

Aperio eSlide Manager System Requirements

This document discusses the recommended hardware and bandwidth requirements for the Aperio eSlide Manager system. Because Aperio digital slides are by design high resolution and information rich, for best results you need sufficiently powerful processing and viewing hardware as well as adequate network bandwidth capacity.

Server Minimum and Recommended Requirements

The DSR (Digital Slide Repository) is the server on which your images are stored. It often is also the location where Aperio eSlide Manager is installed.

Aperio eSlide Manager must be installed on a Windows Server.

Note on the Service Account

The service account is used by Aperio applications that run as services on the server and scanner.

Make sure that the service account:

- ▶ Is excluded from all password expiration policies.
- ▶ Is given local administrator permissions on the server running the Aperio services as well as the scanner.
- ▶ Is given "Full Control" access to any network location where image data is being stored (the file share).
- ▶ Is given DBO (database owner) permissions to the Aperio eSlide Manager SQL database.

Preparing for Windows Updates

Microsoft occasionally issues critical updates that you may want to install on your servers. It is your responsibility to perform regular backups of your servers. Before installing an update, be sure you have a full backup of the server that you could use to restore the server in case the update causes issues.

Cloud/Remote Storage

If you are planning to move Aperio eSlide Manager or image storage to a remote cloud storage service, please contact Leica Biosystems Technical Service for advice and technical tips first.

Server Prerequisites

Verify these items have been installed on your Windows server (if your server is up to date, these may already have been installed):

- ▶ .NET framework 3.5 and 4.5
- ▶ C++ 2015 Redistributables
- ▶ All Microsoft patches for your version of Windows Server (contact Leica Biosystems Technical Services for a list of the latest Windows updates for your Windows Server)
- ▶ In order to secure data transmissions, customers should procure trusted certificates for each server (hub and spokes), either through their IT department or by purchasing them through a trusted issuer such as DigiCert or Sectigo.

Standard Server Requirements

The standard server requirements apply to installations with up to 20 concurrent users. Customers that need to allow more than 20 concurrent users should follow the requirements listed in *“High Performance Server Requirements”* on page 3.

Component	Server Minimum Requirements	Server Recommended Requirements
CPU speed	Two dual-core or one Quad-core Intel 2.4GHz or faster	8-core processors 2.0GHz or faster recommended
Hard disk space	1TB DAS, NAS, or SAN Storage (recommended) RAID for redundancy	5TB DAS, NAS, or SAN Storage (recommended), RAID for redundancy
Available C: or OS drive space	100GB	100GB
Memory	8GB RAM	16GB RAM
Network card	1GB network card	Dual 1GB network cards
Power supply	Redundant power supplies (recommended)	Redundant power supplies
Operating system	Windows Server 2016	Windows Server 2016 or 2019

- ▶ Image analysis is a CPU-intensive activity, and so we recommend your Aperio eSlide Manager/DSR server use the recommended specifications for best performance. Image analysis users may also want to talk with Leica Biosystems Technical Services about using the Aperio Image Analysis Software Accelerator or Aperio Image Analysis Hardware Accelerator to boost image analysis performance.
- ▶ You are encouraged to provision your server following the recommended specifications to provide the best performance experience for your customers.
- ▶ Note That installation procedures may require temporary active Internet connection and access to a Windows update service.

High Performance Server Requirements

The high performance server requirements allow customers to exceed the standard server requirement's limit of 20 users logged in at the same time, up to a maximum of 150 concurrent users, when the appropriate server hardware is being used. See below for information on server requirements for this scenario.

High Performance Server Requirements	Specific Reference Hardware*
CPU 1 Recent Generation 12-Core 2.3 GHz CPU	Intel Xeon Gold 5118 2.3G, 12C/24T, 10.4GT
RAM 16 GB	2x 8GB RDIMM, 2666MTs
Hard Drive 2x 240GB Mirrored SSD Hard Drives for OS and applications	Dell BOSS controller card + with 2M.2 Sticks 240G
Network Card 10GB	Broadcom 57416 2-Port 10Gb Base-T + 5720 2-Port 1Gb
OS Windows Server 2016 or 2019	OS Windows Server 2016 and OS Windows Server 2019

* Specific Reference Hardware lists the configurations used to validate the High Performance server; equivalent or a higher specification is necessary to support 150 concurrent users.

