



Maximum Number of Full-Frame Channels

Supported by GV-Control Center V4.3.0

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Applied to

GV-Control Center V4.3.0
GV-VMS V17.4.8 / V18.3.5 / V20.0.2

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 4K (3840 x 2160) screen resolution. When the performance testing was run, the CPU was at about 70% to 80% utilization.

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

In the performance testing, the sub stream from GV-VMS V17 / V18 is compressed by default. In contrast, the sub stream from GV-VMS V20 is bypassed (FIFO) by default, and the sub stream from GV-Recording Server / IP cameras is always bypassed (FIFO). Using FIFO ensures that the videos are not compressed on the hosts and are transmitted straight to the GV-Control Center.

In multi-channel layouts, the Force Substream option is disabled by default, so live view and playback use the main stream when available. When enabled, they use the sub stream when available, increasing the number of full-frame channels supported.



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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 nd Gen	3 rd ~ 4 th Gen	6 th ~ 14 th Gen	Core Ultra Series 2
OS	64-Bit	Windows 10 / Windows 11 / Server 2016 / Server 2019 / Server 2022			
Resolution		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	
Codec		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

GV-Control Center PC Monitor: 4K (3840 x 2160)

Substream FIFO: For multi-channel layouts, this GV-VMS option determines whether the sub stream delivered from GV-VMS to GV-Control Center is compressed or original.

- GV-VMS V17 / V18: FIFO disabled by default (compressed).
- GV-VMS V20: FIFO enabled by default (original).

Force Substream: For multi-channel layouts, this GV-Control Center option (disabled by default; accessible via right-clicking a layout > Properties) forces live view and playback to use the sub stream when available (see the *Stream Type* columns in the two tables below), increasing the number of full-frame channels supported.

Streaming from GV-VMS

(GV-Control Center PC with 4K Monitor)

Sub Stream Type	Video Resolution	Stream Type	Stream Resolution	Frame Rate / Camera	Full-Frame Channels Supported	Total FPS Supported
Compressed by Geo Mpeg4 (VMS V17 / V18) or Geo H.264 (VMS V20) Default for VMS V17 / V18	4 MP	Main Stream	2688 x 1520	30 fps	4 CH	120 fps
	8 MP	Main Stream	3840 x 2160	30 fps	3 CH	90 fps
FIFO Default for VMS V20	4 MP	Main Stream	2688 x 1520	30 fps	4 CH	120 fps
	8 MP	Main Stream	3840 x 2160	30 fps	3 CH	90 fps

Streaming from GV-Recording Server / IP Cameras

(GV-Control Center PC with 4K Monitor)

Sub Stream Type	Video Resolution	Stream Type	Stream Resolution	Frame Rate / Camera	Full-Frame Channels Supported	Total FPS Supported
FIFO	4 MP	Main Stream	2688 x 1520	30 fps	4 CH	120 fps
	8 MP	Main Stream	3840 x 2160	30 fps	3 CH	90 fps



2 x 2 Layout

GV-Control Center PC Monitor: 4K (3840 x 2160)

Substream FIFO: For multi-channel layouts, this GV-VMS option determines whether the sub stream delivered from GV-VMS to GV-Control Center is compressed or original.

- GV-VMS V17 / V18: FIFO disabled by default (compressed).
- GV-VMS V20: FIFO enabled by default (original).

Force Substream: For multi-channel layouts, this GV-Control Center option (disabled by default; accessible via right-clicking a layout > Properties) forces live view and playback to use the sub stream when available (see the *Stream Type* columns in the two tables below), increasing the number of full-frame channels supported.

Streaming from GV-VMS

(GV-Control Center PC with 4K Monitor)

