

VistA Imaging Exchange (VIX) Query Retrieve

MAG*3.0*269

VIX Administrator's Guide



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Office of Information and Technology (OIT)

VistA Imaging Exchange (VIX) Administrator's Guide June 2022

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1. Introduction

This document explains how to maintain and administer the VistA Imaging Exchange (VIX) service.

The VIX is used to facilitate data sharing and exchange across organizational and functional boundaries. Currently, the VIX's primary purpose is to support image sharing between VA (Department of Veterans Affairs) medical facilities and between VA and the Department of Defense (DoD) medical facilities. It is anticipated that the VIX's role will expand to support data sharing and exchange within a facility and between facilities.

Beginning with MAG*3.0*170, the VIX hosts a zero-footprint viewer providing services to consuming application, chiefly eHMP and JLV. These services are expected to be utilized by future applications. With these changes, the VIX becomes a more critical component as it provides access not only to remote but local images as well. Maintenance of this component becomes more critical to the clinical operation at the site level. The operation of a site VIX also affects access to the portion of the patient record stored at the site.

This document assumes that the VIX is installed and configured. For information about VIX system requirements, installation, and configuration, see the [VIX Installation Guide](#).

1.1. Intended Audience

This document is intended for VA staff responsible for managing a local VIX.

One part of this document, *Image Sharing Related Logging*, may also be of interest to VA Imaging Coordinators at non-VIX sites. This section describes how remote VIXes log access to locally stored images.

This document presumes a working knowledge of the VistA environment, VistA Imaging components and workflow, Windows server administration, and Windows cluster administration.

1.2. Terms of Use

The VIX is a component of VistA Imaging and is regulated as a medical device by the Food and Drug Administration (FDA). Use of the VIX is subject to the following provisions:

- Federal law restricts this device to use by or on the order of either a licensed practitioner or persons lawfully engaged in the manufacture or distribution of the product.
- The FDA classifies VistA Imaging and the VIX (as a component of VistA Imaging) as a medical device. Unauthorized modifications to VistA Imaging, including the VIX, such as installing unapproved software, will adulterate the medical device. The use of an adulterated medical device violates US federal law (21CFR820).
- Because software distribution/inventory management tools can install inappropriate or unapproved software without a local administrator's knowledge, sites must exclude the VIX server from such a system.

1.3. Document Conventions

This document uses the following typographic conventions (Table 1).

Table 1: Typographic Conventions

| Symbol/Typeface | Meaning/Use | Example |
|--------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Bold | User input, selection, GUI element (menu item, button, field) | Click Finish . Choose Open from the File menu. Type the user account name in the Name field. |
| Monospaced font (typically in a box) (Bold indicates user input or selection). | Command-line sample or output (such as character-based screen captures and computer source code), menus, file names | Navigate to the \\Docs\Imaging_Docs_Latest folder. |
| <i>Italics</i> | Emphasis, reference to section in the document or another document, or a variable | For more information, see the Vista Imaging DICOM Gateway Installation Guide . |
| Square brackets, monospace or italics | Variable, placeholder, VistA menu | Access the Kernel Installation and Distribution System Menu [XPD MAIN]. ;;3.0;IMAGING;**[Patch List]**;Mar 19, 2002;Build 1989;Feb 21, 2011 MAG*3.0*<PatchNumber>.KID |

1.4. Section Summary

- **VIX Overview** – A high-level overview of VIX capabilities and key concepts.
- **VIX General Operations** – A description of day-to-day activities that relate to all VIX capabilities.
- **VIX Image Sharing** – A description of VIX operations specific to image sharing.
- **ROI VIX Operation, Configuration and Statistics** – A description of how the VIX processes ROI requests.
- **VIX Reference/Software Description** – VIX technical information.
- **Appendices** – Supplemental and supporting material.

1.5. Related Information

Additional documents containing information about the VIX can be found on the VistA Imaging SharePoint site here: <https://www.va.gov/vdl/application.asp?appid=105>

1.6. VIX Support

If you encounter any problems with the VIX, use the information in the *Troubleshooting* section to try to determine the possible cause of the problem. If problems persist, log a Remedy ticket or call the National Service Desk at **REDACTED**.

2. VIX Overview

This chapter provides a high-level summary of what the VIX does and how it does it. This chapter covers:

- *The VIX and Image Sharing*
- *DICOM Importer III Application Services*
- *VIX Image Viewer*
- *VIX Implementation and Configuration*
- *VIX Dependencies*
- *Standalone Server*
- *Security, Data Integrity, and Data Sensitivity Considerations*

2.1. The VIX and Image Sharing

The VIX implements image sharing between the Department of Veterans Affairs (VA) and the participating Department of Defense (DoD) medical facilities. The VIX also supports and extends VA-to-VA remote image sharing for Clinical Display and VistARad.

The VIX delivers these capabilities in such a way that:

- Clinicians can locate and review images from all VA and participating DoD facilities without manually logging into the remote site.
- Wide Area Network (WAN) traffic is minimized whenever possible using the VIX's compression and caching strategies.
- The VIX handles the burden of connection management and data retrieval rather than client applications such as Clinical Display and VistARad.

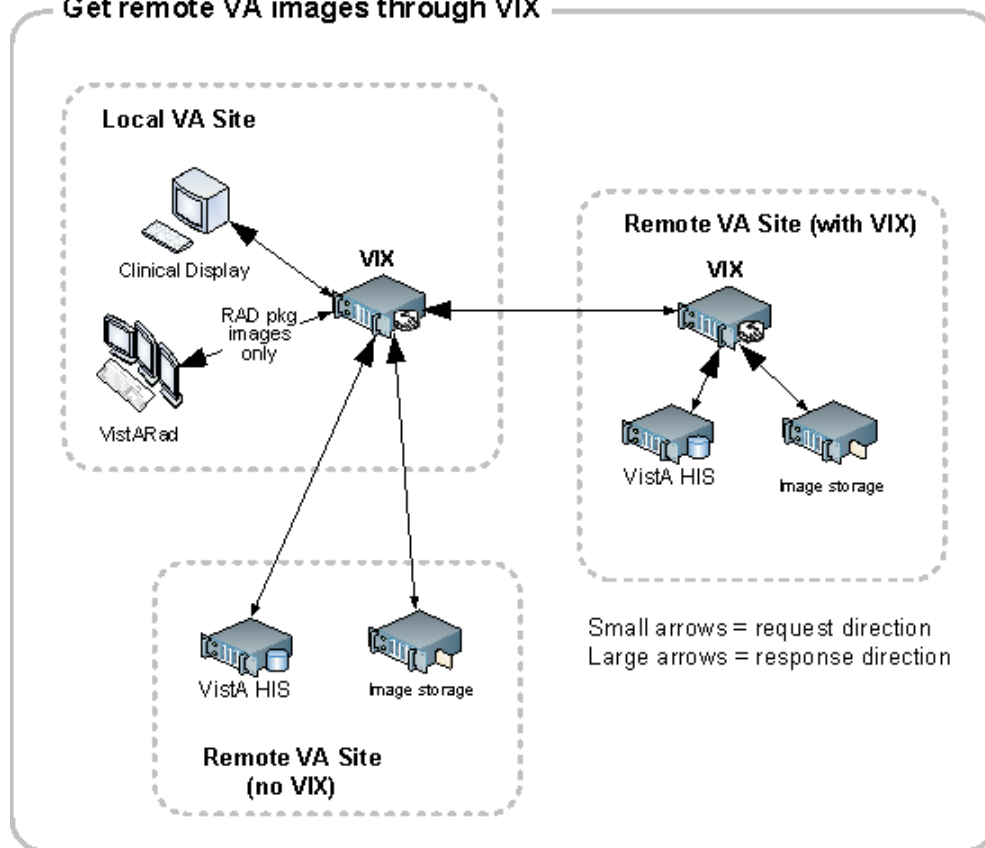
At sites where a VIX is implemented, the VIX's involvement in data retrieval begins when a clinician selects a patient who has been seen at the local hospital as well as at one or more remote hospitals. The clinician's client software (Clinical Display or VistARad) pulls information about locally stored images from the local VistA system, while information about remote images is pulled from remote sites via VIX. The clinician uses this information to decide what images to display. Local images are retrieved directly from the local hospital, while remote images are retrieved via the VIX. From the clinician's perspective, accessing an image works the same way, regardless if the image is from local storage, a remote VA site, or from the DoD.

The following sections outline how a VIX fits in when accessing remote images.

2.1.1. VA-VA Image Sharing

Figure 1 shows how remote VA images and related metadata flow through a VIX.

Figure 1: Remote VA Images Flow Through a VIX
Get remote VA images through VIX

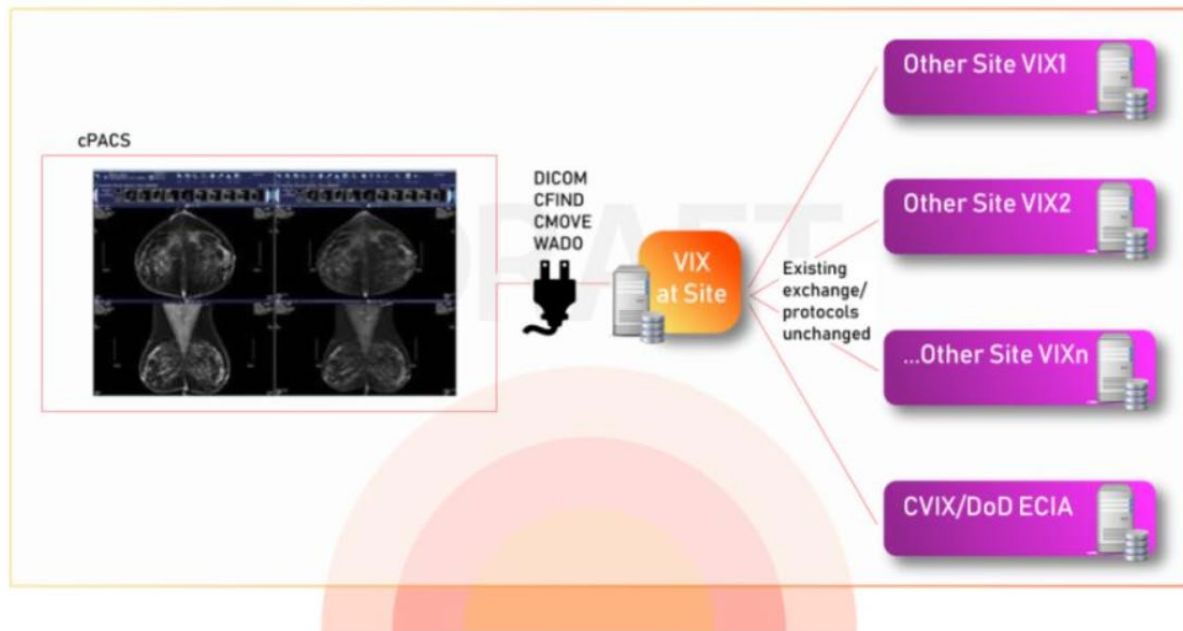


When the VIX is used for VA-to-VA image sharing, the VIX can handle anything stored in VistA Imaging. This includes radiology images, clinical images of all types, scanned documents, video, and audio.

NOTE: If a local VIX is not implemented, VA-VA image sharing is still available (at a reduced performance) to local Clinical Display and zero-footprint Image Viewer users, but not to VistARad users.

Commercial Picture Archiving and Communication System (PACS) (Figure 2) equipment or other query retrieve devices communicates with the local VIX. The local VIX then communicates with the other VistA site VIX systems, just as the VIX system currently does for Clinical Display, VistARad, and the VIX Viewer. In this way Commercial PACS equipment can import before local and remote images into the PACS viewer.

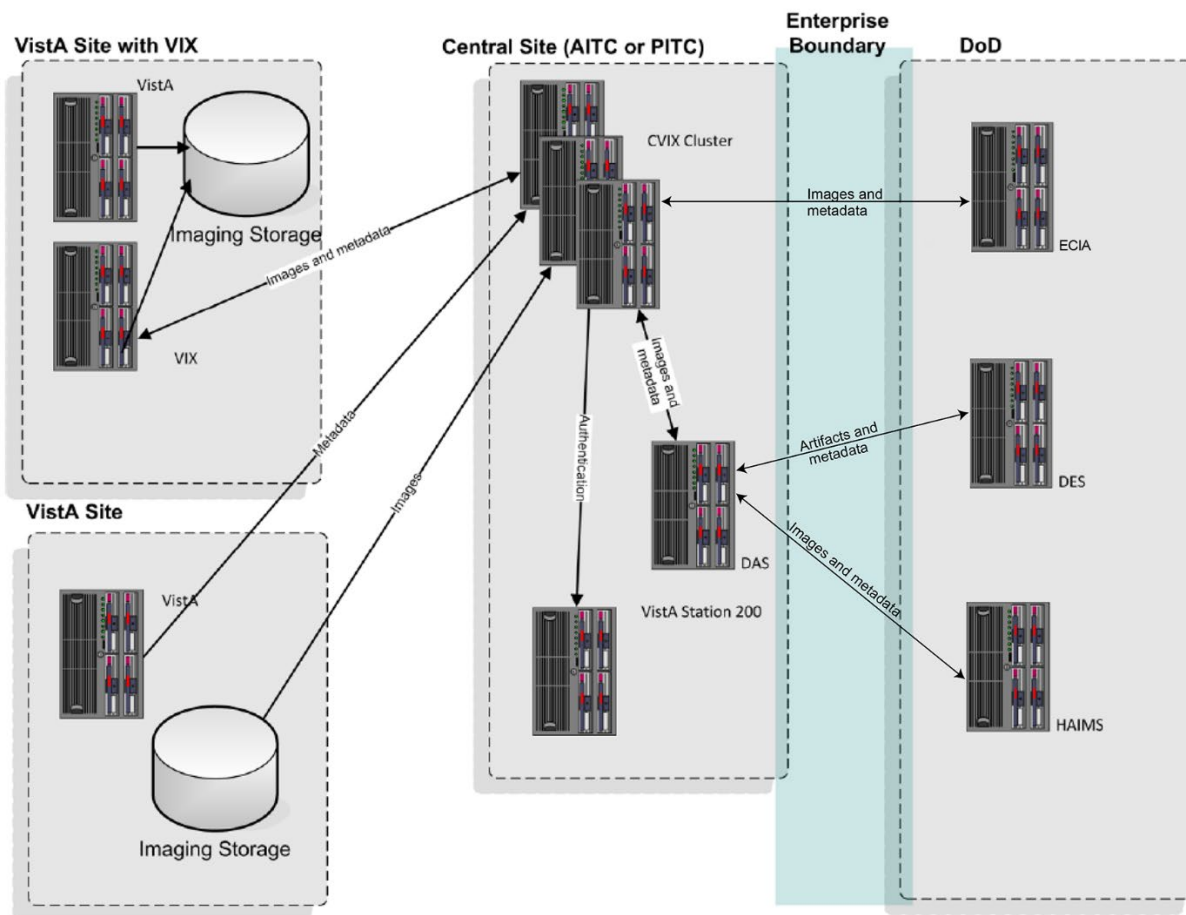
Figure 2: Commercial PACS VA Image Flow



2.1.2. DoD-to-VA Image Sharing

When a local VIX is used to retrieve DoD images for shared VA/DoD patients, the local VIX sends clinicians’ requests to the Centralized VistA Image Exchange (CVIX). The CVIX, in turn, handles the communication with the various sources of DoD images (Figure 3).

Figure 3: DoD-to-VA Image Sharing



VA clinicians can access the types of DoD images in Table 2 for shared patients if a local VIX is implemented and if the appropriate DoD image sources are online.

NOTE: There is an ability to switch between HAIMS (Health Artifact and Image Management Solution) and ECIA (Enterprise Clinical Imaging Archive) for DoD images.

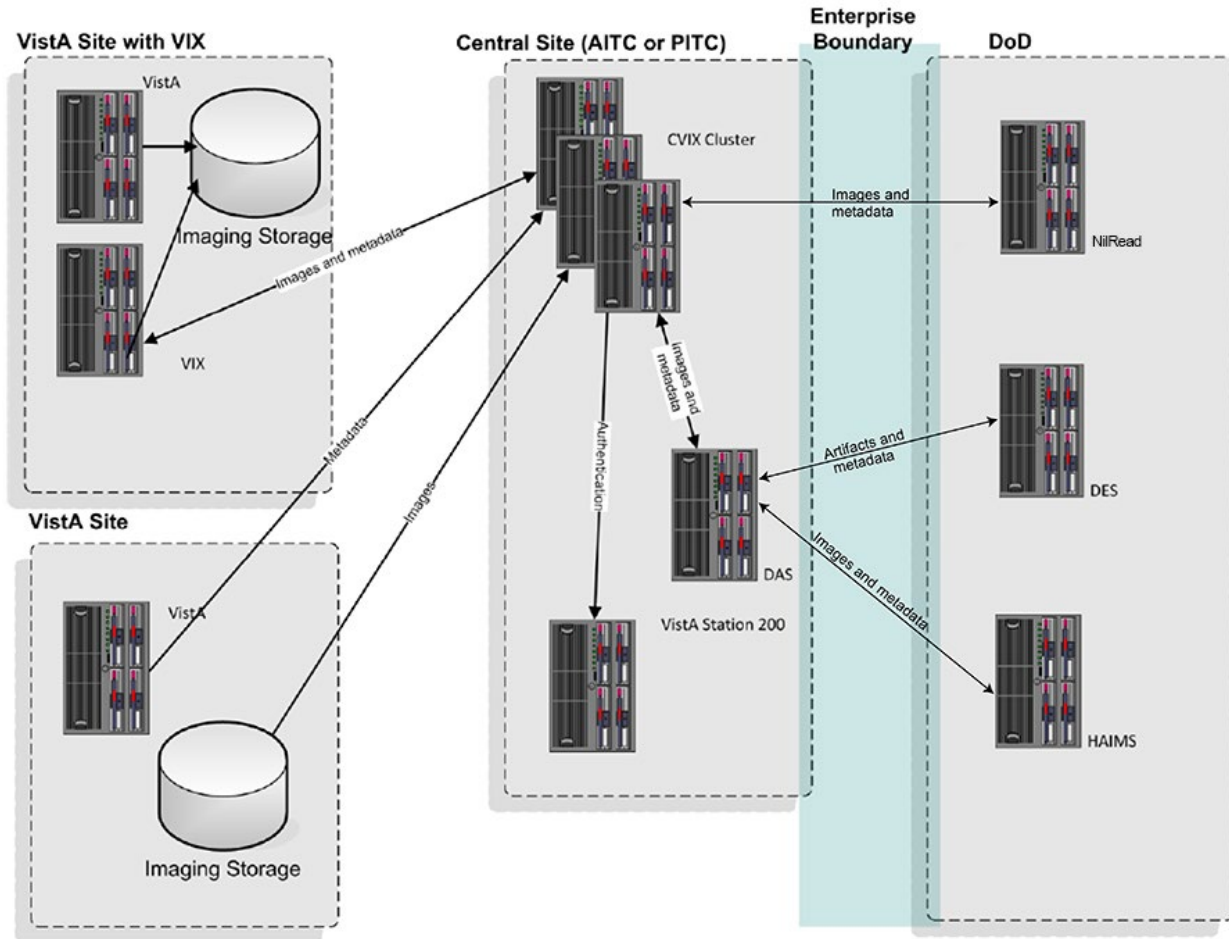
Table 2: Image/Artifact Category Notes for DoD-to-VA Image Sharing

| Image/Artifact Category | Notes |
|-----------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DoD DICOM images | Available from participating DoD facilities via the ECIA, which is through the CVIX. NOTE: There are a limited number of non-image DICOM objects that are not provided. For more information, see <i>DoD DICOM Object Filtering</i> . |
| DoD artifacts (non-radiology medical images, scanned documents, etc.) | Available if DES servers are online, accessible through DAS (Data Access Service), and if DAS servers are capable of communicating with the CVIX. |

2.1.3. VA-to-DoD Image Sharing

When a VA site implements a VIX, that VIX also allows DoD clinicians to access locally stored DICOM images for VA/DoD shared patients (Figure 4). For additional details about the types of images involved, see *VA DICOM Images Provided to DoD*.

Figure 4: VA-to-DoD Image Sharing



NOTE: DoD clinician image access requests are logged in the local VistA system.

NOTE: DoD clinicians can access locally stored non-DICOM medical images and scanned documents using the CVIX alone as long as the patient in question is a shared VA/DoD patient. A local VIX is not required.

NOTE: There is an ability to switch between HAIMS (Health Artifact and Image Management Solution) and NilRead™ or other query retrieve devices for DoD images.

2.1.4. What is the CVIX?

The Centralized VistA Image Exchange (CVIX) service functions as a VIX for the entire DoD. It:

- Provides a single point for VA access to DoD images. Among other things, this means that local site VIXes do not have to be modified if there is a change in how DoD image sources request or provide data; only the CVIX is impacted.

- Provides the portal used by all DoD clinicians to request all VA images. In this role, the CVIX uses the VistA system at Station 200 to provide VA treating facility information for shared patients and temporary VA credentials for DoD clinicians.

