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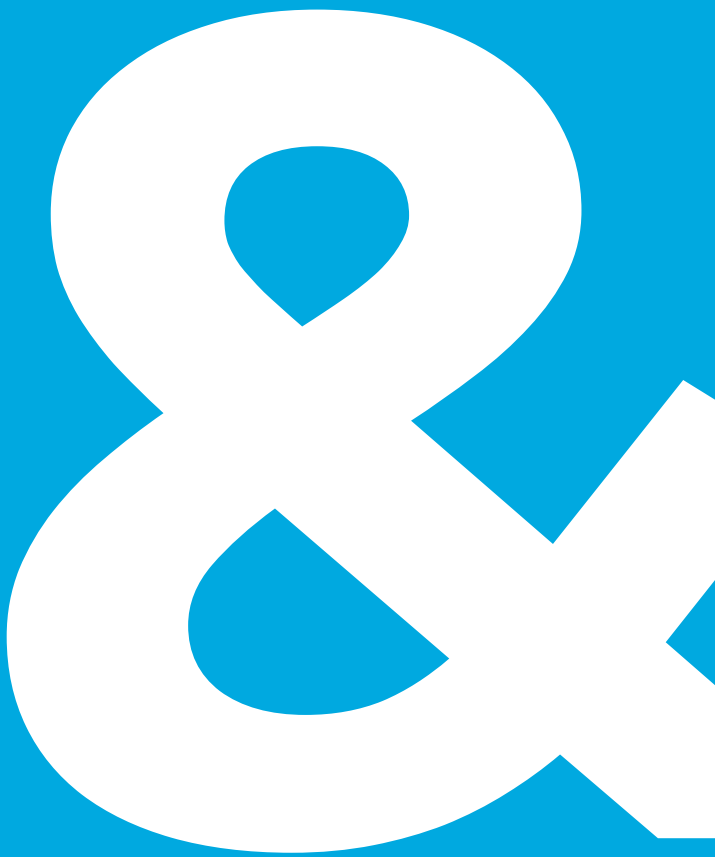
ARIA and Eclipse V18

Technical Specifications Guide

Varian Application Support Infrastructure



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Abstract

The following specifications cover Varian application support infrastructure for ARIA, Eclipse, and related products for release v18 inclusive:

- ARIA Oncology Information System (OIS) for Radiation Oncology (RO)
- ARIA Radiation Therapy Management (RTM)
- ARIA Unified Reporting Application (AURA)
- Eclipse Treatment Planning System (TPS)

Including ARIA Connect 5.0 and later, plus Varian Mobile 2.0 and later.

This publication is the English-language original.

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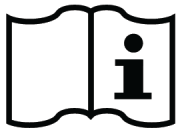

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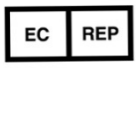

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Introduction

Introduction

This document details the server and workstation specifications in support of the Varian Medical Systems software products listed below. Carefully review Appendix A for recommended deployment models.

- ARIA® oncology information system for Radiation Oncology (ARIA OIS for RO) version v18.
- ARIA® Radiation Therapy Management (ARIA RTM) version v18.
- ARIA® Unified Reporting Application (AURA) version v18.
- Eclipse® Treatment Planning System (TPS) version v18.
- ARIA Connect™ v5.0 and later.
- Varian Mobile v2.0 and later.

Infrastructure requirements for the deployment of software products not listed above are described in separate documents published on either Varian.com or MyVarian.com. Contact a Varian representative for more information.

Other than English, statements regarding supported languages refer only to the NLS (“Native Language Support”) release of the above products when available unless otherwise explicitly noted.

Note: 1) Ensure that the Microsoft Office versions are compatible with the respective installed OS version.

Common Hardware Specifications

Citrix Thin-client Workstations

The following are the specifications for a thin-client workstation for use with ARIA OIS for RO, Eclipse, Velocity® intended for application virtualization using Citrix®.

Table 1: General Requirements

Description	Specification
Citrix Software	Citrix Workspace App 1912 LTSR or later
Operating System	• Consult Citrix Systems, Inc. • Varian has validated its software with the supported Citrix Workspace App on Windows 10.
Processor	Consult Citrix Systems, Inc.
Memory	Consult Citrix Systems, Inc.
Disk Space	Consult Citrix Systems, Inc.
Video Adapter	Consult Citrix Systems, Inc.
Monitor	• 17" monitor capable of 1280x1024 resolution for ARIA OIS for RO, ARIA RTM, and ARIA OIS for MO, minimum. • 23" monitor capable of 1600x1200 for ARIA RTM, recommended. • 23" monitor capable of 1920x1080 for Eclipse, minimum. • 27" monitor capable of 2560x1440 for Eclipse, recommended.
Network Interface	1 Gbps recommended (100 Mbps minimum)
User Interface	• Microsoft® Windows compatible 101-key keyboard and 2-button mouse. • Unless explicitly noted otherwise, Varian software applications are not optimized for use with Touch Screens.
Peripherals	• Optical drive (CD/DVD) for importing documents or images. • Topaz Signature Pad (T-LBK462-HSB-R – USB connection only).
Ports/adapters	• 1 parallel, 1 serial, and 2 USB ports for connecting optional peripherals. • Serial-to-USB and parallel-to-USB adapters may be available to support legacy third-party peripherals at the customer's discretion.

ARIA Thick-client Workstations

The following specifications are common to all Varian client/desktop applications where the Varian application software is to be installed natively. The Eclipse Calculation Workstations, Non-Calculation Workstations and Framework Agent Servers (FAS) are sold as integrated products along with the Eclipse and/or BrachyVision Treatment Planning System (TPS) software and must be purchased from Varian as an integrated product.

