# Cisco Video Surveillance Monitoring Workstation Performance Baseline Specification, Release 7.11

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## Contents




**Americas Headquarters:**
**Cisco Systems, Inc., 170 West Tasman Drive, San Jose, CA 95134-1706 USA**

# Overview

This document provides the performance baseline for a video surveillance monitoring workstation. The performance of a workstation on which you display multiple windows of surveillance video depends on many variables, including, CPU, memory, bus speeds, graphics card capabilities, and other applications that are installed on the workstation. Overall quality of experience also can vary depending on the type of system used, the number of video streams being rendered, and the characteristics of those streams.

This document describes the performance baseline for a dedicated surveillance monitoring workstation to ensure the overall quality of the monitoring experience. This document also describes the maximum number of video streams that can run with acceptable quality on a monitoring workstation when using different codecs (MPEG-4, H.264 and H.265) The values listed in the standard-definition acceptable load table were verified using NTSC video settings.

**Note** Make sure that you are using the version of this specification that matches your version of Cisco Video Surveillance Manager (VSM). This specification is used to validate acceptable loads.

**Tip** Use the Cisco Video Surveillance Workstation Profiler Tool to determine the expected performance of a workstation. See the Using the Cisco Video Surveillance Monitoring Workstation Profiler Tool for more information.

# Workstation Specifications

Refer to the following for workstation requirements and acceptable loads:

- Table 1—Workstation Specifications
- Table 2—Windows OS and web browser requirements
- Table 3—Windows OS and Cisco SASD requirements
- Table 4—Acceptable Load per Client by Codec for Standard Definition (SD)
- Table 5—Acceptable Load per Client for High Definition (HD) H.264
- Table 6—Acceptable Load per Client for High Definition (HD) H.265

**Tip** See the "Enabling 64-Bit Video Monitoring using Internet Explorer (IE)" section on page 10 for more information.

Table 1 describes configurations for a monitoring workstation that displays video from Cisco Video Surveillance Manager (VSM) Release 7.11. Workstations with these configurations were used to determine the recommended maximum video loads. This assumes that the workstation is *dedicated* to video. Running other software, such as firewalls, anti virus applications, CD/DVD burning utilities, and general-purpose applications will reduce the quality of the user experience.

***Table 1 Video Surveillance Monitoring Workstation Recommended Specifications***

| Workstation Attribute | Physical Security Client Workstation |
|---|---|
| Windows OS and web browser | See Table 2. |

*Table 1 Video Surveillance Monitoring Workstation Recommended Specifications (continued)*

| | |
|---|---|
| Windows OS and Cisco SASD | Windows 7 SP1, 8.1, or 10 64-bit version.<br>See Table 3 for more information.<br>**Note** (Windows N and KN versions only) If Cisco SASD does not play sound effects (such as beeping when an alert is generated), you may need to install the Windows Media Feature Pack. Do not install this if sound effects play normally. |
| CPU | Intel Core i7, 3.07 Ghz or faster. |
| Memory | 6 GB DDR3 or greater (we recommend 12 GB for optimal performance). |
| Supported Graphics Cards | • NVIDIA GeForce GT 630<br>• NVIDIA GeForce GTX 660<br>• NVIDIA GeForce GTX 760<br>• NVIDIA GeForce GTX 960<br>• NVIDIA GeForce GTX 1060<br>**Notes**<br>• Always use two of the exact same supported graphics cards when connecting multiple monitors to a workstation.<br>• Always update the graphic card drivers to the latest version.<br>– Use the Cisco Video Surveillance Workstation Profiler Tool to display outdated graphics and network card drivers. Driver status is displayed in the "Issues" section of the profiler report. See Best Practice: Use the Workstation Profiler Tool, page 5 for more information.<br>– To update the outdated drivers, open the Windows "Device Manager", select the graphics card, and click **Action > Update Driver Software** (you can also right click the device entry).<br>• Intel HD graphic cards are not supported. |
| Network connection | Gigabit Ethernet (GigE) network connection required.<br>Update the network card drivers to the latest version. |
| Cisco Multi-Pane client software | The Cisco Multi-Pane client software installed on the PC.<br>• The Multi-Pane client is an Active X client that enables video playback and other features.<br>• You will be prompted to install Multi-Pane client the first time you log in to the Operations Manager, or if you are using a the 64-bit Internet Explorer (IE) web browser for the first time. Follow the on-screen instructions if prompted.<br>• You must have administrative privileges on the PC workstation to install the software.<br>**Note** By default, all video monitoring using Internet Explorer is performed using the 32-bit Cisco Multi-Pane client software. To enable 64-bit browser monitoring in Windows 7, 8 or 10 using IE, see the "Enabling 64-Bit Video Monitoring using Internet Explorer (IE)" section on page 10 |

