GenASIs

Servers Infrastructure and Network Requirements V8.4

Revision History

ECO #	Revision.	Change Rationale	Date
21-676	A	New release (SQL/ Server 2008, 2012, 2014 obsolete, PC specs updated, RDS support)	23-Oct-2023

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1 Introduction

1.1 Purpose

The purpose of this document is to describe the various supported servers' configurations and network requirements for GenASIs installation.

As part of the preparations for the GenASIs installation process, it is recommended to communicate the required server's hardware specifications, software specifications as well as the network topology to the lab's IT department.

This information is a basic requirement when the GenASIs server components are installed on the laboratory servers.

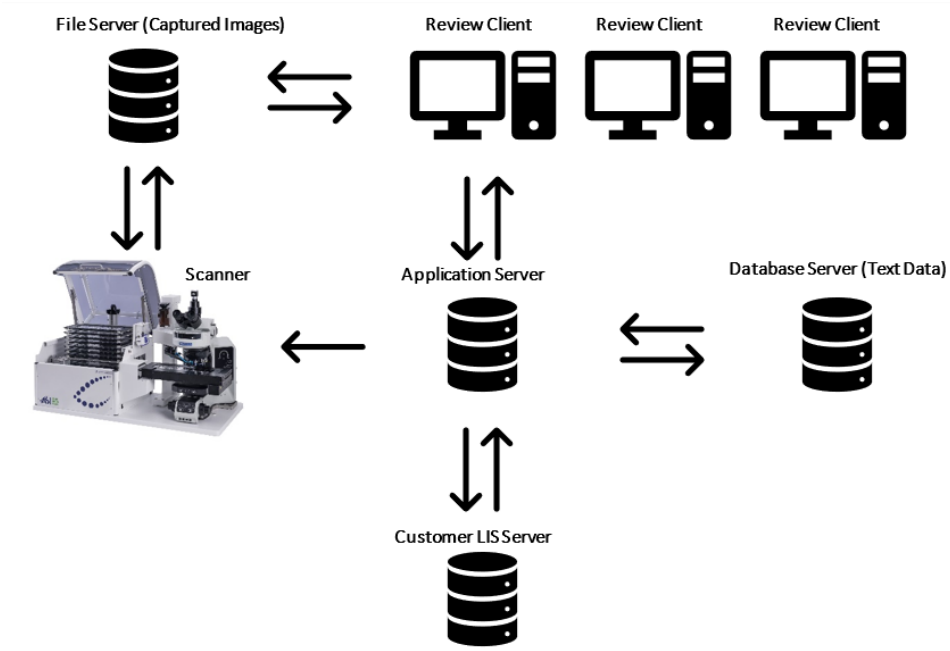
1.2 GenASIs Servers Components

GenASIs Database Server	GenASIs Application Server (The webserver)	GenASIs File Server (Image server)
Installed on the PC/VM where Microsoft SQL server is located	The workstations' communication to the database server is managed by the Application Server	Location where the images and settings are stored
The DB server stores the patient demographics, tests results, textual information of the patients' data, and the lab settings	The Application Server manages the information exchange with LIS and includes the licenses server	It is often installed on local NAS (Network Attached Storage) server

2 System Architecture

2.1 Physical Review Stations Architecture

The following illustration describes the system's architecture:



Communications:

The scanner/s write the digital slides directly to the File Server. All metadata associated with the digital slides is kept on the SQL database server.

Client workstations view the digital slides and metadata by connecting to the Application Server and File Server.

