Enhanced Image Viewer

User Guide

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Revision History

NOTE: The revision history cycle begins once changes or enhancements are requested after the document has been baselined.

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Table of Contents

1.   Introduction

1.1.   Purpose

This manual describes the Enhanced Image Viewer. It is intended for clinicians who use hosting applications such as JLV and need access to images. This manual assumes that a current version of the Enhanced Image Viewer is installed and that users are familiar with the Microsoft Windows environment.

1.2.   Document Orientation

1.2.1.   Organization of the Manual

This document contains the following sections to assist in walking the reader through accessing and using the Enhanced Image Viewer application:

Section 1 – Introduction

Describes the document and is designed to aid the reader in how best to follow the document.

Section 2 – Enhanced Image Viewer Overview

Describes how the Enhanced Image Viewer works. Explains the main Enhanced Image Viewer Window and how the Enhanced Image Viewer handles images.

Section 3 – Using the Enhanced Image Viewer

Describes how to use the Enhanced Image Viewer. References the image manipulation toolbars and explains how close the viewer.

Section 4 – Troubleshooting

Describes how to access some of the information contained in the Enhanced Image Viewer that will assist the user in troubleshooting some issues that may occur when using the application.

Glossary

Defines the Acronyms and Terms used and referenced in this document.

Appendix – Supported File Extensions

Describes the various file extensions of those images supported and that can be viewed with the Enhanced Image Viewer application.

1.2.2. Coordination

Use of the Enhanced Image Viewer is subject to the following provisions:

Caution: 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 Enhanced Image Viewer is not intended for the primary interpretation of radiology exams. When the Enhanced Image Viewer is installed on approved and properly maintained hardware, primary interpretation of other image types is permissible by licensed practitioners at their discretion.

The FDA classifies VistA Imaging, and the Enhanced Image Viewer (as a component of VistA Imaging) as a medical device. Unauthorized modification to VistA Imaging, including the Enhanced Image Viewer, such as the installation of unapproved software, will adulterate the medical device. The use of an adulterated medical device violates US federal law (21CFR820).

1.2.3. Disclaimers

This is a controlled document. No changes to this document may be made without the express written consent of the VistA Imaging Office of Enterprise Development group.

While every effort has been made to assure the accuracy of the information provided, this document may include technical inaccuracies and/or typographical errors. Changes are periodically made to the information herein and incorporated into new editions of this document.

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VistA Imaging Office of Enterprise Development
Department of Veterans Affairs
Internet: http://www.va.gov/imaging
Imaging VI SharePoint: http://vaww.oed.portal.va.gov/applications/VistAImaging/default.aspx

1.2.3.1. Software Disclaimer

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1.2.3.2. Documentation Disclaimer

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1.2.4. Documentation Conventions

This document uses the following conventions:

- Controls, options, and button names are shown in **Bold**.
- A vertical bar is used to separate menu choices. For example: "Click **File | Open**" means: "Click the **File** menu, then click the **Open** option."
- Keyboard key names are shown in bold and in brackets.
- Sample output is shown in `monospace`.
- When this document is used online, hyperlinks are indicated by blue text.
- Useful or supplementary information is shown in a **Tip**.
- Important or required information is shown in a **NOTE**.
- Critical information is indicated by:

1.2.5. References and Resources

Additional information about VistA Imaging can be found at:

- VistA Imaging: http://www.va.gov/vdl/application.asp?appid=105

1.3. Enterprise Service Desk and Organizational Contacts

If you encounter any problems using the Enhanced Image Viewer, contact your local Imaging Coordinator or support staff. If the problem cannot be resolved locally, use CA Service Desk Manager to place a service request, or contact the Enterprise Service Desk at 1-855-673-4357.

2.   Enhanced Image Viewer Overview

2.1.   How the Enhanced Image Viewer Works

The Enhanced Image Viewer adds image display capabilities to hosting applications in the same way the Clinical Display application adds image display capabilities to the Computerized Patient Record System (CPRS). The Enhanced Image Viewer is a web-based application and currently provides a subset of features of Clinical Display. The image viewer will be enhanced over time to include all features of Clinical Display.

With the Enhanced Image Viewer, a user can display images associated with progress notes or radiology reports.

The Enhanced Image Viewer can be launched from a hosting application such as JLV.

Note that certain Clinical Display features (such as filters) and image types (such as EKG images stored on MUSE servers) are not currently available in the Enhanced Image Viewer.

