



# Maximum Number of Full-Frame Channels

## Supported by GV-Control Center

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### Applied to

GV-Control Center V4.2.1

GV-VMS V17.4.8 / V18.3.5

### Summary

This technical notice evaluates the performance of GV-Control Center, which displays IP channels of various resolutions from GV-VMS and GV-Recording Server / IP cameras in a variety of live view layouts. The live view layouts were carried out with Full HD (1920 x 1080) and 4K (3840 x 2160) screen resolution. When the performance testing was run, the CPU was at about 70% utilization.

The performance results were collected using H.264 and H.265 GPU decoding. Decoding is added to reduce CPU load and boost maximum frame rate. For further information, see *1. GPU Decoding Specifications* in this document.

In the performance testing, video streaming from GV-VMS is compressed by default, but video streaming from GV-Recording Server / IP cameras is bypassed (FIFO), which means that the videos are not compressed on the hosts and are transmitted straight to the GV-Control Center.



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### 1. GPU Decoding Specifications

To perform H.264 or H.265 GPU decoding, your computer must meet the following specifications:

		2 <sup>nd</sup> Gen	3 <sup>rd</sup> ~ 4 <sup>th</sup> Gen	6 <sup>th</sup> ~ 14 <sup>th</sup> Gen
<b>OS</b>	<b>64-Bit</b>	Windows 10 / 11 / Server 2016 / Server 2019 / Server 2022		
<b>Resolution</b>		1 MP / 2 MP	1 MP / 2 MP / 3 MP / 4 MP / 5 MP / 8 MP / 12 MP	1 MP / 2 MP / 3 MP / 4 MP / 5 MP / 8 MP / 12 MP
<b>Codec</b>		H.264		H.264 / H.265

### 2. Maximum Number of Channels Supported by GV-Control Center

The following tables show the maximum number of IP channels, from GV-VMS and GV-Recording Server / IP cameras, supported by GV-Control Center in Live View with a different proportional layout.



## 1 x 1 layout

**Monitor:** Full HD is 1920 x 1080; 4K is 3840 x 2160

**Sub Stream:** The sub stream from GV-VMS is compressed by default. The **sub stream (FIFO)** function enables original images to be delivered to GV-Control Center without compression.

### Streaming from GV-VMS

Monitor	Sub Stream Type	Resolution			Total FPS Supported	Full-Frame Channels Supported
		Megapixel	Main Stream	Sub Stream		
Full HD	Compressed by Geo Mpeg4	4 MP (30 fps)	2688 x 1520	640 x 360	240	<b>8 CH</b>
		8 MP (20 fps)	3840 x 2176	1280 x 720	140	<b>7 CH</b>
	FIFO	4 MP (30 fps)	2688 x 1520	640 x 360	240	<b>8 CH</b>
		8 MP (20 fps)	3840 x 2176	1280 x 720	140	<b>7 CH</b>
4K	Compressed by Geo Mpeg4	4 MP (30 fps)	2688 x 1520	640 x 360	120	<b>4 CH</b>
		8 MP (20 fps)	3840 x 2176	1280 x 720	100	<b>5 CH</b>
	FIFO	4 MP (30 fps)	2688 x 1520	640 x 360	120	<b>4 CH</b>
		8 MP (20 fps)	3840 x 2176	1280 x 720	100	<b>5 CH</b>

### Streaming from GV-Recording Server / IP Cameras

Monitor	Resolution			Total FPS Supported	Full-Frame Channels Supported
	Megapixel	Main Stream	Sub Stream		
Full HD	4 MP (30 fps)	2688 x 1520	640 x 360	240	<b>8 CH</b>
	8 MP (20 fps)	3840 x 2176	1280 x 720	140	<b>7 CH</b>
4K	4 MP (30 fps)	2688 x 1520	640 x 360	120	<b>4 CH</b>
	8 MP (20 fps)	3840 x 2176	1280 x 720	100	<b>5 CH</b>



## 2 x 2 layout

**Monitor:** Full HD is 1920 x 1080; 4K is 3840 x 2160

**Sub Stream:** The sub stream from GV-VMS is compressed by default. The **sub stream (FIFO)** function enables original images to be delivered to GV-Control Center without compression.