Table 2: General Requirements

Description	Specification
Operating system	• Microsoft Windows 10 latest supported versions • 64-bit only.
Browser	Chrome, Microsoft Edge
Managed execution environment	.NET 4.8
Windows Installer	Windows Installer 5.0 or greater
Processor	• Dual core 64-bit CPU at 1GHz or higher
Memory	• 8 GB RAM minimum for textual users. • 16 GB RAM recommended when running multiple application (UserHome) sessions or imaging applications (OLR).
Disk space	20 GB available free disk space, minimum.
Video adapter	• Video adapter with 512 MB of video memory recommended. • DirectX® 9 hardware accelerated and Shader Model 3 minimum. • Minimum of OpenGL 2.1 for imaging applications.
Monitor	17" monitor capable of 1280x1024 resolution, minimum.
Network interface	1 Gbps recommended (100 Mbps minimum)
User Interface	• Microsoft Windows compatible 101-key keyboard and 2-button mouse. • Unless explicitly noted otherwise, Varian software applications are not optimized for use with touch screens.
Peripherals	• Optical drive (CD/DVD) for importing documents or images • Topaz Signature Pad (T-LBK462-HSB-R – USB connection only)
Ports/adapters	• 1 parallel, 1 serial, and 2 USB ports for connecting optional peripherals. • Serial-to-USB and parallel-to-USB adapters may be available to support legacy third-party peripherals at the customer's discretion.

Description	Specification
Productivity Software	• Microsoft Word 2016, Word 2019 or Office 365. • Adobe Reader 11.0 and later. • PDF printer • Office365 support

Virtual Desktop Infrastructure (VDI)

VDI is not supported.

Tablet, Slate, and Convertible Laptops

Provided a tablet, slate, or convertible laptop computer meets or exceeds the specifications listed previously, these devices are supported.

Note: Varian applications are not designed for use with touch interfaces. These devices must be supplied with a standard keyboard and mouse.

Eclipse Treatment Planning Workstations

The Eclipse client software is required to run on workstation hardware supplied exclusively by Varian Medical Systems, except when the Eclipse client application is deployed via Citrix. Consult the TPS Supported Hardware Reference Guide[1] for current supported hardware.

Velocity Workstations and Citrix Virtual Apps Server

Consult the Velocity oncology imaging informatics system specifications document:

Velocity 4.1 use document ”Velocity 4.1 Technical Specifications and Sizing.pdf."

Velocity 4.0 use document ”Velocity 4.0 Technical Specifications and Sizing.pdf”

Velocity 3.2 use document ”Velocity 3.2 Technical Specifications and Sizing.pdf”

for further information at MyVarian.com.

[1]The document will be available on Varian.com after the release of Eclipse TPS, version 18.0.

OIS Core Servers - General Requirements

The following are the general server specifications for the deployment of Varian OIS software. Application specific parameters are related to the specific deployment model in subsequent sections.

Table 3: Common Server Requirements

Description	Specification
Operating System	• Microsoft Windows Server 2019, 64-bit, (Standard or Datacenter). • Microsoft Windows Server 2016, 64-bit, (Standard or Datacenter).
SQL Database	• Microsoft SQL Server 2019(Latest CU) (SQL is supplied and installed by Varian Medical Systems under Microsoft's Independent Software Vendor ("ISV") Royalty Licensing agreement, see CTB-SS-966 on MyVarian.com.) • Microsoft SQL Server 2019(Latest CU) is limited to the lesser of 4 Sockets or 16 cores. Customer configurations requiring greater than 16 cores require the customer to supply MS SQL Enterprise Edition licensing to Varian at the time of installation. • Microsoft SQL clustering is not compatible with Varian OIS v18 software. **Note: Customers are strongly advised to consult the Varian Medical Systems' Help Desk, or other authorized technical representatives, prior to applying service pack updates to Microsoft SQL.**
Browser	Microsoft Edge, Chrome
.NET Framework	.NET 4.8
NetBIOS	Computer NetBIOS name not to exceed 15 characters
Windows Installer	Windows Installer 5.0 or greater
Processors (CPU)	• The CPU core counts provided in this document are stated with reference to Intel Xeon V2 processors running at 2.1 GHz or higher. Varian qualifies and supports its software with Intel processors only.
Storage	• Direct Attached Storage with SAS drives having 6ms access time, or less, and interfaces capable of 3 Gbps or more. • While Varian permits deployments on SAN, or other network storage technologies, performance may be impacted. The proper configuration of storage devices is a customer responsibility. • Varian recommends the use of hardware RAID (RAID1 for system and application files, RAID 5 or 6 for data storage). • The use of software RAID is not supported.

Description	Specification
Storage Partition Sizing	• C:/ system partition; 200-300 GB nominal (30 GB minimum free space for upgrades). • D:/ storage partition; sizing is profile dependent and includes data growth (see subsequent detail). • E:/ dump partition; 75 GB nominal for the Database server and 150 GB nominal for the Data Warehouse server. • F:/ applicable to certain combo servers for image storage; partition sizing is profile dependent (see subsequent detail) • Server partition sizes are estimates for new system deployments only. When upgrading from a prior version, add the used drive space to the new system estimate stated herein. Always consider the data growth rate in any calculation. • Adjust partition sizes as necessary to reflect your specific needs.
Data Growth - Database Server Partition (D:/)	• Monitor data growth and adjust storage as needed. • Approximately 15 GB, per year, per linac.
Data Growth – Data Warehouse Server Partition (D:/)	• Monitor data growth and adjust storage as needed. • Approximately 22 GB, per year, per linac. • Growth rate is approximately 1-1/2 times the growth rate of the Database server's D:/ drive.
File Storage Growth (File Server or image directory)	• Monitor data growth and adjust storage as needed. • Approximately 50 GB, per year, per linac with imaging (excluding Halcyon or utilizing daily CBCT imaging) • Approximately 15 GB, per year, per linac without imaging. • Approximately 600 GB, per year linac, for Halcyon or other daily CBCT imaging protocols. • Image file size is variable depending upon the type of image (I.e., kV, MV, CBCT, etc.) and the customer's chosen image parameters.
User Authentication	• User authentication via Windows Active Directory. Please see the Security Implementation Guide on MyVarian.com for further details. • The use of spaces or apostrophes within the AD User ID is not permitted.
Network Interface and Latency	• 1 Gbps or faster recommended (100 Mbps minimum) • Maximum of 20 ms latency for Eclipse and image management users for Citrix server connections • Maximum of 50 ms latency for ARIA OIS users for Citrix server connections

