RT-LAB
Version 10.3

Installation Guide

Q032011-01

I M A G I N A T I O N

T O

R E A L - T I M E

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OPAL-RT Technologies Inc. # TABLE of CONTENTS

Introduction

1.1   What to Expect from this Guide

You can expect to find information on how to install RT-LAB, set up a target machine as well as information on licensing options.

1.2   About RT-LAB

RT-LAB is the real-time technology that is revolutionizing the way model-based design is performed. Through its openness, it has the flexibility to be applied to any simulation and control problem, and its scalability provides a low-risk entry point for any application, allowing the developer to add compute-power where and when needed - whether it is to speed up simulations or for real-time hardware in the loop applications. RT-LAB provides tools for running and monitoring your simulations or controls on various runtime targets. An open architecture enables RT-LAB to work with the popular diagramming tools MATLAB Simulink and MATRIXX SystemBuild.

1.3   Key Features

Real-Time Model Development

- Fully integrated with Matlab/Simulink/Stateflow/SimPowerSystems/Real Time Workshop, and MATRIXx/SystemBuild/AutoCode

- Specialized Blockset to prepare the model for distributed processing, inter-node communication and signal I/O

- "Six Clicks to Real-Time" User interface

- Comprehensive API for developing your own online application, including tools for LabVIEW, C++, Matlab, Visual Basic, Python and 3D Virtual Reality Tools

- Supports models from CarSim/TruckSim, GTPower, AMEsim, Dymola, as well legacy models in FORTRAN 77/95

Run-time Features

- Distributed, synchronized execution across multiple processors, including, multiple CPU motherboards, Shared Memory or FireWire inter-processor communication

- Integrated Signal Visualization and Control Panel

- Dynamic Signal Tracing - select any signal for monitoring during run-time

- On-line Parameter Editor - change parameters on-the-fly (manually or load parameter files)

- Extensive I/O card support - over 80 devices supported

- Choice of RTOS : QNX, RedHawk Linux

Performance Features

- XHP Mode - high speed mode to give closed loop cycle times below 10 microseconds

- Optimized Hard-Real-Time Scheduler - high performance, low jitter

1.4 Intended Audience and Required Skills and Knowledge

The RT-LAB Installation Guide is intended for those who will be called upon to install and manage RT-LAB.

1.5 Organization of Guide

There are several guides offered in the list of RT-LAB documentation:

- Installation Guide
- User Guide

Here we take a look at the Installation Guide. The topics covered are:

Introduction - This section provides basic information such as what you should expect from the guide, the intended audience, the chapter breakdown and conventions.

Basic Concepts - This section describes the different configurations that can be applied to your RT-LAB system.

Requirements - This section describes hardware and software requirements.

Installing RT-LAB Components on Win32 Machines - This section describes the installation of RT-LAB host and target components on a Win32 machine.

Installing RT-LAB Components on QNX 6 - This section describes the installation of RT-LAB target components on a QNX6 machine.

Installing RT-LAB Components on RedHawk Linux Machines - This section describes the installation of RT-LAB host and target components on a Redhawk Linux machine.

1.6 Conventions

Opal-RT guides use the following conventions:

Table 1: General and Typographical Conventions

THIS CONVENTION	INDICATES
Bold	User interface elements, text that must be typed exactly as shown.
Note:	Emphasizes or supplements parts of the text. You can disregard the information in a note and still complete a task.
Warning:	Describes an action that must be avoided or followed to obtain desired results.
Recommendation:	Describes an action that you may or may not follow and still complete a task.
`Code`	Sample code.
Italics	Reference work titles.
Blue Text	Cross-references (internal or external) or hypertext links.

Basic Concepts

Before you begin with the installation, it is important to determine the configuration you wish to use. This section describes the different configurations that can be applied to your RT-LAB system.

RT-LAB makes a distinction between the computer or computers used for development, and the computer or computers used to run the simulation, although the same computer may be used for both development or simulation.

2.1   Definitions

2.1.1 Command Station

Development is always done on Windows NT/2000/XP/Vista/Seven or Redhawk Linux. The computer used to run the **RT-LAB** user interface, design software including Simulink and SystemBuild, and/or monitoring software such as LabVIEW, is known as the **Command Station**. It is possible to include more than one **Command Station** in an RT-LAB system.

2.1.2 Target Nodes

The computers used to run your simulation are called **target nodes** or **targets**. Target nodes can run using Windows NT/2000/XP/Vista/Seven, QNX 6.x (real-time) operating systems, or Redhat Linux (real-time) operating systems, allowing for a variety of simulation requirements. For super-computer performance, RT-LAB can be set up using a network of multi-processor computers.

2.2   Components List

There is a setup file for each operating system. The files are located on the RT-LAB CD. Here is a list of the files and where you can find them:

- For Windows NT/2000/XP/Vista/Seven - **rtlab-win32-[version_name].exe** in **rtlab\setup\win32**

- For QNX6 - **rtlab-qn6-[version_name].tgz** in **\rtlab\setup\qnx6**

- For RedHat - **rtlab-redhawk-version_name.rpm** in **rtlab\setup\redhawk**

Requirements

<div style="text-align: right;">**3**</div>

3.1 Hardware Requirements

- Recommended configuration for a command station computer (Windows or Redhawk Linux OS): Pentium/AMD based PC with 1GB.

- Recommended configuration for a computation node: Pentium/AMD based PC with 128MB.

