Digital Ultrasound Diagnostic System DICOM Quick Guide

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Note: Before using DICOM, please read the electronic file DICOM CONFORMANCE STATEMENT along with the device. At the same time, please verify that the SCU services provided by ultrasound machine can be supported by the SCP services provided by the systems such like PACS/RIS/HIS and so on.

The chapter is confined to the preset, connection verification and DICOM services of the DICOM-configured ultrasound machine, not including SCP configurations like PACS/RIS/HIS.

The DICOM package is optional, so the description here is only applicable for the system configured with the DICOM package.

This system supports the following DICOM functions:

- Verify Connectivity
- DICOM Storage
- DICOM Print
- DICOM Worklist
- MPPS (Modality Performed Procedure Step)
- Storage Commitment
- DICOM Medium Storage (DICOMDIR Review)
- DICOM Task Management

Workflows of DICOM Applications are briefly described as follows:

- 1. DICOM preset (Localhost DICOM Service Property, Server Setting, and Set DICOM Service).
- 2. Verify connectivity.
- 3. DICOM application (Image Storage, Print, MPPS, Worklist, Storage Commitment, DICOMDIR Review, Q/R and Task Management).

Abbreviation introduction:

The followings are the abbreviations in this chapter.

Abbreviation	Description
DICOM	Digital Imaging and Communications in Medicine
AE	Application Entity
MPPS	Modality Performed Procedure Step
PDU	Protocol Data Unit
SCU	Service Class User (DICOM client)
SCP	Service Class Provider (DICOM server)
SOP	Service-Object Pair
SR	Structured Report

1 Preset

1.1 Local TCP/IP Preset

To open the DICOM preset screen:

- 1. Press <F10> key to show the Setup menu.
- 2. Move the cursor onto [Network Preset] to open the screen, as shown in Figure 1 **TCP/IP Preset Screen**.

Setup		mina
System Preset	Network Property Current Net Adapter Local Area Connec	
Exam Preset	Current Net Adapter Local Area Connec	
Measure Preset	OHCP Static	
iWorks Preset	IP Address 10.24.2.117 XXX.XXX	xxx.xxx
Print Preset	Subnet Mask 255.255.255.0 XXX.XXX	XXX.XXX
Network Preset	Gateway 10.24.2.254 XXX.XXX	XXX.XXX Apply
DICOM Preset		
Maintenance		
About		
		Save Cancel
		Save

Figure 1 TCP/IP Preset Screen

 If wireless network adapter is selected, control about wireless network preset will be visible, as shown in Figure 2 TCP/IP Preset Screen (Wireless Network). First, make sure there is an available wireless network, then choose the wireless network in [Wireless Network Manager] and input password to connect it.

Name	Description
Current Net Adapter	To choose from the available net adapters enumerated in the drop-down list.
DHCP/Static	DHCP, Static: select between DHCP and Static; if DHCP is selected, IP address will be automatically obtained from DNS server; if Static is selected (Static refers to static IP address), you need to enter IP address subsequently.

IP Address	IP address of the system.
Subnet Mask	Used to preset different network segment.
Gateway	Used to preset the gateway.
Wireless Network Manager	Visible only when the wireless network adapter is selected.Used to choose the wireless network.
Password	Visible only when the wireless network adapter is selected. Used to input the password of the wireless network.
Connect	Visible only when the wireless network adapter is selected. Used to connect the wireless network.

Note: IP address can't be the same as other IP of LAN, otherwise it will affect DICOM performance.

Setup					mind <i>r</i> ay
System Preset	rstem Preset Local TCP/IP 4D Viewer iStorage				
Exam Preset	Network Property				
Measure Preset	Current Net Adapter	Wireless Network Connecti.	 🔽		
iWorks Preset	DHCP		Static		
Print Preset	IP Address 172.2	4.56.10 XXX.XXX.XXX.XXX			
Network Preset	Subnet Mask 255.2	55.240.0 XXX.XXX.XXX.XXX			
DICOM Preset	Gateway 172.2	4.63.254 XXX.XXX.XXX.XXX		Apply	
Maintenance					
About	Wireless Network Manager				
	Network SSID	Security	Signal Quality	Status	
	СМСС	N	66%	Connected	
	NETGEAR6A		100%	Disconnected	
	NETGEAR	Y	38%	Disconnected	٥
	Password ******	**		Connect	
				Save	Cancel
				() () () () () () () () () () () () () (🔒 🗉 🗈 15:11:5

Figure 2 TCP/IP Preset Screen (Wireless Network)

1.2 DICOM Preset

To open the DICOM preset screen:

- 1. Press <F10> key to show the Setup menu.
- Move the cursor onto [DICOM Preset] to open the screen, you can set up the Localhost DICOM Service Property, Server Setting and DICOM Services, as shown in Figure 3 DICOM Preset Screen:

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Setup						mindray
System Preset	- Localhost DICO	M Service Property(Including	SCU and SCP)			
Exam Preset	AE Title	CALLING_AE	Port	2345	PDU	32768
Measure Preset	Server Setting					
iWorks Preset	Device					
Print Preset	Device		IP Address			Ping
Network Preset	Add					
DICOM Preset		_				
Maintenance	Device List					
About	Device 1 PACS			IP Address 10.24.2.117		
	Se	t DICOM Service	Delete			
						Save Cancel

Figure 3 DICOM Preset Screen

The main parameters of localhost DICOM preset are described as follows:

Name	Description				
AE Title	Application Entity title.				
Port	DICOM communication port, 2345 is default.				
PDU	Maximum PDU data package size, ranging from 16384 to 65536; if the value is less than 16384 or greater than 65536, the system automatically sets it to the value 32768.				
Device	Name of the device supporting DICOM services.				
IP Address	IP address of the server.				
Ping	Check whether IP Address can connect normally or not.				
Add	Click to add server (s) to the Device List.				
Set DICOM Service	Set the attributes of DICOM Storage, Print, Worklist, MPPS, Storage Commitment and Q/R.				
Delete	Click to delete the selected server (s) in the device list.				

In the above screen, please enter AE Title, Port, and PDU according to the actual situation, and then click [Save] to exit the screen.

Tip:

- AE Title should be the same with the SCU AE Title preset in the server (PACS/RIS/HIS), for example, if the AE Title of the server preset in the print server is Printer, and the AE Title of the accepted SCU is preset as Machine, then in the figure above, the AE Title of Local should be Machine, and the AE Title of print server should be Printer.
- The device name can be entered to your preference. If the currently entered name has already existed, the system will show a tip: "The server name exists!" Click [OK] to enter another name.

- Port must not be set as 4001, 6000, 3001, 6555.
- IP address must be the actual IP address of the server.

1.3 DICOM Service Preset

To open the DICOM Service screen:

- 1. Press <F10> key to show the Setup menu. Move the cursor onto the [DICOM Preset] item to open the screen.
- 2. Click the [Set DICOM Service] to set the attributes of services.

After DICOM is installed and DICOM Worklist, MPPS, and Query/Retrieve are optionally configured, there will be related screen for presetting.

1.3.1 DICOM Storage Preset

ICOM Service								mind <i>r</i>
storage Print W	orklist MPPS	StorageCommitm	ient Query/Retriev					
Configure the New Service								
Device	liuchuan	Service Na	ime <mark>liuchu</mark>	an-Storage	AE Title		Port	104
Maximum Retries	3	🗾 🔽 Interval Ti	ime(Sec) 15		Timeout(Sec	;)	15	-
Cine Zoom Mode	Original	Compress	ion Mode Uncor	npressed	Compression	n Ratio	Lossless 🗸	
Color Mode	Color	🔽 🏹 Allow	Multiframe Max	Framerate 35	▼ 3D/4D	I	Normal	-
SR Storage Option	Not Store SR			Encapsulated PDF				
Add (Cancel	Update						
Device	Se	rvice Name	AE Title	Port		Defaul	t	
1 pacs	pa	acs-Storage	CALLED_AE	104		N		
Delete	Default	Verify Ve	rify Undo!					
								Exit
							.	16:4

Figure 4 DICOM Storage Preset Screen

The main parameters of DICOM Storage are described as below:

Name	Description
Devices	After you set the server (s) in DICOM Server screen, the name (s) will appear in the drop-down list, select the name of the storage server.
Service name	Default is xxx-Storage, user-changeable.
AE Title	Application Entity title, here, it should be consistent with that of the storage server.
Port	DICOM communication port, 104 is default. Here, the port should be consistent with that of the storage server port.
Maximum	0-9 times are optional, the default is 3, if the DICOM storage task