Description	Specification
System Setup	• Includes Network Firewall and Communication utilizations for environment setup. • Please see the ARIA v18.x System Preparation Manual (SPM-SS-18x) on MyVarian.com for further details.
Network Integration	• Varian OIS software supports only TCP/IP network environments with IPv4. Varian OIS software can exchange data with many different third-party systems including Hospital Information Systems, PACS, CT and other medical imaging devices, as well as Varian and third-party Linear accelerators. As such, network bandwidth requirements can vary greatly depending upon many factors (including the type and number of products deployed, number of users, and specific treatment and/or imaging techniques). Please see the Varian's CyberSecurity Administration Reference Guide on MyVarian.com for further details.
Power Management	Disable Power Management ("PM"). **Note:** The appropriate PM setting may **not** be labeled "disabled" but rather some combination of "Performance," "Maximum Performance," "High Performance," or similar verbiage. Customers should consult their vendor documentation to confirm the proper setup. Setting this feature appropriately at the BIOS level is generally considered the most reliable means as BIOS settings should override any hypervisor or OS settings.
Anti-virus	• Varian recommends deploying anti-virus software on the servers supporting Varian software with virus definitions updated frequently. • See Varian's CyberSecurity Administration Reference Guide on MyVarian.com for further details.
Additional Hardware Components	• 15" monitor @ 1024 x 768 resolution • Optical Drive (CD/DVD) 8x or higher • 2 USB ports • Microsoft Windows Compatible 101 Key Keyboard & 2 button mouse

Description	Specification
Hardware Virtualization	Varian supports its software on systems using hardware virtualization provided the guest virtual machines are configured with sufficient resources as identified in this document. **Note:** Customers are advised that it is incumbent upon them to ensure proper performance of the system following best practices for their chosen hypervisor with respect to the entire Varian oncology system and for third-party software such as MS SQL & Citrix Virtual Apps; such as, VMWare using VMXNET3 & PVSCSI drivers and ensuring up to date "guest VM" tools. A complete discussion of all best practices for all hypervisor vendor software is outside the scope of this document.
Backup	Varian Oncology Information System ("OIS") software is the repository of extremely important oncology workflow data, as such a proper enterprise backup solution is highly recommended. **Note:** See the Varian's CyberSecurity Administration Reference Guide on MyVarian.com for further details.
Redundancy	Varian OIS for Radiation Oncology software provides direct support for the delivery, planning, and control of therapeutic radiation treatments performed on medical linear accelerators or other delivery modalities. Therefore, the availability of the Varian Software is extremely important. As such, Varian recommends customers supply servers with hardware redundancy in power supplies, fans and other hardware components that may be subject to regular failure.
Disaster Recovery (DR)	Varian makes no specific recommendations on DR solutions. Customers should follow industry best practices in consultation with Varian Medical Systems technical experts to help ensure the DR solution planned by the customer is viable for Varian OIS Software prior to the deployment of any DR solution.

Table 4: Server Descriptions

Server Name or Function	Installed software and services installed by Varian (partial list)
Database Server	Microsoft SQL Server 2019(Latest CU)
Data Warehouse ("DW") Server	Microsoft SQL Server 2019(Latest CU)
Platform Server	Varian application S/w, MS IIS, Web Services, Shared Framework Services, VAIS
File Server	CIFS file storage (images & documents)

Aria Connect Server	HL7 interface engine and Aria Connect services.
DICOM Server	DICOM Daemon Services (one per Linac)
DCF Server	Calculation Distributor (Varian S/w)
T-Box Server (test)	Microsoft SQL Server 2019 (Latest CU), Varian application S/w, MS IIS, Web Services, Share Framework Services, CIFS file storage (images & documents), DICOM Daemon Services

OIS Deployment Models

This document assumes a “relative equivalency” between a virtualized hardware deployment and a physical one. In the virtualized hardware deployment model, we have separated the backend services based on “best practices” considering cost effectiveness, management efficiency, overall serviceability, and so on.

Review Appendix A for more information on recommended deployment models.

Review Appendix B for descriptions of the various system services.

Cloud Hosted Solutions

Varian offers a managed infrastructure solution with its FullScale Infinity Cloud offering. Varian does not encourage or endorse ARIA and Eclipse on customer provided environments hosted on public cloud infrastructure.

Server Sizing Guidelines

The following provides options and specifications needed to create a properly sized core server environment based upon the Varian OIS products purchased, facility size (numbers of Linacs & users), and the server deployment model desired. The OIS Core Servers - General Requirements and the server provisioning requirements detailed in the following sections provide a comprehensive framework for server deployment.

Server sizing presumes quantitative equivalence between customers with similar numbers of machines, users, purchased applications, and using similar deployment models. While it is true that some factors are not included in the following analysis (such as, paperless deployment, patient volume, specialty practices, and others), customers should consider these recommendations as a starting point for system deployment while monitoring and adjusting system resources as needed to achieve the desired level of performance.

Note: 1) The resource requirements supplied here are recommendations intended to ensure end-users experience an acceptable level of performance for typical sizes of deployments. Routine monitoring and adjusting of the OIS core server resources is highly recommended. Customers should not reduce OIS core server resources below Varian recommendations and, if done, should be prepared to add resources quickly when it becomes necessary.
2) The minimum resource requirements are the same as depicted for ARIA version 17 in a previous version of this guide.
2) For cases where the customer does not have a separate server for Domain Controller(DC), it is required to provision a separate DC server. This is as per guidelines from Microsoft.
Typical recommendation for DC server to start with is as below:
vCPU Cores: 2 vCPU
RAM: 8 GB RAM
System Partition(C:\): 100 GB
Data Partition(D:\): 100 GB + Growth

Option 1 - Virtual Server Deployments

These are the unique server requirements for the deployment of Varian software based on the Virtual Server model using the terminology and configuration as described in Appendix A, Figure 1.

