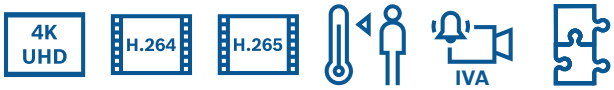
Monitor Wall



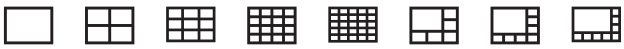
- View multiple live cameras on large screens in your surveillance center
- Multi-channel decoder with up to four screens
- Screen layout independently configurable per display
- Compatible with BVMS
- Compatible with IP cameras and encoders, as well as ONVIF and RTSP video sources

Monitor Wall displays video from Standard Definition (SD), High Definition (HD), 4K Ultra High Definition (UHD), and Megapixel (MP) cameras and encoders using H.264 or H.265 encoding at up to 60 frames per second over IP networks on up to four HD or 4K screens.

Its scalable decoding technology and performance management architecture makes it easy for operators to simply connect cameras, regardless of resolution, bitrate, or frame rate. It automatically scales resources, distributing them over the connected streams to produce the best possible performance.
Monitor Wall can be used in combination with BVMS or other VMS to enhance display capabilities especially for large control centers.

Together with the powerful video management software tools it is ideally suited for CCTV applications of any scale.
Monitor Wall software can be configured in many ways to match view representation expectations using Configuration Manager.
It also provides the possibility to exchange background images.
It supports secure access and connection setup and is easily integrated in IT management environments.
It is designed to run on a FIPS-2 compliant workstation.
Depending on the performance of the PC and its graphic adapter, Monitor Wall can run a single, dual or quad screen with different screen layouts, reaching from full screen to 5x5 or 6x5 views on each screen, depending on screen aspect ratio and configured video tile target aspect ratio.

The screen layout can be switched manually or automated by the management system or client if e.g. an alarm scenario requires a different view.
The list of available screen layouts adapts automatically to different monitor aspect ratios and landscape or portrait orientations.



Monitor Wall is available as software package to be installed on any high-performance Windows PC of your choice.
We tested the product on recommended workstations. For details, refer to the Performance Data section.

Functions

Control Protocol
Monitor Wall features two control protocols: the remote control protocol (RCP+) for configuration and live operation, which is identical to the proprietary remote control protocol used by IP cameras, and the JSON RPC protocol, which focuses on live operation.
Protocol documentation and the JSON schema are available for download from the Monitor Wall built-in web server.

Decoding and rendering performance
Monitor Wall performance is defined as its ability to decode, scale, and render video streams on a given hardware configuration in real time with low video latency. Performance is assessed based on the ratio between frames rendered in time and frames received.

Video is considered “smooth” when more than 99% of received frames are displayed with correct timing. An overload occurs when fewer than 95% of received frames are displayed.

Frame rate support and refresh rate guidance
Monitor Wall supports smooth video display for streams up to 60 fps.
Use matching monitor refresh rates to avoid minor video stuttering. For example, use 60 Hz for 30 fps and 60 fps streams.

Jitter control and latency optimization
A de-jitter buffer reduces video stuttering caused by network jitter or variable transmission times. The buffer dynamically adjusts video delay.
The system continuously optimizes video delay per stream to minimize latency based on frame arrival time variation.
The video smoothness preference can be configured from 100% (default) to 0%, ranging from optimized smooth video to lowest achievable latency.
When a PTZ command is sent to a PTZ-controllable camera through the Monitor Wall control protocol API, Monitor Wall temporarily reduces latency to improve PTZ responsiveness.

Multi-stream optimization
Monitor Wall includes mechanisms to optimize quality of service when displaying multiple video streams in parallel on up to four monitors in real time.
These mechanisms ensure stable operation on recommended hardware configurations. Heuristic preferences, such as GPU and CPU load balancing, can be adjusted if required.

Video content analysis overlay
Metadata from onboard video analytics engines of IP cameras can be rendered as a vector graphics overlay on the video stream.
This enables monitoring of object detection, object tracking, and object classification.

Insights overlay
Monitor Wall includes an on-screen overlay that provides insight into real-time decoding and rendering performance. The overlay is intended for on-site hardware assessment and field issue analysis.

Digital zoom
Monitor Wall video tiles support digital zoom for standard streams and dewarping zoom for streams from panoramic cameras.
Dewarping uses a zoom level-dependent algorithm.
Zoom settings can be configured at connection time or adjusted using PTZ speed commands while the stream is active.
Restoration of zoom settings after reconnection can be enabled in the configuration.

Stream and screen snapshots
The Monitor Wall built-in web server supports snapshots from:

- Individual streams
- Individual screens
- Stitched screens

Snapshots are available via HTTP GET requests.
Refer to the Monitor Wall RCP+ documentation for further details.