Retries	that is sent to this server is failed, the task will be retried automatically, the retry times is set here.
Interval Time (Sec)	5-1800 seconds, 15 seconds is default. (Reserved)
Timeout (Sec)	Refers to the amount of time after which the system will stop trying to establish a connection to the service. Value: 5-60s, in increments of 5s, and 15 is default.
Cine Zoom Mode	Original, 640*480 are optional, the default is Original.
Compression Mode	Uncompressed(The image is uncompressed), RLE(The image is lossless compressed), JPEG(Please refer to the information of provider to confirm whether SCP can support JPGE compression. If not, please do not select it) are optional, the default is Uncompressed.
Compression Ratio	High, Middle and Low, three kinds of Compression Ratio are optional. Compression Ratio is in inverse proportion to image quality.
Color Mode	Three options are available, Color means the images sent from system to server will be coded by 24bit, Mixed means the images sent from system to server will be coded by 8bit or 24 bit depends on whether the images themselves are captured in color imaging mode or colorize switch is in "on" state or not, if they do so, will be coded by 24bit, else 8bit. Gray means the images sent from system to server will be coded by 8bit. The images will contain DICOM tags window center (0028, 1050) and window width (0028, 1051) if they are coded by 8bit. The default is Color.
Allow Multiframe	If SCP supports this function, then select it.
Max Framerate	25,30,35, Full are available, user-changeable
3D\4D	Normal, Rawdata, Volume are optional when sending the 3D\4D image files
SR Storage Option	Five options are available when Structured Reporting is needed to send. You can select "Attach SR When Storage Images", "Only Store SR", "Attach SR When Store Images and SR Contains User-defined Measurements", "Only Store SR and It Contains User-defined Measurements" and "Not Store SR".
Encapsulated PDF	Encapsulate a PDF document within the DCM file. If SCP supports this function, then select it.
Add	Add the DICOM service to the service list.
Cancel	Click to cancel parameter preset.
Update	Select an item in the service list, change the parameters in the above area, and click [Update] to update the item in the service list.
Delete	Click to delete the selected service in the service list.
Verify	Click to verify if the two DICOM application entities are normally connected.

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Default	Select an item in the service list, click [Default] and you can see "Y" in the Default column.
Exit	Click to exit the screen.

Tip:

- JPEG is one of the storage types, but not all SCPs can support it. Please refer to the electronic file DICOM CONFORMANCE STATEMENT to check whether SCP supports this function.
- AE Title and Port must be consistent with those of server.
- Click the item in Service List to modify the parameters and click [Update] to update them.
- You can click [Delete] to delete the item in Service List.

1.3.2 DICOM Print Preset

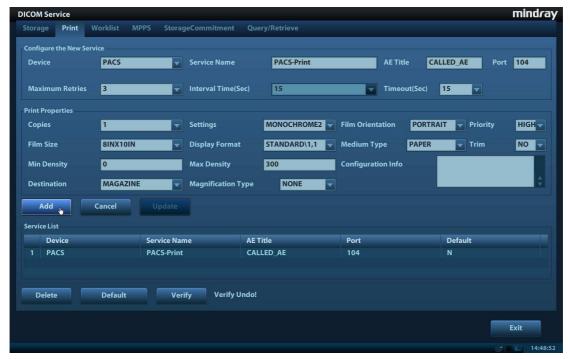


Figure 5 DICOM Print Preset Screen

The main parameters of DICOM Print are described as below:

Name	Description
Devices	After you set the server (s) in DICOM Server screen, the name (s) will appear in the drop-down list, select the name of the print server.
Service name	Default is xxx-Print, user-changeable.
AE Title	Application Entity title, here, it should be consistent with that of the print server.
Port	DICOM communication port, 104 is default. Here, the port should be consistent with that of the print server port.
Maximum Retries	0-9 times are optional, the default is 3. If the DICOM storage task

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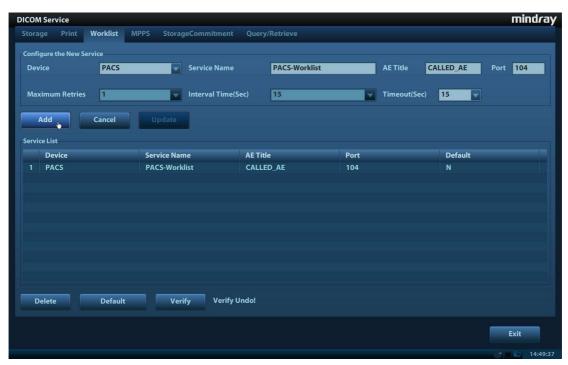
	that is sent to this server is failed, the task will be retried automatically, the retry times is set here.
Interval Time (Sec)	5-1800 seconds, 15 seconds is default. (Reserved)
Times ut (Cas)	Refers to timeout during association establishment.
Timeout (Sec)	Value: 5-60s, in increments of 5s, and 15 is default.
Copies	Refer to copies of printed files. You can select among 1 through 5, or directly enter the numeral.
Settings	The system supports RGB (color printing) and MONOCHROME2 (black and white printing). Please select the type the printer supports.
Film Orientation	Select between LANDSCAPE and PORTRAIT.
Priority	High、Middle、Low
Film Size	Select film size among the selections listed in the drop down list.
Display Format	Specify quantity of printed files, e.g. STANDARD\2, 3 indicates 6 images are printed for each page.
Media Type	Specify print medium: Paper, Clear Film, Blue Film; select Blue Film or Clear Film for black and white printing; select Paper for color printing.
Trim	Specify whether you want a trim box to be printed around each image on the film: Yes or No.
Min Density	Enter the minimum density of the film. The default is 0.
Max Density	Enter the maximum density of the film. The default is 300.
	Select how the printer magnifies an image to fit the film. Replicate: interpolated pixels belong to duplicate of adjacent pixels); Bilinear: interpolated pixels are generated from bilinear
Magnification Type	interpolations between adjacent pixels;
	Cubic: interpolated pixels are generated from cubic interpolations between adjacent pixels;
	None: without interpolation.
Destination	Specify where the file is exposed: MAGAZINE (stored in the magazine), or, PROCESSOR (exposed in the processor).
Configuration Info	Enter configuration information in the field.
Add	Add the DICOM service to the service list.
Delete	Click to delete the selected service in the service list.
Cancel	Click to cancel parameter preset
Update	Select an item in the service list, change the parameters in the above area, and click [Update] to update the item in the service list.
Verify	Click to verify if the two DICOM application entities are normally connected.

	in the Default column.
Exit	Click to exit the screen.

Tips:

The parameters preset should be meet the requirements of printer, for instances:

- 1. If the printer cannot support the [Film Size] of 8IN*10IN, please modify it that the printer can support.
- 2. It will implement color printing when [Settings] is set as RGB, black and white printing when it is set as MONOCHROME2.
- 3. For [Media Type], select Blue Film or Clear Film for black and white printing; select Paper for color printing.
- 4. Other parameters can use defaulted values. If there are special requirements for printer, please modify it.



1.3.3 Worklist Preset

Figure 6 DICOM Worklist Preset Screen

The main parameters of DICOM Worklist are described as below:

Name	Description
Devices	After you set the server (s) in DICOM Server screen, the name (s) will appear in the drop-down list, select the name of the Worklist server.
Service name	Default is xxx-Worklist, user-changeable.
AE Title	Application Entity title, here, it should be consistent with that of the Worklist server.
Port	DICOM communication port, 104 is default. Here, the port should be consistent with that of the Worklist server port.

Maximum Retries	0-9 times are optional, the default is 3. (Reserved)
Interval Time (Sec)	5-1800 seconds, 15 seconds is default. (Reserved)
Timeout (Sec)	5-60s, in increments of 5s, and 15 is default. Timeout is the overtime of connecting Association.
Add	Click it to add the Worklist service to the service list.
Cancel	Click to cancel parameter preset.
Update	Select an item in the service list, change the parameters in the above area, and click [Update] to update the item in the service list.
Delete	Click to delete the selected service in the service list.
Verify	Click to verify if the two DICOM application entities are normally connected.
Default	Select an item in the service list, click [Default] and you can see "Y" in the Default column.
Exit	Click to exit the setup screen.