2.2. Main Enhanced Image Viewer Window

The image below (Figure 1) shows the main Enhanced Image Viewer window and its various components.
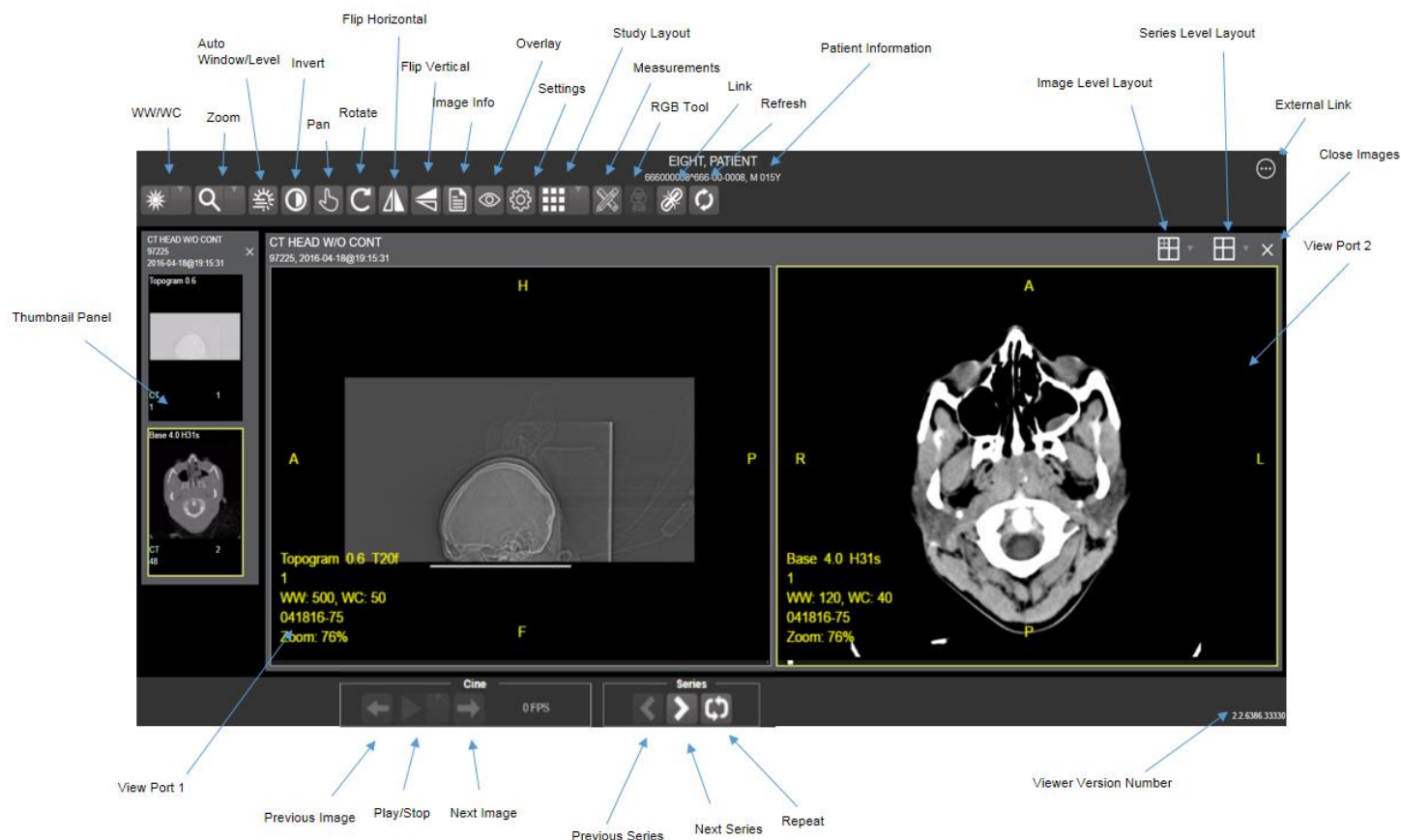
Figure 1

2.3. Enhanced Image Viewer Web-Based Application

The Enhanced Image Viewer Web Application enables users to access patient images using VA approved versions of Internet Explorer. The Enhanced Image Viewer can be accessed using hosting applications such as JLV.

The Enhanced Image Viewer Web Application allows users to locate and display any patient images available to the VA from VistA Imaging, including DoD images.

3. Viewing Images

3.1. Launching the Viewer

Upon launching the viewer, the following loading screen (Figure 2) will display:

Figure 2

The first time a study is launched, the images will be pre-processed and loaded into a cache on the VIX server. After the images are cached, the next time that study is selected, the study will take less time to load.

If there is trouble loading an image or multiple images, the following screen will display (Figure 3) with the option to either proceed or empty the cache and try again. If the proceed option is selected, the study will load without the problem images. If the cache is emptied, the viewer will attempt to re-process all the images for the study.
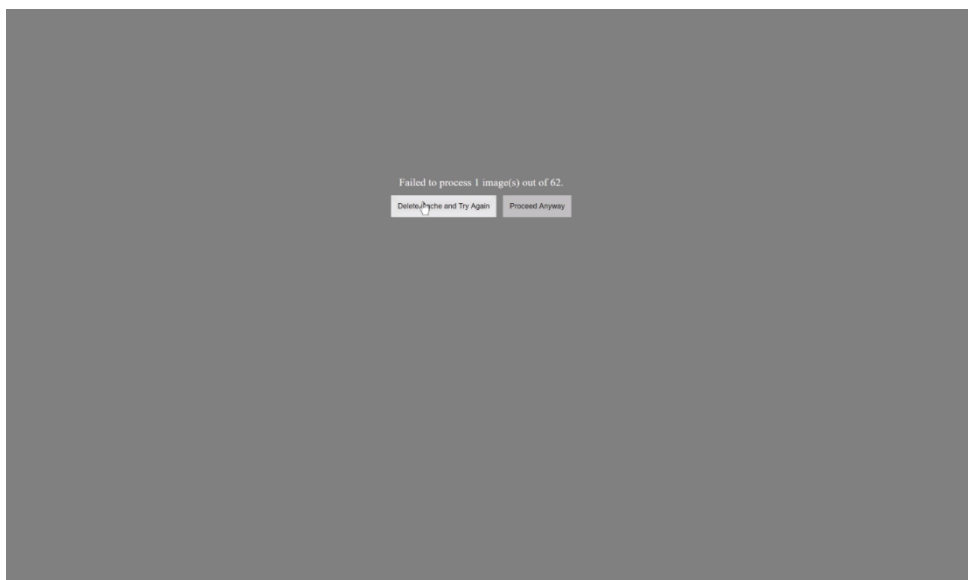
Figure 3

3.2. Loading Images

When the Enhanced Image Viewer window opens, it displays thumbnail placeholders until the thumbnails themselves are retrieved. See table in section 3.3.1 for an example of a thumbnail.