The CVIX server also:

- Hosts the VistA Site Service
- Hosts the VIX Log Collector

2.1.4.1. VIXes and Image Sharing at Multidivisional Sites

VIX implementation at a multidivisional site can be handled in two ways:

- A multidivisional site can implement a single VIX at a primary division to serve all divisions.
- A multidivisional site can implement a VIX at the primary division and one or more subdivisions.

When a local clinician at a VIX-equipped multidivisional site requests remote metadata and images, the closest VIX is used. For example:

- If the division where the clinician is logged into has a VIX, that VIX is used in preference to any other VIXes that may be present.
- If the division where the clinician logged into does not have a VIX, the VIX at the primary division is used.

When clinicians outside of the multidivisional site, request local metadata and images from a VIX-equipped multidivisional site:

- Metadata requests are always handled by the VIX at the primary division because that VIX is local to the applicable VistA database.
- If a subdivision has local image storage and a VIX, the VIX at that subdivision provides the image to the remote requestor.

If a subdivision has local image storage but does not have a VIX, the VIX at the primary division provides the image to the remote requestor.

Performance considerations aside, these distinctions free clinicians from having to determine which VIX to use.

NOTE: Images from different subdivisions within a multidivisional site are considered local images by client software (such as Clinical Display and VistARad). Because of this, the clients request these images directly and not via the VIX.

2.1.4.2. Optional Direct Connection to a DoD PACS Integrator

If a participating DoD facility shares a direct network connection with a VA site that has a VIX, the DoD facility's PACS integrator and the VA's VIX can be configured to communicate directly for DICOM image transfers. This allows the images to be accessed at LAN speeds rather than WAN speeds.

NOTE: This capability is used for DICOM images only.

For more information about this option, contact the VistA Imaging development group at **REDACTED**.

2.2. DICOM Importer III Application Services

The Importer III is a distributed application for allowing users to import outside studies from CD, DVD, or network sources and process and reconcile studies that have entered the DICOM correct workflow. It is composed of a client application that uses the VIX as an application server, and a server component running on the site's HDIGs that picks up reconciled studies and work items for asynchronous processing.

In its role as the Importer III's application server, the VIX provides the following broad categories of functionality:

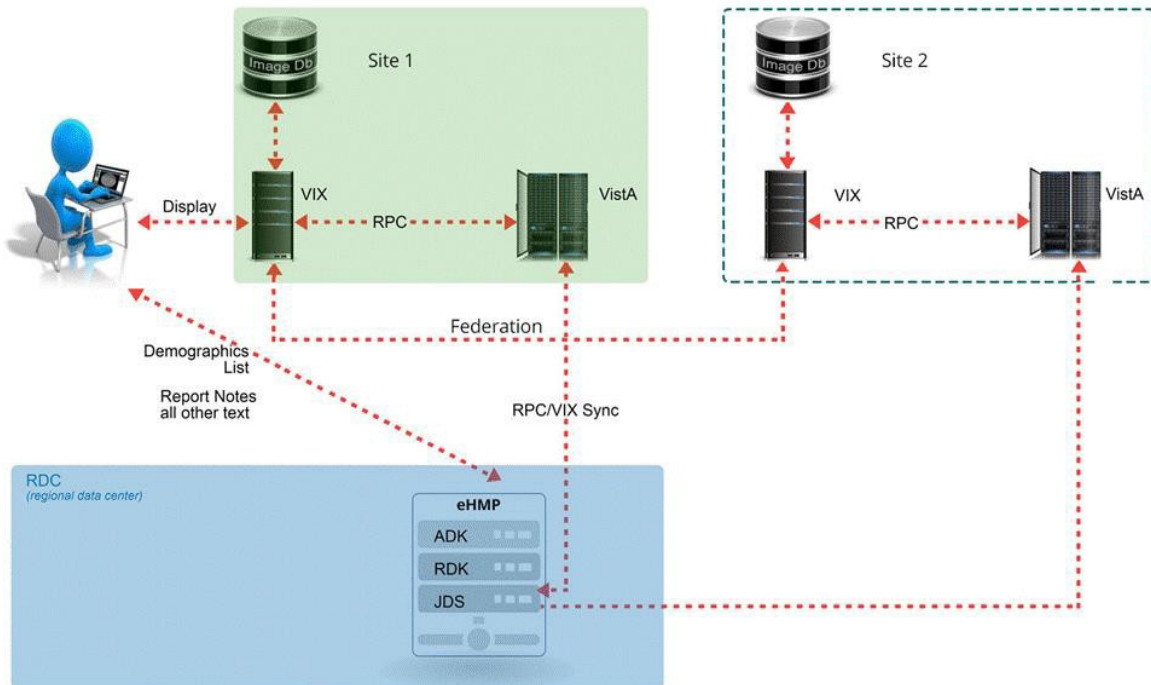
- User services including login, user key retrieval, and related functions
- Patient services including search, patient sensitivity logging, and related functions
- Storage services including retrieving the current read and write locations for the image shares
- DICOM Importer application services, including
 - Validation of application version compatibility
 - Importer work item creation, updating, retrieval, and deletion
 - Decoding of DICOMDIR files
 - Inspecting images from studies to determine whether or not they already exist in VistA
 - Order retrieval for a specified patient
 - Metadata retrieval for Ordering Providers, Ordering Locations, Procedures, and Procedure Modifiers
 - Searching for and generating reports

2.3. VIX Image Viewer

MAG*3.0*177 introduced new VIX services to support a zero-footprint web-based image viewer. This VIX Image Viewer is also known as the VIX Viewer and the Enhanced Image Viewer. The zero-footprint image viewer is not a standalone application. It is a service for external applications to integrate with their apps for viewing images stored in VistA Imaging or images in other enterprises accessible through VistA Imaging (i.e. DoD).

The viewing of images to the zero-footprint viewer redirects to the server from the user's local VIX. This arrangement (Figure 5) keeps image traffic local to the facility as much as possible (for better performance). All image access using the zero-footprint image viewer, whether local or remote, go through the VIX and utilizes these services.

Figure 5: Image Viewer Data and Control flow Using eHMP as an Example Application



2.3.1. Troubleshooting

It is important to ensure the viewer and render Windows services are up and running as they are critical for viewing images while using the zero-footprint image viewer. The listener service is a non-critical service as it is only used to help with the performance of the VIX RPC calls.

All VIX services prior to patch MAG*3.0*170 run under the Apache Tomcat Windows service. After that patch, the services run under their own separate Windows services. See details below to verify all VIX Windows services and processes are operational.

It is also important to verify that the VIX is sized appropriately and the usage of resources such as disk drive, CPU, and memory are not exceeded.

2.3.2. Windows Services

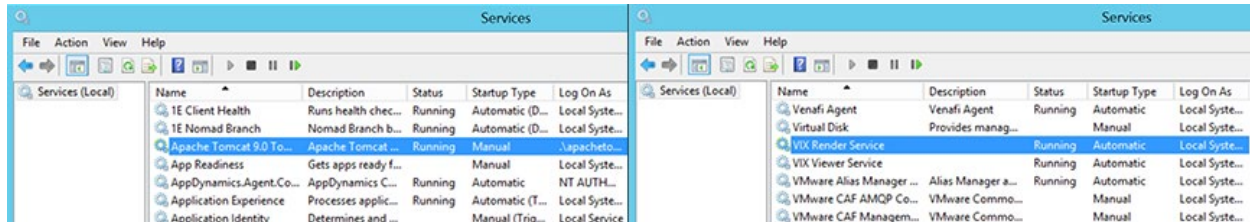
Ensure that Apache Tomcat, VIX Render Service, VIX Viewer Service, Listener Tool, and SQL Server (SQLEXPRESS) services are running and operational (Figure 6).

1. **VIX Viewer Service:** The viewer service is the only public interface used by consuming applications such as eHMP and JLV. It is used to fetch image related metadata to view images in a web browser. The zero-footprint image viewer is hosted and served out by the Viewer service.
2. **VIX Render Service:** The Render service is not a public interface; it is an internal service to pre-process images so they can be displayed efficiently in a web image viewing application. The Render service is used by the Viewer service. The Render cache is a cache of pre-processed images which allows subsequent image accesses through the viewer to be much quicker because there is no need to pre-process these images.

3. **Listener service:** The listener service is a generic TCPIP listener introduced to speed up the VIX connections to VistA.
4. **SQLEXPRESS:** SQLEXPRESS is a local database and associated services used to manage images in the cache.

NOTE: The Apache Tomcat version may vary depending on which patch level is installed.

Figure 6: Windows Services Running



2.3.3. Windows Processes

Verify that the VIX Viewer and Render processes are running in the Windows Task Manager.

1. Launch the Windows Task Manager
2. Look for the following processes:
 - a. VIX.Viewer.Service
 - b. VIX.Render.Service
 - c. Hydra.IX.Processor (x10) – the number of worker processes configurable on the VIX; the actual amount may be more or less
 - d. Hydra.VistA.Worker (x5) - the number of worker processes configurable on the VIX; the actual amount may be more or less
3. If any of these processes are not running, restart the Viewer and Render services.

NOTE: It can take up to a minute for all Hydra.IX.Processor processes to start.

2.3.4. Service Logging

If all related VIX Windows services and processes are running, the service logs can be checked for errors and other information. By default, the logging level for the services is set to "Warn". This means that warnings and errors can appear in the log files. If a more granular level of logging is needed for troubleshooting, you can change the *LogLevel* from "Warn" to either "Debug" or "Trace" in each of the config files listed below:

- **VIX Viewer Service:** C:\Program Files\VistA\Imaging\VIX.Config\VIX.Viewer.config
- **VIX Render Service:** C:\Program Files\VistA\Imaging\VIX.Config\VIX.Render.config

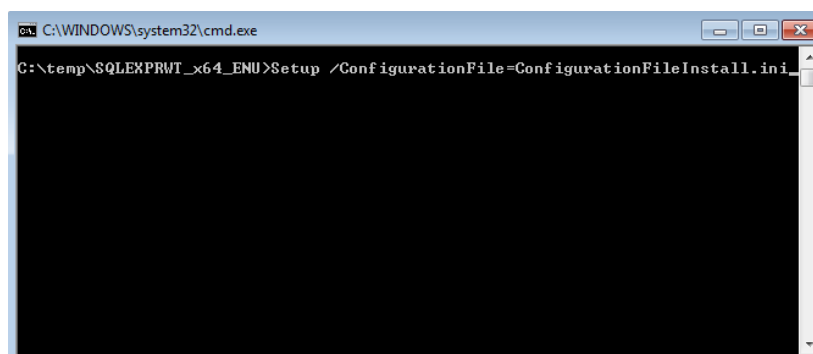
NOTE: Once you are done troubleshooting, be sure to set the logging level back to "Warn," or the log files might become very large and potentially fill up the hard drive.

2.3.5. Viewer Image Caching

The zero-footprint image viewer uses pre-processed images and metadata stored in the VIX Render cache. The VIX render cache is a temporary cache of files built automatically when images are requested for viewing. When images are requested for viewing, the Viewer service fetches the images from the local VIX cache and calls the Render service to create optimized versions of those images for rendering in a web browser. The following describes how to manually re-initialize the Render cache on any given VIX server if needed:

1. Stop the VIX Viewer and VIX Render services
2. Delete all folders in the top-level Render cache folder located in:
 - <Cache Drive> :\VIXRenderCache
3. Re-Install and configure SQL Express
 - a. Copy the SQL Express installation (SQLEXPRESS_x64-14_0_1000_169.zip) to a local folder on the server.
 - b. Extract all the files.
 - c. In the command prompt window, navigate to the directory used for extracted files.
 - d. Run the following command: Setup.exe /ConfigurationFile=ConfigurationFileInstall.ini (Figure 7).

Figure 7: Command Prompt ConfigurationFile Command



4. Review the console window and ensure no errors were reported.
5. Restart the VIX Viewer and Render Services.
6. Verify Viewer operations by opening a few studies by launching via zero-footprint Image Viewer in JLV.

2.3.6. Currently Supported SOP Classes

Table 3 contains a list of currently supported SOP classes.

Table 3: Supported SOP Classes

| SOP Class Name | SOP Class UID |
|------------------------------------------------|-----------------------------|
| Digital X-Ray Image Storage - for Presentation | 1.2.840.10008.5.1.4.1.1.1.1 |

| SOP Class Name | SOP Class UID |
|--------------------------------------------|----------------------------------|
| X-Ray Angiographic Image Storage | 1.2.840.10008.5.1.4.1.1.12.1 |
| Enhanced SR | 1.2.840.10008.5.1.4.1.1.88.22 |
| Positron Emission Tomography Image Storage | 1.2.840.10008.5.1.4.1.1.128 |
| Enhanced MR Color Image Storage | 1.2.840.10008.5.1.4.1.1.4.3 |
| Enhanced XA Image Storage | 1.2.840.10008.5.1.4.1.1.12.1.1 |
| Breast Tomosynthesis Image Storage | 1.2.840.10008.5.1.4.1.1.13.1.3 |
| Ophthalmic Photography 8 Bit Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.5.1 |
| Basic Text SR | 1.2.840.10008.5.1.4.1.1.88.11 |

2.4. VIX Implementation and Configuration

The VIX is hosted on a dedicated VM. Careful considerations should be given when sizing the VIX. With the introduction of the VIX Viewer, the VIX uses a lot more resources as it has to process the images for rendering, and it also can cache a large number of images.

VIX configuration is largely automated and is handled as part of the VIX installation process.

Installation details, including licensing, supported operating systems, and hardware requirements, are covered in the [VIX Installation Guide](#).

2.5. VIX Dependencies

The systems in Table 4 must be present for proper VIX operation.

Except for the local VistA database, the VIX can function for some time at reduced efficiency if any of these systems are temporarily unavailable.

Table 4: Systems for VIX Operation

| Name/Location | Function | Interface Method |
|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| Local VistA | Provides metadata and image locations to requesting VIXes, control access to local VIX transaction log; VistA logging of VIX-mediated image accesses. | LAN/RPC |
| VIX cache | Provides cached images for improved speed. | LAN |
| Remote VistA | Source of remotely stored VA images for local clinician access. (The VIX continues to operate if a specific remote VistA system is unavailable; it just cannot provide images from that remote system.) | WAN/http |
| CVIX (at VA data center) | Source of remotely stored DoD images for local clinician access. (The VIX continues to operate if CVIX is unavailable; it just cannot provide DoD images.) Also hosts the VistA site service, which provides connection data to the VIX. A VIX uses locally cached connection data if the VistA Site Service is unavailable. | WAN/http |

2.6. VIX Operational Priority

The operational priority of the VIX depends on the nature of the server where the VIX is installed and what the VIX is being used for at a given site.

2.6.1. Standalone Server

When the VIX is installed on a standalone server, the VIX's operational priority depends on the role of clinicians using the VIX for remote image access. If the standalone VIX server is shut down:

- Clinicians using Clinical Display can still retrieve remote VA images (at a reduced performance) using Remote Image Views; however, this may be temporarily inaccessible. Clinical Display attempts to revert to pre-VIX remote image views and Clinical Display may need to be restarted. In this scenario, the operational priority of a VIX on a standalone server is low.
- Radiologists performing remote reading using the VistARad VIX-assisted operations cannot view local and remote images together unless the images are routed to VistARad using the DICOM Gateway's routing function. Because of the variations involved, each site must make its operational priority assessment in this case.
- DICOM Importer client users cannot login and import images.
- Clinicians viewing images or artifacts (local or remote) in JLV cannot access them during the duration of the VIX shutdown.
- iMedConsent users Signed Informed Consent ability to store new consent forms will be unavailable.
- Any new Ingest consuming application will be unavailable to store new contents.
- Integrated Visualization System (IVS) mobile application users cannot access local images.
- Enterprise DICOM Q/R functionality will not be available.
- Access to DoD images or artifacts will not be available.
- Access to VA Cerner images or artifacts will not be available.
- Any other external application calling a local VIX service directly will be impacted during the duration of the VIX shutdown.

For detailed information about how the VIX responds if the hosting server is rebooted, see *VIX Startup and Shutdown*.

2.7. Security, Data Integrity, and Data Sensitivity Considerations

The VIX uses the following security, data integrity, and sensitive data handling methods.

- The VIX only responds to requests from authenticated applications. Application-level authentication is invisible to the user who initiated the request.
- Requests for VA data include user credentials that are authenticated and logged by the VistA system where the data resides. The VIX supports both Broker Security Enhancement (BSE) and pre-BSE-style remote logins.
- Access to the VIX transaction log requires authentication with the local VistA system (relative to the VIX in question). It is limited to VistA users that hold the MAG VIX ADMIN security key.
- VIX installation and VIX-to-VIX communications cannot proceed without a security certificate.
- The VIX delegates the sensitivity (data integrity checking implemented by the application requesting data from the VIX. [When Clinical Display requests data, Clinical Display specific logic is used. When VistARad requests data, VistARad specific logic is used.]).

3. VIX General Operations

This chapter covers:

- *VIX General Operations Overview*
- *The VIX and the VistA Service*
- *Using the VIX Transaction Log*
- *VIX Data Retention and Purges*
- *VIX Startup and Shutdown*
- *Monitoring/Maintaining the VIX*
- *Monitoring/Maintaining the VIX Viewer*
- *The VIX and Backups*

3.1. VIX General Operations Overview

VIX operations fall into two categories.

- General operations, which are described in this chapter.
- Function-specific operations (such as image sharing), which are covered later in this manual.

General operations are the activities that always occur as long as the VIX is running. These include retrieving data from the VistA Site Service, general logging, purging old data, and VIX startup/shutdown.

While most VIX operations are automated, the VIX does require some basic monitoring. For more information, see *Monitoring/Maintaining the VIX*.

3.2. The VIX and the VistA Site Service

The VistA Site Service is a CVIX-hosted central repository of connection information. A VIX (along with other VistA Imaging components) uses the VistA Site Service to get connection information for other VistA sites, other VIXes, and the CVIX itself.

The VIX automatically downloads and caches connection information from the site service each day at 11:00 PM, and any time the VIX is restarted. The VIX uses this cached information rather than access the site service for every transaction.

If your local connection information for VistA or the VIX changes, you must do the following:

1. Contact the **REDACTED** mail group to update your site's information in the VistA Site Service.
2. After step 1 is complete, re-run the VIX installation wizard to update your VIX configuration information. For details, see the [VIX Installation Guide](#).

3.3. Using the VIX Transaction Log

The VIX transaction log records information about every image and metadata transfer handled by the VIX. Entries in the log are retained for 30 days and then purged. A permanent backup copy of the VIX transaction log is also stored remotely.

The VIX transaction log can be accessed using Chrome or Edge. The main transaction log Web page can display, filter, and export log entries of interest.

To access the transaction log, you need the following:

- A VistA account with the MAG VIX ADMIN security key assigned to it (while the log is a Web page, the VIX uses a VistA account to secure the log).
- Access to <https://<FQDN>:REDACTED/Vix/secure/VixLog.jsp> (where <FQDN> is the server the VIX is installed on.)




NOTE: For security reasons, completely close out of your browser at the end of your session.

You can only access the VIX transaction log while the VIX is running.

To view the VIX transaction log, complete the following steps.

1. Navigate to <https://<FQDN>:REDACTED/Vix/secure/VixLog.jsp>.
2. Enter your VistA access and verify codes in the User Name and Password boxes and click **OK**.

NOTE: Transaction log credentials are authenticated against the local **VistA** system. Attempting to use Windows credentials do not work.

3. The VIX Transaction Log page displays.
 - By default, the page displays the 100 most recent transactions for the current day.
 - The transactions are ordered from newest to oldest.
4. For detailed information about each field in the log, see *VIX Transaction Log Fields*.
5. To view different parts of the log, use the paging buttons near the top and at the bottom of the log as follows:
 - Click  to show the next page of (older) entries.
 - Click  to show the previous page of (newer) entries.
 - Click  to show the first page (newest) entries in the log.

To change the date range and page size in the VIX transaction log, complete the following steps.

1. To change the date range used to filter log entries, change the values in the **Start Date** and **End Date** boxes, and then click **Show in Browser**.

To export part of the transaction log, complete the following steps.

1. On the Transaction Log page, use the date range boxes near the top of the page to specify the desired date range of entries to export.

- Dates are formatted as MM/DD/YYYY.
 - The most recent log entries are shown first.
2. To change the number of entries displayed on each page, select a different value from the Transactions per Page box, and then click Show in Browser.
 - 1,000 exported log entries result in an approximately 0.5 megabyte file.
 - The **Transactions per Page** setting does not apply when log entries are supported.
 3. Click **Save as CSV** for comma-separated values or **Save as TSV** for tab-separated values.
 4. Use the browser Save dialog box to specify where to store the file.
 5. Use a spreadsheet program or a text editor to open the resulting file.

3.3.1. VIX Transaction Log Fields

When the transaction log is displayed in a Web browser, the fields in Table 5 are shown. These fields are also included when the transaction log is exported as a tab-separated (.TSV) or comma-separated (.CSV) file.

Fields that only appear when the transaction log is exported are listed in the next section.

