Agilent

OpenLab Server and ECM XT

Hardware and Software Requirements Guide

Notices

Document Identification

DocNo D0035352 B.00
EDITION 06/2024

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Software Revision

This guide is valid for the 2.8 revision or higher of the OpenLab Server and ECM XT program and compatible OpenLab Server and ECM XT programs, until superseded.

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In This Book

This guide provides information on supported software, and recommended minimum hardware for various configurations of OpenLab Server and OpenLab ECM XT.

The correct choice of hardware depends on the individual installation environment. Consult with your Agilent representative before purchasing hardware to make sure it is adequate for your needs.

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Table of Contents

1 Hardware, Software, and Network Requirements

This document describes the minimum hardware, software, and network requirements for supporting Agilent OpenLab Server or OpenLab ECM XT. The information provided here applies to both products unless specified otherwise.

CAUTION **Hardware requirements vary depending on many factors. Always review your requirements with your Agilent representative before purchasing or configuring any hardware.**

Hardware

All configurations support the following:

- Internal user authentication
- Domain user authentication
- DNS

Server deployment configurations

OpenLab Server and ECM XT are supported in the following configurations.

For cloud deployment configurations, see **"Cloud Deployments for OpenLab Server/ECM XT"** on page 23.

Definitions

Application server This server PC hosts OpenLab Server/ECM XT and its software components (for example, Shared Services, Secure Storage) and services. This is sometimes referred to as the OpenLab server or ECM XT server.

Database This is the database server storing most of the OpenLab Server/ECM XT data in the Data Repository database, and Shared Services data in its database.

File storage This is the physical storage of analytical raw data, results, reports and other documents.

Search This software component is responsible for indexing Shared Services Activity log entries. In Standard deployment configurations, search is always deployed on the application server. In Enterprise deployment configuration, search is deployed on a designated server.

Load Balancer (Enterprise systems only) Software component that balances traffic among multiple application servers.

Standard configurations

- **Basic or All-in-one server:** Application server with local database and local file storage (**Figure 1** on page 8)
- **2-server**: Two possible configurations (**Figure 2** on page 9) consisting of:
  - 1 Application server with Secure Storage and Shared Services and file storage
  - 1 Database server

OR

  - 1 Application server with Secure Storage, Shared Services and database
  - 1 file server or NAS that meets hardware requirements
- **3-server:** Application server with external database server and external file storage (**Figure 3** on page 10), consisting of:

- 1 Application server with Secure Storage and Shared Services
- 1 Database server
- 1 External file storage: File server or NAS that meets the hardware requirements

Enterprise configuration

- **Enterprise** system (**Figure 3** on page 10), consisting of:
  - 3 Application servers with Secure Storage and Shared Services
  - 1 Database server
  - 1 Windows file server or NAS that meets the hardware requirements
  - 1 Search server
  - 1 Load balancer

Choice of configuration depends on a number of factors. Talk to your Agilent Representative about which server configuration is best suited for your environment.

NOTE The following diagrams are conceptual representations of the system topology. They are not intended to represent the topology's network architecture.

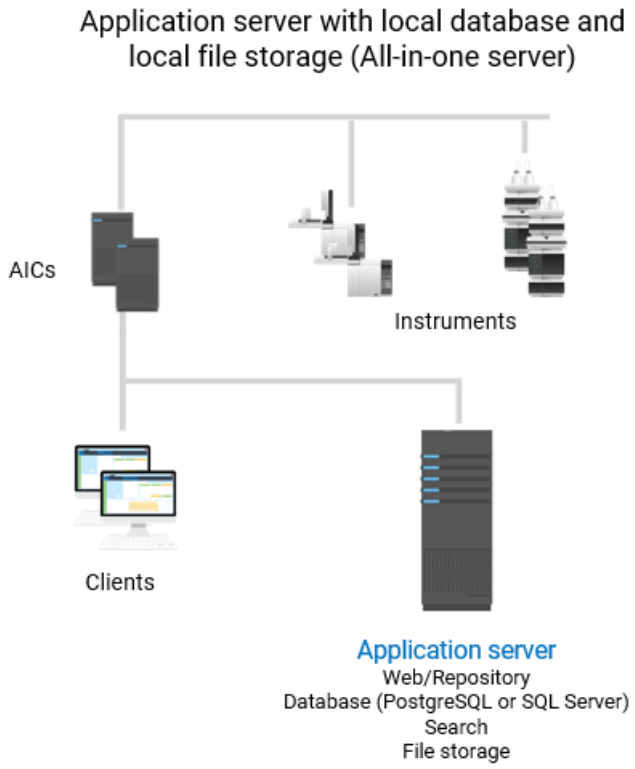

Figure 1. Basic or All-in-one server system configuration

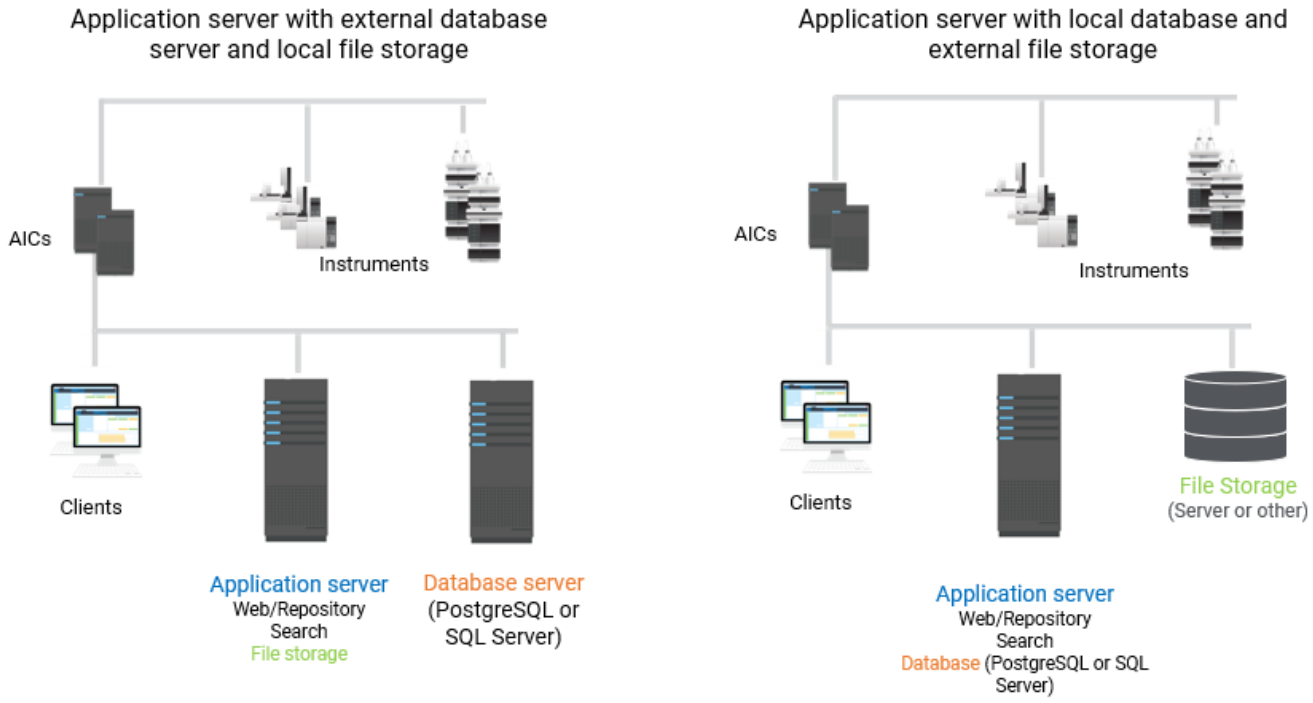

Figure 2. 2 - Server configuration - Application server with external database server and local file storage or application server with local database and external file storage

NOTE External file storage does not necessarily require a dedicated server. You can also use a NAS that meets the hardware requirements.