3.2 Software Requirements

3.2.1 Microsoft Windows Compatibility

Table 2: RT-LAB Versions vs. Windows Versions

	NT 4.0	2000	XP*	VISTA**	SEVEN**
RT-LAB 7.2.x	√	√	√	–	–
RT-LAB 8.0.x	-	√	√	–	–
RT-LAB 8.1.x	-	√	√	√	√
RT-LAB 8.2.x	-	√	√	√	√
RT-LAB 8.3.x	-	√	√	√	√
RT-LAB 8.4.x	-	√	√	√	√
RT-LAB 10.0.x	-	√	√	√	√
RT-LAB 10.1.x	-	√	√	√	√
RT-LAB 10.2.x	-	√	√	√	√
RT-LAB 10.3.x	-	√	√	√	√

Because RT-LAB uses Windows services and this feature is not available in Windows 95/98/ME, you need to be running Windows NT4/2000/XP/Vista/Seven to use RT-LAB. Furthermore, Windows NT4/2000/XP/Vista/Seven is much more stable and reliable than Windows 95/98/ME.

*RT-LAB has been tested on Windows XP 32 bits and 64 bits edition.

** Starting with v8.3, RT-LAB is fully compatible with Windows Vista and Windows 7. However, it will work with v8.1 and v8.2 with some manual configurations.

3.2.2 MATLAB Compatibility

Table 3: RT-LAB Versions vs. MATLAB Versions

	R2006B	R2007B	R2008A	R2008B	R2009B 32 BITS	R2010A 32 BITS	R2010B 32 BITS	R2011A 32 BITS
RT-LAB 8.0.x	-	-	-					
RT-LAB 8.1.x	√	-	-					
RT-LAB 8.2.x	√	√	√					
RT-LAB 8.3.x	√	√	√	√				
RT-LAB 8.4.x	√	√	√	√				
RT-LAB10.0.x	√	√	√	√	√			
RT-LAB10.1.x	√	√	√	√	√			

Table 3: RT-LAB Versions vs. MATLAB Versions

	R2006B	R2007B	R2008A	R2008B	R2009B 32 BITS	R2010A 32 BITS	R2010B 32 BITS	R2011A 32 BITS
RT-LAB10.2.x	√	√	√	√	√	√	√	
RT-LAB10.3.x	√	√	√	√	√	√	√	√

RT-LAB doesn't actually support any 64-bit MATLAB: R2009b 64bits, R2010a 64bits, R2010b 64bits and R2011a 64bits.

Required Elements:

- **Matlab:** Underlying mathematical engine
- **Simulink**: Graphical design environment
- **Real-Time Workshop**: Code generator
- **Stateflow** (supported but optional): Stateful programming environment
- **Stateflow coder** (required if Stateflow is used): Code generator for Stateflow

3.3 MATRIXx Compatibility

Table 4: RT-LAB Versions vs. MATRIXx Versions

	V62.2	V71.X
RT-LAB 7.2.x	√	-
RT-LAB 8.0.x	√	-
RT-LAB 8.1.x	√	-
RT-LAB 8.2.x	√	-
RT-LAB 8.3.x	√	*
RT-LAB 8.4.x	√	*
RT-LAB 10.0.x	√	*
RT-LAB 10.1.x	√	*
RT-LAB 10.2.x	√	*
RT-LAB 10.3.x	√	*
* Could be supported in a future release upon request.		

3.4 National Instruments LabVIEW Compatibility

LabVIEW is not required for RT-LAB to work. However, the Opal API for LabVIEW can be used to create custom user applications.

The API is pre-compiled for LabVIEW 8.5.1 so you will have to "mass compile" it if you use a different version of LabVIEW. This is automatically done when installing the API using the installer as described in **Installing the LabVIEW API**.

Table 5: RT-LAB Versions vs. LabVIEW Versions

	V8.5.X	V8.6.X	V2009	V2010
RT-LAB 10.2.x	√	√	√	√
RT-LAB 10.3.x	√	√	√	√

3.5   National Instruments TestStand Compatibility

TestStand is not required for RT-LAB to work. However, it can be used to create custom test sequences for various quality assurance duties.

Table 6: RT-LAB Versions vs. TestStand Versions

	V3.0	V3.1	V4.1
RT-LAB 7.2.x	√	√	–
RT-LAB 8.0.x	√	√	–
RT-LAB 8.1.x	√	√	–
RT-LAB 8.2.x	√	√	–
RT-LAB 8.3.x	√	√	√
RT-LAB 8.4.x	√	√	√
RT-LAB 10.0.x	√	√	√
RT-LAB 10.1.x	√	√	√
RT-LAB 10.2.x	√	√	√
RT-LAB 10.3.x	√	√	√

3.6   Microsoft Visual C++ compatibility

Microsoft Visual C++ is required on command station for some RT-LAB functionnalities (Windows target).

Table 7: RT-LAB Versions vs. MSVC++ Versions

	MSVC++ 6.0	MSVC++ .NET	MSVC++ 2005	MSVC++ 2008	MSVC++ 2010
RT-LAB 8.0.x	√	–	–	–	–
RT-LAB 8.1.x	√	–	–	–	–
RT-LAB 8.2.x	√	–	–	–	–
RT-LAB 8.3.x	√	–	–	–	–
RT-LAB 8.4.x	√	–	–	–	–
RT-LAB 10.0.x	√	–	–	–	–
RT-LAB 10.1.x	√	–	–	–	–
RT-LAB 10.2.x	√	–	–	–	–
RT-LAB 10.3.x	√	–	√	√	√

3.7   QNX RTOS Compatibility

QNX is used as a computation environment for RT-LAB. Models can be executed in real-time or as pure (unsynchronized) simulations. For pure simulation (no synchronization and no IO), Windows NT/2000/XP computation nodes can be used instead of QNX.