Using a Virtual Machine as Your Aperio eSlide Manager Server (DSR)

If you are using a virtual machine (VM) as the server, you will see better performance in a virtual environment if your VM meets the recommended requirements shown in the tables above and have dedicated resource allocation on the virtual host.

Supported Server Operating Systems and Languages for Aperio eSlide Manager and Aperio Image Analysis Workstation

64-bit support refers to using installers built from 32-bit compilers and installed on 64-bit OS.

We do not support the localization of our software.

To ensure proper operation of Aperio software, the region setting of DSRs, the scanner control workstation, and client workstations should be English (United States), set in the Windows Regional and Language Options window available from the Windows control panel. In addition, the English language Windows pack should be installed on the DSR.

Operating System	OS Bit	Native Language Support	Release
Windows Server 2008 R2	64	US English, Japanese, Spanish, German	Rel 12.x
Windows Server 2008 R2 SP1 (and later)	64	US English, Japanese, Spanish, German	Rel 12.3
Windows Server 2012 R2	64	US English, Japanese, Spanish, German	
Windows Server 2008 R2 SP1 (and later)	64	US English, Japanese, Spanish, German	Release 12.4.3
Windows Server 2012 R2			
Windows Server 2016			
Windows Server 2016	64	US English, Japanese, Spanish, German	Release 12.4.4
Windows Server 2016	64	US English, Japanese, Spanish, German	Release 12.5 and later
Windows Server 2019			

Supported Database Software for Aperio eSlide Manager and Aperio Image Analysis Workstation

Aperio eSlide Manager includes Microsoft SQL Server Express Edition. If you prefer, you can use your own Standard or Enterprise Edition so long as it is a supported version.

Database	Service Pack	Aperio eSlide Manager Release
MS SQL Server 2008 R2	SP2	12.x (pre-12.3)
MS SQL Server 2014	SP2 and later	Rel 12.3 to 12.4.3
MS SQL Server 2016*	SP2	Rel 12.4.3
MS SQL Server 2017*		Rel 12.4.3 and 12.4.4
MS SQL Server 2019		Rel 12.5 or later

*Windows Server 2008 R2 is not compatible with MS SQL 2016 and 2017.

Aperio ImageScope Compatibility and Security

As of Aperio eSlide Manager release 12.5, end-to-end security is available with Aperio ImageScope 12.4.5 and later. If Aperio eSlide Manager is using SSL to encrypt data traffic, network port 443 (a secured port) is used to transmit all Aperio ImageScope data. (Traditionally, port 443 was used to send encrypted Aperio ImageScope data, but port 80 (an unsecured port) was still required to transmit some unencrypted traffic.)

If you want to use an earlier version of Aperio ImageScope (12.4.3 or 12.4.4) with Aperio eSlide Manager 12.5 and later, and you are using SSL, you will need to keep both port 443 and port 80 open on the network firewall to transmit encrypted and unencrypted data. Contact your IT manager to discuss port use on your network and to request port 80 be opened. If your institution's security requirements do not allow opening port 80, you will need to use version 12.4.5 or later of Aperio ImageScope on Aperio eSlide Manager 12.5 and later.

Aperio LDAP Interface Requirements

If your organization uses an LDAP server to centralize user authentication and user information, you can configure the Aperio LDAP interface so that Aperio eSlide Manager uses your LDAP server for user authentication user information.

Note that the Aperio LDAP interface supports only AD (Active Directory) LDAP solutions; it does not support all LDAP solutions.

For detailed information on configuring the Aperio LDAP Interface, see *Configuring the Aperio LDAP Interface*.

Client Workstation Requirements

Viewing Station Requirements – Minimum

Component	Aperio eSlide Manager
CPU speed	Intel Core 2 Duo (or newer) processor, running at 2GHz or faster recommended
Hard disk space	40GB free disk space

Component	Aperio eSlide Manager
Memory	4GB or more recommended
Network card	1 Gigabit network card or faster
Video card	24-bit color at monitor's resolution
Operating system	Windows Pro 10 64-bit



**Users working with large whole slide images (>1GB such as multiple FL channels or z-stack layers) are recommended to use 8GB or more of RAM to minimize performance issues. For best performance, we recommend that images be opened from the Aperio Image Analysis Workstation digital slide list page instead of directly from the file system.*

Monitor Requirements

The following requirements are for Aperio eSlide Manager and Aperio Image Analysis Workstation. The recommended specifications will provide a better viewing experience than the minimum specifications.

