Introduction

AW VolumeShare™ 4 is a multi-modality image review, comparison and processing workstation built with simplicity and power at its core. Powerful software is optimized to take advantage of state-of-the-art 64-bit technology and quad core processor hardware to ensure leading edge performance and modularity.

The AW VolumeShare™ 4 software is available in two configurations:

1. **AW VolumeShare™ 4 NO Volume Viewer**: This configuration includes the Post processing Software Platform that provides DICOM functions and the multi-modality 2D image viewer with dedicated functions for review of CT, MR, X-Ray, Angio, DX, U/S and PET images. It also includes the Filmer, which is a multimedia export tool for creating electronic films, filming and exporting to internal web server and CD or DVD.
2. **AW VolumeShare™ 4**: This configuration includes everything mentioned above and in addition, the premier 3D software package, Volume Viewer 4 that provides Volume Analysis, rendering, navigation and a suite of volumetric visualization and analysis tools for CT, MR, 3D X-ray and PET.

AW VolumeShare™ 4 features significant improvements in workflow and clinical features that will enable increased productivity. These features are explained in more detail in the following sections.

Key Benefits

AW VolumeShare™4 includes capabilities that help reduce operating costs, improve departmental productivity, and increase diagnostic confidence. The workstation features state of the art 64-bit technology that allows it to process up to 5000 images in a single data set. This enables more accurate diagnosis using thin slice CT data. The key benefits include:

Fast access to information you need

With its ability to integrate with your RIS[1] and automatically fetch priors from your archive on exam arrival, AW VolumeShare™ 4 provides you fast access to all the information and applications you need to diagnose quickly across multiple modality images.

Efficient workflow to optimize productivity

AW VolumeShare™ 4 optimizes your productivity by automating many tasks in the background that would otherwise take much of your time. Optional productivity package performs background pre-processing based on configured rules and loads up to 8 sessions ahead of time to allow instant access. Dynamic load allows additional exams to be loaded in the middle of post processing. It also enables you to collaborate with other physicians by marking Key Images[2] and easily send them to multiple destinations using the End Review feature. In addition, VolumeShare 4 automates sending any out put generated from using Volume Viewer applications to configured hosts.

[1] Requires IHE CCOW compliant RIS system or implementing API's provided by AW RIS synchronization

[2] Requires IHE KIN implementation on PACS for optimal workflow

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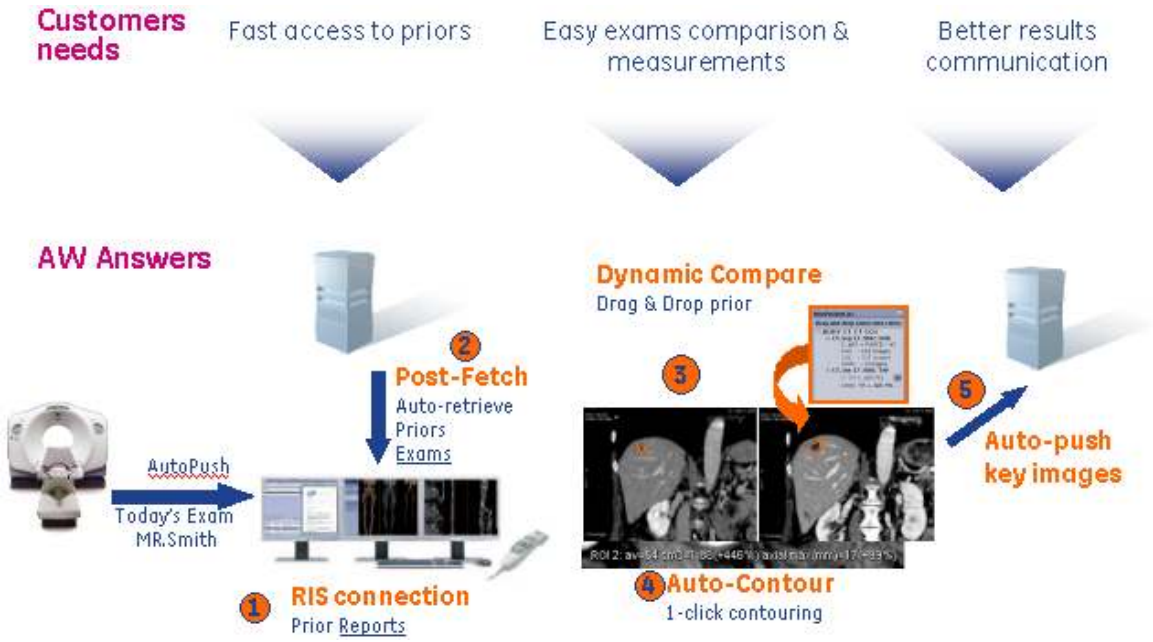

Investment optimization

AW VolumeShare™ 4 supports flexible floating license model[3] to allow sharing of licenses between AW workstations and thin client users. This ensures you maximize usage of your investment in advanced application licenses. Software modularity allow for several product configurations designed to meet a wide variety of needs, from simple image review to more advanced review and analysis.

Large portfolio of advanced applications

AW VolumeShare™ 4 has a large portfolio of applications to address your needs across multiple modalities and care areas. Care areas supported include vascular, cardiology, oncology, radiotherapy, neurology, and women's health.

Investment protection

Use of off-the-shelf hardware components and industry standards enables AW VolumeShare™ 4 to keep pace with the rapid technology evolution and take advantage of cost efficiencies provided by economies of scale.

[3] requires license server onsite (part of AW Server)

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New Capabilities

Workflow features

Post fetch

AW VolumeShare™4 can be configured to automatically retrieve prior and related DICOM exams from you DICOM archive system. The system supports configuring one DICOM host to be queried for related priors. This can be triggered by arrival of new exam on the workstation from network or supported media as well as context synchronization through RIS connection.

RIS Connection

AW VolumeShare™ 4 supports integration with RIS systems (windows OS only) through a command line synchronization interface or through CCOW. This allows a RIS system to automatically select an exam on the AW by passing the patient id, study UID or accession number. Combined with the softswitch ability that allows controlling the RIS system remotely from AW, this allows a RIS driven workflow to be used on the workstation. For more information on the command line interface, please refer to AW RIS integration and configuration.

Support for Key Image Notes

AW VolumeShare™ 4 supports IHE Key Image Notes profile. This allows the user to mark certain images in 2D or 3D Viewer as key images with specific tags. The key images are displayed as a separate series in the exam list and can be easily accessed or sent to a PACS that supports IHE KIN profile. Uses for this feature include tagging specific images for reporting, teaching or for any other purposes and retrieving images quickly later.