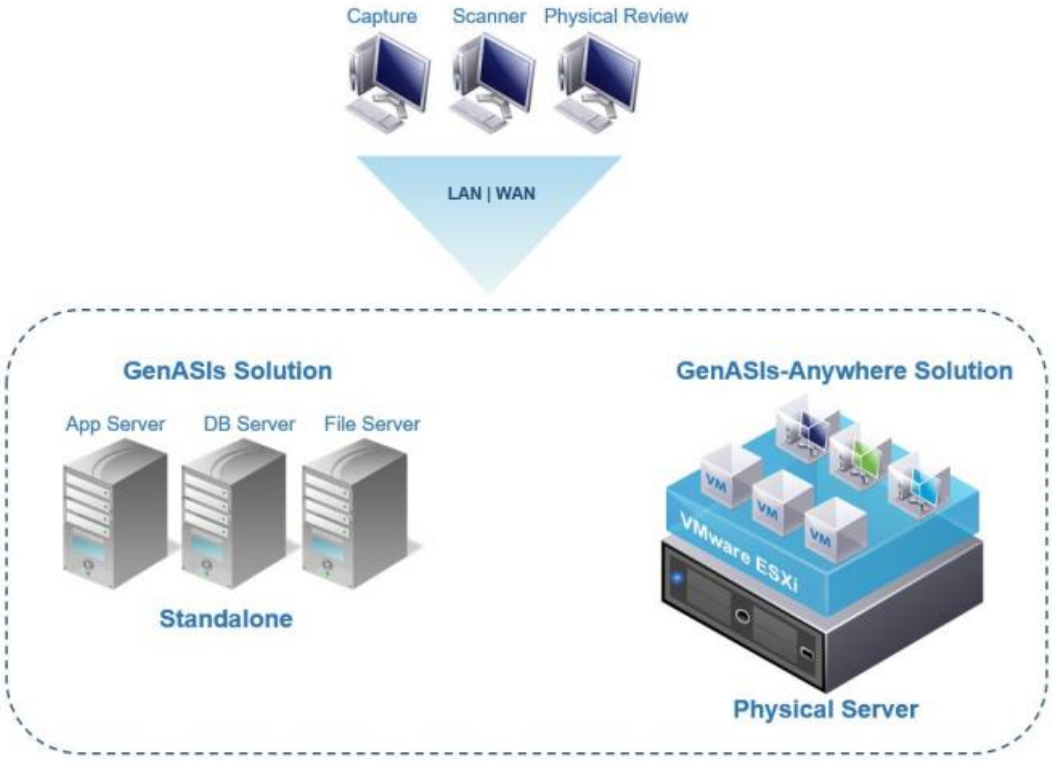
2.2 GenASIs Anywhere Architecture (Horizon/ Citrix/ RDS)

GenASIs™ AnyWhere is Applied Spectral Imaging's complete remote access solution enabling HIPAA compliant access, review, analysis, and sign-off of cases from any location, via a secure link to your lab's GenASIs platform.
This solution can be added to any GenASIs configuration at any time.

