



Maximum Number of Full-Frame Channels

Supported by GV-Control Center

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Applied to

GV-Control Center V3.4.0.0

Summary

This technical notice examines the performance data of GV-Control Center V3.4.0.0 where IP channels of various resolutions from GV-VMS / NVR and GV-Recording Server / IP cameras are displayed with different layouts. Both the Matrix and Video Wall layouts were tested at 1920 x 1080 screen resolution. The CPU usage was around 70% when the performance tests were carried out.

The performance data were obtained using either H.264 or H.265 GPU decoding. Decoding is added to lower the CPU loading and to increase the maximum frame rate. For more details, refer to *1. GPU Decoding Specifications* in this document.

In the performance testing, video data from GV-VMS / NVR is compressed, whereas those from GV-Recording Server / IP cameras is bypassed (**FIFO**), which means that the videos are not compressed on the hosts and are sent directly to 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:

Codec		H.264		H.265
Chipset		Sandy Bridge	Ivy Bridge / Haswell / Haswell Refresh / Skylake	Skylake
Operating System	64-Bit	Windows 7 / 8 / 8.1 / 10 / Server 2008 R2 / Server 2012 R2		
Resolution		1 MP / 2 MP	1 MP ~ 5MP / 8 MP / 12 MP	3 MP / 4 MP / 5 MP
Graphics Card		On-board VGA		

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

2.1 Proportional Matrix Layout

The tables in this section present the maximum number of IP channels supported by GV-Control Center from GV-VMS / NVR and GV-Recording Server / IP cameras in a Matrix View, each with a different proportional layout.



1 x 1 layout

Host	Codec	Resolution			Total FPS Supported	Full-Frame Channels Supported
		Megapixel	Main Stream	Sub Stream		
GV-VMS / NVR	H.264	1.3 MP (30fps)	1280 x 1024	320 x 256	180	6 CH
		2 MP (30fps)	1920 x 1080	448 x 252	180	6 CH
		3 MP (30fps)	2048 x 1536	960 x 720	180	6 CH
		5 MP (25fps)	2592 x 1944	960 x 720	175	7 CH
		8 MP (25fps)	3840 x 2160	1280 x 720	175	7 CH
		12 MP (15fps)	4000 x 3000	1024 x 768	120	8 CH
	Main: H.265 Sub: H.264	3 MP (30fps)	2048 x 1536	640 x 480	120	4 CH
		4 MP (25fps)	2560 x 1440	640 x 360	125	5 CH
		5 MP (30fps)	2592 x 1944	640 x 480	90	3 CH
GV-Recording Server / IP Cam	H.264	1.3 MP (30fps)	1280 x 1024	320 x 256	180	6 CH
		2 MP (30fps)	1920 x 1080	448 x 252	180	6 CH
		3 MP (30fps)	2048 x 1536	960 x 720	180	6 CH
		5 MP (25fps)	2592 x 1944	960 x 720	200	8 CH
		8 MP (25fps)	3840 x 2160	1280 x 720	175	7 CH
		12 MP (15fps)	4000 x 3000	1024 x 768	120	8 CH
	Main: H.265 Sub: H.264	3 MP (30fps)	2048 x 1536	640 x 480	90	3 CH
		4 MP (25fps)	2560 x 1440	640 x 360	75	3 CH
		5 MP (30fps)	2592 x 1944	640 x 480	90	3 CH

Note: By default, video data from GV-VMS / NVR is compressed, whereas those from GV-Recording Server / IP Cam is bypassed (FIFO).



2 x 2 layout

Host	Codec	Resolution			Total FPS Supported	Full-Frame Channels Supported
		Megapixel	Main Stream	Sub Stream		
GV-VMS / NVR	H.264	1.3 MP (30fps)	1280 x 1024	320 x 256	600	20 CH
		2 MP (30fps)	1920 x 1080	448 x 252	480	16 CH
		3 MP (30fps)	2048 x 1536	960 x 720	480	16 CH
		5 MP (25fps)	2592 x 1944	960 x 720	400	16 CH
		8 MP (25fps)	3840 x 2160	1280 x 720	225	9 CH
		12 MP (15fps)	4000 x 3000	1024 x 768	180	12 CH
	Main: H.265 Sub: H.264	3 MP (30fps)	2048 x 1536	640 x 480	210	7 CH
		4 MP (25fps)	2560 x 1440	640 x 360	175	7 CH
		5 MP (30fps)	2592 x 1944	640 x 480	120	4 CH
GV-Recording Server / IP Cam	H.264	1.3 MP (30fps)	1280 x 1024	320 x 256	630	21 CH
		2 MP (30fps)	1920 x 1080	448 x 252	600	20 CH
		3 MP (30fps)	2048 x 1536	960 x 720	600	20 CH
		5 MP (25fps)	2592 x 1944	960 x 720	550	22 CH
		8 MP (25fps)	3840 x 2160	1280 x 720	550	22 CH
		12 MP (15fps)	4000 x 3000	1024 x 768	480	32 CH
	Main: H.265 Sub: H.264	3 MP (30fps)	2048 x 1536	640 x 480	420	14 CH
		4 MP (25fps)	2560 x 1440	640 x 360	350	14 CH
		5 MP (30fps)	2592 x 1944	640 x 480	360	12 CH

Note: By default, video data from GV-VMS / NVR is compressed, whereas those from GV-Recording Server / IP Cam is bypassed (FIFO).



