Digital Ultrasound Diagnostic System

DICOM Quick Guide

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3.5 Common failure: Printing succeeded but the film is blank 35
3.6 Common Failure: Verification of connecting DICOM printer is succeed but printing is failed 35
3.7 Common Failure: Printed image is too small 35
3.8 Common Failure: MPPS message is not sent out correctly or not received by the server 36
3.9 Common Failure: Storage commitment is failed 36
3.10 Common Failure: Query is succeeded, but retrieve is failed, with the prompting that the remote server is wrong 37
3.11 Common Failure: Error messages in DICOM Task Management 37
3.11.1 Association aborts 37
3.11.2 Network error: Socket sending error 38
3.12 Print Service Examples 38
3.12.1 Example 1 38
3.12.2 Example 2 41

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**.

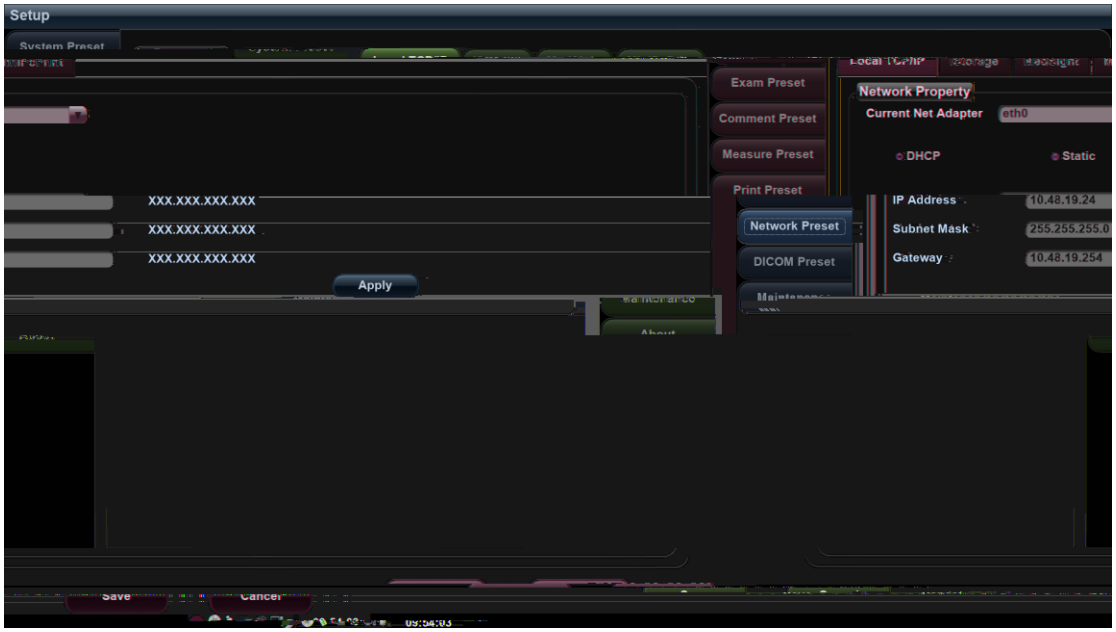

Figure 1 TCP/IP Preset Screen

3. 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.

Local TCP/IP preset items are described as follows:

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.

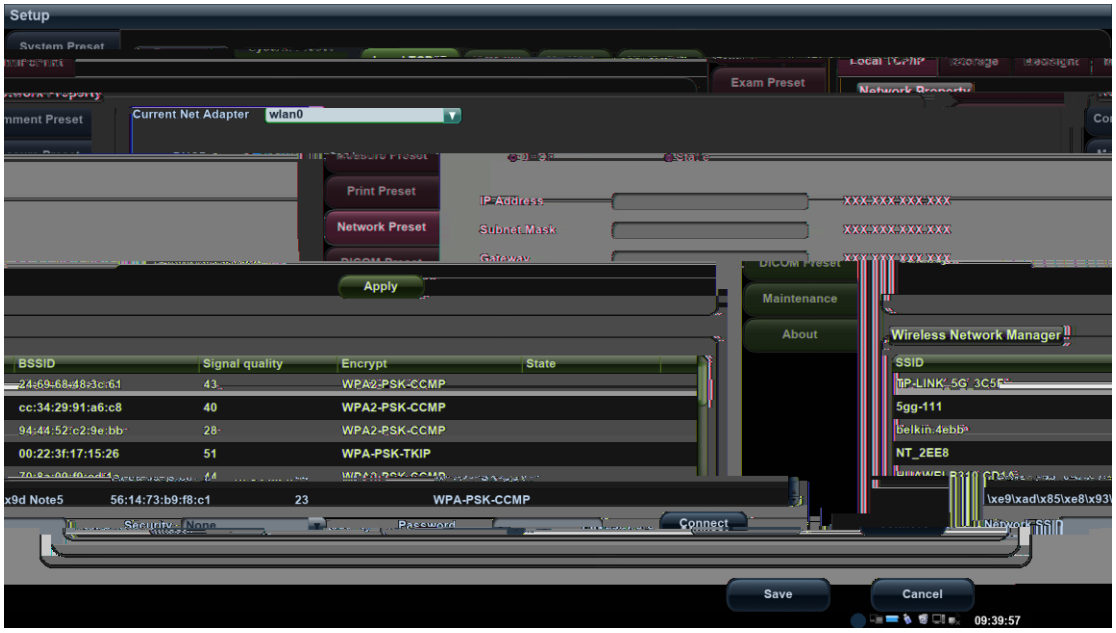

Figure 2 TCP/IP Preset Screen (Wireless Network)

