



Centricity™ PACS 1.0 Customer Release Notes

PACS Release 1.0

**OI10099
Revision 1**



0459

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Regulatory Requirements

This product complies with the regulatory requirements of the following:

- ◆ Medical Device Quality Systems Regulation, FDA (Food and Drug Administration, Department of Health and Human Services, USA).
- ◆ Underwriters' Laboratories, Inc. (UL), an independent testing laboratory.
- ◆ Canadian Standards Association (CSA).
- ◆ International Electrotechnical Commission (IEC), international standards organization, when applicable.
- ◆ General Electric Medical Systems is ISO 9001 and EN 46001 certified.
- ◆ The original document was written in English.

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- ◆ reorient or relocate the affected device(s)

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- 忽略本注意事项会对维修员，操作员或病人造成触电，机械伤害或其他伤害。

Revision History

Rev	Date	Author	Reason For Change
0	5/2002	DB	Initial release for Centricity PACS 1.0
1	8/2002	DB	M4 release

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Introduction

Section 1: Overview of Centricity PACS

Centricity PACS provides a high performance, open system for Hospital Enterprises. Centricity PACS 1.0 offers the following key features:

- ◆ Remote Workstation
- ◆ Centricity Archive
- ◆ DDP Improvements

Note: *To upgrade to Centricity 1.0, the customer site must be at PathSpeed 8.1 CSR1.*

Section 2: Documentation

Document Number	Document Title
FP10531	PathSpeed 8.1 to Centricity 1.0 Upgrade Manual
OI10099	Centricity 1.0 Release Notes - Customer
FP10533	Centricity Archive (ARC) Service Manual - Macintosh Version
FP10599	Centricity Data Migration/Storage Expansion Service Manual
FP10537	Centricity DICOM Application Services (DAS) Service Manual
FP10540	Centricity DICOM Print Server (DPS) Service Manual
FP10541	Centricity Archive Service Manual
FP10542	Centricity Exam Manager Service Manual
FP10547	Centricity Modem Service Manual
FP10549	Centricity Integrated Storage Unit (ISU)/Image Volume (IV) Service Manual - Fiber Channel
FP10548	Centricity Integrated Storage Unit (ISU)/Image Volume (IV) Service Manual - SCSI
FP10550	Centricity Long Term Storage (LoTS) Service Manual
FP10552	Centricity Modality Interface Unit (MIU) Service Manual - Macintosh
FP10553	Centricity PACS Camera Server (PCS) Service Manual - Macintosh
FP10554	Centricity Preventative Maintenance (PM) Manual

Document Number	Document Title
FP10557	Centricity System Administration Manual
FP10555	Centricity System and Subsystem Pre-Installation Manual
FP10559	Centricity Test Information Storage Unit (TISU) Service Manual
FP10562	Centricity Web Service Manual
FP10564	Centricity Workstation Service Manual

Note: The Centricity Exam Manager, Web and Workstation applications offer online help.

Section 3: Security Strategy Statement

The Centricity PACS system is an Intranet-based imaging and information management system consisting of a number of host computers communicating to each other based on the TCP/IP protocols in a trusted network environment. This trusted network environment is referred as the PACS network.

The customer is responsible for the security of the PACS network, which can be a dedicated or shared environment at a customer site. The customer shall apply firewalls, and other network security measures to protect the PACS network. Access from other hosts and / or networks to the PACS network is controlled by the customer.

The Centricity PACS system assumes that the PACS network is secure. Additional security measures may be applied in the communication between the Centricity PACS hosts (i.e. for password transmission in a user authentication process). However, individual PACS hosts are not invulnerable to outside network attacks beyond security measures provided by the PACS network. The patient data stored on the Centricity PACS host computers and the connected storage subsystems are protected by the access control mechanism of the underlying operation systems, but may not be specifically encrypted.

The Centricity PACS system is built on industry standard system software components (i.e. operating systems, relational database management systems, web servers, etc.). The following

system software security patches are included in computing platforms shipped with Centricity 1.0 (M4) PACS system release.

Operating Systems	Security Patches Applied
Windows 2000	W2k Service Pack 2 W2k Hotfix Q311967 W2k Hotfix Q313450 W2k Hotfix Q313829 W2k Hotfix Q314147 W2k Hotfix Q319733 W2k Hotfix Q320206 W2k Hotfix Q321599 W2k Security Rollup package Hotfix Q311401 Internet Explorer 5.5 Service Pack 2
Windows NT 4.0	Service Pack 6a Internet Explorer 5.5 Service Pack 2
Sunfire V100 Sunfire V120 Sun Ultra 10	108576-26, 108604-24, 108605-24, 108606-21, 108693-08, 108806-08, 108813-09, 108921-14, 108940-40, 109039-09, 109152-01, 109154-11, 110910-01, 111197-02, 111299-03, 111317-02, 111319-01, 111624-02, 111883-07, 112097-01, 112158-01, 112425-01, 112396-02, 108987-09, 111293-04, 108869-15, 109326-07, 109805-07, 109147-15, 112218-01, 108949-07, 108434-06, 108435-06, 110458-02, 111325-01, 108875-11, 111881-01, 109898-05, 110075-01, 110901-01, 109657-06, 108901-04, 112325-01, 110662-07, 110943-01, 110898-04, 109324-04, 111111-03, 110916-02, 109091-04, 110387-03, 110283-05, 109277-02, 110951-02, 111234-01, 110903-04, 109320-05, 109470-02, 109783-01, 109951-01, 110453-03, 110945-05, 111071-01, 111232-01, 110700-01, 110939-01, 111548-01, 111570-01, 108652-47, 110322-01, 110286-06, 111504-01,

Operating Systems	Security Patches Applied
Sunfire V100	111606-02, 109882-05, 111069-01, 110615-04,
Sunfire V120	110668-03, 110670-01, 111826-01, 108981-08,
Sun Ultra 10	111874-05, 111659-06, 111596-02, 109667-04,
	110957-02, 111626-01, 111085-02, 108919-14,
	110838-04, 110380-04, 111310-01, 111098-01,
	111327-05, 108974-17, 108977-01, 110934-05,
	108528-14, 108989-02, 108827-20, 108993-07,
	110723-04, 110460-18, 109888-15, 108727-14,
	108725-08, 112138-01, 109318-26, 108985-03,
	109885-08, 109238-02, 108968-05, 108997-03,
	108975-06, 109007-07

On Sunfire V100/V120 and Sun U10, the installed patches can be checked by the following command in any Solaris shell.

patchadd -p

Any future patches from system software vendors will be evaluated in terms of their impact on the Centricity PACS System and the CRET-CC advisory (www.cret.org). The Centricity System Security Patches are provided for the deployment of important system software security patches in the installed base.