3 x 3 layout

Host	Codec	Resolution			Total FPS Supported	Full-Frame Channels Supported
		Megapixel	Main Stream	Sub Stream		
GV-VMS / NVR	H.264	1.3 MP (30fps)	1280 x 1024	320 x 256	2160	72 CH
		2 MP (30fps)	1920 x 1080	448 x 252	2160	72 CH
		3 MP (30fps)	2048 x 1536	960 x 720	1140	38 CH
		5 MP (25fps)	2592 x 1944	960 x 720	1250	50 CH
		8 MP (25fps)	3840 x 2160	1280 x 720	650	26 CH
		12 MP (15fps)	4000 x 3000	1024 x 768	1020	68 CH
	Main: H.265	3 MP (30fps)	2048 x 1536	640 x 480	540	18 CH
	Sub: H.264	4 MP (25fps)	2560 x 1440	640 x 360	475	19 CH
	Sub: H.264	5 MP (30fps)	2592 x 1944	640 x 480	270	9 CH
GV-Recording Server / IP Cam	H.264	1.3 MP (30fps)	1280 x 1024	320 x 256	1020	34 CH
		2 MP (30fps)	1920 x 1080	448 x 252	870	29 CH
		3 MP (30fps)	2048 x 1536	960 x 720	1110	37 CH
		5 MP (25fps)	2592 x 1944	960 x 720	1050	42 CH
		8 MP (25fps)	3840 x 2160	1280 x 720	1050	42 CH
		12 MP(15fps)	4000 x 3000	1024 x 768	900	60 CH
	Main: H.265	3 MP (30fps)	2048 x 1536	640 x 480	1050	35 CH
	Sub: H.264	4 MP (25fps)	2560 x 1440	640 x 360	1275	51 CH
	Sub: H.264	5 MP (30fps)	2592 x 1944	640 x 480	1020	34 CH

Note: By default, video data from GV-VMS / NVR is compressed, whereas those from GV-Recording Server / IP Cam is bypassed (FIFO).



4 x 4 layout

Host	Codec	Resolution			Total FPS Supported	Full-Frame Channels Supported
		Megapixel	Main Stream	Sub Stream		
GV-VMS / NVR	H.264	1.3 MP (30fps)	1280 x 1024	320 x 256	3840	128 CH
		2 MP (30fps)	1920 x 1080	448 x 252	3840	128 CH
		3 MP (30fps)	2048 x 1536	960 x 720	1920	64 CH
		5 MP (25fps)	2592 x 1944	960 x 720	2125	85 CH
		8 MP (25fps)	3840 x 2160	1280 x 720	1225	49 CH
		12 MP (15fps)	4000 x 3000	1024 x 768	1485	99 CH
	Main: H.265	3 MP (30fps)	2048 x 1536	640 x 480	2550	85 CH
	Sub: H.264	4 MP (25fps)	2560 x 1440	640 x 360	2400	96 CH
		5 MP (30fps)	2592 x 1944	640 x 480	2520	84 CH
GV-Recording Server / IP Cam	H.264	1.3 MP (30fps)	1280 x 1024	320 x 256	1320	44 CH
		2 MP (30fps)	1920 x 1080	448 x 252	2730	91 CH
		3 MP (30fps)	2048 x 1536	960 x 720	1500	50 CH
		5 MP (25fps)	2592 x 1944	960 x 720	1475	59 CH
		8 MP (25fps)	3840 x 2160	1280 x 720	1450	58 CH
		12 MP (15fps)	4000 x 3000	1024 x 768	1260	84 CH
	Main: H.265	3 MP (30fps)	2048 x 1536	640 x 480	1500	50 CH
	Sub: H.264	4 MP (25fps)	2560 x 1440	640 x 360	1525	61 CH
		5 MP (30fps)	2592 x 1944	640 x 480	1500	50 CH

Note: By default, video data from GV-VMS / NVR is compressed, whereas those from GV-Recording Server / IP Cam is bypassed (FIFO).



6 x 6 layout

Host	Codec	Resolution			Total FPS Supported	Full-Frame Channels Supported
		Megapixel	Main Stream	Sub Stream		
GV-VMS / NVR	H.264	1.3 MP (30fps)	1280 x 1024	320 x 256	6780	226 CH
		2 MP (30fps)	1920 x 1080	448 x 252	5940	198 CH
		3 MP (30fps)	2048 x 1536	960 x 720	5040	168 CH
		5 MP (25fps)	2592 x 1944	960 x 720	6100	244 CH
		8 MP (25fps)	3840 x 2160	1280 x 720	3650	146 CH
		12 MP (15fps)	4000 x 3000	1024 x 768	3360	224 CH
	Main: H.265	3 MP (30fps)	2048 x 1536	640 x 480	6540	218 CH
	Sub: H.264	4 MP (25fps)	2560 x 1440	640 x 360	7200	288 CH
		5 MP (30fps)	2592 x 1944	640 x 480	5040	168 CH
GV-Recording Server / IP Cam	H.264	1.3 MP (30fps)	1280 x 1024	320 x 256	4050	135 CH
		2 MP (30fps)	1920 x 1080	448 x 252	3660	122 CH
		3 MP (30fps)	2048 x 1536	960 x 720	2070	69 CH
		5 MP (25fps)	2592 x 1944	960 x 720	2050	82 CH
		8 MP (25fps)	3840 x 2160	1280 x 720	1750	70 CH
		12 MP (15fps)	4000 x 3000	1024 x 768	1470	98 CH
	Main: H.265	3 MP (30fps)	2048 x 1536	640 x 480	2520	84 CH
	Sub: H.264	1.3 MP (30fps)	2560 x 1440	640 x 360	2725	109 CH
		2 MP (30fps)	2592 x 1944	640 x 480	2520	84 CH

Note: By default, video data from GV-VMS / NVR is compressed, whereas those from GV-Recording Server / IP Cam is bypassed (FIFO).