ARIA OIS for Radiation Oncology and Eclipse

In addition to the OIS Core Servers - General Requirements, the following server provisions are recommended for the deployment of ARIA OIS for Radiation Oncology software in a purely virtual server environment. In addition to this if Citrix clients are used the Citrix application virtualization is needed as described in section Citrix Virtual Apps Server Specifications for Radiation Oncology Client Application Virtualization.

Table 5: Virtual Server Model Guidelines

Scenario	DB	AURA[2] (DW)	Platform	File	DICOM	DCF[3]	ARIA Connect[4]
Small Sites **Up to 2 Linacs** 30 ARIA Users, 6 Eclipse Users	**8 Cores**	**8 Cores**	**8 Cores**	**4 Cores**	**4 Cores**	**4 Cores**	**4 Cores**
	24GB	**24GB**	**24GB**	**16GB**	**16GB**	**16GB**	**32GB**
Medium Sites **Up to 4 Linacs** 60 ARIA Users, 12 Eclipse Users	**12 Cores**	**12 Cores**	**12 Cores**	**8 Cores**	**8 Cores**	**8 Cores**	**4 Cores**
	32GB	**32GB**	**32GB**	**24GB**	**24GB**	**24GB**	**32GB**
Large Sites **Up to 6 Linacs** 90 ARIA Users, 18 Eclipse Users	**12 Cores**	**12 Cores**	**12 Cores**	**8 Cores**	**8 Cores**	**8 Cores**	**4 Cores**
	32GB	**32GB**	**32GB**	**32GB**	**32GB**	**32GB**	**32GB**
Extra-large Sites **Up to 8 Linacs** 120 ARIA Users, 24 Eclipse Users	**16 Cores**	**16 Cores**	**16 Cores**	**12 Cores**	**12 Cores**	**12 Cores**	**4 Cores**
	64GB	**64GB**	**64GB**	**32GB**	**32GB**	**32GB**	**32GB**
C:\ Drive	**200-300GB**	**200-300GB**	**200-300GB**	**200-300GB**	**200-300GB**	**200-300GB**	**200-300GB**
D:\ Drive	**600GB**	**600GB**	**300GB**	**2160GB**[5]	**300GB**	**300GB**	**300GB**
E:\ Drive	**900GB**	**900GB**	N/A	N/A	N/A	N/A	N/A

[2] Optional for Eclpse TPS
[3] Needed only if Eclipse TPS is included.
[4] Optional for HL7 and FHIR connectivity
[5] Expandable

Platform Server for Varian Treatment Delivery with 3rd party information system

The following server provisions are recommended for the deployment of the required platfrom server and file storage needs for Varian Treatment Delivery systems (e.g. TrueBeam and Halycyon) when deployed without ARIA OIS.

Table 6: Virtual Server Model Guidelines

Scenario	Platform & File Server
Up to 4 Linacs	4 Cores / 12 GB
Up to 8 Linacs	6 Cores / 14 GB
Up to 12 Linacs	8 Cores / 16 GB
Over 12 Linacs	12 Cores / 18 GB
C:\ Drive	200-300GB
D:\ Drive	200 GB
E:\ Drive	Expandable 300 GB/Linac

Option 2 - Physical Server Deployments

The physical server deployment models to follow are based on the servers available from Varian Medical Systems. The server profiles are found in the next section of this document.

ARIA OIS for Radiation Oncology and Eclipse

In addition to the OIS Core Servers - General Requirements, the following server provisions are recommended for the deployment of ARIA OIS for Radiation Oncology and Eclipse TPS software in a purely physical server environment.

Table 7: Secondary Server Model Guidelines

Description	Database Server	DW Server[6]	Platform & DICOM, DCF[7]	File Server
Up to 2 Linacs, 30 ARIA users, 6 Eclipse Users	Data Server	Data Server	File Server	
Up to 4 Linacs, 60 ARIA users, 12 Eclipse users	Data Server	Data Server	Application Server	File Server
Up to 6 Linacs, 90 ARIA users, 18 Eclipse users	Data Server	Data Server	Application Server	File Server
Up to 8 Linacs, 120 ARIA users, 24 Eclipse Users	Data Server	Data Server	2x Application Server	2x File Server
Consult Varian for sizing recommendations when the number of users exceed the parameters stated in this table.				
Storage Partitioning[8]				
System (C:/)	300 GB	300 GB	300 GB	300 GB
Data (D:/)	600 GB	600 GB	600 GB	900 GB
Data (E:/)	900GB - 2160GB expandable	900GB - 2160GB expandable	N/A	2160GB expandable

[6] Not needed for Eclipse TPS
[7] For Eclipse TPS additional FAS servers are needed depending on configuration
[8] Server partition sizes are estimates for new system deployments only. When upgrading from a prior version, add your existing used drive space to the estimate stated above. Always consider the data growth rate in any calculation. Adjust partition sizes as necessary to reflect your specific needs.

Physical Server Profiles

The following is a list of physical servers available for purchase from Varian Medical Systems. Varian customers may elect to deploy physical servers acquired from other vendors; however, it is the customer's responsibility to ensure functional equivalency between the servers listed below and the alternative vendor's device deployed in support of the Varian OIS software.

In addition to the OIS Core Servers - General Requirements, the following reflects the requirements for the specified physical servers. These specifications are subject to change without notice and reflect the current configuration of Varian supplied devices as of the date of this publication.

Server Models

These are four different rack-mounted servers offering an economical and versatile solution to Varian software deployment.

Table 8: Server Options

Description	Utility Server	Data Server	File Server	Application Server
CPU	1x 12 cores	2 x 10- 2x14 cores	2 x 10 – 2x 14 cores	2 x 14 cores
Memory	32 GB	32-64 GB	64-96 GB	64 GB
Total Usable Disk Space	960 GB	1920-3360 GB (expandable)	2880-3360GB (expandable)	960 GB
GPU	NA	NA	NA	Options: a) none b) Citrix: GPU
Suitable for Server Roles	Domain controller, Varian Mobile, Aria Connect	DB, DW	File Server	Platform, DICOM, DCF

Additional Server Requirements

Clinical system configurations often require additional servers not included in the previously described core architecture. System designers should obtain a complete list of purchased applications before finalizing the design of any Varian OIS server environment.

