who are licensed for network clustering can then proceed to configuring and testing a networked cluster.

3.B. Configuring and Testing a FullWAVE Cluster

See Chapter 6 in the MOST manual for instructions on configuring and testing a MOST cluster.

A standalone (e.g. non-networked) cluster allows users to utilize multiple cores/CPUs in a single computer, and networked clusters allows users to utilize multiple cores/CPUs across a computer network.

3.B.1. 'Standalone' FullWAVE Clusters

Standalone clustering is enabled by default. If the software installation has been successful, there should be no additional configuration necessary. If not, here are some steps to follow:

- Linux users need to set the environment variable `P4_RSHCOMMAND=rshlocal` in their login script. This is automatically done by the software, but can be done manually if needed.

To test clustering, open the file `\examples\FullWAVE\wg.ind` in the CAD interface. Click the **Perform Simulation** button in the left toolbar. Make sure that *Auto* is set in the **Cluster Options** dialog and that **# Procs** is set to **Auto**. Click **OK** to start the clustered simulation. See the FullWAVE manual for more details about using clustering.

3.B.2. Configuring and Testing a Networked Cluster

A networked cluster allows users to utilize multiple cores/CPUs/machines on a network. First the connectivity between the nodes must be ensured, and then the cluster can be tested. Note that clusters cannot be a mix of Windows and Linux machines.

Starting the Hydra Service (Windows only)

See instructions in Section 1.G.2. Note that this service is only required for clustering between computers.

Ensuring Network Connectivity

Nodes within a cluster must be able to access the same simulation data and communicate with each other across the network to remotely start jobs and share data.

Windows Clusters

To ensure network connectivity under Windows, perform these steps:

- *Configure firewall(s)*

  Any firewalls on the network must be configured to allow MPICH2 traffic to pass through it.

- *User accounts and running mpiexec*

  MPICH2 requires that a single user account be able to remotely access and start simulation jobs on all computers in the cluster. The account should be created on each node if using a Windows workgroup, or created on the domain controller if using a Windows domain. Do not use user accounts with the name 'administrator' or blank passwords.

To enable MPICH2 access, issue this command on the master node:

```
mpiexec -register
```

Enter the username and password to be used. To check that the user does indeed have remote access, issue the command

```
mpiexec -validate -host cluster_node_name
```

where `cluster_node_name` is the name of a specific node computer. Repeat this test for all nodes in the cluster.

- *Using a shared workspace*

  The working directory where simulation files are stored must be a shared folder on the network that all cluster nodes can access and have full read/write permission. Furthermore, it must be accessible via the same path by all nodes in the cluster.

  - Open design files (`.ind`) via their UNC path on the master node. For example, if design files are located in the directory `c:\tmp` on a computer named `master_node`, and this directory is shared on the network as `cluster_sims`, open the file from the location `\\master_node\cluster_sims`.
  - Map a shared drive to the shared directory where the design files are located. For example, if the local drive `c:\tmp` on the master node is shared on the network and mapped as `z:` on all the nodes, open the file from the mapped drive (`z:\`) on the master node.

  In both scenarios, each node will be able to access the design files using the same path.

Linux Clusters

To ensure network connectivity under Linux, perform these steps:

- *Configure firewall(s)*

  Any firewalls on the network must be configured to allow MPI traffic to pass through it.

- *Enable ssh*

  You must enable `ssh` to remotely access nodes involved in a networked cluster (note `ssh` is not needed for local clustering). You should ask your system administrator if these steps are necessary as many systems already have this enabled:

  - Add '`export P4_RSHCOMMAND=ssh`' to your user login file.
  - Assuming that the cluster has a shared directory structure and that your home directory is the same when you log into any node, issue the command '`ssh-keygen -t dsa`' from your home directory.
  - Accept all the defaults (including the empty passphrase), then issue the commands '`cd ~/.ssh`' and '`cp id_dsa.pub authorized_keys2`'. This will allow you to `ssh` from one node to another without a password.

- Test this by using the command '`ssh cluster_node_name`' twice from the master node. The first time you try each node, you will get a question about the authenticity of the host - type `yes` to continue. After that, you will not be asked again.
- This should be repeated for each cluster node.

- *Creating a shared workspace*

  The working directory where simulation files are stored must be a shared folder on the network that all cluster nodes can access and have full read/write permission. Furthermore, it must be accessible via the same path by all nodes in the cluster. This is most easily done by accessing all design files and running all simulations with UNC paths. For example, if design files are located in the directory `\tmp` on a computer named `master_node`, and this directory is shared on the network as `cluster_sims`, open the file from the location `\\master_node\cluster_sims`.

- *Environment Variables*

  In order for remote shells created by `ssh` to function correctly, they require any variables defined locally to be set in the new shell. Since `ssh` only uses standard shell initialization files, make sure that any modules or environment variables used by the software are defined in the standard login file.

- *X11 forwarding*

  For FullWAVE simulation windows to appear on the master node, you must enable X11 forwarding in the `ssh` configuration file. This can be done by creating (or editing) the `~/.ssh/config` file and adding the line '`ForwardX11=yes`'. FullWAVE can of course be used in a non-graphic mode if desired.