8 x 8 layout

Host	Codec	Resolution			Total FPS Supported	Full-Frame Channels Supported
		Megapixel	Main Stream	Sub Stream		
GV-VMS / NVR	H.264	1.3 MP (30fps)	1280 x 1024	320 x 256	13440	448 CH
		2 MP (30fps)	1920 x 1080	448 x 252	13440	448 CH
		3 MP (30fps)	2048 x 1536	960 x 720	6960	232 CH
		5 MP (25fps)	2592 x 1944	960 x 720	7400	296 CH
		8 MP (25fps)	3840 x 2160	1280 x 720	4275	171 CH
		12 MP (15fps)	4000 x 3000	1024 x 768	3525	235 CH
	Main: H.265 Sub: H.264	3 MP (30fps)	2048 x 1536	640 x 480	13380	446 CH
		4 MP (25fps)	2560 x 1440	640 x 360	12800	512 CH
		5 MP (30fps)	2592 x 1944	640 x 480	13200	440 CH
GV-Recording Server / IP Cam	H.264	1.3 MP (30fps)	1280 x 1024	320 x 256	5760	192 CH
		2 MP (30fps)	1920 x 1080	448 x 252	4500	150 CH
		3 MP (30fps)	2048 x 1536	960 x 720	2160	72 CH
		5 MP (25fps)	2592 x 1944	960 x 720	2450	98 CH
		8 MP (25fps)	3840 x 2160	1280 x 720	1800	72 CH
		12 MP (15fps)	4000 x 3000	1024 x 768	1410	94 CH
	Main: H.265 Sub: H.264	3 MP (30fps)	2048 x 1536	640 x 480	2100	70 CH
		4 MP (25fps)	2560 x 1440	640 x 360	2875	115 CH
		5 MP (30fps)	2592 x 1944	640 x 480	2100	70 CH

Note: By default, video data from GV-VMS / NVR is compressed, whereas those from GV-Recording Server / IP Cam is bypassed (FIFO).



2.2 Disproportionate Matrix Layout

The tables in this section present the maximum number of IP channels supported by GV-Control Center from GV-VMS / NVR and GV-Recording Server / IP cameras in a Matrix View, each with a different disproportionate layout.

3 x 2 layout

Host	Codec	Resolution			Total FPS Supported	Full-Frame Channels Supported
		Megapixel	Main Stream	Sub Stream		
GV-VMS / NVR	H.264	1.3 MP (30fps)	1280 x 1024	320 x 256	1440	48 CH
		2 MP (30fps)	1920 x 1080	448 x 252	1440	48 CH
		3 MP (30fps)	2048 x 1536	960 x 720	1080	36 CH
		5 MP (25fps)	2592 x 1944	960 x 720	1100	44 CH
		8 MP (25fps)	3840 x 2160	1280 x 720	650	26 CH
		12 MP (15fps)	4000 x 3000	1024 x 768	720	48 CH
	Main: H.265 Sub: H.264	3 MP (30fps)	2048 x 1536	640 x 480	540	18 CH
		4 MP (25fps)	2560 x 1440	640 x 360	475	19 CH
		5 MP (30fps)	2592 x 1944	640 x 480	180	6 CH
GV-Recording Server / IP Cam	H.264	1.3 MP (30fps)	1280 x 1024	320 x 256	810	27 CH
		2 MP (30fps)	1920 x 1080	448 x 252	750	25 CH
		3 MP (30fps)	2048 x 1536	960 x 720	810	27 CH
		5 MP (25fps)	2592 x 1944	960 x 720	775	31 CH
		8 MP (25fps)	3840 x 2160	1280 x 720	775	31 CH
		12 MP (15fps)	4000 x 3000	1024 x 768	720	48 CH
	Main: H.265 Sub: H.264	3 MP (30fps)	2048 x 1536	640 x 480	1020	34 CH
		4 MP (25fps)	2560 x 1440	640 x 360	1200	48 CH
		5 MP (30fps)	2592 x 1944	640 x 480	930	31 CH

Note: By default, video data from GV-VMS / NVR is compressed, whereas those from GV-Recording Server / IP Cam is bypassed (FIFO).