To display images associated with thumbnails,

1   On the left side of the Enhanced Image Viewer window, locate the thumbnail for the desired image.

2   Click the desired thumbnail. A progress window will be display as shown below (Figure 4), until the loading of the image is complete:
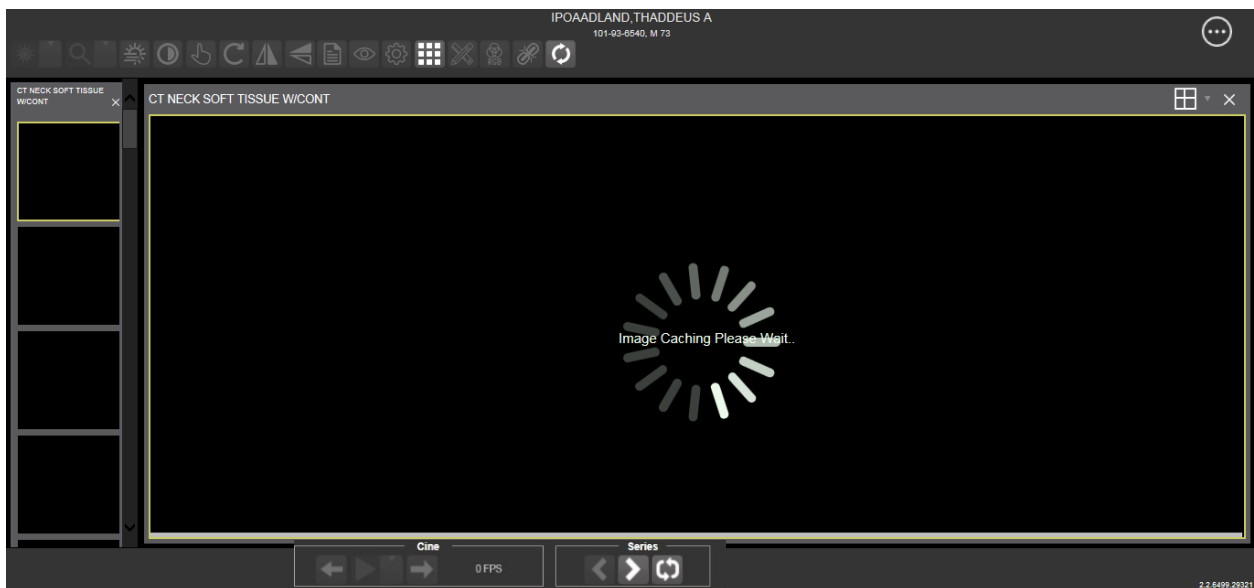
Figure 4
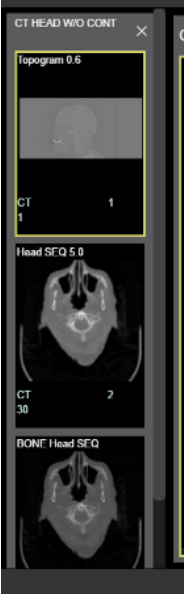
3.3. Working with Images

The functions described below are used to change how the images are displayed.

NOTE: Any changes made to the images as described below apply only to the current session. They will not be saved for subsequent sessions.

3.3.1. Viewing Images and Manipulating View Layout

Button Icon	Button Name and Function	Description
	Image Level Layout	The image level layout button allows users to select how many images within each series are displayed within the view port for each series.
	Series Level Layout	The image series layout button manipulates how many series within the study will display on the view port.
	Close Images	The close images button will close the currently selected image from the view port.
	Thumbnail	The title of the series appears at the top left of the thumbnail. The type of image appears at the bottom left, with the number of images in the series directly below that. The series number is found on the bottom right of the thumbnail. For DICOM images, the modality code appears on the bottom left.

	Thumbnail Panel	To adjust the size of the thumbnail panel, click and drag the right edge of the panel. This will affect how many thumbnails are shown per row within the panel, but will not alter the size of the thumbnails. When hovering over the view port and viewing non-stacked images, use the mouse wheel to scroll between the different series displayed in the thumbnail panel. Drag and drop can be used to drag thumbnails to the view port. A yellow outline will appear around the thumbnail that is currently being viewed in the view port.

3.3.2. Viewing Stacked Images

When viewing a stacked image series, use the mouse wheel to scroll between the images in the stack. Upon scrolling, if multiple series are displayed in the view port, scout lines will appear on the images of the other series in a different plane to indicate what part of the body the series is displaying. See Figure 5 below.
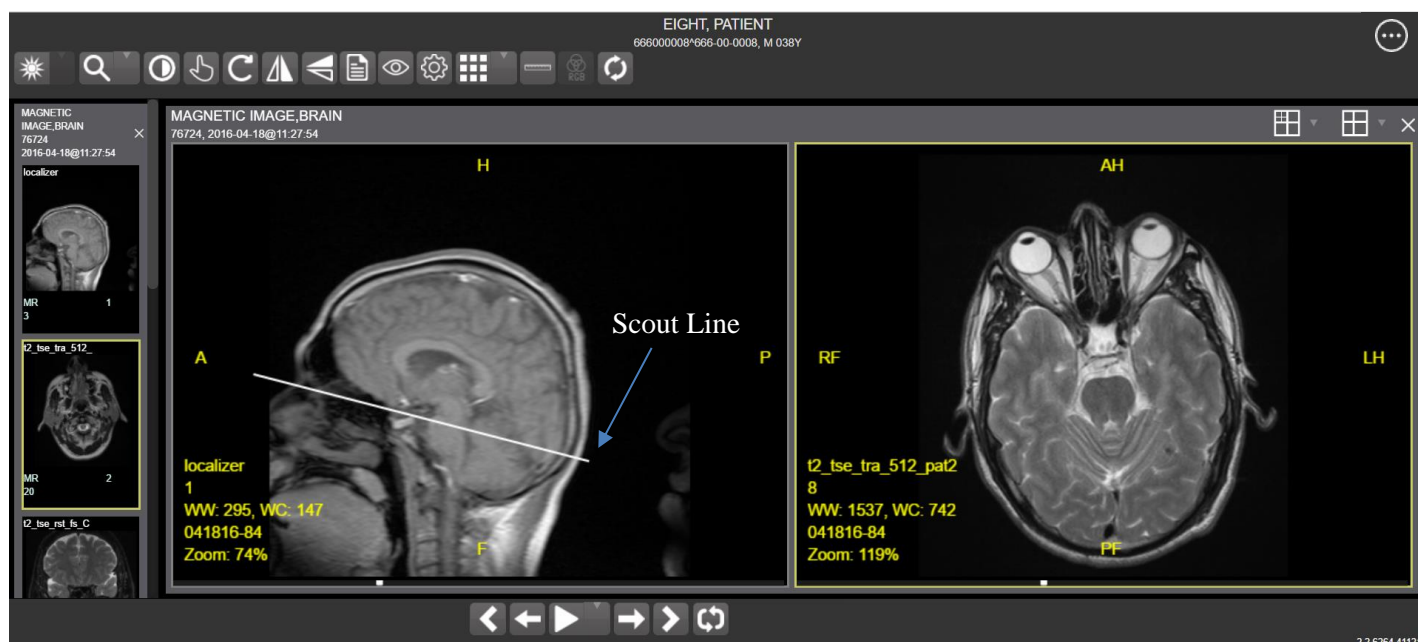
Figure 5

