GE Healthcare

AW Server 3.2

Powering advanced applications across the healthcare enterprise

Continuous improvement in image acquisition capabilities are rapidly expanding your everyday clinical practice and providing new ways to improve patient care. As a result, a solution for manipulating and distributing access to volumetric images becomes as important as the acquisition modalities themselves.

AW Server is your platform supporting a broad portfolio of efficient and automated workflows that allow you to manage your time, equipment resources and costs while enhancing your team's ability to collaborate and provide diagnoses. The AW Server adds speed, efficiency, and diagnostic flexibility to your workflow. Its applications portfolio helps boost your diagnostic confidence as you analyze and evaluate exams from angiography to X-ray and almost everything in between. With its novel, easy to use, intuitive interfaces and reporting flexibility, the AW Server streamlines your workflow and helps make your entire department more productive.

Overview

AW Server 3.2 introduces an extensive portfolio of advanced applications that is virtualization-ready. With a local cache receiving DICOM from your modalities and priors from your PACS, this streamlined advanced visualization workflow engine enables rapid preparation and communication of 3D results throughout the enterprise with access to innovative AW applications.

What's new

- Simplified user experience with powerful support for advanced applications workflows.
- Virtualization-ready platform provides enterprise-wide access to advanced processing applications.
- Support for dual monitors expands screen space to hang more views.
- New hardware supports expanded number of slices for concurrent users
- PACS integration interface to streamline advanced visualization workflow for improved productivity.
- Designed with VolumeShare 7, a multi-modality advanced visualization workflow solution that helps to enhance diagnostic confidence and productivity

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Features

- Choice of desk-side tower, IT-friendly rack mount chassis or virtualized deployment on VMWare® environment
- Receives DICOM® images from modalities and PACS
- Patient list for management of images on server cache.
- Advantage Search for fast and easy search of a patient's exam history on PACS or any other DICOM-compliant device.
- Enhanced Quick Filters of the Patient List filters studies by Modality, Date, End Review Status or Exam Description.
- Offers pre-processing for automation and acceleration of workflows
- Powers advanced visualization and image processing applications
- Delivers diagnostic quality client software to PC and MAC® [1] clients and specific GE Healthcare CT consoles
- Dual monitor client support for symmetric displays[2]
- 2D Viewer for image display, manipulation, annotation, review.
- Integrated Filmer with enhanced flexibility to perform filming and data exporting tasks.
- End Review automates routine filming and networking tasks with just one click.
- Supports Saved State selection
- Provides common tools by 2D and 3D applications, *e.g.* Window/Level, Zoom, Pan, Distance measurement, 2D ROI selection[2]
- Supports core AW Volume Viewer[3] software
- Supports Advanced Applications[2] for automated post-processing, vessel analysis and oncology with streamlined reporting
- Supports IT remote "lights-out" management
- 3rd Party PACS integration supports launching advanced applications directly from the PACS workflow.

Server Requirements

AW Server 3.2 may be purchased as a turnkey solution that includes off-the-shelf enterprise-class server hardware supporting concurrent processing of up to 40,000 slices.

Alternatively, AW Server 3.2 may be purchased for use with existing VMware installations for large enterprises that choose to centralize their infrastructure.

Indication for Use

AW Server is a medical software system that allows multiple users to remotely access AW applications from compatible computers on a network. The system allows networking, selection, processing and filming of multimodality DICOM images. Both the client and server software are only for use with off the shelf hardware technology that meets defined minimum specifications.