Table 5: VIX Transaction Log Fields

| Name | Description |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Date and Time | When the VIX processed the transaction. Formatted as MM-DD-YYYY, HH:MM:SS, AM/PM. |
| Time on VIX | The length of the transaction in milliseconds, begins when the VIX receives a message and ends when the VIX begins to respond. |
| ICN | The Integration Control Number used to uniquely identify the patient across the VA and DoD systems. (NOTE that the ICN is not equivalent to the VA patient ID, and is not considered Protected Health Information.) |
| Query Type | A multi-part field that indicates [<i>handler method receiving site <- sending site</i>]. <i>handler</i> identifies the VIX Web application that handled the request. For details see <i>VIX Interfaces</i> . <i>method</i> identifies the specific operation performed: <ul style="list-style-type: none"> image transfer – Used to transfer an image. getStudyList – Provides the DoD with study metadata from a VA VistA system via the CVIX. Other methods relate to metadata and are described in <i>Remote Metadata</i> . <i>receiving site <- sending site</i> indicates: The station number and home community ID (where applicable) of the sending and receiving sites. |
| Query Filter | Applies to study metadata only. Indicates whether a list of all available studies for a patient was transferred or if a subset based on date was transferred. |

| Name | Description |
|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Asynchronous | Indicates whether the transaction was performed asynchronously (true) or synchronously (false). |
| Items Returned | <p>The number of items returned to the requester.</p> <p>For study metadata, indicates the number of studies or images in the list being transmitted. For an image, this field has a value of 1 if the requested image was transmitted or 0 if the requested image was not found.</p> <p>For other operations, this column is not populated.</p> |
| Items Received | <p>The number of items retrieved from the remote site.</p> <p>For study metadata, indicates the number of studies or images in the list being received. For an image, this field has a value of 1 if the requested image was received or 0 if the requested image was not received.</p> <p>If the VIX is operating asynchronously, the values in this field may not match the values in the Items Returned field.</p> <p>In the exported log, this field is labeled <i>Data Source Items Received</i>.</p> |
| Bytes Returned | <p>If populated, the amount of data returned in the request.</p> <p>In the exported log, this field is labeled <i>Façade Bytes Returned</i>.</p> |
| Bytes Received | <p>If populated, the amount of data received in the request.</p> <p>In the exported log, this field is labeled <i>Data Source Bytes Received</i>.</p> |
| Throughput | <p>The image transfer rate. Both the rate and the units of measurement (KB/sec, MB/sec are indicated). They are not populated for metadata. This value is calculated at runtime and is not present in the exported log.</p> |
| Quality | <p>Populated for images only. Can be one of the following:</p> <ul style="list-style-type: none"> • THUMBNAIL • REFERENCE • DIAGNOSTIC • DIAGNOSTIC UNCOMPRESSED <p>For more information about these parameters, see <i>Image Quality and VIX Compression</i>.</p> |
| Command Class Name | Internal VIX command used for debugging and support. |
| Originating IP Address | The IP address of the workstation that initiated the image or metadata request. |
| User | The name of the clinician that initiated the request. |
| Item in Cache? | <p>TRUE indicates the image is served from the cache.</p> <p>FALSE indicates the image had to be retrieved from its original storage location.</p> <p>It is not populated for other types of transactions.</p> |
| Error Message | If a request fails, this field contains an error message describing the failure. |
| Modality | If applicable, indicates the modality associated with an image request (standard DICOM modality type codes are used). |
| Purpose of Use | Included for HIPAA tracking purposes. |
| Data Source Protocol | <p>The source of the data being handled:</p> <p style="text-align: center;">vistaimaging – Data from a VistA system:</p> |

| Name | Description |
|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | vftp – Data from another VIX |
| Response Code | The response code for a request; generally equivalent to HTTP response codes but, in some cases, they are used for statuses specific to the VIX. Typical values include: 200 – OK (success) 401 – Unauthorized 404 – Not found 409 – Image exists but is not yet available on DoD PACS integrator and/or Imaging jukebox 412 – BSE token expired 415 – Image conversion exception 500 – Internal server error |
| Realm Site Number | The STATION NUMBER (field (#99)) of the INSTITUTION file (#4) of the site that the requester's credentials are authenticated against. |
| URN | Only populated for image transactions. Universal Resource Name; the unique name of the image being requested. |
| Transaction Number | The Globally Unique Identifier (GUID) for an image or metadata transaction. For transactions that originate from Clinical Display or the DoD, the same identifier appears in the Image Access log at the site where the images are stored. |
| VIX Software Version | The software version used by the local VIX. |
| Vista Login Method | The method used to access a Vista system. This is only populated when connecting to Vista and only for the transaction that initiates the connection. Possible values are BSE, CAPRI, or LOCAL. |
| Client Version | The version number of the Clinical Display software. This field is populated only for Clinical Display requests. |
| Data Source Method | Identifies the specific operation performed by the data source. |
| Data Source Version | The version number of the data source. |
| DataSourceResponse Server | The name of the server that responded to the metadata or image request. Only populated for requests directed to a VIX or CVIX. NOTE: This field cannot be populated if the requesting or responding server is a MAG*3.0*83 VIX. |
| VIX Site Number | The site number of the local VIX (as defined in the local VIX's VixConfig.xml file). The site number should match the station number (field #99) defined in the INSTITUTION file (#4). |
| Requesting VIX Site Number | The site number of the requesting VIX (as defined in the remote VIX's VixConfig.xml file), Only populated for Federation (VIX-to- VIX) requests. The site number should match the station number (field #99) defined in the INSTITUTION file (#4). |

3.3.2. VIX Transaction Log Fields (Export Only)

When the transaction log is exported as a tab- or comma-separated file, the exported file includes all of the fields available in the browser view of the log (see previous section). The exported file also includes additional fields that are described in Table 6.

Table 6: VIX Transaction Log Fields (Export Only)

| Name | Description |
|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Facade Bytes Retrieved | The number of bytes returned to the requestor, where the requestor could be Clinical Display, VistARad, another VIX, or the CVIX. |
| Data Source Bytes Returned | The number of bytes returned from the data source, where the data source could be a remote VistA system, a VIX, the CVIX, or a DoD data source such as DAS or DES or ECIA. |
| Machine Name | Name of the VIX server that performed the transaction. |
| Requesting Site | The ID of the site that originated the request; this value is also shown in the Query Type column. |
| Exception Class Name | Internal data used for debugging and support. |
| Time to First Byte | Number of milliseconds elapsed from the point where the VIX opens a connection to a remote site until the remote site begins responding to the request. |
| Responding Site | The ID of the site that filled the request; this value is also shown in the Query Type column. |
| Command ID | Internal ID used for debugging and support. |
| Parent Command ID | Internal ID used for debugging and support. |
| Facade Image Format Sent | The format of the image VIX returns to the requester. |
| Facade Image Quality Sent | The quality of the image VIX returns to the requester; in some cases, this quality is better than the quality requested (as indicated in the "Quality" column). |
| Data Source Image Format Received | The format of the image VIX receives from its source. |
| Data Source Image Quality Received | The quality of the image VIX receives from its source. |
| Debug Information | Internal messaging used for debugging and support. |
| Thread ID | The name of the thread that processed the transaction. |

3.3.3. Log Collector Service

The VIX Log Collector service automatically backs up VIX transaction logs and stores the backup copies on a centralized data center server. This allows the information in VIX transaction logs to be retained after the logs are purged locally (the local retention period is 30 days). The Log Collector service is hosted on the same data center servers where the CVIX resides.

Once a day, the log collector service copies each VIX's local transaction logs to a data server storage area for permanent storage. The time that the backup is performed is configured centrally and is set to be during low-usage hours.

When the Log Collector performs its daily backup, it collects only one full day's worth of VIX transaction log entries to limit network impact. For example: on Monday, the Log Collector service collects all VIX log entries from the previous Saturday.

If the Log Collector cannot reach a VIX on a given day, it queues its backup attempt and attempts to copy any backlogged items during the next backup period. Multiple failed attempts to back up a specific transaction log generates an email warning to data center administrators (email address

entered during the VIX installation), who then would contact the local VIX administrator if local corrective action were needed.

The VIX Log Collector service does not require any site-level or local VIX configuration.

3.4. VIX Data Retention and Purges

The VIX writes only a limited amount of data to VistA; this is described in *Database Information*. The VIX transaction log is stored on the server where the VIX is installed (see Section 3.3 for details); images and associated metadata are stored in the VIX cache.

The VIX runs a daily purge process for locally stored data, as described in Table 7:

Table 7: VIX Daily Purge Process

| Operation | When Performed |
|-------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| Purge Java logs | 1 A.M. daily for Java log entries more than 30 days old. |
| Purge transaction log entries | 2 A.M. daily for transaction log entries more than 30 days old. |
| Purge VIX cache | 3 A.M. daily for images more than 30 days old. Once per minute for old VA metadata, once per hour for old DoD metadata. |

3.5. VIX Startup and Shutdown

The VIX service is designed to be running at all times except during daily automatic scheduled restarts. The daily restarts occur at 4:00 AM by default, but this time can be modified as desired. When the VIX is implemented on the same cluster used for Imaging resources, the VIX is a part of the same resource group used to manage image storage and is not intended to be shut down or restarted independently from the rest of the resource group.

In general, the only time the VIX service needs to be shut down independently from the hosting server is when the VIX software is being updated. For details, including user impact, refer to the [VIX Installation Guide](#).

Table 8 summarizes how the VIX service responds if there is a restart of the server on which the VIX is installed or an interruption of the VIX's connection to the local VistA System.

Table 8: VIX Service Response to Restart or Interruption

| Scenario | VIX Service Behavior |
|-------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Unplanned server shutdown (or failover) | If the VIX is installed on a standalone server, the VIX service restarts itself after the server is restarted. |
| Planned server shutdown (maintenance, Microsoft software updates, etc.) | The VIX service does not need to be stopped; the VIX service restarts automatically once the server is restarted. |
| VIX service fatal error (server unaffected) | On a standalone server, the VIX service restarts itself automatically after 60 seconds and continues restarting itself if it encounters additional errors. |
| Local VistA system restart and/or restore | In the event of a local VistA system restart, the VIX automatically refreshes any previously cached connections within 30 seconds to one minute. |

| |
|-------------------------------------------------------------------------------------------------------------------------|
| VIX operations are unaffected in a Vista system database restore; the VIX stores no configuration information on Vista. |
|-------------------------------------------------------------------------------------------------------------------------|

3.6. Monitoring/Maintaining the VIX

In typical usage scenarios, the VIX service needs only minimal monitoring and maintenance.

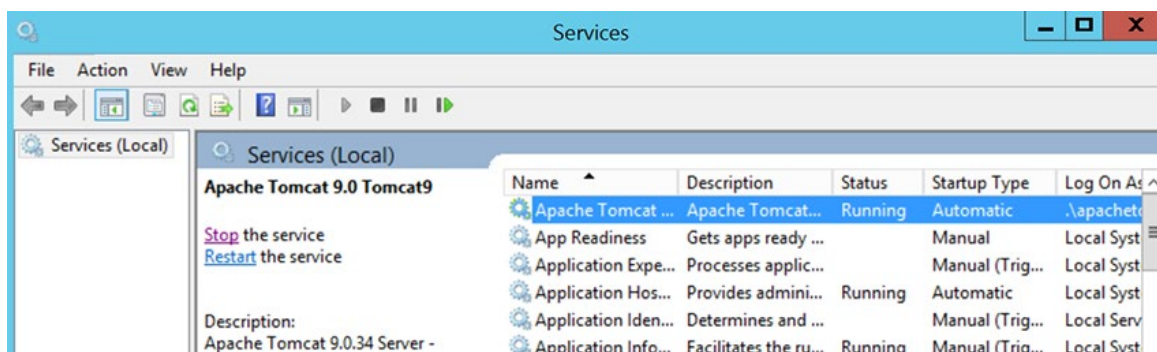
- Once a day, access the transaction log to verify that the VIX is running and that the VIX communication ports (**REDACTED**, **REDACTED**, and **REDACTED**) are not blocked. If necessary, you can also verify the state of the VIX service directly as described below.
- Once a week, check available space on the drive used for the VIX cache. In a newly implemented VIX, the VIX cache size increases rapidly for the first 30 days, and then should level off as the VIX begins to purge older images.
- Optionally, you can get a sense of the VIX processing load by using the Windows Task Manager to determine the CPU cycles being consumed by the Apache Tomcat task.

As described in the previous section, the VIX service restarts automatically if the hosting server is restarted.

3.6.1. Checking the VIX Service: 2012 R2 or 2016 Standalone Server

1. On the server where the VIX is installed, log in as a local administrator.
2. Open the Services window (click **Start** | **All Programs** | **Administrative Tools** | **Services**) shown below.
3. On the right side of the window, locate the Apache Tomcat service and verify that its status is **Running** (Figure 8).

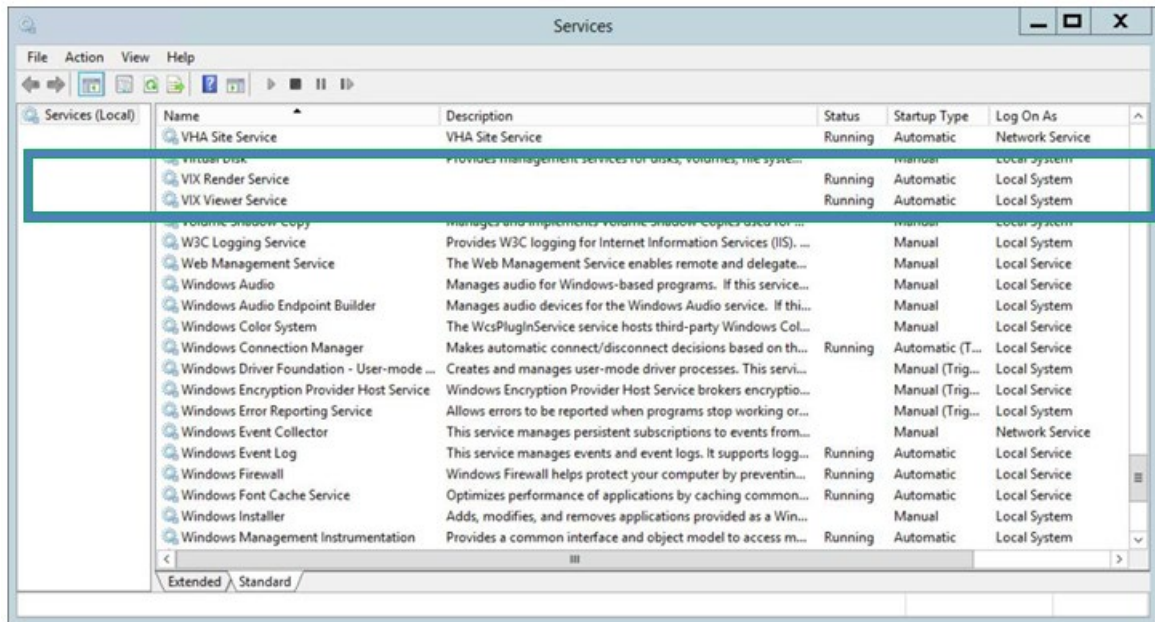
Figure 8: Check Apache Tomcat Service



3.7. Monitoring/Maintaining the VIX Viewer

The VIX Viewer hosts two independent services. These services show up as the VIX Viewer Service and the VIX Render Service (Figure 9).

Figure 9: VIX Viewer and Render Services



The Viewer and Render services must be operational for the site VIX to be able to provide viewing. To verify operation, one has to log into the consuming applications, select a patient with images, and display the images. If the operation fails, proceed to the *Troubleshooting* section.

3.7.1. Troubleshooting the VIX Viewer

The operation of the VIX Viewer depends on the presence and correct operation of a number of resources.

- The Apache Tomcat service must be operational, and the VIX services must be operational.
- The Microsoft SQL Express instance must be up and operational.
- There should be sufficient disk space available for the VIX and Render caches.
- The VIX Viewer and Render Services must be running and operational.

To verify that the VIX is operational, proceed to the normal troubleshooting of VIX services.

To verify that Microsoft SQL Express instance is operational, review the Render Service logs located in:

`<System Drive>\Program Files\Vista\Imaging\VIX.Render.Service\log`

Look for any errors related to access to the SQL server. In case the SQL server is failing, follow the steps outlined in Fixing the VIX Viewer Cache Errors.

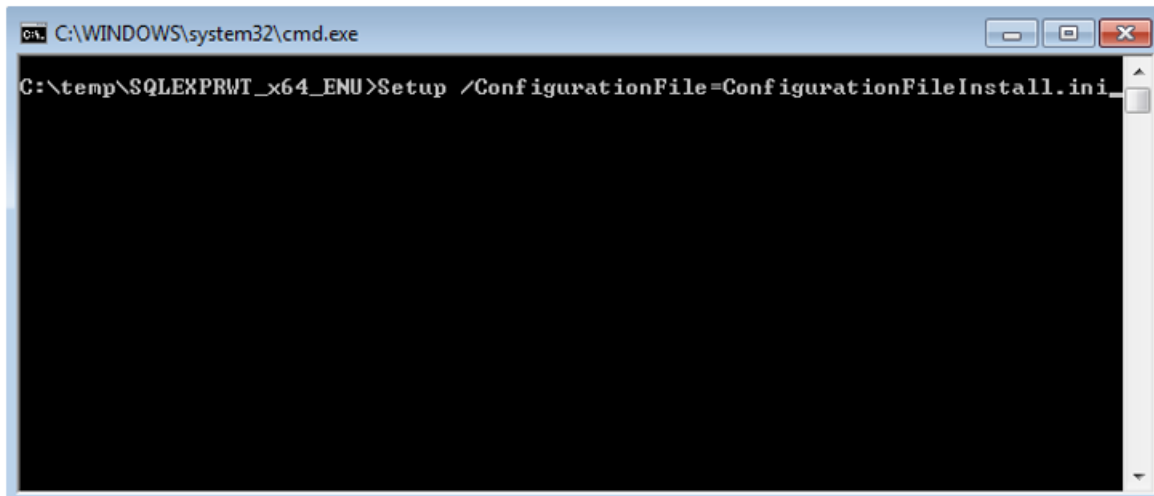
3.7.1.1. Fixing the VIX Viewer Cache Errors

1. Stop the VIX Viewer and VIX Render Services
2. Delete all the files in the Viewer cache located in

<Cache Drive>:\VIXRenderCache

3. Install and configure SQL Express
 - a. Copy the SQL Express installation (SQLEXPRESS_x64-14_0_1000_169.zip) to a local folder on the server.
 - b. Extract all the files.
 - c. Launch a command prompt window as a local Administrator.
 - d. In the command prompt window, navigate to the directory used for extracted files.
 - e. Run the following command:
Setup/ConfigurationFile=ConfigurationFileInstall.ini (Figure 10).

Figure 10: Setup/ConfigurationFile



4. Review the console window and ensure no errors were reported.
5. Restart the VIX Viewer and Render Services.
6. Verify viewer operations by opening a few studies.

3.7.1.2. Analyzing VIX Viewer Logs

The VIX Viewer keeps logs in <System Drive>:\Program Files\Vista\Imaging\VIX.Viewer.Service\log and <System Drive>:\Program Files\Vista\Imaging\VIX.Render.Service\log.

Review the logs for errors and other information you seek.

Modify the log level according to the instructions in the *Service Logging* section.

3.8. The VIX and Backups

The VIX itself does not need to be explicitly backed up.

- The VIX transaction logs are automatically backed up offsite.
- The VIX cache is transitory and does not need to be backed up.

- VIX-specific configuration settings can be recovered by reinstalling the VIX software.

NOTE: The Laurel Bridge DCF toolkit that the VIX uses has a unique product serial number that should be stored in a safe place in case the VIX needs to be reinstalled. For details about where and how this serial number is used, see the VIX Installation Guide. If you need to recover this serial number and there is no local record, you can contact the **REDACTED** mail group.

4. VIX Image Sharing

This chapter describes the VIX operations that are specific to image sharing. Specifically, this chapter covers:

- *Remote Metadata Retrieval*
- *Remote Image Retrieval*
- *Caching of Metadata and Images*
- *Image Sharing-related Logging*
- *Image Sharing and VIX Timeouts*
- *Troubleshooting*

4.1. Remote Metadata Retrieval

When a VIX is used to retrieve remote images, the image retrieval is always preceded by retrieving applicable metadata¹. Also, in some cases, such as retrieving an exam report, metadata retrieval is the only action needed to fulfill a clinician's data request.

Many Clinical Display or VistARad operations silently trigger requests to the VIX to retrieve metadata from remote sites. In general, the VIX handles metadata retrievals as follows:

1. The application (Clinical Display or VistARad) issues a request for metadata based on a clinician's activities.
2. The local VIX determines whether caching is allowed for the specific request. For details about which requests are cached, see the tables in the next two sections.
3. If caching is not allowed, the VIX skips all cache checks, retrieves the metadata directly from the remote site, and proceeds to step 5.
4. If caching is allowed, the VIX first attempts to retrieve the desired metadata from its local cache. If the metadata cannot be found locally, it is retrieved from the remote site (Table 9).