3.3.3. Using the Image Navigation Toolbar

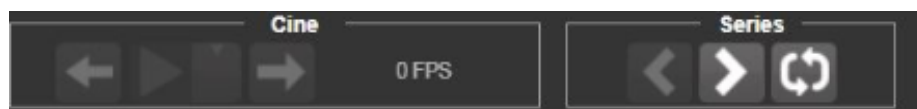The navigation toolbar will appear automatically when applicable.. See Figure 6 below:

Figure 6

Button Icon	Button Name and Function	Description
	Previous Series and Next Series	The previous and next series buttons allow users to toggle between the various image series in the study.
	Previous Image and Next Image	The previous and next image buttons allow users to scroll through the images within the currently selected series.
	Play and Stop	The play and stop buttons will begin and end playing through a cine image series.
	Repeat	When the repeat series button is selected, the current series will repeat. When it is deselected, all the series will play through before repeating the current series.

- While a series is playing, a number will appear next to the image navigation toolbar. The first number is the frame rate the series is currently playing, and the second number is the frame rate the series was recorded at. See Figure 7 below.

Figure 7

- NOTE: The first time a series plays, it may play slower as the images are caching. Once the images are cached, the series will play faster.

3.3.4. Document Viewer

When viewing a document, the document viewer will load and the image viewer toolbars will be disabled. See Figure 8 below for an example of the document viewer.
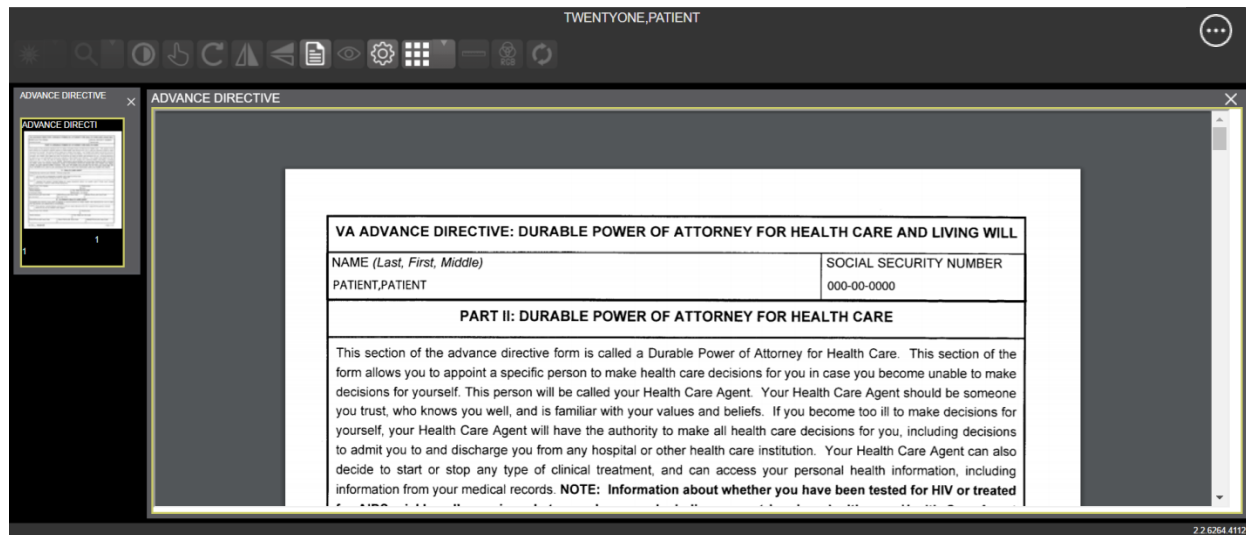

Figure 8

3.3.5. Printing an Image

To print an image, right click on the image and a drop down bar will display. See Figure 9 below for an example.
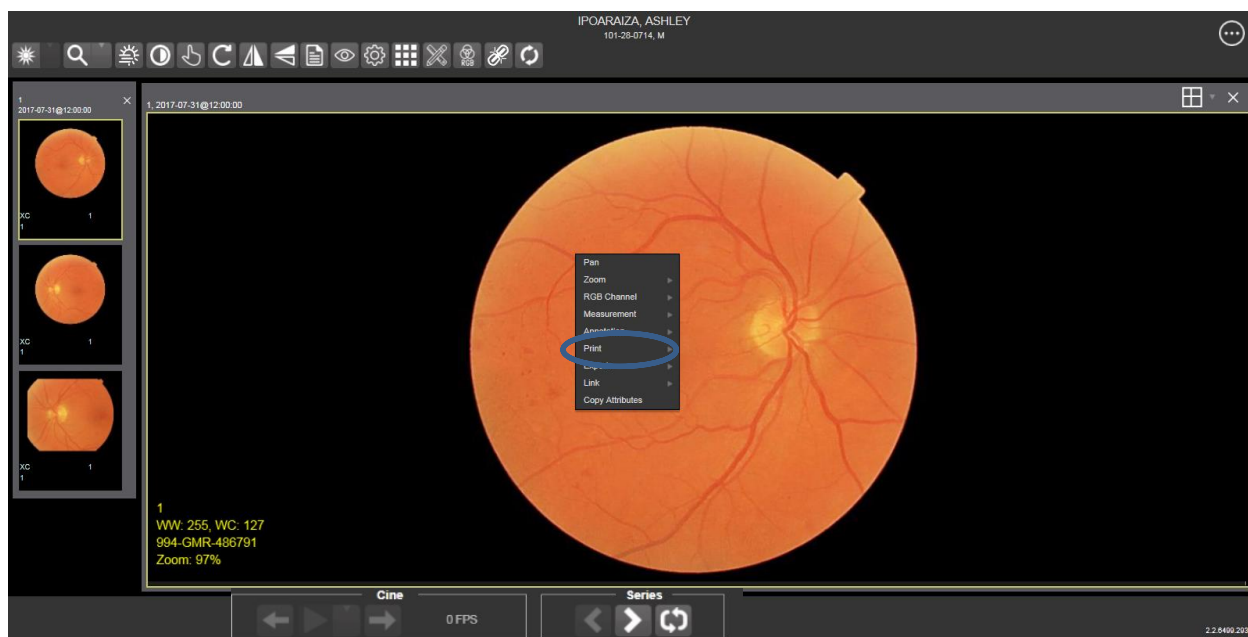
Figure 9