Sub Stream Type	Video Resolution	Stream Type	Stream Resolution	Frame Rate / Camera	Full-Frame Channels Supported	Total FPS Supported
Compressed by Geo Mpeg4 (VMS V17 / V18) or Geo H.264 (VMS V20) Default for VMS V17 / V18	4 MP	Main Stream (Default)	2688 x 1520	30 fps	8 CH	240 fps
		Sub Stream	640 x 360	7 fps*	36 CH	252 fps
				15 fps*		540 fps
	30 fps	1080 fps				
	8 MP	Main Stream (Default)	3840 x 2160	30 fps	5 CH	150 fps
		Sub Stream	1280 x 720	7 fps*	36 CH	252 fps
15 fps*				540 fps		
30 fps	1080 fps					
FIFO Default for VMS V20	4 MP	Main Stream (Default)	2688 x 1520	30 fps	8 CH	240 fps
		Sub Stream	640 x 360	7 fps*	36 CH	252 fps
				15 fps*		540 fps
	30 fps	1080 fps				
	8 MP	Main Stream (Default)	3840 x 2160	30 fps	5 CH	150 fps
		Sub Stream	1280 x 720	7 fps*	36 CH	252 fps
15 fps*				540 fps		
30 fps	1080 fps					

Note: * If 1 to 32 channels are connected during initial setup, all sub streams default to 15 fps for GV-VMS V20. If more than 32 channels are connected during initial setup, all sub streams default to 7 fps for GV-VMS V20 and 15 fps for GV-VMS V17 / V18.



Streaming from GV-Recording Server / IP Cameras

(GV-Control Center PC with 4K Monitor)

Sub Stream Type	Video Resolution	Stream Type	Stream Resolution	Frame Rate / Camera	Full-Frame Channels Supported	Total FPS Supported
FIFO	4 MP	Main Stream (Default)	2688 x 1520	30 fps	8 CH	240 fps
		Sub Stream	640 x 360	30 fps	36 CH	1080 fps
	8 MP	Main Stream (Default)	3840 x 2160	30 fps	5 CH	150 fps
		Sub Stream	1280 x 720	30 fps	36 CH	1080 fps



3 x 3 Layout

GV-Control Center PC Monitor: 4K (3840 x 2160)

Substream FIFO: For multi-channel layouts, this GV-VMS option determines whether the sub stream delivered from GV-VMS to GV-Control Center is compressed or original.

- GV-VMS V17 / V18: FIFO disabled by default (compressed).
- GV-VMS V20: FIFO enabled by default (original).

Force Substream: For multi-channel layouts, this GV-Control Center option (disabled by default; accessible via right-clicking a layout > Properties) forces live view and playback to use the sub stream when available (see the *Stream Type* columns in the two tables below), increasing the number of full-frame channels supported.

Streaming from GV-VMS

(GV-Control Center PC with 4K Monitor)

Sub Stream Type	Video Resolution	Stream Type	Stream Resolution	Frame Rate / Camera	Full-Frame Channels Supported	Total FPS Supported
Compressed by Geo Mpeg4 (VMS V17 / V18) or Geo H.264 (VMS V20) Default for VMS V17 / V18	4 MP	Main Stream (Default)	2688 x 1520	30 fps	9 CH	270 fps
		Sub Stream	640 x 360	7 fps*	81 CH	567 fps
				15 fps*		1215 fps
	30 fps	2430 fps				
	8 MP	Main Stream (Default)	3840 x 2160	30 fps	5 CH	150 fps
		Sub Stream	1280 x 720	7 fps*	81 CH	567 fps
15 fps*				1215 fps		
30 fps	2430 fps					
FIFO Default for VMS V20	4 MP	Main Stream (Default)	2688 x 1520	30 fps	9 CH	270 fps
		Sub Stream	640 x 360	7 fps*	81 CH	567 fps
				15 fps*		1215 fps
	30 fps	2430 fps				
	8 MP	Main Stream (Default)	3840 x 2160	30 fps	5 CH	150 fps
		Sub Stream	1280 x 720	7 fps*	81 CH	567 fps
15 fps*				1215 fps		
30 fps	54 CH	1620 fps				

Note: * If 1 to 32 channels are connected during initial setup, all sub streams default to 15 fps for GV-VMS V20. If more than 32 channels are connected during initial setup, all sub streams default to 7 fps for GV-VMS V20 and 15 fps for GV-VMS V17 / V18.



