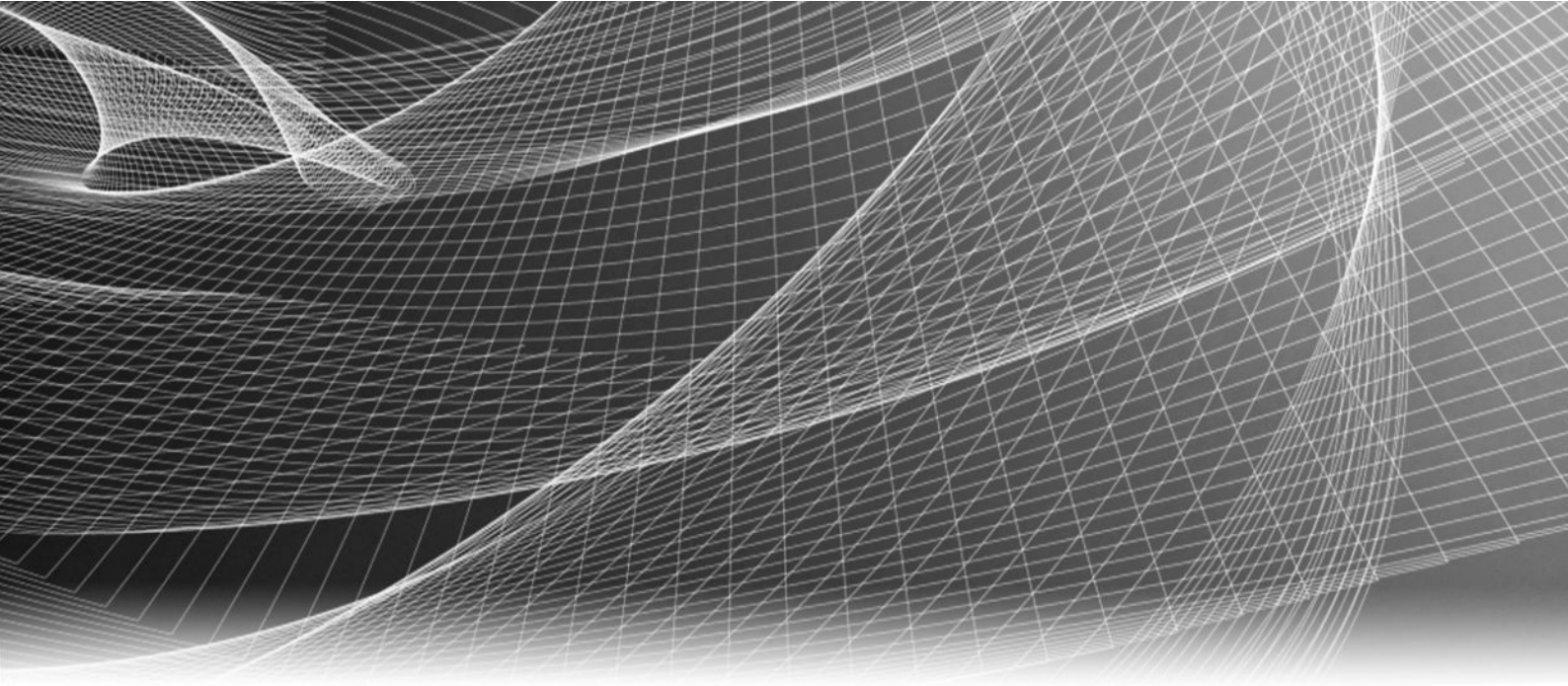

Video Surveillance
EMC Storage with Genetec Security Center

Reference Architecture

H10583

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EMC² VS-LAB TESTED

Genetec

EMC²

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CHAPTER 1

Overview

This chapter provides information on the purpose and business challenge of this solution:

Document purpose

This document provides an architectural overview of the EMC Physical Security solution that is enabled by EMC® VNX®, EMC VNXe®, EMC Isilon®, VMware ESXi, and Genetec Security Center.