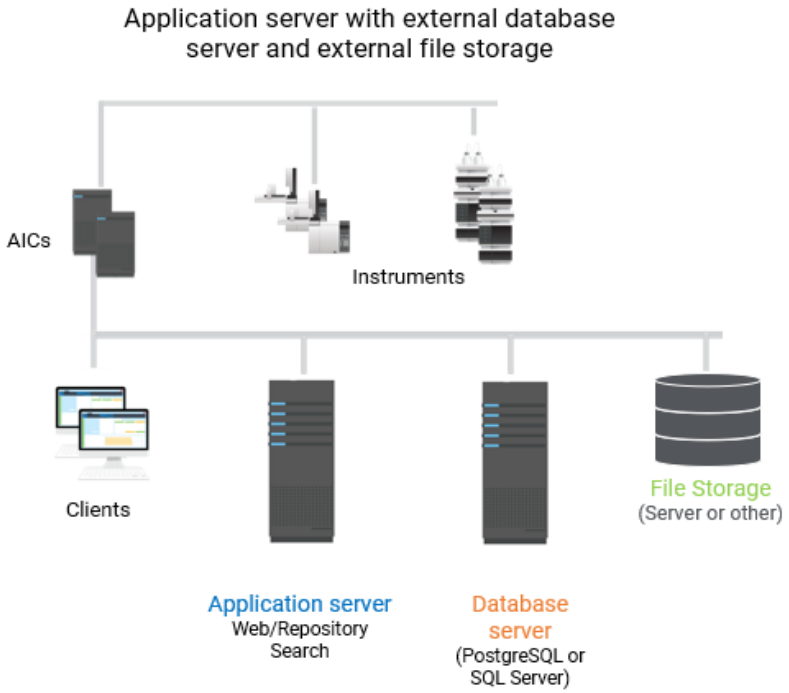

Figure 3. 3 - Server configuration - application server with external database and external file storage

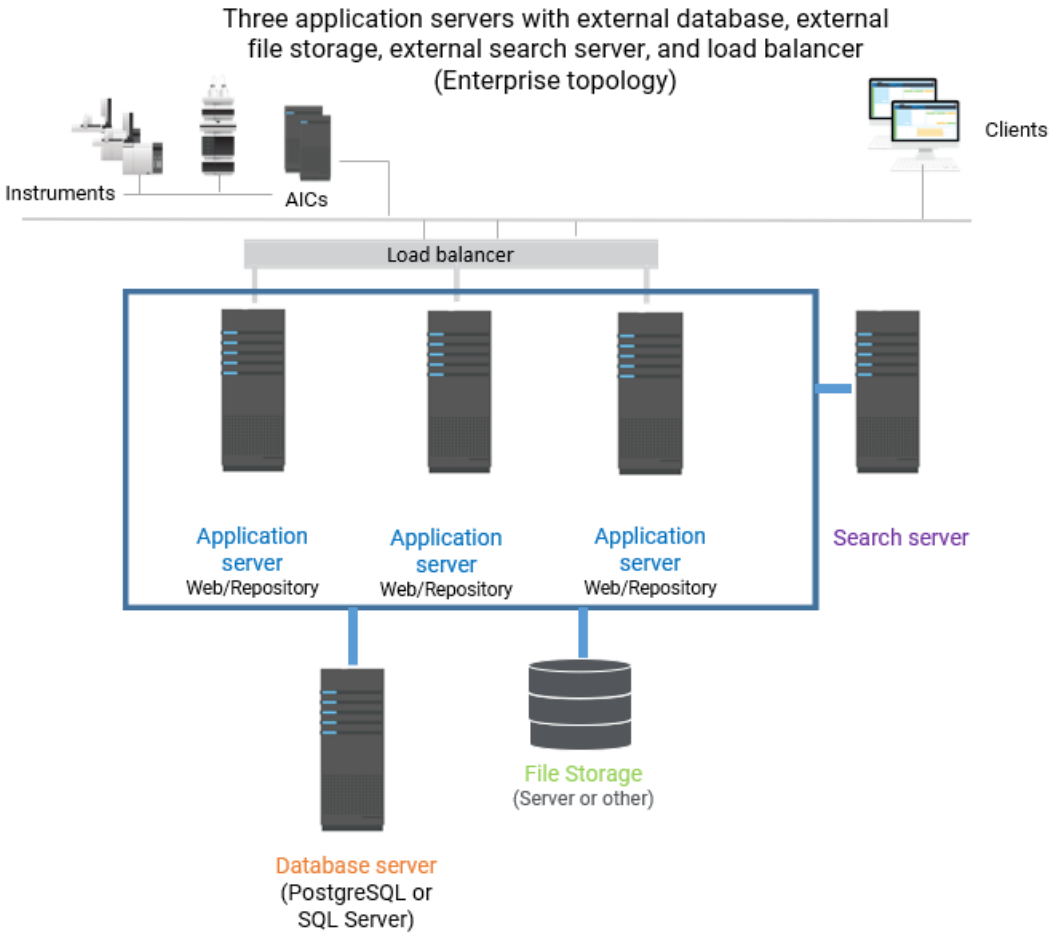

Figure 4. Enterprise configuration - three application servers with external database, external file storage, external search server and load balancer

Minimum hardware for OpenLab Server/ECM XT topologies

CAUTION

The following recommended hardware specifications are for reference purposes. The hardware specifications should be adjusted based on the actual use pattern in the lab.

For example, if a lab acquires larger files as compared to those listed for a typical use pattern, consider adding more disk storage or using an external NAS system for storing files.

Always consult with your Agilent representative to determine the actual hardware required for your needs.

NOTE

For better performance, use solid state drives (SSD) for the hard drives specified in the following tables.

Standard deployment configurations

Application server with local database and local file storage (Basic server and All-in-one server)

NOTE

OpenLab Basic server is available only with the small system all-in-one server configuration.

Table 1. Basic server and All-in-one server

Component	Small system (or Basic server)	Medium system	Large system
	25 (basic is limited to 4 instrument connections)		
Processor	1 x CPU - 2.0 GHz or higher Minimum of 8 vCPU†	2 x CPU – 2.0 GHz or higher Minimum of 16 vCPU†	2 x CPU – 2.0 GHz or higher Minimum of 16 vCPU†
RAM (minimum)	16 GB	24 GB	48 GB
Disk (OS and Software)	150 GB SSD (RAID1)	300 GB SSD (RAID1)	600 GB SSD (RAID1)
Disk (Data)*	500 GB SSD (RAID1)	1 TB SSD (3 x 500 GB RAID5)	2 TB SSD (3 x 1 TB RAID5)
Network	1 Gbps to Clients/AIC	1 Gbps to Clients/AIC	1 Gbps to Clients/AIC
Operating System	Windows Server 2019 or 2022	Windows Server 2019 or 2022	Windows Server 2019 or 2022
Database	PostgreSQL or SQL Server (See **"Supported software"** on page 18 for specific database version information)	PostgreSQL or SQL Server (See **"Supported software"** on page 18 for specific database version information)	PostgreSQL or SQL Server (See **"Supported software"** on page 18 for specific database version information)

* Data disk space is estimated based on 4 years of OpenLab CDS usage. The actual disk space needs to be adjusted based on planned usage pattern.

