



**AudioVisual**  
conference automation

## Network Camera IP Latency Test

---

MVI AudioVisual B.V.  
Hanzelaan 192  
8017 JG Zwolle  
The Netherlands  
+31(0)85 0162 483  
[info@mvi-audiovisual.com](mailto:info@mvi-audiovisual.com)

## 1. About the Test

One of the key features of the MVI AudioVisual Software Suite is to enable network cameras to be integrated in the conference control system and to stream to local and remote displays.

An important part of this integration is to make sure that the connected IP streaming camera will have a processing path that is fast enough for lipsync display of the participant.

With this test we have tried to gather some information about the latency of IP connected cameras using our EasyCam DirectX driven Software using the fastest supported video codec of the camera.

All recorded values are averaged between the 3 photos taken with a fast shutter speed of 1/2000th of a second for accuracy. No further video processing software was running on the Laptop at the time to limit other factors.

## 2. The Equipment

To conduct a fair and repeatable test we need several pieces of software and hardware so we can measure the complete processing path from the camera back to the computers display.

This will make sure that lipsync is guaranteed and will show deficiencies in the cameras on-screen performance. Color differences can occur because of camera shutter speed, white balance and zoom.

### Test Setup:

Timer Hardware: MSI GE66 Raider 10UE Laptop with 240hz panel, Nvidia RTX GFX card, set to 1080p/240

Timer Software: MSI Laptop with a computer generated timer with a 500fps refresh rate (upper timer)

Timer Recorder: Samsung Galaxy S10e in Pro mode with shutter speed of 1/2000th or Canon EOS R in Manual mode with shutter speed of 1/4000th



## 3. The Tables

In this document you will find 2 tables.

The RTSP URL table contains the URLs you need to use to get the RTSP stream from the cameras. This is used in MVI's EasyCam software but also VLC or FFMPEG to test the video streams.

The latency table is sorted by make and model and will show you the mode the stream was captured in, the resolution and refresh rate as set in the cameras web ui or osd and the images that were captured to calculate the 3 frame average. For this test we try to disable all the features of the camera such as noise reduction, predictions, labels or areas.

As time goes by the table size will increase with tested makes and models.

## 4. About I/P/B frames

When talking about video compression, the concept of I-frames, P-frames, and B-frames is fundamental.

These frame types are used to improve the codec's compression efficiency, the compressed stream's video quality, and the resilience of the stream to transmission and storage errors & failures.

Modern video codecs like H264 or HVEC break the video into blocks of pixels, also called macroblocks.

In order to compress each macroblock, the first step is to find a macroblock similar to the one we want to compress by searching in the current frame or previous or future frames.

The best-match macroblock's location is recorded (which frame and its position in that frame). Then, the two macroblocks' difference is compressed and sent to the decoder along with the location information.

- An I-frame (Key-frame or Intra-frame) consists only of macroblocks that use Intra-prediction. I-frames are the least compressible but don't require other video frames to decode. It's like a complete image.

- P-frame stands for Predicted Frame and allows macroblocks to be compressed using temporal prediction in addition to spatial prediction. For motion estimation, P-frames use frames that have been previously encoded. Simply said, a P-frame holds only the changes in the image from the previous frame.

- A B-frame is a frame that can refer to frames that occur both before and after it. The B stands for Bi-Directional for this reason. It saves even more space by using differences between the current frame and both the preceding and following frames to specify its content.

**Important:** B-frames are resource-heavy – both at the encoder and decoder. They can also introduce a lot of latency which is not desired in live streaming network IP cameras.

The MVI EasyCam software does **NOT** support B-frames in the video stream!