After selecting the print option, user may select from print options. The user will also need to select a print reason and enter their digital signature. After print options are selected, the image will open in a new tab in a printable form. The user can now print the image by pressing File | Print, or Ctrl+P. See Figure 10 below for an example.
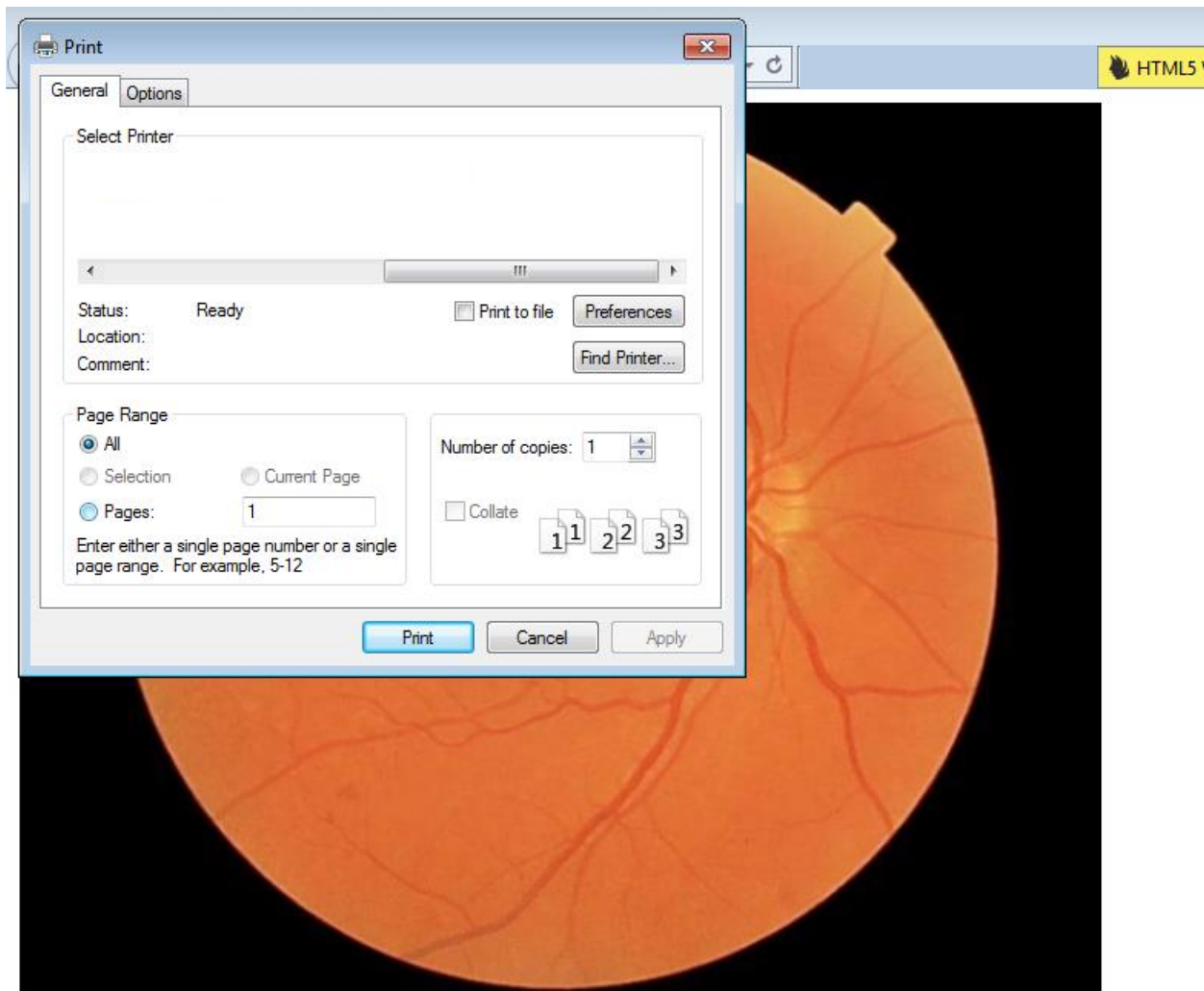

Figure 10

3.3.6. Exporting an Image

To export an image, right click on the image and a drop down bar will display. See Figure 11 below for an example.
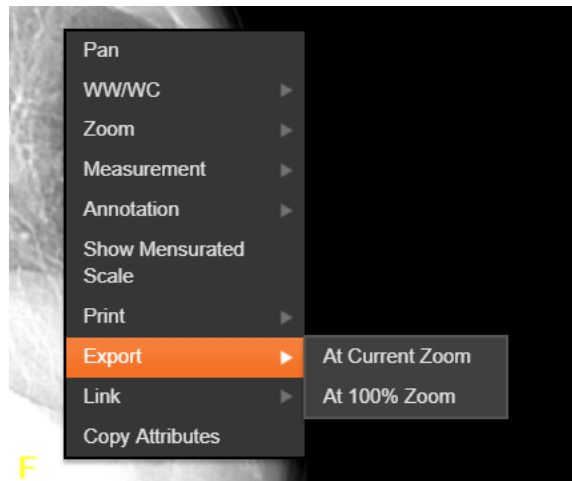

Figure 11

After selecting desired zoom, user will be prompted to enter digital signature. Once the signature is entered, the image will be exported.