Component	Minimum Requirements	Recommended Requirements
Display type	LCD (flat panel)	LCD (flat panel)
Screen resolution	1680(h) x 1050(v) pixels	1920(h) x 1200(v) pixels
Screen size	24-inch	24-inch or larger
Color depth	24-bit	24-bit
Brightness	250 cd/m ² or greater	250 cd/m ² or greater
Contrast ratio	500:1	1000:1

Supported Web Browsers for Aperio eSlide Manager and Aperio Image Analysis Workstation

Other browsers and browser versions may work, but they have not been exhaustively tested by Leica Biosystems Imaging. Note that Firefox ESR (Extended Support Release) is not supported for use with Aperio eSlide Manager and Aperio Image Analysis Workstation.

Web Browser	Versions	Aperio eSlide Manager Release
Internet Explorer	8.x, 9.x 11.x and later	12.x (IE9 recommended) Rel 12.3 to 12.4.3
Firefox	28.x 37.x - 47.x and later 80.x and later	Rel 12.x Rel 12.3 to 12.4.3 Rel 12.4.4 and later
Chrome	56 and later 85 and later	Rel 12.4 to 12.4.3 12.4.4 and later
Edge	84 and later	Rel 12.4.4 and later

Anti-Virus Exclusions for Servers and Workstations

We highly encourage the use of antivirus software on the Aperio system. We recommend that .SVS, .SCN, .TIF, JPG file types as well as the file storage be excluded from “on access scanning” as these files can be very large and are accessed continually as they are being scanned and users are viewing the digital slides. You should also exclude the database files (.mdf and .ldf) from virus scans. Virus scans should be configured to run during non peak hours as they are very CPU intensive and interfere with scanning or analysis.

Possible Third-party Application Conflicts

In rare circumstances, third-party applications such as virus or security software may prevent Aperio software from connecting to servers or devices. If you are having this problem, contact Leica Biosystems Technical Services for assistance.

Cybersecurity and Network Recommendations

For information on requirements and recommendations for ensuring the Aperio eSlide Manager server on your network and the users who use it are protected from security threats, refer to *Aperio eSlide Manager Administrator's Guide*. For specific cybersecurity recommendations for user workstations, see the user guide for the Aperio product you are using.

Aperio SSL Certificates

An internally-generated SSL certificate is used to secure communication between Aperio services. This certificate expires 3 years after installation. When this happens, the Aperio eSlide Manager system will no longer be usable. Contact Leica Biosystems Technical Services to regenerate and install certificates for Aperio services.

In addition to the internally-generated SSL certificate, it is recommended the Aperio WebServer be secured using an SSL certificate that is valid for the hostname it will be accessed from and be recognized by your intranet browsers. Your IT department can procure an SSL certificate for this purpose. Contact Leica Biosystems Technical Services to install this certificate.

As with the internally-generated SSL certificate, the SSL certificate provided by your IT department will also expire after a period of time (typically 1-3 years). Contact Leica Biosystems Technical Services to install the replacement Aperio WebServer certificate.

Digital Slide Bandwidth Requirements for Aperio eSlide Manager

The bandwidth required for different applications varies, as discussed below.

When using Aperio ImageScope, the data for the viewing session is streamed to the end user. First the user is provided the view that has been requested, and then surrounding views are cached in anticipation that the user will request them. The ability to stream this data to end users greatly improves their viewing experience and allows multiple users to easily share even low bandwidth connections while viewing digital slides. These streaming options can be managed and are described in the *Aperio ImageScope User's Guide*.

Digital Slide Viewing for SVS and Third-Party Digital Slides

The minimum network bandwidth required for a good user experience when viewing SVS digital slides is 2 Mbps per user. When it's available, our software will make use of additional available bandwidth to provide the users a better viewing experience.

Actual bandwidth usage when viewing digital slides varies with the type of slide, viewing habits of the Pathologist, tissue area, nature of each case, the client application and performance options in the viewer application. However, based on experience, Aperio has found that a typical viewing session requires about 25MB of data to be transferred to the end user with a variable rate of 2 Mbps to 4 Mbps.