Table 8: RT-LAB Versions vs. QNX Versions

	V6.1	V6.2.1	V6.3.0	V6.3.2	V6.5
RT-LAB 7.2.x	√	√	√	√	–
RT-LAB 8.0.x	√	√	√	√	–
RT-LAB 8.1.x	√	√	√	√	–
RT-LAB 8.2.x	-	-	-	√	–
RT-LAB 8.3.x	-	-	-	√	–
RT-LAB 8.4.x	-	-	-	√	–
RT-LAB 10.0.x	-	-	-	√	–
RT-LAB 10.1.x	-	-	-	√	–
RT-LAB 10.2.x	-	-	-	√	√
RT-LAB 10.3.x	-	-	-	√	√

3.8   Redhawk / Redhat Linux OS Compatibility

Redhawk Linux OS may be used as a command station or as a target node. Models can be executed in real-time or as pure (unsynchronized) simulations.

Table 9: RT-LAB Versions vs. RedHawk/Redhat Linux Versions

	REDHAWK 2.2	REDHAWK 2.3	REDHAWK 4.1	REDHAWK 4.2	REDHAT 5.2
RT-LAB 7.2.x	√	√	-	-	-
RT-LAB 8.0.x	√	√	√*	-	-
RT-LAB 8.1.x	√	√	√	√**	-
RT-LAB 8.2.x	-	-	-	√	-
RT-LAB 8.3.x	-	-	-	√	-
RT-LAB 8.4.x	-	-	-	√	-
RT-LAB 10.0.x	-	-	-	√	√
RT-LAB 10.1.x	-	-	-	√	√
RT-LAB 10.2.x	-	-	-	√	√
RT-LAB 10.3.x	-	-	-	√	√

*RedHawk 4.1 is only supported with RT-LAB 8.0.2 or later.

**RedHawk 4.2 is only supported with RT-LAB 8.1.7 or later.

3.9   Python compatibility

Python is required on command station and target for some RT-LAB functionnalities.

By default, the command station uses its own Python 2.6 release.

Note that Redhawk 4.2 only support Python versions up to 2.4.

Table 10: RT-LAB Versions vs. Python Versions

	PYTHON 2.2.X	PYTHON 2.3.X	PYTHON 2.4.X	PYTHON 2.5.X	PYTHON 2.6.X
RT-LAB 7.2.x	√	√	√	-	-
RT-LAB 8.0.x	√	√	√	-	-

	PYTHON 2.2.X	PYTHON 2.3.X	PYTHON 2.4.X	PYTHON 2.5.X	PYTHON 2.6.X
RT-LAB 8.1.x	√	√	√	-	-
RT-LAB 8.2.x	√	√	√	-	-
RT-LAB 8.3.x	√	√	√	√	√
RT-LAB 8.4.x	√	√	√	√	√
RT-LAB 10.0.x	√	√	√	√	√
RT-LAB 10.1.x	√	√	√	√	√
RT-LAB 10.2.x	√	√	√	√	√
RT-LAB 10.3.x	√	√	√	√	√

3.10 RT-Events Compatibility

RT-Events is a blockset of Simulink developed by Opal-RT. It may be used in real-time when compiled with RT-LAB.

Table 11: RT-LAB Versions vs. RT-Events Versions

	RTE 2.0	RTE 2.1X	RTE 2.2.X	RTE 2.4.X	RTE 3.0.X	RTE 3.1.X	RTE 3.2.X	RTE 3.3.X	RTE 3.4.X	RTE 3.5.X
RT-LAB 7.2.x	-	-	-	√	√	-	-	-	-	-
RT-LAB 8.0.x	-	-	-	√	√	-	-	-	-	-
RT-LAB 8.1.x	-	-	-	√	√	√	√	√	√	√
RT-LAB 8.2.x	-	-	-	-	-	√	√	√	√	√
RT-LAB 8.3.x	-	-	-	-	-	√	√	√	√	√
RT-LAB 8.4.x	-	-	-	-	-	√	√	√	√	√
RT-LAB 10.0.x	-	-	-	-	-	√	√	√	√	√
RT-LAB 10.1.x	-	-	-	-	-	-	-	-	√	√
RT-LAB 10.2.x	-	-	-	-	-	-	-	-	√	√
RT-LAB 10.3.x	-	-	-	-	-	-	-	-	√	√

3.11 ARTEMIS Compatibility

ARTEMIS is a blockset of Simulink developed by Opal-RT. It may be used in real-time when compiled with RT-LAB.

Table 12: RT-LAB Versions vs. ARTEMIS Versions

	ARTEMIS V3.0	ARTEMIS V4.0	ARTEMIS V4.1	ARTEMIS V5.0	ARTEMIS V6.0	ARTEMIS V6.1
RT-LAB 7.2.x	√	√	-	-	-	-
RT-LAB 8.0.x	√	√	-	-	-	-
RT-LAB 8.1.x	√	√	√	-	-	-
RT-LAB 8.2.x	–	√	√	√	-	-
RT-LAB 8.3.x	–	√	√	√	-	-
RT-LAB 8.4.x	–	√	√	√	-	-
RT-LAB 10.0.x	–	√	√	√	-	-
RT-LAB 10.1.x	–	–	–	–	√	√
RT-LAB 10.2.x	–	–	–	–	√	√
RT-LAB 10.3.x	–	–	–	–	√	√

3.12 Xilinx XSG Compatiblity

Starting with v8.3, integration of RT-LAB with the Xilinx System Generator toolbox is provided by the Opal-RT RT-XSG product. Table 13 below gives the compatibility between RT-LAB and RT-XSG versions. Compatibility of RT-XSG with Matlab and Xilinx System Generator versions can be found in RT-XSG Installation Guide.