This document also discusses the architecture of Genetec Security Center with selected EMC storage arrays.

Solution Purpose

This solution enables a security team to view real-time video streams while also receiving policy-based and anomaly-based alerts. Genetec's sophisticated software analyzes data from remote locations and historical archives, and generates alerts based on your criteria.

Also, you can deploy VMware as part of this solution. VMware provides a platform for integrating legacy and state-of-the-art physical security and surveillance infrastructures, while using virtualization technology to:

- Increase resource utilization
- Decrease the number of servers and their associated costs
- Maximize server manageability

Business challenge

Private businesses and public entities have responded to the rising concerns about theft, fraud, and terrorism by sharpening their focus on physical security and surveillance systems. Organizations such as retailers, casinos, financial institutions, higher education institutions, transportation companies, law enforcement, school systems, prison systems, and government agencies all need to manage and protect their ever-growing volume of physical security information.

The ability to access the right data at the right time from anywhere is crucial to supporting physical security and surveillance needs. However, the following factors can hinder achieving a comprehensive solution:

- Proprietary software
- Closed hardware platforms
- Lack of manageable archival capabilities
- Data-retrieval wait times
- Lost data
- Unproven content authenticity
- Information management limitations

Amplifying these limitations are the high expansion costs of legacy video surveillance systems, based on closed-circuit television (CCTV), digital video recorders (DVRs), or network video recorder (NVR) technologies and non-integrated IT and physical security systems.

After information is captured, and throughout the initial response, increased conviction rates and asset protection can be recognized using this integrated EMC, Genetec, VMware, and RSA® solution.

Technology solution

EMC physical security solutions provide flexibility to control video surveillance and analyze security incidents in real time, collect evidence faster, and easily review archived data from anywhere.

EMC storage arrays provide quality storage for the smallest to the largest customers by using a variety of storage topologies including SAN (FC and iSCSI) and NAS (NFS and CIFS).

Genetec provides IP video surveillance, access control, and license plate recognition unified in a single platform called Security Center.

Virtualization with VMware consolidates the number of Genetec Archivers that are required at a particular site. Aggregating multiple Genetec Archivers onto VMware ESX/ESXi hosts enables more bandwidth per physical host than is normally available from a physical host.

EMC Surveillance Validation Lab's VMware ESXi and EMC storage arrays provide tested solutions that are optimized for various implementation tiers.

EMC RSA is a security, compliance, and risk-management solution. Using RSA's constantly changing RSA tokens increases site security and provides a single login structure for accessing multiple Security Center applications.

Avnet provides a certified enterprise class, pre-integrated server for simplifying distributed and centralized deployments. Environments can be virtualized (ESXi), physical (Bare Metal), or a combination of the two.

Data management

This solution integrates EMC and Genetec technology to help meet the challenges of video-surveillance information convergence and management.

This enterprise-class solution provides data management in each phase of the video surveillance lifecycle, including:

- Capturing and monitoring
- Analyzing
- Protecting and securing
- Archiving
- Authenticating

CHAPTER 2

Key Components

This chapter provides information on the key components used in this solution architecture:

Introduction

An incumbent physical security system typically consists of legacy analog monitoring capabilities, analog cameras, and IP cameras. Video encoders convert standard NTSC/PAL video from analog cameras to a digital video stream over TCP/IP.

You can also deploy customer-furnished IP cameras in this solution. Each camera is capable of producing a digital video stream over TCP/IP. This solution uses EMC storage platforms to provide single-tiered or multitiered storage architectures for centralized or decentralized enterprise requirements. EMC PowerPath® multipathing software provides channel failover on Security Center servers for both FC and physical adaptor iSCSI connectivity options.

This solution includes the following components, which are described in this section:

- Genetec Security Center
- Genetec SV-16 and SV-32 appliances
- VMware vSphere
- EMC storage
- Avnet enabled video surveillance solution

Genetec Security Center

Genetec Security Center is a unified security platform that seamlessly blends Genetec's IP security and safety systems within a single innovative solution. The systems unified under Security Center management include Genetec's Omnicast IP video surveillance, Synergis IP access control, and AutoVu license plate recognition (LPR).

