Laerdal Network Requirements

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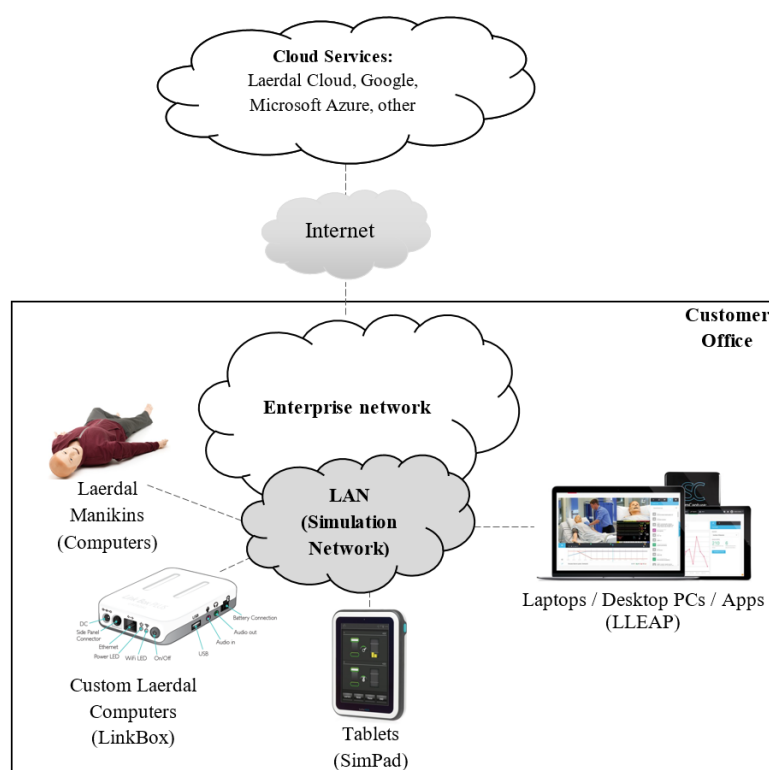
All devices used in a simulation must be connected to the same subnetwork.

3 Devices Connectivity

3.1 Local cabled network

The manikins 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 manikin devices which includes an Ethernet interface, a power on/off button and a power plug. The side panel provides external access to manikin's internal operating system (Windows or Linux) for network configuration and applications traffic.

Figure 2: Manikin's side panel with RJ45 port
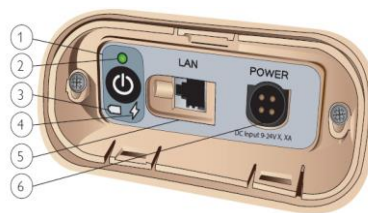
The NIC interfaces of the simulation devices are compatible with 100BASE-TX standard and support maximum 100 Mbps. The interfaces are configured to automatically negotiate the speed and duplex mode settings.

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 manikins have inside their torso installed a wireless communication equipment which can be configured locally over an RJ45 port connection. Dependent on the manikin model, these Wi-Fi network devices can be a router, a dongle 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, SimBaby, SimNewB, Nursing Anne Simulator, SimMan 3G with WRN500 router
Release 5 (Wi-Fi 5, 802.11AC)	SimMan 3G model equipped with a Wi-Fi dongle (LM Technologies dongle), Laerdal provided computers
WPA-2 Personal security	All manikins equipped with an internal Wi-Fi WRN500 router or a Wi-Fi dongle, SimPad PLUS, LinkBox PLUS , SimMan 3G family, SimBaby, SimNewB, Nursing Anne Simulator
WPA2-Enterprise[1] security using PEAP-MSCHAPv2 (authentication with username and password without certificates)	SimMan3G equipped with a Wi-Fi dongle

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 manikins 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.

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[1] Requires LLEAP or SimPad PLUS using software version 7.3.3 or newer

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 manikins, simulation devices, services and other computers connected over the simulation network.

The Bonjour services must be enabled in the enterprise network devices (wireless routers, wired routers, firewalls, any network devices used in the simulation network which block the Bonjour services).