External USB DICOM media

AW VolumeShare™ 4 allows external USB disks to be used as DICOM storage media. The USB disk is treated similar to a CD / DVD and can be accessed for reading and writing through the media button. The maximum number of images stored on the USB media is restricted to 300,000 across all exams. For other limitations, please refer to the release notes for AW VolumeShare™4.

Preference Management

AW VolumeShare 4 provides a tool to exchange preferences across workstations or users. Preferences shared include filmer layouts, Volume Viewer custom protocols, Viewer preferences. It also allows the option of designating one of the AW's on the network as a preference management server or using a standard USB flash drive to share preferences.

Volume Viewer features

Dynamic Compare

Prior exams as well as exams from other modalities can be dragged and dropped inside an active session for comparison. Dynamic compare is compatible with generic VV protocols as well as Fusion protocols. It provides the ability to:

- Drag & drop 3D volumes from CT, MR, PT and 3D XA modalities into desired viewport. Combined with Integrated Registration option, new volumes can be registered to loaded volumes "on-the-fly".

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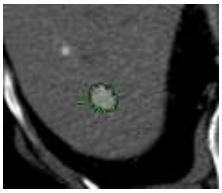
- Display 2D images from many additional modalities such as images from Cath Lab, Ultrasounds, conventional radiology, Dose Reports and Screen Captures.

- Restore Save state series as a separate session that run in the right screen in parallel to the current session that runs in the left screen.

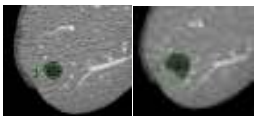
Auto-Contour

The new auto-contour feature simplifies the definition and comparison of contours (hypo-signal and hyper-signal) on CT and MR exams with:

- 1-click detection of contours that can be optimized by the user



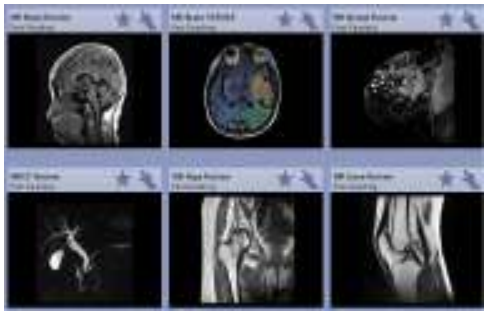
- 1-click comparison with previous contours



MR Volume Viewer

Volume Viewer 4 expands the 3D capabilities to be used with MR exams through:

- Access to all 3D Tools (including volume synchronization, reformatted views) with MR series
- Access to Workflow booster tools like One Touch and Review Step protocols, easy multi-modality review "on-the-fly"
- Recognition of PSD name, image weight, scan plane and specific MR parameters at image loading giving access to a set of customizable Review protocols
    - MR Brain Review
    - MR Brain Stroke Review
    - MR Spine Review
    - MR Shoulder Review
    - MR Breast Review
    - MR Liver Review
    - MR CP Review
    - MR Prostate Review
    - MR Hips Review
    - MR Knee Review



Dedicated MR Cardiac Viewer for Single & multiple Cine review enables comparison between cardiac series such as Time course and Myocardial delayed enhancement images (MDE).

- Support of MR Multi Echo, Multiphase, Diffusion series

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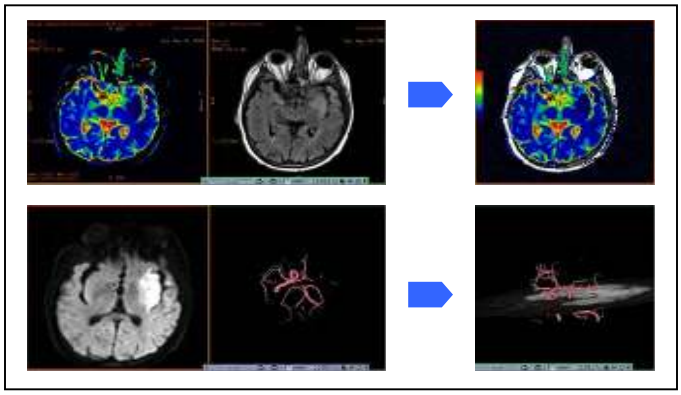
- Support Functool parametric series (ADC, MTT, ...) and enable direct measure on functional maps in Volume Viewer
- 2D/3D ROI propagation to multiple volumes
- Improved Annotations consistency
- In combination with Integrated Registration MR license, direct access to MR image registration, image fusion and Whole Body MR Review protocols

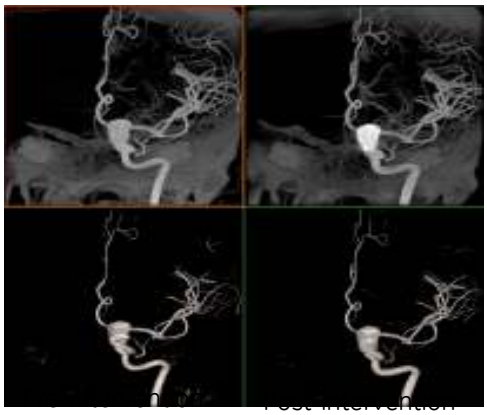


- MR Autobind feature allows easy "Bind" of diffusion-weighted images for Whole Body imaging

Enhanced features for 3D XA images

3D X-Ray format has been enhanced in AW 4.5 for a better DICOM compatibility. The new software Innova 3D XR produces XA images (512 images 512x512 or 256 images 256x256 depending on user settings).
This new format opens the whole Volume Viewer world to Innova 3D images:

- Dedicated Innova Review protocols with dedicated Review Steps
- Single exam: Innova Navigator, Curved Reformat, Multi Oblique, MPVR 3mm Average, Segment Structure
- Compare exam: Compare Axial, Compare Coronal, Compare Sagittal, Reformat
- Creation of user layouts and user protocols, which can be linked to image with OneTouch
- Access to Workflow booster tools, easy multi-modality review "on-the-fly"