WirTm[()-3(W.42 cm/Image135 Dot-36BT/F1 10.56 Tf1 0 0)S10.24 27819 q[T1 0 0 1 505.42 64.70411758 027819 q[W)-21(i)6(r)15(

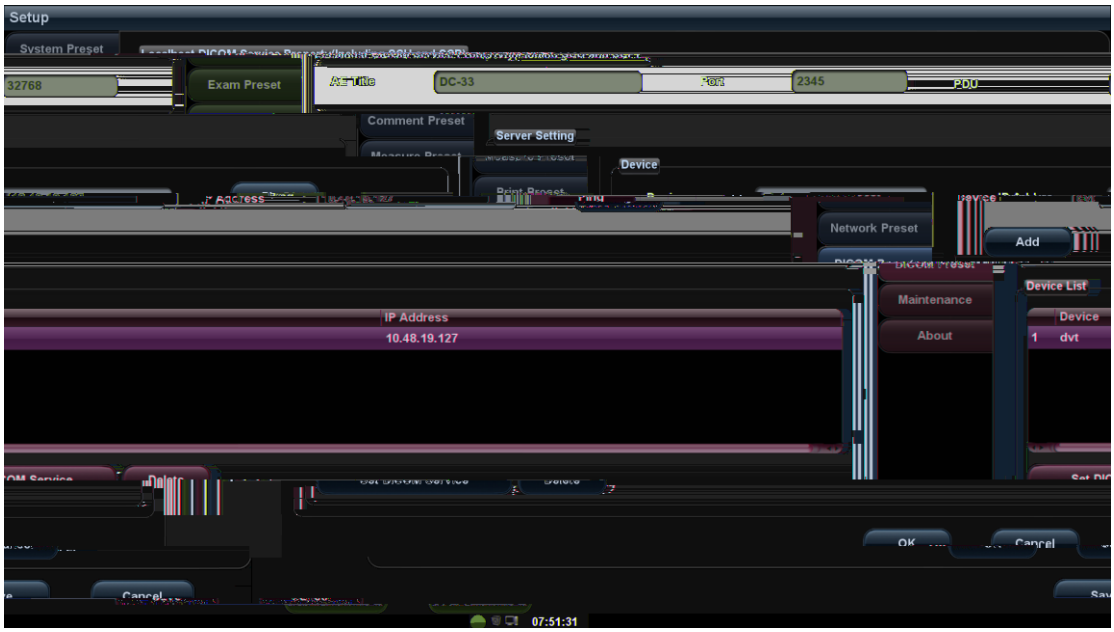

Figure 3 DICOM Preset Screen

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

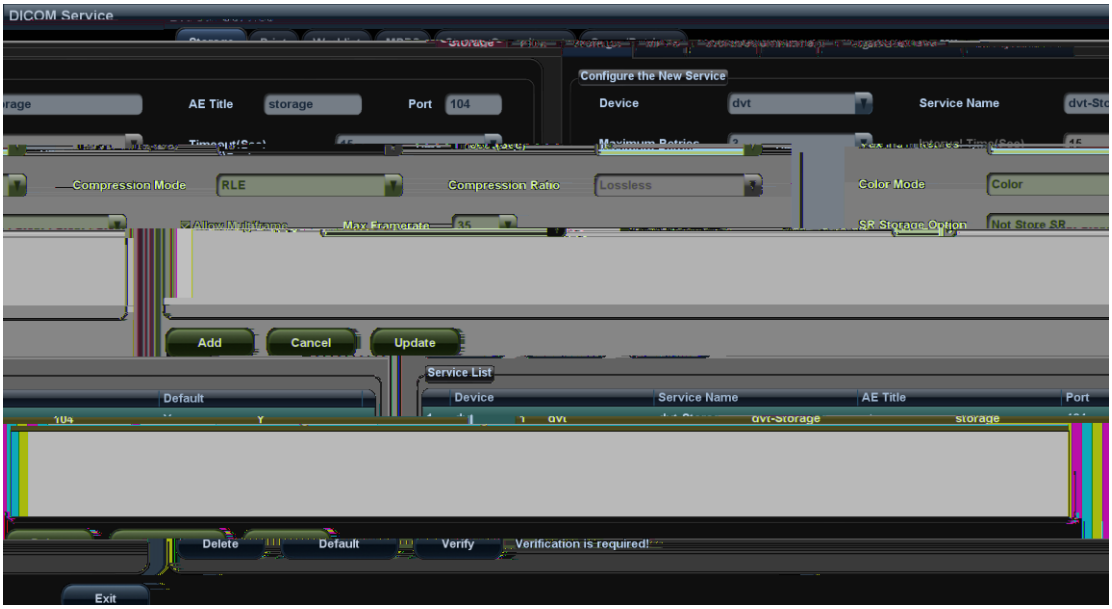

Figure 4 DICOM Storage Preset Screen

The main parameters of DICOM Storage are described as below:

NagTET EN

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.
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
SR Storage Option	Three options are available when Structured Reporting is needed to send. You can select attach SR when storage images, only store SR and not store SR.
Add	Add the DICOM service to the service list.

Cancel

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 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 timeout during association establishment. 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

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

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.

	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

1.3.6 Query/Retrieve Preset

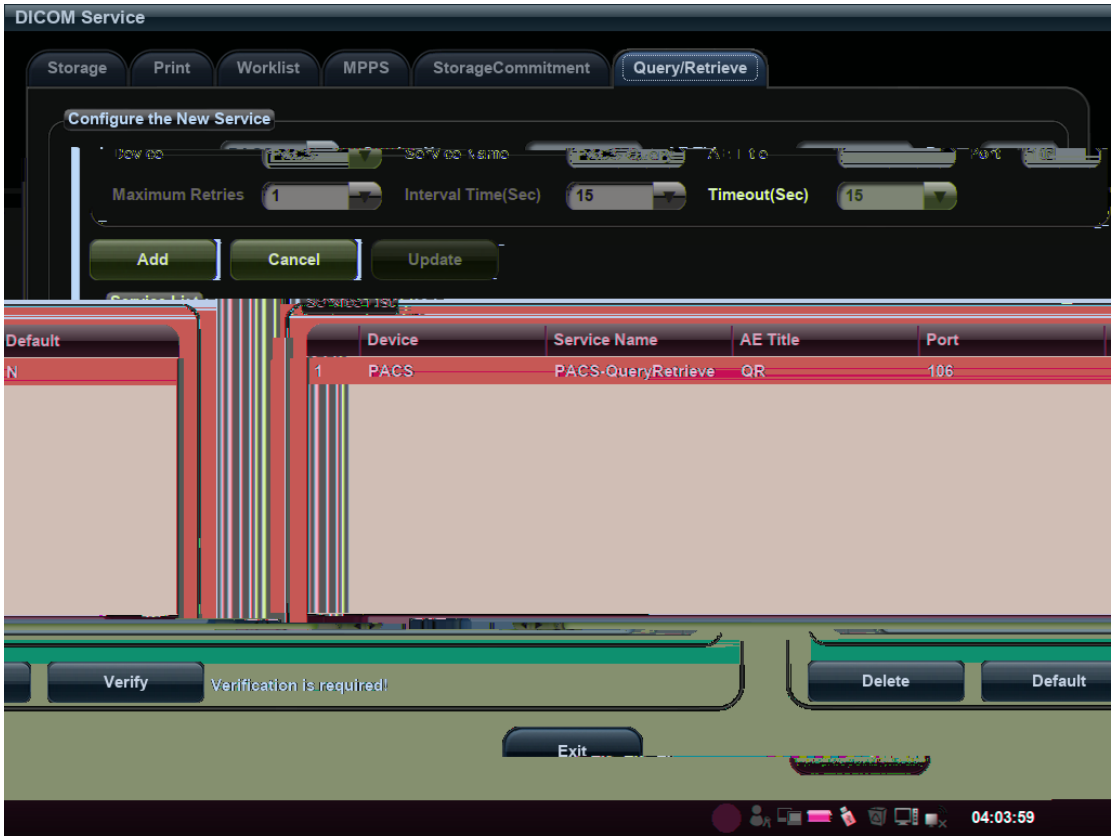

Figure 9 DICOM Query/Retrieve Preset Screen

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.
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:

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**.