Streaming from GV-Recording Server / IP Cameras

(GV-Control Center PC with 4K Monitor)

Sub Stream Type	Video Resolution	Stream Type	Stream Resolution	Frame Rate / Camera	Full-Frame Channels Supported	Total FPS Supported
FIFO	4 MP	Main Stream (Default)	2688 x 1520	30 fps	9 CH	270 fps
		Sub Stream	640 x 360	30 fps	81 CH	2430 fps
	8 MP	Main Stream (Default)	3840 x 2160	30 fps	5 CH	150 fps
		Sub Stream	1280 x 720	30 fps	54 CH	1620 fps



4 x 4 Layout

GV-Control Center PC Monitor: 4K (3840 x 2160)

Substream FIFO: For multi-channel layouts, this GV-VMS option determines whether the sub stream delivered from GV-VMS to GV-Control Center is compressed or original.

- GV-VMS V17 / V18: FIFO disabled by default (compressed).
- GV-VMS V20: FIFO enabled by default (original).

Force Substream: For multi-channel layouts, this GV-Control Center option (disabled by default; accessible via right-clicking a layout > Properties) forces live view and playback to use the sub stream when available (see the *Stream Type* columns in the two tables below), increasing the number of full-frame channels supported.

Streaming from GV-VMS

(GV-Control Center PC with 4K Monitor)

Sub Stream Type	Video Resolution	Stream Type	Stream Resolution	Frame Rate / Camera	Full-Frame Channels Supported	Total FPS Supported
Compressed by Geo Mpeg4 (VMS V17 / V18) or Geo H.264 (VMS V20) Default for VMS V17 / V18	4 MP	Main Stream (Default)	2688 x 1520	30 fps	12 CH	360 fps
		Sub Stream	640 x 360	7 fps*	144 CH	1008 fps
				15 fps*		2160 fps
	30 fps	4320 fps				
	8 MP	Main Stream (Default)	3840 x 2160	30 fps	5 CH	150 fps
		Sub Stream	1280 x 720	7 fps*	144 CH	1008 fps
15 fps*				96 CH	1440 fps	
30 fps	2880 fps					
FIFO Default for VMS V20	4 MP	Main Stream (Default)	2688 x 1520	30 fps	12 CH	360 fps
		Sub Stream	640 x 360	7 fps*	144 CH	1008 fps
				15 fps*		2160 fps
	30 fps	4320 fps				
	8 MP	Main Stream (Default)	3840 x 2160	30 fps	5 CH	150 fps
		Sub Stream	1280 x 720	7 fps*	144 CH	1008 fps
15 fps*				96 CH	1440 fps	
30 fps	60 CH	1800 fps				

Note: * If 1 to 32 channels are connected during initial setup, all sub streams default to 15 fps for GV-VMS V20. If more than 32 channels are connected during initial setup, all sub streams default to 7 fps for GV-VMS V20 and 15 fps for GV-VMS V17 / V18.



Streaming from GV-Recording Server / IP Cameras

(GV-Control Center PC with 4K Monitor)

Sub Stream Type	Video Resolution	Stream Type	Stream Resolution	Frame Rate / Camera	Full-Frame Channels Supported	Total FPS Supported
FIFO	4 MP	Main Stream (Default)	2688 x 1520	30 fps	12 CH	360 fps
		Sub Stream	640 x 360	30 fps	144 CH	4320 fps
	8 MP	Main Stream (Default)	3840 x 2160	30 fps	5 CH	150 fps
		Sub Stream	1280 x 720	30 fps	60 CH	1800 fps



6 x 6 Layout

GV-Control Center PC Monitor: 4K (3840 x 2160)

Substream FIFO: For multi-channel layouts, this GV-VMS option determines whether the sub stream delivered from GV-VMS to GV-Control Center is compressed or original.

- GV-VMS V17 / V18: FIFO disabled by default (compressed).
- GV-VMS V20: FIFO enabled by default (original).

Force Substream: For multi-channel layouts, this GV-Control Center option (disabled by default; accessible via right-clicking a layout > Properties) forces live view and playback to use the sub stream when available (see the *Stream Type* columns in the two tables below), increasing the number of full-frame channels supported.