1.3.4 MPPS Preset

									mindra
Storage Print	Worklist MI	PPS Storage	Commitment	Query/	Retrieve				
Configure the New S	ervice								
Device	PACS		Service Name		PACS-MPPS		AE Title	CALLED_AE	Port 104
Maximum Retries	3		Interval Time(Se	c)	15		Timeout(Sec	15	
Add ,	Cancel	Update							
Service List									
Device		Service Name	e	AE Title		Port		Default	
1 PACS		PACS-MPPS		CALLE	D_AE	104		N	
Delete	Default	Verif	y Verify U	ndo!					
Delete	Default	Verif	y Verify U	ndo!					Exit

Figure 7 DICOM MPPS Preset Screen

The main parameters of DICOM MPPS are described as below:

Name	Description
Devices	After you set the server (s) in DICOM Server screen, the name (s) will appear in the drop-down list, select the name of the MPPS server.
Service name	Default is xxx-Worklist, user-changeable.
AE Title	Application Entity title, here, it should be consistent with that of the MPPS

	server.
Port	DICOM communication port, 104 is default. Here, the port should be consistent with that of the MPPS server port.
Maximum Retries	0-9 times are optional, the default is 3. if the DICOM storage task that is sent to this server is failed, the task will be retried automatically, the retry times is set here.
Interval Time (Sec)	5-1800 seconds, 15 seconds is default. (Reserved)
Timeout (Sec)	5-60s, in increments of 5s, and 15 is default. After user sending MPPS for 15 seconds, the connection will be closed.
Add	Add the DICOM service to the service list.
Cancel	Click to cancel parameter preset.
Update	Select an item in the service list, change the parameters in the above area, and click [Update] to update the item in the service list.
Delete	Click to delete the selected service in the service list.
Verify	Click to verify if the two DICOM application entities are normally connected.
Default	Select an item in the service list, click [Default] and you can see "Y" in the Default column.
Exit	Click to exit the preset screen.

Tip: You should set MPPS as default server when you use it.

1.3.5 Storage Commitment Preset

DICOM Service		_			mind <i>r</i> ay
Storage Print Worklist	MPPS StorageCommitment	t Query/Retrieve			
Configure the New Service					
Device PACS	Service Name	PACS-SC	AE Title	CALLED_AE	Port 104
Maximum Retries 1	Interval Time	e(Sec) 15	Timeout(S	iec) 15 🔽	
Associated Storage Service	PACS-Storage				
Add Cancel	Update				
Service List					
Device	Service Name	AE Title	Port	Default	
1 PACS	PACS-SC	CALLED_AE	104	N	
Delete Defau	It Verify Verify	/ Undo!			
Delete Defau	lt Verify Verify	y Undo!			
Delete Defau	alt Verify Verify	/ Undo!			Exit

Figure 8 DICOM Commitment Preset Screen

The main parameters of storage commitment are described as below:

Name	Description
Devices	After you set the server (s) in DICOM Server Preset screen, the name (s) will appear in the drop-down list, select the name of the server.
Service name	Default is xxx-SC, user-changeable.
AE Title	Application Entity title, here, it should be consistent with that of the storage commitment server.
Port	DICOM communication port, 104 is default. Here, the port should be consistent with that of the storage commitment server port.
Maximum Retries	0-9 times are optional, the default is 3. (Reserved)
Interval Time	5-1800 seconds, 15 seconds is default. (Reserved)
Timeout	Value: 5-60s, in increments of 5s, and 15 is default. After user sending storage commitment for 15 seconds, the connection is closed.
Associated Storage Service	The associated storage server is preset before storage commitment, only after the exam is sent out, can storage commitment be created.
Add	Add the DICOM service to the service list.
Cancel	Click to cancel parameter preset.
Update	Select an item in the service list, change the parameters in the above area, and click [Update] to update the item in the service list.
Delete	Click to delete the selected service in the service list.
Verify	Click to verify if the two DICOM application entities are normally connected.
Default	Unavailable
Exit	Click to exit the setup screen.

Tips:

- 1. Set storage server relating to storage commitment.
- 2. Set the port for message return and IP at server end, which are respectively corresponding to the port in DICOM Local and IP in TCP/IP preset.

1.3.6 Query/Retrieve Preset

DICOM Service					mind <i>r</i> ay
Storage Print Worklist N	IPPS StorageCommitment	Query/Retrieve			
Configure the New Service					
Device PACS	Service Name	PACS-Quer	Retrieve AE Title	CALLED_AE Poi	rt 104
Maximum Retries 1	Interval Time(Se	ec) 15	Timeout(Sec	:) 15 🔽	
Add Cancel	Update				
Service List					
Device	Service Name	AE Title	Port	Default	
1 PACS	PACS-QueryRetrieve	CALLED_AE	104	N	
Delete Default	Verify Verify U	ndo!			
					Exit
					14:52:29

Figure 9 DICOM Query/Retrieve Preset Screen

The main parameters of Query/Retrieve are described as below:

Name	Description
Devices	After you set the server (s) in DICOM Server Preset screen, the name (s) will appear in the drop-down list, select the name of the storage commitment server.
Service name	Default is xxx-SC, user-changeable.
AE Title	Application Entity title, here, it should be consistent with that of the storage commitment server.
Port	DICOM communication port, 104 is default. Here, the port should be consistent with that of the storage commitment server port.
Maximum Retries	0-9 times are optional, the default is 3. (Reserved)
Interval Time	5–1800 seconds, 15 seconds is default. (Reserved)
Timeout	Value: 5-60s, in increments of 5s, and 15 is default. After user sending storage commitment for 15 seconds, the connection is closed.
Add	Add the DICOM service to the service list.
Cancel	Click to cancel parameter preset.
Update	Select an item in the service list, change the parameters in the above area, and click [Update] to update the item in the service list.

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Delete	Click to delete the selected service in the service list.
Verify	Click to verify if the two DICOM application entities are normally connected.
Default	Select an item in the service list, click [Default] and you can see "Y" in the Default column.
Exit	Click to exit the preset screen.

2 Services

2.1 Verify Connectivity

If you want to verify connectivity (it is not a must), you can click [Verify] button on Storage, Print or Worklist, MPPS, Storage Commitment and Query/Retrieve pages respectively. If the verification succeeded, the system prompts "xxx Verify Succeed". Otherwise, it prompts "xxx Verify Failed", which means the connection is wrong. Please reconfirm it.

Tip:

Not all the SCPs can support verification; please consult SCP belongings to confirm whether SCP can support this service. If not, the verification won't pass.

2.2 DICOM Storage

DICOM Storage is used to send images (and SR) to DICOM storage server for remote storage. The entrances of storage include:

- Patient information management (iStation)
- Review status (Review)
- Real time/Freeze status (auto workflow)
- Thumbnail area

DICOM storage supports:

- Single file transfer
- Exam transfer
- Batch transfer
- Static image and Cine file

Batch transfer means multiple exam records can be selected and sent for storage with one DICOM task for each exam. Multiple files in one exam will be sent in one DICOM connection.

The auto send function can be triggered by:

- Ending the exam (send to default storage service)
- Saving an image by pressing the user-defined save key (image is sent to the default DICOM storage server as well as saved).

2.2.1 Storage Operation

The system supports automatic and manual storage.

The operations for manual storage service are described below:

Take "send to DICOM storage" in iStation page as an example, the operations are:

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- 1. Configure the storage server according to the above descriptions about service preset.
- 2. Press <iStation> on the control panel to enter the patient information management page.
- 3. Select one or more exam records (that contain images. If not, the system will prompt) in exam list, or select one or more images in an exam, as shown in Figure 10 **iStation Screen**.

