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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
- 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, Worklist, Storage Commitment, DICOMDIR Review and Task Management).

Abbreviation introduction:
The followings are the abbreviations in this chapter.

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DICOM</td>
<td>Digital Imaging and Communications in Medicine</td>
</tr>
<tr>
<td>AE</td>
<td>Application Entity</td>
</tr>
<tr>
<td>PDU</td>
<td>Protocol Data Unit</td>
</tr>
<tr>
<td>SCU</td>
<td>Service Class User (DICOM client), SCU refers in particular to the ultrasound device in this document.</td>
</tr>
<tr>
<td>SCP</td>
<td>Service Class Provider (DICOM server)</td>
</tr>
<tr>
<td>SOP</td>
<td>Service-Object Pair</td>
</tr>
</tbody>
</table>
1 Preset

1.1 Local TCP/IP Preset

To open the DICOM preset screen:
1. Press <Setup> 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.

![TCP/IP Preset Screen](image)

**Figure 1 TCP/IP Preset Screen**

Local TCP/IP preset items are described as follows:

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Net Adapter</td>
<td>To choose from the available net adapters enumerated in the drop-down list.</td>
</tr>
<tr>
<td>DHCP/Static</td>
<td>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</td>
</tr>
</tbody>
</table>
subsequently.

<table>
<thead>
<tr>
<th>IP Address</th>
<th>IP address of the ultrasound machine.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subnet Mask</td>
<td>Used to preset different network segment.</td>
</tr>
<tr>
<td>Gateway</td>
<td>Used to preset the gateway.</td>
</tr>
</tbody>
</table>

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

### 1.2 DICOM Preset

To open the DICOM preset screen:

1. Press <Setup> key to show the Setup menu.
2. 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 2 **DICOM Preset Screen**:

![DICOM Preset Screen](image)

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

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AE Title</td>
<td>Application Entity title.</td>
</tr>
</tbody>
</table>
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.
- 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.
- IP address must be the actual IP address of the server.

### 1.3 DICOM Service Preset

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

After DICOM is installed and DICOM Worklist is optionally configured, there will be related screen for presetting.
1.3.1 DICOM Storage Preset

The main parameters of DICOM Storage are described as below:

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Devices</td>
<td>After you set the server (s) in DICOM Preset screen, the name (s) will appear in the drop-down list, select the name of the storage server.</td>
</tr>
<tr>
<td>Service name</td>
<td>Default is xxx-Storage, user-changeable.</td>
</tr>
<tr>
<td>AE Title</td>
<td>Application Entity title, here, it should be consistent with that of the storage server.</td>
</tr>
<tr>
<td>Port</td>
<td>DICOM communication port, 104 is default. Here, the port should be consistent with that of the storage server port.</td>
</tr>
<tr>
<td>Color Mode</td>
<td>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. Note: RLE and JPEG compression do not be selected when you set Gray or Mixed.</td>
</tr>
<tr>
<td>Parameter</td>
<td>Description</td>
</tr>
<tr>
<td>----------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Compression Mode</td>
<td>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 JPEG compression. If not, please do not select it) are optional, the default is Uncompressed.</td>
</tr>
<tr>
<td>Compression Ratio</td>
<td>High, Middle and Low, three kinds of Compression Ratio are optional. Compression Ratio is in inverse proportion to image quality.</td>
</tr>
<tr>
<td>Allow Multiframe</td>
<td>If server supports this function, then select it.</td>
</tr>
<tr>
<td>Max Framerate</td>
<td>25, 30, 35, Full are available, user-changeable</td>
</tr>
<tr>
<td>Maximum Retries</td>
<td>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.</td>
</tr>
<tr>
<td>Interval Time(Sec)</td>
<td>5−1800 seconds, 15 seconds is default. (Reserved)</td>
</tr>
<tr>
<td>Timeout(Sec)</td>
<td>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.</td>
</tr>
<tr>
<td>Add</td>
<td>Add the DICOM service to the service list.</td>
</tr>
<tr>
<td>Cancel</td>
<td>Click to cancel parameter preset.</td>
</tr>
<tr>
<td>Update</td>
<td>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.</td>
</tr>
<tr>
<td>Delete</td>
<td>Click to delete the selected service in the service list.</td>
</tr>
<tr>
<td>Verify</td>
<td>Click to verify if the two DICOM application entities are normally connected.</td>
</tr>
<tr>
<td>Default</td>
<td>Select an item in the service list, click [Default] and you can see “Y” in the Default column. You can set one or more default storage server. Note: The server must be default storage server, if you send to DICOM Storage automatically.</td>
</tr>
<tr>
<td>Exit</td>
<td>Click to exit the services preset screen.</td>
</tr>
</tbody>
</table>

