

# Enabling IP video surveillance solutions using Genetec Security Center and IBM Storwize system

*A technical report*

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## Overview

### Challenge

How do you configure and size the storage system for IP video surveillance solutions using Genetec Security Center?

### Solution

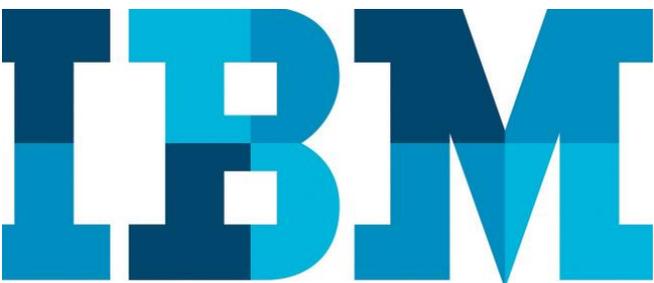
This paper provides the configuration and sizing guidelines to obtain the acceptable performance of the solution.

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*The objective of this paper is to discuss the storage considerations to assist users in properly sizing the solutions to operate in the digital video surveillance solution. The paper covers the test strategy used and the results of the testing. This paper describes the solution architecture for deploying Genetec security solutions on IBM Storwize systems. This paper provides recommendations, configuration and tuning adjustments to help ensure an efficient installation of the joint solution with acceptable performance that meets the needs of the organization.*

Genetec Security Center video management software is a powerful surveillance platform that is easy to manage. Security Center is the unified security platform from Genetec that blends IP security systems within a single intuitive interface to simplify your operations. The configuration capabilities of the software design enable you to customize the solution to fit your exact needs.

IBM® system engineers thoroughly tested the solution using the system parameters outlined in this paper. This technical white paper covers the test results that describe the performance of the Genetec Security Center server running on high-performance IBM Storwize® systems. It illustrates the hardware impact (on the processor, storage, and network) when changing the individual parameters of the video surveillance system, and provides recommendations on how to configure the surveillance system for optimal performance.



## Assumptions and prerequisites

This solution paper assumes that users are equipped with the following technology skills prerequisites:

- Proficiency in installing and configuring the Genetec Security Center
- Familiarity with installing and configuring the IBM Storwize storage solutions.
- Proficiency in installing and configuring the Microsoft® Windows® operating system.

The configurations documented in this paper are based on the tests conducted in the IBM internal lab. These results might differ from individual production implementations in the field.

## IBM Storwize V5000 family



IBM Storwize V5000, built with IBM Spectrum Virtualize™ software, includes a highly flexible, easy to use, all-flash or hybrid storage solution that provides improved performance and enterprise support. The Storwize system includes the following features:

- Provides mid-range customers with a cost-effective, scalable storage platform that can provide advanced features typically only available to more expensive enterprise-class products
- Delivers a new, easy-to-use graphical interface to access all the features of the platform
- Provides automated tiering capabilities with the IBM System Storage Easy Tier® function, can move the frequently accessed extents to high-performing flash storage.
- Provides multiprotocol support for Fibre Channel (FC) and Internet Small Computer Systems Interface (iSCSI) attachment
- Enables replication over IP to improve network utilization for remote mirroring with innovative technology

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### Spectrum family summary

- Three Storwize V5000 hybrid models—IBM Storwize V5030, IBM Storwize V5020, and IBM Storwize V5010
  - 2U rack-mountable chassis
  - 1 Gb iSCSI, 12 Gb SAS and 16 Gb Fibre Channel or 10 Gb iSCSI/Fibre Channel over Ethernet host ports
  - Small form-factor enclosure: Twenty-four 2.5-inch drives
  - Large form-factor enclosure: Twelve 3.5-inch drives
  - Up to 504 drives per system and up to 1,008 drives with two-way clustered systems
  - Up to 2 PB per system and 4 PB with two-way clustered systems
  - RAID 0, 1, 5, 6 and 10 and distributed RAID support for fault tolerance.
  - 32 GB cache standard (64 GB cache optional); 128 GB with two-way clustered systems
  - Redundant, hot-swappable power supplies and fans
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## Key components

This section explains the key components used in the lab.