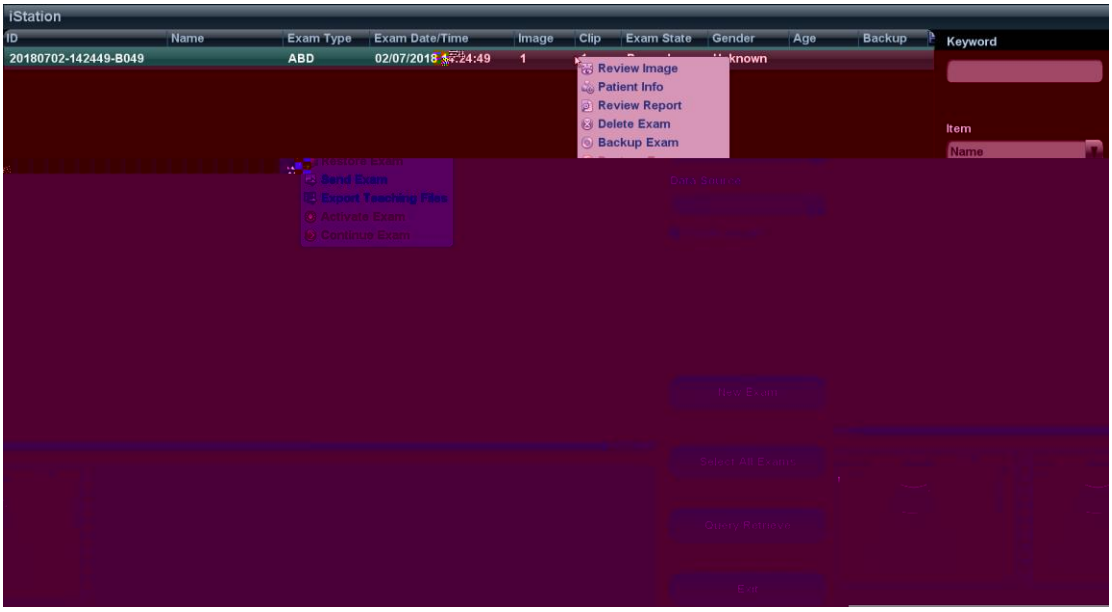

Figure 10 iStation Screen

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**.

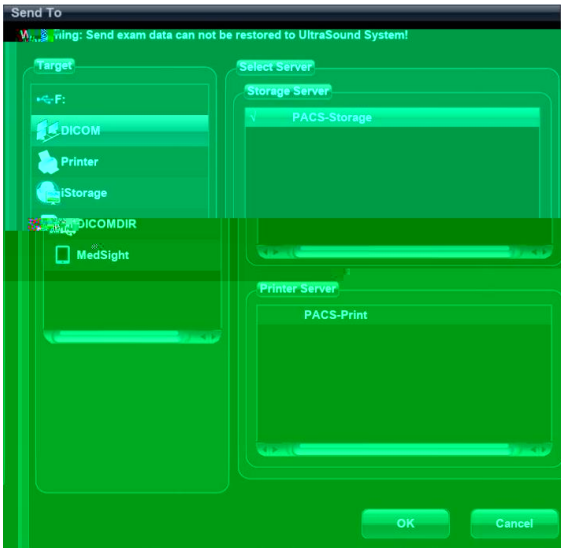

Figure 11 DICOM Send To Screen

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**.