† A vCPU is a logical CPU (each vCPU is a thread of Intel or an AMD core) For example, a single quad core CPU can contain 8 threads.

NOTE

For servers with an Agilent LC/TOF or Agilent LC/Q-TOF mass spectrometer using MassHunter Networked Workstation, use the Medium system specification with the following modification:

- Disk (Data): 8 TB SSD (5 x 2 TB RAID5)

NOTE Note: HDDs are not tested and overall lower performance or concurrent sessions are expected.

Application server with local database and external file storage

Table 2. Minimum hardware for application server with local database and external file storage

Component	Small system	Medium system	Large system	File storage server
Processor	1 x CPU - 2.0 GHz or higher Minimum of 8 vCPU†	2 x CPU – 2.0 Ghz or higher Minimum of 16 vCPU†	2 x CPU – 2.0 Ghz or higher Minimum of 16 vCPU†	1 x CPU – 2.0 Ghz or higher Minimum of 8 vCPU†
RAM (minimum)	16 GB	24 GB	48 GB	8 GB
Disk (OS and Software)	150 GB SSD (RAID1)	300 GB SSD (RAID1)	600 GB SSD (RAID1)	100 GB SSD (RAID1)
Disk (Data)*	Not applicable	Not applicable	Not applicable	• Small: 500 GB SSD (RAID1) • Medium: 1 TB SSD (3 x 500 GB RAID5) • Large: 2 TB SSD (3 x 1 TB RAID5)
Network	1 Gbps to Clients/AIC	1 Gbps to Clients/AIC	1 Gbps to Clients/AIC	2 Gbps server back-end
Operating system	Windows Server 2019 or 2022	Windows Server 2019 or 2022	Windows Server 2019 or 2022	Windows Server 2019 or 2022
Database	PostgreSQL or SQL Server See **"Supported software"** on page 18 for specific database version information.	PostgreSQL or SQL Server See **"Supported software"** on page 18 for specific database version information.	PostgresSQLor SQL Server See **"Supported software"** on page 18 for specific database version information.	Not applicable

* Data disk space is estimated based on 4 years of OpenLab CDS usage. The actual disk space needs to be adjusted based on planned usage pattern.

† A vCPU is a logical CPU (each vCPU is a thread of Intel or an AMD core) For example, a single quad core CPU can contain 8 threads.

Application server with external database server and local file storage

Table 3. Minimum hardware for application server with external database server and local file storage

Component	OpenLab Server / OpenLab ECM XT application server	Database server
Processor	2 x CPU – 2.0 GHz or higher Minimum of 16 vCPU†	2 x CPU – 2.0 GHz or higher Minimum of 16 vCPU†
RAM	32 GB	32 GB

Table 3. Minimum hardware for application server with external database server and local file storage

Component	OpenLab Server / OpenLab ECM XT application server	Database server
Disk (OS and Software)	100 GB SSD (RAID1)	100 GB SSD (RAID1)
Disk (Data)‡	2 TB SSD (3 x 1 TB SSD RAID5)	It is recommended to use separate disks for storing data and transaction/redo logs* 100 GB SSD (RAID1) – Transaction logs 300 GB SSD (3 x 150 GB RAID5) – Actual Database
Network	1 Gbps to Clients/AIC 10 Gbps server back end	10 Gbps server back end
Operating System	Windows Server 2019 or 2022	Windows Server 2019 or 2022
Database	Not applicable	See **"Supported software"** on page 18 for specific database version information. For SQL Server, it is recommended to use the enterprise version. Dedicated database servers are provided by the customer.

* Refer to the database vendor documentation for additional configuration.

† A vCPU is a logical CPU (each vCPU is a thread of Intel or an AMD core) For example, a single quad core CPU can contain 8 threads.

‡ Disk space is estimated based on 4 years of OpenLab CDS usage. The actual disk space needs to be adjusted based on planned usage pattern. In a database server, this disk is for database files.

NOTE

Servers with an Agilent LC/TOF or Agilent LC/Q-TOF mass spectrometer using MassHunter Networked Workstation should use the following modification:

Disk (Data): 9 TB SSD (4 x 3 TB RAID5)

NOTE

Note: HDDs are not tested and overall lower performance or concurrent sessions are expected.

Application server with external database server and external file storage

Table 4. Minimum hardware for application server with external database server and external file storage

Component	OpenLab Server / OpenLab ECM XT application server	Database server	File storage/ server
Processor	1 x CPU – 2.0 GHz or higher Minimum of 16 vCPU†	2 x CPU – 2.0 GHz or higher Minimum of 16 vCPU†	1 x CPU – 2.0 GHz or higher Minimum of 8 vCPU†
RAM	24 GB	32 GB	8 GB
Disk (OS and Software)	100 GB SSD (RAID1)	100 GB SSD (RAID1)	100 GB SSD (RAID1)
Disk (Data)‡	Not applicable	It is recommended to use separate disks for storing data and transaction/redo logs* 100 GB SSD (RAID1) – Transaction logs 600 GB SSD (3 x 300 GB RAID5) – Actual Database	4 TB SSD (5 x 1 TB RAID5)

Table 4. Minimum hardware for application server with external database server and external file storage (continued)

Component	OpenLab Server / OpenLab ECM XT application server	Database server	File storage/ server
Network	1 Gbps to Clients/AIC 10 Gbps server back-end	10 Gbps server back-end	10 Gbps server back-end
Operating System	Windows Server 2019 or 2022	Windows Server 2019 or 2022	Windows Server 2019 or 2022
Database	Not applicable	See **"Supported software"** on page 18 or specific database version information. For SQL Server, it is recommended to use the enterprise version. Dedicated database servers are provided by the customer.	Not applicable

† A vCPU is a logical CPU (each vCPU is a thread of Intel or an AMD core) For example, a single quad core CPU can contain 8 threads.

‡ Disk space is estimated based on 4 years of OpenLab CDS usage. The actual disk space needs to be adjusted based on planned usage pattern. In a database server, this disk is for database files.

* Network teaming

NOTE

Servers with an Agilent LC/TOF or Agilent LC/Q-TOF mass spectrometer using MassHunter Networked Workstation should use the following modification:

Disk (Data): 9 TB SSD (4 x 3 TB RAID5)

NOTE

Note: HDDs are not tested and overall lower performance or concurrent sessions are expected.