4 x 3 layout

Host	Codec	Resolution			Total FPS Supported	Full-Frame Channels Supported
		Megapixel	Main Stream	Sub Stream		
GV-VMS / NVR	H.264	1.3 MP (30fps)	1280 x 1024	320 x 256	2880	96 CH
		2 MP (30fps)	1920 x 1080	448 x 252	2880	96 CH
		3 MP (30fps)	2048 x 1536	960 x 720	1440	48 CH
		5 MP (25fps)	2592 x 1944	960 x 720	1650	66 CH
		8 MP (25fps)	3840 x 2160	1280 x 720	925	37 CH
		12 MP (15fps)	4000 x 3000	1024 x 768	1320	88 CH
	Main: H.265	3 MP (30fps)	2048 x 1536	640 x 480	1950	65 CH
	Sub: H.264	4 MP (25fps)	2560 x 1440	640 x 360	1900	76 CH
		5 MP (30fps)	2592 x 1944	640 x 480	1920	64 CH
GV-Recording Server / IP Cam	H.264	1.3 MP (30fps)	1280 x 1024	320 x 256	1170	39 CH
		2 MP (30fps)	1920 x 1080	448 x 252	2400	80 CHs
		3 MP (30fps)	2048 x 1536	960 x 720	1320	44 CH
		5 MP (25fps)	2592 x 1944	960 x 720	1300	52 CH
		8 MP (25fps)	3840 x 2160	1280 x 720	1250	50 CH
		12 MP (15fps)	4000 x 3000	1024 x 768	1140	76 CH
	Main: H.265	3 MP (30fps)	2048 x 1536	640 x 480	1560	52 CH
	Sub: H.264	4 MP (25fps)	2560 x 1440	640 x 360	1500	60 CH
		5 MP (30fps)	2592 x 1944	640 x 480	1560	52 CH

Note: By default, video data from GV-VMS / NVR is compressed, whereas those from GV-Recording Server / IP Cam is bypassed (FIFO).



5 x 4 layout

Host	Codec	Resolution			Total FPS Supported	Full-Frame Channels Supported
		Megapixel	Main Stream	Sub Stream		
GV-VMS / NVR	H.264	1.3 MP (30fps)	1280 x 1024	320 x 256	4800	160 CH
		2 MP (30fps)	1920 x 1080	448 x 252	4800	160 CH
		3 MP (30fps)	2048 x 1536	960 x 720	2520	84 CH
		5 MP (25fps)	2592 x 1944	960 x 720	3500	140 CH
		8 MP (25fps)	3840 x 2160	1280 x 720	1650	66 CH
		12 MP (15fps)	4000 x 3000	1024 x 768	2400	160 CH
	Main: H.265	3 MP (30fps)	2048 x 1536	640 x 480	3690	123 CH
	Sub: H.264	4 MP (25fps)	2560 x 1440	640 x 360	4000	160 CH
		5 MP (30fps)	2592 x 1944	640 x 480	3660	122 CH
GV-Recording Server / IP Cam	H.264	1.3 MP (30fps)	1280 x 1024	320 x 256	3510	117 CH
		2 MP (30fps)	1920 x 1080	448 x 252	3030	101 CH
		3 MP (30fps)	2048 x 1536	960 x 720	1650	55 CH
		5 MP (25fps)	2592 x 1944	960 x 720	1625	65 CH
		8 MP (25fps)	3840 x 2160	1280 x 720	1550	62 CH
		12 MP (15fps)	4000 x 3000	1024 x 768	1260	84 CH
	Main: H.265	3 MP (30fps)	2048 x 1536	640 x 480	1920	64 CH
	Sub: H.264	4 MP (25fps)	2560 x 1440	640 x 360	1775	71 CH
		5 MP (30fps)	2592 x 1944	640 x 480	1920	64 CH

Note: By default, video data from GV-VMS / NVR is compressed, whereas those from GV-Recording Server / IP Cam is bypassed (FIFO).



6 x 4 layout

Host	Codec	Resolution			Total FPS Supported	Full-Frame Channels Supported
		Megapixel	Main Stream	Sub Stream		
GV-VMS / NVR	H.264	1.3 MP (30fps)	1280 x 1024	320 x 256	5760	192 CH
		2 MP (30fps)	1920 x 1080	448 x 252	5760	192 CH
		3 MP (30fps)	2048 x 1536	960 x 720	3060	102 CH
		5 MP (25fps)	2592 x 1944	960 x 720	3750	150 CH
		8 MP (25fps)	3840 x 2160	1280 x 720	1925	77 CH
		12 MP (15fps)	4000 x 3000	1024 x 768	2880	192 CH
	Main: H.265	3 MP (30fps)	2048 x 1536	640 x 480	4470	149 CH
	Sub: H.264	4 MP (25fps)	2560 x 1440	640 x 360	4800	192 CH
		5 MP (30fps)	2592 x 1944	640 x 480	4440	148 CH
GV-Recording Server / IP Cam	H.264	1.3 MP (30fps)	1280 x 1024	320 x 256	3780	126 CH
		2 MP (30fps)	1920 x 1080	448 x 252	3090	103 CH
		3 MP (30fps)	2048 x 1536	960 x 720	1830	61 CH
		5 MP (25fps)	2592 x 1944	960 x 720	1800	72 CH
		8 MP (25fps)	3840 x 2160	1280 x 720	1650	66 CH
		12 MP (15fps)	4000 x 3000	1024 x 768	1290	86 CH
	Main: H.265	3 MP (30fps)	2048 x 1536	640 x 480	2280	76 CH
	Sub: H.264	4 MP (25fps)	2560 x 1440	640 x 360	2400	96 CH
		5 MP (30fps)	2592 x 1944	640 x 480	2280	76 CH

Note: By default, video data from GV-VMS / NVR is compressed, whereas those from GV-Recording Server / IP Cam is bypassed (FIFO).