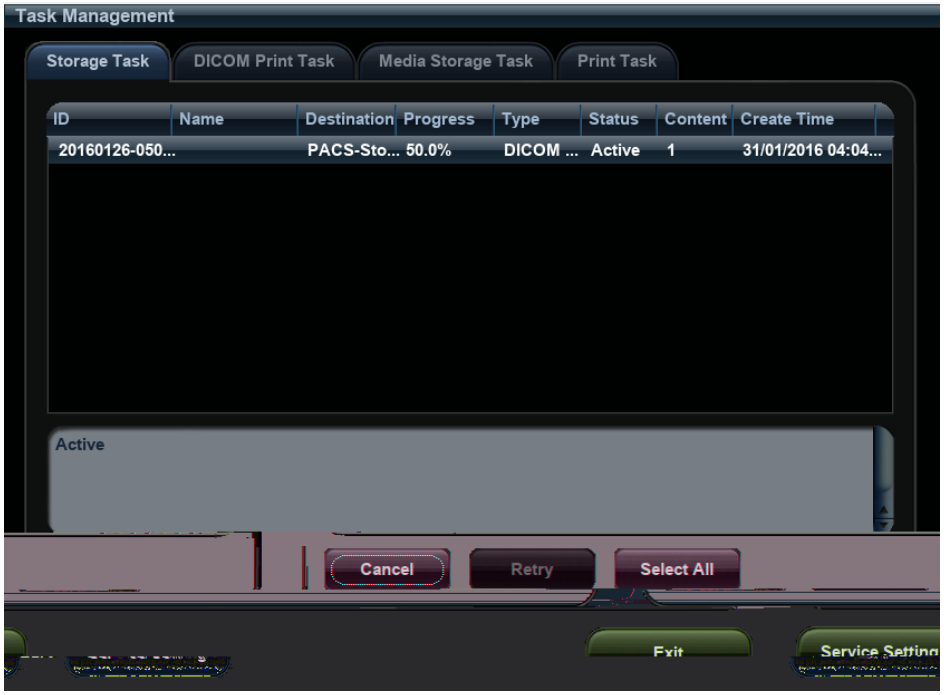

Figure 12 Task Management

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

A. Send Image after end exam:

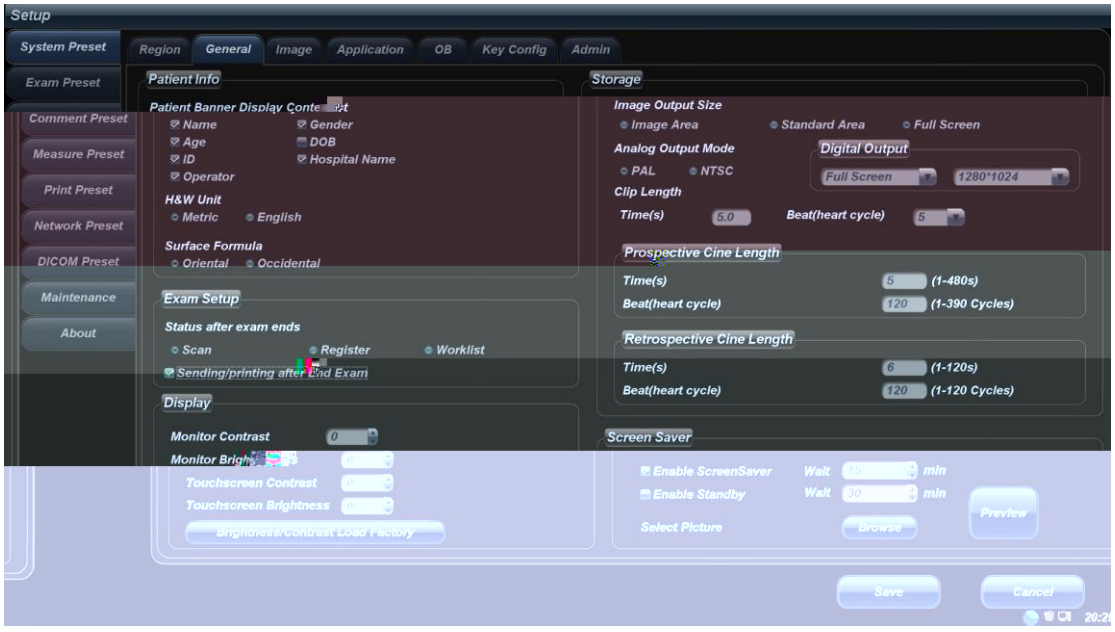

Figure 13 Send Image after End Exam

Steps:

1. In System Preset -> General, select, as shown in Figure 13 **Send Image after End Exam**.
2. In DICOM Preset -> Storage Service, set the default storage server (one or more).

- 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"

2.2.3 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.

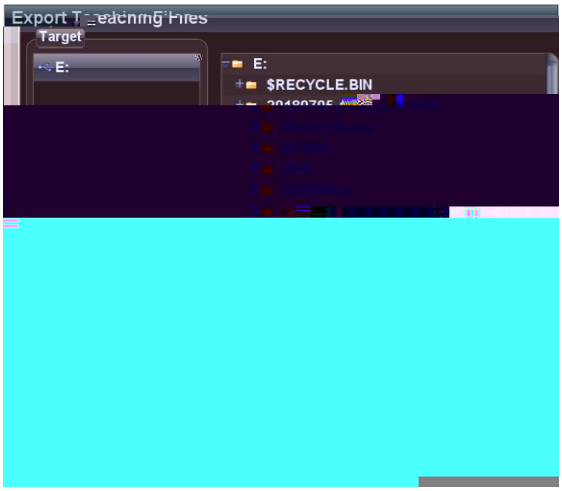

Figure 17 Export Teaching Files

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.

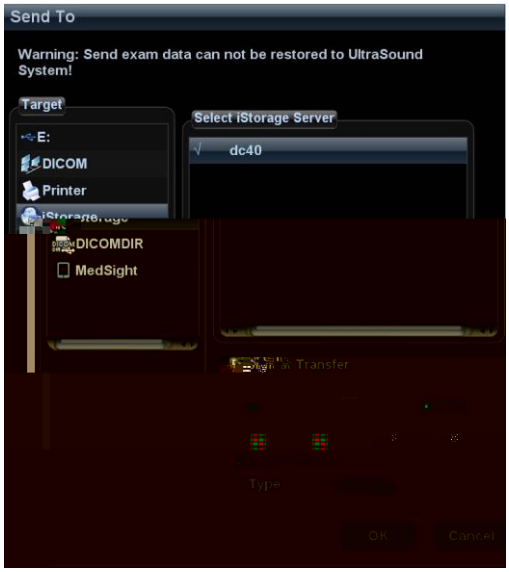

Figure 18 Send to iStorage

2.2.4 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”

- 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
  1. 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.