## 5. About VBR and CBR bitrates

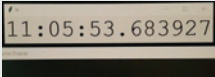
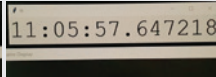
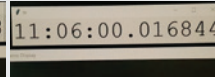
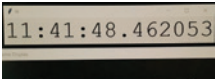
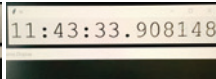
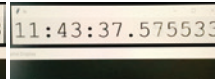
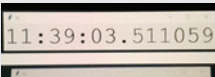
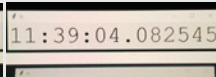
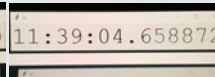
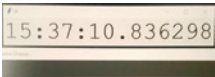
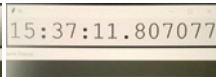
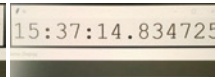
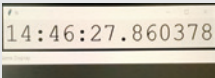
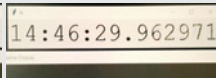
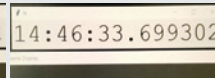
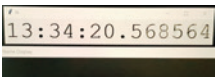
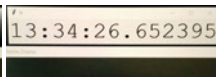
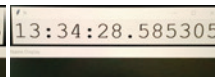
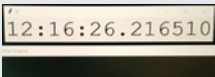
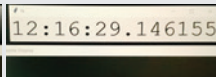
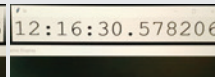
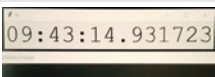
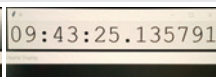
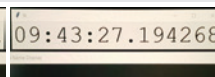
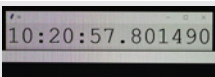
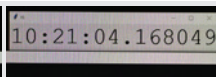
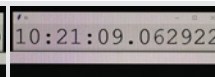
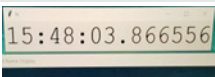
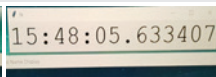
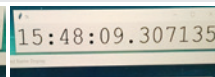
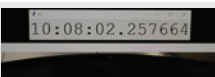
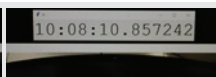
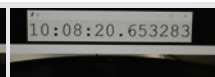
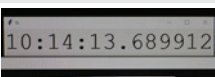
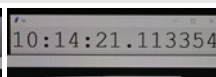
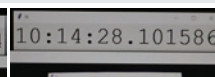
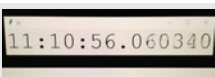
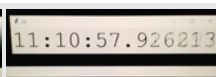
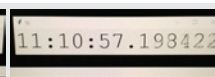
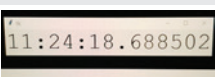
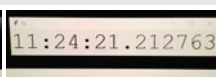
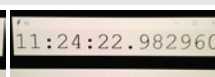
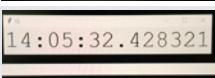
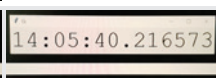
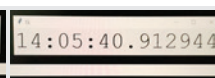
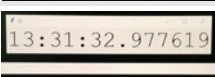
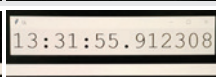
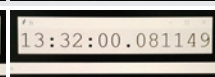
We have come across installations that have left the bitrate setting of the camera on VBR, variable bitrate. This of course means that the camera will use up as much resources as necessary to try and encode the sensor images and send it over the network.

In these installations we have seen a huge amount of network traffic, especially in low lighting situations because of the image noise that got encoded and translated into a huge bitrate of up to 50mbps per camera.

Changing this from VBR to **CBR, constant bitrate**, solved this issue and the network load dropped considerably.

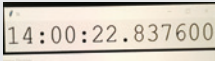
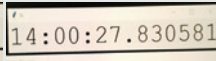
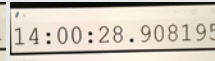
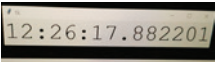
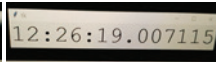
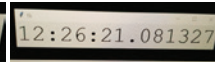
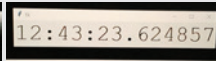
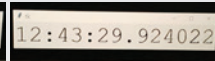
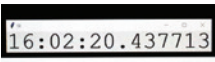
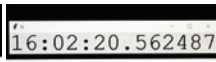
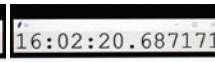
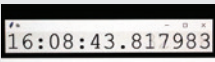
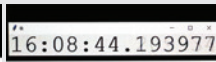
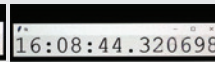
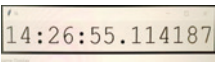
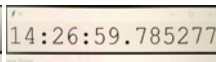
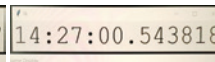
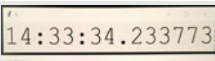
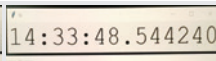
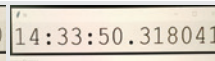
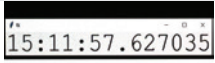
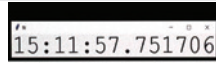