3.3.7. External Links

Click the button in the top right corner of the viewer (shown below in Figure 12) to view the External Links options (Figure 13).
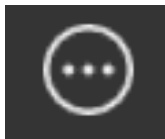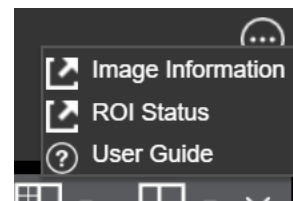

Figure 12

Figure 13

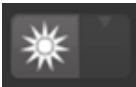## 3.4. Using the Enhanced Image Viewer Toolbar

The toolbar provides access to a variety features of the Viewer while viewing an image. Dependent upon the type of image, some of these capabilities may be unavailable (will be grayed out indicating that the specific functionality is not accessible). See Figure 14 below for an example of a grayed out toolbar button. See Figure 15 below for an image of the toolbar.
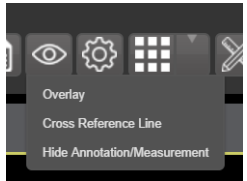
Figure 14

Figure 15

Button Icon	Button Name and Function	Description
	WW/WC (Window/Level)	Provides the ability to set the WW/WC (Window/Level) View. When the WW/WC button is selected, click and drag on the desired image to alter the grayscale value of the image. For CT images, a CT preset menu will be available with the following options: Default, the Abdomen, the Bone, the Brain, the Head/Neck, the Lung, or to Customize.
	Zoom	Provides the ability to resize the image to 100%, or Fit to Window, or Fit Width to Window, or Fit Height to Window, or to Customize the sizing. When the Zoom button is selected, click and drag the image to zoom in and out.
	Auto Window/Level	Provides the ability to click and drag on selected image to adjust the window/level.
	Invert	Inverts the image.
	Pan	When selected, click and drag the image to pan and view the desired area.
	Rotate	Rotates the Image 90 degrees' counter-clockwise.
	Flip Horizontal	Flips the Image horizontally.

	Flip Vertical	Flips the Image vertically.
	View Image Info	Views the DICOM Attributes and Metadata for the Image.
	Overlay	"Overlay" toggles the overlay on and off. "Cross Reference Line" toggles the scout lines on and off. "Hide Annotation/Measurement" either shows or hides the annotations and measurements the user has created on the image.
	Settings	Provides the ability to set the Cine, Measurement and Layout Preferences. For more information on the settings, see section 4.2 below.
	Study Level	Provides the ability to set the Study Level to 1x1, 1x2, 1x3, 2x1, 2x2, 2x3, 3x1, 3x2, or 3x3.
	Measurements	Provides the ability to access the 2D Length, the Angle Tool, 2D Point, 2D Length Calibration, or Delete All. For more information on the measurement options, see section 4.4 below.
	RGB Tool	Access the RGB Tool. For more information on the RGB tool, see section 4.5 below.
	Link	Allows user to select two image stacks and scroll simultaneously.
	Refresh	Provides the ability to refresh the image to its original settings.

3.4.1.   Viewing Information on an Image

- To view an image's information, select the **Image Info** Button.
- To view the **DICOM** information, select **DICOM Header.**
- A screen showing the **DICOM Attributes** will display as shown below (Figure 16):

Figure 16

- To view the **Imaging Data** for the Image, select the **Imaging Data** option.
- A screen showing the **Image Metadata** will display as shown below (Figure 17):

Figure 17

3.4.2.   Changing the Settings of an Image

- Select the **Settings** button to view or update the settings options.

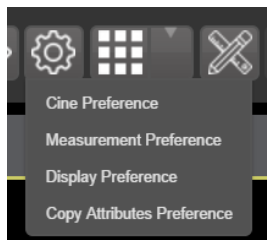- The following screen will be displayed (Figure 18):

Figure 18

- To view or update the Cine Settings, select the **Cine Preference** and the following screen will display (Figure 19):
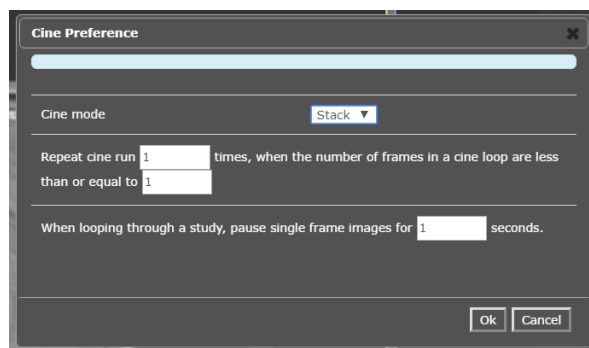
Figure 19

- To view or update the Measurement settings, select the **Measurement Preference** and the following screen will display (Figure 20):
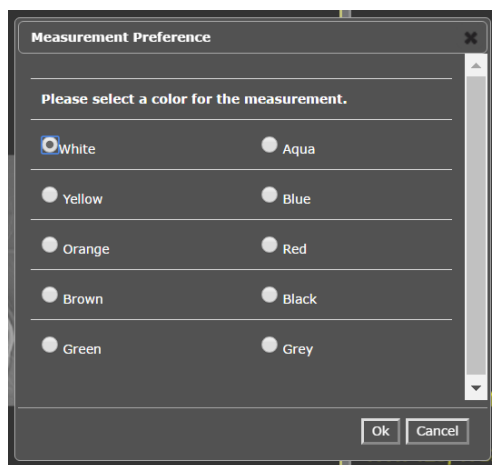
Figure 20