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### Key lab components

- Genetec Security Center 5.2
  - Microsoft Windows 2008 R2
  - IBM Storwize V5030
  - Brocade Fibre Channel switch
  - VMware ESX hypervisor
  - 10 Gb Ethernet switch
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### Genetec video management software

Video management software is the key component of a video surveillance solution that collects video data from the cameras and other data sources. Genetec Security Center is a leading software designed to provide the security solutions required for the large enterprise systems.

Key components:

- Directory role provides a centralized configuration database for all entities in the Security Center system.
- Omnicast is the IP video management component of Genetec Security Center.
- Omnicast requires additional server to host the archiver and media router roles.
- Archiver manages the communication with IP camera and storage system. It records up to 300 Mbps of throughput per server.

### Server platform

Server platform plays a key role in centralized surveillance systems as Omnicast archiver is limited to 300 Mbps. Hypervisors such as VMware helps to host multiple archivers on one physical server depending on the processor and memory resources.

### Storage system

Storage system is the critical component in the surveillance system for storing video content. Simplicity, scalability, and affordability are the important considerations for storing huge volume of video archives. IBM Storwize system provides a cost effective and scalable platform to store and playback the video archives from Genetec Security Center. Storwize family provides a modular architecture, allowing to scale in capacity and performance bandwidth as per the future requirements.

### Networking

10 Gb Ethernet connectivity between the server platform, incoming camera network, and Genetec Security Center applications is recommended.

## Lab validation configuration

The following hardware was used in the lab for validating the functionality and sizing information for the IP video surveillance solution using IBM Storwize system.

### Lab configuration

#### Genetec directory server

- Two virtual processors, 16 GB memory, one 10 Gb Ethernet and Windows 2008 R2.

#### Genetec archive server

- Four virtual processors, 32 GB memory, one 10 Gb Ethernet and Windows 2008 R2
- 15 TB VDisk storage space from Storwize V5030

#### Camera network

- Genetec Protocol Unit Simulator for camera ingesting
- Maximum 100 Mbps per simulator
- Three workstations for 300 camera simulation

#### Storwize V5030

- Dual controller with 16 Gbps FC Storage connectivity
- 15 TB VDisk from NL-SAS drives
- Multipath host mapping