The Centricity System is delivered without any pre-installed anti-virus software on any of its host computers. The Centricity RA-1000 Workstation and Web Server hosts have been validated with Norton and McAfee anti-virus software. The customer may choose to install one of these anti-virus applications on the hosts if desired or required by local security policies. However, it is the customer's sole responsibility to acquire the anti-virus software licenses, maintain the software, and update the virus-signature files.

The Centricity PACS system is built on standard industry operating systems (Sun Solaris 8 and Microsoft Windows NT / 2000). These operating systems may provide C2 security support through built-in or add-on software modules. However, GE does not claim C2 certification for the Centricity PACS system.

Section 4: System-wide Functionality

4-1 Architecture

Introduction of the Centricity DICOM Application Server: With Centricity PACS 1.0 all DICOM services have moved to a new Rack-Mount UNIX based system. DICOM services such as modality connectivity, query, retrieve, send etc. have moved to this architecture.

The primary goal for GE architecture is to minimize the footprint of the Centricity PACS components in the Hospital Data Center by using rack-mounted hardware components.

4-2 Resident Review

Centricity 1.0 will support two kinds of resident reading workflows

- ◆ Resident dictates – attending reviews
- ◆ Resident review – attending dictates

The following major functions will be implemented:

- ◆ Record the Workstation logged-in User ID in examination.prim_approve_std when an exam is F6ed. At the same time, record the timestamp in examination.approval_dttm. This allows the system to know who F6ed an exam until the final report is received. When a final report is received, this field may be overwritten if the final approver is different. However, it is assumed that the resident review episode is finished when the final report is received.
- ◆ Record the Author User ID in examination.prim_approve_std when a temporary report is received from the RIS. At the same time, record the timestamp in examination.approval_dttm. This allows the system to know who authored the preliminary report. Even if the resident did not F6 the Exam in PACS, but directly dictated the report in RIS, the Resident Workflow "Dictate-Review" stills works, because we can create an Approved Worklist which correctly includes this as a "Resident dictated Exam".
- ◆ Create a Resident User Group

- ◆ Create a reading worklist based on a section.
- ◆ Create a worklist that includes all exams with Status 70 (Transcribed) and examination.prim_approve_std is a user of the Resident User Group. This is used to support the Dictate-Review workflow.
- ◆ Create a worklist including all exams with Status 60 (Dictated) and examination.prim_approve_std is a user of the Resident User Group. This is used to support Review-Dictate workflow.

Workflow scenario: A resident views the exam. If the system is set to the PACSONLY mode, he can also write his findings in the report window. Then he presses F6. The attending uses this worklist to locate "resident reviewed" exams and dictate them (F6 again - note).

- ◆ A preliminary report (in report - review mode) or diagnostic impression text (review - dictate mode) will be overwritten when the attending approved final report is received.
- ◆ Display the human readable name of the resident (from examination.prim_approve_std) in all worklists.

Section 5: Server

Centricity 1.0 servers and applications will be run on a number of new platforms:

- ◆ Sybase ASE 12 as the System Database Engine for the IMS and PR Databases
- ◆ Solaris 8 for the System Database Server and other PACS server applications (LoTS, DAS and DPS)
- ◆ Sun Fire V120 (LoTS) with Solaris 8
- ◆ Sun Fire V100 (DAS) with Solaris 8
- ◆ E420 + FC for ISU (database + image volumes) with Solaris 8
- ◆ Veritas xfs upgrade: Image Volume and PR Databases (IMS database likely in the future)
- ◆ RAID Controller Firmware (SCSI only) upgraded to Solaris 8
- ◆ RAID Manager Software (SCSI only) upgraded to Solaris 8
- ◆ EJB Application Server (Orion) and hosting platform
- ◆ HTTP Server and hosting platform

Centricity 1.0 server software packaging shall support a separate deployment of the following items, instead of the one-CD-for-all solution used in 8.1.

- ◆ Operating System (Solaris 8)
- ◆ Operating System Patches
- ◆ VXFS (optional)
- ◆ Sybase ASE (optional)

- ◆ PACS IMS Database
- ◆ Rumba PR Database
- ◆ PACS server applications (DAS, LoTS, DPS, CAM, OM and other services)
- ◆ Rumba server / middle-tier applications

Centricity 1.0 installer will support this packaging plan for both baseline and upgrade installations. The capability of adding OS patches separately is part of the HIPAA support in Centricity 1.0 PACS.

Macintosh ARC and MIU boxes are supported in the Centricity 1.0 system release, however they have no new features.

Centricity 1.0 will continue to support the following IB upgrades:

- ◆ E450 SCSI ISU
- ◆ E450 SCSI LDB
- ◆ E450 SCSI XLDB
- ◆ E450 SCSI Image Volume

Note: U2 SCSI LDB is discontinued in Centricity 1.0.

- ◆ The Test ISU remains a Sun U10.
- ◆ PathSpeed Web for Centricity 1.0 will run on the same platform as 8.1 - Solaris 2.6 on SUN E250. No SSL support is required.
- ◆ Broadcast messaging service, includes the User interface for sending/canceling the message and service to broadcast to all the web clients.
- ◆ Password History, this is fulfillment of HIPPA requirement: User can not change his/her password to any of the previous n passwords where n is a configurable variable.