- To view or update the Display settings, select the **Display Preference** and the following screen will display (Figure 21): (Once display settings are selected, the user preferences will be saved for the next time the user opens a study of the same type)

Figure 21

- To view or update the Copy Attributes Preferences, select **Copy Attributes Preference** and the following screen will display (Figure 22):
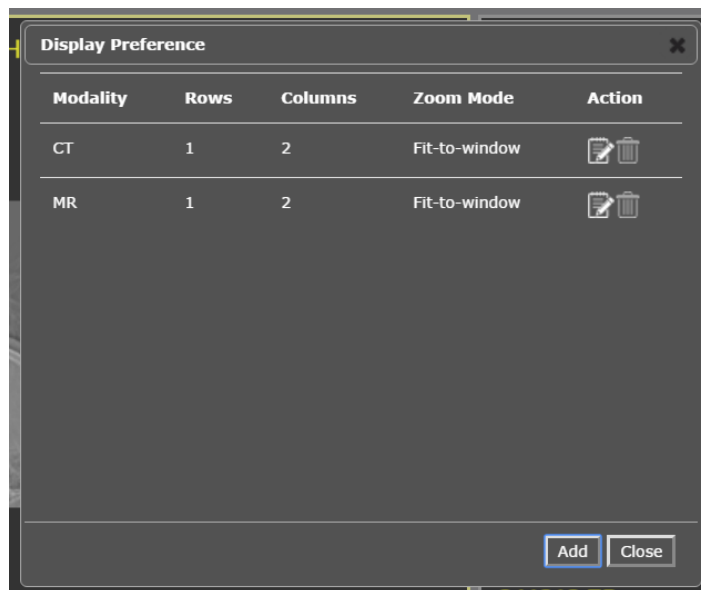

Figure 22

3.4.3.　Changing the Study Layout

- To change the study layout, select the **Study Layout** Button.
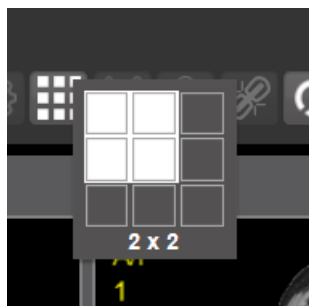- The following screen will display (Figure 23):

Figure 23

- Select the study level that you best suits your purpose.

3.4.4.　Using the Measurements Tools

- To use the various measurement tools, select the **Measurements** Button.

- The following screen will display (Figures 24, 25, 26):
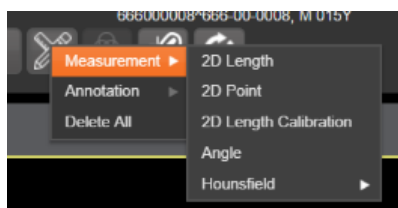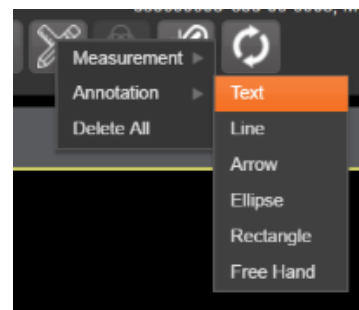
| **Figure 24** | **Figure 25** | **Figure 26** |

- The **2D Length** option draws the necessary line(s) to obtain desired measurements.

- The **Angle Tool** draws the necessary line(s) to measure the desired angle.

- The **2D Point** tool places the necessary dots to obtain desired measurements. This option is typically used for ultrasound studies to measure velocity.

- The **2D Length Calibration** option calibrates measurements to ensure accurate data. Images with DICOM info use the DICOM info to inform measurement calibration, but images without this data need calibration to show accurate data. See Figure 27 below.

Figure 27

- The **Hounsfield** tool takes circular and rectangular density measurements. See Figure 28 below.
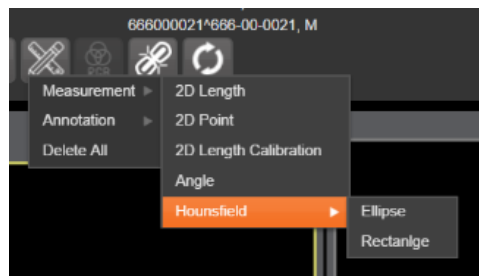
Figure 28

- The **Text** tool allows users to create text boxes on the image.

- The **Line** tool draws straight lines on the image.

- The **Arrow** tool draws straight arrows on the image.

- The **Ellipse** tool draws ellipses on the image.
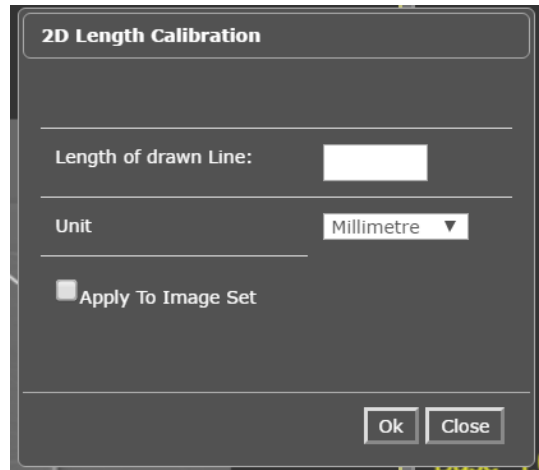
- The **Rectangle** tool draws rectangles on the image.

- The **Free Hand** tool connects points that have been specified by the user to create any desired shape.

- To delete all of the measurements and markings that you have made on the current image, select the **Delete All** option.

3.4.5. Using the RGB Tool

The **RGB Tool** button filters the image for certain color channels to allow for various observations. When selected, a drop-down menu (Figure 29) will appear that allows the user to select the desired color channel.