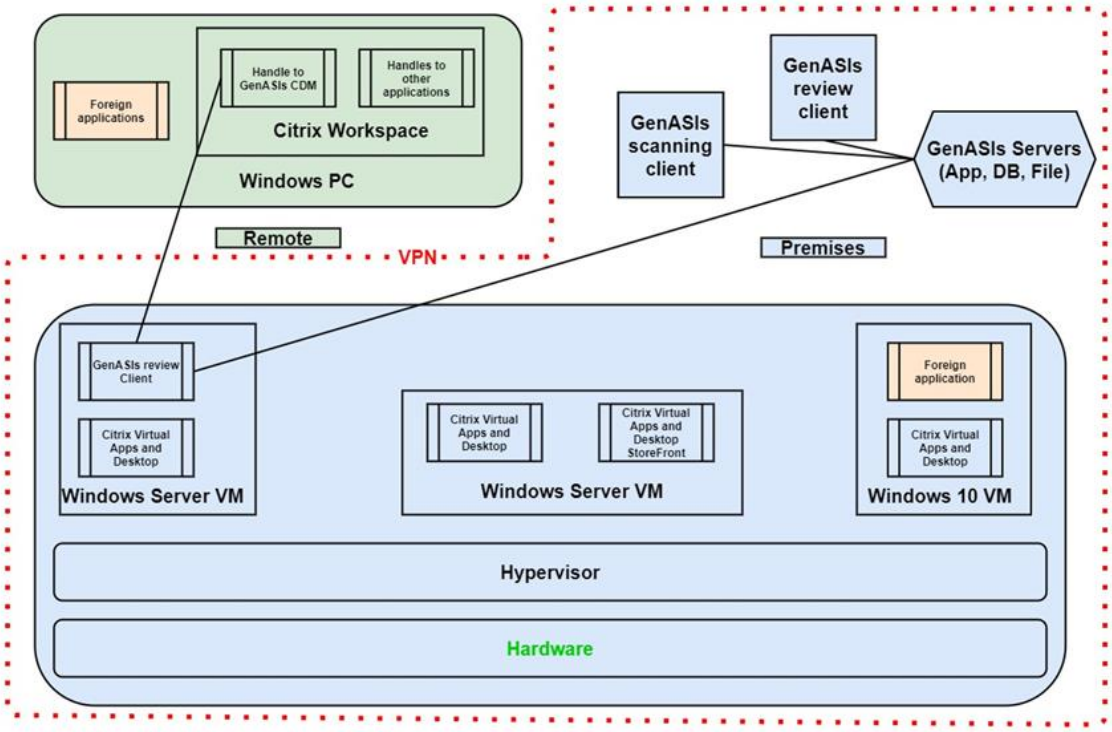
Note

- Solution requires a Citrix/ VMware VDI/ RDS virtualized working environment
- For more details about specs of the different components, see *DOC-462 GenASIs Anywhere Hardware and Licenses specifications*

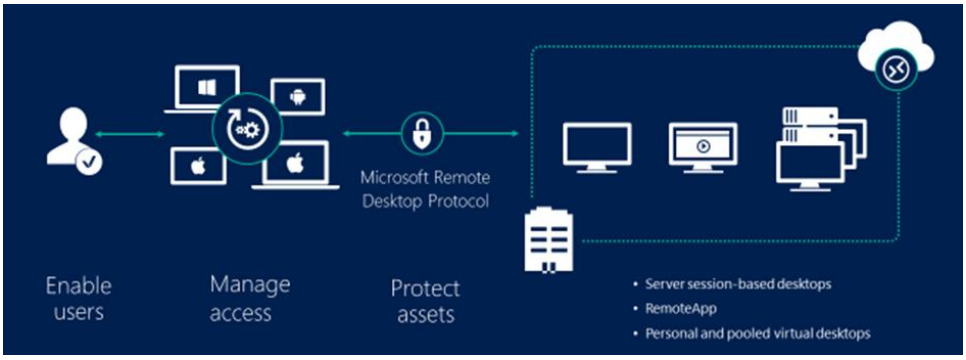
2.2.1 VMware VDI Virtualized Environment



2.2.2 Citrix Virtual Apps and Desktops Environment



2.2.3 RDS Environment



3 Server/s Configurations

3.1 Recommended Specifications for Virtual Servers

Note

SQL Express is supported on Standalone scanner only! As of SQL Express limitations, it cannot be used on virtual server configurations.

	Separate Virtual Servers (If using separate VM for each server)			Consolidated Virtual Servers
Server Type	**Database Server**	**Application Server**	**File Server**	**Database & Application Server**
Processor	2 x vCPU	2 x vCPU	N/A	4 x vCPU
Memory	8GB vRAM	8GB vRAM	N/A	16GB vRAM
Network	1GbE	Dual 1GbE	Dual 1GbE	Dual 1GbE
	Dual network card allows to two separated VMs to connects (Two virtual network cards defined inside the VMs)			
Storage	1st HDD: 100GB	1st HDD: 100GB	2TB DAS, NAS or SAN Storage	1st HDD: 200GB
	2nd HDD: 100GB (Initial *.mdf file size ~4GB)	2nd HDD: 200GB		2nd HDD: 200GB
Power Supply	Redundant Power Supplies Redundant Power Supplies allow running the device on its own, which will allow it to operate even if one goes down			
Operating System	Windows Server 2016/ 2019/2022		N/A	Windows Server 2016/ 2019/2022
IP	Dynamic/Static IP			
SQL Server	SQL Std/Ent 2016-SP2/ 2019/2022	N/A	N/A	SQL Std/Ent 2016-SP2/ 2019/2022