- ◆ User bookmarks, the last visited page will be kept for each user in case of Lock or time out from the web client and in the next logon the user will be taken into the bookmarked page.
- ◆ SSL configuration for encryption, which can override the pages https scheme to http if the value is set to 0. Digital Certificate is generated during installation of the Middle tier to support SSL.
- ◆ Version information dialog, displays the version information of middle tier from the about icon at the top right hand corner of the portal page.
- ◆ IMS Daemon task for configuring ftp service for the rotated log files to the customer archive.
- ◆ Help files are displayed for relevant deployment mode in the portal.
- ◆ Exam Merge
 - Prior to Centricity 1.0, when two exams w/ the same series were merged, one of the series UIDs was changed, so the surviving exam would have two series. Starting with Centricity 1.0, the resultant exam will one single series with all images from the series in both exams.

5-1 DICOM Services

The installed base upgrades will retain the MAC workstations. All DICOM services running on MIU are provided on the SUN Solaris 8 platform (Sun Fire V120/V100). In Centricity 1.0, the following services will be available in the new platform,

- ◆ Data Acquisition Service
 - DICOM C-Store SCP for DICOM data acquisition
 - DICOM Storage Commitment SCP
- ◆ Support DICOM Workstation to query PACS and retrieve images
 - DICOM Query & Retrieve SCP

The Macintosh machine will work as it did in 8.1 but will not support any new features introduced in Centricity 1.0.

5-2 Restrictions to Coexistent of Macintosh MIU/ARC and Unix DAS/LoTS in Centricity 1.0

The following table summarizes the restrictions of adding a new DAS / LoTS into an IB system, which can be divided into three cases:

- ◆ With MIU only
- ◆ With ARC only
- ◆ With both MIU and ARC

It is assumed no new MIU or ARC will be added in 1.0 system.

Existing System New Box Added	MIU	ARC	MIU/ARC
DAS	MPPS Manager off Temporary Storage off PACS only (SR off)	Temporary Storage off	MPPS Manager off Temporary Storage off PACS only (SR off)
LoTS	SOP Instance Level Archiving off	ARC Read only	ARC Read only SOP Instance Level Archiving off
MIU	No	No	No
ARC	No	No	No

Some other important notes:

- ◆ ITS runs still on Mac box.
- ◆ Using LoTS to deploy a Centricity Archive or ASP archive solution, at least one DAS must be installed, because images fetched back from the Centricity Archive or ASP have to be received by DAS.
- ◆ P2P runs on Mac box and operates only in PACS only deployment mode.

- ◆ Centricity Web does not support legacy SPI images. A site using Centricity Web and having SPI images in the LTA shall update all of its legacy Mac ARC to LoTS, which is expected to convert the SPI images to DICOM.

- ◆ There's no Kodak ODJ support in LoTS. A site currently with an ODJ system has the following choices:
 - Continue the ODJ operation with a Mac ARC, which is operating in read-only mode. Image fetch from the ODJ library can be supported, but no data can be written to the ODJ library. In this case, the restrictions listed in the above table apply - there is a Mac ARC in operating.
 - Migrate the images from ODJ to a Centricity Archive Controller or Centricity Archive or ASP. During the migration, a Mac ARC serves the OBJ library for image reading out. After migration completion, both the ODJ library and the Mac ARC can be removed from the system.

Section 6: DICOM Application Services Server (DAS)

The new DICOM Application Services Server (DAS) replaces the legacy Modality Interface Unit (MIU). The new hardware is a rack-mounted SunFire V100 server. The DAS provides the same services performed by the MIU and it offers the next generation of DICOM services.

Sites that use PACS-to-PACS (P2P) services on the MIU should continue using the MIU to support P2P as well as DICOM Send in Centricity 1.0. Instructions for configuring the MIU to support P2P and DICOM Send have not changed from previous releases. See MIU Service Manual FP10552 for more information.

Sites that do not use P2P but use DICOM Send should configure the DAS to support DICOM Send in Centricity 1.0. Instructions for configuring the DAS to support DICOM Send are in DAS Service Manual FP10537.

- ◆ DICOM Store & Storage Commitment as SCP
- ◆ DICOM Query/Retrieve as SCP
- ◆ DICOM Send as SCU
- ◆ Multi-frame image compression for progressive wavelet
- ◆ Improved modality flexibility
 - More control over system access via configurable permissions
 - All modalities can use just one AE Title across PACS - simplified modality configuration
 - Reduction in number of profiling errors.
- ◆ Strategies for choosing profiling algorithm
 - One profiling algorithm per AE Title (as in previous releases)
 - Adaptive Profiling based on who is calling the common PACS AE Title.
- ◆ Hardware
 - Sun Fire V100 server

- Rack mountable (1 RU)
- No monitor or keyboard - remotely configurable web service command center
- Up to seven modality connections per server

◆ GUI Changes

- Button "Browse Remote Logs" is added in the main health panel of Command Center and also in the logviewer pane of the detailed UI.
- Save feature for the browse remote logs was added.
- At any point in time, only one instance of the frame showing log levels for a particular service opens.
- Functionality details for these buttons are added into the service manual.
- Upgrade/Normal/Safe button next to the "Mode:" label on both the Acquisition Services" and "Q/R & Send Services panel of DAS is enabled. It helps in changing mode of operation of DAS from Normal to Upgrade while Safe mode is set automatically by DAS.
- Copyright dialog box for the detail UI have a button "StartUpMessages" which when clicked opens up a separate application which shows start up messages in a text area. If no messages are available a message is displayed.
- Default Selection for Node and Address panel
- Online help for the UI is available.

◆ Support for operation mode changes in DAS is added.

◆ Application Control:

Each application (DAS, SCSI, ADC, AQM) must be configured by running either `config_das.sh` or `config_lots.sh`. After configuration, an executable script file `startserver.sh` will be created in the `bin` directory under flamingo home. Script `stopserver.sh` is in the same directory. Each application will be started on system boot and stopped on system shutdown. If you need to manually stop or start the configured application, use these two scripts (`stopserver.sh` and `startserver.sh`) without any command line argument.