Table 13: RT-LAB vs RT-XSG

	RT-XSG 1.0	RT-XSG 1.1	RT-XSG 1.2	RT-XSG 1.3	RT-XSG 2.0	RT-XSG 2.1
RT-LAB 8.3.x	√	√	√	*	*	*
RT-LAB 8.4.x	√	√	√	*	*	*
RT-LAB 10.0.x	√	√	√	√	*	*
RT-LAB 10.1.x	√	√	√	√	√	*
RT-LAB 10.2.x	√	√	√	√	√	√
RT-LAB 10.3.x	√	√	√	√	√	√

Note: The symbol (*) indicates partial support. For instance, new FPGA controller boards added in the newer versions of RT-XSG are not included in older versions of RT-LAB.

In earlier RT-LAB versions, the XSG option was integrated with RT-LAB. Table 14 below gives the compatibility matrix of RT-LAB (up tp v8.2), Matlab and Xilinx ISE versions. Description of the required elements for each Xilinx version supported in these previous RT-LAB releases follows.

Table 14: RT-LAB (pre-v8.3 versions) and Matlab versions vs Xilinx ISE versions

		XILINX 7	XILINX 10
RT-LAB 7.2.x	Matlab R14 (SP1, SP2, SP3)	–	–
RT-LAB 8.0.x	Matlab R14 (SP1, SP2, SP3)	–	–
RT-LAB 8.1.x	Matlab R14 (SP1, SP2, SP3)	√	–
	Matlab R2006b	–	–
RT-LAB 8.2.x	Matlab R14 (SP1, SP2, SP3)	√	–
	Matlab R2006b	–	–
	Matlab R2007b	–	√
	Matlab R2008a	–	

The recommended Xilinx packages to be installed for using the Xilinx 7 version are :

•Xilinx ISE 7.1i SP4 (BaseX is sufficient),

•System Generator for DSP version 7.1.

For Xilinx 10, the packages are :

•Xilinx ISE 10.1,

•System Generator for DSP version 10.1

Installing RT-LAB Components on Win32 Machines

4

Here we describe the installation of RT-LAB host and target components on a Win32 machine.

4.1 Installing RT-LAB onto your Command Station

An installation file for RT-LAB on Windows NT, 2000, XP, Vista and Seven is included on the CD-ROM in the RT-LAB software package.

To install RT-LAB onto your Command Station:

1. Insert the RT-LAB CD-ROM into your **Command Station** computer's CD-ROM drive. The installation should start automatically. Click on the *Install OPAL-RT products* link and follow instructions.If the installation does not start automatically:

- Go to **Start**>**Run...**.

- In the **Run** window, type **D:\rtlab\setup\win32\rtlab-win32-[version_name].exe** and click on **OK**. This assumes **D:** is assigned to your CD-ROM drive; if not, enter the CD-ROM drive's letter.

2. Follow the online installation instructions. The files are copied onto your hard disk.

3. Restart your computer after completing installation.

The RT-LAB installation software adds new paths to your MATLAB, creating or modifying the following file:

- <MATLAB_ROOT>\toolbox\local\startup.m, for each version of MATLAB.

RT-LAB installation software adds:

- <RT-LAB installation dir>\Simulink\libr**[xxxxx]**;

- <RT-LAB installation dir>\Simulink\rtw\c\common

where **rxxxxx** is r2006b for Matlab 7.3, r2007b for Matlab 7.5 and so on.

4.2 Configuring the License Server

Once RT-LAB is installed, you must install the license file provided by Opal-RT Technologies. If you have already received your license file, go to **Installing the License File**. If you do not have a license file, read the following paragraph to learn how to provide information to Opal-RT Technologies to get your license file.

4.3 Retrieving the License File

To generate your RT-LAB license key, please send us the following information:

- computer name

- network interface card's physical address

To obtain this information:

1. Go to **Start**>**Programs**> **Accessories**>**Command Prompt**.

2. Enter the following command: **ipconfig /all**.

Note: Please note the computer host name (e.g. Host Name: EXOCRON) and the nic's physical address (e.g. 00-50-DA-B9-DD-DA).

3. Once completed, go to URL **http://www.opal-rt.com/support/permanent-license-activation** and fill the registration form, this enables us to send you a personal license file.

4.4 Installing the License File

To install the license file:

1. Go to the **<OPAL-RT Path>\LicServer** directory.

2. Copy the received license file (e.g. **opallmd_PXXXX-XX-XX.lic**) to this directory.

3. Double click on **lmtools.exe**.

Note: Please note that the license server may not have been installed, either because RT-LAB was installed using the floating license server or because the license server was manually uninstalled.

4. Make sure that the RT-Lab License Server is selected. If it does not appear in the list, see **Installing the License Server** for more information.
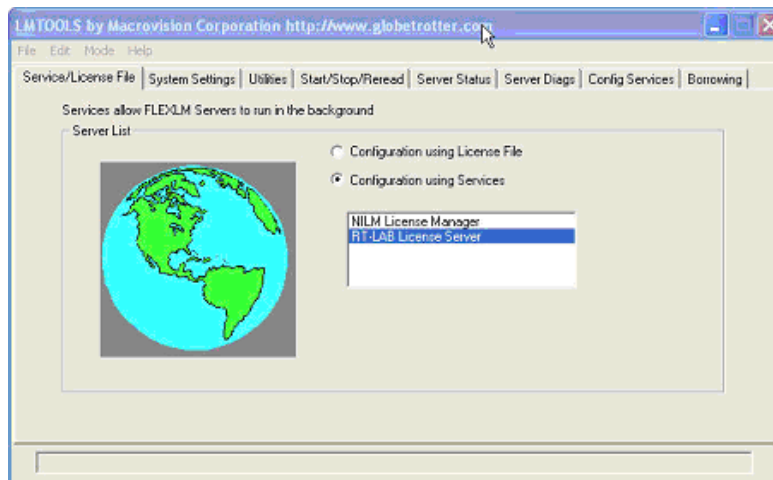