Enterprise deployment configuration

Three application servers with external database server, external file storage, external search server and load balancer

Table 5. Minimum hardware for three application servers with external database server, external file storage, external search server and load balancer (Enterprise)

Component	3x OpenLab Server / OpenLab ECM XT application server	OpenLab search server	Database server	File storage server	Load balancer
Processor	2 x CPU – 2.0 GHz or higher Minimum of 16 vCPU†	2 x CPU – 2.0 GHz or higher Minimum of 16 vCPU†	2 x CPU – 2.0 GHz or higher Minimum of 16 vCPU†	1 x CPU – 2.0 GHz or higher Minimum of 8 vCPU†	1 x CPU – 2.0 GHz or higher Minimum of 4 vCPU
RAM	24 GB	32 GB	64 GB	8 GB	4 GB
Disk (OS and Software)	100 GB SSD (RAID1)	100 GB SSD (RAID1)	100 GB SSD (RAID1)	100 GB SSD (RAID1)	50 GB SSD (RAID1)

Table 5. Minimum hardware for three application servers with external database server, external file storage, external search server and load balancer (Enterprise) (continued)

Component	3x OpenLab Server / OpenLab ECM XT application server	OpenLab search server	Database server	File storage server	Load balancer
Disk (Data)‡	Not applicable	600 GB SSD (3 x 300 GB SSD RAID5)	It is recommended to use separate disks for storing data and transaction/redo logs* 600 GB SSD (RAID1) – Transaction logs 4 TB SSD (3 x 2 TB RAID5) – Actual Database	16 TB SSD (3 x 8 TB RAID5)	Not applicable
Network	10 Gbps server back end	10 Gbps server back end	10 Gbps server back end	10 Gbps server back end	10 Gbps to Clients/AIC 10 Gbps server back end
Operating System	Windows Server 2019 or 2022	Windows Server 2019 or 2022	Windows Server 2019 or 2022 for Microsoft SQL	Windows Server 2019 or 2022	Ubuntu Server 22.04.x (support for HAProxy 2.8)
Database	Not applicable	Not applicable	See **"Supported software"** on page 18 for specific database version information For SQL Server, it is recommended to use the enterprise version. Dedicated database servers are provided by the customer.	Not applicable	Not applicable

† A vCPU is a logical CPU (each vCPU is a thread of Intel or an AMD core) For example, a single quad core CPU can contain 8 threads.

‡ Disk space is estimated based on 4 years of OpenLab CDS usage. The actual disk space needs to be adjusted based on planned usage pattern. In a Database server, this disk is for database files.

* Network teaming

NOTE Servers with an Agilent LC/TOF or Agilent LC/Q-TOF mass spectrometer using MassHunter Networked Workstation, use the Medium system specification with the following modifications: Disk (Data): 32 TB SSD (5 x 8 TB RAID5)

NOTE Enterprise topology is supported only with SSD storage technology.

Minimum hardware for ECM XT Add-ons

Table 6. Minimum recommended hardware for an Import Scheduler server

Component	Minimum hardware
Processor	2 GHz or higher
Minimum Ram	8 GB, recommended 16 GB
Hard Disk	Minimum free space for installation: 500 GB Minimum free space for file cache: 250 GB

NOTE Import Services is typically installed on the primary application client machine; for example, the CDS client.

Table 7. Minimum recommended hardware for an Import Services client machine

Component	Minimum hardware
Processor	2 GHz or higher
Minimum Ram	8 GB
Hard Disk	100 GB

Software

Operating systems

NOTE

Agilent supports the currently supported versions at release, per the **Windows lifecycle policy**. Agilent expects, but cannot guarantee, that newer minor product versions from other software vendors will be compatible.

OpenLab Server/ECM XT core operating system and software versions

Table 8. OpenLab Server\ECM XT Core Operating Systems

	Component	Type	Revision*	Language	Support Statement Supported unless stated otherwise	Notes
OS	Windows Server 2019 (Standard, Datacenter)	64 Bit	1809	en, zh, ja, pt-br		
	Windows Server 2022 (Standard, Datacenter)	64 Bit	21H2	en, zh, ja, pt-br		

* Typical software industry practice is to maintain compatibility in all new minor versions and, when possible, in major versions of Agilent expects, but cannot guarantee, that newer minor product versions from other software vendors will be compatible.

Supported software

Install the following software on any supported operating system before installing OpenLab Server/ECM XT components.

Table 9. Supported software

Element	Sub-element	Type	Revision*	Language	Support Statement Supported unless stated otherwise
Browsers	Microsoft Chromium Edge	64 Bit	As shipped with Windows 10 and 11	en, zh, ja, pt-br	
	Google Chrome	64-bit	40 or higher	en, zh, ja, pt-br	
Database	SQL Server 2019	64-bit	Not applicable	en, zh, ja, pt-br	
	SQL Server 2022	64-bit	Not applicable	en, zh, ja, pt-br	SQL Server 2022 is not supported for in-place upgrades.
	PostgreSQL	64-bit	15.x	en, zh, ja, pt-br	

Table 9. Supported software

Element	Sub-element	Type	Revision*	Language	Support Statement Supported unless stated otherwise
Antivirus	Symantec Endpoint Protection	64-bit		en, zh, ja, pt-br	The antivirus software listed were tested and are recommended. However, the support is not limited to these antivirus software products. Each product may have specific language requirements and support.
	Trend Micro	64-bit		en, zh, ja, pt-br	
	Microsoft Security Essentials	64-bit		en, zh, ja, pt-br	
	McAfee	64-bit		en, zh, ja, pt-br	
Virtualization	VMware vSphere	64-bit	7.x, 8.x	en, zh, ja, pt-br	Virtualization software listed here were tested and are recommended.Other virtualization software can be used as long as it supports the required operating system and provides the required resources.
	Hyper-V for Windows Server	64-bit	As shipped with Windows	en, zh, ja, pt-br	
.Net	.NET Framework	64-bit	4.7.2 or higher	en, zh, ja, pt-br	
	.NET Core	64-bit	6.x	en, zh, ja, pt-br	Installed by default

* Typical software industry practice is to maintain compatibility in all new minor versions and, when possible, in major versions of Agilent expects, but cannot guarantee, that newer minor product versions from other software vendors will be compatible.

Software specifications for ECM XT Add-ons

ECM XT Add-on components consist of the following:

- Import Scheduler
- Import Services

NOTE

Import Scheduler with Empower supports Empower 3 FR5.

Table 10. Import Scheduler and Import services supported software

Element	Sub-element	Type	Revision*	Language	Support Statement Supported unless stated otherwise
OS	Windows 10 Pro	64 Bit	21H2 or greater	en, zh, ja, pt-br	
	Windows 10 Enterprise	64 Bit	21H2 or greater	en, zh, ja, pt-br	
	Windows 11 Pro	64 Bit	21H2 or greater	en, zh, ja, pt-br	

Table 10. Import Scheduler and Import services supported software (continued)

Element	Sub-element	Type	Revision*	Language	Support Statement Supported unless stated otherwise
	Windows 11 Enterprise	64 Bit	21H2 or greater	en, zh, ja, pt-br	
	Windows Server 2019 (Standard, Datacenter)	64-bit	1809	en, zh, ja, pt-br	
	Windows Server 2022 (Standard, Datacenter)	64-bit	21H2	en, zh, ja, pt-br	
Browser	Microsoft Chromium Edge	64 Bit	As shipped with Windows 10 and 11	en, zh, ja, pt-br	
	Google Chrome	64-bit	40 or higher	en, zh, ja, pt-br	
Empower (for Import Scheduler add-on)	Empower 3	64-bit	FR5	en, zh, ja, pt-br	

* Typical software industry practice is to maintain compatibility in all new minor versions and, when possible, in major versions of Agilent expects, but cannot guarantee, that newer minor product versions from other software vendors will be compatible.

* OpenLab ECM XT enforces TLS 1.2 connections from client PCs (for example, Import Scheduler and Import Services). Therefore the respective client OS must ensure TLS 1.2 connections can be established, especially for .Net Framework 2/3.5 as well as .NET Framework >= 4.5.