Developed with simplicity of operation in mind, Genetec Security Center presents information to operators through a single interface, simplifies operator tasks, standardizes workflows, increases productivity, and enhances decision making. It aggregates physical security content from multiple sources, integrating IP networking with a full range of physical security systems, including:

- Video surveillance cameras
- Access control devices and intrusion detection systems
- Information security applications
- Visitor management and identity recognition system
- Asset management application
- Sensors and alarms

You can use EMC VNX and EMC Isilon storage for high-throughput solutions. Alternate storage solutions include EMC VMAX®.

Digital video streams

Typically a Security Center Archiver captures digital video streams over TCP/IP and then writes the video to EMC VNX or Isilon storage.

Genetec Security Center main server and expansion server

A System Center installation consists of a single server or multiple servers in a hierarchical structure.

Main server

Provides the Directory role, which identifies your system. All other servers on the system must connect to the main server to be part of the same system. You can have only one main server on any Security Center system.

Expansion server

Any computer other than the main server that you add to the system to increase its total computing power. An expansion server must connect to the main server and may host any role in Security Center, except the Directory role.

Genetec SV-16 and SV-32 appliances

Genetec SV-16 and SV-32 are IP video physical security appliances that comprise Genetec Security Center software that is preloaded onto a small form factor (SFF) Windows Embedded Standard 7 computer.

These compact, fixed hardware appliances are preloaded with a Genetec Omnicast IP video surveillance system. The SV-16 is designed to accommodate up to 16 cameras with less than 4 MB/s (32 Mb/s) throughput, while the SV-32 can accommodate 32 cameras with less than 8 MB/s (64 Mb/s) throughput.

If the site already has an EMC iSCSI storage array present, or one is being considered, then there might be enough remaining overhead in the storage array to support video from the SV-16 or SV-32.

Genetec SV-PRO appliance

The SV-PRO is a rack-mountable server that can be deployed as a standalone network video recorder, or unified with access control in a single preconfigured appliance.

Powered by Security Center, the SV-PRO ships with pre-installed software and verified hardware configurations to ensure a rapid deployment for any mid-sized installation. This network appliance is simple to install, deploy, and maintain, and provides wide support for industry-standard cameras, edge devices, and door controllers

VMware

Genetec Omnicast records video through the Omnicast Archiver service. This archived video is available to users who connect to this system's directory.

For mobile solutions, such as those for cars, trains, planes, and boats, the connection between the Omnicast Archiver and the Omnicast Directory or even the Omnicast Federation server is not always available. For this reason, we offload video to an accessible location. After offloading the video, the archived video is available to all users on the system, even if the mobile system does not have an active connection to the server. The video offload system consists of two components:

- Video Offload server
- Video Offload agent

EMC Storage

This reference architecture uses EMC VNXe, VNX, and Isilon storage platforms. However, you can integrate different EMC storage platforms and array sizes with Genetec Security Center to provide a physical security solution to meet the requirements of any size application.

The following EMC storage platforms are compatible with Genetec software for physical security:

VNX/VNXe/VSS

The solution supports unified storage VNX and VNXe storage arrays. Unified storage topologies include FC, iSCSI, and SMB2 (CIFS). When a unified VNX is used for an FC or iSCSI attachment, the implementation bypasses the VNX Data Mover.

Isilon

An Isilon cluster is related to a storage array made of a minimum of three Isilon nodes. Any Isilon cluster capable of supporting the Isilon operating system OneFS 7.0 or later may be used. OneFS 7.0 or later supports Omnicast version 4.8 or later and Security Center 5.1 or later.

Symmetrix VMAX

The EMC Physical Security Lab tested the EMC Symmetrix VMAX storage array as part of a Unisys ES7000 G2 test case. This solution is ideal for very large, demanding installations or environments that already have Symmetrix VMAX storage arrays.