*Table 1 Video Surveillance Monitoring Workstation Recommended Specifications (continued)*

| | |
|---|---|
| .Net 4.5 Framework | You will also be prompted to install the required Microsoft .Net 4.5 component, if necessary.<br>If your workstation does not have Internet access, download the .Net 4.5 installer. |
| User Account Type | A standard Windows user account is required (guest accounts are not supported). |
| DirectX Version | DirectX 11.0 or later (included with Windows 7). |

Table 2 describes the supported OS and web browser versions that can be used to monitor video.

*Table 2 Web Browser Video Monitoring Requirements*

| Windows OS | Internet Explorer Support |
|---|---|
| Windows 7 SP1, 8.1 or 10:<br>32 bit or 64-bit | Internet Explorer 11<br>32-bit or 64-bit |

**Note** The 64-bit version of Internet Explorer requires that the workstation run in "Protected Mode" See Enabling 64-Bit Video Monitoring using Internet Explorer (IE), page 10 for instructions.

Table 3 describes the supported OS to monitor video using Cisco SASD.

*Table 3 Cisco SASD Video Monitoring Requirements*

| Windows OS | Cisco Video Surveillance Safety and Security Desktop (Cisco SASD) Application |
|---|---|
| Windows 7 SP1, 8.1 or 10<br>64-bit | The Cisco SASD application requires a 64-bit Windows OS.<br>**Note** ( Windows N and KN versions only) If Cisco SASD does not play sound effects (such as beeping when an alert is generated), you may need to install the Windows Media Feature Pack. Do not install this if sound effects play normally. |

Table 4 shows the maximum number of standard-definition video streams that can run with acceptable quality on the recommended monitoring workstation.

*Table 4 Acceptable Load per Client by Codec for Standard Definition (SD)*

| | MPEG-4 | H.264 SD | Mixed |
|---|---|---|---|
| Video streams | 16 | 16 | 16 |
| Resolution | 4CIF | 4CIF | 4CIF |
| Frame rate | 30 fps | 30 fps | 30 fps |
| Bit Rate per stream (CBR) | 3 Mbps | 3 Mbps | 2-3 Mbps |

Table 5 shows the maximum number of high-definition video streams that can run with acceptable quality on the recommended monitoring workstation when using the H.264 codec.

***Table 5 Acceptable Load per Client for High Definition (HD) H.264***

| | H.264 HD | H.264 HD | H.264 HD |
|---|---|---|---|
| Video streams | 9 | 6 | 4 |
| Resolution | 720p | 1080p | 1080p |
| Frame rate | 30 fps | 30 fps | 30 fps |
| Bit Rate per stream (CBR) | 4 Mbps | 4 Mbps | 12 Mbps |

Table 6 shows the maximum number of high-definition video streams that can run with acceptable quality on the recommended monitoring workstation when using the H.265 codec.

***Table 6 Acceptable Load per Client for High Definition (HD) H.265***

| | H.265 HD | H.265 HD | H.265 HD | H.265 HD |
|---|---|---|---|---|
| Video streams | 16 | 12 | 6 | 4 |
| Resolution | 720p | 960 | 1080p | 1920p |
| Frame rate | 30 fps | 30 fps | 30 fps | 30 fps |
| Bit Rate per stream (CBR) | 1 Mbps | 1 Mbps | 1 Mbps | 1 Mbps |

**Note** H.265 video playback is only supported in the 64-bit ActiveX video client. The 32 bit ActiveX client does not support H265 video playback.

# Mixing Resolutions and Codecs

You can use several codecs on a monitoring workstation simultaneously. However, the number of streams does not necessarily combine linearly. In addition, a 1080p 12 Mbps streams should be mixed only with a single smaller resolution stream.

# Best Practice: Use the Workstation Profiler Tool

It is best practice to validate the performance of any existing system by using the Cisco Video Surveillance Workstation Profiler Tool. This tool enables the user of a workstation to determine the expected performance of the workstation.

See the Using the Cisco Video Surveillance Monitoring Workstation Profiler Tool for information about installing and operating this tool.

# Improving Workstation Playback Performance

Use the following methods to improve the performance of monitoring workstations when playing video:

# Using the Smooth Video Options

If live video playback is jittery due to network or other performance issues, use the **Smooth video settings** to automatically do the following:

- Create a video data buffer (in seconds) that delays live playback while video data caches.