Certificate Specifications

Table 11. Certificate specifications

Deployment and configuration	Application server	Load balancer
On-prem		
Standard	Agilent or commercial certificate	n/a
Enterprise	Agilent certificate on each node	
Cloud		
Standard (VPN*)	Agilent or commercial certificate	n/a
Standard (WAN^)	Not supported	Not supported
Enterprise (VPN*)	Agilent certificate on each node	Commercial certificate
Enterprise (WAN^)	Not supported	Not supported

* Application server contacted using a VPN connection

^Application server contacted using a WAN connection, without VPN

Licensing

OpenLab Server/ECM XT uses Flex-Net Publisher for the distribution and tracking of license entitlements. This software is installed with the OpenLab Server/ECM XT components.

Virtual machines

OpenLab Server/ECM XT can be run on a virtual machine hosted by hardware virtualization. Virtualization was tested using VMWare vSphere and Hyper-V for Windows Server. Other virtualization software may be used as long as they support the required operating system and provide the required resources.The virtual machine must meet the OpenLab Server/ECM XT hardware and software requirements.

For instructions on how to install, configure, and optimize a virtual machine, see the documentation for your virtualization software. Consider the following when optimizing for your particular environment:

- Dedicated resources allocated to the OpenLab Server/ECM XT server (the resource requirements are the same as those of physical machines)
- Potential performance overhead by using the virtual infrastructure

Notes:

- Do not take a snapshot on systems running data acquisition from instruments. Take snapshots only when the system is idle.
- Using a Windows Server virtual machine with the network interface card (NIC) teaming feature is not recommended. With this configuration, OpenLab Server/ECM XT cannot retrieve the MAC address of a network team interface. If you must use this configuration, an extra virtual network adaptor is needed to which the OpenLab Server/ECM XT license can bind.
- Each license is based on the MAC address of the network interface card, being physical or virtual. If you are planning to use NIC teaming for the OpenLab Server/ECM XT server, it is recommended that you use the teaming configuration tool from the vendor of the network interface card.
- To prevent OpenLab CDS licensing issues when using Microsoft Hyper-V, disable the (default) dynamic MAC address.

Language compatibility

The OpenLab Server/ECM XT Installer and Content Management user interfaces are displayed in the language of the Windows operating system for the following languages:

- English
- Simplified Chinese
- Japanese
- Brazilian Portuguese

OpenLab Control Panel supports the following languages:

- English
- Simplified Chinese
- Japanese
- Brazilian Portuguese

The OpenLab Server/ECM XT Add-ons are supported in the following languages:

- English
- Simplified Chinese
- Japanese
- Brazilian Portuguese

All OpenLab Server/ECM XT programs support the use of localized data files.

Test Services is supported in the following languages:

- English
- Simplified Chinese
- Japanese
- Brazilian Portuguese

Cloud Deployments for OpenLab Server/ECM XT

All OpenLab Server/ECM XT systems deployed in cloud environments must follow the same minimum system hardware and software requirements for the respective topology as on-prem systems.

Table 12. Cloud compatibility

OpenLab Server/ECM XT Deployment Type	Components	AWS services	Azure services
Application server with local database and local file storage (All-in-one server)	Application server, database, file storage	• Single EC2 instance with OpenLab Server/ECM XT, local database (PostgreSQL provided by OpenLab Server/ECM XT or SQL Server manually installed by customer) and file storage	• Single Azure VM with OpenLab Server/ECM XT, local database (PostgreSQL provided by OpenLab Server/ECM XT or SQL Server manually installed by customer) and file storage
Application server with local database and external file storage	Application server, database, file storage	• Single EC2 instance with OpenLab Server/ECM XT, and local database (PostgreSQL provided by OpenLab Server/ECM XT or SQL Server manually installed by customer) • S3 for external file storage	• Azure VM with OpenLab Server/ECM XT and local database (PostgreSQL provided by OpenLab Server/ECM XT or SQL Server manually installed by customer) • Azure VM for external file storage
Application server with external database and local file storage	Application server, database, file storage	• Single EC2 instance with OpenLab Server/ECM XT and file storage • External EC2 instance with an external RDS (PostgreSQL) database OR EC2 instance with SQL Server manually installed by customer	• Azure VM with OpenLab Server/ECM XT and file storage • Azure VM with PostgreSQL OR SQL Server manually installed by customer
Application server with external database server and external file storage	Application server, database, file storage	• EC2 instance with OpenLab Server/ECM XT • External RDS (PostgreSQL) database OR EC2 instance with SQL Server manually installed by customer • S3 for external file storage.	• Azure VM with OpenLab Server/ECM XT • Azure VM with PostgreSQL or SQL Server manually installed by customer • Azure VM for external file storage

* For specific database version information, see **Table 9** on page 18.

OpenLab Server/ECM XT components descriptions:

- Application server: This server PC hosts OpenLab Server/ECM XT and its software components (for example, Shared Services, Secure Storage) and services.
- Database: This is the database server storing most of the OpenLab Server/ECM XT data in the Data Repository database, and Shared Services data in its database.
- File storage: This is the physical storage of analytical raw data, results, reports and other documents.

Table 13. Application server with local database and local file storage (All-in-one server)

Component	AWS	Microsoft Azure
VM Server	EC2 Instance	Azure VM
Operating System	Windows Server 2019 or 2022	Windows Server 2019 or 2022
Database	Microsoft SQL Server or PostgreSQL	Microsoft SQL Server or PostgreSQL
Files Storage	File storage	File storage

Table 14. Application server with local database and external file storage

Component	AWS	Microsoft Azure
VM Server	EC2 Instance	Azure VM
Operating System	Windows Server 2019 or 2022	Windows Server 2019 or 2022
Database	Microsoft SQL Server or PostgreSQL	Microsoft SQL Server or PostgreSQL
Files Storage (External)	AWS S3 Storage	File storage on Azure VM

Table 15. Application server with external database and local file storage

Component	AWS	Microsoft Azure
VM Server	EC2 Instance	Azure VM
Operating System	Windows Server 2019 or 2022	Windows Server 2019 or 2022
Database (External)	RDS (PostgreSQL) Microsoft SQL Server on EC2 Instance	PostgreSQL on Azure VM Microsoft SQL Server on Azure VM
Files Storage	File Storage	File Storage

Table 16. Application server with external database server and external file storage

Component	AWS	Microsoft Azure
VM Server	EC2 Instance	Azure VM
Operating System	Windows Server 2019 or 2022	Windows Server 2019 or 2022
Database (External)	RDS (PostgreSQL) Microsoft SQL Server on EC2 Instance	PostgreSQL on Azure VM Microsoft SQL Server on Azure VM
Files Storage (External)	AWS S3 Storage	File storage on Azure VM

NOTE

- Hardware requirements depend on system size. See “Minimum hardware for OpenLab Server/ECM XT topologies” on page 12 for detailed specifications.
- OpenLab CDS with OpenLab Server/ECM XT supports English language only for External DB and local file storage in cloud deployments.

Cloud certificate specifications

For certificate requirements for cloud-based systems, see **Table 11** on page 20.

Network

OpenLab Server/ECM XT uses standard TCP/IP protocols to communicate between the server and client computers. For optimum performance, the network must meet the design criteria for available bandwidth, IP address assignment, name resolution, and appropriate isolation of the lab subnet from the corporate network.

TCP/IP networking is required for all products. Wide Area Networks (WANs) are not supported.

LAN communications

Communication method

Connect OpenLab Server/ECM XT clients to the OpenLab Server/ECM XT server with an isolated switch using standard CAT-5E network cabling.