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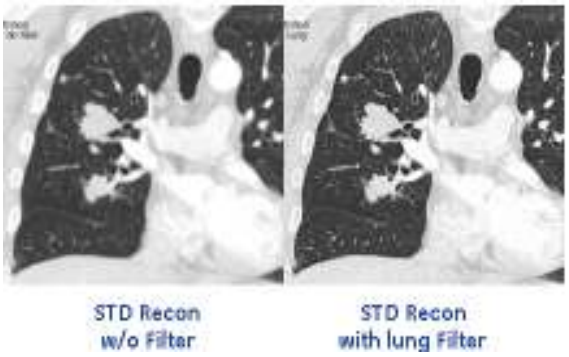
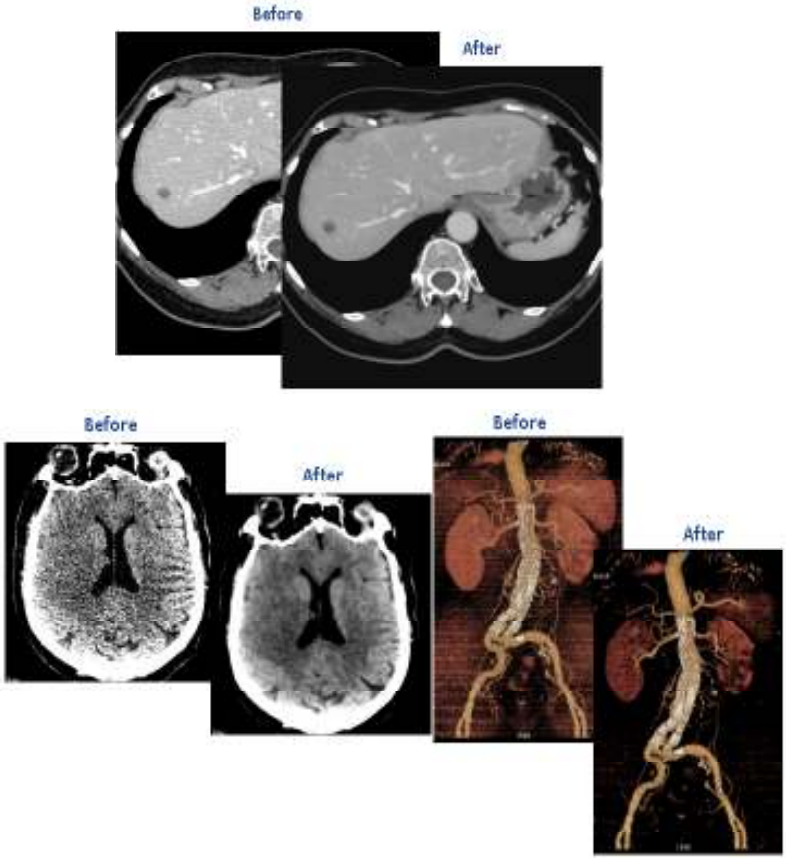
CT Image Quality

New enhancing and smoothing filters provide the ability to improve CT image quality.



Lung filter gives the ability to enhance contours of images reconstructed in Standard mode for a better visualization of lung structures.

New smoothing filter reduces noise while maintaining high image contrast.



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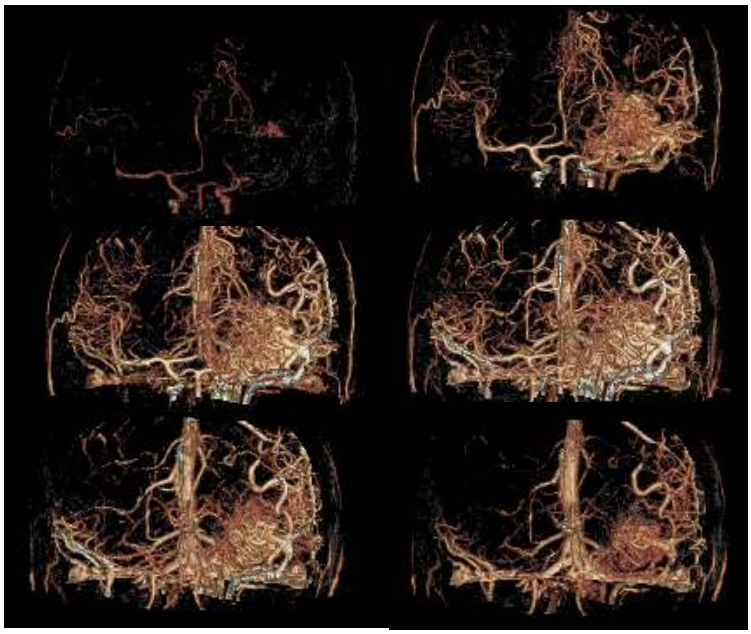
GE imagination at work

Dynamic CT Angiography

Optional Dynamic Angiography package optimizes the review of 4D CT angiography images acquired in GE Shuttle mode with :

- Easy Ciné review of the different vascular phases in both reformat and 3D
- Inter-phase registration to compensate for tiny patient motion between phases
- Bone mask subtraction for an optimized visualization of the vessels tree



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Summary of Operations

User Interface

The user interface features the GE Common User Interface with:

- Choice of one or two 1280x1024 monitors with scroll wheel optical mouse
- Simple drag and drop mechanism for networking, media interchange, filming and Filmer options.
- Automatic displays of help messages briefly describe function currently under the mouse pointer.
- Shortcut keyboard keys and programmable window/level function keys for accelerated control

Figure 1 - AW VolumeShare™ 4 User Interface

- Multi-tasking capabilities that allow Patient List, 2D Viewer, Filmer and Volume Viewer** to run simultaneously with Fast Switch capabilities between applications.

Security

AW VolumeShare™ 4 fully supports Enterprise Authentication using Microsoft Active Directory* (2000, 2003) and Novell* eDirectory (v 8.7.3). Hospitals can now allow users to access the AW's with their existing single sign on credentials and hence greatly simplify compliance with HIPAA.

If Enterprise authentication is not used, at a minimum, an administrator-defined UNIX* login and password is required for each workstation. Lock Screen enables users to lock the workstation display when leaving

** *Volume Viewer is not included in certain configurations*

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the station momentarily unattended, thus preventing unauthorized access to patient data. Main actions performed on the AW (save, film, network, export) are flagged and saved in an audit trail along with the logged username, patient ID, patient name, exam ID, date and time.

Several users can have different local UNIX* logins and use the same AW while keeping their user preferences unique.

AW VolumeShare 4™ is secured by Product Network Filters (PNF), the GE Healthcare feature, which protects the AW from unauthorized users accessing required open ports on the system over the network. This feature can be configured to allow only authorized remote devices to access specific ports on the AW.

Patient List

The Patient List provides all the tools necessary to manage the images stored on the local workstation or remote systems. It is used to list, sort, filter and transfer images for review.

Workflow Management

AW VolumeShare 4™ also supports enhanced DICOM workflow processes, providing operators one click access to applications and application presets through One-Touch protocols. This unique feature allows the operator to define an application or application preset that automatically launches, based upon DICOM elements.

- DICOM Query/Retrieve Storage Class User (SCU) and Storage Class Provider (SCP) provide seamless network integration.
- DICOM Storage Commitment SCU enables the AW user to know when exams have been successfully archived on DICOM devices that support Storage Commitment SCP, like PACS.