PatientID PatientName ABD 27/09/2011 17:16:46 0 20110926-105592-2 breast Beview Image 6/09/2011 10:55:45 3 20110926-105510-2 PED Beview Report 6/09/2011 10:55:26 3 20110926-104552-2 SMP Review Report 6/09/2011 10:48:54 5 20110926-104152-2 urology Belete Exam 6/09/2011 10:48:54 5 20110926-104152-2 urology Belete Exam 6/09/2011 10:48:54 5 20110926-104152-2 urology Belete Exam 6/09/2011 10:28:46 3 20110926-103266-2 cardiad Restore Exam 6/09/2011 10:28:46 3 20110926-101022-2 OB Send Exam 6/09/2011 10:28:46 3 20110926-092849-2 gyn Export Teaching Files 6/09/2011 10:29:28:10 2 20110926-092431-2 abdement Belete Exam 6/09/2011 10:29:28:10 2	0 2 3 3 3 3 3 3	Paused End End End End End	Female 12D Female 41Y Female 35Y Female 24Y Male 28Y
20110926-105510-2 PED PE PED PE PED PE PED PE	2 3 3 3 3	End End End	Female 35Y Female 24Y Male 28Y
20110926-104854-2 SMP Preview Report c6/09/2011 10:48:54 5 20110926-104152-2 urology Si Delete Exam c6/09/2011 10:42:15 3 20110926-103554-2 vas Si Backup Exam c6/09/2011 10:28:64 3 20110926-1032806-2 cardiad Q Restore Exam c6/09/2011 10:28:46 3 20110926-101022-2 OB Q Send Exam c6/09/2011 10:10:39 4 20110926-093849-2 gyn Export Teaching Files c/00/2011 09:39:10 2	3 3 3 3	End End	Female 24Y Male 28Y
20110926-104152-2 urology is Delete Exam c6/09/2011 10:42:15 3 20110926-103554-2 vas is Backup Exam c6/09/2011 10:36:15 2 20110926-103554-2 vas is Backup Exam c6/09/2011 10:28:46 3 20110926-101022-2 OB is Send Exam c6/09/2011 10:10:39 4 20110926-093849-2 gyn the Export Teaching Files c6/09/2011 09:39:10 2	3 3 3	End	Male 28Y
20110926-103554-2 vas Image: Backup Exam c6/09/2011 10:36:15 2 20110926-102806-2 cardiad Image: Backup Exam c6/09/2011 10:28:46 3 20110926-101022-2 OB Image: Send Exam c6/09/2011 10:10:39 4 20110926-03849-2 gyn Image: Send Exam c6/09/2011 09:39:10 2 20110926-03819-2 gyn Image: Export Teaching Files c6/09/2011 09:39:10 2	3		
20110926-102806-2 cardiad Cardiad <td></td> <td>End</td> <td></td>		End	
20110926-102806-2 cardiad Cardiad <td></td> <td></td> <td>Female 25Y</td>			Female 25Y
20110926-101022-2 OB Send Exam 6/09/2011 10:10:39 4 20110926-093849-2 gyn Export Teaching Files 6/09/2011 09:39:10 2 201100926-093849-2 gyn Export Teaching Files 6/09/2011 09:39:10 2	-	End	Female 61Y
20110926-093849-2 gyn Export Teaching Files 6/09/2011 09:39:10 2	3	End	Female 36Y
20110036 002421 2 abdement	3	End	Male 33Y
@ Activate Exam	2	End	Female 37Y
		Paused	Unkno
20110923-10659-2 Xueguan 20110923-104042-2 gyn 20110923-104042-2 gyn 20110923-104042-2 gyn 20110923-104042-2 gyn 20110923-104042-2	0	End	Female
pidP645 One,Secondary Capture Image,z OB 22/09/2011 10:03:46 1	0	End	Male 31Y
20110922-085506-2 3D4DCINFRMBMP CARD 22/09/2011 08:57:11 8	4	End	Male 41Y
SC-I1 One,Secondary Capture Image ABD 21/09/2011 14:40:34 3		End	Unkno
20110921-095613-2 no pdf SMP 21/09/2011 13:43:42 1	0	End	Unkno
2011/021_045613_2 no.ndf DEF 21/04/2011 12:42:26 1		End	Unkno

Figure 10 iStation Screen

- 4. Click [Send To] to pop up the [Send To] dialog box.
- 5. Select the remote DICOM Server; click [OK] to send, as shown in Figure 11 **DICOM Send To Screen**.

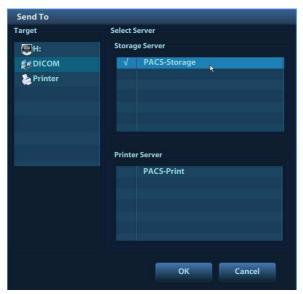


Figure 11 DICOM Send To Screen

6. Click in the right corner of the screen to open Management, in which, you can review sending status. Select one record, and there is sending result in prompt dialog box, as shown in Figure 12 **Task Management**.

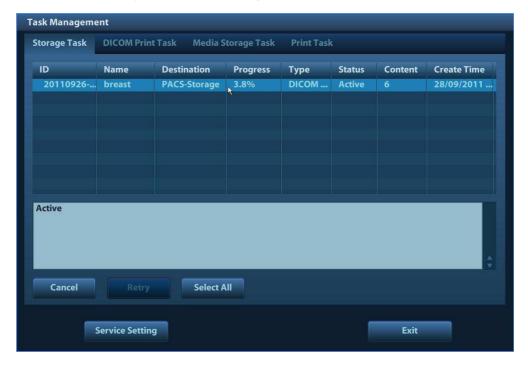


Figure 12 Task Management

Function paths of sending image to DICOM storage and sending images by user-defined key after ending exam automatically:

- mindray Setup System Preset Region General Image Preset Application OB Key Config Admin Patient Info Info displays in image banner Image Size Standard Area
 ✓ Name
 ✓ Gender

 ■ Age
 ✓ DOB
 Image Area Output Mode PAL O NTSC 📝 ID 📝 Operator Clip Length 📝 Hospital 6.0 Beat(heart cycle) Time(s) 6 🗸 English Prospective Cine Length 480 (1-480s) Time(s) Occidental 120 (1-390 Cycles) Beat(heart cycle) Exam Setup Retrospective Cine Length Status after exam ends Time(s) (1-120s) ScanWorklist Register 120 (1-120 Cycles) Beat(heart cycle) Patient Management Screen Saver Wait 15 🗧 min Enable ScreenSaver 🜠 Sending/printing after End Exam Enable Standby Wait 30 🚆 min Display Select Picture Brightness/Contrast Load Factory Save Cancel
- A. Send Image after end exam:

Figure 13 Send Image after End Exam

Steps:

- 1. In System Preset -> General, select, as shown in Figure 13 **Send Image after End Exam**.
- In DICOM Preset -> Storage Service, set the default storage server (one or more).
- 3. When pressing <End Exam> with the current exam being active, all images (and SR) of the current exam are sent to the default DICOM storage server.
- B. Send to DICOM Storage by user-defined shortcut key
 - In System Preset -> Key Config, the NULL key can be set as "Send Image to DICOM storage", as shown in Figure 14 Send to DICOM Storage by User-defined Key.

Exam Preset	Key Function		Function	· · · · · · · · · · · · · · · · · · ·
Measure Preset	Key Function	Footswitch	Output	Print Advanced Features Measurement Other
iWorks Preset	Key Function	Select Function	Save Im	age to hard drive
Print Preset	Print Save1	NULL Save Image to Hard Disk and Send to	Save Cli	ip(Retrospective) to hard drive ip(Prospective) to hard drive III Screen Image to hard drive
Network Preset	Save2 F3	Save Cine(Prospective) to Hard Disk Save Full Screen Image to hard drive	Save Im	age to Hard Disk and Send to DICOM Storage
DICOM Preset	F4 F5	Save Image to Hard Disk and Send to Save Image to Hard Disk and Send to	Save Cir	nage to Hard Disk and Send to DICOM Printer ne(Retrospective) to Hard Disk and Send to DICOM
Maintenance	F6 F12	[*] Save Cine(Prospective) to Hard Disk NULL	Save Cir NULL	ne(Prospective) to Hard Disk and Send to DICOM
About	P1 P2	ExFOV Free Xros M		
	Key Brightness	2 Trackball Speed	. D	Medium Vev Volume 1
	ney brightiess			

Figure 14 Send to DICOM Storage by User-defined Key

- In Storage Preset -> DICOM Service, set the default storage server (one or more).
- In current exam, press <F5> (according to the user preset), the system will save and send a single-frame image to remote DICOM storage automatically. When pressing <F6>, the system will save and send a multi-frame image to remote DICOM storage

2.2.2 Structured Report (SR)

The system provides SRs in gynecology, obstetric, cardiac, vascular, and breast exams that specified in the DICOM standard. The SR can not only be sent alone to a DICOM server but also be sent along with an exam record that has image(s) saved. The type of SR to be sent is determined by the application region of the exam:

- Send obstetric SR: gynecology and obstetrics exam;
- Send cardiac SR: cardiac exam;
- Send Vascular SR: vascular, abdomen and urology exam. (The vascular SR contains the superficial, abdominal and kidney vascular, application region of which

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corresponds to the vascular, abdomen and urology exam respectively.)