- ◆ **Audit Log Restorer:**
Each application (DAS, SCSI, ADC, AQM) will run with a companion AuditLogRestorer application. This application forwards audit logs on local disks to a central repository. It is started or stopped with the Flamingo application.
- ◆ **ISU Address Changes:**
Whenever a customer site changes the IP address (including virtual IP) of the ISU (stand-alone or VCS), the DAS/LoTS software needs to be re-configured. For each of the application (DAS, SCSI, ADC, AQM), re-run the configuration script (config_das.sh or config_lots.sh) with the new ISU address (or virtual IP addresses). On the ISU host, run script ISU_IP_config.sh with the new address(es). On a stand-alone ISU, specify the ISU host IP address after -a and omit the -m option.

Example: ISU_IP_config.sh -a 3.28.73.163

6-1 Configuration File Changes

- ◆ **deadlock_retry_interval** - The time after which DAS should retry, if there is a deadlock during image profiling.
- ◆ **deadlock_retry_count** - Number of times DAS should retry for deadlock to release.

Section 7: Long Term Storage Server (LoTS)

- ◆ Data separation and integrity
 - Rule engine based
 - DICOM Digital Signature Data redundancy support in two modes
 - Redundancy within a single device. Exams in different media.
 - Redundancy among multiple archive devices. Exams across devices.
- ◆ High availability
 - Automatic detection of device failures.
 - Automatic restart in case of software failure.
 - Automatic fail over in case of device/media error.
 - Load balancing among archive devices.
- ◆ DICOM and Centricity Archive support
 - Storage of exams to external Centricity Archive
 - Storage Commitment SCU support for external Centricity Archive
 - Centricity Archive specific optimizations
- ◆ GUI Changes
 - Save feature for the browse remote logs was added.
 - Online help for the UI is available.
- ◆ Other Changes
 - Added VCS Failover Support

- Added SCSI Lossy Compression-Decompression Support
Lossy decompression is primarily used when retrieving exams that had been previously archived by the Macintosh Archive Controller. To fully test this functionality many exams should be archived by the Macintosh using lossy compression and then retrieved by the SCSI LoTS server. This will only affect Plasmon MOD as AIT does not use Lossy compression.
- Added AIT-2 Support

7-1 Configuration File Changes

- ◆ Added need_retrieve_support config item.
- ◆ Removed drive_device_name config item.
- ◆ Added Logging options for performance measurements.
- ◆ Added configure_drivers.sh script to configure scsi device drivers.

More rows of data were added in the loader scripts to facilitate inclusion of new features from the middle tier, and also to resolve the deployment mode issue with the existing features.

Section 8: Centricity Archive

8-1 Communication

8-1-1 Supported IODs

Centricity Archive supports a variety of DICOM IODs. This list does not only contain the traditional Radiology IODs like CT and MR, but also Cardiology IODs like XA.

In addition to images the archive also support non-image DICOM IODs such as:

- ◆ Grey Scale Presentation State
- ◆ Structured Reports
- ◆ Key Image Notes

8-1-2 Storage Commitment

Centricity archive supports DICOM storage commitment. It will notify the sending system when the images have been received (default) or written to media (configurable).

8-1-3 Communication with PACS

The communication with Centricity PACS is completely based on DICOM. Centricity PACS has a dedicated service for communication of the Centricity Archive, the LoTS.

- ◆ Asynchronous C-Move

The LoTS instructs the Archive to pre-fetch images from media through a C-MOVE command. In doing so it also specifies the priority with which the images should be pre-fetched.

◆ CompressExpress/TruRez support

Centricity Archive for PACS will support CE/TruRez (de)compression of inbound and outbound images. This will be available in all versions of the product. We implement the compression as a private DICOM Transfer Syntax.

Default setting is that Centricity Archive will convert incoming CE/TR images into DICOM with JPEG lossless compression. This ensures the stored data remains DICOM compliant.

Regardless the compression that is used for storage, the Centricity Archive will always be able to send images in DICOM format.

◆ Multiple archives on a single PACS installation

The communication between the PACS and the Centricity Archive is managed by the LoTS component. It is possible to have multiple Centricity Archives assigned on one PACS. This does require 1 LoTS per Centricity Archive.

In configurations where the ASP datacenter functions as the off-site archive, the LoTS will provide communication between PACS and the datacenter.

◆ Storage compression schemas

Centricity archive has functionality to configure which compression should be used before storing the images on media. Configuration is rule based, using the DICOM fields from the incoming images.

Possible compression options are:

- Do not change
- DICOM JPEG lossless
- DICOM JPEG lossy with specification of the quality factor

Note: *Quality factor 100 is the highest quality factor. The lowest quality factor can provide up to 9:1 compression. This is similar to the compression in Centricity Web.*

8-1-4 Storage

The Centricity archive stores all files in DICOM part 10 file format. This has the benefit that the user can always read the information that is stored on media.

8-1-5 Supported media types

In addition to RAID only, Centricity Archive supports the following media types.

Media	Toolkit	DICOM Part 10	DICOM Dir + DICOM Files on UDF	DICOM Files on OTG	Comment
CD-R	ArchiveXtender	Yes			
DVD-R	ArchiveXtender		Yes		
DVD-R Dual sided	ArchiveXtender		Yes		
DVD-RAM	DiskXtender			Yes	
DVD-RAM Dual sided	DiskXtender			Yes	Manages each side of media as a single platter. Cannot guarantee that original and backup are not on the same media.
MOD (Dual sided)	DiskXtender			Yes	
AIT-2	DiskXtender			Yes	

8-1-6 Scalability

Single application server capacity

The controller of the Centricity Archive is designed to support up to 300.000 procedures or 10TB of unprocessed data per year.

Redundant storage

The Centricity Archive provides several levels of redundancy.

- ◆ Media copy
- ◆ Redundant archives
- ◆ Off-site archives (GE ASP or a customer-owned Centricity Archive)

8-1-7 Media Management

Centricity Archive supports media management, handling of media that is not in the jukebox.