8 x 6 layout

Host	Codec	Resolution			Total FPS Supported	Full-Frame Channels Supported
		Megapixel	Main Stream	Sub Stream		
GV-VMS / NVR	H.264	1.3 MP (30fps)	1280 x 1024	320 x 256	11520	384 CH
		2 MP (30fps)	1920 x 1080	448 x 252	11280	376 CH
		3 MP (30fps)	2048 x 1536	960 x 720	5520	184 CH
		5 MP (25fps)	2592 x 1944	960 x 720	5825	233 CH
		8 MP (25fps)	3840 x 2160	1280 x 720	3475	139 CH
		12 MP (15fps)	4000 x 3000	1024 x 768	2760	184 CH
	Main: H.265	3 MP (30fps)	2048 x 1536	640 x 480	11520	384 CH
	Sub: H.264	4 MP (25fps)	2560 x 1440	640 x 360	9600	384 CH
		5 MP (30fps)	2592 x 1944	640 x 480	11340	378 CH
GV-Recording Server / IP Cam	H.264	1.3 MP (30fps)	1280 x 1024	320 x 256	4800	160 CH
		2 MP (30fps)	1920 x 1080	448 x 252	4350	145 CH
		3 MP (30fps)	2048 x 1536	960 x 720	2130	71 CH
		5 MP (25fps)	2592 x 1944	960 x 720	2150	86 CH
		8 MP (25fps)	3840 x 2160	1280 x 720	1750	70 CH
		12 MP (15fps)	4000 x 3000	1024 x 768	1365	91 CH
	Main: H.265	3 MP (30fps)	2048 x 1536	640 x 480	2520	84 CH
	Sub: H.264	4 MP (25fps)	2560 x 1440	640 x 360	2800	112 CH
		5 MP (30fps)	2592 x 1944	640 x 480	2520	84 CH

Note: By default, video data from GV-VMS / NVR is compressed, whereas those from GV-Recording Server / IP Cam is bypassed (FIFO).



9 x 6 layout

Host	Codec	Resolution			Total FPS Supported	Full-Frame Channels Supported
		Megapixel	Main Stream	Sub Stream		
GV-VMS / NVR	H.264	1.3 MP (30fps)	1280 x 1024	320 x 256	11820	394 CH
		2 MP (30fps)	1920 x 1080	448 x 252	11700	390 CH
		3 MP (30fps)	2048 x 1536	960 x 720	5880	196 CH
		5 MP (25fps)	2592 x 1944	960 x 720	7750	310 CH
		8 MP (25fps)	3840 x 2160	1280 x 720	3725	149 CH
		12 MP (15fps)	4000 x 3000	1024 x 768	3060	204 CH
	Main: H.265	3 MP (30fps)	2048 x 1536	640 x 480	12300	410 CH
	Sub: H.264	4 MP (25fps)	2560 x 1440	640 x 360	10800	432 CH
		5 MP (30fps)	2592 x 1944	640 x 480	11670	389 CH
GV-Recording Server / IP Cam	H.264	1.3 MP (30fps)	1280 x 1024	320 x 256	5130	171 CH
		2 MP (30fps)	1920 x 1080	448 x 252	5040	168 CH
		3 MP (30fps)	2048 x 1536	960 x 720	2160	72 CH
		5 MP (25fps)	2592 x 1944	960 x 720	2150	86 CH
		8 MP (25fps)	3840 x 2160	1280 x 720	1725	69 CH
		12 MP (15fps)	4000 x 3000	1024 x 768	1395	93 CH
	Main: H.265	3 MP (30fps)	2048 x 1536	640 x 480	2430	81 CH
	Sub: H.264	4 MP (25fps)	2560 x 1440	640 x 360	2775	111 CH
		5 MP (30fps)	2592 x 1944	640 x 480	2430	81 CH

Note: By default, video data from GV-VMS / NVR is compressed, whereas those from GV-Recording Server / IP Cam is bypassed (FIFO).



10 x 8 layout

Host	Codec	Resolution			Total FPS Supported	Full-Frame Channels Supported
		Megapixel	Main Stream	Sub Stream		
GV-VMS / NVR	H.264	1.3 MP (30fps)	1280 x 1024	320 x 256	14640	488 CH
		2 MP (30fps)	1920 x 1080	448 x 252	14640	488 CH
		3 MP (30fps)	2048 x 1536	960 x 720	8400	280 CH
		5 MP (25fps)	2592 x 1944	960 x 720	9025	361 CH
		8 MP (25fps)	3840 x 2160	1280 x 720	5075	203 CH
		12 MP (15fps)	4000 x 3000	1024 x 768	4200	280 CH
	Main: H.265	3 MP (30fps)	2048 x 1536	640 x 480	14400	480 CH
	Sub: H.264	4 MP (25fps)	2560 x 1440	640 x 360	14000	560 CH
		5 MP (30fps)	2592 x 1944	640 x 480	14370	479 CH
GV-Recording Server / IP Cam	H.264	1.3 MP (30fps)	1280 x 1024	320 x 256	5940	198 CH
		2 MP (30fps)	1920 x 1080	448 x 252	5130	171 CH
		3 MP (30fps)	2048 x 1536	960 x 720	2220	74 CH
		5 MP (25fps)	2592 x 1944	960 x 720	1925	77 CH
		8 MP (25fps)	3840 x 2160	1280 x 720	1775	71 CH
		12 MP (15fps)	4000 x 3000	1024 x 768	1155	77 CH
	Main: H.265	3 MP (30fps)	2048 x 1536	640 x 480	1920	64 CH
	Sub: H.264	4 MP (25fps)	2560 x 1440	640 x 360	2750	110 CH
		5 MP (30fps)	2592 x 1944	640 x 480	1920	64 CH

Note: By default, video data from GV-VMS / NVR is compressed, whereas those from GV-Recording Server / IP Cam is bypassed (FIFO).