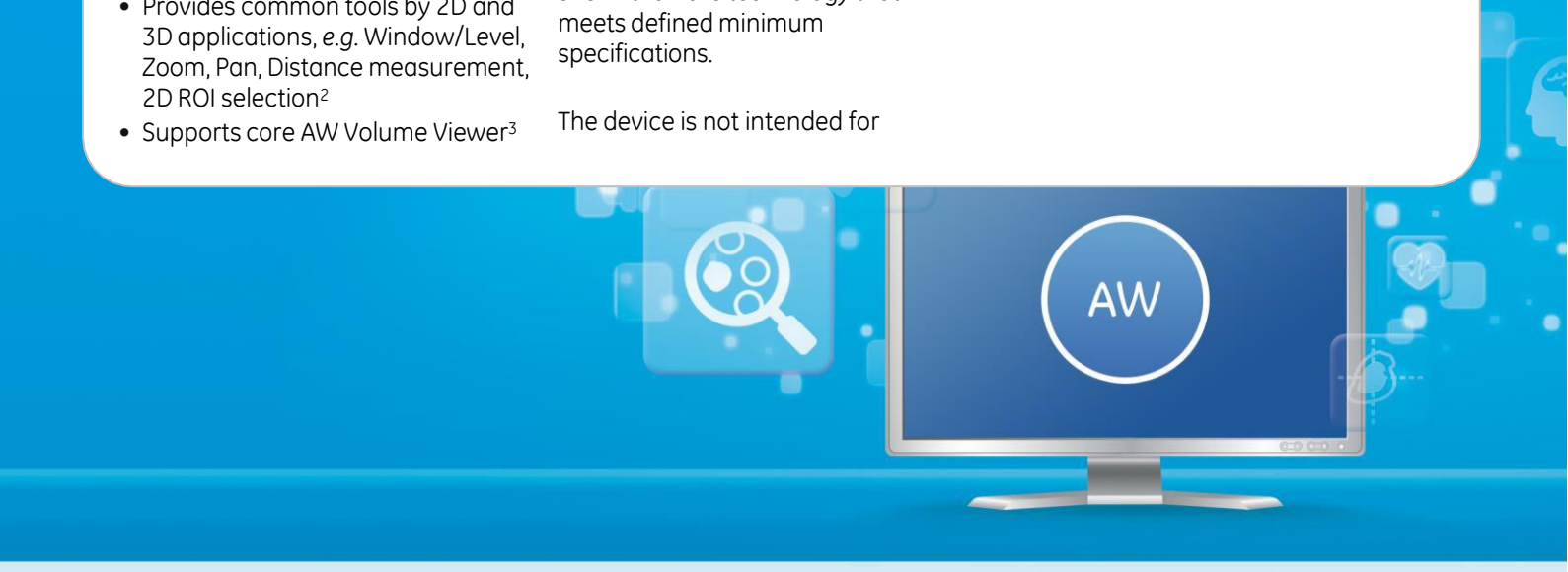
The device is not intended for diagnosis of mammography images. The device is not intended for diagnosis of lossy compressed images. For other images, trained physicians may use the images as a basis for diagnosis upon ensuring that monitor quality, ambient light conditions and image compression ratios are consistent with clinical application.

Notes:

1 Requires purchase of Parallels® 10 and Windows® 7, Windows 8.1 32-bit or 64-bit software.

2 Maximum resolution recommendations vary based on the network bandwidth and latency; maximum resolution might be limited by the specific clinical applications.

3 Requires purchase of appropriate application licenses.



GE imagination at work

Product Details

2D Viewer

The 2D Viewer is an application used to display, manipulate, annotate, and review 2D images by a trained physician for diagnostic interpretations.

Display customization

Display customization allows the user to manage layouts and display data. Key benefits include:

- Allows simultaneous display of studies in either single or multi-exam review
- Standard layouts give you flexibility to tailor the image display from 1x1 to 8x8. The current layout is retained if the images are from the same modality and orientation.
- Annotation levels allow selection of the image information fields to display.
- Toolbar customization puts you in control of which buttons are displayed to meet your needs.

Study Navigation

- The navigator lets you assign a series to a view on the fly
- Cine mode also provides temporal, spatial, or manual playback loops
- With two exams or series loaded, Cine mode supports a side-by-side display format with synchronized playback loops for more efficient comparisons.

Image Review

- The initial image window and level setting is based on the DICOM header. Once displayed, several methods of adjusting image window and level are provided.
- Provides routine image manipulation features:
  - Flip/Rotate, Zoom, Pan, Magnifying Glass
  - Inverse Video: inverts grayscale colormap.
  - Display normal: lets you return the image to its default viewing parameters.

  You can access the following features using a single mouse click directly on the image. Having these direct manipulation tools easily at hand gives you fast access with less distraction from your review task by eliminating the need to return to the graphical user interface controls.
- Several tools are available:
  - 2D distance
  - Angle
  - Report cursor
  - Box ROI, elliptical ROI and freehand ROI

  The program continuously updates statistics on the fly.
- The Annotation feature lets you highlight areas of interest by adding text and line/arrow pointers to any image feature.
- The Copy/Paste/Erase feature lets you copy/paste/remove any text or graphic placed on an image.
- Cross-reference indicates the position of the current slice over the scout or localizer or any other non-parallel series.
- Save lets you store a copy of the image as it appears on the screen for future review.
- The Key Images feature allows you to flag images and create key objects.