• Send breast SR: breast exam;

The SR only could be sent in the circumstance as below:

- The exam type is obstetric, gynecology, cardiac, vascular, breast
- The SR Key for the exam type must be installed in option preset UI.
- Exam is the unit to send.
- The status of the exam is "End", "Paused" or "Cancelled". SR would not be sent when an active exam is selected.
- The DICOM storage service SCPs should be set as "Attach SR When Store Images", "Only Store SR", "Attach SR When Store Images and SR Contains User-defined Measurements" or "Only Store SR and It Contains User-defined Measurements":

A. Attach SR When Storage Images

Send image and gynecology and obstetric SR (or cardiac, vascular, breast SR) in iStation screen:

- Select "Attach SR when Storage Images" in Storage Preset -> SR Storage Option(See 1.3.1)
- 2. Start a new patient:
 - Press <Patient>, enter the Patient ID, Patient Name etc, select [OB] (or GYN, CAR, VAS, BREAST) application region, click [OK]
 - Or, load a patient from the WorkList, click [Start Exam] (commonly used in hospital)
- 3. Perform obstetric (gynecology, cardiac, vascular, breast) measurements:
- 4. Save image(s)
 - Freeze the image, press <Save> (a user-defined key, maybe preset for other function) on the control panel to save single-frame file.
- 5. End the exam
- 6. Enter iStation screen; select the patient, click [Send To].A dialog box pops up, as shown in Figure 15 Send To.

Send To	
Target	Select Server
₩H:	Storage Server
DICOM	√ PACS-Storage
Printer	
	Printer Server
	PACS-Print
	OK Cancel

Figure 15 Send To

- 7. Select DICOM in the [Target] list; select a server in the [Storage Server] list.
- 8. Click [OK], the status of sending task can be viewed in DICOM task management.

NOTE: For sending SR automatically, the same procedures are followed as in 2.2.1 Storage Operation.

B. Only Storage SR

Select "Only Store SR" in DICOM Storage Preset -> SR Store Option (See 1.3.1). The procedures are as the same as "Attach SR when Storage Images".

C. Send User-defined measurements

Config of Storage Service, with SR Storage Option selected "Attach SR When Store Images and SR Contains User-defined Measurements" or "Only Store SR and It Contains User-defined Measurements", and User-defined Measurements will be send to server as private element. The procedures are as the same as "Attach SR When Storage Images".

2.2.3 Encapsulated PDF

Encapsulated PDF is a PDF document that has been encapsulated within a DICOM information object, which is used to encapsulate the report document in this system.

The Encapsulated PDF only could be sent in the circumstance as below:

- Exam is the unit to send.
- The status of the exam is "End", "Paused" or "Cancelled". Encapsulated PDF would not be sent when an active exam is selected.
- The "Encapsulated PDF" should be enabled in DICOM storage service preset.
- Measuring result should be existent in default report template, which is to say that measurement in the exam type must be done.

The operation to send Encapsulated PDF: After [Encapsulated PDF] is enabled in preset, select exam to send or send after ending exam automatically as 2.2.1.

2.2.4 3D/4D

3D/4D images could send as pre-configuration form:

- Normal: send as the same as 2D images.
- Volume: send as 3D volume dataset encapsulated within Enhanced US Volume Storage IOD;
- Raw data: private form. Transfer with Raw data form is mainly used for 4DViewer to get the raw data of the 3D or 4D images. The 3D or 4D images are encapsulated within Raw Data Storage IOD to send, thus the Storage SCP received the image could not review it.
 4DViewer or DC8 Series Diagnostic Ultrasound System could retrieve the file and review it.

The "3D/4D" option is only effective for 3D and 4D images, but isn't for 2D images. The operation to send 3D/4D images: After the [3D/4D] option is set correctly in preset, select 3D or 4D images to send as 2.2.1.

2.2.5 Send DCM File

System allows saving images as DCM format to external media or device. The operations are described below:

A. Send to External Media

When the system is connected to external storage media, it allows saving the image as DCM format. The detailed operations are as follows:

- 1. Select one or more exams (with image) in iStation, click [Send].
- 2. In the dialog box popped up, select the [Destination] as connected external media.
- 3. Select the Export Image "DCM"; after confirming, click [OK], the selected exam or the image(s) of the exam can be sent to the specified external media with the format of DCM, as shown in Figure 16 Save as DCM Format.

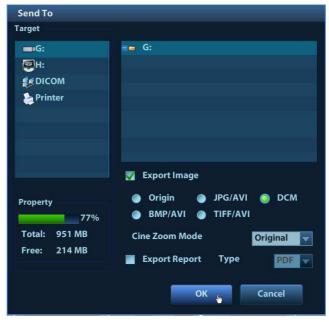


Figure 16 Save as DCM Format

B. Export Teaching Files

When the system is connected to external storage media, it also allows exporting the teaching files as DCM format. The detailed operations are as follows:

Export Teaching Files	
Target	
F: G:	 G: 20120604-135419-BC14 DC8 'popopo20120724-094536-3DE4 20120724-094536-3DE4 DCMIMG IHE_PDI
Property 65% Total: 1930 MB Free: 678 MB	Format Transfer JPG/AVI BMP/AVI TIFF/AVI DCM Origin Patient Info Custom Info K Cancel

Figure 17 Export Teaching Files

- 1. Select one or more exams (with image) in iStation, click [Export Teaching Files].
- 2. In the dialog box popped up, select the [Target] as connected external media.
- 3. Select the Export Image "DCM"; after confirming, click [OK], the selected exam or the image(s) of the exam can be sent to the specified external media with the format of DCM, as shown in Figure 17 Export Teaching Files.

Note: Patient information may need to be de-identified in DCM files.

C. Send to iStorage

When the system is connected to UltraAssist, it also allows sending files as DCM format. The detailed operations are as follows:

- 1. Configure the iStorage server in [Network Preset] / [iStorage].
- 2. Select one or more exams (with image) in iStation, click [Send].
- 3. In the dialog box popped up, select the iStorage server.
- 4. Select the Export Image "DCM"; after confirming, click [OK], the selected exam or the image(s) of the exam can be sent to the specified iStorage server with the format of DCM, as shown in Figure 18 Send to iStorage.

Send To	
Target	Select iStorage Server
≡∎∎H:	√ zmc
e:	
:	
DICOM	
≽ Printer	
Storage	
📤 4D Viewer 📘	
	Format Transfer
	JPG/AVI
	🔵 TIFF/AVI 🛛 💿 DCM
	Cine Zoom Mode Original
	Export Report Type
	OK Cancel

Figure 18 Send to iStorage

2.2.6 Common Reasons of Failure and

Troubleshooting

Failure:

The server disconnects to the system automatically.

• Potential Reasons:

The storage service of connected server cannot support JPEG compression, while which is selected in storage service in the system.

• Troubleshooting:

Modify the storage configuration of this server in Storage screen in the system. Select the service and select "Uncompressed", and then click [Update] to update the latest configuration information.

Failure:

The net is disconnected during transmission.

• Potential Reasons:

The connected net wire is plugged out during transmission.

• Troubleshooting:

Reconnect net wire to ensure normal net connection status.

Failure:

Multi-frame transmission is failed, but single frame is succeeded.

• Potential Reasons:

Enable multi-frame image storage is not selected in the dialog box of Storage preset.

Troubleshooting:

Enable multi-frame image storage is selected in the dialog box of Storage preset.

2.3 DICOM Print

DICOM print provides local image printing via the remote DICOM service or printer that supports the DICOM standard. The image displayed on screen can be printed via the selected DICOM print device during exam or image browsing. Print function entrances:

- Patient information management (iStation)
- Review status (Review)
- Real time/ freeze status (auto workflow)
- Thumbnail area

DICOM print supports:

- Single file transfer
- Exam transfer
- Batch transfer
- Static image file
- Succeeding frames printing is available if more than one frame is being sent for printing.

Batch transfer means multiple exam records can be selected and sent for printing with one DICOM task for each exam. Multiple files in one exam will be sent in one DICOM connection.

