

# Laurel Bridge Beacon User Manual



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## Contents

1	Overview.....	1
1.1	What is a signed study? .....	1
2	Workflow Definitions.....	1
2.1	Sources.....	1
2.2	Destinations .....	1
2.3	Organizations .....	1
2.4	Templates.....	2
2.5	User Access .....	2
3	Built-in Users .....	2
4	Configuration QuickStart.....	2
4.1	Access Beacon’s Website .....	2
4.2	Log In.....	2
4.3	Click “Configuration”.....	3
4.4	Click “System” .....	3
4.4.1	Click “Database” under the “System->Administration” tab .....	4
4.4.2	Click “Listeners” under the “System” tab .....	5
4.4.3	Click “Storage Pool” under the “System” tab .....	6
4.5	Click “Destinations”.....	6
4.6	Click “Organizations” .....	7
4.7	Click “Sources” .....	7
4.8	Click “User Access” .....	8
4.9	Click “Templates” .....	8
4.10	Click “Dashboard” .....	9
4.10.1	Start DICOM Incoming .....	9
4.10.2	Start DICOM Outgoing .....	9
4.11	Enable STOW-RS Support, If Desired .....	9
5	Workflow QuickStart .....	10
5.1	Workflow Overview .....	10
5.2	Study Lifecycle.....	11
5.3	Accessing the Beacon Website .....	12
5.4	Logging In .....	12
5.5	Study Display/Filtering.....	13
5.6	Study Selection.....	15
5.6.1	Single-Study Edit Mode Selection .....	16
5.6.2	Multi-Study Edit Mode Selection .....	17
5.7	Template Selection .....	18
5.8	Study Verification/Editing.....	19
5.9	Study Signing.....	19
5.10	Other Study Operations .....	20
5.11	Uploading DICOM Files .....	20



## 1 Overview

Laurel Bridge Beacon is a Quality Control (QC) station that allows users to view, modify, and sign received studies, and then send signed studies to a destination.

### 1.1 What is a signed study?

A study is said to be signed when the following steps have occurred:

1. A user viewed a study.
2. A user verified the study contents are correct or edited any incorrect values.
3. A user signed the study by pressing the “Sign” button and entering some descriptive text.

## 2 Workflow Definitions

For Beacon to function properly, various workflow configuration items need to be set up correctly. At least one of each of the following types of configuration items must be defined.

### 2.1 Sources

Sources are the devices which send studies to Beacon. There are three types of sources:

- Network Sources: These are DICOM store SCUs that C-STORE images to Beacon.
- Hot Folder Sources: These are folder locations that Beacon can monitor and ingest DICOM chapter 10 formatted files.
- STOW-RS Sources: These are DICOMweb STOW-RS user agents that send images to Beacon via HTTP/S requests.

### 2.2 Destinations

Destinations are DICOM Store SCPs that can receive studies sent by Beacon. The destination for a study is selected via the organization that a study is associated with. If no organization is selected for a study, the study will be sent to the default destination, which is the first enabled destination in the list of destinations.

### 2.3 Organizations

Organizations are logical entities that allow studies to be associated with that organization. Studies can be associated with an organization as a function of:

- Its source origin (either by name or by fixed value)
- Calling AE title
- Called AE title
- The value of a particular DICOM element extracted from each instance in the study, such as Institution Name (0008,0080)
- (*For studies received via STOW-RS only:*) The value of the OrganizationName HTTP request header

## 2.4 Templates

Templates are a way of constraining which study fields can be edited for a given type of study. A template must match one or more modalities (can be “all”) and one or more organizations (can be “all”), and it then defines which study fields can be edited using this template. This allows the editable fields to be customized for particular modalities, organizations, or a combination of the two.

## 2.5 User Access

A user access record gives permission for a user to view studies associated with one or more organizations.

## 3 Built-in Users

Beacon contains definitions for two default users:

Username	Password
Administrator	LaurelBridge1234
beacon	Password1234

## 4 Configuration QuickStart

### 4.1 Access Beacon’s Website

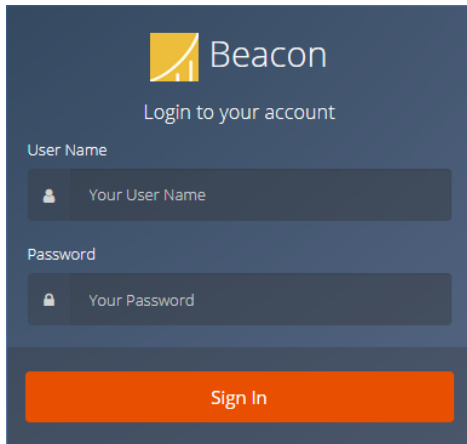
In a web browser, navigate to **http://localhost:10600**

### 4.2 Log In

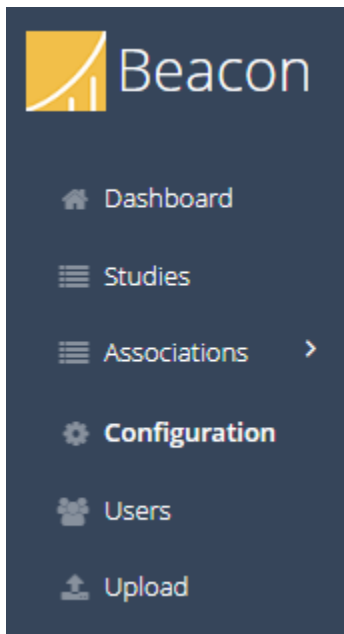
Press the “person” icon:



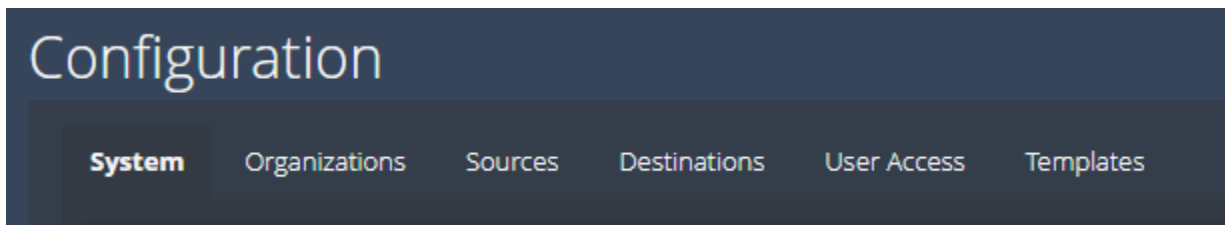
Type in the username “Administrator” (without the quotes) and password “LaurelBridge1234” (without the quotes):