Use 100/1000 mbps speed capable LAN communication hardware.

LAN power management

Avoid data capture or transfer interruptions in your data acquisition system by making LAN communication cards available for instrument and system component communications.

Windows may be set to turn instruments and components off to save power while sleeping or hibernating.

To change the setting:

1 Go to **Windows > Control Panel > Network Connections > Local Area Network Properties**.

2 Select the **Power Management** tab.

3 Uncheck **Allow the computer to turn off this device to save power**.

Requirements for a compliant system

If you intend to use your system in a compliant environment, check the following settings related to time synchronization:

- Your network must have a time synchronization service to make sure that all systems are using a consistent and valid time.
- To ensure that users cannot change the time on a client system, users must not operate using an administrator account. This is important as the client time is used during buffered activity logging during network outages.

Domain Guidelines

Domains support the flow of information and user access rights across machines in the network. This means that all machines within the networked OpenLab Server/ECM XT server system must reside within the same domain or have the appropriate cross domain trusts to allow name-based communications between the client and server.

NOTE

Domain naming has to be consistent with RFC-1034.

When installing the OpenLab Server/ECM XT, you must log into the machine as a domain user that is a local administrator. This allows the OpenLab installer to apply network exceptions to the Windows firewall under the domain profile resulting in a functional system. The components necessary to support OpenLab Server/ECM XT on a domain are:

- **Domain controller -** broadcasts the domain name and negotiates access to machines
- **Domain name server (DNS) -** maintains records of what host names belong to which IP on the network. This component is always required for effective components communications in networked systems.
- **Active directory -** maintains the list of users and their access rights on the domain

NOTE

OpenLab Server/ECM XT server components may not be installed on the same machine as the domain controller.

The domain components above host many services and settings that must be configured appropriately to allow communication across machines. The following services and settings will need to be configured to fit your domain. Your internal IT group is responsible for proper configuration of any custom domain solution. These include settings for:

- Lookup zones and hostnames
- Group and security policies
- Subnet masks and virtual LANs

2 Firewall Settings

Firewall settings

If you are using a third-party firewall or antivirus software on the network where OpenLab Server/ECM XT is installed, open these firewall ports to allow communication between the system components of OpenLab Server/ECM XT.

The OpenLab Server/ECM XT installer will automatically open these ports on an enabled Windows firewall during installation.

The following terms are used in the table:

CM: Content Management

OLSS: OpenLab Shared Services

DCS: Data Collection Service

CertSvc: Certificate Service

ATS: Audit Trail Service

DR: Data Repository

NOTE

Ports in **bold** are required in secure systems.

NOTE

Ports listed for v2.6 and earlier are only required for compatibility with older clients.

OpenLab Server and OpenLab ECM XT

Inbound rules

Table 17 OpenLab Server/ECM XT firewall settings: inbound rules

	v2.8		v2.7		v2.6 or earlier			
Application	**Protocol**	**Port**	**Protocol**	**Port**	**Protocol**	**Port**	**Remote System**	**Notes/Description**
CM Server[1]	n/a	n/a	FTP	21	FTP	21	Any	[Optional] Only if FTP service is turned on for OpenLab Server. By default it is off.
OpenLab Reverse Proxy (Apache HTTPD)	n/a	n/a	HTTP HTTPS	:80 / 443/	HTTP HTTPS	:80 / 443/	Any Any	OpenLab Reverse Proxy (Apache)
OpenLab Reverse Proxy (YARP)	HTTPS	:443 /						Framework Reverse Proxy
OLSS Diagnostics	HTTPS	443	HTTPS	443	TCP	3424	Clients, AICs, Server	Used for collecting diagnostics logs
Content Management PostgreSQL Server	Upgrades only		**TCP**	**5432**	**TCP**	**5432**	Alfresco	For database access Required for secure system on PostgreSQL systems. For database access.
DR PostgreSQL Server	TCP	5432	TCP	5433	TCP	5433	DR Services	Required for Sample Scheduler Desktop or configuration Database port (Firewall rule is applied during installation of DR) Used by all internal and external applications + services, which connect against DR/PG: DCS, Audit Trail Service, Test Services, Sample Scheduler Desktop Client
CM Server[1]	n/a	n/a	**TCP**	**5701**	**TCP**	**5701**	Scalable Servers	OpenLab Server Scalable between the nodes.
DCS[2]	HTTPS	:443/ openlab/ dcs	HTTPS	:443/ openlab/ dcs	HTTPS	52088	Any	
			HTTP	6328 (used by ECM XT)	HTTP	6328 (used by ECM XT)	ECM XT Server (may or may not be remote), ChemStation	Data Collection Service Legacy Port (ChemStation and CDS 2.4 and earlier), ECM XT

Table 17 OpenLab Server/ECM XT firewall settings: inbound rules (continued)

	v2.8		v2.7		v2.6 or earlier			
Application	**Protocol**	**Port**	**Protocol**	**Port**	**Protocol**	**Port**	**Remote System**	**Notes/Description**
OLSS Server	**TCP**	**6570**	**TCP**	**6570**	**TCP**	**6570**	Clients, AICs	OpenLab Licensing (Flexera) Server
	HTTPS (WCF)	443	HTTPS (WCF)	443	TCP (WCF)	6577	Clients, AICs	OpenLab Shared Services WCF APIs
					HTTP	6624	Clients, AICs, Others	No longer used as of 2.7 Legacy Shared Services REST API Legacy Licensing Support service REST API
	HTTPS	443, 8084	HTTPS	443, 8084	TCP	8084	Clients, AICs	Licensing API
	HTTP	8090 8098 8099	HTTP	8090 8098 8099	HTTP	8085-8099	Clients, AICs	OpenLab Licensing view-only web UI (Flexera). Default is 8090. Other ports may be used if 8090 is in use.
	TCP	27000-27009	TCP	27000-27009	TCP	27000-27009	Clients, AICs	OpenLab Licensing (Flexera) Server
OLSS Server (REST API)	HTTP	6625	HTTP	6625	HTTP	6625	Clients, AICs	As of 2.7, called only by OpenLab Installer Shared Services REST API (SSL Termination) Licensing Support service REST API (SSL Termination)
	HTTPS	443	HTTPS	443	HTTPS	443	Clients, AICs	Shared Services REST API Licensing Support service REST API
OLSS Server - OpenLab Distributed Cache Service - Enterprise (scalable) topology only (C:\Program Files\OpenLab Distributed Cache\Hazelcast\lib\Hazelcast-{version}.jar)	TCP	7501, 7502, 7503	N/A	N/A	N/A	N/A	OLSS Server (Scalable topology only)	Shared Services Instrument Status Caching - (Scalable topology only) These should only allow inbound traffic from other cluster nodes.
CM Server[1]	n/a	n/a	HTTP	localhost: 8006	HTTP Internal for CM	8006	No	Content Management server
CM Server[1]	n/a	n/a	HTTPS	8443	HTTPS	8443	CM and Index Server	OpenLab Server website and REST APIs for index service Required for secure system on 4-server and scalable only
CM Search Service[3]	n/a	n/a	HTTPS	8983	HTTPS	8983	Index Server	Search Service (Index Server) Required for secure system on 4-server and scalable only
CM Server[1]	n/a	n/a	HTTP	localhost: 9083	HTTP	9083	Internal (accessed via Reverse Proxy only)	OpenLab Server website and REST APIs