The following describes certain additional server requirements. For all purposes the requirements stated below apply equally to all server models and assume a functional equivalency between physical and virtual deployment.

Varian T-Box Server

A dedicated T-Box (test) server is required for ARIA OIS deployments. Customers who desire to virtualize the ARIA T-Box are strongly encouraged to create a T-Box VM with the following provisions.

Note: ARIA T-Box servers are “all-in-one” deployments where MS SQL and other OIS core applications are deployed on a single server. Performance is not the key objective. The domain controller (AD) functionality cannot be included in the same server.

In addition to the OIS Core Servers - General Requirements, the following server provisions are recommended for the deployment of the ARIA OIS software in a purely virtual server environment.

Table 9: Virtual T-Box Server Model Resource Guidelines

Description	Specification
Operating System	• Windows Server 2019 (Standard or Datacenter), 64-bit • Windows Server 2016 (Standard or Datacenter), 64-bit
Hardware Guidelines	• Intel Xeon Silver 4114 @ 2.1 GHz, or equivalent • 20 vCPU cores, minimum • 48 GB RAM, minimum Note: CPU must support AVX instructions
Storage	• C:/ ~200-300 GB (30 GB free) • D:/ ~1000 GB • E:/ ~100 GB
Recommended HW Server Model	Application Server

Interface Server – ARIA Connect

ARIA Connect is installed on an Interface Server platform and manages the exchange of data between ARIA OIS software and third-party systems using the HL7 (Health Level 7) protocol.

Varian is in the process of replacing IEM with ARIA Connect for most customers with ARIA OIS for Radiation Oncology. Customers upgrading from a previous version of ARIA need to transition to ARIA Connect.

In addition to the OIS Core Servers - General Requirements, the following are the technical specifications for supporting ARIA Connect v5.0

Table 10: Virtual Interface Server Model Resource Guidelines

Description	Specification
Software	ARIA Connect v5.0[9]
Operating System	• Windows Server 2019 (Standard or Datacenter), 64-bit. • Windows Server 2016 (Standard or Datacenter), 64-bit. • Windows 10
Hardware Guidelines[10]	• 4 CPU cores @ 3.0 GHz • 32GB GB RAM, minimum
Storage	• C:/ = 200-300 GB (30 GB free) • D:/ = ~300 GB
Recommended HW Server Model	Utility Server

[9] ARIA Connect v5.0 is compatible with ARIA for Radiation Oncology v15.5 and later.
[10] The amount of CPU and RAM assigned to the Interface Server can vary widely depending on the number & type of interfaces, the amount of filtering of the HL7 data feed, and the message volume. Customers are encouraged to perform load testing prior to putting any new interface into production and adjust the amount of CPU and RAM as needed.

Citrix Virtual Apps Server Specifications for Radiation Oncology Client Application Virtualization

In addition to the OIS Core Servers - General Requirements, the following are the recommended specifications for deployment of the ARIA OIS for RO, Eclipse TPS, and ARIA RTM client software on Citrix application servers, excluding ARIA OIS for CCS.

Table 11: Virtual Apps Server System Guidelines

Description	Specification
Citrix Software	• RECOMMENDED - Citrix Virtual Apps 1912 LTSR or later • MINIMUM COMPATIBLE - Citrix XenApp 7.15 LTSR CU2 • Citrix licenses are not supplied by Varian Medical Systems
Operating Systems	• Windows Server 2019(Standard or Datacenter) with Citrix Virtual Apps 1912(LTSR) • Windows Server 2016 (Standard or Datacenter) with Citrix XenApp 7.15 LTSR[20]
CPU and RAM	The following may vary depending upon user load and the Varian applications deployed. • ARIA OIS for RO: 4 Cores/16 GB RAM supports approximately 10 users. • Eclipse TPS: 6 Cores/24 GB RAM supports up to 3 users. These user counts are for the identified applications when published to run on separate Citrix Virtual Apps servers. The applications can be published to run on the same Citrix Virtual Apps server provided the resources assigned are adjusted proportionally. Customers should regularly monitor resource utilization of Citrix Virtual Apps servers and adjust available resources or number of servers in a farm to meet their actual workload.
Storage Partitioning	• System Partition (C:/) ~100 GB • Application Partition (D:/) ~100 GB
Graphics Processing Units (GPU)	• Varian recommends deploying GPU on Citrix Virtual Apps servers. • Customers using hardware virtualization are guided towards the NVIDIA Tesla M10 GPU, or equivalent. • GPU must meet the proper OpenGL and DirectX compatibility for the client software.
Recommended HW Server Model	Application Server

Varian Mobile Server v2.0

A dedicated server is required for Varian Mobile.

Varian Mobile requires Microsoft Azure AD Connect to be installed. Azure AD Connect is compatible with Windows Server 2016 and above. Microsoft recommends at least two Azure AD Connect instances to be installed for each deployment.

In addition to the OIS Core Servers - General Requirements, the following are the technical specifications for a dedicated server supporting Varian Mobile.

Table 12: Varian Mobile Server System Guidelines

Description	Specification
Operating System	• Windows Server 2022 (Standard or Datacenter), 64-bit. • Windows Server 2019 (Standard or Datacenter), 64-bit. • Windows Server 2016 (Standard or Datacenter), 64-bit.
UP TO 20 USERS	
Virtualization Guidelines	• 2 CPU cores, minimum • 8 GB RAM, minimum
Storage	• C:/ ~100 GB (30 GB free) • D:/ ~100 GB
UP TO 50 USERS	
Virtualization Guidelines	• 4 CPU cores, minimum • 12 GB RAM, minimum
Storage	• C:/ ~100 GB (30 GB free) • D:/ ~150 GB
Recommended HW Server Model	Utility Server

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Velocity Server

Consult the Velocity oncology imaging informatics system specifications

Velocity 4.1 use document ”Velocity 4.1 Technical Specifications and Sizing.pdf."