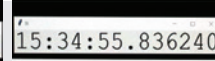
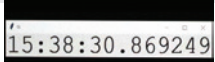
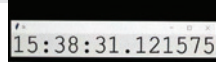
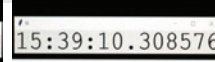
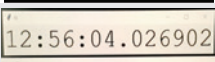
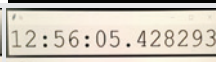
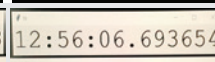
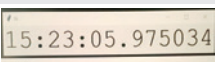
Make	Model	Stream
Angekis	All Models	rtsp://x.x.x.x:554/stream/main
Avonic	CM60	rtsp://x.x.x.x
Avonic	Other Models	rtsp://x.x.x.x/live/av0
Bosch	Other Models	rtsp://x.x.x.x
Bosch	multi 7000i	rtsp://x.x.x.x/?line=1
Everett	All Models	rtsp://x.x.x.x:554/stream/main
Lumens	All Models	rtsp://x.x.x.x:8557/h264
Minrray	UV510AS	rtsp://x.x.x.x/live/av0
Panasonic	AW-HE40SKE	rtsp://x.x.x.x/mediainput/h264/stream_1
Sony	SRG-300	rtsp://x.x.x.x/media/video1
Sony	SRG-X400	rtsp://x.x.x.x:554/video1

## MVI NETWORK CAMERA IP LATENCY TEST

Make	Model	Mode	Video	Hz	Average	Images		
Angekis	Saber NDI 20x	RTSP	1080p h264	60	85ms			
Angekis	Saber NDI 20x	NDI	1080p HX	60	90ms			
Angekis	Saber Plus (U3D-12FHD6)	RTSP	1080p h265	30	108ms			
Avonic	AV-CM40	RTSP	1080p h265	60	62ms			
Avonic	CM60-IP	RTSP	1080p h265	60	103ms			
Avonic	AV-CM70-NDI	RTSP	1080p h265	60	83ms			
Avonic	AV-CM70-NDI	NDI	1080p HX	60	95ms			
Avonic	AV-CM73-IP	RTSP	1080p h265	60	83ms			
Bosch	IP4000i	RTSP	1080p h264	60	165ms			
Bosch	IP5000i	RTSP	1080p h264	60	159ms			
Bosch	Flexidome 7000i	RTSP	1080p h264	30	198ms			
Bosch	Dinion IP 7000 HD	RTSP	1080p h264	60	182ms			
Everett	EVP220N	RTSP	1080p h265	60	77ms			
Everett	EVP220N	NDI	1080p HX	60	77ms			
Everett	EVP412NW	RTSP	2160p h265	30	134ms			
Everett	EVP412NW	NDI	2160p HX	30	302ms			



## MVI NETWORK CAMERA IP LATENCY TEST

Make	Model	Mode	Video	Hz	Average	Images		
Lumens	VC-A50P	RTSP	1080p h264	60	154ms			
Lumens	VC-A71P	RTSP	1080p h264	60	171ms			
Lumens	VC-A71P	RTSP	2160p hevc	60	154ms			
Minrray	UV510AS	RTSP	1080p h265	60	78ms			
Minrray	UV510AS	NDI	1080p HX	60	79ms			
Panasonic	AW-HE40SKE	RTSP	720p h264	60	278ms			
Panasonic	AW-HE40SKE	RTSP	1080p h264	30	252ms			
Panasonic	AW-UE80	RTSP	1080p h265	60	140ms			
Panasonic	AW-UE80	NDI	1080p HX	60	160ms			
Panasonic	AW-UE80	NDI	1080p FULL	60	93ms			
Sony	SRG-X400	RTSP	1080p h265	60	111ms			
Sony	SRG-X400	RTSP	2160p h265	30	187ms			

### Disclaimer

MVI AudioVisual B.V. is not affiliated with any camera manufacturer but tries to conduct an independent latency test for it's customers. No warranties or claims can be made as to the accuracy of the content displayed and we assume no liability or responsibility for an error.