Dynamic Video Quality in AXIS Camera Station

Introduction

*The Liveview of AXIS Camera Station is (since version 5.03) automatically adapting its video quality between the **Low**, **Medium** and **High** profile depending on the current available size for the video stream and if it is zoomed in.*
*This means that if one is viewing one camera in fullscreen, the video will, with highest probability, be shown using the **High** profile. While if one resizes the window to a smaller size, or if the display monitor is small, the client will switch to the **Low** or **Medium** profile.*
All these switches are made in the background and one only sees a smooth transaction to the new stream.

How it works

Media profile selection (basic)

➢ If **Low bandwidth mode** is enabled in the Client settings:

> Uses **Low** quality media profile for any view.

Low bandwidth mode can be enabled for remote clients with limited bandwidth or performance from:

Customize > Live View

➢ If zoomed-in using digital zoom:

> Uses **High** quality media profile

➢ If the pixel count is larger than the pixel count of the **Medium** profile:

> Uses **High** quality media profile

➢ If the pixel count is larger than the pixel count of the **Low** profile:

> Uses **Medium** quality media profile

➢ Else:

> Uses **Low** quality media profile

Example 1: Using a 1080p monitor and displaying a 4-split view. ACS may choose the **Medium** profile for each video stream (usually around 1280 x 720).

Example 2: Using a 4k monitor and displaying a 4-split view. ACS may choose the **High** profile for each video stream (usually 1920x1080 or above, depending on the camera maximum resolution).

Example 3: Using a 1080p monitor and displaying a 9-split view. ACS may choose the **Low** or **Medium** profile for some of the video streams, depending on the camera resolution for the low profile (sometimes 640x360 or 480x360).

Example 4: Using a 4k monitor and displaying a 9-split view. ACS may choose the **Medium** profile for each video stream (usually around 1280 x 720).

How is the pixel count calculated? (advanced)

The calculation of the **pixel count** is done with the following formula:

$$pixelCount = Width * Height * DPI\_ratio * DPI\_ratio$$

Where **Width** is the width of the camera split view and **Height** is the height of the camera split view, as shown in the example below.
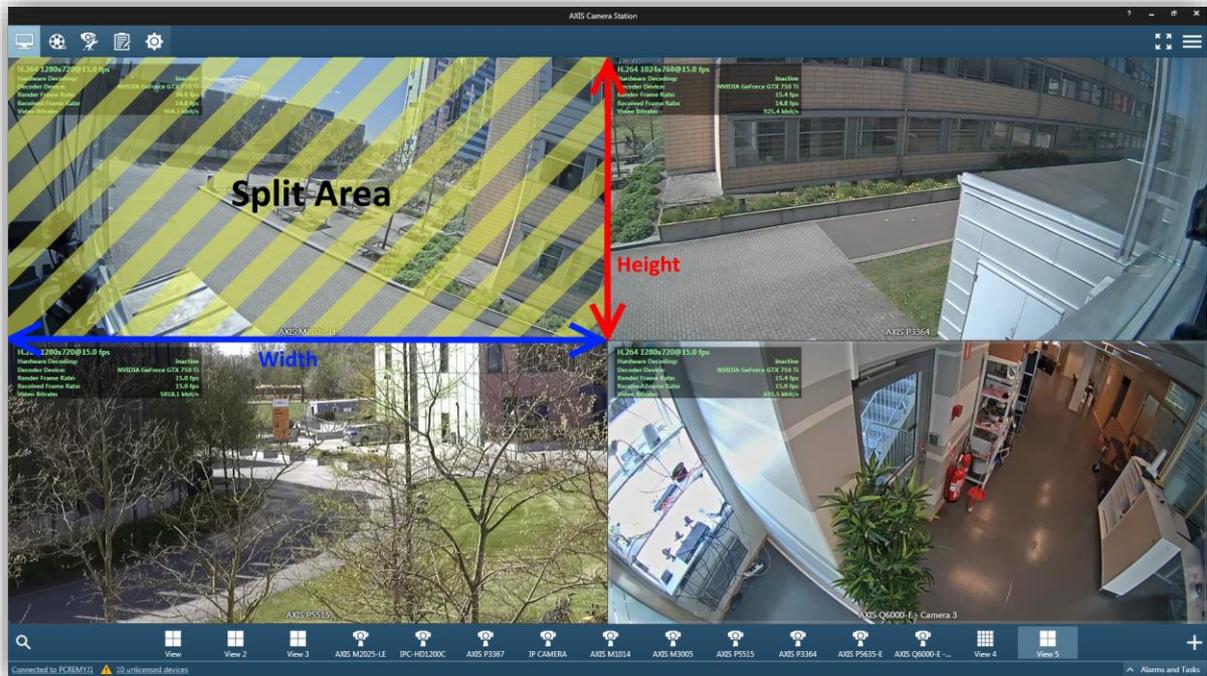
The **DPI ratio** can be found in the DxDiag of the client PC. For instance from a 1080p and 4K monitor in two separate systems:
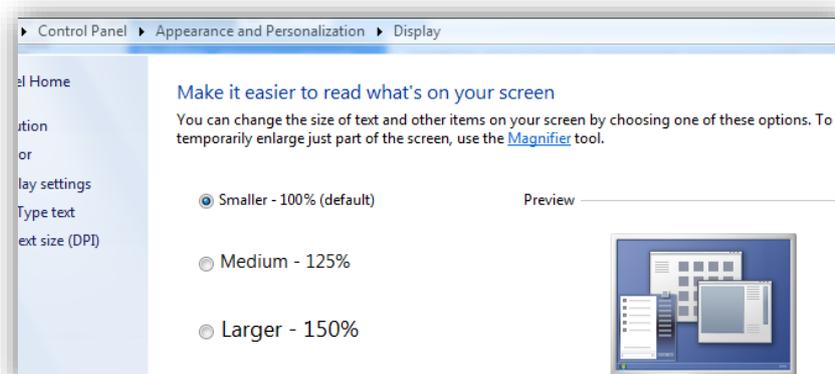

System DPI Setting: 96 DPI (100 percent)

Gives a DPI ratio of 1.

System DPI Setting: 288 DPI (300 percent)

Gives a DPI ratio of 3.

The DPI can be configured from the *Windows Control Panel > Appearance and personalization > Display*:

In other words:

- If the split area multiplied by DPI_ratio^2, is larger than the area of the **Low** profile, the **Medium** profile will be chosen.
- If the split area multiplied by DPI_ratio^2, is larger than the area of the **Medium** profile, the **High** profile will be chosen.

On 1080p monitors, the default DPI ratio is 1.
On 4k monitors, the default DPI ratio is usually 1.5 or 3.

Note: Until [Windows 10 with the Anniversary update](#) (Feature update to Windows 10, version 1607) was introduced, Windows does not handle DPI per monitor very well and uses system DPI instead. It can cause problems when using several monitors with different resolutions/DPIs, as the main monitor's DPI value will be used for any other monitor. The issue is wolved after upgrading Windows 10 with the Anniversary update and AXIS Camera Station to 5.12 or above.

Detailed calculations for Examples above:

	Camera	Model	High		Medium		Low	
📷	AXIS P3364 (2)	AXIS P3364	1280x960	25 fps	1024x768	15 fps	480x360	5 fps
📷	AXIS Q6128-E	AXIS Q6128-E	3840x2160	30 fps	1280x720	15 fps	640x360	5 fps

Video & Audio Settings

The **Low** profile pixel count is 640 x 360 = 230400 or 480 x 360 = 172800
The **Medium** profile pixel count is 1280 x 720 = 921600
The **High** profile pixel count is 3840 x 2160 = 8294400

Example 1: In this scenario, the split view area is measured to be 960 x 517 = 496320px and the DPI ratio is 1 so the Pixel Count is 496320 x 1 x 1 = 496320.
Since the Pixel Count (496320) is higher than the **Low** profile pixel count (230400), but lower than the **Medium** profile count (921600), the **Medium** profile will be used for each camera.