Velocity 4.0 use document ”Velocity 4.0 Technical Specifications and Sizing.pdf”

Velocity 3.2 use document ”Velocity 3.2 Technical Specifications and Sizing.pdf””

for information on supported infrastructure at MyVarian.com.

Appendix A – Recommended Deployment Models

The following are provided as recommended deployment models for Varian ARIA for RO, ARIA RTM, and Eclipse treatment planning software applications. As noted previously, review the Varian documentation for Velocity and InSightive whenever those additional products are purchased and deployed.

LEGEND:

- Represents a physical or virtual server. For a more detailed description of the service names and concepts, see Appendix B.
- Varian ARIA Connect server software used to exchange HL7 data with third-party hospital information systems.
- Represents 1 or more Citrix Virtual Apps “worker” servers (either physical or virtual). Varian client software is deployed directly on these servers.
- Represents the Citrix Virtual Apps support services such as the Citrix WebInterface/Storefront, Delivery Controller, Citrix License server and so on. These are services supplied by Citrix to support any typical Citrix Virtual Apps environment.
- Represents 1 or more **physical** Framework Agent Servers (FAS) used to perform complex treatment plan calculations for Eclipse.
- Represents a collection of “servers” (physical or virtual), the primary purpose being to help identify the collection of servers included in the deployment models described below.
- Varian client software (UserHome, ARIA for OIS, ARIA for RTM, or Eclipse), which can be installed directly on a PC/client device, or in a Citrix Virtual Apps environment. The PC requirements are identified above.
- Varian treatment console software, which is client software that manages delivery of treatments at a linear accelerator. This software is identified slightly differently than the standard Varian client software, as the treatment console software **cannot** be deployed in Citrix Virtual Apps environment and comes packaged only with client hardware supplied by Varian.
- Represents the Citrix Workspace App software deployed on PC/client devices when a customer is using Citrix Virtual Apps.
- Represents one or more third-party imaging (CT/MRI/PET/PACs) or hospital information systems exchanging patient data with Varian software via DICOM (for imaging systems) or HL7 for HIS.
- Represents the exchange of data between Varian server software and Varian client software (or third-party systems).
- Represents the exchange of data (generally screen pixels) between the Citrix Workspace App & backend Citrix Virtual Apps servers.

Virtual Server Recommended Deployment Model

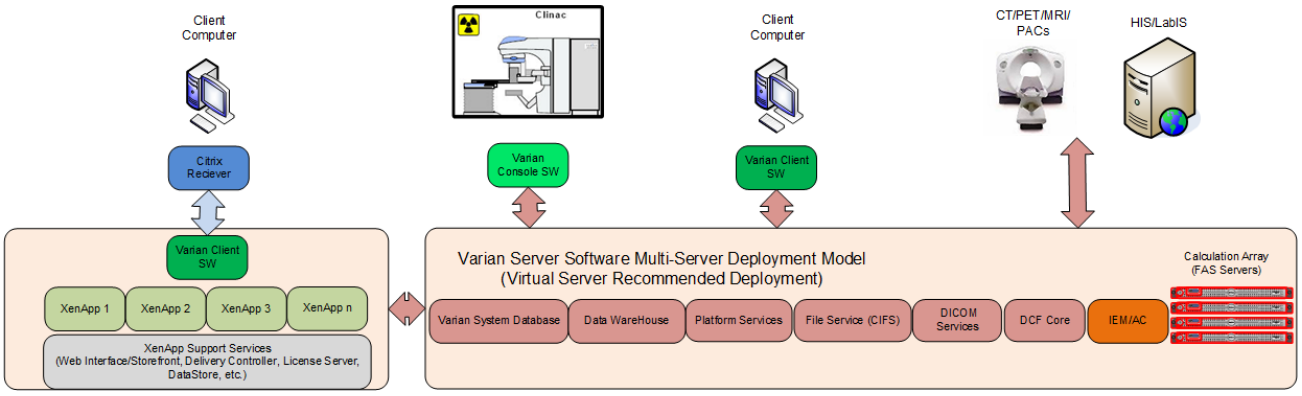

Figure 1: Virtual Server Recommended Deployment

Figure 1 represents Varian recommended deployment model for hardware virtualization. Varian OIS applications and services are distributed onto smaller, dedicated virtual servers. This provides for "fine-grained" computer resource allocation and management of services and minimizes potential resource conflicts.

Separate servers are required for Data Warehouse, ARIA Connect, and the Calculation Array (FAS Servers), which may or may not be deployed depending upon the products purchased by the customer.

Physical Server Deployment Model (Secondary) with Citrix Thin-clients

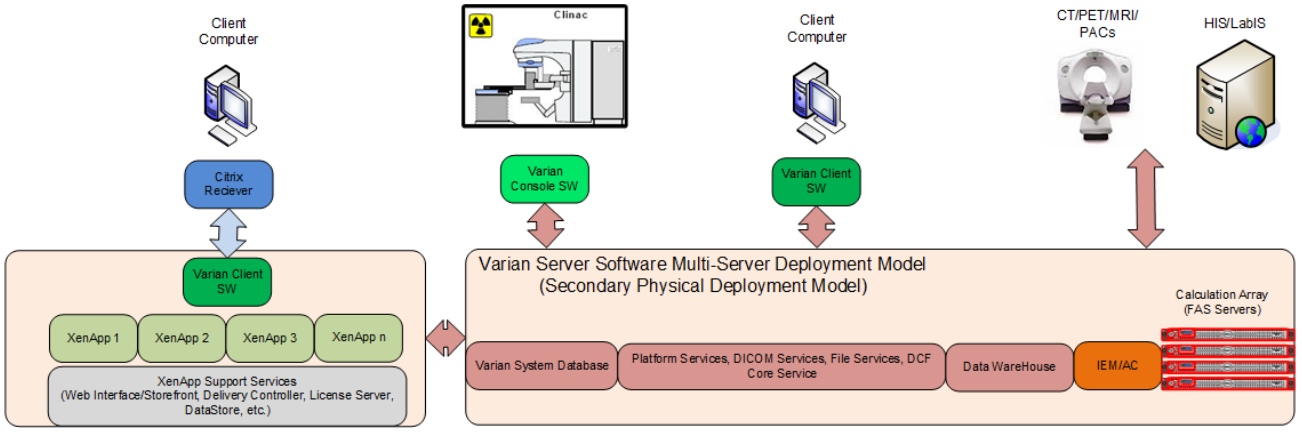

Figure 2: Physical Secondary Server Deployment Model

Figure 2 represents Varian recommended physical server deployment model. Varian OIS applications and services are deployed on a Platform & File server while the Varian System Database server is dedicated to managing SQL tasks.