3.2 Recommended Specifications for Physical Servers

ASI has a wide range of dedicated servers that efficiently store and retrieve clinical data produced from the GenASIs capture and scanning products installed in a network. This range of products provides a cost-effective solution for any small to a medium-sized laboratory. The servers' specifications provided below are based on general minimum specifications. Each server model is suitable for a different size lab, classified into four different levels: Standalone, Professional, Enterprise, and Enterprise Plus servers.

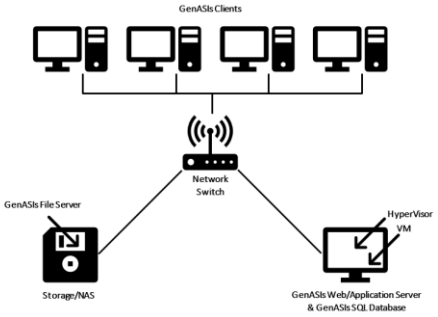
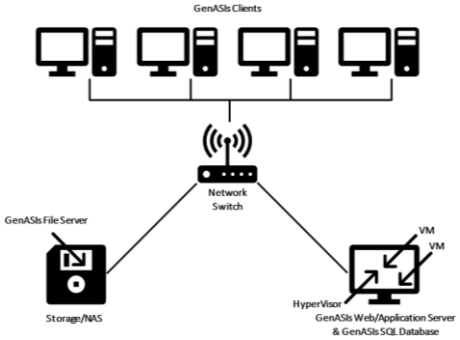
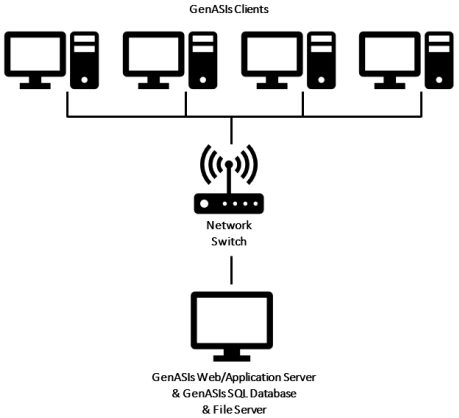
Note

SQL Express is supported on Standalone scanner only! As of SQL Express limitations, it cannot be used on server configurations.

	Standalone Scanner	Professional Server	Enterprise Server	Enterprise Plus Server
Workstations (Review Clients)	Up to 5 clients	6-15 clients	16-25 clients	25-50 clients
		OR	**OR**	**OR**
Scanners	**1**	1-2	2 or more	2 or more
		OR	**OR**	**OR**
High Throughput Systems	0	1	1 or more	1 or more
Processor	See Sec #5 for details	Intel Xeon E-2200 (Quad-Core, 3.4 GHz, 8 MB Cache) or higher	Intel Xeon Silver 4208 (Octa-Core, 2.1 GHz, 11 MB Cache) or higher	Intel Xeon Silver 4215 (Octa-Core, 2.5 GHz, 11 MB Cache) or higher
Memory		16 GB 2666 MT/s	16 GB 2933 MT/s	16 GB 2933 MT/s
Operating System	Win-10 64 bit 21H2 Pro/Ent English OS Or Win-11 64 bit 23H2 Pro/Ent English OS	Windows Server 2016/2019/2022		
Storage	2 TB	4X Dell 1TB (RAID)	4X Dell 1TB (RAID)	6X Dell 1TB (RAID)
SQL Server	SQL Express 2019	MS SQL Std/Ent 2016 SP2/2019/2022		

3.3 Server Schemes

The following schemes are examples of possible configurations for GenASIs Server deployment:

One Virtual Server and NAS	Two Virtual Servers and NAS	Physical Servers
		

3.4 File Server's Storage Capacity

The File server required capacity depends on the clinical flow and the volume of production of the lab, therefore this is to be discussed with both the ASI representative and the Lab Manager prior to the server installation.