Table 17 OpenLab Server/ECM XT firewall settings: inbound rules (continued)

	v2.8		v2.7		v2.6 or earlier			
Application	**Protocol**	**Port**	**Protocol**	**Port**	**Protocol**	**Port**	**Remote System**	**Notes/Description**
Test Services Web Site & REST APIs	HTTPS	:443/testservices/	HTTPS	:443/testservices/ :443/openlab/ca	HTTPS	9092	Any	Test Services (QualA) Web Service hosts REST APIs and Web site on this port. The port number can be changed using QualA Config tool. As of 2.7 the Test Services are registering with Reverse Proxy to use ports 80 and 443. Note: port 9092 and route /openlab/ca are not used in v2.8+.
Test Services Central Management Service	HTTPS	:443/openlab/testservicesserver/	HTTPS	:443/openlab/testservicesserver/	HTTPS	:52088/openlab/testservicesserver/	Any	Central Management Service manages scheduling and email notifications for Test Services
Reverse Proxy Configuration Service[4]			HTTP	12876	HTTP	12876	Internal (accessible on localhost only)	Reverse Proxy Configuration Service hosts REST APIs to configure the Reverse Proxy Server (by programmatically modifying the configuration file). Currently, this modifies the Apache HTTPD server. Disabled after installation.
DCS[2] CertSvc[5] ATS OLSS Server			HTTPS HTTPS	:443/openlab/dcs openlab/certservice/	HTTPS HTTPS	52088 52088	Any	Data Collection Service Not required for secure systems. Certificate Service Not required in a secure configuration for incoming traffic. Required for internal communication on secure systems. Audit Trail Service Not required for secure systems. Sample Scheduler Webserver All: Required in secure systems for backwards compatibility with older clients/servers
RabbitMQ Server			TCP	5671, 15671, 4369	TCP	5671, 15671, 4369	Any Any Server, Clients	AMQP Ports (https) RabbitMQ Management UI (https) Peer discovery service (used by RabbitMQ nodes and CLI tools) Required in secure systems where application requires RabbitMQ.
Sample Scheduler Webserver, Orchestrator, DB-Management			HTTPS	443	HTTPS	52088	Any	
OpenSearch	HTTPS	9200					Server, Search Server, WS/WS+	Required by secure system? Search Server: Yes Other: No
Backup and Restore	HTTP	8045, 8046	HTTP	8045, 8046	HTTP	8045, 8046	Server, WS/WS+	Backup Notification Service Backup Task Status Cache Service

1 C:\Program Files (x86)\Agilent Technologies\OpenLAB Data Store\tomcat\bin\tomcat8.exe

2 C:\Program Files\Agilent Technologies\OpenLab Data Collection Server\Bin\DataCollectionService.exe

3 C:\Program Files (x86)\Agilent Technologies\OpenLAB Data Store\java\bin\java.exe

4 C:\Program Files (x86)\Agilent Technologies\OpenLab Reverse Proxy Configuration Service\ConfigurationService\Agilent.OpenLab.ReverseProxy.ConfigurationService.exe

5 No program configured in Windows Firewall - exe path is: C:\Program Files\Agilent Technologies\OpenLab Certificate Service\Bin\Agilent.OpenLab.CertService.CertServiceCore.exe

Outbound rules

Table 18 OpenLab Server and OpenLab Server/ECM XT firewall settings: outbound rules

Application	Protocol	Port	Remote System	Description
OLSS Server	TCP	25	Email Server	If email server uses a different port or uses secure ports, the destination port will be different.
	TCP/UDP	53	DNS Server	DNS
	TCP/UDP	67, 68	DHCP Server	DHCP or BootP
	TCP	137–139	NetBios WINS	For NetBios/Name resolution for NT Share
OLSS Server	TCP	389	LDAP Server	LDAP
	TCP	445	NAS/Share Server	Server Message Block (SMB). Used for storage on a remote NAS share
	TCP	389	On-prem Active Directory	LDAP
	TCP	636	On-prem Active Directory	LDAPS (only if used)
	TCP	3268	On-prem Active Directory	Global catalog
	TCP	3269	On-prem Active Directory	SSL Global Catalog (only if used)
	TCP	7501, 7502, 7503	Hazelcast (enterprise/scalable topology only)	There is one Hazelcast instance on each redundant node. They need to communicate with one another but not outside the cluster.
	HTTPS	9200	OpenSearch	CDS 2.7.4 Patch Only
CM Server, OLSS	TCP	1433	SQL Server	Only when using MS SQL Server. Configurable.
CM Server, OLSS	UDP	1434	SQL Server	Only when using MS SQL Server. UDP.
OLSS Server	TCP	3268	LDAP Server	Global Catalog LDAP
OLSS Server	TCP	3269	LDAP Server	Global Catalog LDAP SSL
CM Server, OLSS	TCP	5432	PostgreSQL Server	Only when using external PostgreSQL Server. Configurable.
Server, Search-Server, WS/WS+	TCP	9200	OpenSearch	REST API of OpenSearch
Backup monitoring service	HTTP	8045, 8046	Backup Notification Service Backup Task Status Cache Service	Backup Monitoring Service uses HTTP connection to track state of the scheduled backups and send notification about their statuses.

Table 18 OpenLab Server and OpenLab Server/ECM XT firewall settings: outbound rules (continued)

Application	Protocol	Port	Remote System	Description
Backup Notification Service	HTTP	6624	OLSS API	Uses OLSS API to send email notifications.
Redundant licensing	TCP	27009	Other ECM XT servers	Required for inter-server license-clustering.

NOTE

When using an SQL Server named instance, the port used by that database must be open.

ECM XT Add-ons

Table 19. ECM XT Add-ons: inbound rules

Application	Protocol	Port	Remote System	Description
Import Scheduler	HTTP	9091	Server, Services for CM	Import Scheduler communication port for Web UI and REST API
Import Scheduler	HTTPS	9093	Server, Services for CM	Import Scheduler communication port for Web UI and REST API

OpenLab CDS AICs

Inbound Rules

Table 20 OpenLab CDS AICs firewall settings: Inbound rules

	v2.7 or higher		v2.6 or earlier			
Application	**Protocol**	**Port**	**Protocol**	**Port**	**Remote System**	**Description**
OLSS Storage Client			TCP	2886	localhost	Local traffic only,, does not require open port. OpenLab Automation Service (Work Area, Buffered Upload)
OLSS Diagnostics	HTTPS (WCF)	443	TCP (WCF)	3424	Clients, AICs, Servers	Used for collecting troubleshooting logs
OLSS Storage Client	HTTPS	443	HTTP	6628	Clients	Remote Work Area REST API
Test Services Web site & REST APIs	HTTPS	::443/ testservices / :443/ openlab/ca	HTTPS	9092	Any	Test Services hosts REST APIs and website on this port. The port number can be changed using the Test Services Config tool. As of 2.7 the Test Services are registering with Reverse Proxy to use ports 80 and 443.
Acquisition	WS	:443/ openlab/ AcqusitionServices	TCP (until CDS 2.5)	**9753**	Clients	CDS 2.5 or earlier messaging communication Reverse proxy is not installed and communication is TCP based.
	WS	:443/ openlab/ Acquisition Services/ {ID}	HTTPS	**9753**	Clients	CDS 2.6 or later Messaging communication Reverse proxy is installed but dormant, so 9753 is used directly.
	HTTPS	443	HTTPS	443	Clients	CDS 2.7 or later - messaging communication Reverse proxy is installed and active; all incoming connections are routed through the proxy.
Sample Scheduler Agent	HTTPS	443	HTTPS	52088	Clients	CDS 2.7 or later - messaging communication Reverse proxy is installed and active; all incoming connections are routed through the proxy