Example 2: In this scenario, the split view area is measured to be 1280 x 635= 812800px and the DPI ratio is 1.5 so the Pixel Count is 812800 x 1.5 x 1.5 = 1828800.
Since the Pixel Count (1828800) is higher than the **Low** profile pixel count (230400), and higher than the **Medium** profile count (921600), the **High** profile will be used for each camera.

Example 3: In this scenario, the split view area is measured to be 640 x 302 = 193280px and the DPI ratio is 1 so the Pixel Count is 193280 x 1 x 1 = 193280.
Since the Pixel Count (193280) is sometimes higher than some cameras' **Low** profile pixel count (172800) and sometimes lower (230400), the **Medium** profile will be used for some cameras and **Low** profile for some others.

Example 4: In this scenario, the split view area is measured to be 853 x 422 = 359966px and the DPI ratio is 1.5 so the Pixel Count is 359966 x 1.5 x 1.5 = 809923.

Since the Pixel Count (809923) is higher than the **Low** profile pixel count (230400) but lower than the **Medium** profile pixel count (921600), the **Medium** profile will be used for each camera.

Advance configuration of Media Profiles

Tolerance and customization (from ACS version 5.12):

From version 5.12, it is possible to optimize the selection of media profiles depending on the hardware performance, monitor size/resolution, camera resolution, bandwidth and other system requirements by editing the **ClientSettings.xml** file (located at *C:\ProgramData\Axis Communications\AXIS Camera Station\5.12.004* or similar) in the **Rendering** section:

- ToleranceVideoQualityMedium
- ToleranceVideoQualityLow

They are used to calculate the **pixel count** to compare against the **media profile pixel count** in the following way:
- pixelCount = Width * Height * DPI_ratio * DPI_ratio
- mediumPixelCount = pixelCount - ToleranceVideoQualityMedium
- lowPixelCount = pixelCount – ToleranceVideoQualityLow

mediumPixelCount is the value used for the **Medium** profile pixel count.
lowPixelCount is the value used for the **Low** profile pixel count.

Which means if we have a large **ToleranceVideoQualityMedium** the odds decrease **High** profile being chosen and if we have a large **ToleranceVideoQualityLow** then the odds decrease **Medium** profile being chosen.

So if one always wants **Low** quality then we need a large tolerance for both **Medium** and **Low**. If one always wants **Medium** quality then we only need a large tolerance for **Medium**.

Example: Using a 4k monitor with four 4k cameras in a 4-split view (Example 2 above). In this case High profile will be displayed in each of the four splits, which can lead to performance issues if the hardware of the client is not sufficient.
One may want to increase the **ToleranceVideoQualityMedium** in order to prevent the **High** profile from being used in 4-splits.

To do so, close AXIS Camera Station Client and open **ClientSettings.xml** located at *C:\ProgramData\Axis Communications\AXIS Camera Station\5.12.004* (or similar) and change **ToleranceVideoQualityMedium** from 0 to 1200000 for example in order to force the **Medium** profile in a 4-split view instead of **High** profile.

```
    <DisplayAdapter>
      <Description>NVIDIA GeForce GTX 750 Ti</Description>
      <DeviceId>4992</DeviceId>
      <DeviceIndex>0</DeviceIndex>
    </DisplayAdapter>
    <RenderMode>AxisVideoRenderer</RenderMode>
    <ToleranceVideoQualityMedium>1200000</ToleranceVideoQualityMedium>
    <ToleranceVideoQualityLow>0</ToleranceVideoQualityLow>
  </Rendering>
  <Recording Version="2">
    <CameraFrameRateLimit>120</CameraFrameRateLimit>
    <TotalDataRateLimit>10485760</TotalDataRateLimit>
    <TotalFrameRateLimit>600</TotalFrameRateLimit>
```