Testing a Networked FullWAVE Cluster

First test each node separately and then test as a group.

Testing Nodes Separately

Open a command prompt on a node, move to the `\examples\FullWAVE` directory, and issue the following command:

```
fwmpirun –np1 –hosts localhost –show1 wg.ind
```

This command indicates that a clustered simulation of the file `wg.ind` should be performed on the local machine with one process (CPU). A FullWAVE simulation window should open showing a 'normal' simulation of a simple waveguide.

Next, issue this command to use two processes (CPUs) on the local machine:

```
fwmpirun –np2 –hosts localhost –show1 wg.ind
```

A FullWAVE simulation window should open that shows half of the simulation domain seen before. If this appears MPICH is working correctly. This should be repeated on all nodes to ensure they function correctly.

Testing Nodes Together

Once the nodes have been verified to work on their own, the networked aspect of the clustering can be tested. Open a command prompt on the master node and move to the shared directory created in the previous section. Copy the file `\examples\FullWAVE\wg.ind` to this directory and issue the command

```
fwmpirun -np2 -hosts master_node_name,cluster_node_name -show1 wg.ind
```

where `master_node_name` and `cluster_node_name` are the names of the master node and a cluster node respectively. Note that the path to the design file (`wg.ind`) might have to be modified as described in the previous section depending on where it is located. If everything has been set up correctly, a simulation window will open showing half of the simulation domain. Repeat this test with the rest of the cluster nodes to ensure they have been set up correctly.

For more details on the usage of FullWAVE clustering, including how to integrate FullWAVE with a cluster scheduling system, see Chapter 7 in the FullWAVE manual.

4

Uninstalling

Please follow these instructions to uninstall Synopsys' Photonic Solutions tools.

Before uninstalling the software, it is recommended to back up the installation directory including any license key files and user work. Some of these uninstallation steps require administrative (root) access and can seriously impair your system; consult your IT department before performing any of these steps.

4.A. Uninstalling on Windows

The best way to uninstall is via the Add/Remove Programs option in the Control Panel. This should be sufficient to uninstall the software in most cases. Please contact us at photonics_support@synopsys.com with questions.

If it is necessary to completely remove the package, these manual steps may also need to be performed:

- Run the following commands from the command line (DOS Window) to remove various items (see important notes):

Command	Description, Notes
`hydra_service -remove`	Removes the Intel MPI libraries used by FullWAVE FDTD and MOST clustering. Note that this is not installed by default, and could potentially be used by

	other software on the computer. Only uninstall if you know that this will not affect other users/tools, contact your IT department with questions.
`rslmd -remove`	Removes the `rslmd` service, should only be done if uninstalling on the RSoft License Server and using the `RSLM_SERVER` variable on clients. This process runs on clients but will auto-stop in this mode.
`haspdinst -fremove`	Removes the USB dongle driver for 'RSoft' and 'Flex9' dongles

- Remove any environment variables starting with `PHOTONIC_SOLUTIONS_`, `RSOFT_`, `OPTSIM_`, or `RSLM`. Examples are `PHOTONIC_SOLUTIONS_ROOT`, `RSOFT_PROGRAMPATH` or `RSLM_SERVER`
- If no other Synopsys tools are used in this environment, uninstall Synopsys Common Licensing (SCL) and unset the `SNPSLMD_LICENSE_FILE` variable
- Delete `BCADW32.INI`, `WINPLOT.INI`, `LASERMOD.INI`, and `PX.INI` from the user's home directory
- Modify the `PATH` environment variable to remove any Photonic Solutions directories (default is C:\Synopsys\PhotonicSolutions)
- Delete the installation directory. If all the above steps have been completed, it should be able to be removed. If not, contact us at photonics_support@synopsys.com for assistance.

4.B. Uninstalling on Linux

To uninstall the package under Linux, remove any commands from login/startup scripts related to the package, including:

- Commands that start the USB dongle driver and license daemons
- Remove the following environment variables if they exist: `PHOTONIC_SOLUTIONS_ROOT`, `PHOTONIC_SOLUTIONS_VERSION`, `RSLM_SERVER`, `RSOFT_PROGRAMPATH`, `RSOFT_LICENSEPATH`, `RSOFT_MATLIB_GROUP_PATH`, `OPTSIM_PDAFLOW_PDK_ROOT`, `RSOFT_EDITOR`, `RSOFT_TERMINAL`, or `HLS_IPADDR`
- If no other Synopsys tools are used in this environment, uninstall Synopsys Common Licensing (SCL) and unset the `SNPSLMD_LICENSE_FILE` variable
- Delete `BCADW32.INI`, `WINPLOT.INI`, `LASERMOD.INI` , and `PX.INI` from the user's home directory
- Modify the `PATH` environment variable to remove any Photonic Solutions directories
- Delete the installation directory. If all the above steps have been completed, it should be able to be removed. If not, contact us at photonics_support@synopsys.com for assistance.