### Streaming from GV-VMS

Monitor	Sub Stream Type	Resolution			Total FPS Supported	Full-Frame Channels Supported
		Megapixel	Main Stream	Sub Stream		
Full HD	Compressed by Geo Mpeg4	4 MP (30 fps)	2688 x 1520	640 x 360	1080	<b>36 CH</b>
		8 MP (20 fps)	3840 x 2176	1280 x 720	720	<b>36 CH</b>
	FIFO	4 MP (30 fps)	2688 x 1520	640 x 360	1080	<b>36 CH</b>
		8 MP (20 fps)	3840 x 2176	1280 x 720	720	<b>36 CH</b>
4K	Compressed by Geo Mpeg4	4 MP (30 fps)	2688 x 1520	640 x 360	240	<b>8 CH</b>
		8 MP (20 fps)	3840 x 2176	1280 x 720	80	<b>4 CH</b>
	FIFO	4 MP (30 fps)	2688 x 1520	640 x 360	240	<b>8 CH</b>
		8 MP (20 fps)	3840 x 2176	1280 x 720	80	<b>4 CH</b>

### Streaming from GV-Recording Server / IP Cameras

Monitor	Resolution			Total FPS Supported	Full-Frame Channels Supported
	Megapixel	Main Stream	Sub Stream		
Full HD	4 MP (30 fps)	2688 x 1520	640 x 360	1080	<b>36 CH</b>
	8 MP (20 fps)	3840 x 2176	1280 x 720	720	<b>36 CH</b>
4K	4 MP (30 fps)	2688 x 1520	640 x 360	240	<b>8 CH</b>
	8 MP (20 fps)	3840 x 2176	1280 x 720	80	<b>4 CH</b>



### 3 x 3 layout

**Monitor:** Full HD is 1920 x 1080; 4K is 3840 x 2160

**Sub Stream:** The sub stream from GV-VMS is compressed by default. The **sub stream (FIFO)** function enables original images to be delivered to GV-Control Center without compression.

#### Streaming from GV-VMS

Monitor	Sub Stream Type	Resolution			Total FPS Supported	Full-Frame Channels Supported
		Megapixel	Main Stream	Sub Stream		
Full HD	Compressed by Geo Mpeg4	4 MP (30 fps)	2688 x 1520	640 x 360	2430	<b>81 CH</b>
		8 MP (20 fps)	3840 x 2176	1280 x 720	1620	<b>81 CH</b>
	FIFO	4 MP (30 fps)	2688 x 1520	640 x 360	2430	<b>81 CH</b>
		8 MP (20 fps)	3840 x 2176	1280 x 720	1620	<b>81 CH</b>
4K	Compressed by Geo Mpeg4	4 MP (30 fps)	2688 x 1520	640 x 360	270	<b>9 CH</b>
		8 MP (20 fps)	3840 x 2176	1280 x 720	180	<b>9 CH</b>
	FIFO	4 MP (30 fps)	2688 x 1520	640 x 360	270	<b>9 CH</b>
		8 MP (20 fps)	3840 x 2176	1280 x 720	180	<b>9 CH</b>

#### Streaming from GV-Recording Server / IP Cameras

Monitor	Resolution			Total FPS Supported	Full-Frame Channels Supported
	Megapixel	Main Stream	Sub Stream		
Full HD	4 MP (30 fps)	2688 x 1520	640 x 360	2430	<b>81 CH</b>
	8 MP (20 fps)	3840 x 2176	1280 x 720	1620	<b>81 CH</b>
4K	4 MP (30 fps)	2688 x 1520	640 x 360	270	<b>9 CH</b>
	8 MP (20 fps)	3840 x 2176	1280 x 720	180	<b>9 CH</b>



## 4 x 4 layout

**Monitor:** Full HD is 1920 x 1080; 4K is 3840 x 2160

**Sub Stream:** The sub stream from GV-VMS is compressed by default. The **sub stream (FIFO)** function enables original images to be delivered to GV-Control Center without compression.

### Streaming from GV-VMS

Monitor	Sub Stream Type	Resolution			Total FPS Supported	Full-Frame Channels Supported
		Megapixel	Main Stream	Sub Stream		
Full HD	Compressed by Geo Mpeg4	4 MP (30 fps)	2688 x 1520	640 x 360	4320	<b>144 CH</b>
		8 MP (20 fps)	3840 x 2176	1280 x 720	2880	<b>144 CH</b>
	FIFO	4 MP (30 fps)	2688 x 1520	640 x 360	2880	<b>96 CH</b>
		8 MP (20 fps)	3840 x 2176	1280 x 720	2880	<b>144 CH</b>
4K	Compressed by Geo Mpeg4	4 MP (30 fps)	2688 x 1520	640 x 360	4320	<b>144 CH</b>
		8 MP (20 fps)	3840 x 2176	1280 x 720	1280	<b>64 CH</b>
	FIFO	4 MP (30 fps)	2688 x 1520	640 x 360	2880	<b>96 CH</b>
		8 MP (20 fps)	3840 x 2176	1280 x 720	1600	<b>80 CH</b>

### Streaming from GV-Recording Server / IP Cameras

Monitor	Resolution			Total FPS Supported	Full-Frame Channels Supported
	Megapixel	Main Stream	Sub Stream		
Full HD	4 MP (30 fps)	2688 x 1520	640 x 360	2880	<b>96 CH</b>
	8 MP (20 fps)	3840 x 2176	1280 x 720	2880	<b>144 CH</b>
4K	4 MP (30 fps)	2688 x 1520	640 x 360	2880	<b>96 CH</b>
	8 MP (20 fps)	3840 x 2176	1280 x 720	1600	<b>80 CH</b>



## 6 x 6 layout

**Monitor:** Full HD is 1920 x 1080; 4K is 3840 x 2160

**Sub Stream:** The sub stream from GV-VMS is compressed by default. The **sub stream (FIFO)** function enables original images to be delivered to GV-Control Center without compression.