- ◆ Ejecting media

To remove media from the jukebox the operator will select the media from the medialist in the console and presses the 'eject' button. The system will tell the operator that the media needs to be labeled by writing the name on the media.

- ◆ Inserting media

No user intervention is required for pre-fetching exams that are out-of-cache and on on-line media. If the exams are on off-line media the system will generate messages that the media needs to be inserted. This is done by e-mail and via the console.

- ◆ Operator messaging

The operator can retrieve a list of media 'to be inserted' from the console. The list contains the labels of the media that need to be inserted and provides a function to insert media in the jukebox.

8-1-8 Multiple Jukeboxes and Direct Attached RAID

The Centricity archive supports multiple jukeboxes per Application Server. As a rule of thumb it is always safe to state:

- ◆ Maximum 2 jukeboxes
- ◆ 1 SCSI connection kit per jukebox

The actual rules are complicated, but do allow for expansion into more than 2 jukeboxes.

- ◆ 1 PCI slot per CD/DVD jukebox (each device requires 2 SCSI channels)
- ◆ 1 PCI slot per 2 MOD/AIT jukeboxes (each device requires 1 SCSI channel)
- ◆ 1 PCI slot per 12 TB RAID
- ◆ max. 12 TB RAID
- ◆ max 3 PCI slots available

8-1-9 Archive for 3rd Party PACS

The Centricity Archive has the highest level of openness that can be achieved through the DICOM standard. This DICOM interface facilitates use of the Centricity Archive as a DICOM archive for non GE PACS applications.

It provides functionality for caching, routing, pre-fetching and deletion based on rules. The archive can also query span queries to other DICOM nodes and move forward exams from other DICOM nodes. The archive can compete with any 3rd party DICOM archive on the market.

Of course the third party PACS must be DICOM compliant and match the Centricity Archive 1.0 DICOM conformance statement.

8-1-10 Archive Partitions

A unique feature for the Centricity Archive is the possibility to partition the archive into multiple archive partitions. These are also referred to as virtual archive. This feature will not change the physical amount of storage capacity, it partitions the available space over multiple archives. Each archive partition has its own dedicated database and responds to it's own AE title.

Section 9: Workstation

- ◆ Home/Remote Diagnostic Workstation feature
- ◆ Image Display Performance
- ◆ Image Export Feature
 - Select images and export them to an FTP server.
- ◆ Centralized User Login
- ◆ Cursor Icon feature
- ◆ Workflow and Image Viewing Features
- ◆ Technologist software - runs only on a 1280x1024 or less resolution system
- ◆ Clinician software - docked task and function bar, docked tool bar.
- ◆ New Pet related features
 - Pet window level settings will added to the window level presets and will actually set window level presets. Previously the pet selection in the window level presets was for LUTS. NM will no longer be in the window level presets drop down.
 - With PET/CT studies (combined into one study from a Discovery scanner) will have CT window level presets available in the display functions along with the current functions shown for PET. See me for explanation of this if it is not clear.
 - Window level hot keys will be series specific.

Example: When you click on a CT, the presets will be CT. If you then click on a PET, the window level presets will be PET presets.

- Image ordering for PET has been changed to no longer use image number and now uses a DICOM tag specifically for ordering the series. This is a result of meetings with customers who pointed out our ordering was inaccurate when done using image number, because you can have the same number multiple times in a PET study. We worked with the GE PET team to identify the correct tag.
- Right click menu in the function bar - The palette buttons that are in the task bar will be in a popup menu when you right click on the function bar. The minimize button in the function bar is removed.
 - Workmodes
 - Patient jacket
 - Order info
 - Report
 - Favorite desktop
 - Save favorite desktop
- ◆ MinimizeThe plus button on the taskbar is being removed. The hotkey will still be available and the minus button will still close all palettes.
- ◆ Workstation licenses
 - There are six types of licenses. Three are concurrent and three are dedicated. Concurrent are shared licenses and dedicated are designed to set up some workstations to allow login. As an example, five dedicated licenses are used by five workstations, however ten concurrent licenses are shared by twenty workstations.
 - i. Radiologist - concurrent and dedicated
 - ii. Clinician - concurrent and dedicated
 - iii. Technologist - concurrent and dedicated

9-1 User Interface Enhancements

A substantial amount of Graphical User Interface changes have been introduced in the Centricity 1.0 workstation. The new GUI was introduced to address a list of CTQ's that were collected from our user base. Here are some of the major changes:

- ◆ Favorite Desktop - User will be able to display the palettes in a favorite configuration, go into "Image Functions" and save the current size and location of the palettes to be redisplayed via a button on the taskbar. If a configuration is saved but is not displayable in the current monitor setting, the user will get a prompt saying your favorite cannot be displayed in this configuration.
- ◆ High-resolution flat panel display: 3M (higher priority) and 5M. (Vendor-independent)
- ◆ All GUIs are now place in floating palette (i.e. Worklist, historical list, report, etc...) The "Tab" concept no longer exists.
- ◆ Tools, menus, and buttons have been removed from the view area so the entire real state can be utilized for image display.
- ◆ A Function bar (top of screen) as well as a task bar (bottom of screen) now contain all the exam, image and control GUIs. The bars are hidden by default unless the mouse is passed across the top or bottom of screen
- ◆ All DDP functions are now available from a menu on the function bar
- ◆ DDP wizard no longer exists. An advance DDP tab is introduced and is located in the utilities palette.
- ◆ The layout manager is now located in the patient jacket. (patient palette)

9-2 Workstation DDP Enhancements

The relationship of a DDP to its applied procedures, simplifies the save procedure of DDP (10 button clicks now).

Presentation information will be recorded along with the DDP, including W/L, zooming, etc. In Centricity 1.0, this will be saved in a certain proprietary format. However, in the future releases, the presentation data record format in the PACS will be moved to the GSPS framework.

Image group linking information will be recorded along with the DDP, including links, cross-references, etc.

Application of the presentation data (stored in DPP and in FCE) must be configurable, rule-based, and modality specific.

Centricity Web 1.0 will also support some simple DDP features (exam display hanging protocol).