Table 9: Remote Metadata Retrieval for Different Remote Site Types

| Remote site type | How remote metadata is retrieved |
|------------------|--------------------------------------------------------------------------------------------------------------|
| VA site with VIX | The remote VIX retrieves the metadata, either from the remote VIX's cache or the remote site's VistA system. |
| VA site; no VIX | The local VIX retrieves the metadata directly from the remote VistA Imaging system. |
| DoD (via CVIX) | The CVIX retrieves the metadata either from its own cache or from the applicable DoD system. |

¹ In the context of the VIX, metadata is anything that describes an image or image-like object. Metadata includes patient names, IDs of various types, procedure names, index field values, number of images in an exam, radiology reports, and so on.

5. The local VIX passes the data back to the requesting application.

4.1.1. Metadata Requests from Clinical Display

Table 10 summarizes the metadata requests that Clinical Display can issue to a VIX. The request names used in the table are reflected in the Query Type field of the VIX transaction log.

Table 10: Clinical Display Metadata Requests Summary

| Clinical Display Metadata Request | Data Returned | VIX caching allowed? |
|-----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| getImageDev Fields | Populates data in the Image Information Advanced window when Field Values is used to look up IMAGE file (#2005) values for a remote image. | No |
| getImage Information | Populates data in the Image Information window. | No |
| getImageSystem GlobalNode | Populates data in the Image Information Advanced window when ^MAG(2005 is used to display the global for a remote image. | No |
| getPatientShallow StudyList | Provides the study metadata used in remote site buttons, the Image List, and Abstracts windows. NOTE: For this request, the local VIX always gets new data from remote VistA system and always locally caches the data it retrieves. This is done, so the data is readily available for getStudyImageList requests that use the same data. | Yes, see note |
| getStudyImageList | Provides the study metadata needed to populate the Group Abstracts window. | Yes |
| getStudyReport | Retrieves a report for a remote exam. | Yes |
| pingServerEvent | Indicates whether a remote site is available. | n/a |
| postImageAccess Event | Sends a message to a VA site IMAGE ACCESS LOG file (#2006.95) when a VA image is viewed, copied, or printed. | n/a |

4.1.2. Metadata Requests from VistARad

Table 11 summarizes the metadata requests that VistARad can issue to a VIX. The request names used in the table are reflected in the Query Type field of the VIX transaction log.

Table 11: VistARad Metadata Requests Summary

| VistARad Metadata Request | Data Returned | VIX caching allowed? |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| getActiveWorklist | Populates remote worklists accessed using the VistARad Monitored Sites exam list tab. | No |
| getExamDetails | Retrieves additional exam metadata when a local VistARad user opens a remote exam. NOTE: In some cases this request can be partially filled using data previously cached to fill a recent getSiteExamList request. If this is the case, the VIX uses whatever cached | Yes, see note |

| VistARad Metadata Request | Data Returned | VIX caching allowed? |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| | data is available and pulls the rest of the data from the remote site. | |
| getExamSiteMetadataCachedStatus | Checks to see if a list of exams for a remote patient is already on the local VIX cache. | n/a |
| getReport | Retrieves a report for a remote exam. | Yes |
| getRequisition | Retrieves a requisition for a remote exam. | Yes |
| getSiteExamList | Retrieves a list of exams for a specific patient from a remote site. NOTE: Whenever this request is made, the VIX automatically issues an asynchronous getExamDetails request. | Yes, see note |
| pingServer | Indicates if a remote site is available. | n/a |
| postImageAccess | Sends a message to a VA site IMAGE ACCESS LOG file (#2006.95) when a VA image is viewed, copied, or printed. | n/a |

4.2. Metadata Requests from the Zero-Footprint Image Viewer

Table 12 summarizes the metadata requests that the Zero-Footprint Image Viewer can issue to a VIX.

Table 12: Zero-Footprint Image Viewer Metadata Requests Summary

| New Image Viewer Metadata Request | Data Returned | VIX caching allowed? |
|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| /vix/viewer/studyquery | The basic metadata of the studies. | Yes |
| detailsUrl | Detailed metadata about the study. | Yes |
| thumbnailUrl | Thumbnail image that could be used to represent the study. | Yes |
| manageUrl | A web page that displays image thumbnails, imaging data etc. You can delete images or manage controlled images using this web page. | Yes |
| viewerUrl | A web page containing the image viewer. | Yes |
| /vix/viewer/ping | Check if the service is running. | Yes |

4.3. Remote Image Retrieval

When a clinician selects a remote VA or DoD image for display, the VIX uses complex processing to deliver the most desirable image in the shortest amount of time.

The following steps summarize this process.

1. The clinician initiates the display of a remote VA or DoD image.

2. The application (Clinical Display or VistARad) issues a request for the image to the local VIX. The contents of this request (which was provided by the VIX in an earlier metadata retrieval) includes the following:
 - The image identifier
 - The desired image quality (see *Image Quality and VIX Compression*)
 - A list of acceptable image formats (see *Image Types vs. Image Formats*)
3. The local VIX first checks its local cache for the image. If the VIX finds the image in its cache and if the image is of the desired quality and is in any of the acceptable formats, the local VIX stops the search and proceeds to step 6.
4. If the image is not stored on the local VIX's cache, the VIX queries the remote site for the image (Table 13).

Table 13: Remote Image Retrieval for Different Remote Site Types

| Remote Site Type | How Remote Image is Retrieved |
|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VA site with VIX | The remote VIX retrieves the image, either from the remote VIX's cache or from the remote site's VistA system. The remote VIX may convert or compress the image (based on the quality specified in the request) to increase the speed of WAN transfers. |
| VA site; no VIX | The local VIX retrieves the image directly from the remote VistA Imaging system. |
| DoD (via CVIX) | The CVIX retrieves the image, either from its own cache or from the applicable DoD system. The CVIX may convert or compress the image (based on the quality specified in the request) to reduce retrieval times. |

5. If needed, the local VIX decompresses or converts the image into one of the acceptable image formats.
6. The local VIX passes the image to the requesting application.

4.3.1. Image Quality and VIX Compression

The combination of the requested image quality and whether there is a remote VIX involved can affect how a VIX fills a request for a remote image.

Table 14 summarizes these processing differences. For simplicity's sake, this table presumes that the request originates locally, that the requester is a VA clinician, and that an image of the requested quality is *not* already in either the local or remote VIX cache (in which case some or all of the processing would be skipped).

Table 14: VIX Compression Logic for Request Type

| Parameter | Requested by | VIX Compression Logic ² |
|-------------------------|------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DIAGNOSTIC | Clinical Display Radiology Viewer and VistARad, VIX Viewer | If a remote VIX is present, the remote VIX locates the highest-resolution image available and automatically converts the image into a lossless compressed format before sending the image across the WAN to the local VIX. For radiology images, lossless DICOM encapsulated JPEG 2000 is the most frequently used format with a compression ratio of about 2.5:1. If there is no remote VIX, the local VIX locates the highest-resolution image available at the remote site and pulls the image across the WAN in the image's native (uncompressed) format. |
| DIAGNOSTIC UNCOMPRESSED | Clinical Display Full Resolution Viewer, VIX Viewer | If a remote VIX is present, it automatically packages the images as a ZIP file before transferring them across the WAN. If there is no remote VIX, the local VIX locates the highest-resolution image available at the remote site and pulls the image across the WAN in the image's native (uncompressed) format. |
| REFERENCE | Clinical Display Radiology Viewer only, VIX Viewer | If a remote VIX is present, it generates a new reference-quality copy of the image using the highest resolution source image available. Then the remote VIX sends the reference quality image across the WAN to the local VIX. <ul style="list-style-type: none"> • The new image is as good as, if not better than, any pre-existing reference quality image(s) stored on the remote VistA system. • The compression ratio achieved averages about 24:1 for CR images and 10:1 for CT and MR images. If there is no remote VIX, the local VIX checks the remote VistA system for a downsampled image. <ul style="list-style-type: none"> • If a downsampled image is present (as is usually the case for CR or DR images), that image is retrieved across the WAN. • If a downsampled image is not present (as may be the case for CT and MR images), the local VIX pulls the full resolution image from the remote site across the WAN. The local VIX then converts the image to one of the formats specified in the image request. |
| THUMBNAIL | Clinical Display, VIX Viewer | The presence or absence of a remote VIX does not impact how thumbnail images are handled. |

4.3.2. Image Types vs. Image Formats

When a local VA clinician requests a remote image from the VIX, an earlier metadata retrieval has already established the formats that the desired image can be delivered in.

Table 15 lists possible formats that the VIX can return based on image type. When multiple formats are listed, the VIX checks each potential storage location (VIX local cache, VIX remote

² If the requested image originates from the DoD, the CVIX performs the same operations that a remote VIX would perform.

cache [if present], remote VistA system) for an instance of the image in any of the possible formats before proceeding to the next more remote storage location. If the image has to ultimately be retrieved from the remote site, and if it is not in one of the possible formats, the VIX Viewer converts the image to one of the possible formats below before returning it to the requesting application.

Table 15: Image Formats VIX can Return Based on Image Type

| Image Type (from #2005.021) | Image Description (from #2005.021) | Possible formats returned by VIX |
|-----------------------------|-------------------------------------------------------------|----------------------------------|
| 1 | JPEG | JPEG, TIFF, bitmap |
| 3* | XRAY (TGA) (intended for Clinical Display Radiology Viewer) | DICOMJ2K, J2K, DICOM, TGA |
| 3** | XRAY (TGA) (intended for VistARad) | DICOM, TGA |
| 9 | Black and White image | JPEG, TIFF, bitmap |
| 17 | Color Scan | JPEG, TIFF, bitmap |
| 18 | Patient Photo | JPEG, TIFF, bitmap |
| 19 | XRAY_JPEG | JPEG, TIFF, bitmap |
| 15 | TIFF | JPEG, TIFF, bitmap |
| 21 | Motion Video (AVI, MPG) | AVI |
| 100* | DICOM (intended for Clinical Display Radiology Viewer) | DICOMJ2K, J2K, DICOM, TGA |
| 100** | DICOM (intended for VistARad) | DICOM, TGA |
| 101 | HTML | HTML |
| 102 | Word | DOC |
| 103 | ASCII Text | TEXT_PLAIN |
| 104 | PDF | PDF |
| 105 | RTF | RTF |
| 103 | Audio (WAV, MP3) | WAV, MP3 |

* The local VIX always attempts to convert the requested image to DICOM J2K if the header data is available.

** The local VIX always attempts to convert the requested image to DICOM if the header data is available.

4.4. Caching of Metadata and Images

The VIX automatically stores all images, and most of the metadata it handles as a part of image sharing in its own local cache. The VIX cache is self-managing and is independent of other Imaging storage areas and caches.

The VIX cache improves the VIX performance by storing data (especially images) retrieved from remote sites and/or processed by the VIX. If the image is requested again, it can be pulled from the local cache of the VIX without having to retrieve it from the remote site or reprocess it.

At multidivisional sites where there can be more than one VIX, the VIX that handles the data is the only VIX that caches the data (if applicable).

NOTE: Metadata and images cached by the VIX are considered transitory copies and are not a part of the patient record. The site from which the data originates is the official custodian of the data, not the VIX.

4.4.1. Cache Retention Periods

The VIX purges data from its cache when the retention period for the data is reached. The images are considered static data, allowing relatively long cache retention while retaining data consistency. Metadata, which is less static, is retained for shorter periods.

Table 16 lists retention periods based on the source and type of data.

Table 16: Retention Periods by Data Type

| Data type | Retained for | Scan to delete old items is run |
|-------------------|--------------|---------------------------------|
| VA and DoD images | 30 days | Once per day at 3 AM |
| VA metadata | 1 hour | Once per minute |
| DoD metadata | 1 day | Once per hour |

4.4.2. Cache Location

The cache is located in the /VixCache folder on a local drive (when the VIX is installed on a dedicated standalone server).

NOTE: Never manually change the contents of the Vix Cache folder and subfolders using Windows Explorer while the VIX is running.

NOTE: If you need to change the location of the VIX cache, you must re-run the VIX installation wizard to update your VIX's configuration information. For details, see the VIX Installation Guide.

4.5. Using the VIX Cache Manager

A VIX Cache Manager function allows users to browse the VIX cache, identify corrupt data, and delete data as required. The cache browser is accessed using Chrome or Edge.

To access the VIX Cache Manager, go to <https://<FQDN>REDACTED/VixCache> (where <FQDN> is the fully qualified domain name of the individual host).

NOTE: The URL to the VIX Cache Manager is case sensitive.

4.5.1. Cache Organization

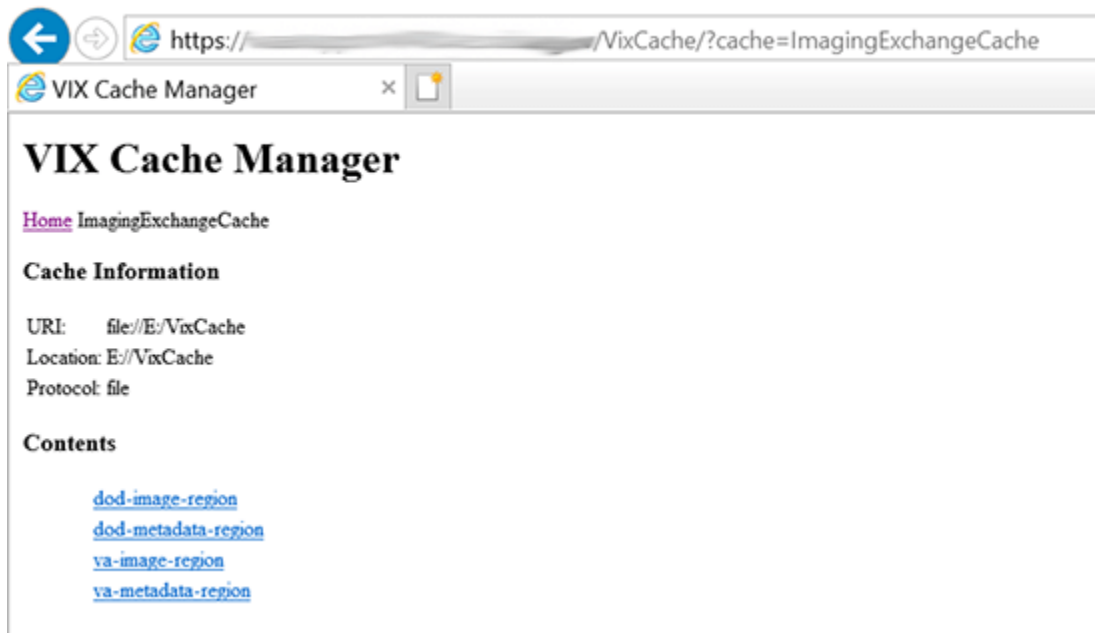
The data in the cache is arranged in a hierarchy with one or more of the following levels;

- data source (VA or DoD) and type (artifact, metadata, or image)

- repository (VA site or DoD facility)
- patient identifier (ICN for VA patients)
- study (group) identifier
- series and instance identifiers

The source and type of data are the most important factor in determining where an item is cached. When the VIX Cache Manager is opened in a browser, the following screen displays (Figure 11).

Figure 11: VIX Cache Manager



The items immediately under the cache name are called "regions" of the cache. Regions divide the items in the cache by the source of the item (VA versus anywhere else) and the type of the item (image versus anything else). A region defines the conditions under which a cache item is deleted from the cache.

Historically, it has been the case that anything that is not from the VA is from the DoD, and anything that is not an image is metadata. Thus, a radiology image from the DoD can be found in the "dod-image-region" while the study text data from a VA site can be found in the "va-metadata-region".

4.5.1.1. Technical Specifics

The cache does not understand anything about sites, patients, or studies but operates on the concept of regions, groups, and instances. Regions are collections of similar items with the same lifespan in the cache (i.e., 30 days since last use). Groups are collections of groups and instances. Instances are the cache items proper. Groups are what is called a recursive data structure. A group can contain other groups, which in turn can contain still more groups. The cache limits that hierarchy to specific levels grouped by well-known business concepts (site,

patient, etc.). Groups are also the basis that the cache deletes items. If no item in a group has been accessed within the region's lifespan, then the entire group is deleted from the cache. If you think of the images in a study, then this makes more sense. If a study has not been accessed for 30 days, then the entire study is deleted from the cache. If none of the studies for a patient have been accessed within 30 days, the whole patient is deleted from the cache.

Click the "va-image-region" region link, and a list of cache groups displays (Figure 12).

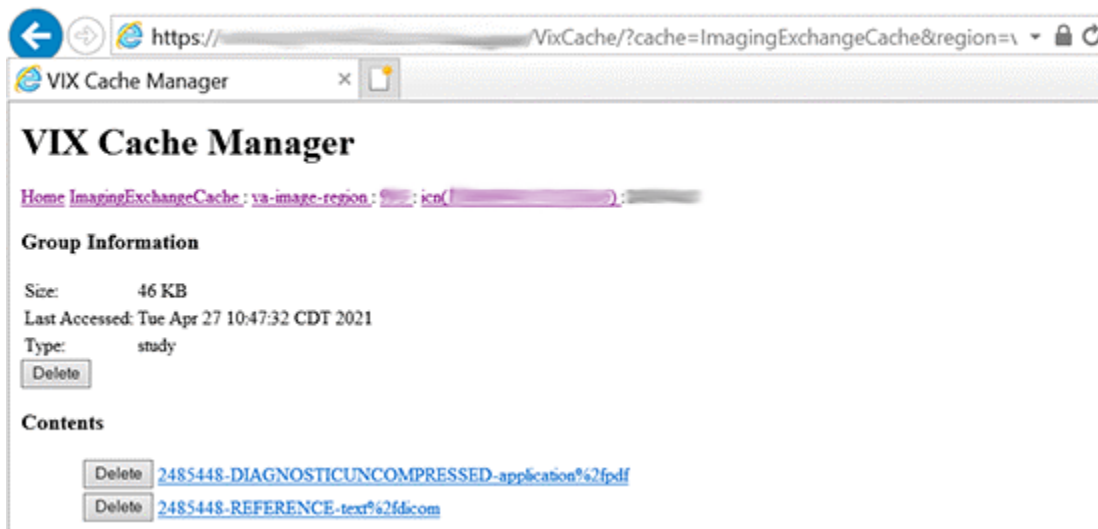
Figure 12: VIX Cache Manager va-image-region



VIX Cache Manager displays the name of the region in the breadcrumb at the top of the page, and a list of the image repositories in this region. To drill down into an image repository, click on the image repository number. To delete an entire image repository, click on the **Delete** button to the left.

You can drill down through the VIX cache using the links in the VIX Cache Manager. The levels of the cache—region, repository, patient, study, and image—appear as hyperlinks in the breadcrumb at the top of the page. To delete an item in the cache at any level, click on the **Delete** button to the left (Figure 13).

Figure 13: VIX Cache Manager Delete Button



4.5.1.2. The DoD Regions

DoD regions are organized by the community operation order identification (OID) number followed by the repository, the patient, and then group identifiers of various sorts. The community OID is an identifier that an enterprise uses to identify itself on the Nationwide Health Information Network (NwHIN). For our purposes, the OIDs that you need are shown in Table 17.

Table 17: OIDs Needed

| OID | Enterprise |
|----------------------------------------------------|---------------|
| 2.16.840.1.113883.3.42.10012.100001.207 | DoD Radiology |
| 2.16.840.1.113883.3.42.10012.100001.206 | DoD Documents |
| 2.16.840.1.113883.3.166 2.16.840.1.113883.6.233 | VA Documents |
| 1.3.6.1.4.1.3768 | VA Radiology |

Below the enterprise OID is a repository (a site in VA parlance). At this time, DoD documents always come from the DES server. Likewise, DoD radiology comes from ECIA, identified as "200".

The DoD metadata region is only used for radiology study text data.

4.5.1.3. Cache Item Information

Clicking a cache item link retrieves information about the item, such as the last time it was accessed and the size. This information may be useful in locating a specific item.

The size of a cache instance is the size of the file on disk (including its descendants); the size of a cache group is the sum of all of the groups and instances within it. The checksum, available only for cache instances, results from a mathematical calculation applied to the entire content of the instance. The checksum is used within the VIX to detect data errors. For an instance with the same identifiers, this value should always be the same on all VIX and CVIX.

4.5.1.4. Cache Delete

Usually, the cache is self-managing, determining the cached items that have not been used recently and deleting them. On rare occasions, a corrupt item might be cached. In this case, that corrupt data repeatedly processes on request. Repeated requests are treated as user access and extend the time that the data stays in the cache. This cache item must be deleted from the cache manually.

To delete a cache item, collect as much identifying information as you can. At a minimum, this must include whether the source is the VA or the DoD and, if it is a VA item, whether the image or a study (metadata) is causing problems and the site the data originated from. In addition, the patient identifier must be known.

Once that information is collected, open the VIX Cache Manager and navigate through the hierarchy to either the corrupt item or to one of its parent groups (patient ID or study) if the item itself cannot be identified. Click on the **Delete** button to the left of the item and then confirm that you want the item deleted. The cache does not immediately delete the item since it has to synchronize operations from all clients. It might take a few seconds or up to a minute before the item deletes. Usually, though, the VIX Viewer responds immediately that the item was deleted, and the item disappears from the VIX Cache Manager.