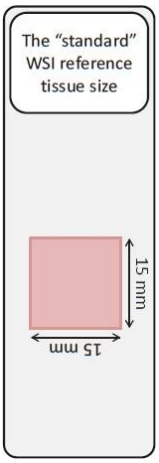
The following tables describe the different applications and storage required depends on the volume.

The image file size is affected by multiple factors such as application, size of the scanning area, and the magnification of the objective used (field of view).

3.4.1 Whole Slide Image of H&E/IHC for viewing only or for analysis

The following illustration describes the deployment architecture of the systems:

	Size of Scan Area	Magnification	Image File Size
H&E/IHC WSI for view & match	15mm X 15mm	10x	110MB
IHC WSI for analysis	15mm X 15mm	20x	285MB
		20x	285MB
HiPath Pro for manual scoring (Avg. of 5 frames)	4,000 cells	20x	180MB



3.4.2 MetScan and MNScore

	Size of Scan Area	Scan Magnification	Scan Data Size	Image Acquisition Resolution	High Res. Image File Size	Number of Images	Total Storage on Disk
MetScan	Full Slide: 25mm X 75mm	10x	290MB	100x	6.5MB	20	420MB
MNScore	15mm X 15mm	10x	1.2GB	N/A	N/A	N/A	1.2GB

3.4.3 SpotScan

	No. of Regions per Slide	High Res. Scan Magnification	Number of Signal Layers	Number of Cell Images	Number of Metaphases	Total Storage on Disk
Density FISH	1	60x	3	400	N/A	350MB
FISH Dual	1	60x	3	200	5	245MB
Tissue FISH	1	60x	3	100	N/A	185MB

4 Network Requirements

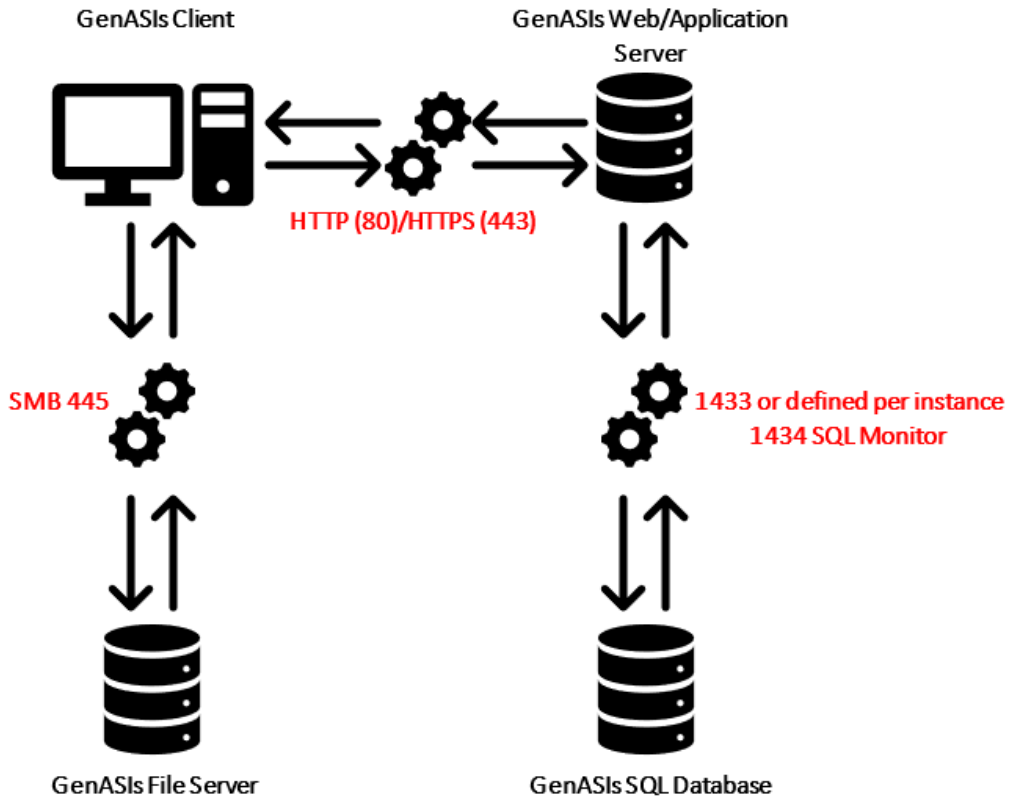
For the best user experience, it is highly recommended to have a 1Gbps. It is recommended to maintain low latency between the workstations to the servers for optimal performance.