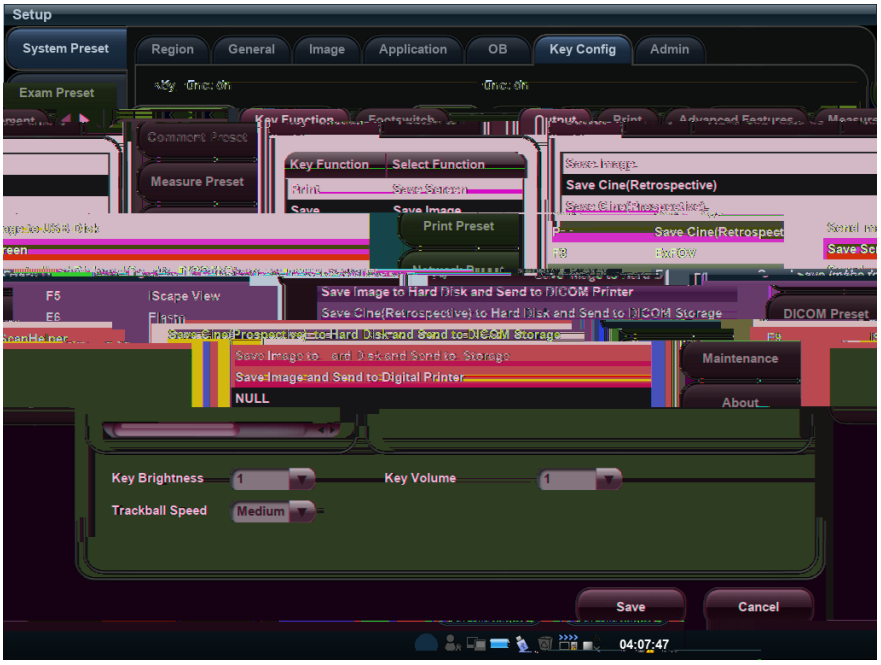

Figure 19 Send to DICOM print when pressing user-defined key

2. In DICOM Preset -> Print Service, set the default print server.
3. In current exam, press <F4> (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 thl