9-3 Sync-ing Multi-Group Image Display in Stack Mode

This feature allows you to select multiple Image Display Series that are all in the Stack mode and synchronize them. (i.e. All of the series will show the same relative anatomical location.)

The feature makes use of the DICOM attributes associated with the image to find an image on the other series that is anatomically close enough to be treated as a match. The feature will work only in the following scenarios:

- ◆ All the images in the series have the DICOM attributes needed to identify a match.
- ◆ At least two series have overlapping anatomical information.

In case the conditions mentioned above aren't fulfilled, then the feature is identical to the "Link Image Series" feature.

Note: *As you navigate through one of the synch'ed series, the other synch'ed series display area will show an anatomically matching image. In case no match can be found, the other series' display area will appear blank.*

9-3-1 Sync-ing Stacks Serviceability Issues

The following aspects of the sync-ing stacks feature's behavior can be configured by changing the Platinum.properties file's settings:

1. Property:

`com.ge.med.newman.gui.userprefs.ViewPreferencePanel.enableSynchStack`

Allowed Value Impact

- a.** true Sync-ing stacks feature will be enabled at startup (the checkbox on the Display Preferences tab will be checked)
- b.** false Sync-ing stacks feature will be disabled at startup (the checkbox on the Display Preferences tab will be unchecked)

2. Property:

`com.ge.med.newman.gui.userprefs.ViewPreferencePanel.maxAngleBetweenPlanes`

Allowed Value Impact

Any positive integer value (e.g. 1, 2 etc.) Specifies the tolerance for the angle between two image planes while searching for a matching image.

3. Property:

`com.ge.med.newman.gui.userprefs.ViewPreferencePanel.breakLinkIfDDPCannotSync`

Allowed Value Impact

- a.** true When a DDP tries to sync some series and fails, then a link will NOT get created.
- b.** false When a DDP tries to sync some series and fails, then a normal link will get created instead.

9-4 Remote Diagnostic Workstation

- ◆ Launch workstation via browser
To launch application via browser, the use case is such that when a new version is available, we want to be able to use web technology to deploy the application. The application is downloaded once and stored on the PC for subsequent use. Much of this requirement is driven more from the need to be able to have the same technology play as the competition.
- ◆ Web-enabled deployment of Workstation
Support @HOME reading workstation. @HOME is a configurable option of the Workstation. The following features are supported if this option is enabled. In the following text, @HOME Workstation means a Workstation enabled with the @HOME option.
- ◆ Exam push function. This function can be issued from one WS, to push the images of the Exam from the system STS to an @HOME WS. The push function can be issued on an @HOME Workstation.
- ◆ The @HOME WS can be connected to the system with a low-speed link (persistent or even POTS line) of 1.5 Mb. Security measures will be applied, but the connection is not required to be persistent.
- ◆ The system is able to resume the data transmission process if it is interrupted due to some communication failure.
- ◆ The @HOME Workstation can support a local cache for the exams pushed to it (images only, not database information). The cached images cannot be pushed. **Push always deals with the images in the system STS.** Tools for management of the local cache are provided, including purging the cache and deleting one or several specific exams. The local cache is automatically maintained by purging the cache using the Exam Received Aging criterion, which is configurable.
- ◆ The @HOME Workstation must be connected to the PACS database when the user reads exams. The user gets all information from the PACS Database as usual, except that the images are loaded from the local cache. In addition, a local worklist is supported, which only lists all locally cached exams. The reading / approve macros shall be supported.

Note: Sites that are not upgrading to our new OS ghosts (both NT and W2K) will have to give administrative privileges to the IIS user.

9-5 Workstation Software Release and Maintenance

9-5-1 Software only Workstation Offering:

- ◆ Workstation application are deployed separately from the supported OS: Two CD's will be provided for OS (if required) and application, respectively.
- ◆ Workstation application is designed to be hardware independent. (Deployed in Dell, Compaq, IBM, Gateway, HP).
- ◆ Workstation application will be verified in the standard OS environment, including coexistence of other applications. Operating environment and expected performance impact needs to be specified and communicated to the field and customer.
- ◆ Software only workstation application license: Per Workstation Seat License and Site License Counting Number of Concurrent Applications
- ◆ Software-only service plan shall be defined (operating / maintenance conditions, system configuration requirements / recommendations, vendor / customer responsibilities, etc.)

9-6 Third Party Software Coexistence Validation

The workstation application will be designed to run in an open operating system environment. The operating system scope is to be determined. (Win 2K, NT, 95/98/ME)

In an open environment, resources are shared by Workstation and other software. A performance predicted and recommended configuration plan shall be included in the software workstation service plan.

Third party software includes:

- ◆ Microsoft Office Suite
- ◆ Internet Browser (IE and Netscape)
- ◆ Virus Scanning Software (Norton Anti-Virus)

Section 10:Administration

10-1 Centricity Administration Tool (CAT)

- ◆ The CAT is accessible using Internet Explorer 5.x browsers only.
- ◆ All functionality carried over from PathSpeed SA Tool
- ◆ Send Queue Management
- ◆ DICOM, Normalized, Remote Workstation
- ◆ Event Notification Management
- ◆ Scheduled Backup jobs (automatically performed at a timed point)
- ◆ Enhanced On-line help (user docs) for customer functions

- ◆ Improved SA Tool user access control via Function Level selection (GE FE, Customer Admin, Customer User)
- ◆ Additional reporting tools
- ◆ Management (Feingold) System Health, Database fill rate, Short term storage usage, Long-term archive usage, Last backup date record
- ◆ Exam Manager integration of Image / Data manipulation
- ◆ CAT will be installed on the new ORION server (E470) along with all other Centricity 1.0 tools, (i.e. Exam Manager)

10-2 Exam Manager Features

- ◆ Audit Logging Expansion
 - Report Create/Preliminary Report Modified
 - Approved Report Modified/Report Approved
 - Exam Merge
 - Exam Update
 - Patient Merge
 - Patient Update
 - Unspecified Exam Creation
 - Unidentified Patient Creation

10-3 Configuration File Changes

The following configurations were added to the property file:

- ◆ In the non-clustered environment, the administrator needs to give the server IP address. This is mandatory.
- ◆ Retain Exam/ Merge Filter Option - Used to retain filter information in filtering fields after the user switches to another view and then returns to Reallocate and Merge View.