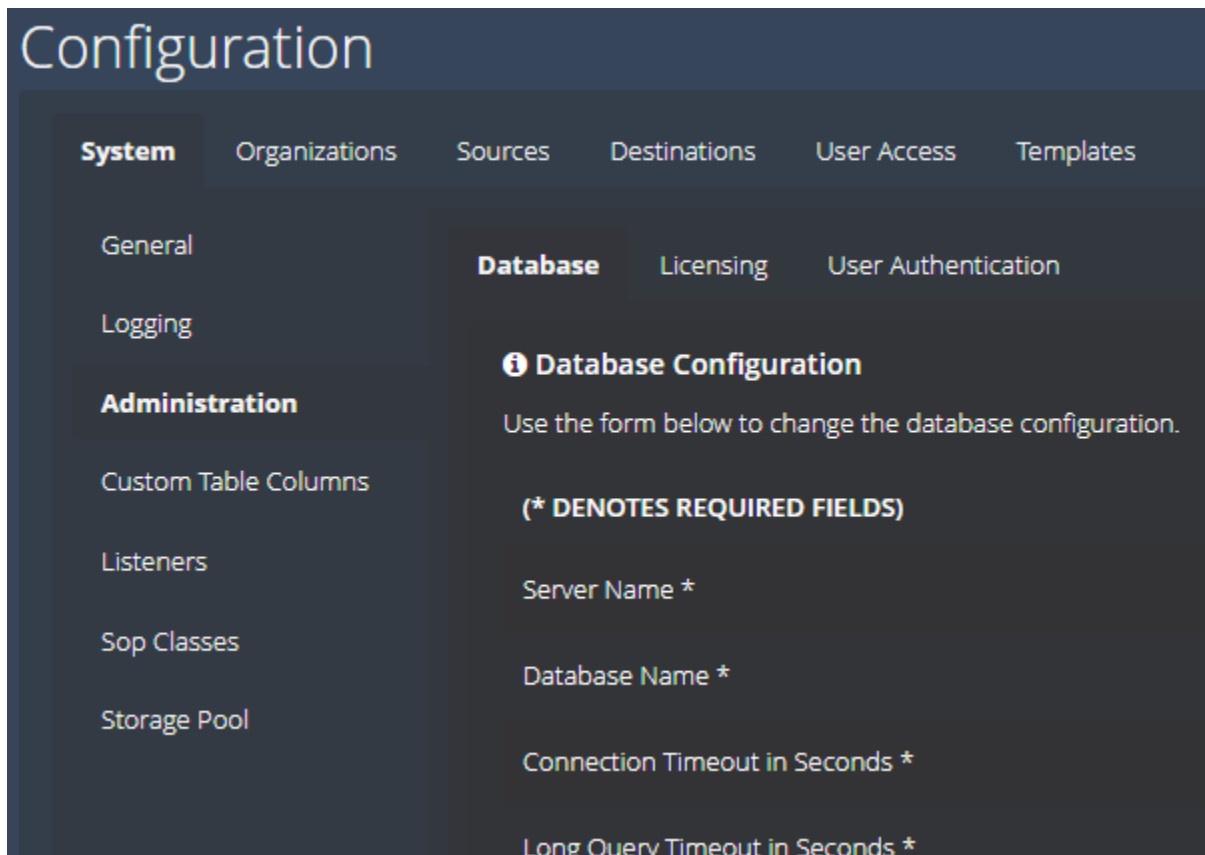
### 4.3 Click "Configuration"



### 4.4 Click "System"

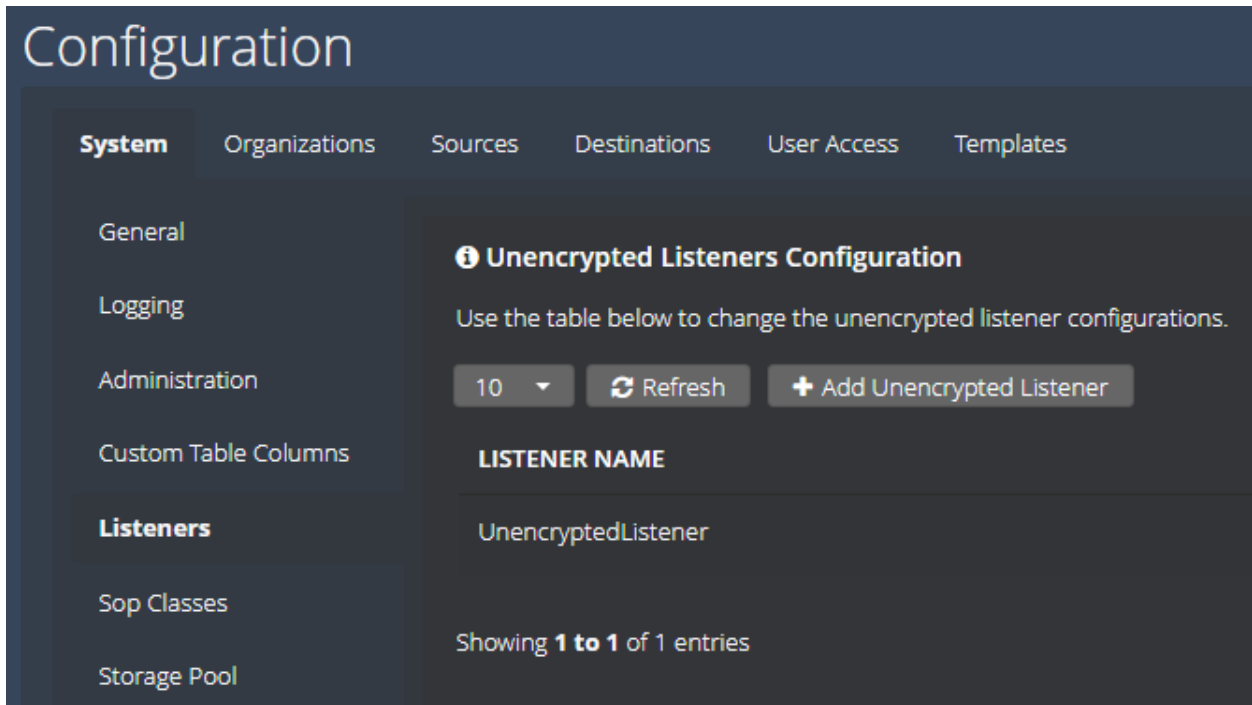


#### 4.4.1 Click “Database” under the “System->Administration” tab



Configure the database settings for your particular scenario.