Avnet

Avnet provides a certified enterprise class, pre-integrated server for simplifying distributed and centralized deployments. Avnet servers can be pre-configured to be virtualized (ESXi), physical (Bare Metal), or a combination of the two. The Avnet enabled video surveillance solution can be used an open, flexible, and integrated server that is purpose built for video surveillance.

EMC PowerPath

EMC PowerPath® software provides channel failover on all Genetec application servers for both fiber and iSCSI (with hardware initiators) connectivity options.

SmartQuotas

SmartQuotas allows administrators to limit the storage used for each Genetec Archiver and presents to the Archiver a view of available storage based on the assigned quota. SmartQuotas allows each Archiver to calculate its available disk space and react correctly.

SmartConnect

SmartConnect provides load balancing of connections to the Isilon cluster as well as failover handling of connections. With SmartConnect, all Genetec Archivers use a single

fully qualified domain name (FQDN) or universal naming convention (UNC) path for video storage access. Using this network name provides load balancing when the connection to the cluster is made and simplifies installations.

EMC Video Transport (EVT)

EVT solves the problem of efficiently moving video across the enterprise network infrastructure by providing accelerated and persistent transfer. In the case of connectivity failure the transfer does not need to restransmit video to recover from a network interruption. The EVT solution covers the needs of the entire video surveillance infrastructure, from distributed components to a large, scalable central storage repository.

CHAPTER 3

Physical Architecture

This chapter provides information about the architecture for this solution:

Genetec Security Center

To successfully design and implement a Genetec Security Center system, you need to consider many aspects of the system, including networks, cameras, storage, and more. This section presents storage considerations and recommendations you should take into account when deploying a Genetec Security Center system on EMC storage platforms.

This reference architecture includes EMC VNX, VSS, and Isilon storage platforms. You can integrate EMC storage platforms and array sizes with Genetec Security Center to provide a physical security solution to meet the requirements of applications of any size.

EMC VNX supports unified storage solutions. Unified storage topologies include FC, iSCSI, and SMBx (CIFS). The VNX can be configured as block storage only (FC and iSCSI) or unified storage to include SMB protocols.

The VSS is a purpose built Video Surveillance Storage platform. This is an enterprise-class, block-only array supporting FC and iSCSI built on the proven VNX platform. As a low cost, high performance and highly available array it is ideally suited for remote locations or smaller centralized sites.

EMC Isilon Scale-Out storage provides enterprise class network attached storage (NAS) for centralized or decentralized enterprise requirements. An Isilon cluster is modularly scalable from terabytes to petabytes of storage.

The following figure shows the overall physical architecture of the core solution

Genetec servers

The Genetec Security Center architecture uses a client/server model in which a pool of servers distributed over an IP network handles all system functions. The number of servers can range from a single machine for a small system to hundreds of machines for a large-scale system.

You must install Genetec Server, a Windows service, on every computer to be included in the pool of servers available for Security Center to use. Every server is a generic computing resource capable of taking on any role (set of functions) you assign to it.

A role is a software module that performs a specific function (or job) within Security Center. For example, you can assign roles for archiving video, controlling a group of units, or synchronizing Security Center users with your corporate directory service.

Genetec deployment size

Genetec solutions are adaptable to environments of any size as long as the file server meets the requirements of EMC and Genetec. The solution also works well with VMware ESXi.

You can use VMware ESXi to greatly reduce the server farm footprint while increasing the bandwidth each physical server can produce. We recommend ESXi 5.5 or greater. Genetec Security Center is ideally suited for VMware.

Main roles

Genetec Security Center provides different roles for video surveillance.