**Tip:**

- JPEG is one of the storage types, but not all Servers can support it. Please refer to the electronic file DICOM CONFORMANCE STATEMENT to check whether Server 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.
- The parameters of Maximum Retries, Interval Time(Sec) and Timeout(Sec) can be seen in [Advanced Preset].
1.3.2 DICOM Print Preset

**Figure 4** DICOM Print Preset Screen

The main parameters of DICOM Print are described as below:

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Devices</td>
<td>After you set the server(s) in DICOM Preset screen, the name(s) will appear in the drop-down list, select the name of the print server.</td>
</tr>
<tr>
<td>Service name</td>
<td>Default is xxx-Print, user-changeable.</td>
</tr>
<tr>
<td>AE Title</td>
<td>Application Entity title, here, it should be consistent with that of the print server.</td>
</tr>
<tr>
<td>Port</td>
<td>DICOM communication port, 104 is default. Here, the port should be consistent with that of the print server port.</td>
</tr>
<tr>
<td>Maximum Retries</td>
<td>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.</td>
</tr>
<tr>
<td>Interval Time (Sec)</td>
<td>5—1800 seconds, 15 seconds is default. (Reserved)</td>
</tr>
<tr>
<td>Timeout (Sec)</td>
<td>Refers to timeout during association establishment. Value: 5-60s, in increments of 5s, and 15 is default.</td>
</tr>
<tr>
<td>Copies</td>
<td>Refer to copies of printed files. You can select among 1 through 5, or directly enter the numeral.</td>
</tr>
<tr>
<td>Settings</td>
<td>The system supports RGB (color printing) and MONOCHROME2 (black and white printing). Please select the type the printer</td>
</tr>
<tr>
<td>Parameter</td>
<td>Description</td>
</tr>
<tr>
<td>----------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Film Orientation</td>
<td>Select between LANDSCAPE and PORTRAIT.</td>
</tr>
<tr>
<td>Priority</td>
<td>High, Middle, Low</td>
</tr>
<tr>
<td>Film Size</td>
<td>Select film size among the selections listed in the drop down list.</td>
</tr>
<tr>
<td>Display Format</td>
<td>Specify quantity of printed files, e.g. STANDARD: 2, 3 indicates 6 images are printed for each page.</td>
</tr>
<tr>
<td>Media Type</td>
<td>Specify print medium: Paper, Clear Film, Blue Film; select Blue Film or Clear Film for black and white printing; select Paper for color printing.</td>
</tr>
<tr>
<td>Trim</td>
<td>Specify whether you want a trim box to be printed around each image on the film: Yes or No.</td>
</tr>
<tr>
<td>Min Density</td>
<td>Enter the minimum density of the film. The default is 0.</td>
</tr>
<tr>
<td>Max Density</td>
<td>Enter the maximum density of the film. The default is 300.</td>
</tr>
<tr>
<td>Magnification Type</td>
<td>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 interpolations between adjacent pixels;Cubic: interpolated pixels are generated from cubic interpolations between adjacent pixels;None: without interpolation.</td>
</tr>
<tr>
<td>Destination</td>
<td>Specify where the file is exposed: MAGAZINE (stored in the magazine), or, PROCESSOR (exposed in the processor).</td>
</tr>
<tr>
<td>Configuration Info</td>
<td>Enter configuration information in the field.</td>
</tr>
<tr>
<td>Add</td>
<td>Add the DICOM service to the service list.</td>
</tr>
<tr>
<td>Delete</td>
<td>Click to delete the selected service in the service list.</td>
</tr>
<tr>
<td>Cancel</td>
<td>Click to cancel parameter preset</td>
</tr>
<tr>
<td>Update</td>
<td>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..</td>
</tr>
<tr>
<td>Verify</td>
<td>Click to verify if the two DICOM application entities are normally connected.</td>
</tr>
<tr>
<td>Default</td>
<td>Select an item in the service list, click [Default] and you can see “Y” in the Default column. Only one default print server can be set. Note: The server must be set default print server, if you send to DICOM Print automatically.</td>
</tr>
<tr>
<td>Exit</td>
<td>Click to exit the service preset screen.</td>
</tr>
</tbody>
</table>