Laerdal Learning Application (LLEAP) can use both methods for device discovery - Bonjour and 'Legacy'. Only Bonjour is supported for the discovery of Laerdal LinkBox devices 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
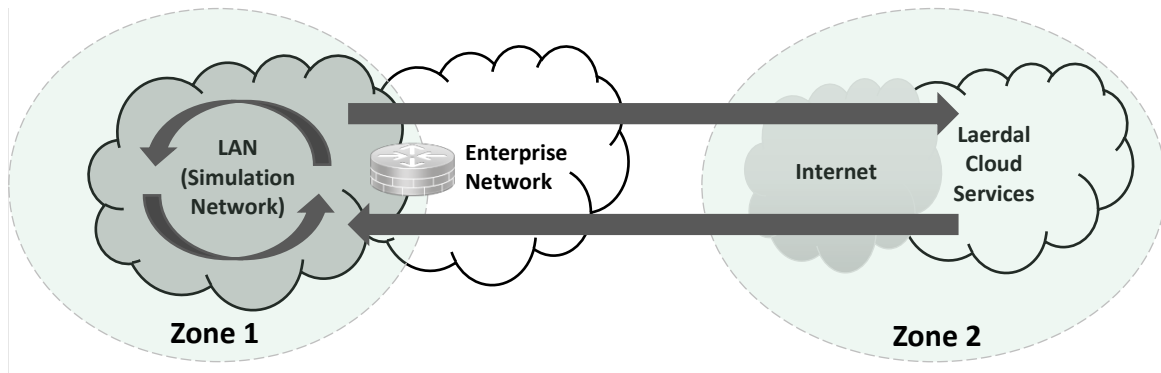
The security control measures (access control lists, ACLs, and firewall filtering) implemented in the network equipment in Zone 1 and Zone 2 shall not restrict the traffic flows and shall not block the TCP/UDP ports used by the simulation devices and applications.

Sections 5.2.1 and 5.2.2 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[2]	Rsync, WinSCP and sFTP used to transfer files to and from the client and the manikin
TCP	80, 443	SimMan3G simulators 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 manikin used to calculate QCPR score
TCP	3389	SimMan3G	Remote Desktop
UDP	5353	All	Bonjour / mDNS / DNS-SD, Zeroconf discovery Udp://224.0.0.251:5353

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[2] 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
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 Client PC	Used by Laerdal 'legacy' discovery
UDP	7557-7558	Linkbox simulators	Laerdal VS params and unified params Build on protocol buffers message subscription service
TCP	9897	SimMan3G-family	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
UDP	54915, 52734	Client PC ASL5000	ASL 5000 device discovery
TCP	55195, 52719	Client PC ASL5000	ASL 5000 device control and data

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, Manikins	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, Manikins	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, Manikins	Online Laerdal Scenario Cloud synchronization	Zip-archives containing xml and media files
TCP	443	laerdalmedicalb2c.b2clogin.com	LLEAP PCs SimPad, Manikins	Laerdal Active Directory B2C login	Verification of user credentials
TCP	443	gigya.com	LLEAP PCs SimPad, Manikins	Identity management required for Laerdal cloud services (Scenario Cloud, Laerdal Connect)	Verification of user credentials
TCP	443	api.ipify.org	LLEAP PCs SimPad, Manikins	IoT external lookup, LLEAP and SimPad	URL Redirects & Lookup of geolocation data about users.
TCP	25	smtp.gmail.com	LLEAP PCs SimPad, Manikins	LLEAP and SimPad feedback forms, errors reporting and log files for debugging. Users can trigger an e-mail to be sent to Laerdal with crash logs and other forensic information for troubleshooting system errors.	E-mail
TCP	443	*.teamviewer.com	LLEAP PCs SimPad, Manikins	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.

Protocol	Ports	Target URL	Devices	Function	Data
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
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	applicationinsights.azure.com applicationinsights.microsoft.com services.visualstudio.com	LLEAP PCs SimPad, Manikins	LLEAP and SimPad, MS Application Insight Telemetry data. Anonymized data (no personal information) used for improving our products, troubleshooting, preventive maintenance etc.	Telemetry data
TCP	443	servicebus.windows.net	LLEAP PCs SimPad, Manikins	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, Manikins	Network Time Protocol	NTP data

6   ANNEX A – SimCapture Requirements

6.1   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.

