Laerdal Network Requirements

Document name	Laerdal Network Requirements
Revision date	October 30th 2024
Internal reference	00066667
Revision	U

1 Introduction

This document describes the main settings of the network required by Laerdal equipment to perform medical simulations. Annex A describes the requirements for SimCapture products.
The Laerdal simulation software and simulation equipment require a local area network (LAN) to exchange data and commands.
In addition, Laerdal's products require a connection to Internet for software maintenance, security upgrades, telemetry reporting, use of other cloud services and remote technical support.

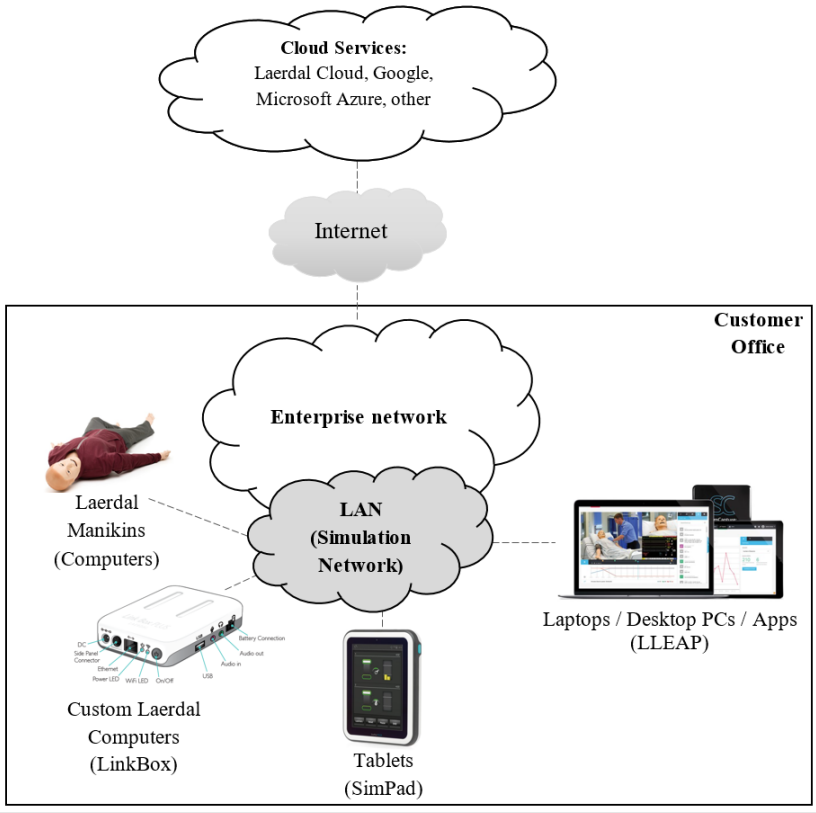
1.1 Bandwidth assumptions

Each Laerdal simulation device requires a minimum 1 Mbps bandwidth capacity across the network that is used for simulations. During different phases of application execution devices may produce peaks of traffic exceeding 1 Mbps.

2 High-level network architecture

Figure 1 shows the high-level architecture of a network which provides local and Internet connectivity for Laerdal simulation equipment. The simulation network is a separate subnet inside customer's enterprise network. Certain Laerdal simulation applications require access through the enterprise network over Internet to Laerdal cloud and third-party cloud services.

Figure 1: The high-level architecture of a simulation network



All devices used in a simulation must be connected to the same subnetwork.

3 Devices Connectivity

3.1 Local cabled network

The simulators and other Laerdal simulation devices are equipped with Ethernet network interface cards (NIC) which can be used to connect the devices to a local-area network switch or hub using minimum category 5 UTP (CAT5) copper cables.

Figure 2 shows the side panel found in several simulator devices which includes an Ethernet interface, a power on/off button and a power plug. The side panel provides external access to simulator's internal operating system (Windows or Linux) for network configuration and applications traffic.