End Review

The AW VolumeShare 4™ comes with a new workflow-enhancing feature - "End Review". This enables automation of routine tasks done at the end of reviewing each exam on the AW with just one click. In addition, the "End Review" flag in the patient list allows for exams to be marked as "Done" after post processing using the End Review feature. The user can configure "End Review" button to perform one or several of the following actions:

- Print the pages as prepared in the Filmer to the default printer (DICOM, Postscript) with an option to automatically save and clear the Filmer after printing is done. Also supports saving electronic films.
- Automatically push the entire exam or only the series created on the AW to one or more remote hosts and save the filmer results (Structured Reports, Electronic Films) to the local DICOM database.

Remote Network Host Management

The AW VolumeShare 4™ Patient List conveniently provides a control panel for selecting a remote host or destination for network transfer. Specific Icons are used to signal different types of devices (acquisition, post processing, PACS, etc.) accessible by the station via the network.

Dragging a Patient, Exam, Series or Image(s) to the remote host icon will start a network transfer to the remote host. A remote browser can be activated to display detailed exam information from the remote host, including filtering of the remote data if supported.

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Direct Connect

AW VolumeShare 4™ supports a direct connection between AW VolumeShare 2 or later workstations. This feature requires Gigabit Network between the AW's and HP XW8200 or better hardware. Post processing can be done on exams residing on Direct Connected systems by launching applications without having to DICOM transfer the exam to the AW although there might be a slight delay in launching applications and viewing the exams on patient list.

Search Advantage

AW VolumeShare 4™ is equipped with an advanced search engine that allows for fast and easy searching of a given patient's exam history on PACS or any other DICOM compliant device with few clicks. If the remote device is "Direct Connected" to the AW, you can launch applications without having to DICOM transfer the exam, hence greatly improving productivity.

Worklists and Filters

Enhanced quick filters are available on AW VolumeShare 4™ that allows filtering the patient list by modality, date, end review status or exam description. Most of these capabilities are available on the remote host patient list as well.

In addition, Worklists display the data that you want to see by filtering the Patient List lists using advanced filters based on one or any of the following parameters:

- Modality; all supported, or selected (i.e. CT, MR, RF, XA, CR, DX, MG, NM, PET, US, SR, KO)
- Patient Name; Patient ID
- Exam location (hospital name) and exam description
- Series description
- Date and time of day: today, or a specified date or date ranges, with a specified time or time range.
- Radiologist's and referring physician's name
- Accession number

Quick Sort (ascending, descending) and Quick Access (entry field) are available on any of the fields displayed at the exam level (Patient Name, Patient ID, Exam location and description, radiologist's and referring physician's name, date and time).

Queues

Three queues are managed by the system: one for network transfer; one for media interchange; and the other for filming. A menu on the Patient List provides easy access to queue status. Continuous status of the network queue is also provided in the form of animated icons.

DICOM CD/DVD/USB Creation Tool

AW VolumeShare 4™ includes a flexible DICOM Media Creation Tool designed to offer greater flexibility. The media can be any supported CD / DVD or USB storage device.

- Any selected data (exam, series, images) can be added with a simple drag-and-drop to a pre-mastering window.

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- CD/DVD usage (percentage) is shown prior to launching actual writing process.
- A user selectable option enables down sampling of certain 1024^2 X-ray Angiographic images to 512^2 during CD creation.
- The CD/DVD Composer is capable of managing jobs for large amount of data. If the size is greater than the content of a single CD/DVD, the operator will be prompted for additional Media.
- The operator may specify the number of copies created during CD/DVD save.
- Integrated Centricity® DICOM Viewer can also be imbedded on DICOM CD/DVD for review on a PC running Windows XP operating system.
- JPEG Lossless read of any DICOM CD/DVD Media. Writing is available with X-Ray exam.
- The CD/DVD Drive operates at speeds up to 12X depending on CD media and 4X depending on DVD media.
- For limitations on USB storage device, please refer to AW VolumeShare™4 release notes

Database Management

The AW VolumeShare 4™ uses a high-performance database management system. The database classifies the data according to the patient folder description of the DICOM standard, with Patient/Exam-Study/Series-Sequence/Images.

- Auto Delete automatically deletes images on a first-in-first-out (FIFO) basis; can be toggled on/off.
- Lock Exam prevents specified exam from being deleted.
- The permanent display of available disk space facilitates easy disk management.
- A patient anonymization tool can be used to modify DICOM elements to protect patient information.

2D Viewer

The 2D Viewer is the primary tool where images are displayed, manipulated, annotated and reviewed for making diagnostic interpretations by a trained physician. A focus on user efficiency underlies the design of this tool, providing a rich feature set in an intuitive, easy-to-use interface. ISO-Latin1 patient names are displayed on the Viewer.

Display Preferences and Layout Manager

The Display Preferences and Layout Manager are key features for efficient 2D review. This feature allows the station to prepare and display data according to either default protocols (function of exam codification) or user-defined protocols. The key benefits of this feature are:

- A user logon that allows a differentiation between users and a definition of default settings (work list filters to use, sort modes, protocols to apply, etc...).
- The flexibility to change the protocols from those applied by default or to disable them as needed.
- A screen management function called Layout Manager that allows easy/interactive modification of the settings made by the protocols through view port/screen drop-down menus and series selection menu.

Using the various stack modes for more selections, the user can choose how to organize the various layouts they wish to have on the screen, as well as the image layout inside each stack.

The user can also modify the contents of each stack using simple drag and drop operations:

- A drag and drop from a box in the list at the bottom of the window to one of the stacks on the screen will load the corresponding series/sequence into the screen stack, replacing the former contents, if any.
- A drag and drop between two screen stacks will exchange the contents.
- A drag and drop from one of the screen stacks to the box list (or, as an option, outside of the window) will empty the screen stack.
- Nine commonly used layouts provide flexibility in tailoring the image display to the user or the application at hand: 1x2, 2x1, 1x2, 3x4, 4x4, and 4x5.
- Custom layouts further extend the viewer flexibility offering any layout grid up to 8x8.
- Annotation levels allow the user to specify which image information fields are displayed on the images. Present annotation groupings of Full, Partial, and None are provided, along with a Custom grouping where any individual field can be toggled on/off.
- Replicate Graphics allows text and graphics placed on one image to be replicated across the entire dataset.
- Groupings allow application of window/level values, magnification/miniaturization, pan or flip/rotate to a user-defined image set.
- Save State stores user-selected image orientation and window/level settings with each dataset, allowing the user to store the modified images on the AW for efficient future review.

