

LLEAP IT & Network Information

This document describes aspects of the LLEAP Simulator SW system that may be useful to IT/Network administrators.

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Introduction

A typical LLEAP simulator computer is set up in one of three alternative ways:

A) LLEAP computer:

This is the most common configuration. Computers that are purchased through Laerdal and setup with LLEAP will have all SW applications related to LLEAP installed. The LLEAP installer includes LLEAP itself, Patient Monitor Application, SimDesigner, Session Viewer and auxiliary tools. Note that SimDesigner does not interact on networks. LLEAP requires a license to connect to a simulator and to be used with a Patient Monitor.

B) Patient Monitor computer:

While the LLEAP installer contains both LLEAP and the Patient Monitor there is a separate Patient Monitor installer which is considerably smaller than the LLEAP installer. It is used to set up a dedicated computer so that it can be used as patient monitor. Additionally, it includes the Simulator Firmware & Network Wizard (SFNW).

Note: The LLEAP software can be used as a Patient Monitor without license, but SFNW requires license in order to update a SimMan 3G simulator.

C) **Debrief Computer:**

Sometimes users want to set up a computer as a dedicated debriefing station, in which case they only need to install Session Viewer on the computer and connect the web camera to it.

Most applications utilize network communication in one way or another. They interact with each other and other devices such as the simulators and their Link Boxes. Some of the applications also attempt to access Internet services although this is not required for basic simulator functionality. The URLs accessed and their associated functionality is described later in this document.

Communication paths

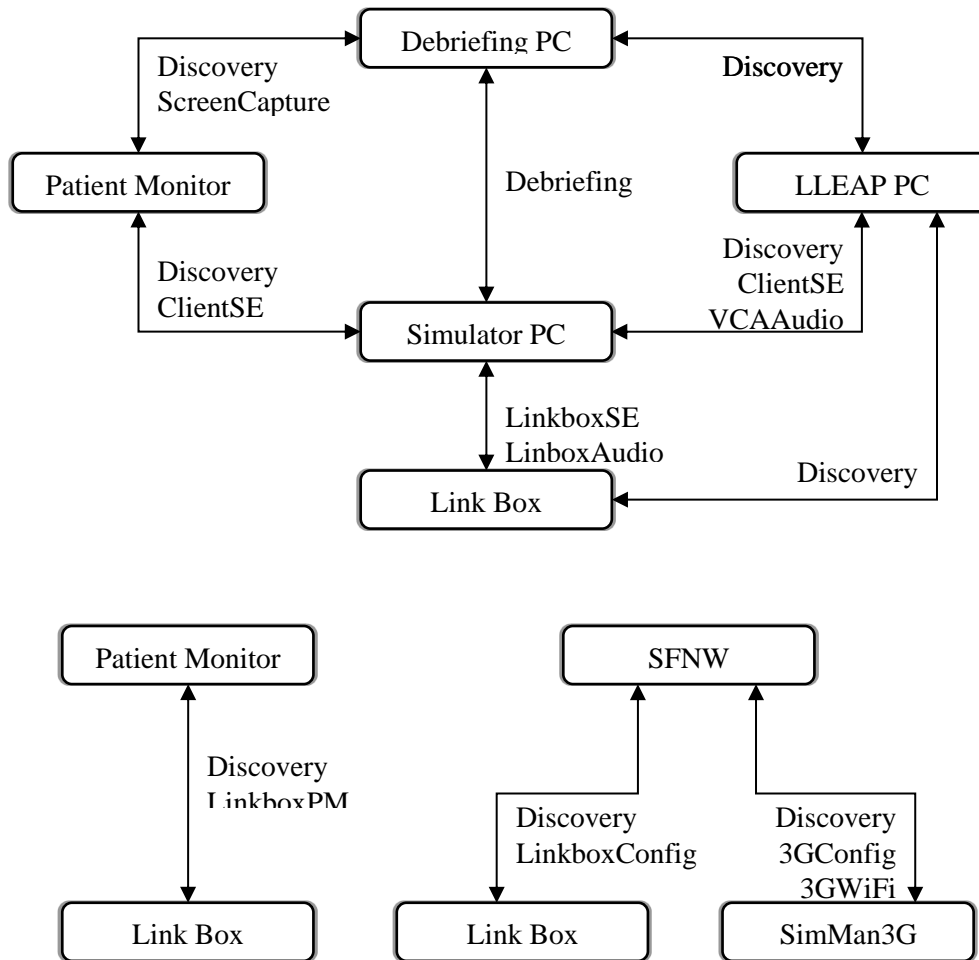
The following are the type of **Devices** that may communicate with each other:

- **Client PC** – There are two types of client PC's:
 - **LLEAP PC** – A PC with the full LLEAP installation.
 - **Patient Monitor PC** - A PC using a Patient Monitor installation or LLEAP installation. May be the same as the LLEAP PC.
- **Simulator PC** – Is a computer that runs the Simulation Engine program. Typically this is one of two alternatives:
 - **LLEAP PC** – the same PC that runs LLEAP.
 - **SimMan3G** – one of the simulator types that run Simulation Engine inside the manikin. I.e.: SimMan 3G, SimMan 3G Trauma, SimMan 3G Mystic, SimMan Essential or SimMan Essential Bleeding.
- **Link Box** – A SimPad Link Box for simulators without a built in hardware controller board.
- **Debriefing PC** – A PC running Session Viewer or SimView Server. May also function as a Client PC.
- **SFNW** - Simulator Firmware & Network Wizard (SFNW) is an application used to update simulators, usually used from the LLEAP PC.

The main **communication paths** are as follows:

- **3GConfig** – Communication between a Client PC and SimMan3G used to configure and update the simulator.
- **3GWiFi** – Communication between a Client PC and SimMan3G used to configure its WiFi device.
- **LinkboxPM** – Communication between PatientMonitor PC and a Link Box.
- **LinkboxConfig** – Communication between Client PC and a Link Box
- **LinkboxSE** – Communication between Simulator PC and a Link Box
- **ClientSE** – Communication between LLEAP PC/Patient Monitor PC and Simulator Engine.
- **VCA Audio** – Communication (voice) between LLEAP PC and Simulator PC.
- **Debriefing** – Communication between Simulator Engine and a Debriefing PC.
- **ScreenCapture** – Screen capture streaming from Patient Monitor to a Debriefing system
- **Discovery** – Bonjour discovery
- **Internet** – Http access to the Internet to look for updates.

Paths visualized on sample setup



Note that many nodes in this setup may be running on the same PC.

Ports used

The LLEAP system uses IPv4.

SimPads, Link Boxes and Debriefing systems may use other communications outside of the LLEAP system. Please refer to the documentation of these products for more information.

SimMan3G specific

Type	Ports	Direction	Device	Path	Description
UDP Broadcast	6797	To From	SimMan3G Client PC	3GConfig	Identification request from Network Configuration and Manikin Update
UDP Broadcast	6798	From To	SimMan3G Client PC	3GConfig	Identification response
TCP	6798	To	SimMan3G	-	Used internally. SimMan3G listens to shutdown signal from baseboard.
TCP	9897	To From	SimMan3G Client PC	3GConfig	Update control of SimMan3G from Network Configuration and Manikin Update
Http	80	To From	3G Router Client PC	3GWiFi	Used to configure WiFi router inside SimMan3G simulators

Voice Conference

Type	Ports	Direction	Device	Path	Description
TCP	9898	To From	Simulator PC Client PC	VCAAUDIO	Voice Conference Application server control
UDP Multicast	11000	To / From To / From	Simulator PC Client PC	VCAAUDIO	AliveData. Identification of Voice Conference Application
UDP Multicast	11001	To From	Simulator PC Client PC		Obsolete.
UDP (Multicast)	11005	To / From To / From	Link Box Simulator PC	LinboxAudio	Transmission and reception of audio data on directed UDP. Also Voice Conference server information on multicast udp://224.0.0.1:11005/
UDP	11006	To / From To / From	Simulator PC Client PC	VCAAUDIO	Transmission and reception of audio data on directed UDP.

Discovery

Type	Ports	Direction	Device	Path	Description
UDP Multicast	13000	To From	Client PC Simulator PC	Discovery	udp://224.168.102.12:13000/ Legacy AliveData. LLEAP will listen for legacy SW but does not require this port to function.
UDP	15000	To From	Client PC Simulator PC	Discovery	AliveData. Identification of Simulator
UDP Multicast	15001	To From	Client PC Simulator PC	Discovery	udp://224.168.100.9:15001/ AliveData request.
UDP Multicast	15007	To / From	Client PC	Discovery	AliveData used locally on the same computer
UDP	5353	From / To From / To From From	Client PC PatientMonitor PC Simulator PC Link Box	Discovery	Bonjour zero conf. Udp://224.0.0.251:5353