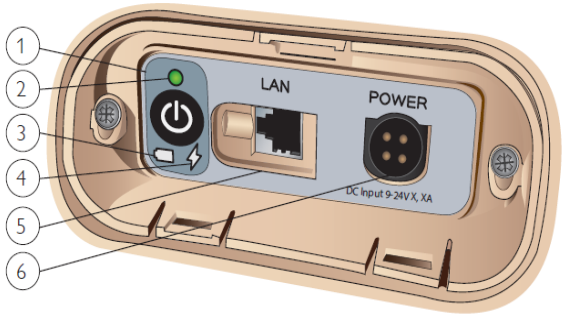


Figure 2: Simulator's side panel with RJ45 port

The NIC interfaces of the simulation devices are compatible with 100BASE-TX / 1000BASE-TX standard and support maximum 100 Mbps. The interfaces are configured to automatically negotiate the speed and duplex mode settings.

Note: SimPad PLUS, LinkBox PLUS, SimMom, SimMan ALS, Resusci Anne Simulator, Resusci Anne Advanced SkillTrainer, SimBaby, SimNewB and Nursing Anne Simulator may not support multigigabit interfaces.

If the enterprise network uses virtual LAN (VLAN) capability for optimization and flexibility, then all Laerdal equipment must be connected to network interfaces allocated to the same VLAN identifier (VLAN ID).

3.2 Local wireless network

Several Laerdal simulation devices can be connected to an enterprise network over wireless local-area networks (WLANs) as shown in Figure 2.b.

The WLAN devices used by Laerdal devices are compatible with the protocol specifications of the Wi-Fi standards (802.11).

The recommended topology for the Wi-Fi simulation network is the network infrastructure mode (i.e., BSS mode). In the Wi-Fi architecture Laerdal devices are clients of the Wi-Fi network.

Laerdal simulators have inside their torso installed a wireless communication equipment which can be configured locally over an RJ45 port connection. Dependent on the simulator model, these Wi-Fi network devices can be a network adapter or a built-in circuit module.

The following table lists the main features of the wireless devices used by Laerdal simulation equipment:

Wi-Fi	Compatible Simulation Devices
2.4-Ghz channels 1-11	All
5-Ghz channels 36, 40, 44, 48	All devices except: SimPad or LinkBox Classic based models (Some devices may support additional 5-Ghz channels)
Release 4 (Wi-Fi 4, 802.11N)	SimPad PLUS LinkBox PLUS SimMom with LinkBox PLUS SimMan ALS with LinkBox PLUS SimBaby with CPUm SimNewB with CPUm Nursing Anne Simulator with CPUm SimMan 3G family[1] with white router (WRN500)
Release 5 (Wi-Fi 5, 802.11AC)	SimPad PLUS 2 LinkBox PLUS 2 SimBaby with CPUm2 SimNewB with CPUm2 Nursing Anne Simulator with CPUm2 MamaAnne with CPUm2 SimMan 3G family[1] equipped with a Wi-Fi adapter (LM Technologies) Laerdal provided computers
WPA-2 Personal security	All simulators equipped with an internal Wi-Fi WRN500 router or a Wi-Fi adapter, SimPad PLUS, LinkBox PLUS, SimMan 3G family[1], SimBaby, SimNewB, Nursing Anne Simulator
WPA2-Enterprise security using PEAP-MSCHAPv2[2] (authentication with username and password without certificates)	SimPad, LinkBox, SimMom, SimMan ALS, SimBaby, SimNewB, Nursing Anne Simulator and MamaAnne SimMan3G equipped with a Wi-Fi dongle, default on production date after week 13, year -22. Found in serial number 20x**1322**xxxx. Available accessory as 212-77455. **Note:** Manually configured using Remote Desktop, see link 1 or link 2.
WPA2-Enterprise security using certificates[2]	SimMan3G equipped with a Wi-Fi dongle, default on production date after week 13, year -22. Found in serial number 20x**1322**xxxx. Available accessory as 212-77455. **Note:** Manually configured using Remote Desktop, see link 1 or link 2.

Note: SSID names and network password should only contain letters and numbers. Not all network devices support special characters.

[1] SimMan 3G family are SimMan 3G, SimMan Essential, SimMan Essential Bleeding, SimMan 3G PLUS, SimMan Critical Care, SimMan Vascular, SimMan Trauma, SimMan Mystic

[2] Requires LLEAP 7.3.0 or newer, SimPad Classic or SimPad PLUS using software version 7.4.5 or newer.