  Live video can then be played back smoothly despite network delays between the camera, Media Server, and workstation.
- Automatically switch to a different stream if the live video quality is poor.

## Icon Colors

The video quality icons in each pane indicate the following:

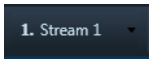
- Green  indicates video is performing as expected.
- Yellow  indicates that the client workstation has detected that playback is not smooth.
- Red  indicates a severe adverse situation. Action will be taken to correct the situation such as switching to secondary stream or iFrame streaming.

## Icon Cable Colors

- A blue cable (  or  ) indicates that the primary stream is being used.
- A red cable  indicates that the secondary or iFrame stream is being used.

## Usage Notes

- The *Smooth Video Options* are available only for live video on non-PTZ cameras (the *Smooth Video Options* are disabled on PTZ cameras).
- The settings are applied to all non-PTZ cameras and are persistent for the current PC workstation. Cisco SASD and the Operations Manager can have different settings.

  The settings remain if you log out and back in, or view a different camera and then return to the current camera.
- The Smooth Video options are disabled if you manually select a stream (click 

in the control bar).
  - The pane displays the selected stream even if the video quality is poor (the video does *not* automatically switch to the Smooth Video alternate stream).
  - To cancel the manually selected stream and re-enable the Smooth Video settings, reload the view or drag the camera onto the pane again.
- The Smooth Video option is disabled if you choose a video stream from a redundant media server (the camera will not use a secondary stream even if the video quality icon is red).
- In the Operations Manager, the **Save View** option is disabled, so you cannot save the view on Monitor Video page.

## Procedure

To enable smooth video:

**Step 1** Launch a Cisco VSM monitoring application, such as the Cisco Video Surveillance Safety and Security Desktop (Cisco SASD) application or the Cisco SASD Advanced Video Player.

**Step 2** Select **Settings > Video** to display the Video Settings window.

**Step 3** In the **Smooth Video Settings** pane, select the **Enable Smooth Video for Live/Non-PTZ Camera** check box to enable the smooth video options.

**Step 4** (Optional) Enter a value for **Buffer Pre-Roll (Seconds)** to define the number of seconds that live video to delay until recording begins.

Video data is saved in a cache on your PC to avoid pauses caused by network bandwidth and other issues.

We recommend a value between 1.5 and 3 seconds.

**Caution!** We strongly recommend that **Buffer Pre-Roll (Seconds)** be disabled (= **0**) because streaming delays can cause a potential security risk. It is a better practice to address the network bandwidth or performance issues that are causing the delays. Use **Buffer Pre-Roll (Seconds)** only when significant jitter occurs and a network resolution is not available.

**Step 5** Use the **Smooth Video Settings** to define an alternate video stream to use if video quality is poor despite the smooth video buffer (video quality is indicated by the  icon on the live viewing pane).

- **Secondary Stream**—(Only if configured on the camera) If the live video quality is poor  , automatically switch to the secondary video stream. Secondary streams typically present a lower-quality image that requires less bandwidth and processing.
- **iFrame Only**—If the live video quality is poor  , then display only iFrame video. iFrame video reduces the bandwidth requirement to correct the situation.
- **None**—If the live video quality is poor  , make no change and display the selected stream even if it results in jittery or paused playback.

  **Notes**

  – These options are not used if the video quality is *acceptable*  or if the icon is yellow (*intermediate*)  . The selected stream displays.

  – A red cable  displays when the secondary or iFrame stream is applied.

  – If an alternate stream is applied, the settings remain until you close and reopen the video source (camera).

# Displaying the Secondary Stream by Default

By default, cameras display a camera's primary video stream, which is often configured to display high resolution video. If workstation or network performance issues occur, you can create a video View to display the camera's secondary stream by default. Secondary streams are often configured to display the same video in lower resolution.

### Procedure

**Step 1** Access the video monitoring screen using the Cisco SASD or the Operations Manager UI.

**Step 2** Select a layout and add video cameras to the panes.

**Step 3** Select the secondary stream for the cameras:

- Cisco SASD—Select the stream and select Stream 2 from the controls.
- Operations Manager—Right-click the video pane, select **Select Streams** and select a lower-resolution secondary stream.

**Step 4** (Cisco SASD only) Save the layout as a View.

**Step 5** Select the view using Cisco SASD or the Operations Manager UI. The camera's secondary stream will be displayed.