Figure 1:Service/License File Tab

5. In **lmtools**, go to the **Config Services** tab, in the **Path to the license file** field, enter the name and the path of your new license file (you can use the browse button to enter it). Once completed, click on **Save Service**.
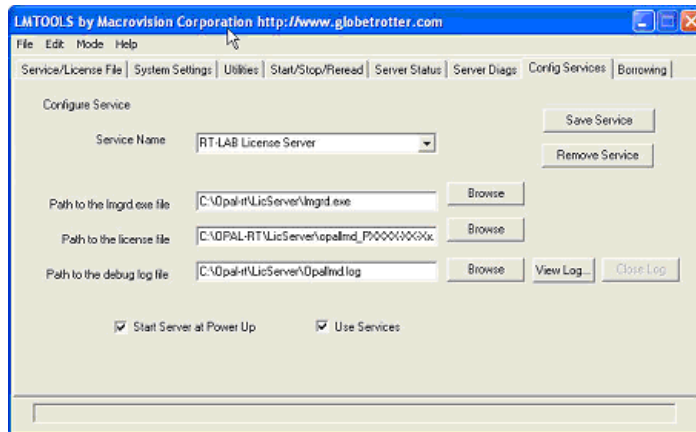
Figure 2:Config Services Tab

6. Go to the Start/Stop/Reread tab and click on **Stop Server** followed by **Start Server**.

4.4.1 Installing the License Server

The RT-LAB license server is automatically configured during the installation process and should not be configured manually. Read this section only if you need to configure it manually, otherwise skip to the next section. Contact Opal-RT's support team at support@opal-rt.com if you experience any difficulties with the license server.

To configure the license server manually, follow these steps:

1. Go to the <OPAL-RT Path>\LicServer directory.

2. Double click on **lmtools.exe**.

3. Go to the **Config Services** tab.

4. Enter the RT-LAB license server in the **Service Name** field.

5. Enter **C:\OPAL-RT\LicServer\lmgrd.exe** in the Path to the lmgrd.exe file field

6. Enter **C:\OPAL-RT\LicServer\opallmd_PXXXX-XX-XX.lic** in the Path to the license file field.

7. Enter **C:\OPAL-RT\LicServer\Opallmd.log** in the Path to the debug log file field.

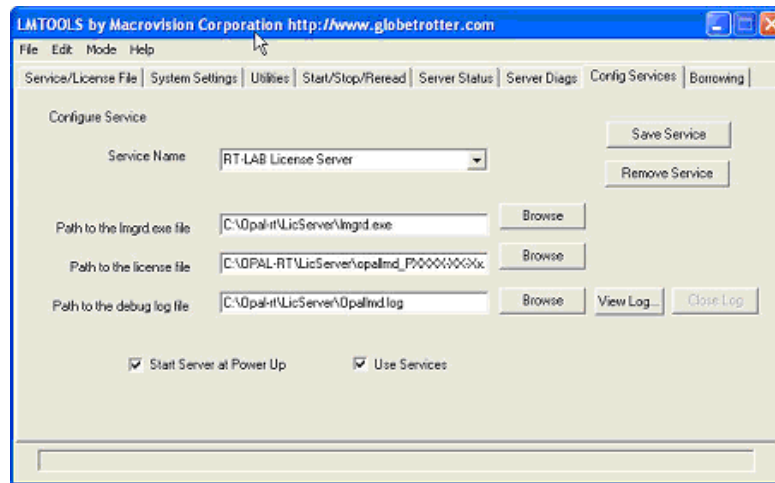8. Check the **Start Server at Power Up and Use Services** checkbox.

Figure 3:Config Services Tab

9. Click on **Save service**.

10. Start the license server using steps 6 to 8 from .

4.5 Configuring the Target Nodes

After the Windows installation, target nodes must be installed.

The target nodes must be added to the list of targets in the Project Explorer of RT-LAB. If you have installed RT-LAB over an existing version or have the configuration of an older version, you can skip this procedure.

1. Open RT-LAB.

2. In Project Explorer, right click on Targets.

3. Click the New Target menu item from the contextual menu New of Targets.

4. Specify the name and the IP Address of the target.

5. Press the Ping button to validate the entries.

6. Press Finish button.

4.6 Setting Up the Command Station for Windows Target Configurations

4.6.1 Installing Visual C++

As the model is going to be compiled on the command station with NT/2000/XP/Vista/Seven target type, you must install Microsoft Visual C++. If you want multiple users on this station to be able to use Microsoft Visual C++ you must install it as administrator. When the installation program prompts you to register environment variables answer yes. The installer registers those variables in the current user local variables. To compile as another user, you must first copy those variables from the current user variables to all user variables.

4.6.2 Registering Variables

If Visual C++ 6.0 is already installed, there is an issue with the installer setting the environment variables for the user performing the installation instead of the whole system. To correct the situation, you need to do the following:

1. Go to **Start**>**Settings**>**Control Panel** and click on **System**. The **System Properties** window is displayed.

2. Click on the **Advanced** tab.

3. Click on **Environment Variables**. The **Environment Variables** window is displayed.

4. Add the following environment variables (append to existing values) in the **System variables** section.

> Note: Please note that these values are for a default installation of Visual C++ 6.0. You may modify them according to your installation.