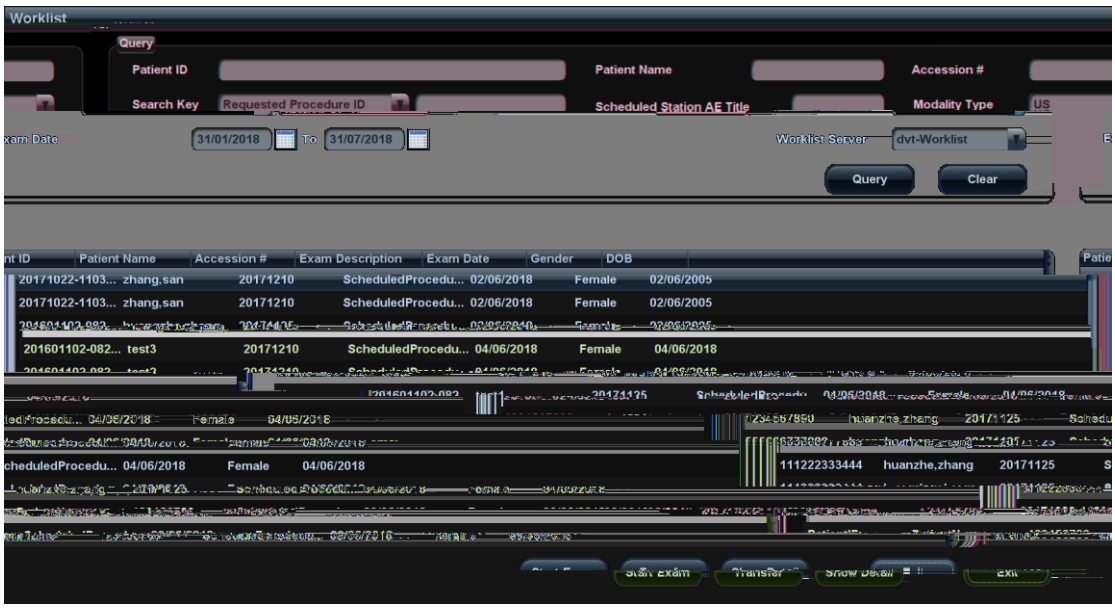

Figure 20 Query in WorkList

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

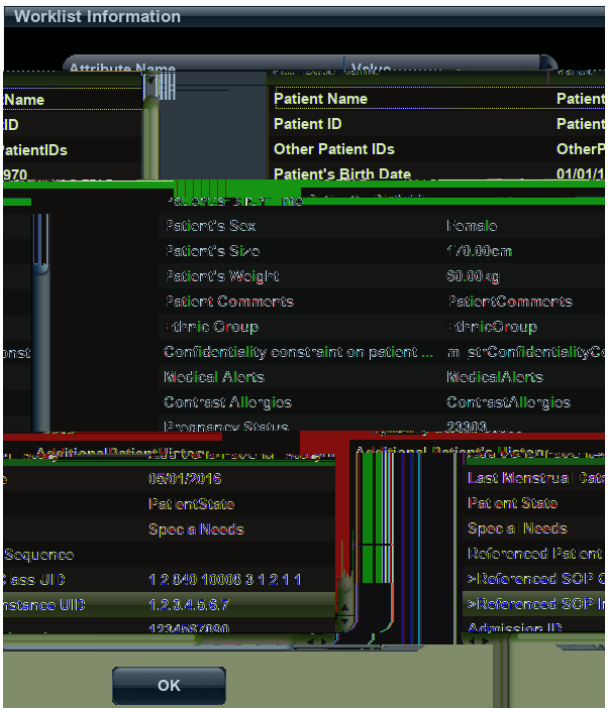

Figure 21 Detailed Information

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 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 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.