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

6.2   Networking

If you did not purchase an Advanced Package (ADV) with the control or headphone package, then only the SIMULATION CENTER-VLAN requirements are needed and the inter-VLAN SIMULATION CENTER/Dante routing section is N/A for your site. Your site only needs 1 VLAN.

If the advanced audio package with the control station or headphone package is purchased, the client is expected to provision 2 VLANs: a primary VLAN referred to as SIMULATION CENTER VLAN and an audio only VLAN referred to as the Dante VLAN.

6.2.1   Simulation Center VLAN

6.2.1.1   General Bandwidth Requirements

6.2.1.1.1   Upload

When a simulation starts recording, every configured video feed (~1500 kb/s), is uploaded to the cloud service and to any number of Live streaming viewers external of the Simulation VLAN per recording node:

$$\left(\begin{array}{c} \text{\# of Video Sources} \\ \textbf{per} \text{ node (up to 4):} \\ \textit{IP Camera (720P)} \\ \textit{JTECH or ScreenCapture} \end{array} \text{ x } 1500\text{kb/s} \right) \text{ x } \left(1 + \begin{array}{c} \text{\# of External LAN} \\ \text{Viewers} \end{array} \right) = \begin{array}{c} \text{Total Upload} \\ \text{Bandwidth per node} \\ \text{during a recording} \end{array}$$

To allow for a stable connection from the Customer's network to the SimCapture Cloud servers, a minimum of a one Gigabyte (1GB) uplink is **strongly** recommended.

6.2.1.1.2 Download

Any previously recorded simulation debriefs will be downloaded from the cloud service. A stable connection to the cloud services is strongly recommended for seamless playback.

6.2.1.2 Internal VLAN Connections

The SIMULATION CENTER VLAN connects all cameras, audio modules, and capture nodes. This VLAN is used to transmit the video and data streams from the cameras and audio modules to the capture nodes for recording. The capture nodes process, encode, and transmit the data for live viewing and storage.

Application	Port/Protocol	Source	Destination	Use
SimCapture Software	554 TCP/UDP	Capture Node	Audio Modules and Cameras	RTSP Audio and Video Streams
SimCapture Multiplexer	443 TCP	Control, Multiplex Workstations	Cameras	Optional Product: To view/control cameras in a gird configuration.
SimCapture Paging Application	554 TCP/UDP	Paging Workstations	Audio Modules	Optional Product: For software-based paging without the advanced audio option.
LLEAP Screen Capture	6682 TCP	Patient Monitor	Capture Node	Optional Product: For recording Laerdal patient monitors.

6.2.1.3 Inter-VLAN Outgoing Internet Connections

SimCapture Cloud services are hosted on Amazon Web Services (AWS) – any devices interacting with SimCapture will need to be able to communicate with those services over HTTP (443/TCP). Additionally, live viewing of video requires webRTC (5000-5100/UDP/TCP). **Whitelisting by FQDN/IP address is not recommended as these may change within the AWS infrastructure.**

All connections from SimCapture Cloud are outgoing and never require incoming internet access.

Port/Protocol	Source	Destination	Purpose
443 TCP	Capture Node	*.simcapture.com	Connection to SimCapture Cloud
443 TCP	Control, Debrief, SP, Student, Monitor Workstations	*.simcapture.com	Access to SimCapture Cloud
3478 UDP/TCP (Legacy as of July 15 2023 and can be removed)	Capture Node	*.simcapture.com	Sending Live Video

3478 UDP/TCP (Legacy as of July 15 2023 and can be removed)	Control, Debrief, SP, Student, Monitor Workstations	*.simcapture.com	Viewing Live Video
443 TCP	Capture Node	*.amazonaws.com	Upload of Recorded Video
443 TCP	Debrief	*.cloudfront.net	Debriefing of Previously Recorded Video

6.2.1.3.1 WebRTC Turn Server Outgoing Port Information

The information below is regarding a user viewing live Simulations from outside of the Simulation Center VLAN. **Port 5000-5100 TCP/UDP and 443 TCP will be replacing port 3478**. Please add the correct region based on your location; if you are not sure which to use, please contact your local Laerdal support.