- **include** - C:\Program Files\Microsoft Visual Studio\VC98\atl\include;C:\Program Files\Microsoft Visual Studio\VC98\mfc\include;C:\Program Files\Microsoft Visual Studio\VC98\include

- **lib** - C:\Program Files\Microsoft Visual Studio\VC98\mfc\lib;C:\Program Files\Microsoft Visual Studio\VC98\lib

- **MSDevDir** - C:\Program Files\Microsoft Visual Studio\Common\MSDev98

- **Path** - C:\Program Files\Microsoft Visual Studio\Common\Tools\WinNT;C:\Program Files\Microsoft Visual Studio\Common\MSDev98\Bin;C:\Program Files\Microsoft Visual Studio\Common\Tools;C:\Program Files\Microsoft Visual Studio\VC98\bin;

5. Your command station is now ready to compile, execute and debug models.

4.7 Installing Windows Target

During the RT-LAB installation process, RT-LAB target service (also called OpalDLoader) is installed only if the option is selected. You need to install this service if you want to run a simulation on this Windows machine.

1. Start the installation program.

2. Follow the instructions until you are prompted to install the RT-LAB daemon.

3. Select **Install** when prompted during the installation process and click on **Next**.

4. Enter the password for the displayed username. You may change the username if you wish to install the service with another user. You must provide a valid username as this service runs using the user's permissions.

5. Complete the installation following the online instructions.

4.8 Installing updates

After the installation is completed, install the updates (if any) from the "Updates CD" or by checking on the Opal-RT website.

1. Start the executable for the update and follow the instructions. RT-LAB folder and version will be detected automatically.

2. Some updates have to be installed on target also. Refer to QNX6 or Redhawk chapter to read the installation procedure.

4.9   Installing the LabVIEW API

The LabVIEW API is provided as a LabVIEW library (.llb file). It contains one VI (Virtual Instrument) per API function.

This API must be installed for each version of LabVIEW you want to use and LabVIEW must be installed first.

To install the API, open the VI located at <RT-LAB installation dir>\labview\Install_API.vi with LabVIEW. The VI should run automatically. If not, press <Ctrl> + R.
Verify that the correct version is used for both LabVIEW and RT-LAB. Select the components you want to install and click OK. Note that the library is required to install the palette.

The installer will do the following (it can be done manually if needed):

1. Copy the OpalApi.llb file to <LabVIEW installation dir\vi.lib\OpalApi\>.

2. Mass compile the entire library for the current version of LabVIEW. This has no effect if LabVIEW 8.5 or 8.5.1 is used.

3. (Optional) Copy the palette to <LabVIEW installation dir\menus\Categories\OpalApi\>.

Remove the destination folders to completely uninstall the library and/or the palette.

Warning: It is strongly discourage to use the original library located at <RT-LAB installation dir>\common\bin\OpalApi.llb. Doing so would create hard-links to this file that will not be updated when you install a newer version of RT-LAB.

4.10   Installing for TestStand

During the installation process, RT-LAB will add certain files to TestStand if TestStand was installed prior to installing RT-LAB. RT-LAB does all the necessary adjustement so that most of the RT-LAB API functions may be readily used in TestStand. The supported versions of TestStand are 3.0, 3.1 and 4.1.

One additional adjustment to TestStand that you may want to perform manually to avoid having to locate OpalApiTs.dll when you open sequences that use the RT-LAB API is the following:

1. Run TestStand, and log in as administrator.

2. Go in the **Configure** menu and open the **Search Directories** window.

3. Make sure the item **PATH environment variable** is checked.

4. Click **OK** to apply any changes.

Warning: It is strongly discouraged to add the complete path to the location of OpalApiTs.dll for a certain RT-LAB release beause this path will not be updated when you install a newer version of RT-LAB.

4.11   Configuring ScopeView with EMTP-RT

RT-LAB and EMTP-RV can be installed on the same host computer and can both use ScopeView. Normally, both applications will use two different versions of ScopeView but, if required, it is possible to configure EMTP-RV to start the version that is packaged with RT-LAB. To do so, follow these steps:

1. Click the Windows **Start > Run ...** menu or click **WIN+R**.

1. Start the Registry Editor by typing **regedit.exe**

2. Locate the following registry:
   HKEY_LOCAL_MACHINE\SOFTWARE\ScopeView.

3. Change the InstallPath value to the ScopeView installation folder package with
   RT-LAB. Example: <RT-LAB installation dir>\ScopeView.

Installing RT-LAB Components on QNX 6

<div style="text-align: right">**5**</div>

5.1   Installing QNX 6.3.2

5.1.1 Installing the QNX RTOS

Insert the CD labeled "OPAL-RT - QNX 6.3.2 runtime CD" in the CD-ROM drive of the target.

Follow the QNX 6.3 standard installation procedure (see Installation notes – QNX 6.3 Neutrino hosts).

Note: During the installation, select the standard installation when prompted. All configuration required for using RT-LAB will be performed automatically during this installation. Once the installation has finished and the target has been rebooted, configure your network.

5.1.2 Configuring the Network

To configure the network:

1. To set your network options, click on **Network**. Now you are ready to set the following (if you do not know what to enter, consult your network administrator):

- **Device** tab: IP address and Netmask
- **Network** tab: Default Gateway and Name Server

2. When done, click on **OK** to apply your changes and close the window.

3. QNX is now installed on your computation node. To make this station functional you must install the RT-LAB target component on an operational QNX node.