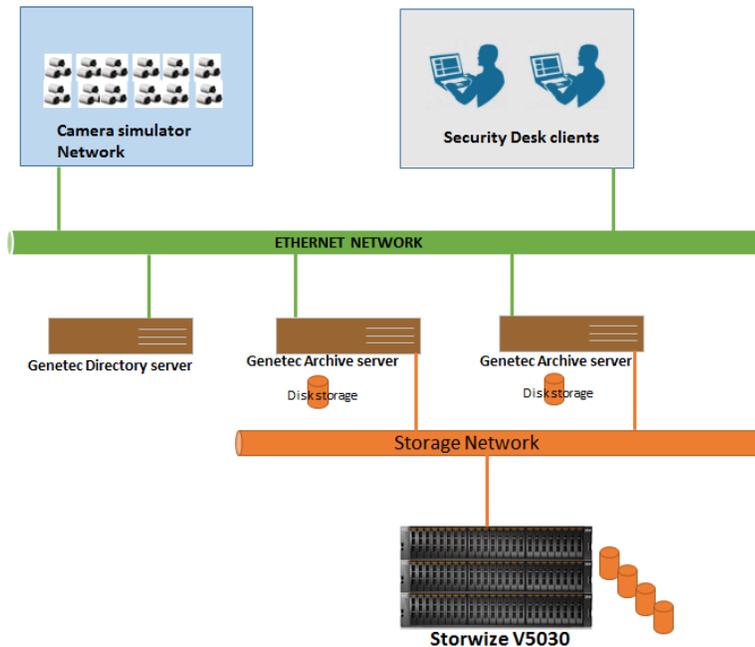


Figure 1: Genetec high-level architecture with IBM Storwize system

No.	Role	Configuration
1	Genetec directory server	Two processor core, 8 GB memory Windows 2008 R2, Genetec Security Center 5.2, Security Desk client for playback
2	Genetec archiver server	Four processor cores, 32 GB memory, 10 Gb Ethernet Windows 2008 R2, Genetec Security Center 5.2 archiver role, external 24-drive nearline (NL) serial-attached SCSI (SAS) RAID6 volume, NTFS file system with 64 KB storage allocation unit
3	Camera Simulator	One processor core, 8 GB memory, 10 Gb Ethernet Windows 2008 R2, Genetec Protocol Unit Simulator
4	Storage Unit	IBM Storwize V5030, Spectrum Virtualize software version 7.7.0, 24 drives RAID6 NL-SAS 7000 rpm for video storage unit

Table 1: Lab configuration details

The virtual machines (VMs) were configured with windows 2008 R2 for the directory, archiver, and simulator servers.

Cameras: Genetec simulators were used for simulating video workloads. Three VMs, each configured up to 100 cameras, are used for simulating a 300-camera data ingestion.

10 Gb Ethernet network was used for ingesting the video data from the camera network to the Genetec servers.

## Testing and lab validation

Various tests were conducted in the lab with the focus on the storage-related factors for video archiving. A controlled environment was used for testing by adjusting the camera settings, and quantity of simulated cameras while monitoring key performance metrics for write latency, processor consumption, network utilization, and video frame loss. The Genetec Protocol Unit Simulators utility was used to simulate the cameras. Sustained, continuous testing was performed with a given set of parameters for a given time period that spans to multiple archive periods. Tests were also performed after the system had run for a period of four days with the initial benchmark value and some amount of data had accumulated in the archive database, in order to simulate a production environment. Through the Genetec Protocol Unit simulation utility, the camera count was set at 300 cameras per archive server and ran for four days, without loss of frame data.

The test procedure includes the following steps:

1. Configure the IBM Storwize V5030 system as the video storage.



Figure 2: IBM Storwize V5000 login page

2. Configure the archive role server as the Fibre Channel host on the IBM Storwize system.

3. Create RAID6 NL-SAS storage volumes and assign them to the archiver servers as the video storage.



Figure 3: IBM Storwize volumes

4. Configure three servers for simulating the camera data ingestion. Configure each server to simulate up to 100 Mbps camera data.
5. Configure the archive role server with the video storage space from the IBM Storwize system.