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See the Cisco Video Surveillance Operations Manager User Guide or Cisco Video Surveillance Safety and Security Desktop User Guide for more information.

# Questions & Answers

**Q.** Can two video monitors be used, either with two graphics cards or one card with dual connectors?

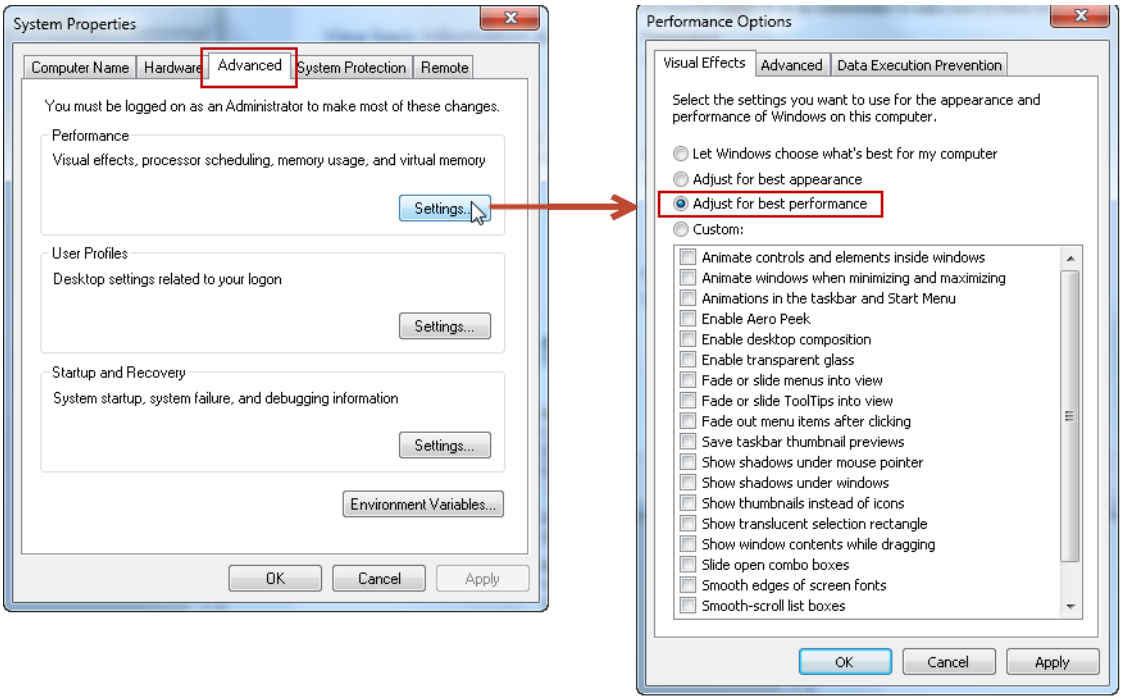
**A.** Up to 2 identical graphics cards may be used in a single system with up to a maximum of 4 monitors, two per graphics card. While additional graphics cards and/or additional monitors do not generate additional performance within a system, this configuration may be used to provide greater display flexibility. It must be ensured that the total aggregate video displayed within a single system, regardless of number of displays or graphics card, stays within parameters outlined above.

**Q.** What is the recommended Windows 7 Configuration when using dual graphics cards?

**A.** To configure a Windows 7 workstation with dual cards, we recommend the following.

1. Connect the monitors to the of the graphics cards using DVI connections.
2. On the Window 7 workstation select **Control Panel > System and Security**.
3. Select **System** and click **Advanced System Settings**.
4. In the **Advanced** tab, click the *Performance* **Settings** and select **Adjust for best Performance** (Figure 1).

*Figure 1 Adjusting a Workstation for Best Performance*




**Q.** Is the Video Surveillance Multipane Client supported on Windows 7 and Windows 8?

**A.** Yes, the Video Surveillance Multipane Client is supported on Windows 7 and Windows 8 using Internet Explorer or the Cisco Safety and Security Desktop. See the "Workstation Specifications" section on page 2. If you have a question about whether your workstation supports the VSM Multipane Client, use the workstation Profiler Tool (as described in the "Best Practice: Use the Workstation Profiler Tool" section on page 5).

**Q.** How do PAL video settings affect expected behavior?

**A.** While the standard-definition acceptable load tables were verified using NTSC video settings, using PAL settings (such as 25 fps) should not degrade the quality of the monitoring experience.