**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.

5. The parameters of Maximum Retries, Interval Time(Sec) and Timeout(Sec) can be seen in [Advanced Preset].

### 1.3.3 Worklist Preset

![Figure 5 DICOM Worklist Preset Screen](image)

The main parameters of DICOM Worklist are described as below:

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Devices</td>
<td>After you set the server(s) in DICOM preset screen, the name(s) will appear in the drop-down list, select the name of the Worklist server.</td>
</tr>
<tr>
<td>Service name</td>
<td>Default is xxx-Worklist, user-changeable.</td>
</tr>
<tr>
<td>AE Title</td>
<td>Application Entity title, here, it should be consistent with that of the Worklist server.</td>
</tr>
<tr>
<td>Port</td>
<td>DICOM communication port, 104 is default. Here, the port should be consistent with that of the Worklist server port.</td>
</tr>
<tr>
<td>Maximum Retries</td>
<td>0—9 times are optional, the default is 3. (Reserved)</td>
</tr>
</tbody>
</table>
### 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 services preset screen.

**Tip:**
- The parameters of Maximum Retries, Interval Time(Sec) and Timeout(Sec) can be seen in [Advanced Preset].

### 1.3.4 Storage Commitment Preset

![DICOM Commitment Preset Screen](image)

The main parameters of storage commitment are described as below:
## DP10/DP20/DP30 Series Diagnostic Ultrasound System

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

**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 and IP in DICOM preset.
3. The parameters of Maximum Retries, Interval Time(Sec) and Timeout(Sec) can be seen in [Advanced Preset].
2 DICOM 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 and Storage Commitment pages respectively. If the verification succeeded, the ultrasound system prompts “xxx Verify Succeed”. Otherwise, it prompts “xxx Verify Failed”, which means the connection is wrong. Please reconfirm it.

Tip:
Not all the Servers can support verification; please consult Server 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 to DICOM storage server for remote storage. The entrances of storage include:
- Patient information management (iStation)
- Review status (Review)
- Thumbnail area

DICOM storage supports:
- Single file transfer (single-frame file, Cine file, static image and DCM file)
- Exam transfer
- Batch transfer

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 server)

2.2.1 Send to DICOM Storage Manually

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. As shown in Figure 7 iStation Screen.
3. Click [Send To] to pop up the [Send To] dialog box.
4. Select the remote DICOM Server; click [OK] to send, as shown in Figure 8 DICOM Send To Screen.
5. 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 9 Task Management.

![Figure 9 Task Management](image)

**2.2.2 Send to DICOM Storage Automatically**

Function path of sending image to DICOM storage after ending exam automatically:

Steps:
1. In System Preset -> General, select, as shown in Figure 10 Send Image after End Exam.
2. 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 of the current exam are sent to the default DICOM storage server.
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 [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 11 Save as DCM Format.
B. 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 12 Send to iStorage.
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)
- Thumbnail area

DICOM print supports:

- Single file transfer (single-file, static image)
- Exam transfer
- Batch transfer
  Note: 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 (Presetable):

- Ending the exam (send to default print server)
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, and click [OK] to print.

2.3.2 Send to DICOM Print Automatically

Function path of sending 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 of the current exam are sent to the default DICOM print server.

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]. As shown in Figure 13 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 14 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 Storage Commitment

Storage commitment is to ensure that the image data will be stored into the server correctly.
Prerequisite: a default 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 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.
2.6 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

2.6.1 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 [Backup]
3. In the dialog box popped up, select the [Destination], and select “DICOM Format” as shown in Figure 15  DICOM Format Backup.

![Figure 15 DICOM Format Backup](image)

4. Click [Backup], 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.
2.6.2 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.

2.7 Task Management

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

Click icon in the lower right corner of the screen to open the DICOM Task Management dialog box, as shown in Figure 9 Task Management.

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 16 Add a Port.

![Figure 16 Add a Port](image)
3.2 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;
- Check the switch, router or hub; or replace a network device with higher performance.

3.3 Common Failure: If DICOM has wide area network communication ability.

Troubleshooting:
- DICOM standard is an application protocol, based on “open systems networking” (TCP/IP); DICOM communication ability is not associated with the network topology. Only two sides of the communication on network can interconnect, you can use the DICOM Services.