Port/Protocol	Source	Destination Hostname/IP	Purpose
5000-5100 TCP/UDP	Capture Node	**United States East (US & Latin America)** turn.us-east-1.simcapture.com 52.223.44.95 **Canada Central (Canada)** turn.ca-central-1.simcapture.com 13.248.196.69 **Europe Central (EU and UK)** turn.eu-central-1.simcapture.com 75.2.93.103 **Asia Pacific Southeast (Asia Pacific)** turn.ap-southeast-2.simcapture.com 75.2.17.88 **Asia Pacific Northeast (South Korea)** turn.ap-northeast-2.simcapture.com 75.2.32.121	Live video (TURN servers)
443 TCP	Capture Node	**United States East (US & Latin America)** platform.us-east-1.simcapture.com 13.248.201.86 **Canada Central (Canada)** platform.ca-central-1.simcapture.com 75.2.46.89 **Europe Central (EU and UK)** platform.eu-central-1.simcapture.com 52.223.25.121 **Asia Pacific Southeast (Asia Pacific)** platform.ap-southeast-2.simcapture.com 99.83.170.55 **Asia Pacific Northeast (South Korea)** platform.ap-northeast-2.simcapture.com 3.33.226.2	SimCapture microservices (WebRTC signalling, future microservices)

6.2.1.4 SimCapture Connected Equipment on Simulation Center VLAN

Device	IP Address	Network Type	Network Port	Notes	Used for
SimCapture Capture Node	DHCP, DHCP reservation or Static IP	Ethernet	1x 1000 BaseT Network drop		Local device used capture the local Simulations
IP Camera	DHCP, DHCP reservation or Static IP	PoE (PoE plus is possible)	1x 1000 BaseT Network drops with PoE (12.95w)	If configured with DHCP the camera must be connected with its hostname, not via an IP address.	Video Capture device
Audio Module	DHCP, DHCP reservation or Static IP	PoE	1x 1000 BaseT Network drop with PoE (15.4w)	If configured with DHCP the audio module must be connected with its hostname, not via an IP address.	Analog Audio input to IP Encoder
Symetrix DSP Ethernet Port 1 (*Turnkey ONLY)*		PoE+ (No Cisco uPoE)	1x 1000 BaseT Network drops with PoE+ (25.5w)	The DSP is on the SIMULATION CENTER VLAN if NO control station or headphone package was purchased	Audio processor to mix and process multiple audio capture devices (Microphones)
Simulator Instructor PC	DHCP, DHCP reservation or Static IP	Ethernet	1x 1000 BaseT Network drop	Must be physically connected even if in wireless mode	EX: LLEAP Instructor Laptop
Simulated Patient Monitor PC	DHCP, DHCP reservation or Static IP	Ethernet/ Wireless	1x 1000 BaseT Network drop	If an HDMI capture device is not being used to record, then this device must be physically connected to the network to communicate with SimCapture; even if in wireless mode for communication with the manikin	EX: LLEAP Patient Monitor PC displaying simulated Vitals

6.2.1.5 Client Furnish Equipment on Simulation Center VLAN

Device	IP Address	Network Type	Notes
Control PC	DHCP	Ethernet	

Device	IP Address	Network Type	Notes
Multiplex PC	DHCP	Ethernet	To view/control cameras in a grid configuration
Debrief PC	DHCP	Ethernet	
Student PC	DHCP reservation or Static IP	Ethernet	SimCapture Enterprise w/CCM only
Standardized Patient PC	DHCP reservation or Static IP	Ethernet	SimCapture Enterprise w/CCM only
Monitor Station PC	DHCP reservation or Static IP	Ethernet	SimCapture Enterprise w/CCM only

6.2.2   Dante VLAN (Turnkey Only)

The Dante VLAN (D-VLAN) connects all Digital Signal Processors (DSP) and Dante audio amplifiers for real-time audio transmission over ethernet without the need to run extra audio cabling. This is used for in-room and hallway paging.

The workflow starts at the control station microphones: -> DSP -> in-room Dante amplifiers -> speaker. The DSP takes the analog microphone signal, processes it, and transmits it over UDP to the amplifiers, which then send the amplified analog signal to the speakers.

This setup can also be used to transmit a copy of the audio (from the room microphones) to the control station headphones to provide low-latency monitoring audio.