Restrictions
Monitor Wall supports hardware-accelerated H.264 and H.265 decoding in addition to CPU-based decoding on compatible Nvidia GPUs and Intel onboard graphics. Compatibility is typically provided for professional Nvidia workstation GPU models that use the same microarchitecture as the recommended hardware configuration. Compatibility is not guaranteed for models not listed in this datasheet.
Simultaneous hardware-accelerated decoding on Nvidia GPUs and Intel onboard graphics is not supported. For such workstation configurations, disable Intel onboard graphics in Windows Device Manager.
Nvidia GPUs support a limited number of parallel decoding sessions and have an upper limit for real-time encoded data throughput. GPU memory limitations may also restrict the number of high-resolution streams processed in parallel.
Monitor Wall uses a heuristic to decide whether a stream is decoded on the CPU or GPU to optimize overall system performance. Lower-resolution streams may be assigned to CPU decoding to reserve GPU resources for higher-resolution streams.
Some load-balancing preferences can be adjusted if required.
The CPU-based decoding framework uses predictive scheduling to maintain real-time display during overload conditions. If decoding or rendering cannot be completed in time, the system may skip selected encoded frames.
Aggressive CPU clock rate regulation can reduce prediction accuracy. Select the “High performance” power plan in Windows Power Settings.

Performance tables
The tables below show maximum values for smooth video display on recommended hardware configurations. These values provide guidance for performance design.
Additional streams beyond the listed values can be connected, but this may reduce video smoothness.
Reducing the encoder frame rate (for example, from 30 fps to 15 fps) increases the number of streams that can be displayed without frame drops.

Performance dependencies
Performance depends on multiple factors, including:

- Video stream resolution

- Frame rate
- Stream aspect ratio
- Monitor resolution
- Monitor refresh rate
- Monitor aspect ratio
- Selected panel layout
- Target aspect ratio
- Scaling requirements

These factors can affect overall system performance positively or negatively.

Reference hardware: Z2 G4 workstation with Nvidia Quadro P620

Stream parameters	Bit rate	Display output mode 4x 1920x1080 (60Hz)	
Resolution @ frame rate	Mbps	H.264	H.265
3840x2160@30	32	6	
3840x2160@25	32		5
2992x1680@30	16	9	
1920x1080@60	12	10	10
1920x1080@30	8	24	15
1280x720@60	6	10	10
1280x720@30	4	34	26
768x432@30	2	44	
512x288@30	1	48	

Reference hardware: Z4 G4 workstation with Nvidia Quadro P4000

Stream parameters	Bit rate	Display output mode 4x 3840x2160 (60 Hz)	
Resolution @ frame rate	Mbps	H.264	H.265
3840x2160@30	32	8	
3840x2160@25	32		6
2992x1680@30	16	12	
1920x1080@60	12	10	10
1920x1080@30	8	22	20
1280x720@60	6	16	16
1280x720@30	4	28	22
768x432@30	2	38	
512x288@30	1	45	

Reference hardware: Z4 G4 workstation with Nvidia RTX4000

Stream parameters	Bit rate	Display output mode 4x 3840x2160 (60Hz)	
Resolution @ frame rate	Mbps	H.264	H.265
3840x2160@30	32	11	
3840x2160@25	32		8
2992x1680@30	16	18	
1920x1080@60	12	15	12
1920x1080@30	8	24	21
1280x720@60	6	17	15
1280x720@30	4	30	23
768x432@30	2	40	
512x288@30	1	46	

Reference hardware: Z2 G9 workstation with Nvidia A400

Stream parameters	Bit rate	Display output mode 2x 3840x2160 (60Hz)	
Resolution @ frame rate	Mbps	H.264	H.265
3840x2160@30	32	12	
3840x2160@25	32		8
2992x1680@30	16	18	
1920x1080@60	12	10	12
1920x1080@30	8	26	26
1280x720@60	6	16	16
1280x720@30	4	34	30
768x432@30	2	52	
512x288@30	1	58	

Reference hardware: Z4 G5 workstation with Nvidia T1000

Stream parameters	Bit rate	Display output mode	
		4x 3840x2160 (60Hz)	
Resolution @ frame rate	Mbps	H.264	H.265
3840x2160@30	32	7	
3840x2160@25	32		5
2992x1680@30	16	10	
1920x1080@60	12	10	12
1920x1080@30	8	22	22
1280x720@60	6	18	18
1280x720@30	4	30	26
768x432@30	2	52	
512x288@30	1	60	

Technical specifications

System requirements

	MVS-MW Monitor Wall
Hardware	Management workstation Z2 or Z4 (G4 and newer)
Operating system	Windows 11 (64 bit)
Graphic card	NVIDIA Quadro P620 or P4000, NVIDIA RTX 4000, T1000, or A400.
Ethernet card	1000 Mbps
Sound card	Recommended
Memory (RAM) (GB)	8 GB
Free space (MB)	200 MB
Recommended software for configuration	Configuration Manager 7.77 or newer
Recommended software for operation	BVMS 12 or newer

System integration

	MVS-MW Monitor Wall
Encryption	TLS 1.2; AES
Protocols / standards	IPv4; IPv6; UDP; TCP; HTTP; HTTPS; RTSP; RTP

Video streaming

	MVS-MW Monitor Wall
Frame rate (fps)	60 fps
Video compression	H.264 (ISO/IEC 14496-10); H.265/HEVC

Ordering information

MVS-MW-2D Monitor Wall license for two displays
Digital software solution to view many cameras on up to two state-of-the-art monitor screens
Order number **MVS-MW-2D**

MVS-MW-4D Monitor Wall license for four displays
Digital software solution to view many cameras on up to four state-of-the-art monitor screens
Order number **MVS-MW-4D**

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