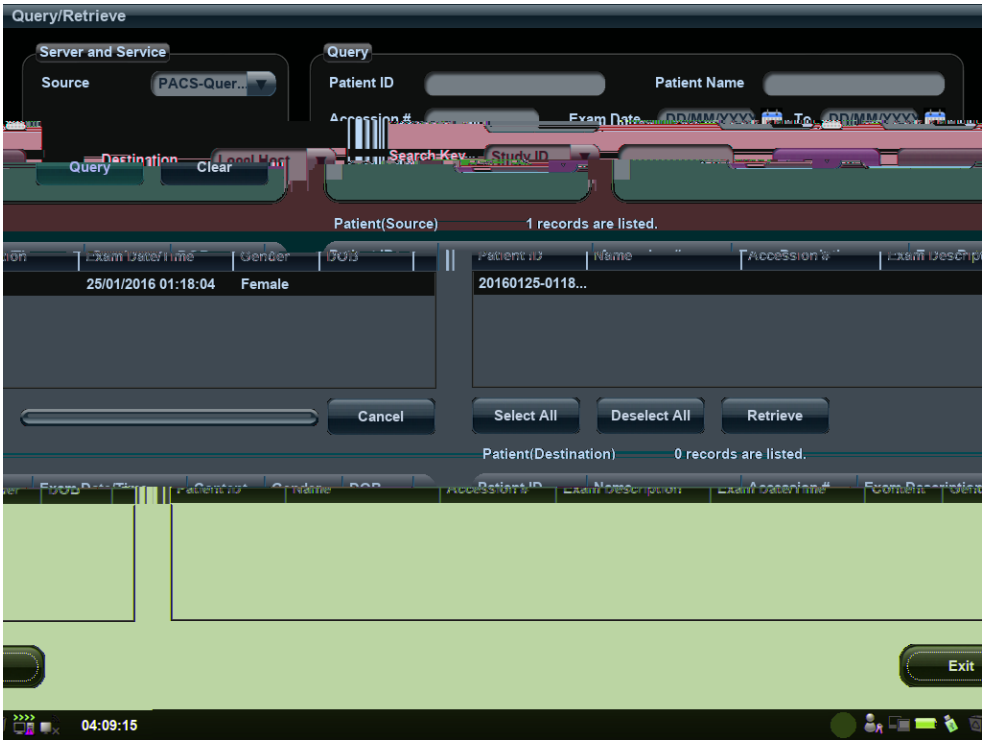

Figure 22 Query

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

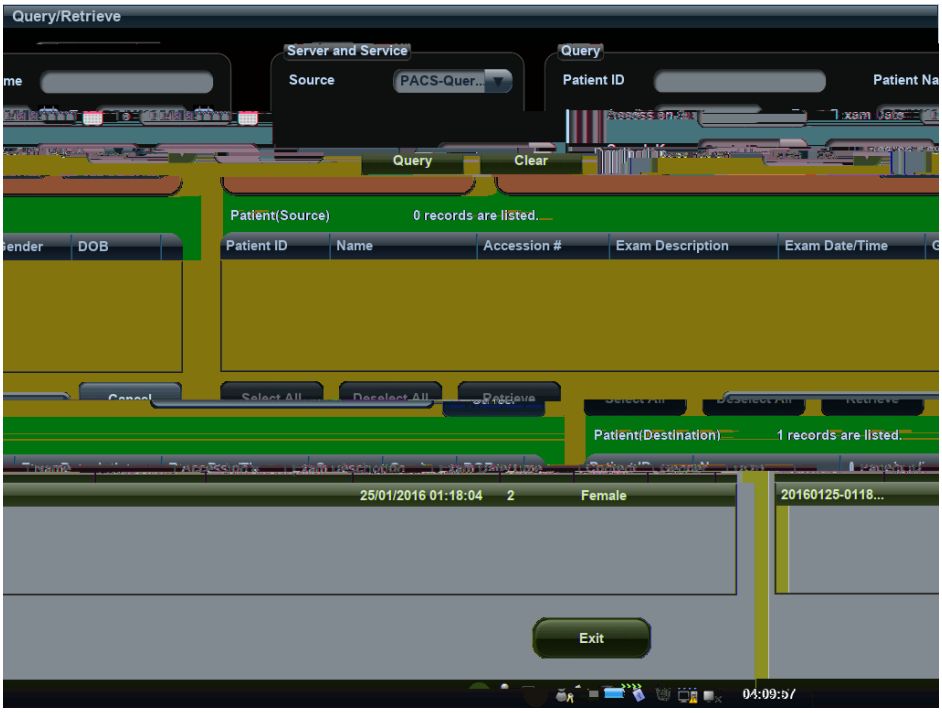

Figure 23 Retrieve

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

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]
3. In the dialog box popped up, select the [DICOMDIR] as shown in Figure 24 DICOM Format Backup.

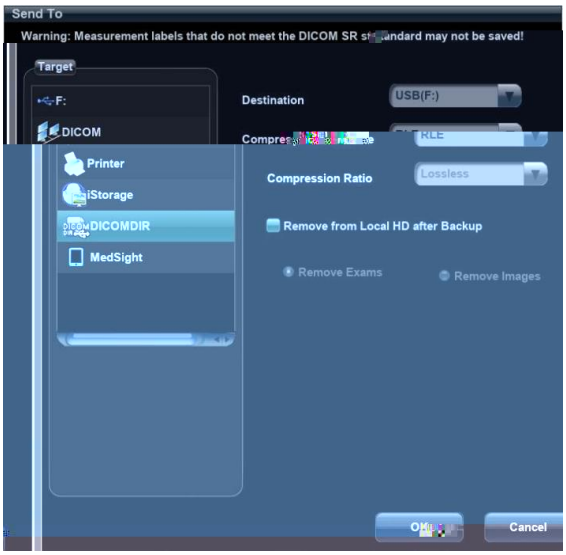

Figure 24 DICOM Format Backup

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 √; otherwise no √ 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

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;
-

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 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.

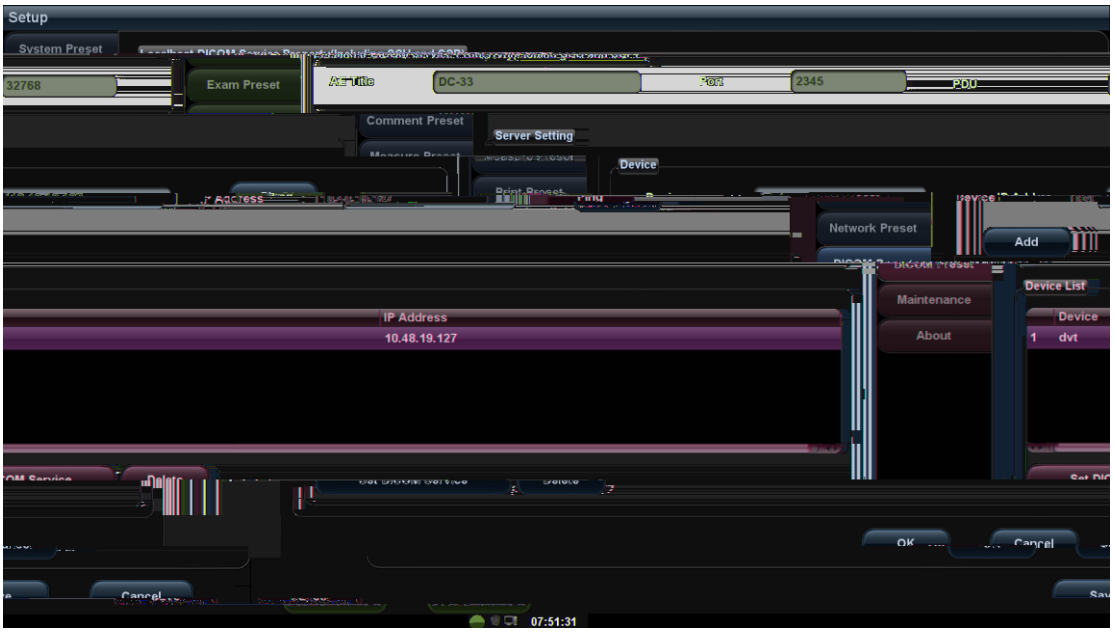

Figure 26 DICOM Local Preset

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.

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 Type (standard values)	Grayscale PMM SOP negotiated	Color PMM SOP negotiated
PAPER	DV Paper	

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)

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
2)	Medium Type: Blue Film	Incorrect. 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.
3)	Film Size: A3	Incorrect. Only three film size are available according to printer screen display: 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

1) Portrai

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 wi(t)5(T56 T[(1 109.34 593.38 Tm[(et)4(t)70T(l)6(m)4(nt)4FO)] T1 151M(w)

14"·17" Portrait	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 STANDARD\4,8 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

14"·17" Landscape	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 STANDARD\8,4 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