#### 4.4.2 Click “Listeners” under the “System” tab

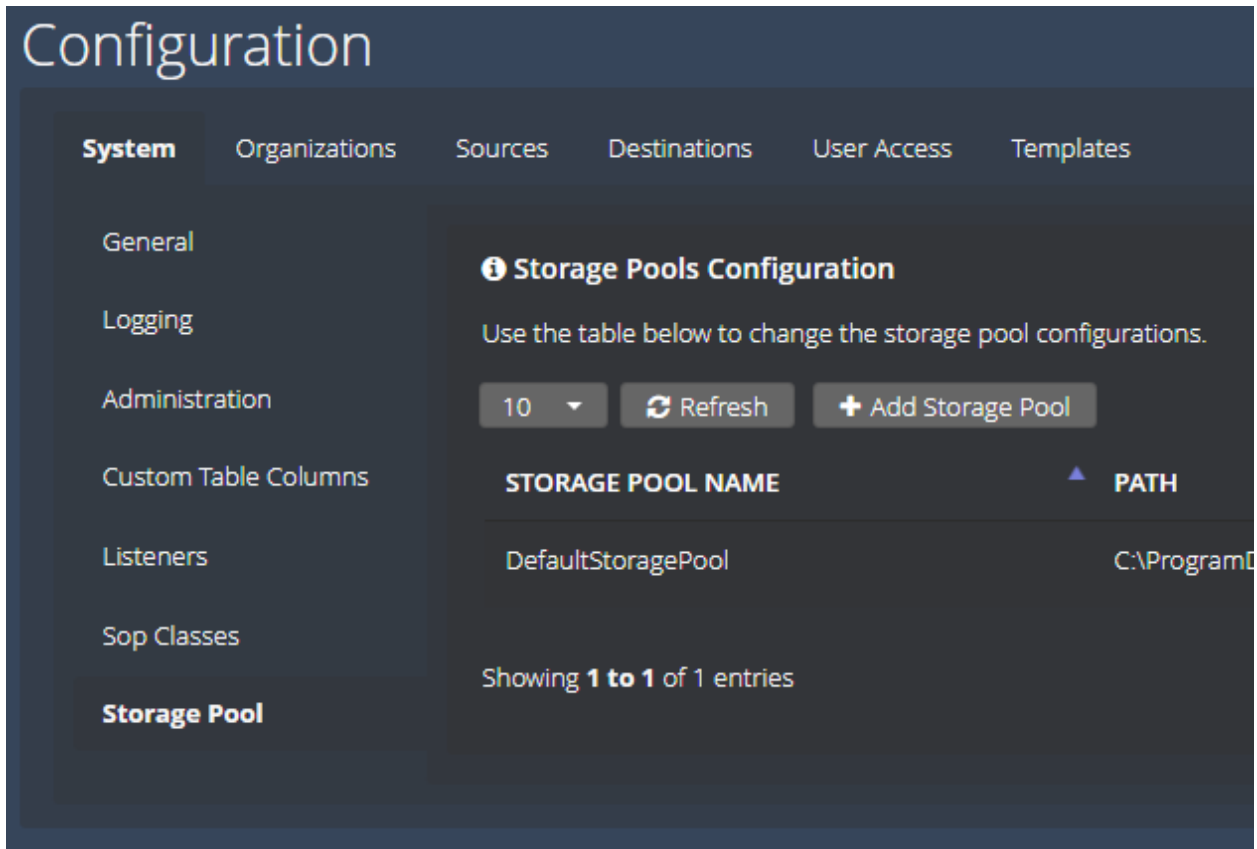


Add an Unencrypted Listener. Assign it a unique name and unique port number.

(Note: An Encrypted Listener can also be configured, but this requires an additional precursor step of configuring the TLS certificate information in “General” under the “System” tab.)

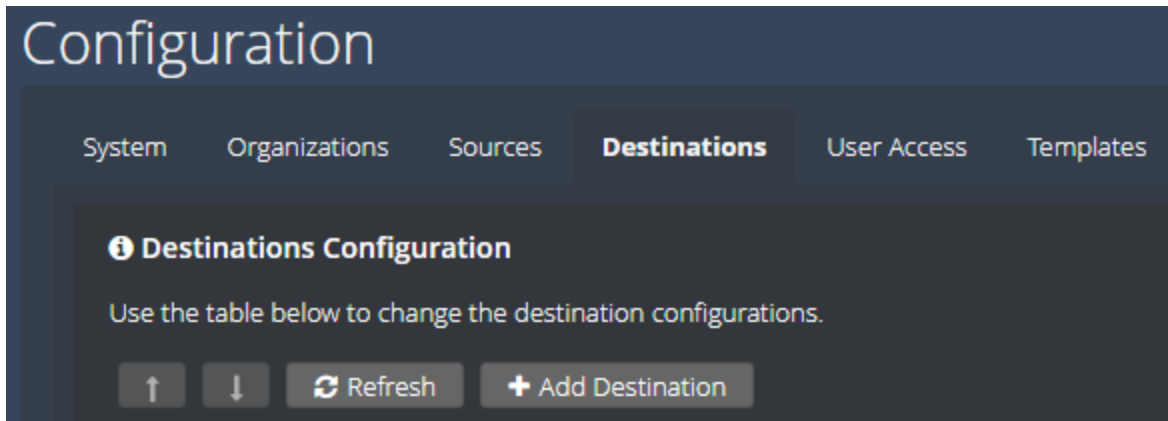


### 4.4.3 Click “Storage Pool” under the “System” tab



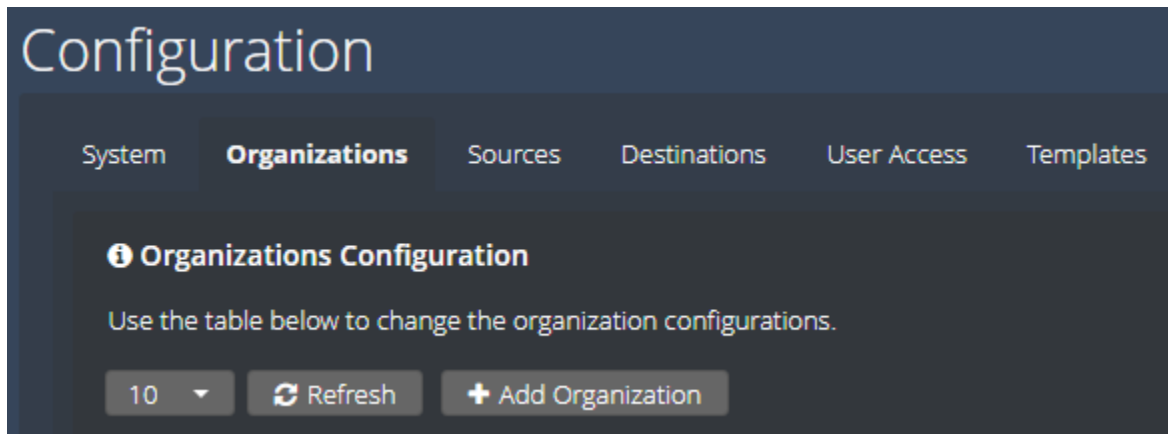
Add a Storage Pool. Assign it a unique name and a unique path where the images will be stored.

### 4.5 Click “Destinations”



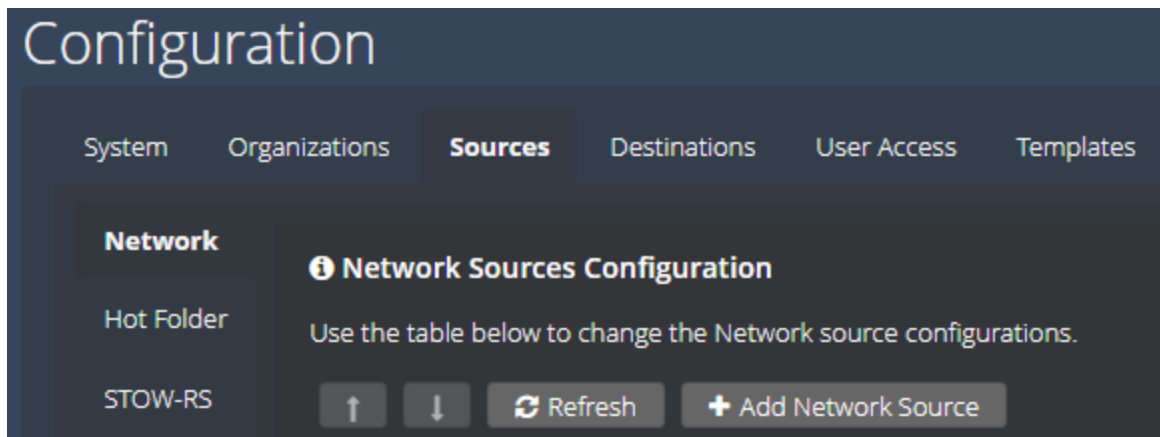
Add a Destination. Assign it a unique name and specify values for the required fields. Configure the optional fields, if desired. (Please note that the first enabled destination will be considered the default destination, which will be used for studies without an assigned organization.)