The auto send function can be triggered by (presettable):

- Ending the exam (send to default print service)
- Saving an image by pressing the user-defined save key (image is sent to the default DICOM service as well as saved)

2.3.1 Send to DICOM Print Manually

Take "send to DICOM print" in iStation screen as an example, the operation steps are:

- 1. Configure the print server according to the upper descriptions of service preset.
- 2. Press <iStation> on the control panel to enter the patient information management screen.
- 3. Select one or more exam records (that contain images) in exam list, or select one or more images in an exam.
- 4. Click [Send To] to pop up the [Send To] dialog box, select the Printer Server, click [OK] to print.

2.3.2 Send to DICOM Print Automatically

Function paths of sending to DICOM print automatically:

Send to DICOM print when ending the exam

Steps:

1. System Preset -> General Preset, select "Send/ print Image after End Exam".

- 2. In DICOM Preset -> Print Service, set the default print server.
- 3. When pressing <End Exam> with the current exam being active, all images (and SR) of the current exam are sent to the default DICOM print server.
- Send to DICOM print when pressing user-defined key
 - In System Preset -> Key Config, the NULL key can be set as "Send Image to DICOM print", as shown in Figure 19 Send to DICOM print when pressing user-defined key.

Exam Preset		And Share	
	Key Function		Function
Measure Preset	Key Function Foots	witch	Output Print Advanced Features Measurement Other
iWorks Preset	Key Function	Select Function	Save Image to hard drive
Print Preset	Print Save1	Save Image to Hard Disk an Save Image to Hard Disk an	Save Clip(Retrospective) to hard drive Save Clip(Prospective) to hard drive Save Full Screen Image to hard drive
Network Preset	Save2 F3	Save Cine(Prospective) to H Save Full Screen Image to h	Save Image to Hard Disk and Send to DICOM Storage Save Image to Hard Disk and Send to DICOM Printer
DICOM Preset	F4 F5 F6	Save Image to Hard Disk an AC FL	Save Cine(Retrospective) to Hard Disk and Send to DICOM Save Cine(Prospective) to Hard Disk and Send to DICOM
Maintenance	F0 F12 P1	FL NULL ExFOV	NULL
About	P2	Free Xros M	
	Key Brightness	2 Trackball Speed	d Medium Key Volume 1 🗸 🗸

Figure 19 Send to DICOM print when pressing user-defined key

- 2. In DICOM Preset -> Print Service, set the default print server.
- 3. In current exam, press <Print> (according to the user preset), the system will save and send a single-frame image to remote DICOM printer automatically.
- 4. View the print status in the DICOM Task Management, check the DICOM preset and network connection if a print error occurs.

2.4 DICOM WorkList

The user can set query conditions when finding exam record(s) from the RIS or other Worklist server, and import the patient information selected in the query result. Steps:

- 1. Press <Info> to open the Patient Info screen.
- 2. Click [WorkList] to enter the WorkList screen.
- 3. Query the patient information by setting conditions such as Patient ID, Name, and Key words, Exam Date, Modality, WorkList Server, and Scheduled Station AE Title. The default Exam Date is "today" of the system time. Patient records will be listed after clicking [Query].

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Query					
Patient ID			Patient Name	Accession	1#
Search Key Req	uested Procedure ID 🛛 🥃		Scheduled Station AE Title	Modality Ty	pe US
Exam Date 27/0	09/2011 🕎 To 28/09	/2011	WorkList Server PACS-Worklist	Que	ry Clear
1 records are listed.					
Patient ID	Patient Name	Accession #	Exam Description	Exam Date	Gend DOB
LMID	LiMing	123456789	ScheduledProcedureStepDescription	28/09/2011	Male 28/09/2011
			Start Exam Transfer	Show Detail	Exit
					14:21

Figure 20 Query in WorkList

- 4. After the first query is finished, you can perform the second query within the range of the scheduled patients in the first time. The scheduled patients in the list will change in real time.
- 5. Select a patient record, click [Start Exam], the system import this patient and start the exam; Click [Transfer] will launch the patient record selected into the Patient Info screen to edit and restart the exam; Click [Show Detail] to view the detailed information of the patient. As shown in Figure 21 Detailed Information

Attribute Name	Value	*
Patient Name	LiMing	
Patient ID	LMID	
Other Patient IDs	JHID	
Patient's Birth Date	28/09/2011	
Patient's Birth Time		
Patient's Sex	Male	
Patient's Size	185.00cm	
Patient's Weight	78.00kg	
Patient Comments	NOComments	
Ethnic Group	NO	
Confidentiality constrai	m_strConfidentialityConstra	
Medical Alerts	MedicalAlerts	
Contrast Allergies	ContrastAllergies	
Pregnancy Status	23303	
Additional Patient's Hist	AdditionalPatientHistory	
Last Menstrual Date	28/09/2011	
Patient State	PatientState	
Special Needs	SpecialNeeds	
Referenced Patient Seq		
>Referenced SOP Class	1.2.840.10008.3.1.2.1.1	
>Referenced SOP Instan	1.2.3.4.5.6.7	
Admission ID	1234567890	
Current Patient Location	CurrentPatientLocation	
Admitting Diagnosis De	AdmittingDiagnosesDescript	-
•		

Figure 21 Detailed Information

NOTE:

The modality type can be entered by the user.

If you set the "Scheduled Station AE Title" in Worklist Query Screen, then this item configured should be consistent with the one set in the server.

Second query and detail information are still available during off-line. The query will be started automatically according to the default query conditions each time entering the [WorkList] screen if a default WorkList Server is set.

Check the DICOM preset and network connection if a query error occurs.

2.5 MPPS

MPPS is to send the states information of exams to the configured server. Thus the exam states can be known and edited by other systems. Prerequisite: a default MPPS server is needed.

The MPPS function will be started by:

- Staring a new exam
- Canceling an exam
- Ending an exam
- Activating an exam

The states are listed in the [Exam State] column in iStation screen. MPPS sending is hidden to the user.

2.6 Storage Commitment

Storage commitment is to ensure that the image data will be stored into the server correctly.

Prerequisite: a Storage Commitment server is needed, and a relative storage server must be set.

Steps:

- 1. A default storage commitment server is preset and a relative storage server is set.
- 2. Send image (and SR) to the storage server, the storage commitments are sent to the commitment server automatically.
- 3. The state of the committed service will be returned with the **b** column in iStation screen marked with a tick if the commitment is succeeded. Otherwise the column will not be marked.

2.7 Query/ Retrieve

The query/ retrieve function is to query and get the patient exam record from a specified server.

Steps:

- 1. A query/ retrieve server is preset.
- 2. Path1: press <iStation> -> [Query/ Retrieve].
- 3. Path2: press <Patient> -> <iStation> -> [Query/ Retrieve].

4. Select the Source server, enter Search Key words and click [Query]. As shown in Figure 22 Query.

Query/Retrieve					mindray
Server and Service	c	luery			
Source PACS-Que	eryRetrieve 🔽	Patient ID	Patient Name		
Destination Local Hos		Accession #	Exam Date	13/09/2009 🔁 To	28/09/2011
		Search Key S	tudy ID	Query	Clear
Patient(Source)	2 records are listed.				
Patient ID	Name	Accession #	Exam Description	Exam Date/Ti Ge	nder DOB
20100919-150238-89B7	new patient			19/09/2010 1 Un	kno
L0423001	wang	L0423001		19/09/2010 1 Ma	le 23/04/
Select All Deselect A	ll Retrieve		0 records are listed.		Cancel
Patient (Destination) Patient ID	Name	Accession #	Exam Description	Exam Date/T Con	t Gender D(
<>					< >
					Exit
					14:39:47

Figure 22 Query

5. Select one or more records and click [Retrieve] to get the records down to local system, as shown in Figure 23 Retrieve.

Query/Retrieve					mindray
Server and Service	Que	ry			
Source PACS-Qu	eryRetrieve Pa	tient ID	Patient Name		
Destination Local Ho		cession #	Exam Date	13/09/2009	To 28/09/2011
		arch Key Stu	dy ID	Qu	ery Clear
Patient(Source)	1 records are listed.				
Patient ID	Name	Accession #	Exam Description	Exam Date/Ti	Gender DOB
L0423001	wang	L0423001		19/09/2010 1	Male 23/04/
Select All Deselect	All Retrieve		1 records are listed.		Cancel
Patient(Destination)					
Patient ID	Name	Accession #	Exam Description	Exam Date/T	Cont Gender DC
20100919-150238-89B7	new patient			19/09/2010	2 Unknown
∢ ▶					4 •
					Exit
					14:40:17

Figure 23 Retrieve

6. Click [Exit], the obtained patient records can be viewed in iStation screen.

2.7.1 3D/4D Raw Data

The system supports retrieving the 3D/4D raw data sent by DC8 Series Diagnostic Ultrasound System and reviewing it by converting it to the original form.