3.3 Communication over Internet

3.3.1 Connectivity to cloud services

The simulation network must be connected to Internet for device and application communication with cloud services.

3.3.2 Connectivity for Laerdal technical support

For technical support, the enterprise customer shall provide VPN, RemotePC, Go2Assist or another remote access option to the simulation network. The computers with Laerdal Learning Application (LLEAP) include TeamViewer application which is used for remote technical support.

4 IP addressing

The Laerdal devices used in simulations must be assigned private IPv4 addresses. All allocated IP addresses must belong to the same subnet range to facilitate device discovery and stability of the simulation session.

The following range of IP addresses which are used internally by Laerdal simulators should not be used in the simulation network (wired or wireless): 192.168.168.*.

The allocation of the IP addresses should be performed by an enterprise DHCP server, which should reserve permanently the addresses to the simulation devices.

5 Network services, protocols and applications

5.1 Devices and services discovery

Laerdal applications use Bonjour services (multicast Domain Name Services – mDNS – and DNS Service Discovery – DNS-SD) and a proprietary method (named hereafter 'Legacy') to discover simulators, simulation devices, services and other computers connected over the simulation network.

The Bonjour services must be enabled in the enterprise network devices for devices to locate each other (wireless routers, wired routers, firewalls, any network devices used in the simulation network which block the Bonjour services). In the event that Bonjour is blocked, Bluetooth may be used to make the initial detection and transfer of necessary info to communicate on the network, or manual connection must be made.

Laerdal Learning Application (LLEAP) can use both methods for device discovery - Bonjour and 'Legacy'. Only Bonjour is supported for the discovery of simulators, while only Legacy is supported for updating SimMan3G simulators.

5.1.1 Discovery using Bonjour services

The following Bonjour services names must be enabled in the network devices used to build the simulation network.

_simbridge._tcp	_http._tcp
_simmonitor._tcp	_workstation._tcp
_simlink._tcp	_ssh._tcp
_simse._tcp	_lleaphost._tcp
_simvca._tcp	_ctgserver._tcp
_simventures._tcp	_lleapsimupdate._tcp

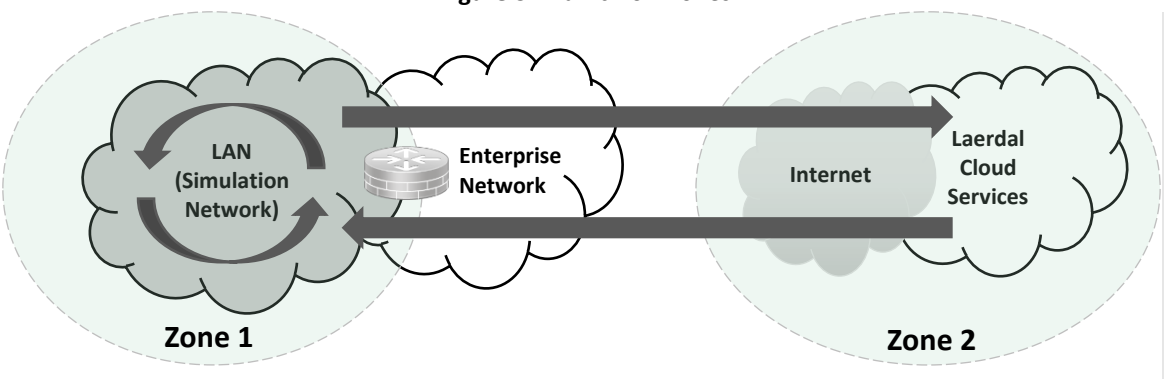
Note that, for certain network equipment manufacturers, the above service names must be added, configured and enabled in the network devices (routers, wireless controllers, other Layer 3 devices) following the instructions included in the vendor manuals.

5.2 Application TCP/UDP ports and network security policies

This section describes the protocols and the ports used by Laerdal simulation devices which must be considered when implementing the security policies in the enterprise network.

The traffic generated by Laerdal devices flows within and between two main network zones as shown in Figure 3.