* The Dante VLAN is only required when SIMULATION CENTER control room(s), headphone station package(s) or Hallway Paging package(s) are purchased. *

6.2.2.1   Inter-VLAN Routing (SIMULATION VLAN and Dante VLAN)

Application	Port	Protocol	Source	Destination	Use
Symetrix Composer	49184, 49344	UDP	D-VLAN Dante DSPs and Amplifiers	Simulation – VLAN	Control and meter feedback, Channel Names
Symetrix Composer	8000, 49472, 59472	UDP	Control Workstations	D-VLAN DSP's and Amplifiers	SymNet Communications, Routing
Symetrix Composer	21	FTP	Simulation – VLAN	D-VLAN DSP's and Amplifiers	Firmware Update
Symetrix Composer	48631	TCP	Simulation - VLAN	D-VLAN DSP's and Amplifiers	Remote Terminal

6.2.2.2 AV Devices on Dante VLAN

Device	Network Type	Notes
In-Room Stewart Amplifier	POE+	No Cisco uPoE*
In-Room Symetrix DSP – Ethernet Port 1	POE+	No Cisco uPoE* This is configured on the Dante VLAN if a control station or headphone package exists
In-Room Symetrix DSP – Dante Port 1	Ethernet	
Control Room Symetrix DSP – Ethernet Port 1	POE+	No Cisco uPoE*
Control Room Symetrix DSP – Dante Port 1	Ethernet	

* If you are experiencing PoE negotiation issues with Cisco Switch, verify that the LLDP is enabled. This is the protocol that negotiates PoE and it is disabled by default in Cisco products. In addition, PoE+ on Cisco products has three additional separate command sets, one sets max PoE per port at the site, one sets the max budget for the switch, and a final is called "Cisco two event classification" and handles delivered PoE wattage. *

6.2.2.3 Dante VLAN Switch Requirements

Configuration Setting	Value	Notes
Energy Efficiency Ethernet	Disabled	This will cause DSP and Amp devices to go offline.
IGMP Snooping	Disabled	Must be disabled on the Dante VLAN. Dante uses Precision Time Protocol to sync clocks. We use unicast traffic not multicast.
IGMP Snooping	Disabled	This will cause latency
VPN	Dante VLAN	The IP assigned after a VPN connection is made must be on the Dante VLAN. This allows Dante Controller to diagnose/update the Dante configuration.

* We highly recommend all devices on the Dante VLAN be on the same physical switch. Failure to complete the above could manifest as clicks, pops, and dropouts of audio transmissions. *

6.3   Remote Support Access

Remote support access, such as VPN access, Go2Assist, RemotePC, or another remote access option is highly suggested and must be provided to both networks for remote SimCapture and AV support. Without access, support may be delayed or unavailable.

The VPN connection must provide an IP address within the same subnet as the Dante VLAN - if applicable

6.4   Sample Network Diagrams

[SimCapture Cloud Pro_Enterprise- Advanced Audio.pdf](#)

[SimCapture Cloud Pro_Enterprise- Standard Audio.pdf](#)

[SimCapture Cloud CCM - Advanced Audio.pdf](#)

[SimCapture Cloud CCM - Standard Audio.pdf](#)

[SimCapture Cloud - Laerdal Simulator.pdf](#)

[SimCapture Cloud - Guamard Simulator.pdf](#)

6.5   Typical Network Drop and Power Requirements

The following are <u>typical</u> network and power requirements for each package. Your exact number of connections may vary based on the products purchased.

- *All Ethernet connection types are assumed to be <u>1000 BaseT Gigabit Ethernet</u>.*
- *Some PCs outlined below are Customer Furnished Equipment (CFE)*
- *Some sections are Not Applicable (N/A) for each device*

6.5.1   Standard AV Package

Device	Network Port Requirements			Mains Power	Notes
	Qty	PoE or PoE+	VLAN		
Axis Audio Module	1	PoE	Simulation	Optional	Includes 120/220VAC Power Adapter
Axis PTZ Cameras	2	PoE	Simulation	N/A	
Stewart Audio Amp	1	PoE+	Dante	N/A	
SimCapture Node	1	N/A	Simulation	Required - 1.5 Amps	Includes 120/220VAC Power Adapter

Device	Network Port Requirements			Mains Power	Notes
	Qty	PoE or PoE+	VLAN		
HDMI to IP Capture	1	N/A	Simulation	Required - 1 Amp	Includes 120/220VAC Power Adapter