Figure 29

3.5. Closing the Enhanced Image Viewer

To close the Enhanced Image Viewer window, click the "X" on the tab in the browser. See Figure 30 below.
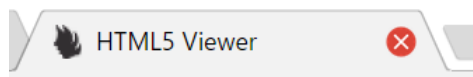
Figure 30

NOTE: The Enhanced Image Viewer closes automatically with a different patient selection.

4. Troubleshooting

To display version information and message history about the Enhanced Image Viewer, click the **Viewer Version Number** located in the lower right corner of the Enhanced Image Viewer window. See Figure 31 below.

Figure 31

To exit the window, click the "X" in the top right corner.

The **Imaging Info** found in the top toolbar can also be used for troubleshooting. See section 3.4.1 for more info.

Glossary

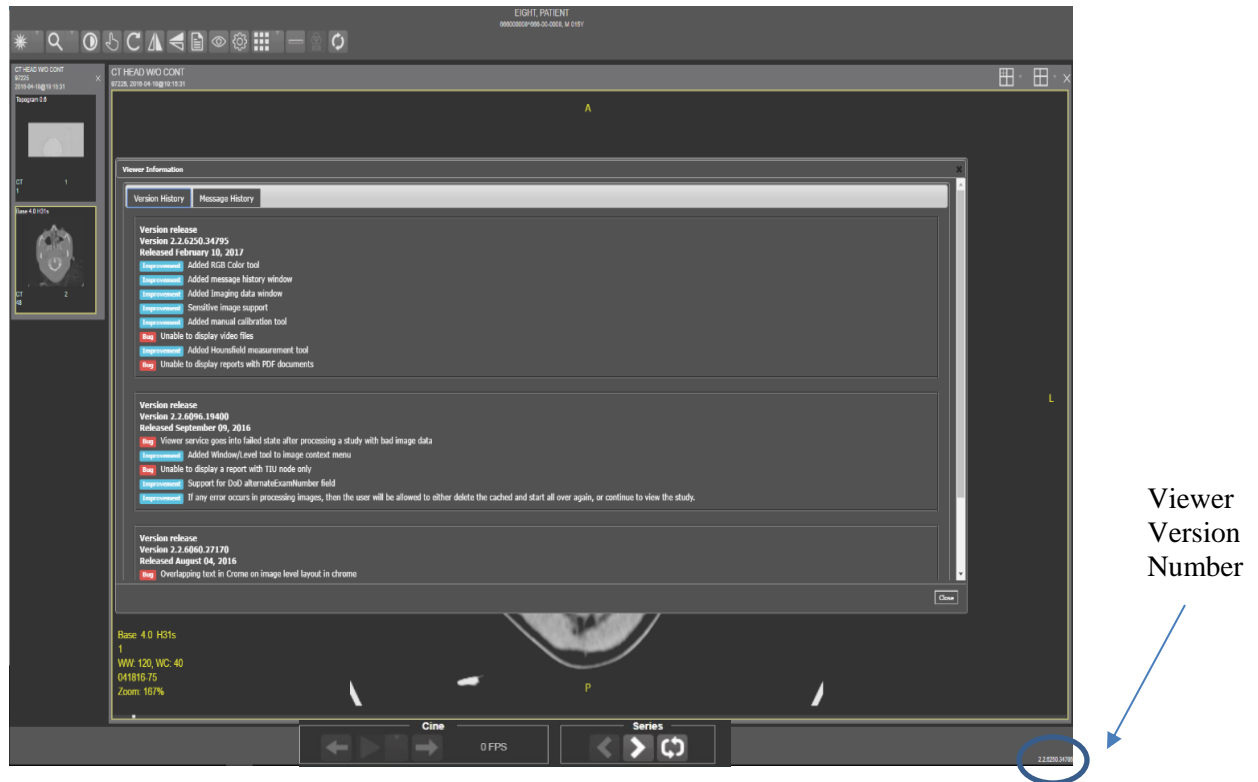| Acronym /Term	Definition
Enhanced Image Viewer	Enhanced Image Viewer
CPRS	Computerized Patient Record System
DICOM	Digital Imaging and Communications in Medicine
EKG	Electrocardiogram
FAQ	Frequently Asked Questions
FDA	Food and Drug Administration
ID	Identifier or Identification
JLV	Joint Legacy Viewer
Multi-frame	A DICOM image that contains multiple two-dimensional pixel planes in a single file. When the file is displayed, each plane (frame) is presented as a separate image. This separation is automatically handled in the Radiology Viewer.
MUSE	A third-party cardiology information system used to store and manage EKG (electrocardiogram) images. If a VA facility stores their images in MUSE, they will not be accessible to the Enhanced Image Viewer.
VA	Veteran Affairs
VistA	Veterans Health Information System and Technology Architecture

Appendix – Supported File Extensions

Extension	Description	Associated Viewer
756	Historical 756	Radiology Viewer or Full Resolution Viewer depending on image type.
ABS	Abstract file	Abstract area
ASC	ASCII text file	Not Supported
AVI	Motion video	Video Player
BIG	X-ray file 2000K	Radiology Viewer
BMP	Bitmap	Full Resolution Viewer
BW	Black and white	Radiology Viewer or Full Resolution Viewer depending on image type.
DCM	DICOM	Radiology Viewer
DOC	MS Word document	Microsoft Word
DOCX	MS Word document	Microsoft Word
HTM	Web HTM document	Not Supported
HTML	Web HTML document	Not Supported
JPG	JPEG full color	Full Resolution Viewer
MHT	MIME HTML web page archive	Not Supported
MHTML	MIME HTML web page archive	Not Supported
MP3	Motion video MPEG-3	Not Supported
MP4	Motion video MPEG-4	Not Supported
MPEG	Motion video MPG	Not Supported
MPG	Motion video MPG	Not Supported
PAC	X-ray PAC image	Radiology Viewer
PDF	Adobe PDF	Full Resolution Viewer
RTF	Rich text format	MS Word
TGA	TARGA image	Radiology Viewer

TIF	Tagged Image File Format	Full Resolution Viewer
WAV	Audio wave file	Not Supported