Separate servers are required for Data Warehouse, ARIA Connect, and the Calculation Array (FAS Servers), which may or may not be deployed depending upon the products purchased by the customer. Other optional components like Varian Mobile will require additional servers.

Appendix B – Services Descriptions

Figure 4 is a conceptual view of the deployment of Varian software. As a conceptual view this figure is not meant to depict any particular "deployment model" of the services but rather the exchange of information between client software (or third-party systems) and the Varian server software and is provided to help facilitate further description of the Varian and third-party server software below.

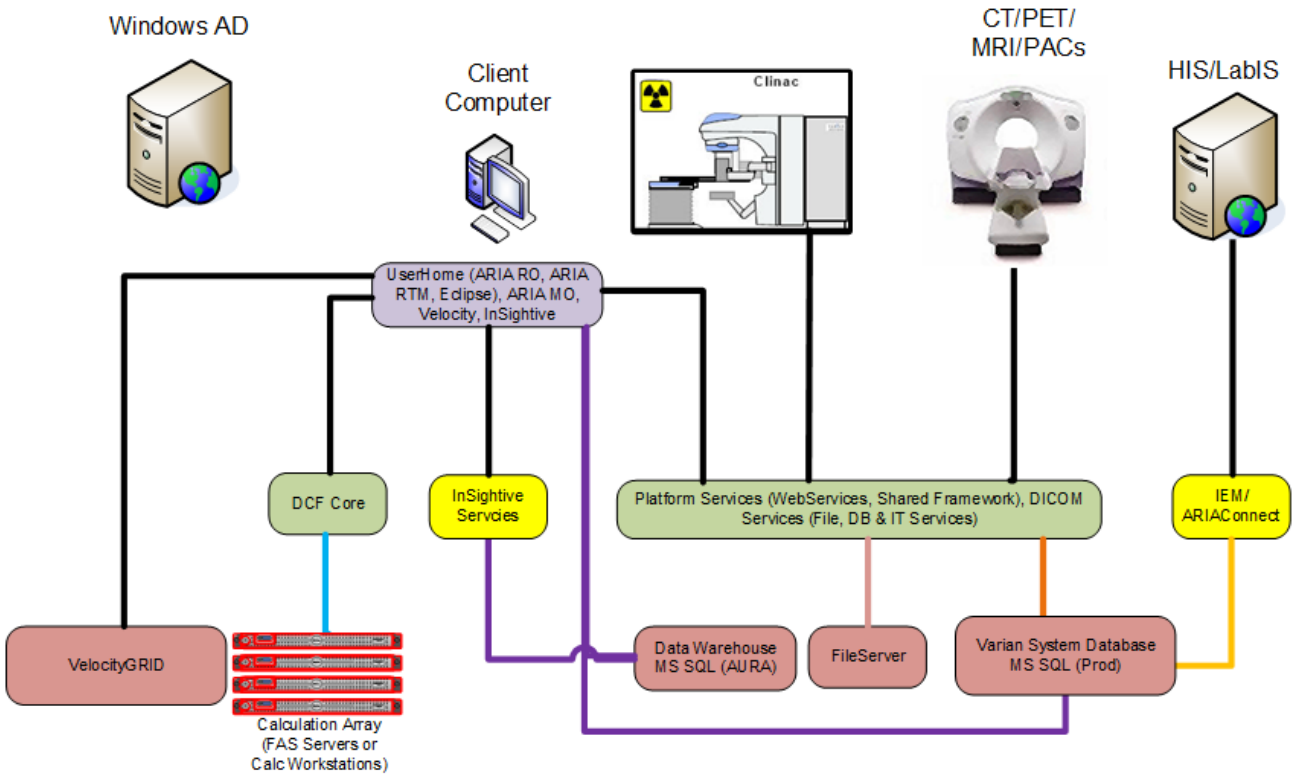

Figure 4: Varian Software Conceptual View

The following is a description of the various services depicted in Figure *4*4.

The exact services used within any particular deployment will depend upon the purchased Varian software applications and support modules.

Table 13: Varian software applications and support modules

<table>
<tr><th>Name</th><th>Function</th><th>Services</th><th>Product/Feature Purchased</th></tr>
<tr><td rowspan="2">Varian System Database</td><td>Production Database</td><td>MS SQL</td><td>ARIA RO, ARIA RTM, Eclipse</td></tr>
<tr><td colspan="3"><u>Considerations:</u>
The Varian System Database is the workhorse for daily work done by clinic staff including treatment software. This type of workload is termed a “transactional” workload as end-users are performing a specific function or task. This database needs fast response time to requests for information to minimize end-user wait time.</td></tr>
<tr><td rowspan="2">Data Warehouse</td><td>Reporting & Analytics Database</td><td>MS SQL</td><td>ARIA RO</td></tr>
<tr><td colspan="3"><u>Considerations:</u>
This database supports the workload for reporting (AURA) and, optionally, InSightive Analytics (see the table below). In general, reporting and analytics are not considered a “real-time” activity as reports can be complex and may aggregate data from multiple tables and/or over long periods of time and, as such, the workload can be sporadic. By offloading the reporting workload from the Varian System Database server to this Data Warehouse database instance (synchronized regularly) the potential impact of large reports or analyses can be diminished significantly while still allowing “real time reports”, such as, “daily activity for today”, to run against the Varian System Database.</td></tr>
<tr><td rowspan="2">Platform Services</td><td>Web based Application Pools for application support & third-party tools for support functions.</td><td>IIS, Varian WebServices and Shared Framework (Flexnet, WinSyslog) services</td><td>ARIA RO, ARIA RTM, Eclipse,</td></tr>
<tr><td colspan="3"><u>Considerations:</u>
These services provide IIS application pools to act as a middle-ware layer between Varian client software and the database and/or file server as well as support for system functions such as license management, logging, inventory management, and so on. The application pools are designed to support daily transactional workload. They support caching of data to speed up access to the data used by multiple end-users.</td></tr>
</table>