Figure 3: Traffic flow zones



The security control measures (access control lists, ACLs, and firewall filtering) implemented in the network equipment in Zone 1 and Zone 2 shall not restrict the traffic flows and shall not block the TCP/UDP ports used by the simulation devices and applications.
Sections 5.2.1 and 0 describe the ports used by Laerdal devices and applications inside Zone 1 and between the two zones, respectively.

5.2.1 Traffic inside the simulation network

The following table describes the ports used by Laerdal applications inside Zone 1 (that is Zone 1 to Zone 1 traffic).

Protocol	Ports	Devices	Description
TCP	22	SimPad, LinkBox, Client PC[3]	Rsync, WinSCP and sFTP used to transfer files to and from the client and the simulator
TCP	80, 443	SimMan 3G simulators - SimMan 3G - SimMan 3G PLUS - SimMan Essential - SimMan Ess Bleeding - SimMan Vascular - SimMan 3G Trauma - SimMan Critical Care	Configuration of router within SimMan 3G simulators. New SimMan 3G does not use this router anymore. Note: Possibility to updating to USB WiFi adapter for those that do not have the WiFi adapter
TCP	80, 443	SimView SimCapture On-Premise SimCapture Cloud	Web application access via a browser Local automated health checks internally and outgoing communication
TCP	2000-2001	SimPad Resusci Anne Plus	Serial data communication of the ventilation and compression performed on the simulator used to calculate QCPR score
TCP	3389	SimMan3G	Remote Desktop
UDP	5353	All	Bonjour / mDNS / DNS-SD, Zeroconf discovery Examples: UDP://224.0.0.251 (Multicast) *UDP://224.0.0.252 (Link-Local Multicast)* *UDP://224.0.0.22 (IGMP)* *ff0x::fb (IPv6 Multicast)*
TCP	5671	Client PC	Data Analytics
UDP	6681-6682	SimMan3G simulators Client PC Debrief PC SimView	For the Patient Monitor Remote Screen Capture Software
UDP	6797-6798	SimMan3G-family	Used by Laerdal 'legacy' discovery

[3] Client PCs are computers or laptops running simulation components of the Laerdal Learning Application (LLEAP) such as: Patient Monitor, Simulator Firmware and Network Wizard, Debrief Application.

Protocol	Ports	Devices	Description
		Client PC	
UDP	7557-7558	LinkBox simulators[4]	Laerdal VS params and unified params Build on protocol buffers message subscription service
TCP	9897	SimMan3G-family[5]	Configuration of SimMan 3G simulator
TCP	9898	Simulator PC Client PC	Voice conferencing control
UDP multicast	11000-11006	Simulator PC Client PC SimPad, LinkBox	Voice conferencing. Binary data stream of data using OPUS encoder/decoder
UPD broadcast	13000	Simulator PC Client PC	Legacy alive data
TCP	14997	Client PC VitalsBridge	VitalsBridge Communication
UDP	14998	Client PC VitalsBridge	VitalsBridge advertising
UDP multicast	15000-15007	Simulator PC Client PC	Alive data
TCP	15020-15024	LinkBox, SimPad Simulator PC Client PC	Configuration and control, file transfer. Used to communicate with Patient Monitor application using web service (wsdl) protocol
TCP	15029	Simulator PC Client PC	Computers used in simulation
UDP	15030-15033	Simulator PC Client PC	CTG server stream for SimMom
TCP	42560	Client PC SimMan Critical Care	ALM (ASL 5000 equivalent)
UDP	54915, 52734	Client PC ASL5000	ASL 5000 device discovery
TCP	55195, 52719	Client PC ASL5000	ASL 5000 device control and data

[4] LinkBox PLUS, SimMom, SimMan ALS, SimBaby, SimNewB, Resusci Anne Simulator and MamaAnne.

[5] SimMan 3G family are SimMan 3G, SimMan Essential, SimMan Essential Bleeding, SimMan 3G PLUS, SimMan Critical Care, SimMan Vascular, SimMan Trauma, SimMan Mystic.

5.2.2 Traffic to the cloud services

The following table describes the ports used by Laerdal devices and applications transferring traffic between Zone 1 to Zone 2.

The ports listed in this table shall be outbound open in the security devices sitting on the communication path from Zone 1 to Zone 2.