Image Sequencing

- Next and prior controls are provided to initiate the display of the next/prior Patient, Study, Series, or Image. This keeps the same layout by default if exams are from the same type and modality.
- Cine mode also provides temporal, spatial or manual playback loops.
- When two exams or series are loaded, cine can display a one-on-one format for each and synchronize playback loops, facilitating efficient comparison

Image Review

- An initial image window and level setting is determined based on the DICOM header. Once the image is displayed, several methods are provided to adjust window and level of images to meet a variety of clinical work environments and user preferences
- 6 user-programmable keys on the keyboard (F5-F10); plus one key for returning to prior setting or display normal (F11)
- The same 6 programmed settings on-screen for simple mouse access
- User modified discrete or variable steps using the arrow keys on the keyboard
- Auto window level for MR
- Real-time on-image adjustment using the middle mouse button

A set of routinely used image manipulation features is provided on the Viewer:

- Flip/Rotate: 90 degree increments
- Zoom: 0.5x or 2x explicit magnification controls located on-screen; any magnification factor between 0.2x and 6x can be specified
- Pan: interactively moves an image within its own window
- Inverse Video: inverts the grayscale colormap used to display images
- Magnifying Glass: allows quick 2x magnification window that can be moved over an image
- Display normal: returns the image to its default viewing parameters

Features are conveniently accessed using the mouse directly on the desired image. Such direct manipulation tools eliminate the need to return to the graphical user interface controls providing faster access with minimal distraction from the review task at hand

- Window/Level ; Zoom ; Pan ; Magnification Glass ; Manual Cine (paging)/stack review
- Box, Ellipse, and Trace Region of Interest (ROI) provide maximum flexibility in defining analysis regions. Statistical results are continuously updated as the ROI graphics are altered and include the area, mean, standard deviation, minimum, and maximum pixel values within the ROI.
- Measure Distance and Measure Angle support recursive measurements between line segments. As with ROI, results are continuously reported while the graphics are manipulated.
- Annotation allows the user to add text and line/arrow pointers to any image display highlighting areas of interest.
- Report Cursor provides a continuous readout of pixel coordinates and values at the current position of the cursor over an image - it also gives correlation between series.
- An erase feature removes any text or graphics placed on an image by the user.
- A save feature stores a copy of an image as it appears on the monitor for future review

Enhanced Cross-Referencing Mode

When CT or MR series are synchronized and linked with a cross-referencing relationship, geometric displacement and navigation in the series are coupled for all series in terms of RAS coordinates.

This means that for series in the same plane, a fixed point in terms of localization difference is preserved. This point is expressed in terms of RAS coordinates, so that in case of different slice thickness, the referencing algorithm searches for the closest matching slice in terms of those coordinates.

For series in different planes, a line representing the cut position moves with the image.

Batch Filming

- Print Series permits automatic batch filming of an entire series with one keystroke.

Advanced X-Ray Analysis

- Shutters can be applied to X-ray images to focus on the area of interest within the image. Shutters are black opaque overlays with elliptical or rectangular cutouts that can be sized as desired. Once a Shutter is

applied, the underlying image can be moved to alter the viewable area. Shutters can also be applied to CT and MR images using the Image Matte feature.

- Seven levels of edge enhancement filters can be applied to the image.
- Image subtraction: A graphical user interface allows selection of a mask and subtraction of all images in the associated sequence. Subtracted images can be saved as a series directly through one click.
- Landscape: A percentage of the mask image may be introduced into a subtracted image for anatomical reference. The percentage of the mask that is reintroduced is user selectable via a graphical user interface.
- Pixel Shift: Auto pixel shift optimizes the mask to image registration. The mask can also be moved manually to optimize subtraction quality in a specific region of interest.
- Split Pixel Shift : The screen can be split horizontally or vertically for pixel shift
- Maximum/Minimum Opacification: Selected images are integrated together to give a resulting Max. Op./Min. Op. image. This feature is offered for Iodine and CO2 contrast materials.

Filmer

The Filmer is an important tool that enhances the efficiency of the review station for the radiologist. It is integrated within the AW VolumeShare 4™ environment and offers enhanced flexibility to perform all filming and exporting tasks.

The Filmer is available in two modes, the mini Filmer and the full-screen mode, which allows full customization and film layout template creation.

The Filmer contains three key mechanisms to offer unprecedented flexibility:

- Free Format Filming
- DICOM Structured Reporting (SR)
- Data Export (HTML/PDF and JPEG/PNG/MPEG/AVI/QTVR)

The Filmer also enables easy extraction of significant images from any of the AW Application (2D Viewer, Volume Viewer**, FuncTool, etc...).

- Images may be individually filmed manually via “drag and drop” to the on-screen Filmer or using the F1 Keystroke.
- Multiple Image formatting allows filming of multiple images in a single page frame using the F2 keystroke.
- Film MID allows multiple images to single frame of the filmer and is available through the F3 keystroke.
- Batch Filming is also supported from the applications that provide that capability (Print Series in the Viewer, Batch Film Protocols in Volume Viewer**).

Communication between applications and the Filmer is done through the use of the mini Filmer with a minimized footprint, which provides the following services:

** *Volume Viewer is not included with certain configurations*

- Compatibility with Batch Filming from Volume Viewer**
- Store and position images transferred from Application
- Type of export (film, media, database)
- Fast switch back and forth to and from full-screen Filmer to and from Application

This electronic film can become a quick summary for 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 uses the full power of the WYSIWYG (What You See Is What You Get) approach; the electronic film can contain one or several pages with specific layouts for each page or all pages.

The Filmer has a very flexible Edit Mode, where images on the film can be easily added, manipulated, formatted or deleted. Images can contain text and graphics from measurements and user annotation, and may be window/leveled, magnified, flipped, rotated or cine. Additional user annotation may be added to the image in edit mode.

The Preview Mode will display the film, as it would be printed or exported, taking into account the layout applied to each page of the film and the compression level specified for non-DICOM exporting (JPEG/PNG and MPEG/AVI, QTVR).

Printing

- Network DICOM Print (B&W and Color) is included in AW VolumeShare 4™.
- Network PostScript capability (B&W and Color) is included in AW VolumeShare 4™ for supported printers.
- For PostScript and DICOM Printers, any printing format created in the Filmer is supported, (non-square matrix formats, for instance for rectangular images (CT Run-offs).
- Digital cameras and Analog Cameras using a 3M-952 protocol (inc. DASM interface) are **NOT** supported on AW VolumeShare 4™.

Exporting

The Filmer provides export capabilities of any electronic film to DICOM SR, PDF/HTML and JPEG/PNG/MPEG/AVI/QTVR format. Data Export is totally integrated in the Filmer, thus providing the entire image processing tools needed to perform multimedia image export. Its simplicity is reflected in the different export mechanisms available: CD/DVD removable media, USB flash drive or network HTTP and FTP protocols. It is intended for publishing and communication, not for diagnostic purposes. Non-DICOM data can be also saved on a multi-session CD/DVD using the Filmer tool.