Finally, it is worth reinforcing that when an item is deleted from the cache it is not deleted from the original source of the data. If the VIX is asked for that item again, it simply notices that it is not in its cache, retrieves it from the original data source, and re-caches it. The effect to the user is a slight delay, nothing more.

The minimal negative effect of deleting a cache item might lead someone to delete "good" cache items to get all of the "bad" ones. This is not an issue since the VIX simply re-caches the items when requested again.

4.6. Image Sharing-related Logging

In addition to the VIX transaction log, VIX-supported image sharing is logged on VistA and temporarily logged by Clinical Display.

4.6.1. Logging on VistA

The IMAGE ACCESS LOG file (#2006.95) uses specific values in the ACCESS TYPE field (#1) and the ADDITIONAL DATA field (#100) to indicate when a VIX was involved in an image access.

4.6.1.1. VIX-related Access Type Values

If the ACCESS TYPE field (#1) in an IMAGE ACCESS LOG file (#2006.95) entry contains one of the values in Table 18, the VIX accessed the image on behalf of a remote requester.

NOTE that only the values unique to the VIX are described. For information about other entries in the IMAGE ACCESS LOG file (#2006.95), refer to the file's data dictionary (Table 18).

Table 18: Access Type Values

| Access Type Value | Description |
|-------------------|-----------------------------------------------------------------------------------|
| RVVAVA | A locally stored image that a remote VA Clinical Display user accesses via a VIX. |

| | |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | NOTE: This value can be present even if there is no local VIX (i.e., the image was accessed via a remote VIX). |
| VR-RVVAVA | A locally stored image that a remote VA VistARad user accesses via a VIX. NOTE: This value can be present even if there is no local VIX (i.e., the image was accessed via a remote VIX). NOTE: A similar value, VR-RVVAVA/REM, indicates a remote VistARad access <i>without</i> a VIX. |
| RVVADOD | A locally stored image that a DoD clinician requests via the VIX (or CVIX if a local VIX is not present). NOTE: In this scenario, the VIX (or CVIX) reports all <i>requests</i> . Because the requested image is ultimately passed to DoD systems, the VIX (or CVIX) cannot report if the requested image was accessed or not. |
| RVDODVA | A remotely stored DoD image that a local VA Clinical Display user accesses via the VIX. NOTE: The VIX logs this activity at the requesting site rather than at the site where the image is stored because the DoD storage site is unknown to the VIX. NOTE: Access to remotely stored DoD images is not logged in #2006.95 if the access is made using VistARad. However, these accesses are recorded in the VIX transaction log. |

4.6.1.2. VIX-Related Additional Data Values

The VIX also populates the Additional Data field (#100) based on data provided by the requesting application (Table 19). Because the VIX adds a lot of information to this single free-text field, the VIX uses the vertical bar "|" character to organize the Additional Data field into four parts. Note that these parts exist for organizational purposes only and are not considered discrete pieces in the FileMan sense.

Table 19: Additional Data Fields for Access Type

| If Access Type is... | Part 1 | Part 2 | Part 3 | Part 4 |
|----------------------|--------------------|--------------------|-----------------------|------------------------------------------|
| RVVAVA | empty | VIX transaction ID | Requesting VA site ID | empty |
| RVVADOD | empty | VIX transaction ID | Requesting VA site ID | Username of the requesting DoD clinician |
| RVDODVA | DoD image ID | VIX transaction ID | local VA site ID | empty |
| VR-RVVAVA | VIX transaction ID | VIX transaction ID | VIX transaction ID | VIX transaction ID |

4.6.1.3. Example – RVVAVA Access Type

```

^MAG(2006.95,16401,0)=16401^RVVAVA^126^51^DOD^ROU^3090216.081305^1023^1^4892
^688
^MAG(2006.95,16401,100)=|246a2052-70b1-4ed7-af55-bea35b1|688|
    
```

4.6.1.4. Example – RVVADOD Access Type

```
^MAG (2006.95,610535,0)=610535^RVVADOD^1376^8820^DOD^XXX^3100302.0
94747^ 1023^1^6557^660
```

```
^MAG (2006.95,610535,100)=|5aafabc4-2361-4a34-b843-
5aad4163620c XX.XXX.MIL/HP0000-PZ01|DoDUsername
```

4.6.1.5. Example – RVDODVA Access Type

```
^MAG (2006.95,610566,0)=610566^RVDODVA^126^Wrrks^ROU^3100302.134155^1023^1
^6561^ 660
```

```
^MAG (2006.95,610566,100)=urn:bhieimage:rp02_0108_rp01-e403e3c3-bdc2-
4494-b816- 3757b435ec0b|{EEEF890A-4C66-4F8C-8121-2CD1FE8F9B80}|660|
```

4.6.1.6. Example – VR-RVVAVA Access Type


```
^MAG (2006.95,720029,0)=720029^VR-
RVVAVA^126^506^VRAD:3.0.90.6^ROU^
3100405.161144^1011^1^8478^660
```

```
^MAG (2006.95,720029,100)={71247e80-f250-42c3-b8ea-9156b6d03a28}
```

4.6.2. Additional Client Logging

4.6.2.1. Clinical Display Message History Log

The Message History log on a Clinical Display workstation can also be used to check/troubleshoot VIX activities.

- To access this log, click  located in the lower-left corner of the main Clinical Display window.
- The "transid" in the Message History log can be traced to specific transactions in the VIX transaction log. See *VIX Transaction Log Fields* for details.
- Specific details (such as Internal Entry Numbers (IENs) and image paths) are shown only if the active user holds the MAG SYSTEM key.
- The Message History Log is session-specific and is cleared when Clinical Display is exited.

4.6.2.2. VistARad Logging of VIX Operations

Refer to VistARad documentation for details.

4.7. Image Sharing and VIX Timeouts

When a local VIX retrieves metadata and images from remote sites, the system load at the remote site and WAN network traffic impacts the time needed to complete the retrieval. If a request for data cannot be completed in a timely manner, the local VIX cancels its request. This prevents excessive delays in client applications (Clinical Display and VistARad) that use the VIX.

Table 20 summarizes VIX connection timeout parameters based on the type of remote system and data involved.

Table 20: VIX Connection Timeout based on Remote System Type

| Remote System Type | Local VIX Timeout if No Response |
|---------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VA data via a remote VIX | For metadata, 600 seconds for data transfer to begin (this is to handle very large datasets; usually, data transfer begins in a few seconds). For images, wait up to 30 seconds for initial connection and up to 120 seconds for data transfer to begin. |
| VA data from a remote non-VIX VA site | For metadata, no timeout. For images, N/A because the local VIX only starts the operation if it can connect to the remote site and can verify that the remote image is present. |
| DoD data via the CVIX | For metadata, the CVIX waits up to 45 seconds to retrieve DoD metadata before sending a timeout message to the local VIX. For images, the CVIX waits up to 30 seconds for the initial connection with the DoD image source, and up to 120 seconds for the image transfer to begin. If the CVIX is able to retrieve data from some DoD sources but not all of them, the CVIX passes a partial response message to the local VIX. NOTE: For some patients, especially polytrauma cases, the source of DoD DICOM data needs more than 45 seconds to process the request. If this happens at the CVIX, the local VIX sends a "Try Again" message to the local requesting application (such as Clinical Display or VistARad). In most cases, the requested data is available within a minute or so, and a subsequent request is successful. NOTE: Because the CVIX can retrieve DoD data from multiple sources, there may be cases where one DoD data source responds, but another does not. If this happens at the CVIX, the local VIX sends a partial message to the local requesting application. |

4.8. Troubleshooting

Table 21 may help diagnose potential VIX-related image sharing problems.

Table 21: Troubleshooting VIX-related Image Sharing Problems by Symptoms

| Symptom | Check |
|-----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VIX transaction log not accessible | On the server where the VIX is installed, make sure that the VIX is running and that ports REDACTED, REDACTED, and REDACTED are not blocked by antivirus firewalls or by an ACL (access control list) update. Also, make sure the VIX service is running as described in <i>Monitoring/Maintaining the VIX</i> . |
| Clinical Display cannot connect to any remote sites | Make sure the local VIX is running and that required ports are open as described above (if you can access the VIX transaction log, the VIX is running). Determine if the issue is specific to one Clinical Display workstation or if it affects all workstations. On an affected Clinical Display workstation, disconnect from and reconnect to all remote sites. If that does not work, restart the Clinical Display software. (If the VIX is the source of the issue, restarting Clinical Display makes Clinical Display use pre-VIX remote image views that are independent of a VIX. However, pre-VIX remote image views cannot be used to access DoD |

| Symptom | Check |
|----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | images, and in some cases, they have poorer performance than VIX-supported remote image views.) |
| VistARad cannot connect to any remote sites | <p>Make sure the local VIX is running and that required ports are open as described above (if you can access the VIX transaction log, the VIX is running).</p> <p>Determine if the issue is specific to one VistARad workstation or if it affects all workstations.</p> <p>On an affected VistARad workstation, go to View Settings VIX Configuration and verify that the settings on the tab are correct. See the VistARad documentation for details.</p> |
| Retrieval times increase significantly relative to previous retrievals | <p>If the problem is specific to one remote site, there may be an issue with the remote site's VIX. Image retrievals continue at reduced performance until the remote VIX is up and running.</p> <p>If the problem is specific to Clinical Display, check to see if Clinical Display is using pre-VIX remote image views. If this is the case, restart Clinical Display to verify that it uses the VIX for subsequent image retrievals.</p> <p>If the problem is specific to VistARad, refer to VistARad documentation for details.</p> <p>In rare cases, the local VIX cache may become full. (If the VIX cache is full, the VIX continues to retrieve images but bypasses its cache. If the VIX cache is full, contact customer support.</p> <p>If the problem affects all remote sites and the potential issues above have been eliminated, WAN congestion may be the issue.</p> |
| A specific VA remote site is disconnected (but other remote sites are available) | <p>Determine if the problem affects multiple patients or if it occurs only for a specific patient.</p> <p>If the problem is specific to a single patient, the most likely cause is a problem with the metadata being retrieved from the remote site.</p> <p>If the problem affects all patients, the issue is most likely connectivity with the remote site.</p> <p>In both cases, contact the remote site (if possible) or customer support.</p> |
| Some, but not all remote images from VA sites are inaccessible | <p>Try to determine if the problem is specific to certain sites, patients, or image types; then contact customer support.</p> <p>If the problem is specific to remote radiology images, try to view those images using both VistARad and the Clinical Display Radiology Viewer; then report the results to customer support.</p> |
| ID mismatch icon or Questionable Integrity warning for remote images | <p>If the metadata of a remote image does not correlate with local identifiers, the VIX still retrieves the image and stores it in the VIX cache, but Clinical Display or VistARad might block the display of an image. If possible, contact the remote site's Imaging Coordinator, or contact customer support.</p> |
| DoD remote site button in Clinical Display shows "Try Again" label | <p>This can occur if the source of DoD DICOM images cannot respond to a metadata request via the CVIX within 30 seconds. This is especially likely to happen if the patient in question is a polytrauma patient with a large number of studies.</p> <p>In most cases, the originating system can finish processing the request in a minute or so. Clicking the DoD button again renews the request, and the VIX retrieves the data if it is available.</p> |

| Symptom | Check |
|--------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DoD remote site button in Clinical Display shows "Partial" label | <p>This can occur if one or more DoD data sources cannot respond to a request for metadata in a timely manner. If this occurs, the CVIX sends all available metadata back to the local VIX and uses the "partial" flag to indicate that the data is potentially incomplete.</p> <p>If this issue persists, especially for multiple patients, contact customer support.</p> |
| DoD remote site is unavailable (no "Try Again" label in button) | <p>If the DoD is available on VistARad workstations but not on Clinical Display workstations, verify that the Clinical Display workstations are using the VIX to retrieve images. To do this, check the Image ID of the remote image in the Clinical Display Image List. If the Image ID is prefixed with the string "urn", the VIX is being used. If a standard ID is shown, the VIX is not being used, and you should restart the workstations in question and then try to reconnect to the DoD.</p> <p>If this occurs for Patch 93 Clinical Display only, verify that the MAG VIEW DOD IMAGES security key is assigned to the user. (This key is not checked for Patch 94 or later.)</p> <p>If the connection remains unavailable for more than an hour, contact customer support.</p> |
| DoD connection is available, but images are inaccessible | <p>If an "Image not Available" icon shows in Clinical Display, there was a delay in processing the images. Wait 30 seconds, and try to display the image again.</p> <p>If an "Image not Found" icon is shown in Clinical Display, the issue cannot be resolved on the VA side. If the image is deemed necessary for medical care, contact customer support.</p> |
| One or more images appear to be corrupted | <p>Display the image on a different Clinical Display or VistARad workstation to verify that the problem is with the actual image (rather than a transitory display error).</p> <p>If the problem persists, contact customer support immediately.</p> |

5. ROI VIX Operation, Configuration and Statistics

This chapter explains how the VIX processes ROI (Release of Information) requests, describes the ROI-related statistics and configuration parameters and explains how to configure the other ROI-related parameters of the VIX.

5.1. How the VIX Processes ROI Requests

There are two ways in which the VIX can process ROI disclosure requests:

- Immediately when it gets the disclosure request and/or
- Periodically, in the background

How the VIX processes ROI disclosures is determined by two parameters its configuration. By default, both parameters are enabled, and the VIX uses both ways to process ROI disclosure requests simultaneously.

Users with the MAG VIX ADMIN security key can modify these parameters.

NOTE: At least one of the two ROI processing parameters must be enabled for the VIX to process ROI requests. If both parameters are disabled, the VIX does not process ROI requests. It displays a message alerting VIX administrators to the fact that ROI requests cannot be processed until at least one of the parameters is enabled.

NOTE: Reinstalling the VIX service resets these parameters to their default enabled values. If these values have been changed manually, the change needs to be reapplied after the VIX service is installed.

5.1.1. Processing ROI Disclosure Requests Immediately

When the parameter **Process Disclosure Requests Immediately** is enabled, the VIX processes ROI disclosure requests when it receives them. This option does not require ROI processing credentials. The VIX uses the credentials of the user who submits the ROI request to process the disclosure. By default, this option is enabled. However, if the VIX gets too busy, users with the MAG VIX ADMIN security key can disable this option and configure the VIX to only process ROI disclosures periodically.

NOTE: If the VIX is interrupted while processing an ROI request because of a network disconnection or a VIX restart, the ROI disclosure completes only if periodic processing is enabled. If periodic processing is not enabled, the request does not complete.

5.1.2. Periodic Processing of ROI Disclosure Requests

When periodic processing is enabled, the VIX processes ROI disclosure requests periodically, in the background. Enabling periodic processing is useful because it allows an ROI disclosure to be completed even if the VIX operation is interrupted because the VIX was restarted or because it ran into an issue.

Periodic processing requires a valid VistA account with ROI processing credentials. If the credentials provided to the VIX are invalid, periodic processing does not work.

For information about setting ROI Processing credentials, see *ROI Periodic Processing Credentials*.

5.1.3. Purging Completed Disclosures

When the parameter **Completed Disclosures Purge Processing** is enabled, the VIX purges old ROI disclosures after the number of days specified in the parameter **Completed Disclosures Purge Days**.

The purge removes the metadata associated with an ROI disclosure from the VistA database. The actual ROI disclosure result is removed when the VIX cache purges data, typically after 30 days.

Completed disclosures purge processing requires a valid VistA account with ROI periodic processing credentials. If the credentials provided to the VIX are invalid, completed disclosures purge processing does not work.

5.1.4. Processing Disclosure Wait Time

The parameter **Processing Disclosure Wait Time** indicates the number of minutes the VIX waits for an ROI disclosure to be in a processing state before resetting the disclosure request. ROI disclosures are processed in several either active or waiting states. If a request stays in an active state beyond the number of minutes specified in this parameter, it is reset to a waiting state to be processed. By default, the wait time to process a work item is 120 minutes. The value should be set to a period that is long enough for a work item to complete but not too long to orphan the ROI disclosure request.

For information about setting ROI Processing credentials, see *ROI Periodic Processing Credentials*.

5.1.5. ROI Periodic Processing Credentials

The ROI periodic processing credentials are the credentials the VIX uses to do periodic processing for ROI. These credentials must be valid VistA credentials with the MAG DICOM and OR CPRS GUI CHART secondary menu options. The credentials can be the credentials of the same service account that the DICOM Gateway and the HDIG use.

For more information about setting the access and verify codes of the account, see the [VistA Imaging VIX Installation Guide](#).

Users with the MAG VIX ADMIN security key can reset the access and verify code of the account through the ROI Processing Status page. For more information about the procedure, see *Modifying the ROI Processing Parameters of the VIX*.

5.1.6. Alerts About Problems in the ROI Configuration

If the VIX encounters a problem with the ROI processing configuration, for example, if both periodic processing and **Process Disclosure Requests Immediately** are disabled, it displays an alert at the top of the ROI Processing Status page and the Release of Information (ROI) Configuration page. When there is a message, this means that there is a problem with the current configuration, and you should take action to resolve the issue or issues. For information about the procedure for modifying the ROI processing parameters of the VIX, see *Modifying the ROI Processing Parameters of the VIX*.

5.2. Getting Information About ROI Processing

You can see the status of an ROI request and get information about ROI statistics on the ROI Processing Status page.

To display the ROI Processing Status page:

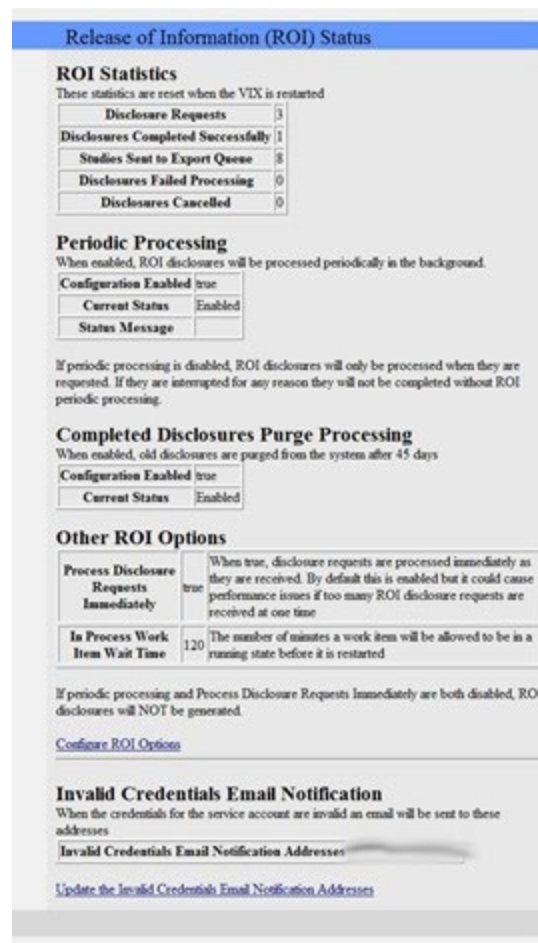
In your browser, open the URL for the ROI Processing Status page:

https://<VIXHostName>:REDACTED/ROIWebApp

where <VIXHostName> is the name of the fully qualified domain name (FQDN) of the server on which the VIX is installed.

Figure 14 shows the ROI Processing Status page.

Figure 14: Release of Information (ROI) Status Page



5.2.1. Information the ROI Processing Status Page Provides

The ROI Processing Status page provides statistics about the ROI processing jobs since the last VIX restart. The counters for each field are reset every time the VIX is restarted.

Table 22 explains the information that the VIX provides for ROI processing.