## 4.6 Click “Organizations”



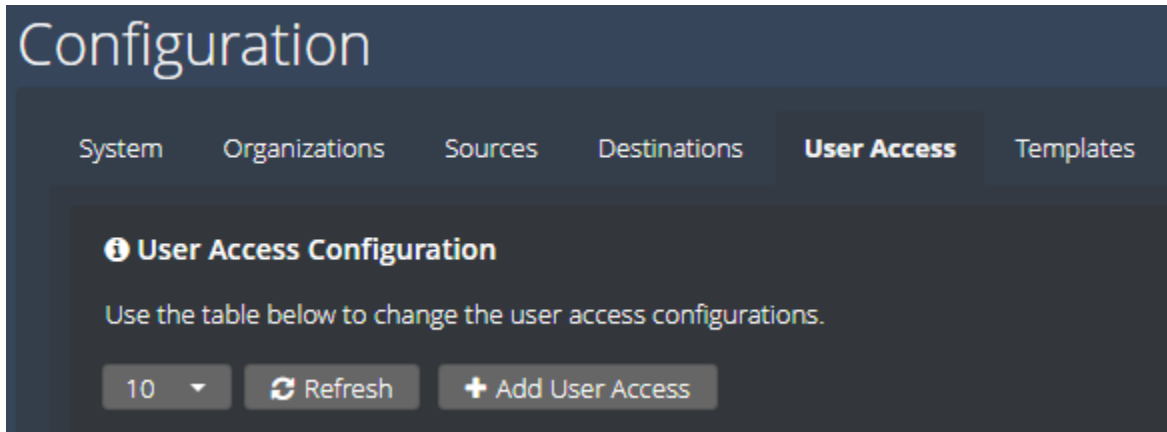
Add an Organization. Assign it a unique name and an optional address. Select the desired destination for studies assigned to this organization.

## 4.7 Click “Sources”



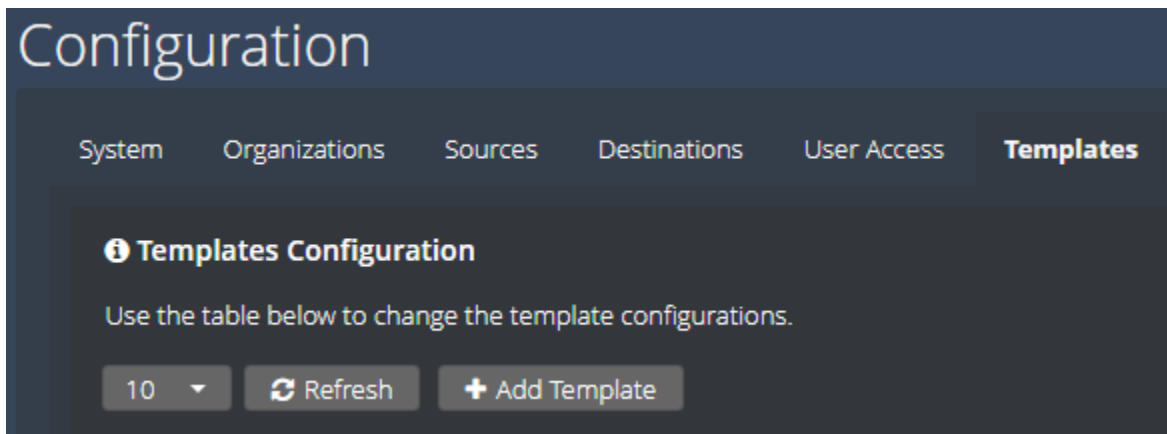
Click “Network” under the “Sources” tab (if not already selected). Add a Network Source. Assign it a unique name and specify values for the required fields. Configure the optional fields, if desired.

#### 4.8 Click “User Access”



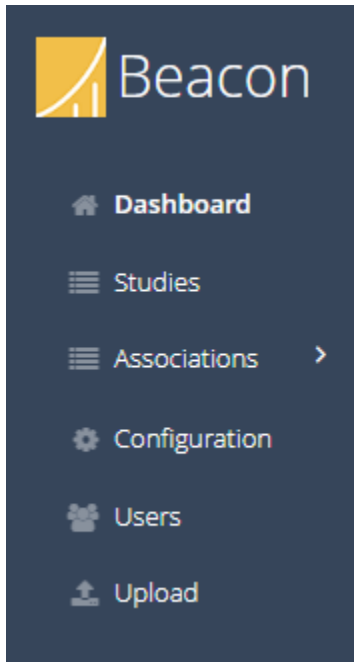
Add a new User Access entry. Assign it the name “Administrator” (without the quotes). Click the “Allow All Organizations” checkbox.

#### 4.9 Click “Templates”



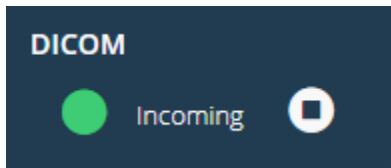
Add a Template. Assign it a unique name. Add the desired study fields this template should display. Add the desired modality types to which this template can be applied. Add any organizations that should have permission to use the newly defined template.

## 4.10 Click “Dashboard”



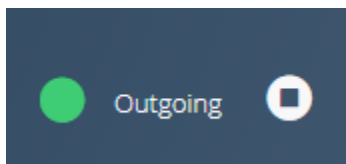
Click the “Dashboard” icon on the side of the screen.

### 4.10.1 Start DICOM Incoming



If not already running, click the “play” button to allow Beacon to listen for new associations. A green icon indicates Beacon is listening; a red icon means Beacon is not listening.

### 4.10.2 Start DICOM Outgoing



If not already running, click the “play” button to allow Beacon to send studies to the enabled destination. A green icon indicates Beacon will send any available studies; a red icon means Beacon will not send any outbound studies.