Batch Filming

The Print Series feature lets you automatically batch film an entire series with a single keystroke.

Filmer

The integrated Filmer enhances the efficiency of the review station and gives you greater filming and exporting flexibility. This feature supports two modes: the Mini Filmer mode and Full Screen mode, which provides the ability for customization and film layout template creation. Three key mechanisms give you flexibility:

1. Free Format Filming
2. DICOM Structured Report (SR)
3. Data Export (HTML/PDF and JPEG, PNG, MPEG, or AVI)

With the Filmer you can easily extract significant images from any AW application (2D Viewer, Volume Viewer[1] etc.).

- You can film images individually by dragging and dropping to the on-screen Filmer, or by a single keystroke.
- Multiple Image formatting lets you film multiple images in a single page frame
- With Film MID you can send multiple images to a single filmer frame
- Batch Filming is supported from applications that provide that capability (Print Series in the Viewer, Batch Film Protocols in Volume Viewer[1]).

Communication between applications and the Filmer is accomplished in the mini Filmer mode, which provides a minimized footprint. The mini Filmer mode provides the following:

- Compatibility with Batch Filming from Volume Viewer[1]
- Store and position images transferred from an

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Features

- Choice of desk-side tower, IT-friendly rack mount chassis or virtualized deployment on VMWare environment
- Receives DICOM images from modalities and PACS with pre-fetch for priors
- Patient list for management of images on server cache.
- Search Advantage provides a fast and easy search of the patient's exam history on PACS or any other DICOM compliant device.
- Enhanced Query Filters of Patient's first ID, Patient Name, Modality, Date, and Review status or Exam Description.
- Offers pre-processing for automation and acceleration of workflows
- Powers advanced visualization and image processing applications
- Delivers diagnostic quality client software to PC and Mac clients
- Dual monitor client support for symmetric displays up to 2MP each
- 2D Viewer for image display, manipulation, annotation, review
- Integrated Filmer with enhanced flexibility to perform all filming and data exporting tasks.
- End Review automates routine filming and networking tasks with just one click
- Supports Saved State selections.
- Provides common tools for 2D and 3D applications, *e.g.* Window/Level, Zoom, Pan, Distance measurement, 2D ROI selection
- Supports core AW Volume Viewer[1] software capabilities such as:
  - Sophisticated MIP/MPR/CPR/3D rendering and analysis tools
  - 2D and 3D lesion measurements
  - Multi-volume comparison and merge capabilities
  - 4D visualization (cine, functional)
  - Auto-select feature for one-click and automatic segmentation of vessels, tumors and other structures
  - 3D fly-through tools synchronized with reformats
  - Dedicated MR review protocols
- Supports Advanced Applications[1] for automated post-processing, vessel analysis and oncology with streamlined reporting
- Supports IT remote “lights-out” management

Server Requirements

AW Server 3.1 may be purchased as a turnkey solution that includes off-the-shelf enterprise-class server hardware (supporting concurrent processing of up to 40,000 slices).

Alternatively, AW Server 3.1 may be purchased for use with existing VMware installations for those enterprises that choose to centralize their infrastructure.

Hardware and application licensing a dedicated server Windows Server 2008, Windows Server 2012, Windows 7 SP1 or Windows 8.1 is required to support the licensing software.

application.
- Type of export (film, media, database).
- Rapid switching between Full-Screen Filmer and application.

The resultant electronic films become a quick summary of the patient study and radiological interpretation to be reviewed by clinicians and physicians. They can also be saved as independent files (DICOM SR and Secondary Captures) for teaching purposes.
The Filmer works on the What You See Is What You Get approach, and the electronic film can contain one or several pages with specific layouts for each page or all pages.
A flexible Edit Mode provides the ability to easily add, manipulate, format, or delete images from the film. Images can contain text and graphics from measurements and your annotations, and may be window/leveled, magnified, flipped, rotated, or cine. You can add additional annotation to the image in edit mode.
The Preview Mode displays the film as it will be printed or exported, taking into account the layout applied to each page and the compression level specified for non-DICOM exporting (JPEG/PNG and MPEG/AVI/QTVR).

Printing

- AW Server 3.2 includes Network DICOM Printing (B&W and color).

Volume Viewer Application

- The AW Server supports AW's 3D image analysis package with a broad range of multimodality image analysis tools including Multiplanar Reformat, Volume Rendering and Navigation.
- For detailed description of Volume Viewer features, please refer to the Volume Viewer Product Data Sheet.