**Q.** Can I use a workstation that does not meet the recommended baseline specifications?

**A.** When considering the number of codecs, resolutions, and frame rates supported by VSM, and the number of workstations, graphics cards and processors that are available, it is difficult to determine the optimal workstation for a given user experience, so this document provides recommended maximum loads. Workstations that do not meet the baseline specifications may be able to render some video, but they cannot provide the same quality of monitoring experience. If you have a question about whether your workstation can perform the tasks that you need, follow the best practice of using the workstation Profiler Tool (as described in the "Best Practice: Use the Workstation Profiler Tool" section on page 5).

**Q.** What is the difference between "minimum requirements" and this "baseline specification"?

**A.** Minimum requirements define what is required to install and run the VSM Multipane Client to display a single video stream. They do not define acceptable loads for multi-paned use cases or the necessary configuration to ensure a quality monitoring experience.

# Enabling 64-Bit Video Monitoring using Internet Explorer (IE)

By default, all video monitoring using Internet Explorer is performed using the 32-bit Cisco Multi-Pane client software.

- The 32-bit version can display a maximum of 4 video panes (for example, in a 2x2 layout).
- The 64-bit version can display a maximum of 25 video panes (for example, in a 5x5 layout).

The 64-bit version of Internet Explorer, however, requires that the workstation run in "Protected Mode". To enable video monitoring in Windows 7, 8, 8.1 or 10 therefore, you must first enable "Protected Mode" on the workstation.

Refer to the following topics for instructions:

- Windows 7—Enabling 64-bit Video Monitoring with IE, page 10
- Windows 8 / 8.1 / 10—Enabling 64-bit Video Monitoring with IE, page 12

**Note** See Table 2, Windows OS and web browser requirements, for the IE support for your OS version

## Windows 7—Enabling 64-bit Video Monitoring with IE

**Procedure**

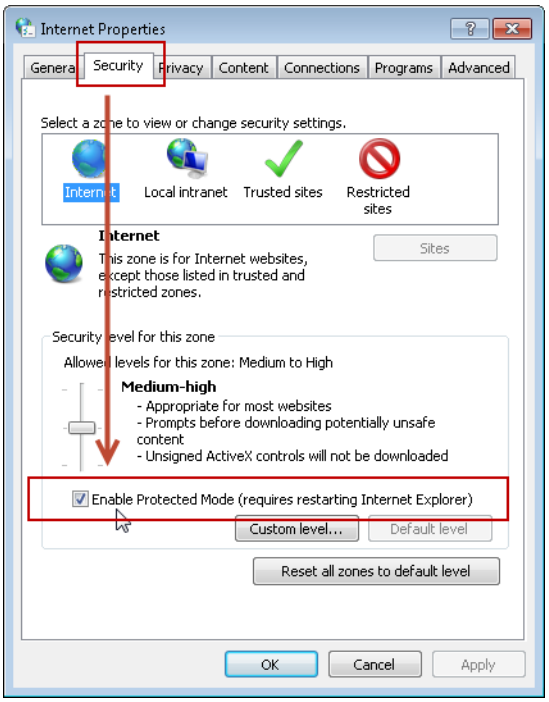
**Step 1** Turn on Enable Protected Mode.

a. Go to **Control Panel > Network and Internet > Internet Options**.

b. Click the **Security** tab.

c. Check the box for **Enable Protected Mode** (Figure 2).

*Figure 2 Enable Protected Mode*



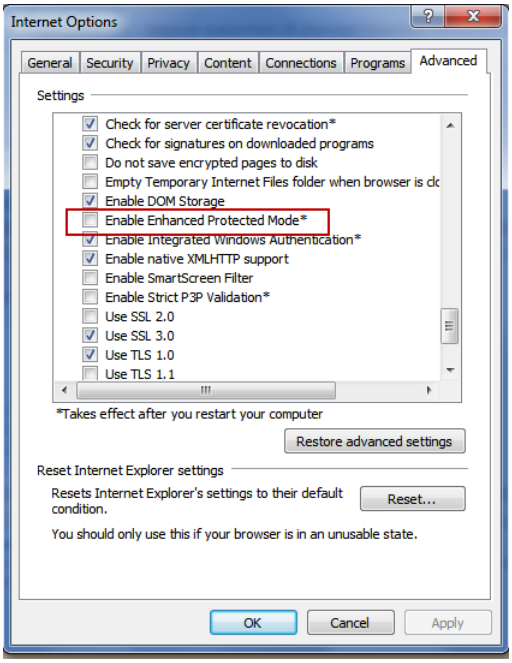

**Step 2** Turn on **Enable Enhanced Protected** mode.

a. Select the **Advanced** tab (**Control Panel > Network and Internet > Internet Options**).

b. Scroll down to **Security**.

c. Check the box for **Enable Enhanced Protected Mode** (Figure 3).