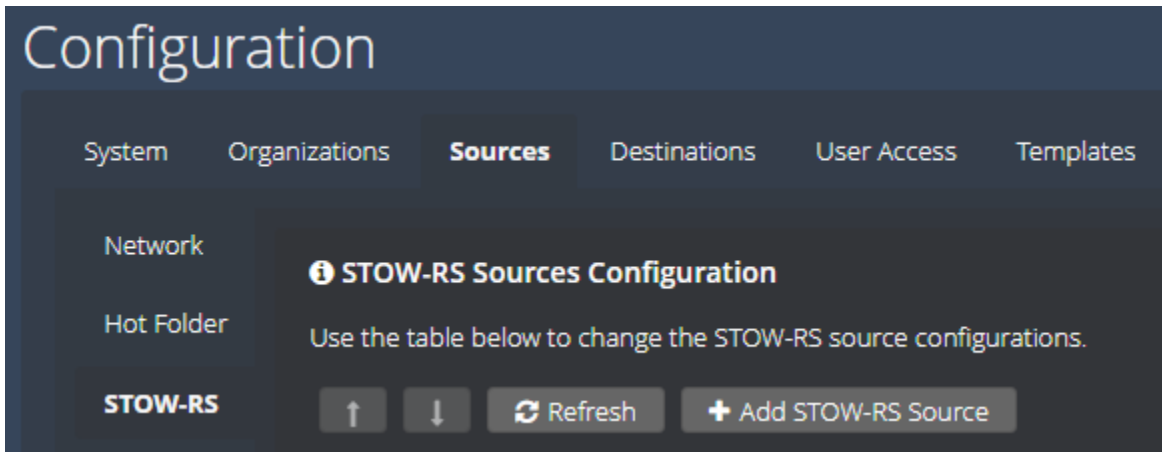
## 4.11 Enable STOW-RS Support, If Desired

If support for incoming STOW-RS (as an origin server) is desired (required for the DICOM file upload capability), the following additional configuration steps are required:

1. Under “System”, “General”, enable the “STOW-RS Enabled” checkbox. If configuring the DICOM file upload capability and authentication is desired, enable the “Require Authentication for Uploads” checkbox. Note that without authentication enabled, the organization name to be assigned to uploaded instances cannot be selected.



2. Add a STOW source entry, under “Sources”, “STOW-RS”.



The Called AE and Calling AE values are used as the called/calling AE titles for all instances received via STOW-RS. If configuring the DICOM file upload capability with authentication enabled, select “HTTP Header” as the Organization Mode.



## 5 Workflow QuickStart

### 5.1 Workflow Overview

The basic Beacon QC application workflow is as follows:

1. A configured source device sends a study to Beacon. As part of the input processing, Beacon identifies the study as belonging to a particular organization.
2. A Beacon user (with permission to view/edit studies for the above organization) accesses the Beacon website and logs in.

3. The user is presented with a list of available studies to verify. This list can be filtered in various ways to display only the relevant list of studies. The user selects the above study, which displays the “Verify Study” dialog.
4. The user selects one of the available templates with which to view/edit the study (a default will already be selected), and either verifies that the information is correct (and proceeds to step 6) or chooses to edit the study by unlocking the study.
5. The user edits one or more of the available editable fields for the selected template.
6. The user chooses to either save-and-sign (or verify-and-sign, if no changes were made) the study (and proceeds to step 8), or simply save (or verify, if no changes were made) the study.
7. When the user is ready to sign the study, the user chooses the “Sign” action.
8. This displays the “Sign Study” dialog, in which the user enters the signing text (annotation text that will be saved in the study record, along with the username of the signing user). Once the signing text has been entered, the user signs the study.
9. The signed study is automatically sent to the active destination.
10. At some later point, the study will either be automatically purged or manually deleted by a user. In addition, studies that have been previously sent (or failed to send) can be sent again. They can also be reset, which makes them verifiable/editable again. All these operations are performed using the study Action button.

The mechanics of these steps are discussed in more detail in the sections below.

## 5.2 Study Lifecycle

The states in the lifecycle of a study as it moves through the above workflow are as follows:

1. **Receiving** – The study is actively receiving images via a DICOM association.
2. **Ready** – The study is no longer actively receiving images and is ready for verification. Note that a study may move back and forth between Ready and Receiving as new associations add more images to the study.
3. **Editing** – The study has been locked by a user for verification/editing (the “Verify Study” dialog has been displayed).
4. **EditedValid** – The study has been edited (or verified, with no changes made) and is in a valid state (i.e., no mandatory fields are empty).
5. **EditedInvalid** – The study has been edited (or verified, with no changes made) and is in an invalid state (i.e., one or more mandatory fields are empty).
6. **Signing** – The study has been locked by a user for signing (the “Sign Study” dialog has been displayed).
7. **Signed** – The study has been signed and will be automatically sent to the active destination.
8. **Sending** – The study is in the process of being sent to the active destination.
9. **Sent** – The study was successfully sent to the active destination.
10. **SendFailed** – The study failed to send to the active destination.
11. **Purging** – The study is actively being purged.
12. **DeleteRequested** – The study has been manually marked for deletion (but has not yet been deleted).

### 5.3 Accessing the Beacon Website

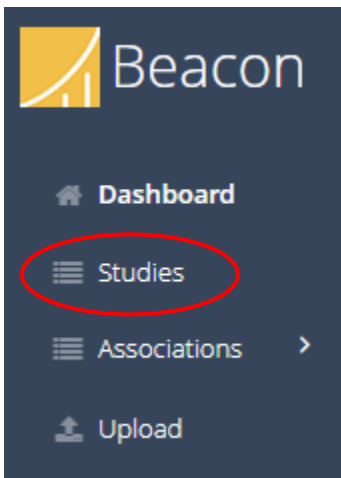
In a web browser, navigate to **http://localhost:10600** (note that the port number may be different than 10600, depending on the local system configuration – see your Beacon system administrator for details).

### 5.4 Logging In

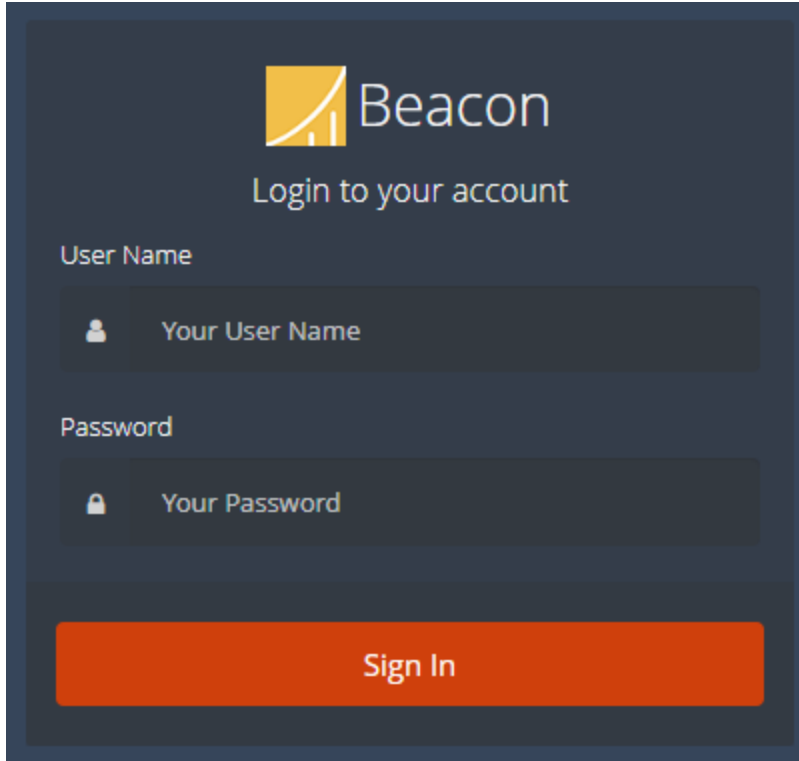
To log in, either click the Arrow icon:



or click on the “Studies” tab on the left side of the browser window:



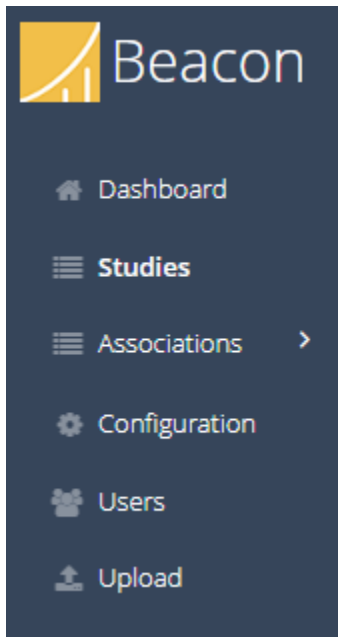
Either one will display the Login dialog:



Then type in your username and password.

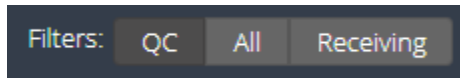
## 5.5 Study Display/Filtering

If not already on the Studies tab, click the Studies tab at the left side of the browser window:





This will display the list of available studies (that you are currently authorized to view/edit) for the selected filter. There are three filters buttons that can be used to filter the list of available studies, shown on the upper right:



These filters behave as follows:

- **QC** – Displays all studies that are ready to be verified or signed (i.e., studies in the Ready, Editing, Edited, and Signing states).
- **All** – Displays all available studies.
- **Receiving** – Displays only studies in the Receiving state.

All studies that are in the Receiving state (regardless of filter setting) are shown with the Receiving icon, as an aid for quick identification:



The list of available studies can also be filtered using the search bar:



Text entered in the Search bar will be treated in one of three ways:

- **Simple Search (Text)** – To use the Simple Search (Text) mode, enter a text string that will be used to search the contents of the **PatientId**, **PatientName**, and **AccessionNumber** fields. Any studies containing the given string in any of these fields (case-insensitive) will be displayed.
- **Simple Search (Date)** – To use the Simple Search (Date) mode, enter a date string in the format **mm/dd/yyyy** that will be used to search the contents of the **StudyDate** and **PatientDateOfBirth** fields. Any studies matching the given date in either field will be displayed.
- **Advanced Search** – To use the Advanced Search mode, enter a tagged string in the format **tag:value** that will be used to search any of the following supported tag fields (tag matching is case-insensitive, allowed abbreviations are shown in parentheses):
  - **AccessionNumber** (or **accession** or **acc**)
  - **CalledAe** (or **called**)
  - **CallingAe** (or **calling**)
  - **CreatedTime** (or **created**)
  - **DestinationName** (or **destination** or **dest**)
  - **IpAddress** (or **ip** or **host**)
  - **LastModified** (or **lastmod**)
  - **Organization** (or **org**)
  - **OwningUser** (or **owner**)
  - **PatientId** (or **patid**)

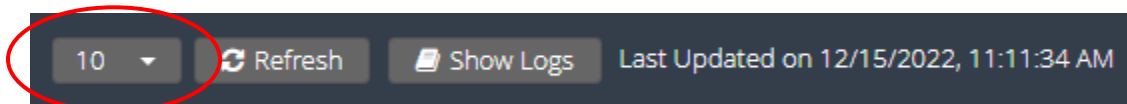
- **PatientName** (or **patname**)
- **PatientDateOfBirth** (or **patdob**)
- **SentTime** (or **sent**)
- **SignedBy** (or **signer**)
- **SignedTime** (or **signed**)
- **State**
- **StudyDate**
- **StudyDescription** (or **description** or **desc**)
- **StudyId**

As with simple search (text mode), any studies containing the **value** (value matching is case-insensitive) in the given tag field will be displayed. Also note that the **value** for date fields is in the same **mm/dd/yyyy** format as the simple search (date mode) above.

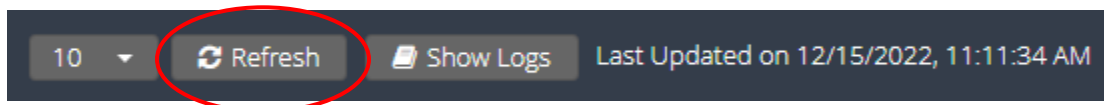
Below are some examples of valid advanced search strings:

- “patid:123” – Will show any studies where the **PatientId** field contains “123”, such as “A7123Z”.
- “patientname:smith” – Will show any studies where the **PatientName** field contains “smith” (first, middle, or last name, case-insensitive).
- “state:sendfailed” – Will show any studies that failed to send to the active destination.
- “sent:10/24/2019” – Will match any studies sent to the active destination on October 24, 2019.
- “org:Imaging Center” – Will match any studies where the **Organization** field contains “Imaging Center” (with a space, case-insensitive).
- “StudyDescription:CT CHEST” – Will match any studies where the **StudyDescription** field contains “ct chest” (with a space, case-insensitive).

The list of studies that is displayed at any given time is paged. The PageSize selector at the top left of the study list can be used to control the number of studies displayed on each page:



The list of studies displayed on the Studies tab does not auto-refresh (except when filters or search criteria are changed). To manually refresh the list, click the Refresh button:

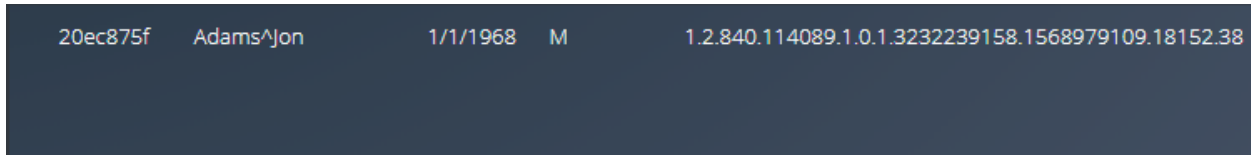


## 5.6 Study Selection

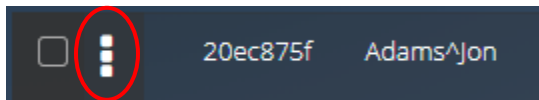
Beacon supports two modes of study selection, single-study edit mode, and multi-study edit mode. Single-study edit mode allows the user to select and verify a single study at a time, while multi-study edit mode allows the user to select and verify multiple studies at a time.