10-4 DICOM Print Server Features (DPS)

The Centricity DICOM Print Server functionality comes with the following enhanced features.

- ◆ Printable scout lines
- ◆ Progressive wavelets in landscape view
- ◆ Solaris 8 operating system and U10 platform
- ◆ 6:1 printer connection support 3 concurrent printing jobs
- ◆ Arabic character set support
- ◆ VCS support for IMS and STS connectivity
 - IMS Connectivity: Whenever a connection to IMS is to be established and it is found to be unreachable or down, DPS will keep on trying to connect to IMS in a loop With some sleep interval (30 secs).And DPS will stay in this state until IMS comes up.
 - STS Connectivity: DPS will reinitialize and try to initialize its STS connection, If STS connection is down, it will sleep for 10 seconds and return. It will be reinitialized by daemon process again.This will go on till STS is up.The print requests in the printing mode at the time STS connection went down will be retried. Except in some cases (See issues), where that particular request will have to be manually retried using FEAT tool.
- ◆ User Privilege and account Expiry

- Now valid FEAT tool user will be created through Centricity Administration Tool with account expiry date and default password expiry date.
- There can be only two privileges assigned to user.
 - DPSAdmin, and
 - ManagePrintQueue.
- If both the privileges are absent then guest privilege is assumed.
- User will see corresponding pop up message in following conditions.
 - If user account is disabled
 - If user account expired
 - If password expired
 - If username is not found in the database
- If user clicks on guest then also guest login assumed and only log file tab is shown.
- User with ManagePrintQueue privilege user will see five tabs i.e. (Log file tab, Job management tab, System Annotation. tab, Misc. Command tab, Printer status tab)
- In the print job management tab, a user with ManagePrintQueue privilege will be able to see all the requests currently in the queue but he will be able to cancel/delete/retry only his requests.
- User with DPSAdmin privilege user will see all tabs and would be able to see/ cancel/delete/ retry requests of all users under job management tab.

10-5 GUI Changes

- ◆ In view of User Privilege in FEAT tool following things will happen:
 - If user clicks on guest then also guest login assumed and only log file tab is shown.
 - User with ManagePrintQueue privilege user will see five tabs i.e. (log file tab, Job Management tab, System Annotation. tab, Misc. Cmd tab, Printer status tab)

- In the print job management tab, a user with ManagePrintQueue privilege will be able to see all the requests currently in the queue but he will be able to cancel/delete/retry only his requests.
- User with DPSAdmin privilege user will see all tabs and would be able to see/ cancel/delete/ retry requests of all users under job management tab.

10-6 Configuration File Changes

◆ sysannot.properties:

- added new modalities: NM, MG, RF, PT, DX, US

◆ Logmsg.properties :

New messages related to account expiry feature in FEAT tool are added.

■ #Login privilege properties

```
com.ge.satools.dps.authentication.LoginPrivilegeQuery=select sql_privilege_name from  
sql_privilege_user where sql_class_name='DPSFEAT'
```

■ #Account expiry date check query

```
com.ge.satools.dps.authentication.RISLookupForExpiryDate=select  
active,exdate=datediff(day,getdate(),expiration_dt) , accexdate=datediff(day,getdate(),  
account_expiration_dt) from users where username='  
com.ge.satools.dps.common.RISDBName = ris
```

◆ FEAT.properties : new queries added for privilege and expiry account feature.

- 10034 = Your account has been disabled. Please contact your System Administrator to reactivate it.
- 10035 = User account has expired. Please contact your System Administrator.
- 10036 = Your password has expired. Please use the Centricity Administration Tool to provide a new password.

- 10037 = Username is not found in RIS database. Please use Centricity Administration Tool to create valid user.
- ◆ dps.conf: arrow width (ARROW_WIDTH) configuration variable is added.
 - #= 53 =
 - # Name: ARROW WIDTH
 - # Width of arrow can be configured by changing the value of ARROW_WIDTH
 - ARROW_WIDTH=0.28

10-7 MIU Integration Tool

Dynamic profiling tools will be implemented in the new, web-accessible, MIU service tool. The Profiling Configuration tool supports the following features:

- ◆ Allows download of the profiling algorithms to a local computer and local editing.
- ◆ Some level of syntax check will be provided which can be used to check configured algorithms before they are uploaded to the system.
- ◆ Profiling algorithms configuration is a privileged function.

10-8 Applications Serviceability

PACS applications shall support serviceability features so that the ASM monitoring can work efficiently:

- ◆ A list of critical processes need to be monitored.
- ◆ A list of log files, including the fully qualified path, which need to be monitored.
- ◆ A list of key words used in the log files, which indicate the fatal errors or serious warnings defined for reporting of the system health status.
- ◆ Clear, complete message text in the log files describes the error cases.

Section 11: Centricity Web

Centricity 1.0 PACS provides the new Centricity Web product which is fully integrated into the Centricity PACS system environment.

Centricity Web supports all PathSpeed 8.1 features and much more. All displayable images on the workstation can also be displayed in Centricity Web (see Centricity PACS 1.0 DICOM conformance Statement for supported SOP classes).

The Centricity Web clients can be any Windows 98, ME, 2000, NT or XP workstation running IE 5.5 SP2 or 6.0. Better client hardware generally means better performance (assuming that the network has enough bandwidth). It is recommended to use client machines with at least an 800 MHz processor and 256 MB RAM.