12 x 8 layout

Host	Codec	Resolution			Total FPS Supported	Full-Frame Channels Supported
		Megapixel	Main Stream	Sub Stream		
GV-VMS / NVR	H.264	1.3 MP (30fps)	1280 x 1024	320 x 256	14700	490 CH
		2 MP (30fps)	1920 x 1080	448 x 252	11820	394 CH
		3 MP (30fps)	2048 x 1536	960 x 720	5280	176 CH
		5 MP (25fps)	2592 x 1944	960 x 720	4475	179 CH
		8 MP (25fps)	3840 x 2160	1280 x 720	3600	144 CH
		12 MP (15fps)	4000 x 3000	1024 x 768	2505	167 CH
	Main: H.265	3 MP (30fps)	2048 x 1536	640 x 480	8220	274 CH
	Sub: H.264	4 MP (25fps)	2560 x 1440	640 x 360	7000	280 CH
		5 MP (30fps)	2592 x 1944	640 x 480	8100	270 CH
GV-Recording Server / IP Cam	H.264	1.3 MP (30fps)	1280 x 1024	320 x 256	6360	212 CH
		2 MP (30fps)	1920 x 1080	448 x 252	5340	178 CH
		3 MP (30fps)	2048 x 1536	960 x 720	2160	72 CH
		5 MP (25fps)	2592 x 1944	960 x 720	1925	77 CH
		8 MP (25fps)	3840 x 2160	1280 x 720	1725	69 CH
		12 MP (15fps)	4000 x 3000	1024 x 768	1200	80 CH
	Main: H.265	3 MP (30fps)	2048 x 1536	640 x 480	1920	64 CH
	Sub: H.264	4 MP (25fps)	2560 x 1440	640 x 360	2200	88 CH
		5 MP (30fps)	2592 x 1944	640 x 480	1920	64 CH

Note: By default, video data from GV-VMS / NVR is compressed, whereas those from GV-Recording Server / IP Cam is bypassed (FIFO).



2.3 Proportional Video Wall Layout

The tables below present the maximum number of channels supported by GV-Control Center V3.4.0.0 from GV-VMS / NVR and GV-Recording Server / IP cameras using proportional video wall layouts.

1 x 1 layout

Host	Codec	Resolution			Total FPS Supported	Full-Frame Channels Supported
		Megapixel	Main Stream	Sub Stream		
GV-VMS / NVR	H.264	1.3 MP (30fps)	1280 x 1024	320 x 256	120	4 CH
		2 MP (30fps)	1920 x 1080	448 x 252	120	4 CH
		3 MP (30fps)	2048 x 1536	960 x 720	150	5 CH
		5 MP (25fps)	2592 x 1944	960 x 720	150	6 CH
		8 MP (25fps)	3840 x 2160	1280 x 720	100	4 CH
		12 MP (15fps)	4000 x 3000	1024 x 768	75	5 CH
	Main: H.265 Sub: H.264	3 MP (30fps)	2048 x 1536	640 x 480	240	8 CH
		4 MP (25fps)	2560 x 1440	640 x 360	200	8 CH
		5 MP (30fps)	2592 x 1944	640 x 480	180	6 CH
GV-Recording Server / IP Cam	H.264	1.3 MP (30fps)	1280 x 1024	320 x 256	150	5 CH
		2 MP (30fps)	1920 x 1080	448 x 252	150	5 CH
		3 MP (30fps)	2048 x 1536	960 x 720	150	5 CH
		5 MP (25fps)	2592 x 1944	960 x 720	175	7 CH
		8 MP (25fps)	3840 x 2160	1280 x 720	175	7 CH
		12 MP (15fps)	4000 x 3000	1024 x 768	120	8 CH
	Main: H.265 Sub: H.264	3 MP (30fps)	2048 x 1536	640 x 480	27	1 CH
		4 MP (25fps)	2560 x 1440	640 x 360	24	1 CH
		5 MP (30fps)	2592 x 1944	640 x 480	20	1 CH

Note: By default, video data from GV-VMS / NVR is compressed, whereas those from GV-Recording Server / IP Cam is bypassed (FIFO).