Digital Slide Viewing for SCN Digital Slides

The minimum network bandwidth required for a good user experience when viewing SCN digital slides is 24 Mbps per user. When it's available, our software will make use of additional available bandwidth to provide the users a better viewing experience.

Actual bandwidth usage when viewing digital slides varies with the type of slide, viewing habits of the Pathologist, tissue area, nature of each case, the client application and performance options in the viewer application.

Digital Slide Capture on Aperio Scanners

We recommend that the connection between the scanner and DSR be low latency and dedicated to scanning activities. If the connection is not dedicated, scanning performance may be impacted or may impact other applications on your network.

The amount of bandwidth required for scanning digital slides to a network is 1Gb/s for optimal scanning time in environments where the connection cannot be dedicated or is shared. In instances where multiple scanners are writing to the same network share, these connections may need to be scaled up appropriately.

Aperio eSlide Manager System Requirements

MAN-0495, Revision A | January 2022

This document applies to Aperio eSlide Manager Release 12.5 and later

Copyright Notice

- ▶ Copyright © 2022 Leica Biosystems Imaging, Inc. All Rights Reserved. LEICA and the Leica logo are registered trademarks of Leica Microsystems IR GmbH. Aperio is a trademark of the Leica Biosystems group of companies in the USA and optionally in other countries. Other logos, product and/or company names might be trademarks of their respective owners.
- ▶ This product is protected by registered patents. For a list of patents, contact Leica Biosystems.


Customer Resources

- ▶ For the latest information on Leica Biosystems Aperio products and services, please visit www.LeicaBiosystems.com/Aperio.

Contact Information – Leica Biosystems Imaging, Inc.

Headquarters	Customer Support	General Information
 Leica Biosystems Imaging, Inc. 1360 Park Center Drive Vista, CA 92081 USA Tel: +1 (866) 478-4111 (toll free) Direct International Tel: +1 (760) 539-1100	Contact your local support representative with any query and service request. https://www.leicabiosystems.com/service-support/technical-support/	US/Canada Tel: +1 (866) 478-4111 (toll free) Direct International Tel: +1 (760) 539-1100 Email: ePathology@LeicaBiosystems.com

 Worldwide: 23ESM, 23SPOKE, 23SPOKETOHUB; U.S. Only: 23ESM5Y01, 23SPOKE5Y01

 00815477020402(8012) 12.5

Notices

Revision History

Rev.	Issued	Sections Affected	Detail
A	January 2022	All	New document for Aperio eSlide Manager 12.5. Based on existing <i>Aperio System Requirements</i> , MAN-0052, Revision P.

Cautions and Notes

- ▶ **Specifications and Performance** - For information on the requirements for client workstations and monitors, and Aperio eSlide Manager performance characteristics, refer to *"Client Workstation Requirements"* on page 4.
- ▶ **Installation** - Aperio eSlide Manager must be installed by a trained Leica Biosystems Technical Services representative.
- ▶ **Accessories** - For information on using Aperio eSlide Manager with third-party accessories such as a Laboratory Information System (LIS) or image analysis algorithms not provided by Leica Biosystems, contact your Leica Biosystems Technical Services representative.
- ▶ **Quality Control** - When viewing digital slides, the operator must confirm that the digital slide labels match the digital slide data for quality assurance.
- ▶ **Maintenance** - To ensure optimal viewing of digital slides, periodic maintenance is required for the monitors connected to viewing stations. For information on monitor calibration, contact your Leica Biosystems Technical Services representative. Some viewers include a test image that is used to verify the monitor display. For those viewers, refer to their user guides for information.
- ▶ **Cybersecurity** - Be aware that workstations are susceptible to malware, viruses, data corruption, and privacy breaches. Work with your IT administrators to protect workstations by following your institution's password and security policies. For Aperio recommendations on protecting your workstations and servers, see the *Aperio eSlide Manager Administrator's Guide*.
- ▶ **Training** - This manual is not a substitute for the detailed operator training provided by Leica Biosystems or for other advanced instruction. Leica Biosystems Technical Services should be contacted immediately for assistance in the event of any malfunction.



CAUTION: Use normal care in maintaining and using Aperio servers. Interrupting network connections or turning off servers while they are processing data (such as when they are analyzing digital slides or generating an audit report) can result in data loss.