The following functionality has been added:

- ◆ Optional: Dual monitor support (same resolution)
- ◆ Optional: High resolution monitor supports up to three Mega pixel
- ◆ Basic worklist support (Patient List, Study List, My Patient List)
- ◆ On the fly compression to be used when connected via a low bandwidth connection.
- ◆ Optional: SSL connection from server to clients for data transmission security
- ◆ Same GUI look-and-feel to the workstation
- ◆ Exam level Open API
- ◆ Auto Log-off configurable per user group
- ◆ Series comparison
- ◆ Conferencing capabilities. For Centricity web users participating in a conference the viewports remain synchronized as they zoom, pan, window and perform other viewing actions. They can also see each others mouse pointers.
- ◆ Send an email with link to images to another web user

- ◆ Modality dependent toolbars - tools accessible by just 1 click
- ◆ Scoutline support
- ◆ Export images to JPEG or TIFF
- ◆ Advanced measurement tools
- ◆ Web Based management console
- ◆ Pictorial Index for image navigation
- ◆ Sort on query fields in data selector
- ◆ Change password via central logon
- ◆ Previous/Next button to go to the next patient/study while staying in viewing mode
- ◆ Pseudo color support when embedded in DICOM header. No color scheme selector
- ◆ Regional calibration for Ultrasound
- ◆ Localization of GUI, online help and manuals in GE languages. Language can be configured per user/group.
- ◆ Use windows default date settings

11-1 New Mouse Control

Centricity Web 1.0 allows users to easily access most used functionality via the mouse. For example; window level, zoom and pan are immediately accessible via the mouse without the need to select a tool first. The following mouse functionality is currently available and is not configurable:

- ◆ Scroll through study in viewing using mouse wheel
- ◆ Continuous zoom by holding down mid-mouse button/scroll wheel

- ◆ Start manual cine mode by shortly clicking on mid-mouse button/scroll wheel
- ◆ Change cine speed of automated cine via mouse wheel
- ◆ Pan by holding down left mouse button
- ◆ One-up (and back) via double-click left mouse button
- ◆ Window level via right mouse button
- ◆ Right mouse button menu

Section 12:Known Issues

12-1 DPS

Issue	Resolution
<p>When adding a printer, if a space is used as a character in the description or printer name; FEAT will let you add it & it will show up in the IMS/workstation table, but the printer will not be listed in the FEAT, "check printer status" tab. The printer will be listed when using a Centricity 1.0 Workstation & printing an image.</p>	<p>A space character is not allowed in the printer name string, as a space causes an inconsistency in DPS. At this time, use the underscore character instead of a space.</p>

12-2 Server

Issue	Resolution
<p>Difficulty accessing academic folders</p>	<p>Please contact your field engineer and the folders can be restored.</p>
<p>The "All Patients" folder should expand to a list of all Patient names. (IISge15490)</p>	<p>The user can still get all exams for a patient by loading the "All Exams" worklist and filtering by the patient. The code has been changed so it can be turned off if required. Added the following option to the Platinum.properties file. com.ge.med.platinum.showAllPatients=false By default, this ability is turned off. To turn it on, the variable has to be set to true in the platinum_custom.properties.</p>

Issue	Resolution
Send the same exam twice.	If the user sends the same exam twice, an error message is displayed. The message may or may not indicate a problem with the send. Check the queue. If the exam is already in the queue, disregard the error message.

12-3 HIPAA

Issues	Solution/Comments
<p>The latest secure certificate is a self signed certificate and can not be added as a trusted certificate to the JDK.</p> <p>Since the certificate can not be added as a trusted certificate, it breaks the Secure Socket Gateway sub system.</p>	<p>The system can operate without SSL. SSL is currently working with a self-signed certificates for Middle-tier and Workstation. However, it is not working with the certificates in other sub-systems.</p>
<p>The PACS system shall use a secure connection to the REMOTE reading workstations for working sessions as well as pushing images.</p>	<p>The connection for pushing images between the ISU and local cache is not secure.</p> <p>The connection for transmitting other data is capable of using SSL, but this feature is disabled at this time. The server team is working on a way for the jdbc connection to use ssl. This is in M4i.</p>

12-4 Workstation

Issues	Solution/Comments
Showing an exam as acquired may take up to 30 seconds.	A wait cursor has not yet not been implemented. For large exams users will have to wait for the operation to perform. No functionality is lost.
The PACS system shall use a secure connection to the REMOTE reading workstations for working sessions as well as pushing images.	The connection for pushing images between the ISU and local cache is not secure. The connection for transmitting other data is capable of using SSL, but this feature is disabled at this time.The server team is working on a way for the jdbc connection to use ssl. This is in M4i.
Worklist does not update after images are removed.	You have to close the exam, select another exam in the worklist, and then refresh the worklist to get the update.
At times, the Work Modes pallet gets into a state where it is always on top. The pallet will then be on top of other dialogs and applications, sometimes making it seem like the system is crashed. Side effects: 1) When the "Fetch offline" dialog comes up, the Work Modes pallet may cover it completely and the user is unable to interact with the system. 2) Working with other applications like IE is difficult because the Work Modes pallet covers them when Alt+Tabbing.	If this scenario presents itself, you must restart the Centricity Application.
It was possible to filter by body part in the Layout Manager in 8.1.	This is no longer possible in Centricity's Patient Jacket.
DDP's	The GE Defaults DDP's are not accessible from the DDP advanced wizard.

Issues	Solution/Comments
<p>When working with multiple regions on a screen, Comp or Series hotzones sometimes are invoked for no reason.</p>	<p>Enter the mouse in the hotzone and exit again.</p>
<p>The image about dialog for an exam does not close if the exam for which it was opened is closed.</p>	<p>Close the dialog manually.</p>
<p>The workstation scroll bar on the work modes palette does not update when located at the bottom of the window.</p>	<p>Scroll up slightly, and then scroll back down again.</p>
<p>When building DDP's the user would like to have the Copy Monitor Format.</p>	<p>Drag and drop regions - not monitors.</p>
<p>If a first user closes an exam, and a third user opens the same exam, the third user will have no knowledge that the second user is viewing the exam. There are two users editing the same exam but the third user sees no indication that his changes might be overwritten.</p>	<p>If an exam is opened and a message is received saying the exam is opened by another user, the user should consider the exam read-only and not make changes to the exam.</p>



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