Volume Viewer 4

Summary of Operation

Volumetric models are loaded by selecting the exam or series. The user can select a protocol category from an anatomical selector or just go directly to a Review Layout. In either case, images are loaded progressively in the background; this gives control to the user in just a few seconds after selecting the images. Selecting a Review Layout launches a volumetric display protocol with predefined layout preferences. Review Layouts may be saved and combined to suit your workflow. Selecting a protocol category unlocks a variety of visual protocols that include the layout, threshold, rendering mode and filming formats. Some of these protocols direct the user through the process providing capabilities to interactively view and manipulate the model. Increasing productivity and consistency for all modalities.

Features description

Automatic images loading and processing with AutoLaunch and One touch protocols

Volume Viewer with **productivity package** option gives access to **Instantaneous Exam Display** of exams that are automatically Launched and Preloaded.

This feature gives the ability to automatically load in memory cases that are transferred to the AW. A single click in the AutoLaunch window raises instantly the Volume Viewer protocol that has been automatically launched. Interaction with the data is immediately possible as data are preloaded and **ready to read**. AutoLaunch is compatible with CT, MR and PET single volume protocols of Volume Viewer.

- The productivity package option requires **dual screen xw8400 or later hardware** and is not compatible with older versions of AW hardware.
- By default exams AutoLaunch in Reformat protocol, but using One-Touch links provide the ability to Autolaunch the best protocol for each exam.
- AutoLaunch is compatible with CT, MR and PET single volume protocols of Volume Viewer.
- It can be installed in **dual screen xw8400 or later hardware** only.
- By default exams AutoLaunch in Reformat protocol, but using One-Touch links provide the ability to Autolaunch the best protocol for each exam.

One-Touch protocols allow the operator to define an entire Application or a Review Layout protocol that automatically launches based upon DICOM image acquisition elements. An intuitive user interface in the Protocol launcher provides easy configuration of One Touch links clicking the hand icon.

When combined with optional packages **AutoBone Xpress, CardIQ Xpress Elite and CardIQFunction Xpress**, AutoLaunch package will also give access to the **Automatic Preprocessing** of the data. Raising exams present in the AutoLaunch window will give instantaneous access to the processed data:

- For CT Exams linked to AutoBone One Touch protocols, bone removal will be preprocessed.
- For CT cardiac exams, cardiac structures will be preprocessed.

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Protocol Management and Loading with "My Protocols":

Any of the Protocols that are created with Volume Viewer can be saved as a "My protocol" that can be accessed directly from the AW Patient List with one click of a button. This bypasses the Anatomical Selection Tool. For instance, a Reformat Review can be launched directly from the Patient List selection.

Image Loading is also enhanced thanks to the Progressive Load. Progressive Load has two modes, one in which images are loaded in sequential mode (Reformat) and one where images are loaded in interlaced mode (3D/VR). In both cases it allows the user to start image manipulation as soon as the first image is displayed (either the axial view or the 3D view).
Navigation through series and exams can be performed without exiting to the patient list. The Volume Viewer also enhances the productivity of the user by looking at DICOM series description code and filtering protocols based on the anatomical selector.

Series/Exam Comparison:

The Volume Viewer lets users load several volumes either from the same exam or from different exams. This can be used for exam comparison (Compare Mode) or for Multiphase examinations (Liver for instance). The Compare Mode is also available for PET/CT examinations and takes advantage of Dual Screen configuration.

Free Format Layout Presets:

Default Layout Presets provide faster and more flexible review modes for all modalities. The user has the possibility to create customized Layout Presets that can be saved and used at any time.
The Layout Preset contains the following information:

- Screen format: 1:1, 4:1,16:1 or any Free Format (square/rectangular)
- Type of view in each viewport (axial, coronal, sagittal, oblique, curved, lumen, navigator, MPVR, 3D, VR)
- Window Width and Level, Zoom, FOV, MPVR slice thickness
- Navigator parameter
- Volume Rendering Preset

Layout Presets extend the usability of Volume Viewer as a default review environment for any 3D image dataset.

Image Display

- 1:1 to 16:1 display
- Single and dual-screen formats
- Square and/or Rectangular viewports
- Images are created real-time for display, review, and export
- Images and state can also be saved for later retrieval

Dynamic Volume Review:

To simplify and improve exam screening, Dynamic Volume Review provides an interactive view port control that allows the user to perform the following functions:

- Continuous or contiguous slice paging
- Cine
- Slice thickness adjustment and rendering mode (MIP, MinIP, Average, Volume Rendering)

Curved VOI:

Curved VOI allows the user to display a MIP, MinIP or VR region of interest along a curved projection. The VOI thickness is displayed in mm and can be interactively adjusted by the user.

3D Bookmarks and ROI Tool:

The user is able to deposit 3D Bookmarks to mark the positions of the 3D cursor. Buttons allow users to add and remove bookmarks and to navigate through in the added order. Indicators are added on the Dynamic Volume Review slider background to visualize the positions of the bookmarks.

The bookmark can be used to define a Region Of Interest (ROI) that can be adjusted in a volumetric format in any plane. Statistical information is provided for each ROI such as Min, Max and Average Values within the ROI; Standard Deviation, Size and Volume of the ROI.

Reference Image Oblique Reformat:

To simplify paging and orientation adjustment operation, Reference automatic Image Oblique Reformat enables the user to control paging from the reference image on each view port.

Enhanced Multi-Phase Exams Review

Review Protocols for multi-phase exams are available for CT Liver. Merging of Volume Rendering from different phases is possible for Multiphase CT exams such as Multiphase Liver.

Cine Mode:

The cine feature enables automatic paging through the slices. A list of slices allows adjusting the slice range of the cine to involve all the slices or be restrained to a small range of slices around the current position. Cine has two modes: the loop mode (go back to beginning when reaching the end), and the rock mode (reverse direction when reaching end). The Dynamic Volume Review slider lets the operator modify the speed & direction of the cine.

VR Processing Speed:

The software design of Volume Rendering takes full advantage of quad core systems and Intel* Xeon* latest technology. This additional processing speed translates into smooth VR model manipulation in high resolution, interactive model manipulation and faster batch rotation movie mode.

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in an identical rendering as on the CT Console. This facilitates better workflow integration of AW with LightSpeed and gives the users of such systems greater flexibility.