Simulation

Type	Ports	Direction	Device	Path	Description
TCP	6681	To From	Debriefing PC Simulator PC	Debriefing	Debriefing system control
TCP	6682	To From	PatientMonitor PC Debriefing PC	ScreenCapture	Screen capture stream from Patient Monitor PC
TCP	15020	To From From	Link Box PatientMonitor PC Simulator PC	LinkboxConfig LinkboxPM	Main connection for Link Box configuration and control
TCP	15021	To From	Simulator PC Client PC	ClientSE	Main connection for simulation control
TCP	15022	To From	Client PC Simulator PC	ClientSE	File transfer to Client PC
TCP	15023	To From	Simulator PC Client PC	ClientSE	File transfer to Simulator PC
TCP	15024	To From From	PatientMonitor PC Simulator PC Client PC	ClientSE	File transfer to Patient Monitor PC
UDP	15030	To From	Client PC Simulator PC	ClientSE	CTG server stream
TCP	2000	To From	Simulator PC Client PC	ClientSE, LinkboxSE	CPR data stream

Device discovery

LLEAP is using two parallel methods for discovery – Bonjour or „Legacy“. Only Bonjour is supported for discovery of Link Boxes whilst only Legacy is supported for updating SimMan3G simulators.

Bonjour - network service discovery

The LLEAP System uses an mDNS (multicast DNS system) and DNS-SD (DNS Service Discovery) for publishing and discovering network devices. This is described in RFC6762 and RFC6763 respectively. Please see <http://en.wikipedia.org/wiki/MDNS>, http://en.wikipedia.org/wiki/Zero_configuration_networking#Service_discovery. This service is often referred to as Apple Bonjour, zeroconf or Avahi.

It communicates with IP multicast message to 224.0.0.251 using UDP port 5353.

Below are the different services used by LLEAP and/or SimPad and Link Box

Service name	Device/Application	Description
_simbridge._tcp	SimPad Link Box	LLEAP uses this to connect to Link Box
_simmonitor._tcp	SimPad Link Box	Patient Monitors use this to connect to Link Box when running with a SimPad
_simlink._tcp	SimPad Link Box	SimPad will use this to connect to Link Box
_simse._tcp	LLEAP Simulation Engine	LLEAP and Patient Monitor use this to connect to a Simulation Engine (for 3G family simulators this is running inside the simulator, for other simulators the Simulation Engine is running on the LLEAP PC)
_simvca._tcp	Voice Conference Application (VCA)	VCA use this to connect to another VCA, typically running inside a 3G family simulator, but also on a PC running with a LinkBox type simulator

_simventures._tcp	SimView/Session Viewer	Used by LLEAP and SimPad to connect to a SimView Server or Session Viewer
_http._tcp	Screen Capture	Used by SimView Server or Session Viewer to connect to a screen capture service
_workstation._tcp	SimPad update service	Used by LLEAP for updating software on the SimPad

Legacy discovery - broadcast and multicast

The LLEAP system use broadcast and multicast UDP for device discovery. It is mostly kept as a backup in case Bonjour traffic is blocked on the network. Legacy discovery is required for updating SimMan3G simulators but since the recommended update procedure requires to use a direct cable it seldom requires changes in corporate network settings.

External network usage

The LLEAP system does not require access to the Internet for everyday simulator operation.

Internet access is required when performing the following functions:

- Automatic software update. Laerdal Simulation Home will be able to detect and update new versions and patches that become available.

Internet access is required if you wish to perform the following functions:

- SimStore and SimManager registration of device and synchronization of content.
- License activation after installation of the SW.
- Software update. If the simulator computer has no Internet access, the user must visit www.laerdal.com/downloads to check for updates. Any new versions or patches must be downloaded and copied to the simulator computer.
- Windows update. This is not part of the LLEAP SW but the computers should be maintained as recommended by Microsoft.

Internet access by the LLEAP system

Domains	Protocols	Function
www.laerdal.com	HTTP HTTPS	Online activation of licenses using.
cdn.laerdal.com laerdalcdn.blob.core.windows.net	HTTP	Automatic updates detection and updates download
api.healthstream.com api.mysimcenter.com www.healthstream.com	HTTP HTTPS	Online SimStore synchronization
login.healthstream.com	HTTPS	SimManager login
api.mysimcenter.com	HTTPS	Uploading debrief files by Session Viewer and SimView Server
www.laerdal.com www.mysimcenter.com simulation.laerdal.com	HTTP	Opened in browser from Laerdal Simulation Home
smtp.gmail.com	SMTP	Feedback forms, error reporting and log files for debugging
Microsoft Application Insights		If user accepts that LLEAP reports usage data this is done through Microsoft Application Insights.

	HTTPS	For details ref. https://docs.microsoft.com/en-us/azure/application-insights/app-insights-ip-addresses
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Automatic updates

Laerdal Simulation Home regularly checks for automatic download using HTTP towards cdn.laerdal.com or laerdalcdn.blob.core.windows.net. Downloads are made from the same domains when initiated by the user. Installation requires administrative privileges.