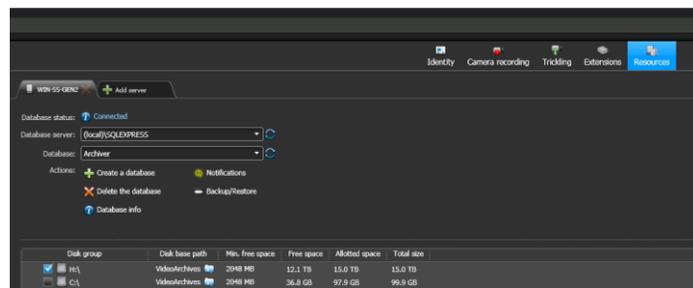


Figure 4: Genetec archiver configuration

6. Configure video units to produce the required camera traffic ingestion to the archiver.

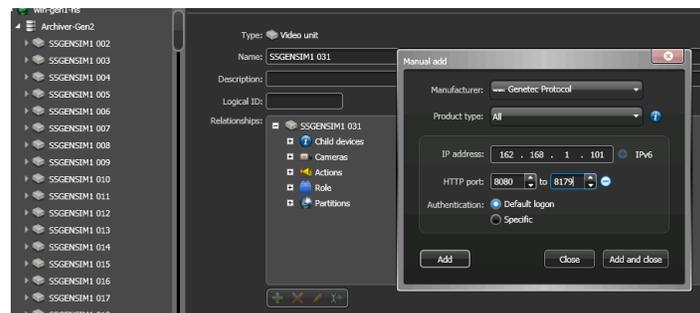


Figure 5: Genetec camera unit configuration

7. Configure motion detection on all the cameras.

## Test settings

To validate the storage unit performance to run the archiver, various test cases are simulated in the lab to check the sustained throughput under all archiving conditions.

Camera video quality settings include:

- Resolution: H.264 1280x1024
- Frames per second: 20
- Recording frames: All

Test case	Storage throughput	Number of simulated cameras	Number of simulation servers
1 Mbps per camera continuous recording	300 Mbps	300	3
1 Mbps per camera motion detection	100 Mbps	100	2
5 Mbps per camera continuous recording	300 Mbps	60	3
5 Mbps per camera motion detection	150 Mbps	30	2

Table 2: Test simulation configuration details

## Monitoring and testing the playback workloads

After camera ingesting ran for a period of 24 hours, the test team logged into the security desk application to monitor the events, such as archiving queue full and pocket loss errors. Security desk was used to request playback streams continuously from the archived storage. Live video caching is disabled for validating the storage video unit performance during playback streams.

The play procedure includes the following steps:

1. Open a 24-camera view in the security desk application for the playback.
2. Use the timeline selector to select the last four hour of video.
3. Increase the playback speed for forward and backward movement.
4. Click **Play**.

The video playback time must span for couple hours of the data that resides in the archiver and needs to be adjusted during the playback streams.

During the 5-day test, up to 300 cameras were simulated with h.264, 20 frames per second, continuous recording or motion detection capabilities.

1 TB of storage unit space has been allocated to archiver to run various tests. These tests measure the throughput of an IBM storage video unit can sustain when the archiver is deleting oldest video files. Also various hardware fault injections were simulated at the storage level to measure the sustainability of the IBM storage system. No **Archiving Queue Full** or **RTP packet lost** messages were noticed during these extended testing.

## Test results

Lab test observations:

- Various tests were run, with a simulation of up to 300 cameras, h.264, 20 frames per second, 1 Mbps or 5 Mbps cameras, continuous recording or motion detection in the environment.
- Archiver server was configured with four virtual processors and 32 GB of memory.
- Archive video storage volume was configured with 24-drive RAID6 NL-SAS spindles from the IBM Storwize system.
- No **Archiving Queue Full** or **RTP packet lost** error messages were noticed.

## Performance raw numbers

Archiver server:

- Processor – Average around 40%
- Memory – approximately in 16 GB use
- Average disk throughput – 35 MBps
- Average Network throughput – 300 Mbps
- Average disk write latency – 10 ms
- Average disk read latency – 9 ms

Storage system:

- Processor – Average around 40%
- Average disk throughput – 35 MBps
- Average disk write latency – 6 ms
- Average disk read latency – 8 ms

Lab test results shows that 300 cameras with 1080p resolution is very conservative for the reference design due to the lower resource utilization. Based on the 300 camera lab test results with no data lost, the IBM Storwize V5030 system can accommodate up to 900 cameras. It is recommended to start with an archiver server configured with a 300-camera count as the base configuration and monitor the parameters before adding the additional cameras, without the risk of losing data. This also might possibly be an option to mitigate a failure situation while repairs are being implemented in the environment.

All video content was received through the 10 Gb interface on the archiver server. During the performance run, the 10 Gb adapter operated at a very low utilization. In a moderate camera count environment, binding multiple 1 Gb adapters might be effective, but this was not tested.