Enhanced contours VR mode:

Enhanced contours VR mode produces transparent rendering of structures with high contrast such as vessels which relation with surrounding plaques can be better assessed. This mode can also be used to display the patient skin as a transparent silhouette for anatomical landmarks while showing underneath organs of interests.

Multiple VR Objects:

Volume Viewer allows the user to create multiple objects as multiple VR models that can be merged into a single view or model for later review. This added functionality lets users perform more complex VR views with multiple object segmentation and visualization.
Multi-object panel can be floated to keep access to object selection panel while using movie, scalpel or any other tool.

Pseudo Surface Shading Mode:

In order to facilitate the adoption of VR as the default 3D display mode, Volume Rendering enables a pseudo surface shaded mode, which renders a 3D model using the VR algorithm in a similar way as a Surface Shaded 3D Model would. By selecting this mode, the Volume Rendering model is displayed using a step curve with a uniform color mode. This mode allows the user to switch very quickly from VR to Pseudo Surface Shaded modes and opens up Volume Viewer for greater review flexibility.

Predefined Cut Planes:

Volume Viewer allows the user to use Cut Planes in order to isolate certain structures in the VR model. The Cut Planes include:

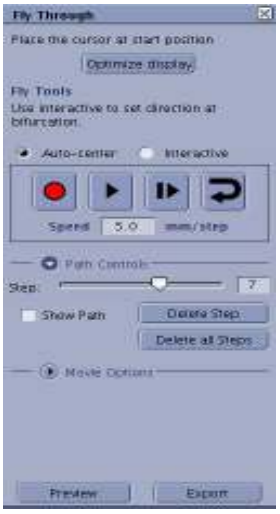
- Left / Right / Inferior / Superior / Anterior / Posterior
- Left Anterior Superior / Left Anterior Inferior
- Left Posterior Superior/ Left Posterior Inferior
- Right Anterior Superior / Right Anterior Inferior
- Right Posterior Superior / Right Posterior Inferior

Direct3D Compatibility:

Volume Viewer allows users of the LightSpeed® CT Scanner with Direct3D visualization option to transfer Direct3D models from their CT Scanner to the Advantage Workstation and review them

Optimize Display of Navigator views with Best Guess Threshold:
When displaying a Navigator view based on threshold (all except Volume Rendering), a Best Guess Threshold is calculated when pressing the "Optimize Display" button. This speeds up the setup time for a Navigator view.

Auto-Center Fly Through with Smart Cursor:



In case of fly-through in air contrast studies (airways, colon), the user can automatically navigate at the center of the structure of interest, simply by pressing the Forward or the Backward Keys.

Record your movie as you fly through:
Creating a fly through movie just requires to press the record button.

Navigator panel :

Navigator panel offers an easier interaction to Fly Through as well as an easier way to choose from display options.
Following options are available:

- Rendering Mode in surface or Volume Rendering with default preset to optimize visualization of calcified plaques on vessels
- Cut Plane On/Off to identify wall tissue

Anterior Cut Plane:

On any Navigator view, the user can have an Anterior Cut Plane perpendicular to the Navigator axis. Structures at the cut plane are displayed in a reformatted view; structures behind the cut plane are displayed in Navigator mode. This mode is similar to the Cut Plane function in Volume Rendering, allowing the operator to visualize how features within the lumen relate to structures outside the lumen.

Synchronized Navigator and Reformatted Views:

When displaying the default Navigator layout, the user can switch to the Synchronized Reformatted View mode. In this mode the user is provided an oblique view transversal to the direction of the Navigator, a view parallel to the direction of the Navigator and a view parallel to the direction of the Navigator in the vertical plan. This helps target and correlate areas of interest within the Navigator view.

Fish-Eye View:

In addition to the regular 180° or less Navigator view, this release enables a Fish-Eye View with any angle value from 180° to 360°. This enables the user to look at structures behind its point of view on the same image as the structure in front of the point of view.

Lumen View:

A structure previously outlined with a manual trace can be looked in a Lumen View. This is an unfolded 3D view of the structure to be tracked. The user can interactively rotate the lumen view around the centerline of the structure and set the width and field of view.

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Image Manipulation Tools:

- Screen Save: Allows an image to be saved within for later review or export
- Preset W/L: Allows the user to select Window / Levels for quick display of images with proper contrast
- Plane reference: Quickly brings a volumetric model back to any of six planes of reference: Left, Right, Anterior, Posterior, Superior, and Inferior
- Auto centering: Automatic image centering within each image viewport
- Magnify: Interactive magnification or preset magnification levels provide life size images in various formats
- Viewport array: Provides the user with the ability to change image data type displayed within the viewports
- Annotation: Ability to create independent annotation, or use a pre-defined annotation library. Multiple font size and type is available
- Measure Angle: Allows angle measurements on source or volumetric images by defining three points
- Measure Distance: Features includes 2D, 3D, straight and curved measurement capabilities

AutoSelect:

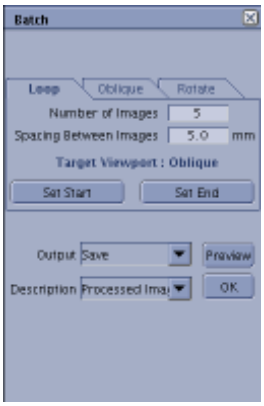
Segmentation tools are enhanced with easy point & click segmentation to add or remove any continuous structures, including bone and vessel structures for CT and vessel structures for MR. It is also possible to remove the CT couch with one click.

Consistent Image Capture

Common with all GE CT and MR consoles and AW, the function keys may be used to capture any images displayed on screen and populate current films.

Batch Filming with Free Format Filming and Hi-Resolution capture:

This allows the user to quickly set up and batch reformat 2D or 3D images that can be exported and/or saved in the background. The batch parameters can be saved as protocols for easy recall and future use. Created images may be viewed while being filmed and saved. Batch filming modes include:



- Oblique reformat
- Fan reformat
- 3D Rotation.

Images generated and captured can be put on any film layout, including non-square images at the highest resolution possible. Films can be printed, saved or exported in multimedia format *(see AW Product Datasheet)*.
Saved images can be renamed.
This function is available for any type of dataset, including Multi-phase exams (Cardiac, Liver) and hybrid images (PET/CT, PET/MR).

Batch Loop Mode:

An additional batch movie mode allows the user to perform a first image to last image movie. In this tool, the user simply defines the first and last views of the movie to be created. The software will automatically create the movie with all images between the first

and last view. This guide can be used for batch 3D rotation (MIP, 3D, VR) and batch reformat (axial, coronal, sagittal, oblique).

Remote Interactive 3D:

Volume Viewer has the capability to export QuickTime* VR objects. This enables easy viewing and manipulation of 3D objects, through the Advantage Workstation Filmer, providing clinicians and radiologists access to 3D data anywhere across the clinical enterprise to PC or Apple clients.