2.8 DICOM Media Storage and Review

DICOM media storage supports storing ultrasonic diagnostic data (patient and image information) into the media (USB flash drive, optical disk or removable hard disk). DICOM media review (DICOMDIR) function supports viewing DCM image(s) stored in external media.

Prerequisites for DICOM media storage and DICOMDIR:

- Configured with DVD recorder that working normally
- Normally read/ write of the USB ports on the ultrasound system
- File system format of CD/ DVD optical file should be ISO9660, and the optical disk should not be damaged
- File system format of DVD optical file should be UDF, and the optical disk should not be damaged
- File system format of removable device (USB flash drive) is FAT32 and the media should not be damaged

2.8.1 DICOM Media Storage

Steps:

- 1. Press <iStation> on the control panel to enter the patient information screen
- 2. Select one or more exams (with image) that is not active, click [Send Exam] to pop up the [Send To] dialogbox.
- 3. Select the target [DICOMDIR], and select the [Destination] as shown in Figure 24 DICOM Format Backup.



Figure 24 DICOM Format Backup

- 4. Click [OK], to backup the image in current exam to the external media in DICOM format
- 5. If the backup is succeeded, [Backup] in the iStation screen will be marked with \surd ; otherwise no $~\checkmark~$ is marked

NOTE: make sure enough space on the media; otherwise the media storage process will be failed due to insufficient space.

2.8.2 DICOMDIR Review

Steps:

- 1. Press <iStation> on the control panel to enter the patient information screen
- 2. Select the external media from "Data Source"
- 3. The exam(s) and image(s) will display in the iStation screen if the media is read successfully.

2.9 Task Management

The task management is a platform for the user to manage, view, delete or restart the background task, including DICOM tasks.

Click con in the lower right corner of the screen to open the DICOM Task Management dialog box, as shown in Figure 11 **DICOM Send To Screen**.

Task progress and status of storage task, print task and media storage task can be viewed in this dialog box. The task management icon indicates the status of the task:

- 1. Task in progress, the icon indicates in green.
- 2. No task is in progress with failed task exists, the icon indicates in yellow.
- 3. No task is in progress without failed task, the icon is

3 Common Failures and Troubleshooting

3.1 Common Failure: Service Verification Failed

Potential Reasons:

- Failed network connect, please check the network cable and connection;
- Verification service is not supported by the server;
- The verification is supported but not activated on the server; check the server setting if the verification service is activated.

Troubleshooting:

- Check the DICOM Conformance Statement if the SCP is supported;
- Enable the SCP service referring to the Server Manual or DICOM Conformance Statement.
- If the verification is still failed after all above steps and the operating system is Windows, please add the server program and the port to the "Exceptions" in Control Panel -> Windows Firewall. As shown in Figure 25 Add a Port.

eneral Exception	NS Advanced
Add a Port	
	s to open a port through Windows Firewall. To find the port col, consult the documentation for the program or service you
<u>N</u> ame:	ADVT
Port number:	014
What are the risks	● ICP ○ UDP of opening a pot?
Change scope	OK Cancel
Add Program	Add Port Edit Delete
Display a notific	cation when Windows Firewall blocks a program

Figure 25 Add a Port

3.2 Common Failure: Server disconnects the ultrasound system during implementing storage

Potential Reasons:

- The JPG compression is enabled on local device but is not supported on the server;
- Wrong AE_TITLE settings on local device and the server.

Troubleshooting:

- Select "uncompressed" in DICOM Service -> Storage;
- Set the correct local AE_TITLE and server AE_TITLE on local device according to the DICOM Conformance Statement or settings of the server.

3.3 Common Failure: Network disconnected (shown by network icon) during transmission

Potential Reasons:

- The network cable is disconnected during transmission;
- The connected switch, router or hub is down or in failure;

Troubleshooting:

- Connect the network cable;
- Reset the switch, router or hub; or replace a network device with higher performance.

3.4 Common failure: Worklist query succeeded, but no patient is shown

Potential Reasons:

- Scheduled Station AE Title in the preset is not consistent with the setting on server;
- Records on the server database are not accordant with the query conditions on local ultrasound system

Troubleshooting:

- Preset the right Scheduled Station AE Title on Worklist screen according to the server settings.
- The ultrasound system is defaulted only to inquire the patient information that the Modality is US, and the patient needs the server to provide US attribute. Change the query conditions (e.g. date or patient name) to make the server find the record accordingly. Based on DICOM standard, Patient ID cannot support fuzzy inquiry, only

can support the whole word match. Please confirm the entered Patient ID is right or not.

3.5 Common failure: Printing succeeded but the film is blank

Potential Reasons:

- The printer doesn't support color printing which is performed by the ultrasound system;
- The film or paper of the printer doesn't support color printing.

Troubleshooting:

- Check the printer conformance statement if the printer can support color printing; if not, modify the "Settings" in Print Preset Screen -> Print to B/W type (MONOCHROME2);
- Generally, the "Medium Type" is set to "Blue File" for B/W printing while "Paper" or "Clear Film" for color printing

3.6 Common Failure: Verification of connecting DICOM printer is succeed but printing is failed

Potential Reasons:

- Wrong AE_TITLE settings on local device and the server.
- The parameters set in DICOM Service -> Print are not supported.
- IP address of printer server is the same with the system IP.

Troubleshooting:

- Set the correct local AE_TITLE and server AE_TITLE on local device according to the DICOM Conformance Statement or settings of the printer.
- Refer to the printer conformance statement for the printing parameters (Format, Film Size) value that supported. Check film size and type, and then correctly set Film Size, Format, Medium Type etc. in print service preset in ultrasound system.
- Set the correct IP address of the printer server.

3.7 Common Failure: Printed image is too small

Potential Reasons:

The Magnification Type of local ultrasound system is set to NONE while this parameter on printer is set to same with the local ultrasound system.

Troubleshooting:

Set the right Magnification Type in local ultrasound DICOM Service preset according to the Magnification Type specified in the printer conformance statement. If there is no printer conformance statement for reference, set the Magnification Type as Bilinear, CUBIC or REPLICATE.

3.8 Common Failure: MPPS message is not sent out correctly or not received by the server

Potential Reasons:

The MPPS server is not set as default.

Troubleshooting:

Set the MPPS server as default after setting the Port and AE Title correctly.

3.9 Common Failure: Storage commitment is failed

Potential Reasons:

- 1. The associated storage commitment server is incorrect;
- 2. The port and IP address settings on the commitment server are inconsistent with the local preset.

Troubleshooting:

- 1. Check if the associated storage commitment server is correct;
- 2. Check if the port and IP address settings on the commitment server are consistent with the local preset.

NOTE:

The storage commitment icon **i** in [iStation] screen is not refreshed in real time. Exit and enter the [iStation] screen will refresh the commitment icon if a storage commitment is succeeded.

3.10 Common Failure: Query is succeeded, but retrieve is failed, with the prompting that the remote server is wrong

Potential Reasons:

- 1. The client port, CALLED_AE and IP address settings on the Q/R server are inconsistent with the local preset.
- 2. The setting of the local storage SCP port is wrong.

Troubleshooting:

- 1. Check if client port, CALLED_AE and IP address settings on the Q/R server are consistent with the local preset.
- 2. Some servers only support the specified port as the storage SCP port. Please confirm whether the server has this restriction. If it has, please modify the serial number of local port. See the Figure 26 DICOM Local Preset.

Setup						mi	ndray
System Preset	Localhost DI	COM Service Property(Inclu	ding SCU and SCP)				
Exam Preset	AE Title	CALLING_AE	Port	2345	PDU	32768	
Measure Preset	- Server Settin	g					
iWorks Preset	Device —						
Print Preset	Device		IP Add	lress		Ping	
Network Preset	Ad	d					
DICOM Preset							
Maintenance	Device List						
About	Devi			IP Address			
About	1 PAC	S		10.24.2.117			
		Set DICOM Service	Delete				
						Save Cancel	
							14:42:49

Figure 26 DICOM Local Preset

3.11 Common Failure: Error messages in DICOM Task Management

3.11.1 Association aborts

Potential Reasons: The association is denied by the SCP due to incorrect setting of AE_TITLE on the SCU. See Figure 27 Association aborts.