4.1 Firewall Rules/Ports and Network Connections

Port Forwarding:

Destination Source	Database Server	Application Server	File Server	Workstation
Application Server	1433 or defined per instance 1434 SQL Monitor	N/A	N/A	Local server firewall is off
Workstation	N/A	80: HTTP 443: HTTPS	445: SMB	N/A

The table describes a cross-connection between the applications as seen in the scheme below:



Note: the following ports should be kept free for ASI usage: 42023-42043

5 Supported Workstation Models Hardware Specification

Workstations and servers should be protected from power surges and power fails. It is strongly recommended to connect all systems to a UPS (Uninterruptable Power Supply) or other power protection systems.

Note For locally purchased computers please refer to *DOC412 – PC Display Minimal Specs For Capture and Review*

	Review & Analysis Computer Dell Precision T3660	Capture & Analysis Computer Dell Precision T3660	Scanner Computer (Cytogenetic Product Line) DELL Precision T3660	Scanner Computer (Pathology Product Line) DELL Precision T3660	HyperSpectral Platform DELL Precision T5820 Entry Level (EL)
Standard Features	Mid- Tower orientation				Tower XCTO Chassis
Operating System	Win 10 Pro/Ent 64Bit **ENG** (21H2) or Win 11 Pro/Ent 64Bit **ENG** (23H2)				
Processor	Intel Core i5-12500 (8C, 3.0GHz, 18MB Cache)			Intel Core i7-13700 (3.4 GHz, 16C, 30MB Cache)	Intel Xeon W-2123 (8.25M Cache, 3.6GHz, 4C)
Memory	16GB DDR5 4400MHz UDIMM Non-ECC			64GB DDR5 4400MHz UDIMM ECC	16GB (2x8GB) DDR4 2666MHz, RDIMM ECC
Accelerators	On board Supporting res. 2560 X 1440	NVIDIA T1000 8GB			
Storage Optional	1st SSD (NVME): 500GB	1st SSD (NVME): 500GB		1st SSD: 1TB	1st HDD: 1TB
		2nd HDD: 2TB		2nd HDD: 2TB	2nd HDD: 2TB
PCI/PCIe Slots	3 PCIe slots				2X PCIe x16 PCIe x16 wired as X8 PCIe x16 wired as X4 PCIe x16 wired as X1 PCI
Network	One onboard				
Ports	COM: N/A				COM: one onboard
	6 USB ports (4 x USB 3.2, 2 x USB-C ports)				8 USB ports (6 x USB 3.0, 2 x USB 3.1)
Antivirus (See Section #7 for further information)	ESET NOD32				

6 Antivirus Exclusions

6.1 Antivirus Recommendation

ESET NOD32 Antivirus software is recommended to be installed and configured with the GenASIs software.

The ESET NOD32 Antivirus software has been configured, tested, and validated to perform optimally on ASI systems.

Systems provided by ASI are installed with ESET NOD32.