Storage system was connected using dual 16 GB FC connections with multi-pathing software. During the performance run, the 16G B FC utilization was low and 8 GB FC might work for the moderate camera count environment. No SSDs or IBM Easy Tier optimization was considered. This is because the data footprint is a write-once, read-never scenario and does not receive any benefit from an SSD architecture.

## Sizing guidelines

When choosing the hardware for a traditional digital video surveillance solution, the following criteria need to be evaluated:

- Number of cameras per server
- Frame rate and the resolution of the cameras
- Retention period
- Physical location of the servers, cameras, and network infrastructure
- Bandwidth capabilities of the network
- Remote cameras or wide area networking for remote locations

The team conducted various tests in the lab to determine the sustainability of the IBM Storwize system with the Genetec security center.

### Archiver server

Genetec Archiver server is the key component of the Video Management solution and requires enough resources for recording the data without any data loss.

Refer to the following high-level recommendations for the archiver server:

- A Genetec archiver server supports up to 300 cameras and 300 Mbps throughput
- Four processor cores and 32 GB memory is recommended
- 10 Gb Ethernet interface for the camera video Ingesting.
- 8 Gb or 16 Gb FC connectivity

### Storage system sizing guide lines

IBM Storwize V5000 family provides three modes: IBM Storwize V5030, IBM Storwize V5020, and IBM Storwize V5010.

Storage model	Storwize V5030	Storwize V5020	Storwize V5010
Connectivity	16 Gbps FC 10 Gbps iSCSI	16 Gbps FC 10 Gbps iSCSI	16 Gbps FC10Gbps iSCSI
Cache per system	64 GB or 32 GB	32 GB or 16 GB	16 GB
Maximum Drives	Up to 1024	Up to 512	Up to 240

*Table 3: IBM Storwize V5000 family summary*

IBM Storwize V5000 family provides an excellent storage option for small to mid-size surveillance environments.

- Storwize V5030 system can support up to 900 cameras with 1080p HD resolution.
- IBM Storwize V5010 is the minimal basic building block for the smaller environments and it can store the data up to 300 cameras.
- Both FC and iSCSI can be implemented. FC performs better than iSCSI
- RAID6 NL-SAS volumes are recommended for storing the archived content on the IBM Storwize systems.

In case of distributed islands of cameras, Storwize V5030 can be configured as the central storage unit to store the archived content. Storwize V5010 can be configured as the edge solution with a fewer cameras at remote branch offices. In the remote locations, you can use a server with local disk storage or Storwize V5010 as the edge storage and can transfer the archiving content to the centralized larger storage systems, such as Storwize V5030 or Storwize V7000 at the core location.

### Summary

IBM has performed extensive testing with Genetec Security Center and IBM Storwize family. Depending on your requirements, Genetec and IBM storage system architecture allow an extremely scalable solution from few cameras to few thousands of cameras.

Below are the key benefits of the solution

**Easy to use** – The IBM Storwize platform is easy to use, proven in operation, and scales to support your requirements. Genetec products can support a wide choice of network video hardware and are designed with an application programming interface (API) that integrates seamlessly with the IBM hardware platform.

**Best in class** – Genetec and IBM Storwize provides *best-in-class* and extreme scalable video solutions to enable your business, reduce costs, optimize processes, protect assets, and ultimately increase value in your organization's products and services.

**Solution partnership** – By combining the innovative software and ease of use of suite of Genetec Security Center with a market-leading IBM Storwize platform, you can provide a comfortable solution that provides the best-in-class performance and value. The partnership also ensures that a solution investment can provide value for many years to come with the opportunity to upgrade as required while protecting the legacy investment in technology.

## Resources

The following links provide useful references to supplement the information contained in this paper:

- Genetec Security Center documentation  
<https://www.genetec.com/>
- IBM Systems on PartnerWorld  
[ibm.com/partnerworld/systems](http://ibm.com/partnerworld/systems)
- IBM Redbooks  
[ibm.com/redbooks](http://ibm.com/redbooks)
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