3.4 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:
- Enter the DICOM Storage Service Preset dialogue, select the server and modify the “uncompressed”; click the [update] button to save.
- Set the correct server AE_TITLE on local device according to the DICOM Conformance Statement or settings of the server. Then enter the DICOM Preset, check the local AE_TITLE.
3.5 Common 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:
- Enter the Storage preset screen, choose the server, enable multi-frame image storage dialog box, and click [update] button to save.

3.6 Common Failure: Service Storage Failed

Potential Reasons:
- Wrong DICOM settings on local device;
- Firewall in the hospital restricting network.
- The connected switch, router or hub is down or in failure;

Troubleshooting:
- Enter the DICOM preset screen; firstly check the localhost AE_TITLE and port. Then check the server IP address, click [ping] button to check the connection between the server and the ultrasound machine. If the connection is success, please according to the DICOM Conformance Statement or settings of the server to set the correct server AE_TITLE and port on local storage service preset.
- Turn off the firewall.
- Check the switch, router or hub; or replace a network device with higher performance.

3.7 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, enter the Print Service Preset Screen, choose the server and modify the Print to B/W type (MONOCHROME2) and click [update] button to save;
- Generally, the “Medium Type” is set to “Blue File” for B/W printing while “Paper” or “Clear Film” for color printing.
3.8 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 in DICOM preset screen.

3.9 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.

3.10 Common Failure: Storage commitment is failed

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

Troubleshooting:
- Check if the associated storage commitment server is correct;
- 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.

3.11 **Common Failure: Worklist query succeeded, but no patient is shown**

**Potential Reasons:**
- Wrong Worklist Server settings on local device;
- Scheduled Station AE Title in the Worklist Query Screen 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:**
- According to the settings of the server; set the correct server name, IP address on localhost DICOM Server Preset; check the port and AE_TITLE on local Worklist Service Preset Screen.
- 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.

**Notes:** If necessary, all query conditions on query screen set null, then verify the Worklist Service work normally;

3.12 **Common Failure: Study ID invalid when Worklist data is imported**

**Potential Reasons:**
- "Study ID number" is not provided from the Worklist server;
- "Study ID number" already exist, but is invalid;

**Troubleshooting:**

After the query finished, you can select a patient record, click [Transfer] to restart the exam, the “Study ID number” of patient record will be generated automatically. Or you can modify the “Study ID number” of server database records, and then query the patient information again.
3.13 Common Failure: Worklist query succeeded, but error messages appear in exam records

Potential Reasons:
- System language settings do not match between the Worklist server and ultrasound device;

Troubleshooting:
- Check the language setting on the server; Press <Setup> to open the ultrasound system preset, enter the “Region preset” of the “System Preset” and check the device language setting. Please keep the setting on Worklist server consistent with the one on the device.

3.14 Common Failure: Error Messages appear during transmission

Potential Reasons:
- System language settings do not match between the transferring DICOM data and DICOM coding analytical program;

Troubleshooting:
- Check the language setting on the analytical program; Press <Setup> to open the ultrasound system preset, enter the “Region preset” of the “System Preset” and check the device language setting. Please keep the setting on analytical program consistent with the one on the device.

3.15 Common Failure: Error messages in DICOM Task Management

3.15.1 Association aborts

Potential Reasons:
- The association is denied by the SCP due to incorrect setting of AE_TITLE on the SCU. See Figure 17 Association aborts.
3.15.2 Network error: Socket sending error

Potential Reasons:
- Network cable unplugged or network equipment is failed during data transmission. See the Figure 17 Association aborts.

3.16 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.

3.16.1 Example 1

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

<table>
<thead>
<tr>
<th>Medium Type (standard values)</th>
<th>Type</th>
<th>Grayscale PMM SOP negotiated</th>
<th>PMM SOP</th>
<th>Color PMM SOP negotiated</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAPER</td>
<td>DV Paper</td>
<td></td>
<td></td>
<td>CV Paper</td>
</tr>
<tr>
<td>Blue Film</td>
<td>DV Blue Film</td>
<td></td>
<td></td>
<td>CV Film (clear)</td>
</tr>
<tr>
<td>CLEAR FILM</td>
<td>DV Clear Film</td>
<td></td>
<td></td>
<td>CV Film (clear)</td>
</tr>
</tbody>
</table>
The MAGNIFICATION Types supported by Horizon CI DICOM printer conformance statement are listed in table below:

<table>
<thead>
<tr>
<th>MAGNIFICATION TYPE</th>
<th>NONE</th>
<th>REPLICATE</th>
<th>BILINEAR</th>
<th>CUBIC</th>
<th>BICUBIC</th>
<th>MITCHELL</th>
<th>LANCZOS</th>
<th>SHARP1</th>
<th>SHARP2</th>
<th>SHARP3</th>
</tr>
</thead>
</table>

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

<table>
<thead>
<tr>
<th>System Job Settings File</th>
<th>Corresponding Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Print_SCP</td>
<td>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.</td>
</tr>
<tr>
<td>Default Grayscale</td>
<td>Imager uses the media set for Grayscale in the Default Media menu at the control panel</td>
</tr>
<tr>
<td>Default Color</td>
<td>Imager uses the media set for Color in the Default Media menu at the control panel</td>
</tr>
<tr>
<td>8x10-dvf</td>
<td>8x10 DirectVista film (blue)</td>
</tr>
<tr>
<td>8x10-dvfb</td>
<td>8x10 DirectVista film (blue)</td>
</tr>
<tr>
<td>8x10-dvfc</td>
<td>8x10 DirectVista film (clear)</td>
</tr>
<tr>
<td>8x10-dvp</td>
<td>8x10 DirectVista paper</td>
</tr>
<tr>
<td>8x10-cvf</td>
<td>8x10 ChromaVista film</td>
</tr>
<tr>
<td>8x10-cvt</td>
<td>8x10 ChromaVista film</td>
</tr>
<tr>
<td>11x14-dvf</td>
<td>11x14 DirectVista film (blue)</td>
</tr>
<tr>
<td>11x14-dvfb</td>
<td>11x14 DirectVista film (blue)</td>
</tr>
<tr>
<td>11x14-dvfc</td>
<td>11x14 DirectVista film (clear)</td>
</tr>
<tr>
<td>11x14-dvp</td>
<td>11x14 DirectVista paper</td>
</tr>
</tbody>
</table>
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
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
     - 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:
       - A4
       - 14X17
       - 8X10
  3) Film Size: A3
     - A4
     - 14X17
     - 8X10
  4) MAGNIFICATION TYPE
     - Can be set as: NONE/CUBIC/REPLICATE/BILINEAR
     - Incorrect.
  5) AE Title: 14x17-dvfb
     - Setting AE Title as “14x17-dvfb” will enforce the 14x17 Direct Vista film (blue) printing.

### 3.16.2 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:

<table>
<thead>
<tr>
<th>Film Size and Orientation</th>
<th>FORMAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>14”-17” Portrait</td>
<td>STANDARD\1,1</td>
</tr>
<tr>
<td></td>
<td>STANDARD\1,2</td>
</tr>
<tr>
<td></td>
<td>STANDARD\1,3</td>
</tr>
<tr>
<td></td>
<td>STANDARD\2,1</td>
</tr>
<tr>
<td></td>
<td>STANDARD\2,2</td>
</tr>
<tr>
<td></td>
<td>STANDARD\2,3</td>
</tr>
<tr>
<td></td>
<td>STANDARD\2,4</td>
</tr>
<tr>
<td></td>
<td>STANDARD\3,3</td>
</tr>
<tr>
<td></td>
<td>STANDARD\3,4</td>
</tr>
<tr>
<td></td>
<td>STANDARD\3,5</td>
</tr>
<tr>
<td></td>
<td>STANDARD\3,6</td>
</tr>
<tr>
<td></td>
<td>STANDARD\4,4</td>
</tr>
<tr>
<td></td>
<td>STANDARD\4,5</td>
</tr>
<tr>
<td></td>
<td>STANDARD\4,6</td>
</tr>
<tr>
<td></td>
<td>STANDARD\4,7</td>
</tr>
<tr>
<td></td>
<td>STANDARD\4,8</td>
</tr>
<tr>
<td></td>
<td>STANDARD\5,5</td>
</tr>
<tr>
<td></td>
<td>STANDARD\5,6</td>
</tr>
<tr>
<td></td>
<td>STANDARD\5,7</td>
</tr>
<tr>
<td></td>
<td>STANDARD\5,8</td>
</tr>
<tr>
<td></td>
<td>STANDARD\6,6</td>
</tr>
<tr>
<td></td>
<td>STANDARD\6,7</td>
</tr>
</tbody>
</table>
| 14”-17” Landscape | 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  
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|                  | STANDARD\9,8  
|                  | STANDARD\10,8 |