2 x 2 layout

Host	Codec	Resolution			Total FPS Supported	Full-Frame Channels Supported
		Megapixel	Main Stream	Sub Stream		
GV-VMS / NVR	H.264	1.3 MP (30fps)	1280 x 1024	320 x 256	540	18 CH
		2 MP (30fps)	1920 x 1080	448 x 252	390	13 CH
		3 MP (30fps)	2048 x 1536	960 x 720	270	9 CH
		5 MP (25fps)	2592 x 1944	960 x 720	275	11 CH
		8 MP (25fps)	3840 x 2160	1280 x 720	100	4 CH
		12 MP (15fps)	4000 x 3000	1024 x 768	75	5 CH
	Main: H.265	3 MP (30fps)	2048 x 1536	640 x 480	270	9 CH
	Sub: H.264	4 MP (25fps)	2560 x 1440	640 x 360	200	8 CH
		5 MP (30fps)	2592 x 1944	640 x 480	180	6 CH
GV-Recording Server / IP Cam	H.264	1.3 MP (30fps)	1280 x 1024	320 x 256	600	20 CH
		2 MP (30fps)	1920 x 1080	448 x 252	600	20 CH
		3 MP (30fps)	2048 x 1536	960 x 720	540	18 CH
		5 MP (25fps)	2592 x 1944	960 x 720	575	23 CH
		8 MP (25fps)	3840 x 2160	1280 x 720	575	23 CH
		12 MP (15fps)	4000 x 3000	1024 x 768	480	32 CH
	Main: H.265	3 MP (30fps)	2048 x 1536	640 x 480	840	28 CH
	Sub: H.264	4 MP (25fps)	2560 x 1440	640 x 360	75	3 CH
		5 MP (30fps)	2592 x 1944	640 x 480	690	23 CH

Note: By default, video data from GV-VMS / NVR is compressed, whereas those from GV-Recording Server / IP Cam is bypassed (FIFO).



3 x 3 layout

Host	Codec	Resolution			Total FPS Supported	Full-Frame Channels Supported
		Megapixel	Main Stream	Sub Stream		
GV-VMS / NVR	H.264	1.3 MP (30fps)	1280 x 1024	320 x 256	2430	81 CH
		2 MP (30fps)	1920 x 1080	448 x 252	2430	81 CH
		3 MP (30fps)	2048 x 1536	960 x 720	420	14 CH
		5 MP (25fps)	2592 x 1944	960 x 720	350	14 CH
		8 MP (25fps)	3840 x 2160	1280 x 720	600	24 CH
		12 MP (15fps)	4000 x 3000	1024 x 768	900	60 CH
	Main: H.265 Sub: H.264	3 MP (30fps)	2048 x 1536	640 x 480	1020	34 CH
		4 MP (25fps)	2560 x 1440	640 x 360	775	31 CH
		5 MP (30fps)	2592 x 1944	640 x 480	1020	34 CH
GV-Recording Server / IP Cam	H.264	1.3 MP (30fps)	1280 x 1024	320 x 256	930	31 CH
		2 MP (30fps)	1920 x 1080	448 x 252	870	29 CH
		3 MP (30fps)	2048 x 1536	960 x 720	930	31 CH
		5 MP (25fps)	2592 x 1944	960 x 720	825	33 CH
		8 MP (25fps)	3840 x 2160	1280 x 720	825	33 CH
		12 MP (15fps)	4000 x 3000	1024 x 768	735	49 CH
	Main: H.265 Sub: H.264	3 MP (30fps)	2048 x 1536	640 x 480	1380	46 CH
		4 MP (25fps)	2560 x 1440	640 x 360	1625	65 CH
		5 MP (30fps)	2592 x 1944	640 x 480	1380	46 CH

Note: By default, video data from GV-VMS / NVR is compressed, whereas those from GV-Recording Server / IP Cam is bypassed (FIFO).



4 x 4 layout

Host	Codec	Resolution			Total FPS Supported	Full-Frame Channels Supported
		Megapixel	Main Stream	Sub Stream		
GV-VMS / NVR	H.264	1.3 MP (30fps)	1280 x 1024	320 x 256	3840	128 CH
		2 MP (30fps)	1920 x 1080	448 x 252	3690	123 CH
		3 MP (30fps)	2048 x 1536	960 x 720	420	14 CH
		5 MP (25fps)	2592 x 1944	960 x 720	775	31 CH
		8 MP (25fps)	3840 x 2160	1280 x 720	600	24 CH
		12 MP (15fps)	4000 x 3000	1024 x 768	915	61 CH
	Main: H.265 Sub: H.264	3 MP (30fps)	2048 x 1536	640 x 480	1020	34 CH
		4 MP (25fps)	2560 x 1440	640 x 360	775	31 CH
		5 MP (30fps)	2592 x 1944	640 x 480	1020	34 CH
GV-Recording Server / IP Cam	H.264	1.3 MP (30fps)	1280 x 1024	320 x 256	1080	36 CH
		2 MP (30fps)	1920 x 1080	448 x 252	960	32 CH
		3 MP (30fps)	2048 x 1536	960 x 720	1140	38 CH
		5 MP (25fps)	2592 x 1944	960 x 720	1050	42 CH
		8 MP (25fps)	3840 x 2160	1280 x 720	1050	42 CH
		12 MP (15fps)	4000 x 3000	1024 x 768	855	57 CH
	Main: H.265 Sub: H.264	3 MP (30fps)	2048 x 1536	640 x 480	1620	54 CH
		4 MP (25fps)	2560 x 1440	640 x 360	1800	72 CH
		5 MP (30fps)	2592 x 1944	640 x 480	1620	54 CH

Note: By default, video data from GV-VMS / NVR is compressed, whereas those from GV-Recording Server / IP Cam is bypassed (FIFO).



