

Eagle Eye Application Note - AN038

Understanding Impact and How To Use Bandwidth Calculations

2022-06-07 Revision 1.1

Target Audience

This Application Note is intended for Resellers looking to best determine and calculate minimum bandwidth requirements for Eagle Eye VMS customers. VMS access is not required because the Bridge Wizard doesn't require a login. Using this wizard will provide sufficient bandwidth recommendations.

Bandwidth Calculations Overview

When calculating bandwidth, there are three main factors that need to be considered:

- The Resolution of each video stream
- The Frame Rate and Compression Value of each video stream (Bitrate)
- The Expected Percentage of Motion Activity within a 24-hour period of each video stream (Duty Cycle)

Basic Calculations

A single camera calculation can be made as follows:

Camera Bitrate (kbps) X Camera Duty Cycle % = Minimum Bandwidth Required

Example: (1 Camera with 1MegaPixel Resolution streaming at 12 FPS), with a 50% Duty Cycle
(1x1000kbps) X .50 = 500kbps Minimum Bandwidth Required

Note: Camera Bitrate is determined by the camera Resolution and Quality settings. The VMS determines the best bitrate for each camera based on these settings. However, Users may select a higher or lower bitrate if required.

System Bandwidth Calculations

There are three main considerations for determining how much Bandwidth an entire system deployment may require.

1. The Full Video Stream of each camera - the high resolution, high frame rate video recorded for historical review and streamed for live viewing.
2. The Preview Stream - the low resolution, low frame rate video used for system analysis and layout displays.
3. The Number of Concurrent Users - Users actively accessing live video and historical video of separate cameras within concurrent User Sessions.

Calculating these considerations with the Eagle Eye VMS Bridge Wizard will provide two recommendations:

1. Cloud Bandwidth Needed Daily Average (Mb/s) - The amount of bandwidth needed to synchronize the entire system's video to the Eagle Eye Cloud.
2. Suggested Bandwidth For Live Viewing (Mb/s) - The amount of bandwidth required to stream live Full Video to concurrent users.

The Eagle Eye VMS Bridge Wizard can be found at <https://een.com/eevmswizard>.

Below is an example of the calculations provided for a 10 camera system recording at 2 and 4 megapixels for Full Cloud Retention.

Enter Video Surveillance System Requirements (up to 4 different camera groups)

Input Data	CAMERAS				Total	Additional Features	
	Group 1	Group 2	Group 3	Group 4			
Camera Quantity	5	5	0	0	10	Local Display HDMI	None <input type="button" value="v"/>
Camera Type	IP H264 <input type="button" value="v"/>	IP H264 <input type="button" value="v"/>	IP H264 <input type="button" value="v"/>	IP H264 <input type="button" value="v"/>	--	Local Display HTTP	None <input type="button" value="v"/>
Camera Resolution (MegaPixels)	2.00	4.00	4.00	4.00	30.00	Industrial Temp Needed	No <input type="button" value="v"/>
Number of Cameras with Analytics Active	2	0	0	0		Rack Mount Needed	Yes <input type="button" value="v"/>
Preview Resolution (approximately)	320x240 <input type="button" value="v"/>	320x240 <input type="button" value="v"/>	320x240 <input type="button" value="v"/>	320x240 <input type="button" value="v"/>	--	Assumptions:	
Days of Retention	30	30	30	60	300	1 FPS for Preview	
Image Quality	Medium <input type="button" value="v"/>	Medium <input type="button" value="v"/>	Low <input type="button" value="v"/>	High <input type="button" value="v"/>	--	2 Simultaneous live view cameras	
Scene Type	Indoor (medium <input type="button" value="v"/>	Indoor (medium <input type="button" value="v"/>	Outdoor <input type="button" value="v"/>	Indoor (not busy <input type="button" value="v"/>	--		

Your RESULTS: Recommended Eagle Eye Bridges, CMVRs and Switches:

EAGLE EYE BRIDGE - 100% CLOUD VIDEO RETENTION		Approximate Utilization
Recommended Eagle Eye Bridge	Eagle Eye Bridge 301 (- Rack 1U EN-SU301-0)	
Recommended Eagle Eye Bridge with POE	2 x Eagle Eye Bridge 403 (8 POE Ports - Rack 1U EN-SU403-0)	
Cloud Bandwidth Needed Daily Average (Mbits)	17.1	
Suggested Bandwidth for Live Viewing	8.9	
Recommended Eagle Eye Switch	Eagle Eye Switch SW18m (16 Port Managed POE+, with 2xGig Uplink EN-SW18m-001)	

Image 1: Example calculations for a 10-camera system recording at 2 and 4 megapixels for full cloud retention using the Eagle Eye VMS Bridge Wizard

The above example gives the following suggestions for Required Bandwidth:

- Cloud Bandwidth needed Daily Average (Mb/s) - 17.1 Mb/s
- Suggested Bandwidth For Live Viewing (Mb/s) - 8.9 Mb/s

Intelligent Bandwidth Management and Local Buffering

The Eagle Eye VMS provides Intelligent Bandwidth Management which allows a system administrator to determine exactly how and when the video system impacts the network.

The Intelligent Bandwidth Manager determines the amount of bandwidth available on the upload circuit and regulates video streaming based on the parameters configured or scheduled.

Administrators may select the types of Allocation (Max, Min, Percentage, Fixed Rate) and schedule upload times as well.

When Full Video is streamed from the camera to the Bridge, the Intelligent Bandwidth Manager may buffer the video on internal drives until either the Parameters for Transmission are met or a Request for Full Video Live View or Historical Playback is made.

The Intelligent Bandwidth Manager is also responsible for buffering video in the event of a network disruption. Video continues to record and upon remediation of the network, video is synchronized back to the cloud and offloaded from the drives. Buffering is available for at least 48 hours in a balanced system.

Additional Information

See the “Eagle Eye Application Note 004 - Managing and Optimizing Bandwidth with the Eagle Eye VMS” for more information regarding the Intelligent Bandwidth Manager including configuration steps and other key considerations.