5.1.3 Installing the SMP kernel (optional)

If the target where QNX has been installed is a multi-cpu or multi-core computer, the SMP kernel has to be installed to enable the multi-core feature of QNX. An Opal-RT SMP kernel has been install during the CD installation.

To install the OPAL-RT SMP kernel:

1. copy the opal-rt smp kernel and replace the boot file:

- **cp /boot/fs/smp_opal.ifs /.boot**

2. reboot the target

5.2   Installing RT-LAB on QNX 6.x Targets

For QNX 6.x, you must install RT-LAB on each target node.

Refer to **5.2.3, Installing from the RT-LAB GUI**. The RT-LAB daemon (OpalD) has been installed automatically during the CD installation.

5.2.1 Installing from the CD

1. Insert the RT-LAB CD-ROM in the target node.

2. Log on as **root**.

3. Execute the following commands:

- # cd /

- # cp /fs/cd0/rtlab/setup/qnx6/opinstall /tmp

- # textto –l /tmp/opinstall

- # chmod 755 /tmp/opinstall

- # /tmp/opinstall /fs/cd0/rtlab/setup/qnx6/rtlab-qnx6-[version_name].tgz

5.2.2 Installing from the Network

To install from the network:

1. If the target node does not have a CD-ROM drive, installation can be performed using remote access.

2. On the **Command Station** double click on **My Computer**. The **My Computer** window is displayed.

3. Go to **<CD-ROM drive>\rtlab\setup\qnx6**.

4. Open another **My Computer** window.

5. Enter **ftp://user:pass@xxx.xxx.xxx.xxx/** in the user field, where **user** is a valid username for your qnx system (default is **ntuser**), **pass** is the corresponding password (default is **ntuser**) and **xxx.xxx.xxx.xxx** is the compilation node's IP address.

6. You are now connected by FTP to your compilation node.

7. Copy the RT-LAB installer script **opinstall** by dragging and dropping from one window to the other.

8. Copy the RT-LAB archive file **rtlab-qnx6-[version_name].tgz** by dragging and dropping from one window to the other.

9. Connect to the QNX node by telnet (i.e. **Start**>**Run**> **telnet xxx.xxx.xxx.xxx**) and login as **root**.

10. Execute the following commands to install the archive:

    cd /

    # textto -l /home/ntuser/opinstall

    # chmod 755 /home/ntuser/opinstall

    # /home/ntuser/opinstall /home/ntuser/rtlab-qnx6-[version_name].tgz

    # rm -f /home/ntuser/rtlab-qnx6-[version_name].tgz

5.2.3 Installing from the RT-LAB GUI

These steps could be only perform to update a target node to a new version of RT-LAB. To install RT-LAB for the first time on target node, refer to previous paragraph to install RT-LAB from the CD or from the network.

To install from the RT-LAB GUI:

1. Open the **RT-LAB**.

2. Right-click on target you want to install RT-LAB.

3. Select Install/RT-LAB from popup menu.

5.3 Installing RT-LAB updates on target

After the installation is completed, install the updates (if any) from the "Updates CD" or by checking on the Opal-RT website.

1. Install the updates on the command station first. Refer to Windows chapter to read the instructions.

2. Follow the same instruction described on paragraph **5.2.3, Installing from the RT-LAB GUI** but select the tgz file from Install/Patch popup menu for the update instead of the **rtlab-qnx6-vx.y.tgz** file.

Installing RT-LAB Components on RedHawk Linux Machines

6

This section describes the installation of RT-LAB host and target components on a RedHawk Linux machine.

6.1 Installing the Operating System

Follow the RedHawk standard installation procedure (*See Redhawk Linux Releases Notes* for installation procedures). Once the Redhat Linux OS is installed, you must configure it for using RT-LAB.

6.2 RT-LAB Specific Configuration

To configure the RedHawk Linux OS for use with RT-LAB:

1. Log in as **root** and open a new terminal.

2. Add a user to be used by RT-LAB for file transfers and compilation:
   adduser ntuser
   passwd ntuser
   you are then prompted for various information, hit **Enter** until the **Password:** prompt is displayed, usually, we enter **ntuser** as a password, in which case, ignore the **Bad Password** message.

3. Modify /home folder permission; this provides RT-LAB a repository for the files and directories it creates:
   chmod 777 /home

4. Enable the telnet service:
   set disable option to **no** in the **/etc/xinetd.d/telnet** file, or
   go to **Start**>**Settings**>**Server Settings**>**Services** and check the **telnet** checkbox then click on **Save** followed by **Quit**.

5. Enable the ftp service:
   type the following command: **chkconfig --level 345 vsftpd on** or
   go to **Start**>**Settings**>**Server Settings**>**Services**, check **vsftpd**, click on **Save** followed by **Quit**.

6. (Optional Step) Enable Samba to mount Windows drive under RedHawk. Modify the following lines in the file **/etc/samba/smb.conf**: **workgroup = DOMAIN_NAME and security = workgroup**.

7. (Optional step, target only) For Optimal performance, boot in level 3 mode (full multiuser mode). Edit **/etc/inittab** file and modify line **id:5:initdefault:** to **id:3:initdefault:.** This will disable graphical interface which may induce some jitter for some computer's configuration.

8. (Optional step, target only) For optimal performance, disable the nmi watchdog. Modify the following file **/boot/grub/grub.conf** by adding **nmi_watchdog=0** to the kernel boot options.

9. (Optional step) Enable to connect by telnet to the target using **root** user. Add entries to the end of /etc/securetty file :

pts/0
pts/1
pts/2
...
pts/5.
It will provide 5 telnet sessions as root.