5 x 5 layout

Host	Codec	Resolution			Total FPS Supported	Full-Frame Channels Supported
		Megapixel	Main Stream	Sub Stream		
GV-VMS / NVR	H.264	1.3 MP (30fps)	1280 x 1024	320 x 256	4950	165 CH
		2 MP (30fps)	1920 x 1080	448 x 252	4950	165 CH
		3 MP (30fps)	2048 x 1536	960 x 720	990	33 CH
		5 MP (25fps)	2592 x 1944	960 x 720	1250	50 CH
		8 MP (25fps)	3840 x 2160	1280 x 720	675	27 CH
		12 MP (15fps)	4000 x 3000	1024 x 768	3375	225 CH
	Main: H.265 Sub: H.264	3 MP (30fps)	2048 x 1536	640 x 480	5130	171 CH
		4 MP (25fps)	2560 x 1440	640 x 360	5250	210 CH
		5 MP (30fps)	2592 x 1944	640 x 480	5130	171 CH
GV-Recording Server / IP Cam	H.264	1.3 MP (30fps)	1280 x 1024	320 x 256	1170	39 CH
		2 MP (30fps)	1920 x 1080	448 x 252	3000	100 CH
		3 MP (30fps)	2048 x 1536	960 x 720	1290	43 CH
		5 MP (25fps)	2592 x 1944	960 x 720	1150	46 CH
		8 MP (25fps)	3840 x 2160	1280 x 720	1150	46 CH
		12 MP (15fps)	4000 x 3000	1024 x 768	945	63 CH
	Main: H.265 Sub: H.264	3 MP (30fps)	2048 x 1536	640 x 480	1740	58 CH
		4 MP (25fps)	2560 x 1440	640 x 360	2175	87 CH
		5 MP (30fps)	2592 x 1944	640 x 480	1740	58 CH

Note: By default, video data from GV-VMS / NVR is compressed, whereas those from GV-Recording Server / IP Cam is bypassed (FIFO).



6 x 6 layout

Host	Codec	Resolution			Total FPS Supported	Full-Frame Channels Supported
		Megapixel	Main Stream	Sub Stream		
GV-VMS / NVR	H.264	1.3 MP (30fps)	1280 x 1024	320 x 256	8640	288 CH
		2 MP (30fps)	1920 x 1080	448 x 252	8460	282 CH
		3 MP (30fps)	2048 x 1536	960 x 720	6120	204 CH
		5 MP (25fps)	2592 x 1944	960 x 720	5350	214 CH
		8 MP (25fps)	3840 x 2160	1280 x 720	3350	134 CH
		12 MP (15fps)	4000 x 3000	1024 x 768	4320	288 CH
	Main: H.265	3 MP (30fps)	2048 x 1536	640 x 480	8640	288 CH
	Sub: H.264	4 MP (25fps)	2560 x 1440	640 x 360	7200	288 CH
		5 MP (30fps)	2592 x 1944	640 x 480	8640	288 CH
GV-Recording Server / IP Cam	H.264	1.3 MP (30fps)	1280 x 1024	320 x 256	3930	131 CH
		2 MP (30fps)	1920 x 1080	448 x 252	3390	113 CH
		3 MP (30fps)	2048 x 1536	960 x 720	1320	44 CH
		5 MP (25fps)	2592 x 1944	960 x 720	1250	50 CH
		8 MP (25fps)	3840 x 2160	1280 x 720	1250	50 CH
		12 MP (15fps)	4000 x 3000	1024 x 768	975	65 CH
	Main: H.265	3 MP (30fps)	2048 x 1536	640 x 480	1800	60 CH
	Sub: H.264	4 MP (25fps)	2560 x 1440	640 x 360	2075	83 CH
		5 MP (30fps)	2592 x 1944	640 x 480	1800	60 CH

Note: By default, video data from GV-VMS / NVR is compressed, whereas those from GV-Recording Server / IP Cam is bypassed (FIFO).



3. Testing Environment

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

Bitrate used for the test		
Resolution / Codec	H.264	
	Main Stream	Sub Stream
1.3 MP (30 fps)	1280 x 1024 (5.05 Mbit/s)	320 x 256 (1.35 Mbit/s)
2 MP (30 fps)	1920 x 1080 (7.01 Mbit/s)	448 x 252 (1.73 Mbit/s)
3 MP (30 fps)	2048 x 1536 (8.11 Mbit/s)	960 x 720 (3.18 Mbit/s)
5 MP (25 fps)	2592 x 1944 (7.67 Mbit/s)	960 x 720 (2.59 Mbit/s)
8 MP (25 fps)	3840 x 2160 (14.13 Mbit/s)	1280 x 720 (3.53 Mbit/s)
12 MP (15 fps)	4000 x 3000 (14.47 Mbit/s)	1024 x 768 (2.2 Mbit/s)

Resolution / Codec	H.265	H.264
	Main Stream	Sub Stream
3 MP (30 fps)	2048 x 1536 (5.35 Mbit/s)	640 x 480 (1.05 Mbit/s)
4 MP (25 fps)	2560 x 1440 (9.06 Mbit/s)	640 x 360 (1.7 Mbit/s)
5 MP (30 fps)	2592 x 1944 (8.29 Mbit/s)	640 x 480 (1.58 Mbit/s)

PC specifications used for the test	
OS	64-bit Windows 7
Motherboard	MSI Z170 PC MATE
CPU	Core i7-6700K 4.00GHz
Chipset	Intel Skylake
RAM	DDR4 2133 4 GB x4
On-board VGA	Intel HD Graphics 530
Monitor	9 monitors, Full HD (1920 x 1080)