*Figure 3 Enable Enhanced Protected Mode*



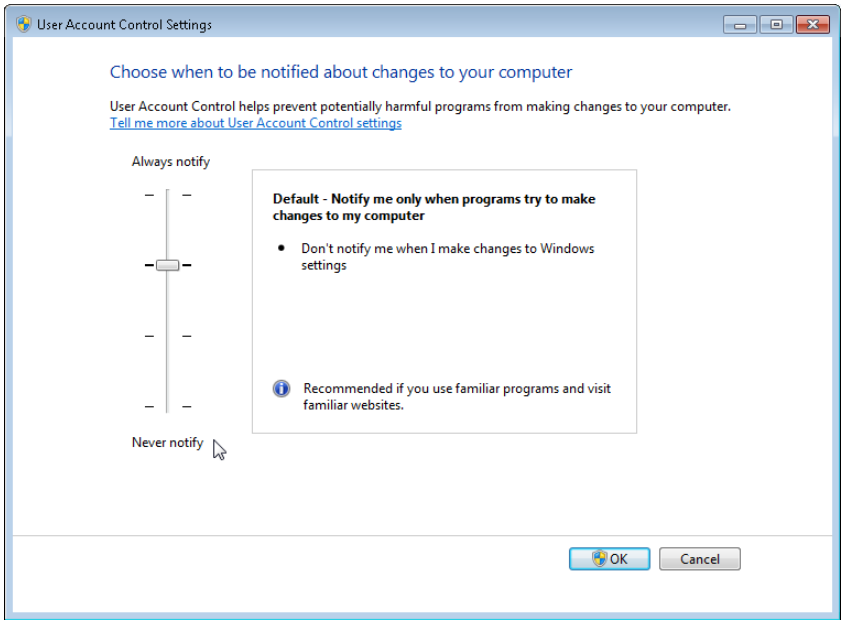
**Step 3** Ensure that User Account Control (UAC) is enabled.

a. Go to **Control Panel > User Accounts > User Accounts**.

b. Click **Change User Account Control settings**.

c. Verify that the slider is NOT set to **Never notify** (Figure 4).

***Figure 4 User Account Control (UAC)***




**Step 4** Create a registry entry under the key:

HKEY_CURRENT_USER\Software\Microsoft\Internet Explorer\Main\'TabProcGrowth' = 0

**Step 5** Restart your computer.

**Step 6** Launch the 64-bit Internet Explorer in normal user (non-admin mode).

**Step 7** Log on to the Operations Manager.

**Step 8** Install the 64-bit multi-pane client, when prompted.

# Windows 8 / 8.1 / 10—Enabling 64-bit Video Monitoring with IE

**Procedure**

**Step 1** Turn on Enable Protected Mode.

a. Go to **Control Panel > Internet Options > Security**.

b. Check the box for **Enable Protected Mode** (under **Internet Zone**).

**Step 2** Turn on **Enable Enhanced Protected** mode.

a. Go to **Control Panel > Internet Options > Advanced**.

b. Scroll down to **Security** and check the box for **Enable Enhanced Protected Mode**.

**Step 3** Create a registry entry under the key:

HKEY_CURRENT_USER\Software\Microsoft\Internet Explorer\Main\'TabProcGrowth' = 0

**Step 4** Launch the 64-bit desktop version of Internet Explorer in normal user (non-admin mode).

**Step 5** Log on to the Operations Manager.

**Step 6** Install the 64-bit multi-pane client, when prompted.

# Saving Clips in Protected Mode Internet Explorer 64 bit

Internet Explorer running in "Protected Mode" is a low integrity process that can only write files to low integrity folders.

The default low integrity folder in the system is `$USER$\AppData\LocalLow`. To perform file system functions, such as saving snapshot, you can save the file to the default low-integrity folder or create a low integrity folder using the following steps:

**Procedure**

**Step 1** Create a new folder using file explorer.

**Step 2** Lower the integrity of that folder using the **icacls** command:

icacls <path> /setintegritylevel (OI)(CI)low

**Step 3** Save the clips to the new folder.

# Related Documentation

See the Cisco Video Surveillance 7 Documentation Roadmap for descriptions and links to Cisco Video Surveillance documentation, server and storage platform documentation, and other related documentation.