Table 22: ROI Processing Information

| Group | Field | Description |
|----------------------------------------|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ROI Statistics | | |
| | Disclosure Requests | The number of requests made to the VIX for ROI disclosures. |
| | Disclosures Completed Successfully | The number of successfully completed ROI disclosures. |
| | Studies Sent to Export Queue | The number of studies sent to the export queue to be processed. A disclosure may contain several studies that are sent to the export queue (among others that may be processed by the VIX). |
| | Disclosures Failed Processing | The number of ROI disclosures that did not complete successfully. |
| | Disclosures Cancelled | The number of ROI disclosures that were cancelled before completion. |
| Periodic Processing | | When periodic processing is enabled, the VIX processes ROI disclosures in the periodically in the background. Periodic processing requires an account with ROI processing credentials, which is configured when the VIX is installed. For more information about periodic processing, see Periodic Processing of ROI Disclosure Requests. |
| | Configuration Enabled | When this parameter is set to true, periodic processing is enabled, and the VIX processes ROI requests periodically in the background. |
| | Current Status | Indicates the current status of periodic processing. The values are: Disabled – Indicates that periodic processing is disabled. Enabled – Indicates that periodic processing is enabled and that there is an account with valid ROI processing credentials. |
| Completed Disclosures Purge Processing | | When completed disclosures purge processing is enabled, the VIX purges old ROI disclosures after the number of days specified in its configuration. Completed disclosures purge processing requires an account with ROI processing credentials. For more information, see Purging Completed Disclosures. |
| | Configuration Enabled | Indicates if completed disclosures purge processing is enabled. When this parameter is set to true, completed disclosures purge processing is enabled. |
| | Current Status | Indicates the current status of completed disclosures purge processing. The values are: Disabled – Indicates that completed disclosures purge processing is disabled. Enabled – Indicates that completed disclosures purge processing is enabled and that there is an account with valid ROI processing credentials. |

| Group | Field | Description |
|--------------------------------------------------------------|--------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Other ROI Options | | |
| | Process Disclosure Requests Immediately | When enabled, the VIX processes ROI disclosures immediately when requested. This option does not require ROI processing credentials. The VIX uses the credentials of the user who submits the ROI request to process the disclosure. For more information, see Processing ROI Disclosure Requests Immediately. |
| | In Process Work Item Wait Time | Indicates the number of minutes the VIX waits for an ROI disclosure to be in a processing state before resetting the disclosure request. ROI disclosures are processed in several either active or waiting states. For more information, see Processing Disclosure Wait Time. |
| Configure ROI Options and Update Service Account Credentials | | To change any of the VIX ROI configuration settings, click on the Configure ROI Options and Update Service Account Credentials link. Accessing this configuration page requires VistA credentials for a user with the MAG VIX ADMIN security key. This page also allows resetting the access and verify codes for the service account. |
| Invalid Credentials Email Notification | | To change any of these settings, click on the Configure ROI Options link. This configuration page requires VistA credentials for a user with the MAG VIX ADMIN security key. When the VIX is configured to do periodic processing for ROI or completed disclosures purge processing, it authenticates the ROI processing credentials. If the account credentials are invalid or expired, the VIX sends an email notification of the invalid credentials. |
| | Invalid Credentials Email Notification Addresses | The email address or addresses to which the VIX sends an email notification about invalid ROI processing credentials. The value can include multiple email addresses (separated by a comma) and/or an email group. The email comes from the REDACTED email account. The values are specified when the VIX is installed. Users with the MAG VIX ADMIN key can modify these values. |
| Update the Invalid Credentials Email Notification Addresses | | To change the email addresses to send notifications to click on the Update the Invalid Credentials Email Notification Addresses link. Accessing this page requires VistA credentials for a user with the MAG VIX ADMIN security key. |
| Alert Messages | | If there is a problem with the VIX ROI processing configuration, the VIX displays a message at the top of the page, indicating that you need to change the configuration to resolve the issue. For more information about the alerts, see Alerts. |

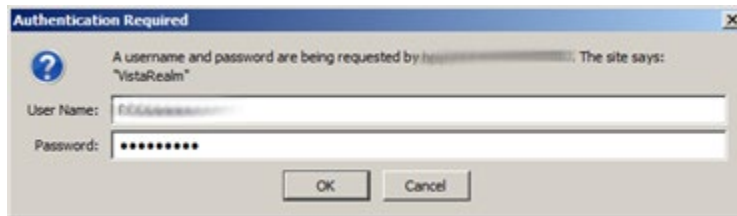
5.3. Modifying the ROI Processing and DICOM Query/Retrieve Parameters of the VIX

Users with the MAG VIX ADMIN security key can change the ROI configuration parameters of the VIX and re-set the access and verify codes of the service account with the ROI periodic processing and DICOM Query/Retrieve (Q/R) credentials.

To change the ROI processing parameters of the VIX:

1. In your browser, open the URL for the ROI Statistics page:
https://<VIXHostName>:REDACTED/ROIWebApp
where <VIXHostName> is the name of the fully qualified domain name (FQDN) of the computer on which the VIX is installed.
2. In the ROI Processing Status page, click the link **Configure ROI Options**.
3. In the dialog box that displays (Figure 15), enter the access, and verify code of the user with the MAG VIX ADMIN security key. Then, click, **OK**.

Figure 15: Authentication Required



4. In the Configure Release of Information (ROI) page, modify the configuration parameters as desired. For information about the parameters, see *Information the ROI Processing Status Page Provides*.
5. Click the **Save Configuration** button to save the changes. The page refreshes with a status message indicating if the changes were saved or if there was an error.
6. To return to the ROI Processing Status page, click on the **ROI Status** link on the left side of the page.

5.4. Changing User List for Get Invalid ROI Credentials Email Notifications

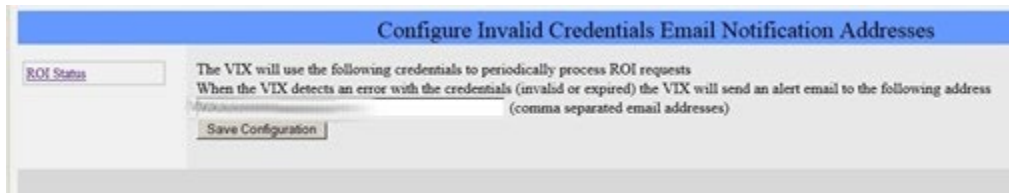
When the VIX encounters a problem with the service account credentials (invalid credentials or expired verify code), it sends an email notification to the address or addresses specified in its configuration. The parameter **Invalid Credentials Email Notification Addresses** specifies the email address or addresses to which the VIX sends an email notification about invalid ROI processing credentials. The value can include multiple email addresses (separated by a comma) and/or an email group.

The email notification for invalid credentials comes from the **REDACTED** email account. The values of the **Invalid Credentials Email Notification Addresses** are specified when the VIX is installed. Users with the MAG VIX ADMIN key can modify these values.

To change the list of email addresses to which the VIX sends notifications about invalid ROI processing credentials:

1. In your browser, open the URL for the ROI Statistics page:
https://<VIXHostName>:REDACTED/ROIWebApp
 where <VIXHostName> is the name of the fully qualified domain name (FQDN) of the computer on which the VIX is installed
2. In the ROI Processing Status page, click the link **Update the Invalid Credentials Email Notification Addresses**.
3. In the dialog box that displays (Figure 15), enter the access, and verify code of the user with the MAG VIX ADMIN security key. Then, click **OK**.
4. In the Configure Invalid Credentials Email Notification Addresses page, modify the list of addresses as desired (Figure 16). The list can contain multiple addresses separated by commas and/or an email group.

Figure 16: Configure Invalid Credentials Email



5. Click the **Save Configuration** button to save the changes. The page refreshes with a status message indicating if the changes were saved or if there was an error.
6. To return to the ROI Processing Status page, click on the **ROI Status** link on the left side of the page.

6. VIX Reference/Software Description

6.1. VIX Java Components

The following sections summarize the primary Java components of the VIX.

6.1.1. VIX Servlet Container

The VIX uses an Apache Tomcat-based servlet container to provide the environment used to execute the Java code on the VIX. This servlet container is installed automatically as part of the VIX installation process.

6.1.2. VIX Security Realms

The VIX implements security realms to verify that only properly authenticated applications (Clinical Display, VistARad, and other VIXes) can use the interfaces provided by the VIX Web applications. Authentication is handled silently by the application and the VIX and does not require an explicit login by clinicians requesting images.

6.1.3. VIX Interfaces

The VIX uses a dedicated interface for each outside application that requests and receives data from the VIX.

VIX interfaces are used for both metadata and image retrieval. In general, each VIX interface implements a Web service that handles metadata requests and an image servlet that handles image requests. Table 23 summarizes each VIX interface.

Table 23: VIX Interfaces Description

| Interface Name | Description |
|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VistARad interface | Handles metadata and image requests from local VistARad workstations. |
| Clinical Display interface | Handles metadata and image requests from local Clinical Display workstations. |
| Federation interface | Handles metadata and image requests from other remote VIXes or the CVIX. |
| User services interface | Handles user-related functionality such as authentication and security key retrieval. |
| Patient services interface | Handles patient-related functionality, including patient search and sensitive patient access logging. |
| Storage services interface | Handles requests related to read and write locations and metadata. |
| DICOM Importer services interface | Handles application-specific requests for the importer, including study and order metadata, performing CRUD operations on work items, dealing with Importer reports, and other related features. |

When an interface receives a request, it issues the appropriate command to the VIX core for proper disposition. When the VIX core ultimately provides a response (the requested data), the same interface responds to the requesting application.

6.1.4. VIX Core

The VIX core provides the central switching intelligence for the VIX. It performs the following:

- Examines commands received from all the VIX interfaces.

- Determines which VIX data source is the best one to retrieve the data requested and packages the request appropriately before passing the request to the data source.
- Implements and manages the VIX cache.

6.1.5. VIX Data Sources

The VIX has a dedicated data source for each outside entity from which it retrieves data. Data sources receive requests from and return responses to the VIX core. Table 24 summarizes each VIX data source. These data sources are identified in the Data Source Protocol field in the VIX transaction log.

Table 24: VIX Data Sources Description

| Data Source Name | Description |
|------------------|---------------------------------------------------------------------------------|
| vistaimaging | Retrieves data from a VistA System using RPCs |
| vftp | Retrieves data from other VIXes (or the CVIX) using their Federation interfaces |

6.1.6. Java Installation Locations

On the server where the VIX is installed, VIX-related files are stored in the locations described below.

For installation procedures, see the [VIX Installation Guide](#).

6.1.6.1. VIX folders on the System Drive

The following VIX-related folders are on the system drive (usually C:\). Note that because the VIX is a collection of services hosted in a servlet container, most VIX related-files cannot be stored under \Program Files\VistA.

\DCF_Runtime

Laurel Bridge DICOM Connectivity Framework (DCF) toolkit files

\Program Files\Apache Software Foundation\Tomcat 9.0

Primary application area for the VIX servlet engine and VIX program files. Includes:

- \bin** – servlet engine executables and Aware JPEG2000 toolkit files
- \conf** – servlet engine configuration files
- \lib** – shared servlet engine files, VIX core and data source files, and Aware JPEG2000 toolkit files
- \logs** – Java and debugging logs
- \temp** – temporary files
- \webapps** – VIX Web applications and associated parameter files
- \work** – servlet engine system files

\Program Files\Java\jre1.8.0_291

The runtime environment files and resources for the VIX servlet engine and for VIX Java components.

\Program Files\Vista\Imaging\VixInstaller

VIX installation files and resources.

\VixCertStore

Stores VIX security certificates. For details about security certificates, see the *VIX Security Certificate* section.

6.1.6.2. VIX Folders on the System Drive or a Shared Drive

When the VIX is installed on a standalone server, the following folders can be on either the system drive or on a shared drive at the site's discretion.

\VixCache

This is the primary storage area for images and metadata that the VIX caches. For details about the VIX cache, see *Caching of Metadata and Images*.

\VixConfig

Configuration files used by the VIX Java components and the VIX transaction log.

NOTE: Files in the VixConfig folder are generated as part of the VIX installation process and are regenerated when the VIX is updated.

6.1.7. Java Logs

The following Java logs reside in \Program Files\Apache Software Foundation\Tomcat 9.0\Logs. For active logs, a new instance is generated each day, and the older instances are retained with the date appended to their filenames.

catalina.log: Tomcat (VIX servlet container) output.

host-manager.log: Java host manager application output.

ImagingCache.log: VIX cache output.

ImagingExchangeWebApp.log: VIX interface/web application output.

jakarta_service.log: Windows jakarta service output.

localhost.log: generated but not populated.

manager.log: generated but not populated.

stderr.log: Tomcat service errors.

VistaRealm.log: VIX security realm output.

6.2. VistA/M Information

The following sections describe how a VIX interacts with local and remote VistA systems.

6.2.1. RPCs Used by the VIX

The VIX uses numerous remote procedure calls (RPCs). Most of these RPCs are part of the VistA Imaging (MAG) package and are listed in Table 25. RPCs from other packages are listed in the next section.

Table 25: MAG RPCs used by the VIX

| RPC Name | Description |
|-----------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MAG BROKER SECURITY Routine: BSE^MAGS2BSE | Returns a BSE token from BSE (Broker Security Enhancement) XUS SET VISITOR. |
| MAG DICOM GET HOSP LOCATION Routine: GETLOC^MAGDRPCB | Returns a list of matching hospital locations. |
| MAG DICOM RADIOLOGY MODIFIERS Routine: MOD^MAGDRPCA | Returns a list of entries from the PROCEDURES MODIFIER file (#71.2) sorted by Radiology Imaging Type. |
| MAG DICOM RADIOLOGY PROCEDURES Routine: PROC^MAGDRPCA | This RPC returns a list of Radiology Procedures for "no-credit" Imaging locations within a given division. If the division does not have any "no-credit" Imaging locations defined, the results return an error message indicating the problem. Modified by MAG*3.0*118 to – optionally – filter out procedure types Broad and Parent. |
| MAG DOD GET STUDIES IEN Routine: STUDY2^MAGDQR21 | Returns study information based on the IMAGE file (#2005) Internal Entry Number (IEN) of the image group that is provided as a parameter. |
| MAG DOD GET STUDIES UID Routine: STUDY1^MAGDQR21 | Returns study information based on the Study UID that is provided as a parameter. |
| MAG EVENT AUDIT Routine: EVENT^MAGUAUD | The RPC is used to populate the data dictionaries (tables) introduced in this patch. |
| MAG GET NETLOC Routine: SHARE^MAGGTU6 | Returns a list of all entries in the NETWORK LOCATION file (#2005.2). |
| MAG IMAGE CURRENT INFO Routine: INFO^MAGDQR04 | Returns current values for the various DICOM tags that are to be included in the header of an image. |
| MAG NEW SOP INSTANCE UID Routine: NEWUID^MAGDRPC9 | Generates a new SOP Instance UID for an image and stores the value in the IMAGE file (#2005) if a SOP instance UID is not already present. |
| MAG3 CPRS TIU NOTE Routine: IMAGES^MAGGNTI | Returns a list of all images for a Text Integration Utility (TIU) document. |
| MAG4 GET IMAGE INFO Routine: GETINFO^MAGGTU3 | Returns specific fields of an image entry for display in the Clinical Display Image Information window. |
| MAG4 INDEX GET ORIGIN Routine: IGO^MAGSIXGT | This call returns an array of INDEX ORIGIN. |
| MAG4 PAT GET IMAGES Routine: PGI^MAGSIXG1 | Returns a list of image groups from the IMAGE file (#2005) based on filters provided. |
| MAGG CPRS RAD EXAM Routine: IMAGEC^MAGGTRAI | Returns a list of images for the radiology exam. |
| MAGG DEV FIELD VALUES Routine: GETS^MAGGTSYS | Returns a list of field values for an IEN in the IMAGE file (#2005). |
| MAGG GROUP IMAGES Routine: GROUP^MAGGTIG | Returns array of images for a group entry in the IMAGE file (#2005). Included for backward compatibility only. |
| MAGG INSTALL | Returns a list of all Imaging package installs on the host system. |

| RPC Name | Description |
|-------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Routine: GPACHX^MAGQBUT4 | |
| MAGG LOGOFF Routine: LOGOFF^MAGGTAU | Tracks the time of the Imaging session. |
| MAGG OFFLINE IMAGE ACCESSED Routine: MAIL^MAGGTU3 | Sends a message when there is an attempt to access an image from an offline jukebox platter. |
| MAGG PAT FIND Routine: FIND^MAGGTPT1 | Used for patient lookups. |
| MAGG PAT INFO Routine: INFO^MAGGTPT1 | Returns a string of '^' delimited pieces of patient information. |
| MAGG PAT PHOTOS Routine: PHOTOS^MAGGTIG | Returns a list of patient photo IDs. |
| MAGG SYS GLOBAL NODE Routine: MAG^MAGGTSY2 | Returns the global node of an IMAGE file (#2005) entry. |
| MAGG WRKS UPDATES Routine: UPD^MAGGTAU | Starts a new session for image access logging. |
| MAGG ACTION LOG Routine: LOGACT^MAGGTU6 | Call to log an action performed on the image. Actions are logged the IMAGE ACCESS LOG file (#2006.95). |
| MAGGRPT Routine: BRK^MAGGTRPT | Returns associated report for Image IEN. |
| MAGGUSER2 Routine: USERINF2^MAGGTU3 | Returns information about a Clinical Display user. |
| MAGJ CACHELOCATION Routine: CACHEQ^MAGJUTL3 | Obtains the locations for images that have been routed to remote sites/workstations. |
| MAGJ CPTMATCH Routine: CPTGRP^MAGJUTL4 | Finds related radiology procedures based on the matching tables in the MAG RAD CPT MATCHING file (#2006.67). |
| MAGJ EXAM REPORT Routine: RADRPT^MAGJRPT | Retrieves a radiology report. |
| MAGJ PT ALL EXAMS Routine: PTLSTALL^MAGJLST1 | Retrieves a list of all radiology exams for a selected patient. |
| MAGJ RADACTIVEEXAMS Routine: ACTIVE^MAGJLS2 | Retrieves lists of "unread," "recent," or "all active" radiology exams for VistARad. |
| MAGJ RADCASEIMAGES Routine: OPENCASE^MAGJEX1 | Fetches IMAGE file (#2005) information for all the images for a selected case. If the case's images are on the archive (jukebox), then this RPC initiates a fetch of the image files from the archive. |
| MAGJ RADORDERDISP Routine: ORD^MAGJRPT | Returns the Detailed Request Display (order) for the radiology exam. |
| MAGJ STUDY DATA Routine RPCIN^MAGJEX3 | Obtains various study and/or image data stored in XML format. |
| MAGJ USER2 Routine: USERINF2^MAGJUTL3 | Returns information about a VistARad user. |

| RPC Name | Description |
|-------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MAGJ VIX LOG REMOTE IMG ACCESS Routine: LOGRIA^MAGJVAPI | Logs remote image accesses. |
| MAGN CPRS IMAGE LIST Routine: IMAGEL^MAGNTRAI | Lists images for Rad Exams or TIU Notes by CPRS context. |
| MAGV ADD WORK ITEM TAGS Routine: ADDTAG^MAGVIM01 | Allows tags to be added to work items in the WORK ITEM (#2006.941) file. Tags consist of a tag name and a tag value. Tags and values can be used to look up entries in the WORK ITEM (#2006.941) file. |
| MAGV CONFIRM RAD ORDER Routine: CONFIRM^MAGVIM06 | Returns a RAD/NUC MED ORDERS file (#75.1) IEN for a set of DICOM Unique Identifiers. |
| MAGV CREATE WORK ITEM Routine: CRTITEM^MAGVIM01 | Creates work item entries in the WORK ITEM file (#2006.94) and the WORK ITEM HISTORY file (#2006.941). |
| MAGV DELETE WORK ITEM Routine: DELWITEM^MAGVIM01 | Deletes a single entry in the WORK ITEM file (#2006.941). |
| MAGV FIND WORK ITEM Routine: | Returns an array of work items with values that match the parameters provided. |
| MAGV GET NEXT WORK ITEM Routine: FIND^MAGVIM01 | Returns the work item with the oldest LAST UPDATED date/time with the specified expected status and work item type. |
| MAGV GET PAT ORDERS Routine: GETORD^MAGVIM02 | Returns an array of consult or radiology orders for and input patient enterprise identifier. |
| MAGV GET WORK ITEM Routine: GETITEM^MAGVIM01 | Returns all of the data elements for a single entry in the WORK ITEM file (#2006.941). |
| MAGV GET WORKLISTS Routine: GETLIST^MAGVIM01 | Returns a list of all worklist entries in the WORKLIST file (#2006.942). The worklists name and active status are returned in an array. |
| MAGV IMPORT MEDIA LOG STORE Routine: IMPMEDIA^MAGVIM03 | Files data from an Importer III media import event to the MAGV IMPORT MEDIA LOG file (#2006.9422). |
| MAGV IMPORT STATUS Routine: IMSTATUS^MAGVIM01 | Given a set of UIDS, a patient identifier, and an accession number, this remote procedure returns the import status of a matching item. |
| MAGV IMPORT STUDY LOG REPORT Routine: IMPLOGEX^MAGVIM03 | Exports data from the MAGV IMPORT STUDY LOG file (#2006.9421) as formatted reports. |
| MAGV IMPORT STUDY LOG STORE Routine: IMPLOGIN^MAGVIM03 | Collects study-level data for objects imported by the DICOM Importer III. |
| MAGV RAD EXAM ORDER Routine: XMORDER^MAGVIM05 | Wraps a call to the RAMAG EXAM ORDER remote procedure, and re-formats the output for the DICOM Importer III application. Returns the IEN of the new order in the RAD/NUC MED ORDERS file (#75.1), or an array of error messages. |
| MAGV RAD EXAM REGISTER Routine: XMREGSTR^MAGVIM05 | Wraps a call to the RAMAG EXAM REGISTER remote procedure, and re-formats the output for the DICOM Importer III application. Returns the IEN of the new case |

| RPC Name | Description |
|-------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| | in the RAD/NUC MED PATIENT file (#70), or an array of error messages. |
| MAGV RAD STAT COMPLETE Routine: XMCOMPLT^MAGVIM05 | Wraps call to code underlying the remote procedure RAMAG EXAM COMPLETE. |
| MAGV RAD STAT EXAMINED Routine: XMEXAMIN^MAGVIM05 | Wraps calls to the remote procedure RAMAG EXAMINED and re-formats the output. |
| MAGV UPDATE WORK ITEM Routine: UPDITEM^MAGVIM01 | Updates a work item in the WORK ITEM file (#2006.94). It also creates an entry in the WORK ITEM HISTORY file (#2006.941). |

6.2.2. Non-MAG RPCs used by the VIX

Table 26 shows the RPCs the VIX uses from other VistA packages. The use of these RPCs is governed by Integration Control Registrations (ICRs) stored in FORUM. For information about viewing specific ICRs, see Chapter 12 in the [VistA Imaging Technical Manual](#).