Protocol	Ports	Target URL	Devices	Function	Data
TCP	443	*.laerdal.com	LLEAP PCs SimPad, Simulators	Online activations of licenses and Laerdal products. It is required by Laerdal products to work. Software updates for Laerdal products downloaded manually.	License keys information – REST api Installation files for miscellaneous products.
TCP	80, 443	cdn.laerdal.com laerdalcdn.blob.core.windows.net	LLEAP PCs SimPad, Simulators	Software updates for LLEAP and SimPad. Detection of needed software updates.	Installation files / executables for Windows and Linux
TCP	80, 443	scenariocloud.laerdal.com	LLEAP PCs SimPad, Simulators	Online Laerdal Scenario Cloud synchronization	Zip-archives containing xml and media files
TCP	443	laerdalmedicalb2c.b2clogin.com	LLEAP PCs SimPad, Simulators	Laerdal Active Directory B2C login	Verification of user credentials
TCP	443	gigya.com	LLEAP PCs SimPad, Simulators	Identity management required for Laerdal cloud services (Scenario Cloud, Laerdal Connect)	Verification of user credentials
TCP	443	api.ipify.org	LLEAP PCs SimPad, Simulators	IoT external lookup, LLEAP and SimPad	URL Redirects & Lookup of geolocation data about users.
TCP	443	*.teamviewer.com	LLEAP PCs SimPad, Simulators	Remote desktop application used for remote support. Must be initialized by user on the local computer.	See www.teamViewer.com
TCP	80, 443	*.SonoSim.com	LLEAP PCs	LLEAP software updates and content for SonoSim Ultrasound simulator	Windows installation files + content in the form of multimedia files.
TCP	443	SonoSim.auth0.com	LLEAP PCs	LLEAP SonoSim Ultrasound Simulator authentication server	Device (probe) ID to authenticate use
TCP	443	update.VitalsBridge.com	LLEAP PCs	LLEAP software updates for VitalsBridge	Installation files / executables
TCP	443	www.ingmarmed.com	LLEAP PCs	LLEAP software updates for Ingmar ASL 5000 ventilator	Windows installation files / executables

Protocol	Ports	Target URL	Devices	Function	Data
TCP	443	*.googleapis.com *.gstatic.com	LLEAP PCs SimPad	Google Telemetry data Anonymized data (no personal information) used for improving our products, preventive maintenance etc.	Telemetry data
TCP	443	servicebus.windows.net	LLEAP PCs SimPad, Simulators	Microsoft EventHub Telemetry data. Anonymized data (no personal information) used for improving Laerdal products, troubleshooting, preventive maintenance etc.	Telemetry data
UDP	123	Network Time Protocol servers	LLEAP PCs SimPad, Simulators	Network Time Protocol	NTP data

6 Laerdal Network Validator Tool

Network Validator Tool is an application that runs on two computers and runs some tests to check the network for the requirements mentioned in this document.

- Checks access to Internet sites listed in 5.2.2.
- Checks Bonjour services listed in 5.1.1.
- Check availability for the ports listed in 5.2.1.

Laerdal Network Validator Tool can be downloaded from this link.

7 ANNEX A – SimCapture Requirements

7.1 Introduction

As part of your SimCapture Cloud purchase and outlined in your services agreement, a Project Manager will contact you to begin planning your installation. This will include reviewing all installation and networking requirements, as well as a site readiness survey before installation begins.

Our SimCapture Cloud AV products include IP cameras, microphones, speakers, and audio modules which may include audio amplifiers and digital signal processors for use in recording and paging (when control station packages are purchased). Most of these devices use PoE and PoE+ (802.11af & 801.11at) and the client providing the network is responsible for providing switches capable of providing PoE+ and enough wattage to support all devices.

For basic SimCapture Cloud communication, outgoing internet access must be allowed from the Capture Nodes (the recording device) internal network to *.simcapture.com (443 TCP, 5000-5100 TCP/UDP) and *.amazonaws.com (443 TCP). More detailed information is found below.

For requirements see: Connection and port requirements - SimCapture (https://help.simcapture.com/en_US/technical-information/connection-and-port-requirements)

Please note that you may need to reference purchased equipment to understand specific network requirements. Please consult with your project manager or support.