Name	Function	Services	Product/Feature Purchased
File Services	NTFS/CIFS File Access	OS File Services	ARIA RO, ARIA RTM, Eclipse
	Considerations: Traditionally Varian has referred to this as the “Image Server” but other unstructured file data (documents, templates, Beam Data files for Eclipse, and so on) are stored on the file system external to the database. The services related to this purpose is more properly simply termed a “File Server.” As a networked application Varian software reads and writes files using the OS provided CIFS (file sharing) functions. File access utilizes Windows security and is configured according to the Security Implementation Guide. Whether the files are actually stored on the same server acting as a file server (for instance, customers using a SAN may make this storage visible to the file server using other means) is a deployment design decision for some customers. However, in pure physical deployments, it is generally the case that the physical storage is directly attached to the server acting as a “file server” and this document “assumes” this is the case. Configuration of SAN storage and making it visible to the server acting as a file server for Varian applications is outside the scope of this document.		

Name	Function	Services	Product/Feature Purchased
DICOM Services	DICOM Transfers with accelerators and third-party information systems	File, DB and IT Daemons	ARIA RO and Eclipse
	Considerations: DICOM services in version 15.x collectively replace the File, DB, and IT Daemons which were used in previous releases. The File and DB Services are exact equivalents to the File and DB Daemons. The IT Service replaces the Treat Daemon and Image Daemon previously deployed on the Treatment Console workstations. For configuring secure DICOM, certificates from connecting DICOM nodes need to be configured in the DICOM Services configuration. The **DICOM File Service** requires no connection to the Varian System Database and is used simply to receive DICOM objects and store them to files that can be later imported to the Varian software manually. The **DICOM DB Service** interfaces with the Varian System Database. It supports bi-directional DICOM query-retrieve services and DICOM import/export services. The **DICOM IT Service** consists of a single DICOM service for each Linear Accelerator in the customer's environment and is designed to act as the middle-ware layer between the Varian System Database, File Server, and Varian treatment and imaging software. For this release it is now **mandatory** that this service be placed on a backend server and not on a workstation at the Linear Accelerator.		
UserHome (ARIA RO, ARIA RTM, Eclipse), Velocity	Client Applications		ARIA RO, ARIA RTM, Eclipse, Velocity
	Considerations: These client applications are depicted for purposes related to completeness of the deployment models only.		
DCF Core	Calculation job control.	Distributor	Eclipse
	Considerations: This service is used as a "command & control" service for calculation jobs submitted to the calculation system, it is similar to a "printer queue" since jobs submitted to it are sent to one or more calculation computers and are queued up if those computers are otherwise currently busy.		

<table>
<tr><th>Name</th><th>Function</th><th>Services</th><th>Product/Feature Purchased</th></tr>
<tr><td rowspan="2">Calculation Array (FAS Servers)</td><td>Eclipse calculation support</td><td>DCF Agent,
DCF Core (Optionally)</td><td>Eclipse</td></tr>
<tr><td colspan="3"><u>Considerations:</u>
The deployment of Framework Agent Servers (FAS) used for calculation support is depicted in Figures 1-3 purely for purposes related to completeness of the deployment models only. Eclipse Framework Agent Servers (FAS) are sold as integrated products along with the Eclipse and/or BrachyVision Treatment Planning System (TPS) software and must be purchased from Varian as an integrated product. FAS are always deployed as “pure physical servers”. One or more FAS are required when customers deploy Varian Eclipse client software using Virtual Apps application virtualization and do not have Eclipse Calculation Workstations for treatment plan calculation support.</td></tr>
<tr><td rowspan="2">ARIA Connect (AC)</td><td>HL7</td><td>Cloverleaf</td><td>ARIA Connect</td></tr>
<tr><td colspan="3"><u>Considerations:</u>
These services are optional, purchasable interface modules used to transfer data between the Varian System Database and third-party systems in HL7 format. The server’s workload will vary depending upon the number and type of interfaces deployed (ADT, Billing, Lab, and so on).</td></tr>
</table>

Name	Function	Services	Product/Feature Purchased
VelocityGRID	Velocity data storage and analytics	PostgreSQL, file storage, DICOM Services.	Velocity
	Considerations: The VelocityGRID server manages image data with a pseudo database and file system. For information on VelocityGRID server requirements, see Velocity Server.		
DC Server	Domain Controller Servers arer servers used for authenticating and validating user access on the network. They responds to security authentication requests and verify users within a computer network domain.		

Acronyms and Abbreviations

4DITC	4-Dimension Integrated Treatment Console
AC	ARIA Connect
AD	Microsoft Active Directory
AURA	ARIA Unified Reporting Application
CCS	Comprehensive Cancer Solution
CIFS	Common Internet File System
DB	Database
DCF	Distributed Calculation Framework
DICOM	Digital Imaging and Communications in Medicine
DS	Microsoft Domain Services
DW	Data Warehouse
FAS	Framework Agent Server
HL7	Healthcare Level 7
IEM	Information Exchange Manager
IIS	Microsoft Internet Information Server
Linac	Linear Accelerator
MO	Medical Oncology
NAS	Network Attached Storage
OBI	On-board Imaging
OIS	Oncology Information System
RO	Radiation Oncology
RTM	Radiation Treatment Management
S/w	Software
SAN	Storage Area Network
SAS	Serial Attached SCSI
SCSI	Small Computer System Interface
SSRS	SQL Server Reporting System
VM	Virtual Machine
DC	Domain Controller