Table 26: Non-MAG RPCs used by the VIX

| RPC Name | Description |
|-----------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DDR FILER Routine: FILEC^DDR3 | Generic call to file edits into a FileMan file. |
| DG SENSITIVE RECORD ACCESS Routine: PTSEC^DGSEC4 | Verifies that a user is not accessing his/her own Patient file record if the RESTRICT PATIENT RECORD ACCESS field (#1201) in the MAS PARAMETERS file (#43) is set to yes and the user does not hold the DG RECORD ACCESS security key. If the parameter is set to yes and the user is not a key holder, a social security number must be defined in the NEW PERSON file (#200) for the user to access any Patient file (#2) record. |
| DG SENSITIVE RECORD BULLETIN Routine: NOTICE^DGSEC4 | Adds an entry to the DG Security Log file (#38.1) and generates the sensitive record access bulletin depending on the value in the ACTION input parameter. |
| PSB GETPROVIDER Routine: PROVLST^PSBRPCMO | Used to get a list of active providers. |
| VAFACTFU CONVERT ICN TO DFN Routine: GETDFN^VAFACTFU1 | Given a patient Integration Control Number (ICN), this returns the patient's Internal Entry Number (IEN) from the PATIENT file (#2). |
| VAFACTFU GET TREATING LIST Routine: TFL^VAFACTFU1 | Given a patient DFN, this returns a list of treating facilities. |
| XUS AV CODE Routine: VALIDAV^XUSRB | Checks to see whether an ACCESS/VERIFY code pair is valid. |
| XUS DIVISION GET Routine: DIVGET^XUSRB2 | Returns a list of divisions of a user. |
| XUS DIVISION SET Routine: DIVSET^XUSRB2 | Sets the user's selected division in DUZ(2) during sign-on. |
| XUS SIGNON SETUP Routine: SETUP^XUSRB | Establishes the environment necessary for DHCP sign-on. |

| RPC Name | Description |
|---------------------------------------------------------|-------------------------------------------------------------------------------------------------------|
| XWB CREATE CONTEXT Routine: CRCONXT^XWBSEC | Establishes context on the server that the Broker checks before executing any other remote procedure. |
| XWB GET VARIABLE VALUE Routine: VARVAL^XWBLIB | Accepts the name of a variable to return its value to the caller. |

6.2.3. Database Information

The VIX retrieves data from both local and remote VistA databases using the RPCs described in the previous sections.

The VIX writes data to VistA if it needs to update the following:

- IMAGE ACCESS LOG file (#2006.95). See *Logging on VistA*.
- IMAGE file (#2005) with SOP instance UIDs for images that do not have SOP instance UIDs already. The VIX uses the MAG NEW SOP INSTANCE UID RPC used by other Imaging components for the same purpose.

There are no general VIX parameters stored on VistA. Any site-specific VIX parameters are set during installation and are stored in the local configuration files of the VIX.

6.2.4. Exported Menu Options

There are no exported VistA menu options associated with the VIX.

6.2.5. Security Keys

The VIX uses the MAG VIX ADMIN security key to determine who can access the VIX transaction log. See *Using the VIX Transaction Log* for more information.

When a Clinical Display, VIX Image Viewer, or VistARad user uses the VIX to access remote VA images, their locally assigned security keys are honored on the remote VistA system. VistARad and Clinical Display security keys are described in the [VistA Imaging Technical Manual](#).

6.2.6. User Accounts

When a VA clinician retrieves metadata or images from a remote VA site via a VIX, their VistA account information is used to automatically log into the remote VA site. Users do not need to explicitly enter access or verify codes.

When a DoD clinician retrieves metadata or images from a VA site, the credentialing is handled by the Station 200 VistA system co-located with the CVIX. If a local service account was established for the initial VIX implementation (MAG*3.0*83), that account is no longer needed after updating to the most recent VIX.

A DoD clinician's requests for local images are logged at the site where the images reside. See *Image Sharing-related Logging* for details.

6.3. Other VIX Components

The VIX incorporates the following additional components.

- *Security certificate*
- *.NET*

- *Apache Tomcat*
- *Sun JRE*
- *Laurel Bridge DCF toolkit*
- *Aware JPEG2000 toolkit*
- *LibreOffice*

Each component is described in the following sections. All of these components are integral to VIX operations and cannot be modified without impacting VIX operations.

6.3.1. VIX Security Certificate

When a VIX communicates with another VIX, they exchange security certificates for authentication purposes. This long-term security certificate is stored in the \VixCertStore directory on the server where the VIX is installed.

The VIX security certificate is provided as a part of the VIX installation process and must be available to complete a VIX installation.

6.3.2. .NET

The .NET 4.7.X framework is needed to install, update, and run the VIX software.

Patches for .NET 4.7.X, if any, should be installed as soon as reasonably possible after they are released in accordance with local site maintenance policies and the Windows update guidelines documented in the [VistA Imaging Technical Manual](#).

Other versions of .NET have no impact on the VIX installer or update processes and can be installed or not in accordance with local policy.

6.3.3. Apache Tomcat

The VIX's servlet container and the VIX itself require Apache Tomcat. The VIX Installation automatically installs Tomcat.

Do not install later versions of Tomcat. The VIX installation software bundles the correct version for the VIX.

6.3.4. Sun JRE

The VIX's servlet container and the VIX itself require the Sun Java Runtime Environment (JRE). The Sun JRE is installed automatically as a part of the VIX installation process.

Do not install later versions of the Sun JRE. The correct JRE for the VIX is bundled with the VIX installation software.

6.3.5. Laurel Bridge DCF Toolkit

The Laurel Bridge DICOM Connectivity Framework (DCF) toolkit, version 3.3.X, is a third-party toolkit that VIX uses to convert images to and from DICOM format.

The license for this toolkit is tied to the server where the VIX is installed. Shifting to a new server requires an updated license from Laurel Bridge. If a new or updated license is needed, contact the **REDACTED** mail group.

Version 3.3.X of this toolkit is bundled with the VIX installer and is installed automatically as part of the VIX setup process. Do not install this toolkit manually.

6.3.6. Aware JPEG2000 Toolkit License

For information regarding the Aware Toolkit License, see the [VistA Imaging System VistA Exchange \(VIX\) Service Installation Guide](#).

6.3.7. LibreOffice

The VIX requires the install of LibreOffice 7.0.6, a third-party open-source office productivity software suite, to support Rich Text Format (RTF) files. The VIX Installation automatically installs LibreOffice.

7. Configure MUSE Functionality

Configuring the MUSE functionality is performed as part of the VIX Installation, see the [VIX Installation Guide](#). This section provides details in the event the MUSE functionality needs to be enabled or configured. Configuration of the MUSE interface will require the MUSE username and MUSE password for the site's online MUSE server. If the MUSE username and password are not documented in existing site VistA Imaging documentation, please contact the local BioMed team or MUSE administrator for the information.

Has the MUSE functionality already been configured to be enabled?

- To determine if MUSE functionality is already configured to be enabled, open the MuseDataSource-1.0.Config file located in C:\VixConfig. Run, Notepad, Notepad++, or WordPad as an administrator and then open the file.
 - **No, it is not enabled.** If the MuseDataSource-1.0.Config file located in C:\VixConfig is like the template displayed in Figure 17, continue with this section to perform the steps to enable MUSE functionality.
 - **Yes, it is enabled.** If the MuseDataSource-1.0.Config file located in C:\VixConfig is not like the template displayed in Figure 17 (i.e. a real MUSE site number, host, username, and password are present), the MUSE functionality is already enabled. There is no reason to perform this section unless reconfiguring.

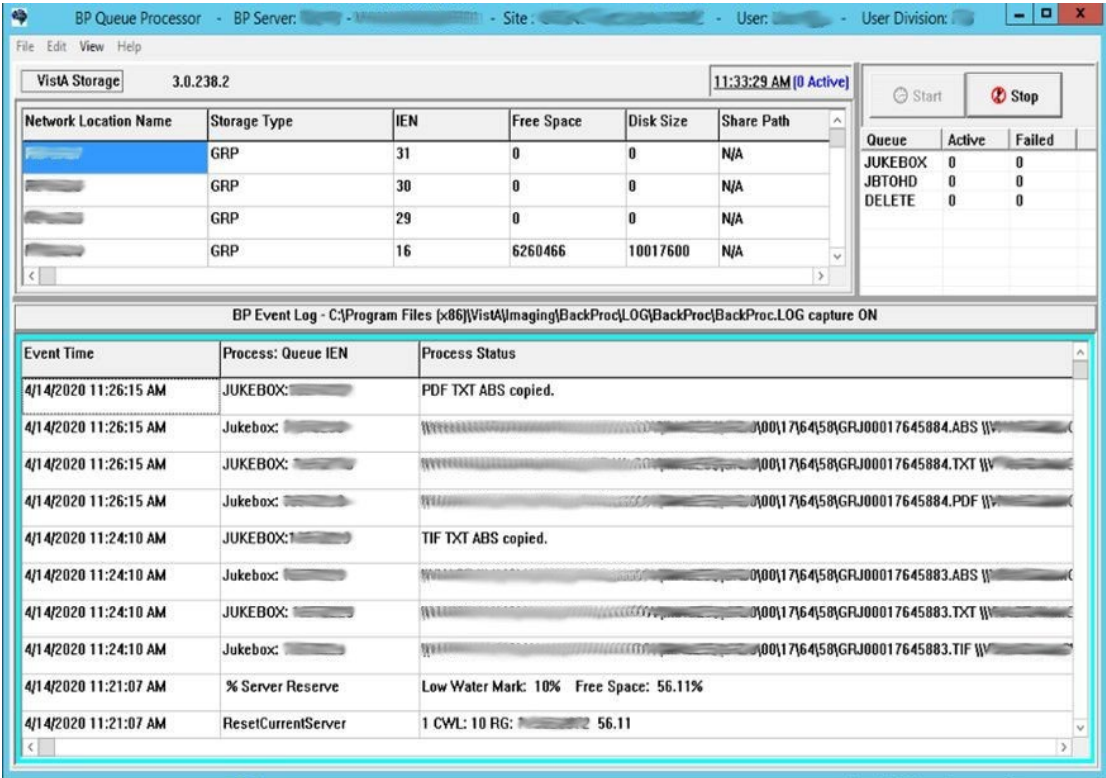
NOTE: It is expected that the site administrator is aware of all needed entries in the MUSE configuration, including museSiteNumber, host, username, and password. One method to obtain the values of museSiteNumber, host, and username is *from the Background Processor (discussed below in this step)*. If the password is not documented in existing site VistA Imaging documentation or if *not* available, please contact the local BioMed team or MUSE administrator.

By default, the MuseDataSource-1.0.Config file is located in C:\VixConfig. Open the MuseDataSource-1.0.Config file. Run Notepad, Notepad++, or WordPad as an administrator and then open the file.

To enable or reconfigure the MUSE configuration, the site administrator is expected to know the museSiteNumber, host, username, and password and replace the default values with those for the site:

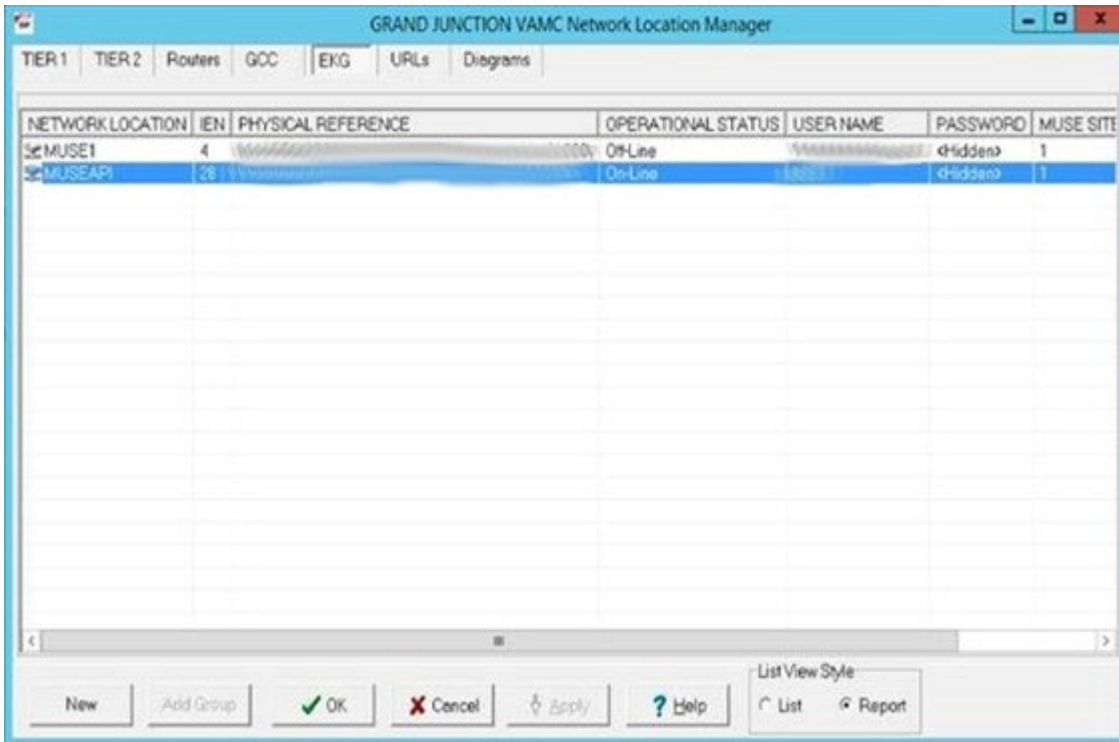
1. Set the entries for the MUSE config in the MuseDataSource-1.0.Config file.
2. Set the value for the MUSE site number of the MUSE server that contains EKGs for your facility.
`<museSiteNumber>**MUSE SITE NUMBER HERE**</museSiteNumber>`
3. Insert the value of the host.
`<host>**MUSE HOST HERE**</host>`
4. Insert the value of the MUSE username.
`<username>**MUSE USER HERE**</username>`

Figure 18: Background Processor Queue Processor



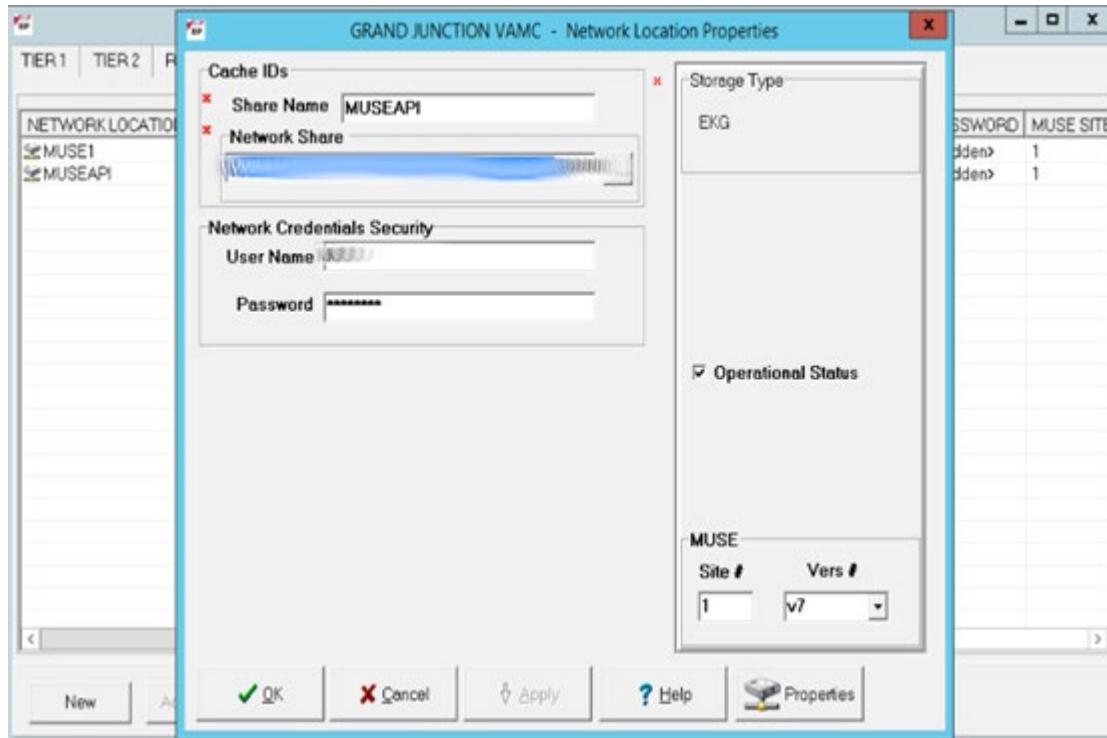
- 2. Click on the EKG tab in the Network Location Manager window. A listing of the network location of available MUSE servers will appear (Figure 19).
NOTE: Pay attention to the Operational Status of available MUSE servers. Only add the MUSE server that is **On-Line and contains EKGs of the local site.**

Figure 19: EKG Tab in Network Location Manager in Background Processor Queue Processor



3. To obtain details for a MUSE server, right-click on the server and run **Properties** to launch Network Location Properties. The network share and username for that MUSE server displays (Figure 20).
4. Use the details from the Network Location Properties for the MUSE server that is On-Line to obtain the <museSiteNumber>, <host>, and <username> entries for the MuseDataSource-1.0.Config file. The MUSE Site Number for the <museSiteNumber> entry is listed under “Site Number” under “MUSE”. The Fully Qualified Domain Name of the Server for the <host> entry is listed under “Network Share” between \\ and \ (Figure 20). The MUSE Site Username for the <username> entry displays under “User Name” under “Network Credentials Security”.

Figure 20: Network Location Properties in Background Processor Queue Processor



Once inside the file, `MuseDataSource-1.0.Config`, find entries for the `<museSiteNumber>`, `<host>` and `<username>` and update them with the information for the MUSE server that is On-Line. This is obtained from the Network Location Manager Properties tab in the Background Processor Queue Processor. The parameter line for `<password>` with the MUSE site password must be manually added. This password can be obtained from the existing site VistA Imaging documentation (if not available, obtain your MUSE site password from the local BioMed team or MUSE administrator).

After updating the MUSE config file, `MuseDataSource-1.0.Config`, as described above, it is necessary to restart the Apache Tomcat service, VIX Viewer and VIX Render services, and Listener Tool. One way this can be performed is by executing the restart script (`Restart_VIX_Services.ps1`) as described in the [VIX Installation Guide](#).

8. Configure DICOM SCP Functionality

This section provides details on the DICOM Service Class Provider (SCP) configuration. The DICOM SCP enables Commercial PACS and various query retrieve devices at VA facilities, and NilRead™ or other query retrieve devices at DoD facilities, to get remote VistA images through the use of DICOM C-FIND and C-MOVE.

Henceforth, this section refers to the Commercial PACS, NilRead™, and query retrieve devices as a DICOM SCP client.

NOTE: Commercial PACS is for VIX, but CVIX also has the capability to provide data to NilRead™ to read, as the protocol used is the same; however, other query retrieve devices can also be used.

AE Titles Configuration must be performed manually after VIX Installation of MAG*3.0*269 and a Tomcat restart performed after completed. The VIX install performs some of the configuration for the DICOM SCP automatically with reasonable defaults and predefined entries. Reasonable defaults and predefined entries include the configurations described in *Tomcat DICOM SCP Configuration* and *Laurel Bridge DICOM SCP Configuration*. If specific configuration values are desired instead of the reasonable defaults, then after updating and saving the configuration file, a Tomcat restart must be completed.

NOTE: For additional installations of MAG*3.0*269 and/or subsequent patch releases, no additional changes to the *AE Titles Configuration* are necessary unless the settings configured have changed and an update is needed.

NOTE: If updates are needed to the access and verify codes for the account with VistA credentials see section 5.3 Modifying the ROI Processing and DICOM Query/Retrieve Parameters of the VIX to update (preferred) in this VIX Administration Guide or see the [VIX Installation Guide](#) and specifically the section “Using the VIX Installation Wizard to Reconfigure the VIX,” to perform a reconfigure installation.

8.1. AE Titles Configuration

This section describes both the calling and called Application Entities (AE) Titles that must both be configured for DICOM SCP to work. It is necessary to configure both the AE Titles on the VIX server with those of the DICOM SCP client and also to configure the AE Titles on the DICOM SCP client with those of the VIX server.

NOTE: The port for the host for DICOM SCP must be configured as a bi-directional open port in any firewall.