Storage Task	DICOM Print Task Media Storage Task Print Task						
ID	Name	Destination	Progress	Туре	Status	Content	Create Time
20110926	breast	PACS-Storage	0.0%	DICOM	Failed	6	28/09/2011
Potential reaso Potential reaso	n 1:the serv n 2:please c	ened when sending er is not running,o heck the network v rameters are wron Select A	r the server IF vorks normal ig in DICOM s	P is not correctly or not.			AE Title and

Figure 27 Association aborts

3.11.2 Network error: Socket sending error

Potential Reasons: Network cable unplugged or network equipment is failed during data transmission. See the Figure 27 Association aborts.

3.12 Print Service Examples

Whether the printing will be succeeded is determined by:

- 1. Printer settings on local ultrasound system should consist with that specified on printer conformance statement;
- 2. The operations being performed are supported by the printer.

The following are two examples.

3.12.1 Example 1

The medium type supported by the Horizon CI DICOM printer in color and B/W printing is shown in table below:

Medium values)	Туре	(standard	Grayscale negotiated	PMM	SOP	Color negotiat	PMM ed	SOP
PAPER			DV Paper			CV Pap	er	
Blue Film			DV Blue Film			CV Film	(clear)	

CLEAR FILM	DV Clear Film	CV Film (clear)

The MAGNIFICATION Types supported by Horizon CI DICOM printer conformance statement are listed in table below:

MAGNIFICATION	NONE
TYPE	REPLICATE
	BILINEAR
	CUBIC
	BICUBIC
	MITCHELL
	LANCZOS
	SHARP1
	SHARP2
	SHARP3

AE TITLE settings that specified in Horizon CI DICOM printer conformance statement are listed in table below:

System Job Settings File	Corresponding Use
Print_SCP	Used for DICOM. Does not contain any print parameter settings. If the media type or size is not included in the DICOM attributes sent to the imager, the imager detects the image type and selects the media type and size as follows: For grayscale images, uses the media set for Grayscale in the Default Media menu at the control panel. For color images, uses the media set for Color in the Default Media menu at the control panel.
Default Grayscale	Imager uses the media set for Grayscale in the Default Media menu at the control panel
Default Color	Imager uses the media set for Color in the Default Media menu at the control panel
8x10-dvf	8x10 DirectVista film (blue)
8x10-dvfb	8x10 DirectVista film (blue)
8x10-dvfc	8x10 DirectVista film (clear)
8x10-dvp	8x10 DirectVista paper
8x10-cvf	8x10 ChromaVista film
8x10-cvt	8x10 ChromaVista film
11x14-dvf	11x14 DirectVista film (blue)
11x14-dvfb	11x14 DirectVista film (blue)
11x14-dvfc	11x14 DirectVista film (clear)
11x14-dvp	11x14 DirectVista paper
11x14-dvp	11x14 DirectVista paper

14x17-dvf	14x17 DirectVista film (blue)
14x17-dvfb	14x17 DirectVista film (blue)
14x17-dvfc	14x17 DirectVista film (clear)
14x17-dvp	14x17 DirectVista paper
a-dvp	A-size DirectVista paper
a-cvf	A-size ChromaVista film
a-cvt	A-size ChromaVista film
a4-dvp	A4-size DirectVista paper
a4-cvp	A4-size ChromaVista paper
a4-cvf	A4-size ChromaVista film
a4-cvt	A4-size ChromaVista film
priority-high	Sets print job priority to high
priority-medium	Sets print job priority to medium
priority-low	Sets print job priority to low
receive-1	Forces sheet output to receive tray 1
receive-2	Forces sheet output to receive tray 2
receive-3	Forces sheet output to receive tray 3
syngofilm	Special OEM-specific job settings

The Horizon CI DICOM printer screen displays:

- A4 CV PAPER
- 8X10 DV Blue

14X17 DV Blue

The following are the correct settings of the ultrasound system DICOM print preset:

- Color printing:
 - (1) Settings: RGB
 - (2) Medium Type: Paper
 - (3) Film Size: A4
 - (4) MAGNIFICATION TYPE: NONE/CUBIC/ REPLICATE/BILINEAR
 - (5) AE Title: Print_Scp (Recommended)
- B/W printing
- 1. Method 1
 - (1) Settings: MONOCHROME2
 - (2) Medium Type: Blue Film
 - (3) Film Size: 8X10
 - (4) MAGNIFICATION TYPE: NONE/CUBIC/ REPLICATE/BILINEAR
 - (5) AE Title: Print_Scp (recommended)

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- 2. Method 2
 - (1) Settings: MONOCHROME2
 - (2) Medium Type: Blue Film
 - (3) Film Size: 14X17
 - (4) MAGNIFICATION TYPE: NONE/CUBIC/ REPLICATE/BILINEAR
 - (5) AE Title: Print_Scp (recommended)

The following are the incorrect settings of the ultrasound system DICOM print preset:

Color printing:

1)	Settings: MONOCHROME2	Incorrect. "RGB" should be selected in color printing while "MONOCHROME2" for B/W printing
		Incorrect.
2)	Medium Type: Blue Film	Paper and Clear file are supported by color printer according to the printer conformance statement; but only Paper is available as displayed in the printer screen.
		Incorrect.
		Only three film size are available according to printer screen display:
3)	Film Size: A3	A4
		14X17
		8X10
4)	MAGNIFICATION TYPE	Can be set as: NONE/ CUBIC/ REPLICATE/ BILINEAR
5)	AE Title: 14x17-dvfb	Incorrect. Setting AE Title as "14x17-dvfb" will enforce the 14x17 Direct Vista film (blue) printing.

3.12.2 Example 2

This example is being performed with FUJI Film drypix4000 printer connected with the ultrasound system.

- DICOM print settings on ultrasound system:
- 1) Settings: MONOCHROME2
- 2) Medium Type: Blue Film
- 3) Film Size: 14X17
- 4) FORMAT: STANDARD\3, 5
- 5) Film Orientation: Landscape

Result: failed

- Modify the DICOM print settings:
- 1) Settings: MONOCHROME2

- 2) Medium Type: Blue Film
- 3) Film Size: 14X17
- 4) FORMAT: STANDARD\3, 5
- 5) Film Orientation: Portrait
- Result: succeeded.
- Reasons:

Settings of Film orientation along with the FORMAT that supported by FUJI Film drypix4000 printer are specified in the conformance statement. The print setting of 14X17 Landscape STANDARD\3,5 is unavailable.

According to the printer conformance statement, Film orientation and FORMAT table supported by FUJI Film drypix4000 are listed in table below:

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Film Size and Orientation	FORMAT
	STANDARD\1,1
	STANDARD\1,2
	STANDARD\1,3
	STANDARD\2,1
	STANDARD\2,2
	STANDARD\2,3
	STANDARD\2,4
	STANDARD\3,3
	STANDARD\3,4
	STANDARD\3,5
	STANDARD\3,6
	STANDARD\4,4
	STANDARD\4,5
	STANDARD\4,6
	STANDARD\4,7
14" 17" Dortroit	STANDARD\4,8
14" 17" Portrait	STANDARD\5,5
	STANDARD\5,6
	STANDARD\5,7
	STANDARD\5,8
	STANDARD\6,6
	STANDARD\6,7
	STANDARD\6,8
	STANDARD\6,9
	STANDARD\6,10
	STANDARD\7,7
	STANDARD\7,8
	STANDARD\7,9
	STANDARD\7,10
	STANDARD\8,8
	STANDARD\8,9
	STANDARD\8,10

	STANDARD\1,1
	STANDARD\2,1
	STANDARD\3,1
	STANDARD\1,2
	STANDARD\2,2
	STANDARD\3,2
	STANDARD\4,2
	STANDARD\3,3
	STANDARD\4,3
	STANDARD\5,3
	STANDARD\6,3
	STANDARD\4,4
	STANDARD\5,4
	STANDARD\6,4
	STANDARD\7,4
14"-17" Landscape	STANDARD\8,4
14.17 Lanuscape	STANDARD\5,5
	STANDARD\6,5
	STANDARD\7,5
	STANDARD\8,5
	STANDARD\6,6
	STANDARD\7,6
	STANDARD\8,6
	STANDARD\9,6
	STANDARD\10,6
	STANDARD\7,7
	STANDARD\8,7
	STANDARD\9,7
	STANDARD\10,7
	STANDARD\8,8
	STANDARD\9,8
	STANDARD\10,8