Streaming from GV-VMS

(GV-Control Center PC with 4K Monitor)

Sub Stream Type	Video Resolution	Stream Type	Stream Resolution	Frame Rate / Camera	Full-Frame Channels Supported	Total FPS Supported
Compressed by Geo Mpeg4 (VMS V17 / V18) or Geo H.264 (VMS V20) Default for VMS V17 / V18	4 MP	Sub Stream	640 x 360	7 fps*	324 CH	2268 fps
				15 fps*		4860 fps
				30 fps	144 CH	4320 fps
	8 MP	Sub Stream	1280 x 720	7 fps*	324 CH	2268 fps
				15 fps*	180 CH	2700 fps
				30 fps	144 CH	4320 fps
FIFO Default for VMS V20	4 MP	Sub Stream	640 x 360	7 fps*	324 CH	2268 fps
				15 fps*	288 CH	4320 fps
				30 fps	144 CH	4320 fps
	8 MP	Sub Stream	1280 x 720	7 fps*	324 CH	2268 fps
				15 fps*	180 CH	2700 fps
				30 fps	96 CH	2880 fps
Note: * If 1 to 32 channels are connected during initial setup, all sub streams default to 15 fps for GV-VMS V20. If more than 32 channels are connected during initial setup, all sub streams default to 7 fps for GV-VMS V20 and 15 fps for GV-VMS V17 / V18.						



Streaming from GV-Recording Server / IP Cameras

(GV-Control Center PC with 4K Monitor)

Sub Stream Type	Video Resolution	Stream Type	Stream Resolution	Frame Rate / Camera	Full-Frame Channels Supported	Total FPS Supported
FIFO	4 MP	Sub Stream	640 x 360	30 fps	144 CH	4320 fps
	8 MP	Sub Stream	1280 x 720	30 fps	96 CH	2880 fps



8 x 8 Layout

GV-Control Center PC Monitor: 4K (3840 x 2160)

Substream FIFO: For multi-channel layouts, this GV-VMS option determines whether the sub stream delivered from GV-VMS to GV-Control Center is compressed or original.

- GV-VMS V17 / V18: FIFO disabled by default (compressed).
- GV-VMS V20: FIFO enabled by default (original).

Force Substream: For multi-channel layouts, this GV-Control Center option (disabled by default; accessible via right-clicking a layout > Properties) forces live view and playback to use the sub stream when available (see the *Stream Type* columns in the two tables below), increasing the number of full-frame channels supported.

Streaming from GV-VMS

(GV-Control Center PC with 4K Monitor)

Sub Stream Type	Video Resolution	Stream Type	Stream Resolution	Frame Rate / Camera	Full-Frame Channels Supported	Total FPS Supported
Compressed by Geo Mpeg4 (VMS V17 / V18) or Geo H.264 (VMS V20) Default for VMS V17 / V18	4 MP	Sub Stream	640 x 360	7 fps*	576 CH	4032 fps
				15 fps*		8640 fps
				30 fps	192 CH	5760 fps
	8 MP	Sub Stream	1280 x 720	7 fps*	320 CH	2240 fps
				15 fps*	192 CH	2880 fps
				30 fps		5760 fps
FIFO Default for VMS V20	4 MP	Sub Stream	640 x 360	7 fps*	576 CH	4032 fps
				15 fps*		8640 fps
				30 fps	192 CH	5760 fps
	8 MP	Sub Stream	1280 x 720	7 fps*	320 CH	2240 fps
				15 fps*	192 CH	2880 fps
				30 fps	112 CH	3360 fps
Note: * If 1 to 32 channels are connected during initial setup, all sub streams default to 15 fps for GV-VMS V20. If more than 32 channels are connected during initial setup, all sub streams default to 7 fps for GV-VMS V20 and 15 fps for GV-VMS V17 / V18.						



Streaming from GV-Recording Server / IP Cameras

(GV-Control Center PC with 4K Monitor)

Sub Stream Type	Video Resolution	Stream Type	Stream Resolution	Frame Rate / Camera	Full-Frame Channels Supported	Total FPS Supported
FIFO	4 MP	Sub Stream	640 x 360	30 fps	192 CH	5760 fps
	8 MP	Sub Stream	1280 x 720	30 fps	112 CH	3360 fps



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 2160 (3.52 Mbit/s)	1280 x 720 (1.48 Mbit/s)

PC specifications used for the test	
OS	64-bit Windows 11 Pro (24H2)
Motherboard	ASUS PRIME B860-PLUS WIFI-CSM
CPU	Intel Core Ultra 7 Processor 265, 2.40 GHz
RAM	DDR5 5600 16 GB x 2
On-board VGA	Intel Arc Graphics
Monitor	9 monitors, 4K (3840 x 2160)