8.1.1. Laurel Bridge AE Titles Configuration on VIX

The mapping of external Application Entities (AE) Titles to Transmission Control Protocol/Internet Protocol (TCP/IP) addresses and ports is configurable and set at the time of installation by installation/administration personnel on the VIX server. This mapping is necessary for resolving the IP address and port of C-MOVE Destination AE and must be correctly configured for the Laurel Bridge SCP AE to correctly function as a C-MOVE SCP.

This section describes how to configure the AE Titles configuration file `ae_title_mappings` located in the folders `cfg\dicom` within the Laurel Bridge installation directory (`C:\DCF_RunTime_x64\cfg\dicom` by default).

Open the `ae_title_mappings` file to perform edits. Run Notepad, Notepad++, or WordPad as an administrator and then open the file.

For each DICOM SCP client, the AE Title name and its host/port attributes must be set. For each DICOM SCP client, update the following entries for the AE Titles configuration file (refer to Figure 21 for line numbers):

1. Set the IP address for the host for the DICOM SCP client (after `host =` - line 11).
2. Set the port for the DICOM SCP client where the DICOM SCP is used for the C-STORE operation (after `port =` - line 12).
3. Set the AE Title the DICOM SCP client is using to communicate with the DICOM SCP (calling AE) (inside `[]` - line 10 and after `ae_title =` - line 13).

Ensure that each of these lines is uncommented (i.e. remove the `#` at the front of the line if present). Save the `ae_title_mappings` file after updating the entries.

Figure 21: Sample AE Titles Configuration File

```

1 #
2 # VistA Imaging map between an Application Entity Title and a full address
3 # i.e. host:port:called-ae-title
4 #
5 # [ **Insert AE Title the Commercial PACS client is using to communicate with the DICOM SCP** ]
6 # host = **Insert IP Address for the host for the Commercial PACS client**
7 # port = **Insert port for the Commercial PACS client where the DICOM SCP is used for the C-STORE operation**
8 # ae_title = **Insert AE Title the Commercial PACS client is using to communicate with the DICOM SCP**
9
10 [ **Insert AE Title the Commercial PACS client is using to communicate with the DICOM SCP** ]
11 host = **Insert IP Address for the host for the Commercial PACS client**
12 port = **Insert port for the Commercial PACS client where the DICOM SCP is used for the C-STORE operation**
13 ae_title = **Insert AE Title the Commercial PACS client is using to communicate with the DICOM SCP**
14

```

An example of the `ae_title_mappings` file updated for one DICOM SCP client is shown in Figure 22.

NOTE: The example in Figure 22 for configuration of one DICOM SCP client is not how an actual VIX site's `ae_title_mappings` file is to be configured. This example is for illustrative purposes only.

Figure 22: Example AE Titles Configuration File

```

1 #
2 # VistA Imaging map between an Application Entity Title and a full address
3 # i.e. host:port:called-ae-title
4 #
5 # [ **Insert AE Title the Commercial PACS client is using to communicate with the DICOM SCP** ]
6 # host = **Insert IP Address for the host for the Commercial PACS client**
7 # port = **Insert port for the Commercial PACS client where the DICOM SCP is used for the C-STORE operation**
8 # ae_title = **Insert AE Title the Commercial PACS client is using to communicate with the DICOM SCP**
9
10 [AE_SCP_HOST]
11 host =
12 port =
13 ae_title = AE_SCP_HOST
14

```

For each additional DICOM SCP client, similarly add lines for the host, port, and ae_title with the correct values as new lines below the prior lines for the prior DICOM SCP client (Figure 23). Save the ae_title_mappings file after updating the entries.

Figure 23: Sample AE Titles Configuration File with Multiple DICOM SCP clients

```

1 #
2 # VistA Imaging map between an Application Entity Title and a full address
3 # i.e. host:port:called-ae-title
4 #
5 # [ **Insert AE Title the Commercial PACS client is using to communicate with the DICOM SCP** ]
6 # host = **Insert IP Address for the host for the Commercial PACS client**
7 # port = **Insert port for the Commercial PACS client where the DICOM SCP is used for the C-STORE operation**
8 # ae_title = **Insert AE Title the Commercial PACS client is using to communicate with the DICOM SCP**
9
10 [ **Insert AE Title the 1st Commercial PACS client is using to communicate with the DICOM SCP** ]
11 host = **Insert IP Address for the host for the 1st Commercial PACS client**
12 port = **Insert port for the 1st Commercial PACS client where the DICOM SCP is used for the C-STORE operation**
13 ae_title = **Insert AE Title the 1st Commercial PACS client is using to communicate with the DICOM SCP**
14
15 [ **Insert AE Title the 2nd Commercial PACS client is using to communicate with the DICOM SCP** ]
16 host = **Insert IP Address for the host for the 2nd Commercial PACS client**
17 port = **Insert port for the 2nd Commercial PACS client where the DICOM SCP is used for the C-STORE operation**
18 ae_title = **Insert AE Title the 2nd Commercial PACS client is using to communicate with the DICOM SCP**
19

```

After updating the ae_title_mappings file, as described above, it is necessary to restart the Apache Tomcat service. One way this can be performed is by executing the restart script (Restart_VIX_Services.ps1) as described in the [VIX Installation Guide](#).

8.1.2. AE Titles Configuration on DICOM SCU

This section describes the AE Titles configuration on the DICOM Service Class User (SCU). Installation/administration personnel on the VIX server might not be able to perform this configuration and, in which case, must provide the necessary information to the DICOM SCU administration personnel to perform.

The following three pieces of information are needed for the configuration of the DICOM SCU Client: 1) the IP address for the host for the VIX server, 2) the port of DICOM SCP on the VIX server, and 3) the AE Title of DICOM SCP (called AE).

Many different DICOM SCU vendors exist and each of these systems has their own distinct approach for configuration. If additional information regarding specifics of configuring the DICOM SCU is needed, please reach out to its vendor or consult its documentation.

8.2. Tomcat DICOM SCP Configuration

This section provides details on the ScpConfiguration.Config file located in C:\VixConfig. If updates are needed to the access and verify codes for the account with VistA credentials see section 5.3 Modifying the ROI Processing and DICOM Query/Retrieve Parameters of the VIX to update (preferred) in this VIX Administration Guide or see the [VIX Installation Guide](#) and specifically the section “Using the VIX Installation Wizard to Reconfigure the VIX,” to perform a reconfigure installation.

NOTE: Tomcat hosts the DICOM SCP, and the DICOM SCP uses the Laurel Bridge library. Refer to the *Laurel Bridge AE Titles Configuration on VIX* to configure the ae_title_mappings file which contains the AE Title and port to trust for DICOM SCP.

The VIX install performs some of the configuration for the DICOM SCP automatically with reasonable defaults and predefined entries. Update two entries in the ScpConfiguration.Config
VIX Query Retrieve MAG*3.0*269

site will be counted. The default setting is set to 45 seconds. Depending on the DICOM SCU server settings, this setting may be adjusted to a time the DICOM SCU is willing to wait.

4. Set the entry for the maximum thread pool size for simultaneous image fetching through the local ImageWebApp (inside `<imageFetchThreadPoolMax>` `</imageFetchThreadPoolMax>` - line 9). The default setting is to fetch from at most 4 images at the same time.
5. Set the entry for the maximum time to wait for fetching the images. (inside `<imageFetchTimeLimit>` `</imageFetchTimeLimit>` - line 10). The default setting is set to 600 seconds (10 minutes).
6. Each time a user makes a query for a patient (C-FIND), the query information (patient ID) and the study metadata is stored in memory cache for future reference by subsequent series queries and image retrieval (C-MOVE). Set the entry for the cache retention period of how long (in hours) this query information and study metadata is stored in memory (inside `<cacheLifespan>` `</cacheLifespan>` - line 11). If 0 is entered, the entries are kept indefinitely in memory or until the next Apache Tomcat service restart.
7. Set the value to true or false for if the Commercial PACS should return local VIX study information (`<fetchLocalVix>` `</fetchLocalVix>` - line 12).
8. Set the value to true or false for if the C-FIND operation, when querying for studies, also caches the list of studies series metadata in the background (`<preFetchSeries>` `</preFetchSeries>`) - line 13.
9. Set the value to true or false for if the C-FIND operation, when querying for studies and also caching the list of studies series metadata (preFetchSeries value is true), also caches the studies lists of images in the background (`<preFetchImages>` `</preFetchImages>` - line 14).
10. If desired to set allowed AE Titles for the C-FIND caller called AE that it is calling, inside the opening and closing `calledAETitle` tags (line 15), insert the AE Title of DICOM SCP (called AE) followed by an underscore (`_`) followed by the IP address for the host for the VIX server.
11. If desired to see the report as images (generated as DICOM files) instead of as a DICOM Structured Report (SR), set `buildImageSR` to true inside the opening and closing `buildImageSR` tags, otherwise set false (inside `<buildImageSR>` `</buildImageSR>` - line 20).
12. If desired to see only VA studies (currently VA Cerner Images - 200CRNR - are not being retrieved, that will be processed in the next release) and prevent DoD studies from being retrieved, set `fetchVAOnly` to true inside the opening and closing `fetchVAOnly` tags, otherwise set false (inside `<fetchVAOnly>` `</fetchVAOnly>` - line 21).
13. If desired to not fetch certain modality images, set the entries inside the opening and closing `modalityBlockList` tags for different dataSources.
 - a. For each `dataSource` (DoD or VA), set different modality lists if necessary, by inserting DoD or VA inside the opening and closing `dataSource` tags (`<dataSource>` `</dataSource>` - line 24), by default the value is ALL.
 - b. The modalities will be filtered at study and series levels. If needed, set at the image level. To do so, set true at the image level when needed by inserting true

inside the opening and closing `addImageLevelFilter` tags, otherwise set false (`<addImageLevelFilter> </addImageLevelFilter>` - line 25).

- c. List all the modalities to be blocked for that `dataSource` separately using string tags inside the opening and closing modalities section (`<modalities> </modalities>` - lines 26 and 28). Examples of modalities to potentially include inside the string tags include SR and PR.

Save the `ScpConfiguration.Config` file after updating the entries. After updating the DICOM SCP config file, the `ScpConfiguration.Config` file will look like (Figure 26):

Figure 26: Sample DICOM SCP Configuration File

```

1 <gov.va.med.imaging.facade.configuration.ScpConfiguration>
2   <dirty>>false</dirty>
3   <accessCode>[REDACTED]</accessCode>
4   <verifyCode>[REDACTED]</verifyCode>
5   <cachedir>C:\VixCache</cachedir>
6   <studytype>radiology</studytype>
7   <siteFetchTPoolMax>20</siteFetchTPoolMax>
8   <siteFetchTimeLimit>45</siteFetchTimeLimit>
9   <imageFetchTPoolMax>4</imageFetchTPoolMax>
10  <imageFetchTimeLimit>600</imageFetchTimeLimit>
11  <cacheLifespan>1</cacheLifespan>
12  <fetchLocalVix>>false</fetchLocalVix>
13  <preFetchSeries>>true</preFetchSeries>
14  <preFetchImages>>false</preFetchImages>
15  <calledAETitle>ANY_0.0.0.0</calledAETitle>
16  <callingAEConfigs>
17    <gov.va.med.imaging.facade.configuration.ScpCallingAE>
18      <aeTitle>ALL</aeTitle>
19      <callingAeIp>0.0.0.0</callingAeIp>
20      <buildImageSR>>true</buildImageSR>
21      <fetchVAOnly>>false</fetchVAOnly>
22      <modalityBlockList>
23        <gov.va.med.imaging.facade.configuration.ScpModalityList>
24          <dataSource>ALL</dataSource>
25          <addImageLevelFilter>>false</addImageLevelFilter>
26          <modalities>
27            <string>none</string>
28          </modalities>
29        </gov.va.med.imaging.facade.configuration.ScpModalityList>
30      </modalityBlockList>
31    </gov.va.med.imaging.facade.configuration.ScpCallingAE>
32  </callingAEConfigs>
33 </gov.va.med.imaging.facade.configuration.ScpConfiguration>

```

For additional DICOM SCU calling AE titles, insert an additional block of code (see Figure 27) containing the elements from lines 17 to 31 before current line 32 and then repeat steps 1 to 12 inside these additional lines that have been added.

After updating the ScpConfiguration.Config file, as described above, it is necessary to restart the Apache Tomcat service. One way this can be performed is by executing the restart script (Restart_VIX_Services.ps1) as described in the [VIX Installation Guide](#).

8.3. Laurel Bridge DICOM SCP Configuration

This section provides details on the Laurel Bridge DICOM file located in the cfg folder within the Laurel Bridge installation directory (C:\DCF_RunTime_x64\cfg by default). Updates to this file are useful for debugging purposes but the details on how to change this are beyond the scope of this document. For typical VIX operation, no changes are necessary to the Laurel Bridge DICOM file.

Open the DicomScpConfig file to perform edits. Run Notepad, Notepad++, or WordPad as an administrator and then open the file. Numerous entries can be updated in the DicomScpConfig configuration file (Figure 28). Save the DicomScpConfig file after updating the entries.

Figure 28: Sample DicomScpConfig Configuration File

```

1 [ application_info ]
2 name = DicomScp
3 description = Java server app that demonstrates use of QRServer and DicomSCP in DCS lib.
4 app_component_name = java_app/DicomScp
5 #app_component_name = cfg_app_name
6 execution_state = STOPPED
7
8 [ required_components ]
9 component = java_lib/LOG_a
10 component = java_lib/DCF
11 component = java_lib/LOG
12 component = java_lib/APC
13 component = java_lib/CDS
14 component = java_lib/APC_a
15 component = java_lib/CDS_a
16 component = java_lib/DCS
17 component = idl_lib/DDCS
18 component = java_lib/DSS
19 component = java_lib/DDS
20 component = java_lib/DDS_a
21 [ java_app ]
22
23 #=====
24 # per-instance information for the DicomScp component
25 #=====
26 [ java_app/DicomScp ]
27 #debug_flags = 0x0000f
28 debug_flags = 0x00000
29
30 #
31 # if true, demonstrate the DataSetByteReader class for making
32 # a a decoded, and re-encoded network C-Store-Request look like
33 # a ReadableByteChannel or InputStream object.
34 #
35 use_byte_reader = YES
36
37 image_directory =
38 make_new_uids = FALSE
39 test_cfg_name = dcms.cfg
40 dicom_files_dir = dcms.cfg
41
42
43 [ java_lib ]
44
45 #=====
46 # per-instance information for the LOG_a component
47 #=====
48 [ java_lib/LOG_a ]
49 debug_flags = 0

```

9. Configure ID Conversion

The Id Conversion Configuration calls VA's Master Veteran Index (MVI) to do the ID Conversion from ICN to Electronic Data Interchange Personal Identifier (EDIPI) or from EDIPI to ICN. On a VIX, DICOM SCP needs this functionality.

The VIX install populates the IdConversionConfiguration.config file in C:\VixConfig with the host, username, and password for the destination of ID conversion lookup.

NOTE: Since, the VIX install populates the IdConversionConfiguration.config file no additional manual configuration changes are expected during the Post-Installation steps.

If additional changes to the defaults for the ID Conversion Configuration are needed, open the IdConversionConfiguration.config file in C:\VixConfig. Run Notepad, Notepad++, or WordPad as an administrator and then open the file.

You can update the following entries for the ID Conversion Configuration (refer to Figure 29 for line numbers):

1. Set the protocol for the destination of ID conversion lookup (inside <protocol> </protocol> - line 16).
2. Set the entry for the host for the destination of ID conversion lookup (inside <host> </host> - line 17).
3. Set the port for the destination of ID conversion lookup (inside <port> </port> - line 18).
4. Set the username for the destination of ID conversion lookup (inside <username> </username> - line 19).
5. Set the password for the destination of ID conversion lookup (inside <password> </password> - line 20).
6. Set the trustStoreFilePath (inside <trustStoreFilePath> </trustStoreFilePath> - line 21) (only if a change is needed).
7. Set the trustStorePassword (inside <trustStorePassword> </trustStorePassword> - line 22) (only if a change is needed).
8. Set the urlResource for the destination of ID conversion lookup (inside <urlResource> </urlResource> - line 30) (only if a change is needed).

Save the IdConversionConfiguration.config file after updating the entries. The IdConversionConfiguration.config should look like (Figure 29):

Figure 29: Sample IdConversionConfiguration.config file

```

14 <gov.va.med.imaging.facade.configuration.IdConversionConfiguration>
15
16   <protocol>https</protocol>
17   <host>NEED.TO.CHANGE.HOST</host>
18   <port>    </port>
19   <username>**ADD USERNAME**</username>
20   <password>**ADD PASSWORD**</password>
21   <trustStoreFilePath>C:\VixCertStore\federation.truststore</trustStoreFilePath>
22   <trustStorePassword>**ADD PASSWORD**</trustStorePassword>
23
24   <!-- equal ("=") and ampersand("&") signs are not allowed in value per XStream.
25   |   <urlResource>/changeMe/vi/Patient?_query={queryMethod}&identifier=</urlResource>
26   |
27   |   DO NOT change anything after the last forward-slash ("/").
28   |-->
29
30   <urlResource>_____</urlResource>
31
32 </gov.va.med.imaging.facade.configuration.IdConversionConfiguration>

```

10. Appendix A: Image Sharing and DICOM Images

Images are delivered to VA sites by the CVIX.

10.1. VA DICOM Images Provided to DoD

DoD clinicians can request the types of exams from the VA listed in Table 27 via the CVIX:

Table 27: DICOM Modality Types Provided to DoD

| DICOM Modality Description | DoD Identifiers |
|------------------------------------------|---------------------------|
| Angioscopy (retired) | AS, RAD AS |
| Biomagnetic Imaging | BI, RAD BI |
| Color flow Doppler (retired) | CD, RAD CD |
| Cinefluorography (retired) | CF, RAD CF |
| Culposcopy (retired) | CP, RAD CP |
| Computed Radiography | CR, RAD CR |
| Cystoscopy (retired) | CS, RAD CS |
| Computed Tomography | CT, RAD CT |
| Duplex Doppler (retired) | DD, RAD DD |
| Diaphanography | DG, RAD DG |
| Digital Microscopy (retired) | DM, RAD DM |
| Digital Radiography | DR, RAD DR, DX, RAD DX |
| Digital Subtraction Angiography | DS, RAD DS |
| Echocardiography (retired) | EC, RAD EC |
| Endoscopy | ES, RAD ES |
| Fluorescein Angiography (retired) | FA, RAD FA |
| Fundoscopy | FS, RAD FS |
| General Microscopy | GM, RAD GM |
| Intra-oral Radiography | IO, RAD IO |
| Laparoscopy (retired) | LP, RAD LP |
| Laser Surface Scan | LS, RAD LS |
| Magnetic Resonance Angiography (retired) | MA, RAD MA |
| Mammography | MG, RAD MG |
| Magnetic Resonance | MR, RAD MR |
| Nuclear Medicine | NM, RAD NM |
| Positron Emission Tomography | PT, RAD PT |
| Radio Fluoroscopy | RF, RAD RF |
| Radiographic Imaging | RG, RAD RG |

| DICOM Modality Description | DoD Identifiers |
|------------------------------------------------------|------------------------|
| Single-Photon Emission Computed Tomography (retired) | ST, RAD ST |
| Thermography | TG, RAD TG |
| Ultrasound | US, RAD US |
| X-ray Angiography | XA, RAD XA |
| External-Camera Photography | XC, RAD XC |

11. Appendix B: VIX Tools

There are numerous tools the system administrator executes to monitor and manage the VIX server. Table 28 lists the VIX Tools available. To access the tools, navigate to [REDACTED/vix/viewer/tools](#) to be prompted to login (Figure 30). Use a VistA account with the MAG VIX ADMIN security key and INITIAL to log in. Once logged in, a VIX tools page will appear (Figure 31). Access a VIX tool by clicking Open.

Figure 30: Login Page

NOTE: In Table 28, please replace <FQDN> with your server's fully qualified domain name. For example: [REDACTED/VixServerHealthWebApp/secure/MyVix.jsp](#)

Table 28: List of URLs

| URL | Description |
|-----------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| REDACTED/Vix/ssl/JavaLogs.jsp | Displays information for Java Logs: <ul style="list-style-type: none"> • Filename • File Size • Date Modified |
| REDACTED/ROIWebApp/secure/ConfigureROI.jsp | To configure an ROI request and ROI options. Also, to reset the access and verify codes of the service account with the ROI periodic processing and DICOM (Q/R) credentials. |
| REDACTED/ROIWebApp/ | To verify the status of an ROI request and get information about ROI statistics on the ROI Processing Status page. |
| REDACTED/VixCache | To access the Cache Manager to manage metadata and images cached by the VIX. |
| REDACTED/VixServerHealthWebApp/secure/MyVix.jsp | Displays information for the VIX: <ul style="list-style-type: none"> • Start Time |

| | |
|---------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | <ul style="list-style-type: none"> • Up Time • Status • Realm Configuration • Tomcat Thread Details • Transaction Log • Site Service • Release of Information (ROI) • DICOM Services Transmit Failures |
| REDACTED/Vix/secure/VixLog.jsp | To access the VIX transaction log while the VIX is running, which contains information about every image and metadata transfer handled by the VIX. |

Figure 31: VIX Tools Page