Outbound Rules

Table 21. OpenLab CDS AICs firewall settings: Outbound rules

Application	Protocol	Port	Remote System	Description
	TCP/UDP	53	DNS Server	DNS
	TCP/UDP	67, 68	DHCP Server	DHCP or BootP
CM	TCP	80	OpenLab Server	OpenLab Server website and REST APIs

Table 21. OpenLab CDS AICs firewall settings: Outbound rules (continued)

Application	Protocol	Port	Remote System	Description
CM	TCP	443	OpenLab Server	OpenLab Server secure website and Secure REST APIs. Needed only if HTTPS is used.
OLSS Licensing API	TCP	6570	OpenLab Server	OpenLab Licensing (Flexera) Server
Acquisition	TCP	27000–27009	OpenLab Server	OpenLab Licensing (Flexera) Server
OLCF Data Collection API, Data Collection Agent	HTTPS HTTP	443 6328	OpenLab Server	Data Collection Service, 6328 used as fallback only if https is not available
Sample Scheduler	HTTPS	443	OpenLab Server	Sample Scheduler, connection to Orchestrator service

See the **"Agilent instruments firewall settings: Inbound rules"** on page 39 and **"Agilent instruments firewall settings: Outbound rules"** on page 39 for additional ports that are used by an AIC to communicate with instruments. Firewalls on AICs must be configured to allow such traffic.

OpenLab CDS Clients

Inbound Rules

Table 22 OpenLab CDS Client firewall settings: Inbound rules

	v2.7 or higher		v2.6 or earlier			
Application	**Protocol**	**Port**	**Protocol**	**Port**	**Remote System**	**Description**
OLSS Storage Client			TCP	2886	localhost	Local traffic only, does not require open port. OpenLab Automation Service (Work Area, Buffered Upload)
Test Services Service (Optional, See description)	HTTPS v2.7 v2.8+:	 9092 52088	HTTPS	9092	Any	v2.7: Test Services (QualA) Web Service hosts REST APIs and Web site on the port 9092[1] From version 2.8+, port 9092 is no longer used. Test Services uses shared HTTPS port 52088 in version 2.8.

1 It is not necessary to open this port in the firewall for the tool to work. Users can load the web UI and access REST APIs using https://localhost:9092/ from local system (client) itself. However if remote access it required, then this port should be open in firewall and users can access https://<client-fqdn>:9092/ from remote systems.

Note 1: Reverse Proxy is not available on Client systems.

Note 2: v2.7 and earlier: The port number can be changed using QualA Config tool.

Outbound Rules

Table 23. OpenLab CDS Client firewall settings: Outbound rules

Application	Protocol	Port	Remote System	Description
	TCP/UDP	53	DNS Server	DNS
	TCP/UDP	67, 68	DHCP Server	DHCP or BootP
	TCP	80	OpenLab Server	OpenLab Server website and REST APIs
	TCP	443	OpenLab Server	OpenLab Server secure website and Secure REST APIs. Needed only if HTTPS is used.
OLSS Licensing API	TCP	6570	OpenLab Server	OpenLab Licensing (Flexera) Server
OLSS Client API	HTTPS	443	OpenLab Server	OpenLab Shared Services WCF APIs
Control Panel	TCP	8084	Clients, AICs	Licensing Support service WCF API
Control Panel	HTTP	8090, 8098,8099	OpenLab Server	OpenLab Licensing view-only Web UI (Flexera). Default is 8090. Other ports may be used if 8090 is in use.
Control Panel	TCP	27000–27009	OpenLab Server	OpenLab Licensing (Flexera) Server
Acquisition	HTTPS	443	AIC	Agilent OpenLab remote work area. Client talks to AICs on this port.
Acquisition	TCP	9753	AIC	CDS 2.5 or earlier messaging communication
	HTTPS	9753	AIC	CDS 2.6 messaging communication
	HTTPS	443	AIC	CDS 2.7 or later messaging communication
OLCF Data Collection API, Data Collection Agent	HTTPS HTTP	443 6328	OpenLab Server	Data Collection Service, 6328 used as fallback only if https is not available.
Sample Scheduler	HTTPS	443	OpenLab Server, AIC	Sample Scheduler
Sample Scheduler	TCP	5433	OpenLab Server	Sample Scheduler Client / Configuration OLDR connection (only if activated, only if OLDR configuration)

Agilent Instruments

Inbound rules

Table 24. Agilent instruments firewall settings: Inbound rules

Protocol	Port	Remote System	Description
TCP, UDP	20	AIC, Workstation	FTP is required for some instruments
TCP	21	AIC, Workstation	FTP: GC/MSD - Firmware installation (FTP). Needs to be open from PC used to do FW update to instrument.
TCP	22	AIC, Workstation	SFTP: Firmware installation & SmartCard Trace (7000 series GC-Triple-Quad, 7200A GC-QTOF)
TCP, UDP	23	AIC, Workstation	Telnet: GC MSD - Firmware Installation Instrument communication (LC, CE)
UDP	69	AIC, Workstation	TFTP: Required for communication with legacy instruments (Jet Direct Cards)
TCP	111, 1007, 1024–1026	AIC, Workstation	LC/MS instrument communication GC MSD instrument communication
TCP	2883–2886	AIC, Workstation	GC/MSD - Instrument control (proprietary/SunRPC/TCP)
	3068, 3071	AIC, Workstation	
TCP	4879	AIC, Workstation	Instrument communication (headspace)
TCP	5813	AIC, Workstation	GC/MSD - Firmware installation (ICMP/Ping)
TCP	5973	AIC, Workstation	GC/MSD - Instrument control (Proprietary/SunRPC/TCP)
TCP	7972, 7973	AIC, Workstation	GC/MSD Instrument Control
TCP	8194	AIC, Workstation	PAL3, data subscription
TCP	9001, 9002	AIC, Workstation	Instrument communication (GC/LC)
TCP, Licop	9100	AIC, Workstation	Instrument communication (GC/LC/35900)
TCP	9101, 9110	AIC, Workstation	Instrument communication (GC/LC)
TCP	10000–10020	AIC, Workstation	Instrument communication (GC 78xx, 88xx, 9000)
TCP	30718	AIC, Workstation	Instrument utilities
TCP	55055-55057	AIC, Workstation	Instrument utilities
UDP	55065	AIC, Workstation	GC MSD - Instrument Control
TCP	60000	AID, Workstation	PAL XT
TCP	61001	AIC, Workstation	Instrument utilities
TCP	64000, 64001	AIC, Workstation	PAL3 communication
TCP	64500	AIC, Workstation	PAL3, plain socket protocol

Outbound rules

Table 25. Agilent instruments firewall settings: Outbound rules

Protocol	Port	Remote System	Description
TCP/UDP	53	DNS Server	DNS

Table 25. Agilent instruments firewall settings: Outbound rules

Protocol	Port	Remote System	Description
TCP/UDP	67, 68	DHCP Server	DHCP or BootP
TCP	7980-7983	AIC, Workstation	GC MSD - Reverse Slick

In This Book

- Minimum hardware, software, and network requirements and recommendations
- Cloud configuration
- Firewall settings

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DocNo D0035352 Rev. B.00
06/2024

Agilent