Movie Builder

All manipulations (Zoom, Rotate, Rendering Parameters) on 3D and Volume Rendering Views can be recorded with the Movie Builder function. The user needs only to set intermediate reference views and the software will automatically compute interpolated images at a predefined frame rate. The output is a standard MPEG or AVI file when using the Advantage Workstation Filmer

Cardiac Review and Export

Processing and review of cardiac exams for CT, MR and PET with manual oblique reformatted protocols can be exported into a multi-phase cine movie that allows for the referring physician to review the exam in a dynamic mode.

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Industry Standards

The AW VolumeShare 4™ complies with a wide variety of industry standards to facilitate more rapid adoption of features and performance improvements as the computing and medical imaging industry evolves.

Computer Industry Standards for Workstation Class Products:

- GE CTT OS Linux
- POSIX (1003.1, 1003.2, 1003.4)
- ANSI C / ANSI Draft Standard C++ / JAVA

DICOM Conformance Standards:

- DICOM 3.0 Storage Service Class for RT, CT, MR, CR, X-ray (Angio and R&F), Digital X-ray (DX), MG, NM, PET, U/S, Secondary Capture, Secondary Capture Color DICOM Image Objects. (Service Class User (SCU) for image send and Service Class Provider (SCP) for image receive).
- DICOM 3.0 Query/Retrieve Service Class (SCU and SCP)
- DICOM 3.0 Storage Commitment Service Class (SCU)
- DICOM Print (Color and B&W)
- DICOM Media Interchange (CD-R, DVD+R(W))

Filming Protocols

- DICOM Print (Color and B&W) and Adobe Postscript (Color and B&W) for supported printers

System Components

AW VolumeShare 4™ - Standard Configuration

- *HP XW8600 Workstation*
- *Intel 5482 Quad Core Xeon 3.2 GHz CPU w/ 12MB Shared L2 Cache*
- *1600 MHz Dual Front Side Bus*
- *4GB (2x2GB) DDR-2 800 ECC DIMM (expandable to 16GB)*
- *1 x 146GB SAS 15,000rpm Hard Disk for OS and Apps.*
- *2 x 146GB: SAS 15,000rpm Hard Disks for Image Data.*
- *292 GB can be used for image storage as follows:*
  - *2,304,000 256^2 images OR*
  - *576,000 512^2 images OR*
  - *144,000 1024^2 images OR*
  - *28,800 2048 x 2560 images*

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- *Internal DVD Writer drive for read/write of DICOM CD/DVD media, read/write of Data Export CD/DVD data and service use (DVD Install)*
- *Integrated Ethernet 10/100/1000 Mbit/s Port.*
- *1 internal 3½" Floppy Drive*
- *1 USB QWERTY Keyboard.*
- *1 USB Optical 2 Button Scroll Wheel Mouse*

Footprint

- *Height 45.5cm (17.9in.)*
- *Width 21cm (8.3in.)*
- *Depth 52.5cm (20.7in.)*
- *Weight 25.2kg (55.6 lbs.)*

Operating Environment

- *Temperature: +5°C to +35°C*
- *Humidity: 8% to 85% (relative non-condensing) @ +35C*
- *Altitude: 0 to 10,000 ft. (3100 m)*
- *Acoustics: +5° to +25° C: L_{WA} less than 5.0 Bels ; +25° to +35° C: L_{WA} less than 5.5 Bels*
- *Shock: 40 G peak, half-sine, 2-3 ms*

Non-Operating Environment

- *Temperature: -40°C to +60°C*
- *Humidity: 8% to 90% (relative, non-condensing)*
- *Altitude: 0 to 30,000 ft. (9100 m)*

Monitors

- NEC Flat Panel 19" LCD
- NEC MultiSync* LCD1980SXi
- 19 inch diagonal width
- 1280x1024 Landscape display
- 60 Hz refresh rate
- Height: 44.5cm (17.5in.)
- Width: 39.8cm (15.7in.)
- Depth: 21.8cm (8.6in.)
- Weight: 8.5kg (18.7lb.)

- 110-240VAC, 47-63Hz, 0.35-0.8Amps.

Image Networking

- Standard 10/100/1000 Base-T Ethernet for DICOM
- 1000 Base-T dedicated network for optimal Direct Connect performance
- Protocols supported:
  - DICOM 3.0 Storage SCU/SCP and Query/Retrieve SCU/SCP
  - InSite
  - TCP/IP network layer
  - SdCNet supported to query/retrieve from AW 3.1 and AW 4.0
- AW VolumeShare 4 does **NOT** support the AdvantageNET network protocol.
- AW VolumeShare 4 does **NOT** support DICOM images from GE Signa® version 5.x 1.5T MR systems

Standards and Regulation

This product complies with the following requirements:

- Safety: UL1950, CSA 950, TUV EN 60950
- AWVolumeShare 4™ is compliant to IEC 601-1-2 Edition 2
- European CE marking regulation following Medical Devices Directive: Directive 93/42/EEC, dated 14 June 1993.

Warranty

The published company warranty in effect on the date of shipment shall apply, GE HEALTHCARE reserves the right to make changes. All specifications are subject to change.

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New Product Configurations

Catalog	Description	Availability
	NEW AW VolumeShare 4 systems	
M81521FA	1 Monitor AW VolumeShare 4, 4GB RAM	Asia
M81521FB	2 Monitor AW VolumeShare 4, 4GB RAM	Americas
M81521FD	2 Monitor AW VolumeShare 4 CV, 12 GB RAM + productivity package	Europe / Asia
M81521FC	2 Monitor AW VolumeShare 4 XT, 4GB RAM	Europe / Asia
M81521FF	2 Monitor AW VolumeShare 4 Performance, 4GB RAM	Europe / Asia
M81521NA	1 Monitor AW VolumeShare 4 NO Volume Viewer, 4GB RAM	Global
M81521NB	2 Monitor AW VolumeShare 4 NO Volume Viewer, 4GB RAM	Global
	SOFTWARE ONLY OPTIONS / UPGRADES	
M81521RD	RIS Synchronization + CONTEXT MANAGER for CCOW OPTION	Global
M81521RC	RIS Synchronization	Global
M81531VF	Software Upgrade to AW VolumeShare 4 (requires x8400 HW)	Global
M81521VB	Volume Viewer 4 software for AW VolumeShare 4 NO VV systems	Global
M81521PL	Productivity Package, 4GB RAM	Global
M81521PM	Productivity Package, 8GB RAM	Global
M81521PN	Productivity Package, 12GB RAM	Global

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