To disable the user interface for software download in Laerdal Simulation Home, set the registry key: [HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\Laerdal Medical\Laerdal Simulation Home] "DisableUpdates"="true"

To disable automatic detection of software updates in Laerdal Simulation Home, set the registry key:

[HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\Laerdal Medical\Laerdal Simulation Home] "AutoUpdateCode"="Disable"

The setting in LSH configure updates will show as "Never (Forced by Administrator)"

Special IP addresses

LLEAP will function when your network adapters are configured to use automatic addresses (DHCP) with a couple of exceptions:

- a) If you connect to a SimPad Link Box that is configured to use SimLink, the network adapter must be configured with an address in the range 172.26.8.X. This is automatically applied if you use the „Select simulator network“ dialog in LLEAP to connect to a SimLink network. Using the same dialog to connect to another network will also revert IP settings to automatic addresses (DHCP).
- b) When updating the firmware of a SimMan 3G, SimMan 3G Trauma, SimMan 3G Mystic, SimMan Essential and SimMan Essential Bleeding from legacy SW to LLEAP using a direct cable, it will temporarily set the IP address of the computer to 192.168.169.X. The IP settings will revert to automatic addresses (DHCP) when the update is complete.

The SimMan 3G, SimMan 3G Trauma, SimMan 3G Mystic, SimMan Essential and SimMan Essential Bleeding simulators have a wireless device inside the torso. This device is configured with IP “192.168.169.254”. Basic configuration of the device can be performed with the “Simulator Firmware & Network Wizard” that is installed with LLEAP.

Elevated privileges

Administrator privileges are required for a few selected functions:

- Installation of the SW, upgrades and patches.
- If firewall settings have been removed, they will be re-written on start of LLEAP and this requires elevation.
- When changing settings for Windows auto logon from Laerdal Simulation Home.
- When connecting to a SimLink Ad-hoc network the Network Selector application will ask for elevation to set a static IP on the WiFi adapter. Also, when disconnecting for SimLink and connecting to a normal network it will ask for elevation to remove the static IP. Refer to the section “Special IP addresses“ above.
- Voice Conference Application may ask for elevation to change a sound setting in the Playback Sound device properties under “Enhancements“ where it needs to activate the setting “Disable all sound effects“.

- When using Simulator Firmware & Network Wizard (SFNW). In some situations, SFNW will require administrator privileges in order to discover remote simulator devices on the network (change routing tables).
- SimDesigner is using Silverlight and running this in Out-of-Browser mode with elevated trust. For SimDesigner to function elevated trust must be allowed. Make sure this registry key is not set to 0 (or remove it if there):
HKLM\Software\Wow6432Node\Microsoft\Silverlight\AllowLaunchOfElevatedTrustA
pps

Required access

LLEAP requires access to certain files and folders.

It also requires access to certain areas in the registry.

Some Policy restrictions may interfere with these requirements when running logged into a domain.

The below list is not exhaustive, but lists the most important locations that LLEAP needs access to.

Access	Application	Location	Purpose
Read/Write	LanguageSelector Laerdal Simulation Home	HKLM\SOFTWARE\Laerdal Medical	Configuration
Read/Write	LLEAP	HKCU\SOFTWARE\Laerdal Medical HKCU\SOFTWARE\Laerdal Sophus HKCU\SOFTWARE\Laerdal	Configuration
Read/Write	LLEAP, SimDesigner	%programdata%\Laerdal Medical	Licensing, folder locations, Custom events definitions
Read/Write	Laerdal Simulation Home, SDK	%tmp%\Laerdal Medical	Automatic updates and SDK cache
Write	Laerdal Simulation Home	%tmp%\Laerdal Simulation Setup Assistant	Logging
Write	LLEAP	%tmp%\Laerdal Simulation	Logging
Write	LLEAP	%tmp%\SimSW	Logging
Write	Laerdal Manikin Update	%appdata%\Laerdal Manikin Update	Logging
Write	Laerdal Network Configuration	%appdata%\Laerdal Network Configuration	Logging
Write	Laerdal Simulation Home	%appdata%\ Laerdal Simulation Setup Assistant	Logging
Write	3G Manikin Update	%appdata%\ SimMan 3G Configuration Tool	Logging
Write	SessionViewer	%programdata%\SimVentures	Logging
Read/Write	SessionViewer	HKCU\SOFTWARE\SimVentures HKLM\SOFTWARE\WOW6432Node\SimVentures	Configuration
Read/Write	SimDesigner	%appdata%\SimDesigner	File launching
Read/Write	LLEAP, SimDesigner	{Personal}\Laerdal Simulation	Local resources