10. (Redhawk 4.1 and later only). Unload OHCI modules at boot time. Edit
/etc/rc.d/rc.local file and add the following lines:
rmmod ohci1394
rmmod ieee1394

6.3 Installing RT-LAB Command Station

Matlab must be installed on the Command Station to design the models. Install Matlab before installing RT-LAB.

Note: We recommend that you install MATLAB under the **/usr/local** directory.

6.3.1 Installing Other Required Software

To install the other required software:

1. Log in as **root** and open a new terminal.

2. Insert the RT-LAB CD into the CD-ROM drive.

3. If the CD-ROM device does not mount automatically, execute the following command: **mount /mnt/cdrom**.

4. Install a new version of Wine:

- **rpm –e wine wine-devel**

- **rm -fR /boot/.wine***

     For RedHawk 2.2 or RedHawk 2.3:

- **rpm –ivh wine-20031118-1rh8winehq.i686.rpm**

- **rpm –ivh wine-devel-20031118-1rh8winehq.i386.rpm**

     For RedHawk 4.1 or later:

- **rpm -ivh wine-0.9.2-1wbel3winehq.i386.rpm**

- **rpm -ivh wine-devel-0.9.2-1wbel3winehq.i386.rpm**

Note: Please note that Wine is used by the RT-LAB auxiliary applications, **ProbeControl**, **ParameterControl** and **ChooseModel**. If these applications are always on top when opened, and otherwise do not integrate well with the X window manager, then the following settings must be changed: **in/etc/wine/wne.conf**, section [x11drv], check that there is a line **"Managed" = "Y"** in **~/.wine/config**, check for the same variable and value, where **~** is the home directory for all RT-LAB GUI user.

If you experience some problems starting the **ProbeControl, ParameterControl** and **ChooseModel**, please remove the Wine configuration files into your home folder and the root folder (for instance: # rm /root/.wine)

5. Install the Java runtime:

- **cd /mnt/cdrom/rtlab/setup/redhawk**

- **rpm –ivh j2re-1_4_2_02-linux-i586.rpm**

- **cd /usr/bin**

- **ln –s /usr/java/j2re1.4.2_02/bin/java java**

- **ln –s /usr/java/j2re1.4.2_02/bin/java javaw**

6.4   Installing RT-LAB

To install RT-LAB:

1. Log in as root and open a new terminal.

2. Insert the RT-LAB CD into the CD-ROM drive.

3. If the cdrom device does not mount automatically, execute the following command:
   mount /mnt/cdrom.

4. Type the following command to install RT-LAB:
   rpm -ivh /mnt/cdrom/rtlab/setup/redhawk/rtlab-Redhawk-version_name.rpm.

6.5   Installing RT-LAB Target Node

If you have already installed your node as a **Command Station**, you can skip this section.

6.5.1 Installing from the CD

To install from the CD:

1. Log in as **root** and open a new terminal.

2. Insert the RT-LAB CD into the CD-ROM drive.

3. If the cdrom device does not mount automatically, execute the following command:
   mount /mnt/cdrom.

4. Type the following command to install RT-LAB:
   rpm -ivh /mnt/cdrom/rtlab/setup/redhawk/rtlab-Redhawk-version_name.rpm.

6.5.2 Installing from the Network

To install from the network:

1. If the target node does not have a CD-ROM drive, installation can be performed using remote access.

2. On the **Command Station** double click on **My Computer**. The **My Computer** window is displayed.

3. Go to **<CD-ROM drive>\rtlab\setup\redhawk**.

4. Open another **My Computer** window.

5. Enter **ftp://user:pass@xxx.xxx.xxx.xxx/** in the user field, where **user** is a valid username for your qnx system (default is **ntuser**), **pass** is the

corresponding password (default is **ntuser**) and **xxx.xxx.xxx.xxx** is the compilation node's IP address.

6. You are now connected by FTP to your compilation node.

7. Copy the RT-LAB archive file **rtlab-redhawk-[version_name].rpm** by dragging and dropping from one window to the other.

8. Connect to the RedHawk node by telnet (i.e. **Start**>**Run**> **telnet xxx.xxx.xxx.xxx**) and login as **root**.

9. Type the following command to install RT-LAB:
   rpm -ivh /home/ntuser/redhawk/rtlab-Redhawk-version_name.rpm.

6.5.3 Installing from the RT-LAB GUI

These steps could be only perform to update a target node to a new version of RT-LAB. To install RT-LAB for the first time on target node, refer to previous paragraph to install RT-LAB from the CD or from the network.

To install from the RT-LAB GUI:

1. Open the **RT-LAB**.

2. Right-click on target you want to install RT-LAB.

3. Select Install/RT-LAB from popup menu.

6.6   Installing RT-LAB updates

After the installation is completed, install the updates (if any) from the "Updates CD" or by checking on the Opal-RT website.

- If your RedHawk machine is configured as a command station, follow the same instruction described on paragraph **6.4, Installing RT-LAB** but replace RT-LAB rpm file with update rpm file.

- If your RedHawk computer is configured as a target only:

   1. Install the updates on the command station first. Refer to Windows chapter to read the instructions.

   2. Follow the same instruction described on paragraph **6.5.3, Installing from the RT-LAB GUI** but select the rpm file from Install/Patch popup menu for the update instead of the **rtlab-redhawk-vx.y.rpm** file.

6.7   Uninstalling RT-LAB

To uninstall RT-LAB:

1. Open a shell terminal.

2. Type the following command
   rpm –e rtlab-Redhawk-version_name.

Note: Please note that you can list the installed RT-LAB versions by typing the following command in a shell terminal: **# rpm –qa | grep rtlab**.