6.5.2 Advanced AV Package

Device	Network Port Requirements			Mains Power	Notes
	Qty	PoE or PoE+	VLAN		
Axis Audio Module	1	PoE	Simulation	Optional	Includes 120/220VAC Power Adapter
Axis PTZ Cameras	2	PoE	Simulation	N/A	
Stewart Audio Amp	1	PoE+	Dante	N/A	
Symetrix DSP	1	PoE+	Simulation	N/A	DSP will be connected to both VLANs via separate ports
	1	N/A	Dante		
SimCapture Node	1	N/A	Simulation	Required - 1.5 Amps	Includes 120/220VAC Power Adapter
HDMI to IP Capture	1	N/A	Simulation	Required - 1 Amp	Includes 120/220VAC Power Adapter

6.5.3 Control Room

Device	Network Port Requirements			Mains Power	Notes
	Qty	PoE or PoE+	VLAN		
Symetrix DSP	1	PoE+	Simulation	N/A	DSP will be connected to both VLANs via separate ports
	1	N/A	Dante		
CFE Control PC	1	N/A	Simulation	If Applicable	CFE Control Station PC to Start Stop and Annotate Sessions (Optional but recommended).
CFE Multiplex PC	1	N/A	Simulation	If Applicable	CFE PC to display IP cameras in a multiplex view

Device	Network Port Requirements			Mains Power	Notes
	Qty	PoE or PoE+	VLAN		
					(Optional but recommended)

6.5.4   Additional Fixed Camera

Device	Network Port Requirements			Mains Power	Notes
	Qty	PoE or PoE+	VLAN		
Fixed IP Camera	1	PoE	Simulation	N/A	

6.5.5   Additional PTZ Camera

Device	Network Port Requirements			Mains Power	Notes
	Qty	PoE or PoE+	VLAN		
PTZ IP Camera	1	PoE	Simulation	N/A	

6.5.6   Hallway Paging

Device	Network Port Requirements			Mains Power	Notes
	Qty	PoE or PoE+	VLAN		
Stewart Speaker Amp	1	N/A	Dante	120VAC	

6.5.7   Headphone Station Package

Device	Network Port Requirements			Mains Power	Notes
	Qty	PoE or PoE+	VLAN		
Headphone Amp	1	PoE+	Dante	N/A	

6.5.8   Pillow Speaker Package

Device	Network Port Requirements			Mains Power	Notes
	Qty	PoE or PoE+	VLAN		
Stewart Speaker Amp	1	PoE+	Dante	N/A	

6.5.9   Voice Changer Package

Device	Network Port Requirements			Mains Power	Notes
	Qty	PoE or PoE+	VLAN		
Voice Changer	0			120vac to USB	

6.5.10 Confederate Microphone Package

Device	Network Port Requirements			Mains Power	Notes
	Qty	PoE or PoE+	VLAN		
RDL RU-MLB2P	1	PoE	Dante	N/A	
2x Wireless Mic bases	0			2x 120vac	

7   ANNEX B – vrClinicals requirements

7.1   Introduction

vrClinicals for Nursing is a unique, VR solution that engages students with a realistic, busy hospital environment. A collaboration between Laerdal, Wolters Kluwer, and the National League for Nursing to develop **multi-patient prioritization** and **clinical judgment skills**. See more at vrClinicals for Nursing | Laerdal Medical.

7.2   Network requirements

In order to make sure we provide a good reliable solution for our users, we need to ensure the user's internet is fast enough to give them a good experience. The vrClinicals VR App downloads audio for patient responses during the simulation which is the main reason for needing a good internet connection.

The requirements for the user's internet connection on the VR headset are:

1. Minimum 10 Mbit internet connection.

2. Less than 200 ms latency when pinging https://cdn-esim.contentservice.net/.

3. Network requests must resolve within 3 seconds.

4. Network ports open: 80 (http), 443 (https)

To ensure this is the case, the vrClinicals VR App checks these conditions are true when loading a scenario and with 1 minute intervals. If the network check fails the user will be presented with a dismissible popup notifying them of the connection issues, and that their simulation experience may be impacted by the poor network conditions.

The browser based Web App for vrClinicals has the same network requirements, but does it not continuously check the network conditions like the VR App.