### Streaming from GV-VMS

Monitor	Sub Stream Type	Resolution			Total FPS Supported	Full-Frame Channels Supported
		Megapixel	Main Stream	Sub Stream		
Full HD	Compressed by Geo Mpeg4	4 MP (30 fps)	2688 x 1520	640 x 360	6480	<b>216 CH</b>
		8 MP (20 fps)	3840 x 2176	1280 x 720	5040	<b>252 CH</b>
	FIFO	4 MP (30 fps)	2688 x 1520	640 x 360	2160	<b>72 CH</b>
		8 MP (20 fps)	3840 x 2176	1280 x 720	3600	<b>180 CH</b>
4K	Compressed by Geo Mpeg4	4 MP (30 fps)	2688 x 1520	640 x 360	4320	<b>144 CH</b>
		8 MP (20 fps)	3840 x 2176	1280 x 720	2160	<b>108 CH</b>
	FIFO	4 MP (30 fps)	2688 x 1520	640 x 360	4320	<b>144 CH</b>
		8 MP (20 fps)	3840 x 2176	1280 x 720	2880	<b>144 CH</b>

### Streaming from GV-Recording Server / IP Cameras

Monitor	Resolution			Total FPS Supported	Full-Frame Channels Supported
	Megapixel	Main Stream	Sub Stream		
Full HD	4 MP (30 fps)	2688 x 1520	640 x 360	2160	<b>72 CH</b>
	8 MP (20 fps)	3840 x 2176	1280 x 720	3600	<b>180 CH</b>
4K	4 MP (30 fps)	2688 x 1520	640 x 360	4320	<b>144 CH</b>
	8 MP (20 fps)	3840 x 2176	1280 x 720	2880	<b>144 CH</b>



## 8 x 8 layout

**Monitor:** Full HD is 1920 x 1080; 4K is 3840 x 2160

**Sub Stream:** The sub stream from GV-VMS is compressed by default. The **sub stream (FIFO)** function enables original images to be delivered to GV-Control Center without compression.

### Streaming from GV-VMS

Monitor	Sub Stream Type	Resolution			Total FPS Supported	Full-Frame Channels Supported
		Megapixel	Main Stream	Sub Stream		
Full HD	Compressed by Geo Mpeg4	4 MP (30 fps)	2688 x 1520	640 x 360	7680	<b>256 CH</b>
		8 MP (20 fps)	3840 x 2176	1280 x 720	5120	<b>256 CH</b>
	FIFO	4 MP (30 fps)	2688 x 1520	640 x 360	1800	<b>60 CH</b>
		8 MP (20 fps)	3840 x 2176	1280 x 720	2560	<b>128 CH</b>
4K	Compressed by Geo Mpeg4	4 MP (30 fps)	2688 x 1520	640 x 360	5760	<b>192 CH</b>
		8 MP (20 fps)	3840 x 2176	1280 x 720	3840	<b>192 CH</b>
	FIFO	4 MP (30 fps)	2688 x 1520	640 x 360	5760	<b>192 CH</b>
		8 MP (20 fps)	3840 x 2176	1280 x 720	3840	<b>192 CH</b>

### Streaming from GV-Recording Server / IP Cameras

Monitor	Resolution			Total FPS Supported	Full-Frame Channels Supported
	Megapixel	Main Stream	Sub Stream		
Full HD	4 MP (30 fps)	2688 x 1520	640 x 360	1800	<b>60 CH</b>
	8 MP (20 fps)	3840 x 2176	1280 x 720	2560	<b>128 CH</b>
4K	4 MP (30 fps)	2688 x 1520	640 x 360	5760	<b>192 CH</b>
	8 MP (20 fps)	3840 x 2176	1280 x 720	3840	<b>192 CH</b>



### 3. Testing Environment

The performance tests were carried out using the following bitrates and the test PC.

Bitrate used for the test		
Resolution	Main Stream	Sub Stream
4 MP (30 fps)	2688 x 1520 (2.78 Mbit/s)	640 x 360 (0.94 Mbit/s)
8 MP (20 fps)	3840 x 2176 (3.52 Mbit/s)	1280 x 720 (1.48 Mbit/s)

PC specifications used for the test	
OS	64-bit Windows 10 Pro (23H2)
Motherboard	ASRock B760 Pro RS
CPU	Core i7-14700, 2.10 GHz
RAM	DDR5 4800 8 GB x 2
On-board VGA	Intel UHD Graphics 770
Monitor	9 monitors, Full HD (1920 x 1080) / 4K (3840 x 2160)