Workflow Capabilities

- 3rd party PACS integration provides interface to launch advanced applications directly from the PACS client in the same context.
- Ability to manually adjust image compression during user interaction including lossless to multiple lossy levels to improve performance for sluggish network situations. Static images will always be displayed at full resolution.
- Support for Saved State creation and selection.
- Common tools by 2D and 3D applications (Window/Level, Zoom, Pan, Distance measurement, 2D ROI selection).
- AW Server 3.2 provides local DICOM cache allowing rapid launching of 3D applications and temporary storage of derived imagery.
- Allows you to save the exam to the PACS database in an intermediate post processing state at any time and then to restore it, allowing multiple radiologists or technologists to contribute to post processing studies.

IT and Security Capabilities

- Active directory integration allows enterprise level user authentication. Directories supported include Microsoft® Active Directory (MSAD) and other LDAP authentication services
- Provides a centralized user management system in case integration with enterprise directory is unavailable.
- Centralized web-based administration interface for configuration, diagnostics, usage and day-to-day server management.
- Provides group privileges for full access to exams or to enforce mandatory exam search by configurable criteria.
- Centralized Enterprise Audit trails capture user access to patient data using industry standard protocols: IHE ATNA compliant audit messages (RFC3881), TCP, BSD Syslog, and Reliable Syslog (Cooked profile Experimental) transport to third party audit repositories. Local storage with log rotation (size+number of rotations).
- Display of annotations and patient protected information can be controlled for privacy
- Provides support for deployment of client software through Microsoft Windows® Installer (MSI), making it easy to manage enterprise client PCs.
- Features a stateful server firewall to track network connections and detect malicious intrusion attempts.
- Lets you allow thin client access over the internet with either http port (80) or https port (443).[3]

Notes

[1] Requires purchase of separate application licenses.
[2] Please refer to Volume Viewer datasheet for details.
[3] For security reasons, GE Healthcare always recommends VPN access to the server.

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Performance

Performance and interactivity of AW Advanced Applications depends on the network bandwidth, latency and client workstation configuration. For optimal performance, a minimum network bandwidth of 40 Mbps with a latency of 2.7ms or lower is required. High bandwidth such as a hardwired local area network (LAN) permits faster interactions at lower compression ratios.

AW Server may also be used over WIFI or WAN/Internet although performance will depend on round trip latency between the client workstation and the server. A minimum of 3 Mbps bandwidth per client with latency less than 50ms is recommended for reasonable performance when compression is used.

To optimize performance, GE Healthcare's "Smart Compression" technology applies a user-selectable level of compression to displayed images only while you interact with the images. Images are displayed automatically at full fidelity once user interaction stops. A clear visual display on the images indicates when compression is being applied. The device is not intended to meet a diagnostic quality criteria with lossy-compressed images.

The AW Server 3.2 supports the following compression levels:

- Lossless
- Lossy 15:1 (compression ratio is 15:1)
- Lossy 22:1 (compression ratio is 22:1)
- Lossy 33:1 (compression ratio is 33:1)

Turn-Key Server Specifications

AW Server 3.2 can be configured for 8,000, 16,000 or 40,000 slice capacity supporting from 2 through 12 users[1] per physical system. Turn-key server hardware specifications listed here are minimum server hardware capabilities. Specific server hardware is subject to change without prior notice.

Server Hardware (Physical)

- 2x Dual Intel® E5-2630 six core or 4x eight-core Intel Xeon® E5-4617 CPUs
- 24 or 64GB RAM
- Mirrored 146GB disk for OS, additional local storage for image cache
- 1 Gbps NIC for DICOM and client traffic
- Dedicated Embedded Lights Out Manager (LOM)
- Fully redundant power and cooling
- Choice of tower (2 CPU) or rack (4 CPU) server
- 2 TB or 6 TB (DAS required) storage [2]
- Operating System: GE HELiOS 6.6

Virtualized Server Specifications

A software-only version of AW Server 3.2 is available for existing VMware installations. Hyperthreading, CPU and RAM overcommit are not recommended. Hard disk drives are required to store all VM data with thick provisioning.