### 5.6.1 Single-Study Edit Mode Selection

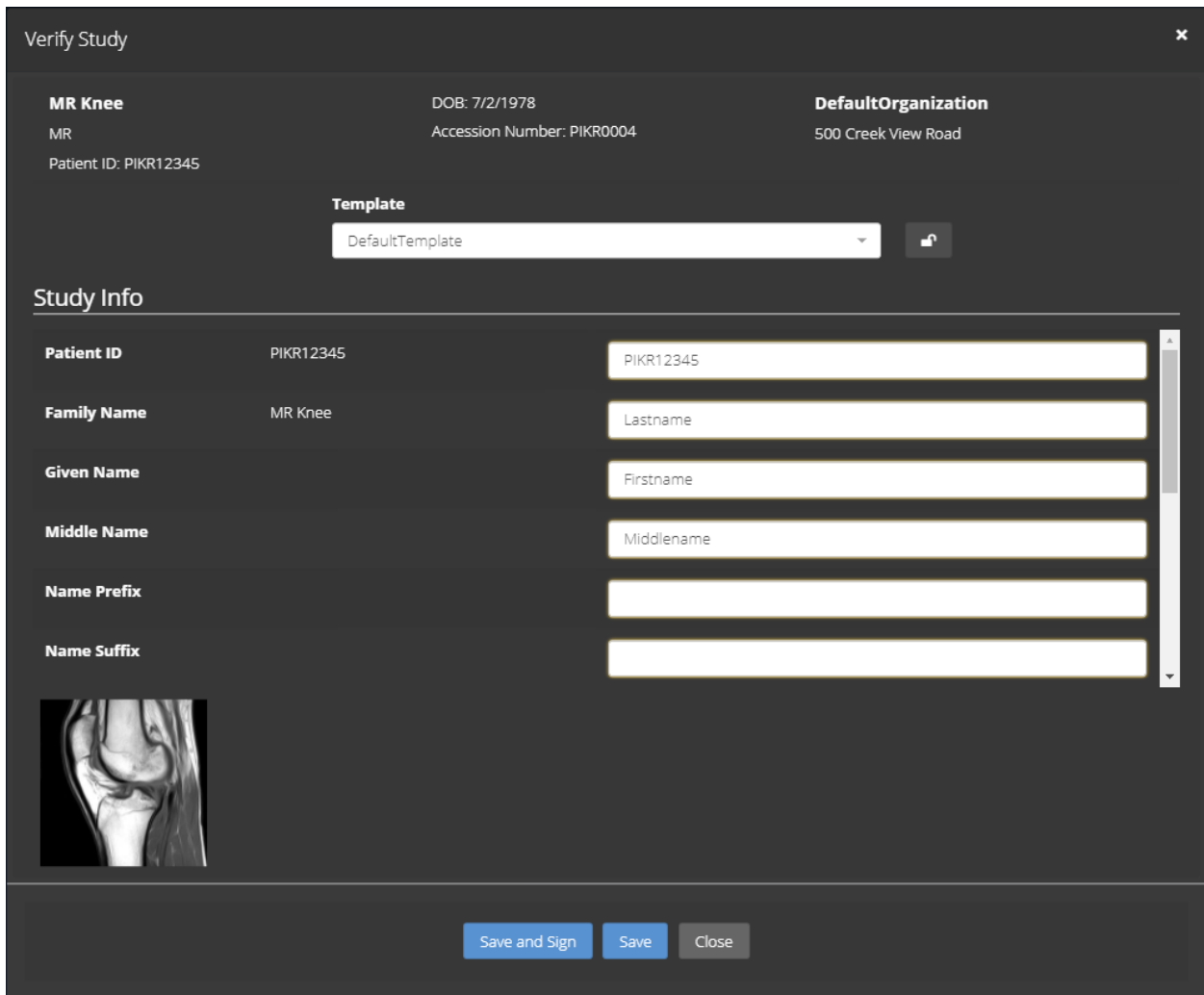
To select a study to verify/edit in single-study edit mode, either click on the study:



or click on the Action button for the study:



and select the “Verify” action. The single-study edit “Verify Study” dialog will be displayed:

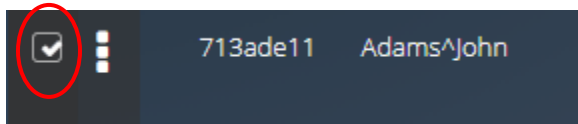


Clicking on any of the thumbnail images at the bottom of the dialog will display a larger version of the image.

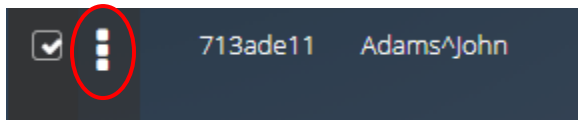
**Note: These displayed images are not intended for diagnostic use.**

### 5.6.2 Multi-Study Edit Mode Selection

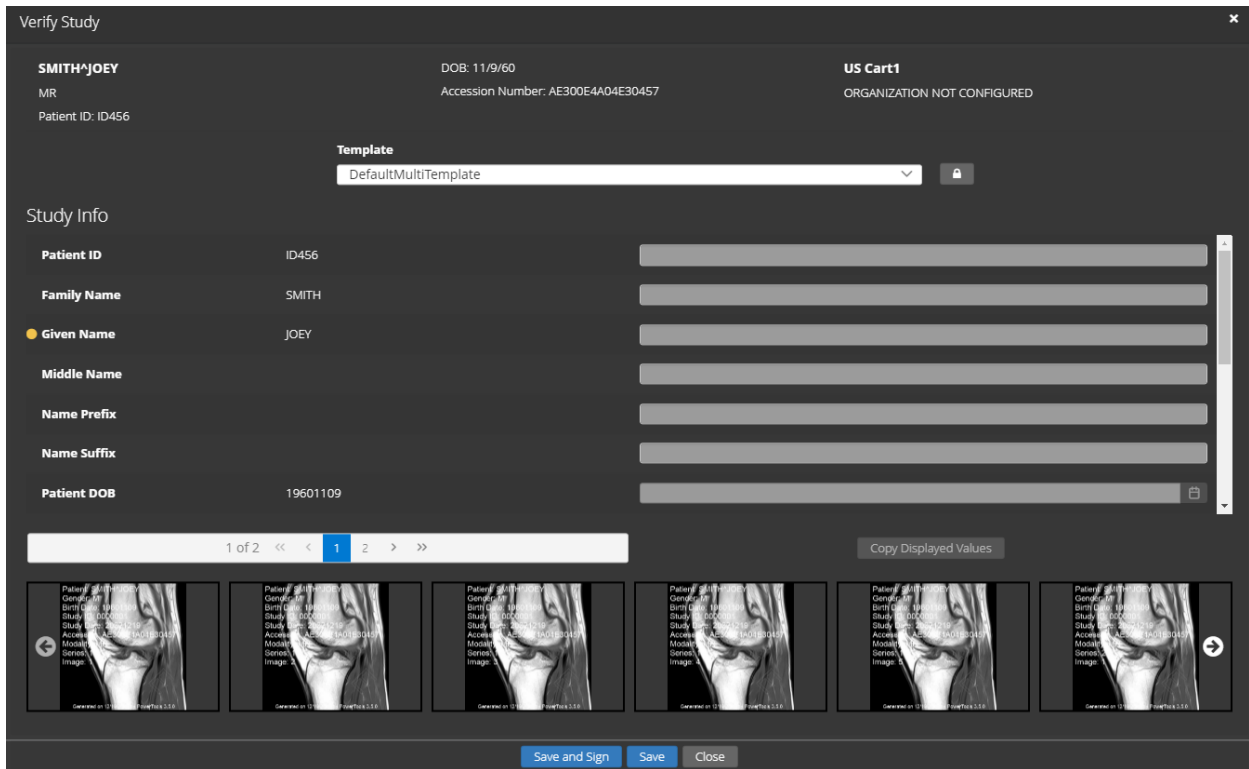
To select studies to verify/edit in multi-study edit mode, select the studies you wish to edit by selecting the checkboxes next to each of the studies:



and click on the Action button for any of the selected studies:



and select the “Verify” action. The multi-study edit “Verify Study” dialog will be displayed:

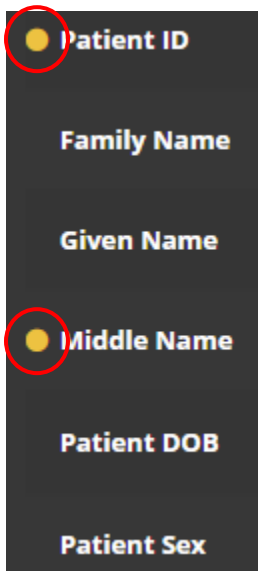


The multi-study edit “Verify Study” dialog has a couple of additional controls to take note of. First, there is a scrollbar that allows the user to scroll through the selected studies:



In addition, there is a button, labeled “Copy Displayed Values”, that will copy all of the values shown in the current-value column (above the scrollbar) into the textboxes shown in the new-value column (above the “Copy Displayed Values” button):

Finally, there is an additional yellow dot icon displayed next to each field for which the current values differ between the selected studies. This helps draw the user’s attention to the fields which may need editing:



Clicking on any of the thumbnail images at the bottom of the dialog will display a larger version of the image.

**Note: These displayed images are not intended for diagnostic use.**

## 5.7 Template Selection

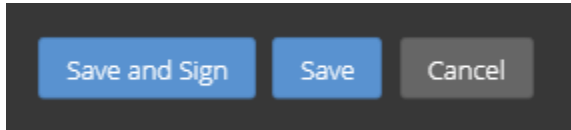
To select a template with which to verify/edit, click on the Template listbox:



and select from the given templates. Each template will define a set of study fields that can be viewed and edited. Note that if multiple studies were selected, only templates which support multi-study edit mode will be available for selection.

## 5.8 Study Verification/Editing

If no edits are needed, either click the “Save” button (to verify) or the “Save and Sign” button (to verify and sign immediately):



If the “Save and Sign” button is selected in multi-study edit mode, each study will be signed with the same message.

If edits are needed, click the Unlock button to allow editing:

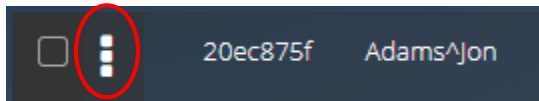


Once edits are complete, either click the “Save” button or the “Save and Sign” button, as described above. Again note that when in multi-study edit mode, the “Save and Sign” button is not available, as studies must be individually signed.

**Note: Clicking the “Save” button in multi-study edit mode saves the values currently shown in the new-value textboxes (in the right-most column) to all selected studies.**

## 5.9 Study Signing

To sign a verified study, either click on the Action button for the study:



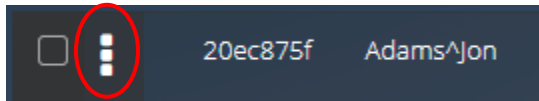
or use the “Save and Sign” button in single-study edit mode, as described above. Either of these will display the “Sign Study” dialog:



This dialog allows the user to input annotation text that will be stored in the study record, along with the ID of the signing user and a timestamp indicating when the study was signed. Upon signing of a study, it will automatically be sent to the active destination.

### 5.10 Other Study Operations

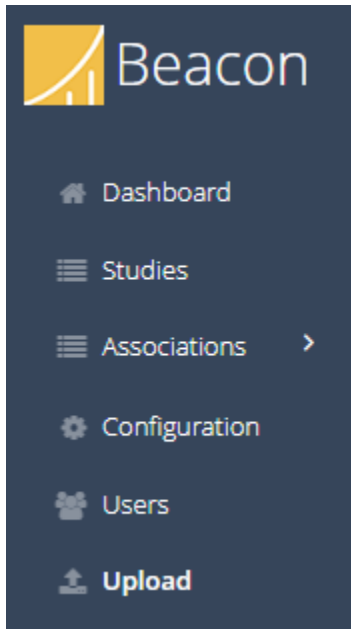
To re-send a study that failed to send, manually remove a study, or reset a study back to the Ready state (so it can be verified/edited again), click the Action button for the study:



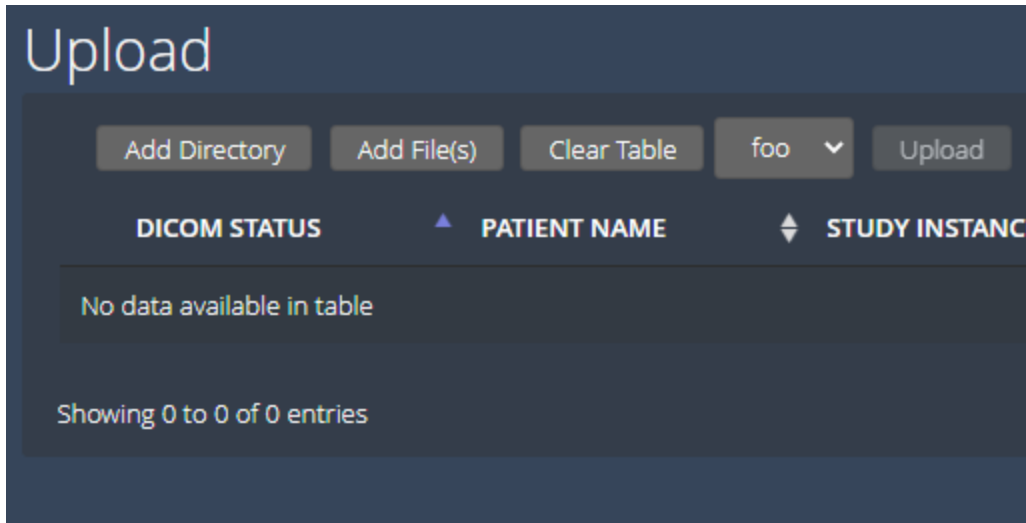
and choose the appropriate action.

### 5.11 Uploading DICOM Files

To upload DICOM files to Beacon, click the Upload button in the Navigation panel:



If Beacon has been configured to require authentication, you will be required to log in with valid user credentials. Upon successful login, the Upload screen will be displayed:



The Add Directory button can be used to browse to and select a folder containing DICOM Part 10 images to be uploaded to Beacon. Likewise, the Add File(s) button can be used to browse to and select one or more DICOM Part 10 files to be uploaded to Beacon. The DICOM Part 10 files will be displayed in the grid table, grouped by Study Instance UID.

The Clear Table button can be used to clear all files which have been previously selected. If Beacon has been configured to require authentication, a dropdown list will be displayed to the right of the Clear Table button, allowing you to select the organization name the uploaded files should be associated with. And finally, the Upload button will initiate the sending of the selected DICOM Part 10 files to Beacon. The upload status of each instance will be displayed in the Upload Status column (visible only when the study is expanded to show the component files).