In case different antivirus software in use, it will be at the customer responsibility and ASI will not be liable to any failure relating to the use of such anti-virus, whether used in accordance with ASI's guidelines or not.

Note

- The Exclusion comments are also relevant for Microsoft Defender
- Make sure to disable Microsoft Defender in case another Antivirus is in use

6.2 Client-side Exclusions

Exclusions Steps	Exclusions Sections	File Path (if relevant)
1. Real-time file system protection	Media to scan- Disable Any Network Drive	
2. Disable scan of the ASI following folders	1. ASI installation folder 2. TEMP Folder 3. WSI: • WSI Incoming • WSI Outgoing • WSI LocalTemp • WSI Temp folder	1. *C:\Program Files (x86)\Applied Spectral Imaging* 2. %TEMP% folder 3. WSI Folders • *C:\Temp\incoming* (as defined in WSIInputFolder field in ASIConfig.xml) • *C:\Temp\outgoing* (as defined in WSIOutputFolder field in ASIConfig.xml) • *D:\AppliedSpectralImaging\LocalTemp* as defined in LocalDirectoryName field in ScanViewConfig.ini) • *D:\AppliedSpectralImaging\WSITemp* (as defined by TMPDIR Windows environment variable)
3. File types to be excluded from the workstation	All files that end with these file extensions: *.tif, *.jpg, *.ini, *.xml, *.raw, *.mpr, *.bnd, *.dzi *.v	

6.3 File Server-side Exclusions

Exclude all the files with extension *.zip In all folders under: *\\CDM\FileServer\Cases*

6.4 Database Server-side Exclusions

For additional information see: How to choose antivirus software to run on computers that are running SQL Server

Exclude the following file extension files:

1. SQL databases files	2. IIS
SQL Server data files- These files usually have one of the following file name extensions: A. ***.mdf** B. ***. Ldf** C. ***.ndf**	Exclude the compressed file cache folders as follows: In IIS 10.0, the default location of the compressed file cache is: *\\%SystemDrive%\inetpub\temp\IIS Temporary Compressed Files.*
SQL Server backup files- These files frequently have one of the following file name extensions: A. ***.bak** B. ***.trn**	To verify the compression directory: A. Click Start → Programs → Administrative Tools → Internet Information Services (IIS) Manager B. In IIS Manager: right-click the Web Sites folder → Properties → Service tab → Under HTTP Compression, make sure that Compress static files option is selected, and then locate the path to the temporary directory

7 Users and Permissions

7.1 Power Plan

- PC should not set to move to “Sleep” mode at any time! Failing to do so will interfere with the scanner’s work.
- PCs installed by ASI include a specific Power Plan setup to avoid USB and other ports being blocked.

7.2 Screen Saver

- In case screen saver is in use, make sure that when activated, ports such as USB are not blocked.
- Make sure power plan of the PC is not modified when the screen saver is activated.

7.3 Permissions required for installation and Service:

Customer Support Account (ASI Windows User)	Lab Users Account
The service account is used by GenASIs applications that run as services on the scanner, workstation and on the application server	The lab user account is used by the lab users to login into the computers and use the GenASIs software
Make sure that the service account:	
A. Is excluded from all password expiration policies B. Is given local administrator permissions on the application server C. Is given local administrator and full control permissions on the File Server shared folder D. Is given ‘asi_db_owner’ permissions on the database server E. Is given local administrator on workstation and scanner F. Is given permissions on the desktop and Start menu (to allow adding SW launch icons in both locations)	A. Is part of the domain group B. Is given Read/Write access to the local applications folders on the workstations and scanner. C. *C:\Program Files (x86)\Applied Spectral Imaging* D. R/W on *HKLM\software\ASI* (Windows registry) E. R/W on *%TEMP%* folder. F. Is given Read/Write access to the File Server shared folder \\CDM\FileServer G. Is given Read/Write permissions on the Application Server folder *D:\CDM*