- Intel Xeon CPU with SSE® 4.1 (45 nm or higher)
- VMware ESXi® 5.0u1, 5.1 5.5, 6.0

VM Configuration Requirements

VM supporting AW Server must be configured with the following resources :

- 8 or 24 core vCPU,
- 24 or 64 GB vRAM
- 2 NICs
- 70GB OS vHDD
- Supports 2 or 12 AWS users[1]
- 2 TB to 6 TB virtual disk storage, randomized read IOPS: 800 or above

Server Licensing

AW Server 3.2 may be purchased either as a single physical installation, or as a virtual installation. Application licensing is structured to allow easy addition of clinically specific workflow tools. Applications seat licenses are sold separately, allowing you to purchase only what you need to support your facility.

Client Requirements

Hardware

AW Server delivers user-installable client software to enable access to applications and data on the server. The minimum HW configuration is as follows:

Processor	2.2GHz Pentium®4 minimum, Pentium dual core processors recommended for optimal performance
Memory	1024 MB minimum
Disk drive	250MB free space available
Network card	100 Mbps minimum (1000 Mbps recommended)
Internet connection	Customer-provided IPSEC VPN, for internet/WAN operation
Mouse	Two or three-button mouse. Three button mouse suggested for best use of functions

Monitors
AW Server 3.2 supports dual monitor clients with a recommended combined resolution of 4MP (2x2MP), larger monitors may be used[3]. Advanced applications may take advantage of the dual screen support to allow larger or more numerous views.

Screen resolution
Minimum: 1024 x 768 with full color (32 bit)
Recommended: dual 2MP (1600 x 1200) or a single 3MP (1536 x 2048)
Maximum**:** 6MP combined[3]

Supported client OS software

- Windows 7 SP1 32 and 64 bit,
- Windows 8.1 32 and 64bit
- Mac Parallels® (Mac OS X 10.10, Parallels 9. Windows 7 SP1 32bit)

User interface languages

- Chinese[4]
- Danish
- Dutch
- English
- Finnish
- French
- German
- Italian
- Japanese[4]
- Korean[4]
- Norwegian
- Portuguese
- Russian[4]
- Spanish
- Swedish

Keyboard layouts

- Danish
- Dutch
- Finnish
- French
- Canadian French
- German
- Italian
- Norwegian
- Portuguese
- Spanish
- Swedish
- United States English
- United Kingdom English

Standards
- DICOM Storage Service Class for RT, CT, MR, CR, X-ray (Angio and R&F), Digital X-ray (DX), MG, NM, PET, Key Image Notes (KIN), Structured Reporting (SR), Grayscale Softcopy Presentation State (GSPS), U/S, Secondary Capture, Secondary Capture Color DICOM Image Objects.
- DICOM Service Class User (SCU) for image send and Service Class Provider (SCP) for image receive
- DICOM Storage Commitment Service Class User (SCU)
- DICOM Print (Color and B&W)

Regulatory Compliance

This product complies with:

- European Council Directive 93/42/EEC Medical Device Directive as amended by European Council Directive 2007/47/EC
- EN 980:2008 - Symbols for use in the labeling of medical devices
- EN 1041:2008 - Information supplied by the manufacturer with medical devices
- ISO 14971:2007 / EN ISO 14971:2012 -Medical devices - Application of risk management to medical devices
- IEC 62304:2006 / EN 62304:2006 +AC:2008 - Medical device software Software life-cycle processes
- IEC 62366:2007 / EN 62366:2008 – Medical Devices - Application of usability engineering to medical devices

Notes
[1] Number of supported clients depends on the server configuration, purchased licenses, network and client monitor resolution.
[2] Capacity calculated at the advertised value of the hard disk manufacturer, available disk space might vary.
[3] Maximum resolution recommendations vary based on the network bandwidth and latency; maximum resolution might be limited by the specific clinical applications.
[4] Limited to Windows clients only, not available on Linux clients.

About GE Healthcare

GE Healthcare provides transformational medical technologies and services that are shaping a new age of patient care. Our broad expertise in medical imaging and information technologies, medical diagnostics, patient monitoring systems, drug discovery, biopharmaceutical manufacturing technologies, performance improvement and performance solutions services help our customers to deliver better care to more people around the world at a lower cost. In addition, we partner with healthcare leaders, striving to leverage the global policy change necessary to implement a successful shift to sustainable healthcare systems. Our "healthymagination" vision for the future invites the world to join us on our journey as we continuously develop innovations focused on reducing costs, increasing access and improving quality around the world. Headquartered in the United Kingdom, GE Healthcare is a unit of General Electric Company (NYSE: GE). Worldwide, GE Healthcare employees are committed to serving healthcare professionals and their patients in more than 100 countries. For more information about GE Healthcare, visit our website at www.gehealthcare.com.

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