The following table describes the main roles:

Table 1 Genetec main roles

Service	Description
Media Router	• Handles all stream (audio or video) requests on the system. • Calculates the optimal path between the source and destination, based on location and transmission capabilities.
Directory	• Defines a Security Center system. • Includes main server module that provides a centralized configuration database for all entities in the system including cameras, users, other Security Center roles, and applications on the system. • Responsible for authentication and access control using the built-in security model or through Microsoft Active Directory. • Offers the option to log all system events and user actions in a relational database for reporting purposes. • Starting with Security Center 5.1, multiple Directories can run concurrently to provide high availability and load balancing to client connections. SQL mirroring is also available for Directory database failover.
Health monitoring	• Monitors Security Center and provides real-time status of the system entities. • Includes health statistics that provide valuable information like availability, uptime, mean time between failures, and mean time to recovery for cameras, door controllers, and intrusion panels. • Detects health issues early enough to avoid potential problems in the future.
Archiver	• Manages the communication with IP cameras and an encoder. The Archiver is the only Security Center component that communicates directly with the IP cameras. • Includes a plug-in architecture to introduce support for new camera manufacturers without requiring a complete software upgrade. • Records up to 300 cameras or a maximum bandwidth of 300 Mb/s (37.5 MB/s). • Responsible for maintaining the database that links a specific camera at a specific time to a video file stored on disk. • Performs motion detection algorithms on recorded video streams.

CHAPTER 4

VMware ESXi architecture

This chapter provides information on the ESXi configuration for this solution:

EMC Storage

This solution integrates EMC and Genetec technology in a virtualized architecture to help meet the challenge of video surveillance information convergence and management.

To reduce the footprint of a Security Center installation, the Archiver servers can run on virtual machines using VMware vSphere.

The following figure depicts the overall solution's physical architecture in an ESXi infrastructure. From a Genetec Security Center perspective, the physical server architecture and the virtual server architecture are logically identical.

The figure shows only a single ESXi host. However, the architecture can easily scale to include many ESXi hosts, each with many Genetec virtualized servers.

With a virtualized implementation, each Genetec server is implemented as an additional instance, or virtual machine, within the VMware ESXi physical host or hosts.

The virtualized infrastructure must use server and storage adapter hardware that is officially validated by VMware and EMC.

VMware high availability

VMware HA automatically reboots a virtual machine to a different ESXi host in the vSphere cluster if a failure occurs. You can use HA for any Genetec service. HA is not dependent on the CPU having hardware-assisted virtualization (Intel VT and AMD-V), which is a restriction of VMware Fault Tolerance.

For information about VMware supported hardware, refer to the *VMware Compatibility Guide* at the VMware Technical Resource Center.

CHAPTER 5

Test environment

This chapter provides information about the EMC Surveillance Validation Lab test environment:

Validated environment profile

This solution integrates EMC and Genetec technology in a virtualized architecture to create our test environment.

Hardware resources

The following table lists the hardware used in this solution:

Table 2 Solution hardware

Hardware	Configuration
Any Genetec approved server.	Per Security Center server.
VMware ESXi host	The servers and associated hardware must be VMware compatible based on the VMware Compatibility Guide
Any VNX, VNXe, Isilon X200, 108NL, X400, and NL400	See the *EMC Storage with Genetec Security Center: Configuration Guide* for more information. If you do not have access to this document, see your EMC representative.
Avnet	Integrated solution
Storage topology	SAN, DAS, iSCSI • iSCSI: HBA • iSCSI: Microsoft initiators NAS • SMB

Software resources

The following table lists the software used in this solution:

Table 3 Solution software

Software	Version	Configuration
Genetec Security Center	5.2 - 5.4	• Windows Server 2008 R2 • Windows Server 2012 R2 • Maximum bandwidth per Archiver server 37.5 MB/s (300 Mb/s)
EMC PowerPath	Latest version	Installed on Genetec Archiver servers
EMC Naviagent	Latest version	Installed on Genetec Archiver servers
Security Center, Security Desk, and Configuration Tool	Same version as Security Center	Specified in Genetec Security Center documentation

CHAPTER 6

EMC RSA domain security

This chapter provides information on securing a domain with RSA:

Domain secured by EMC RSA

This Genetec Security Center solution, installed with EMC RSA's secured domain, increases Windows and Security Center security. RSA authentication, which uses constantly changing RSA tokens, increases the user's Security Center experience by providing a single login structure for accessing multiple Security Center applications.

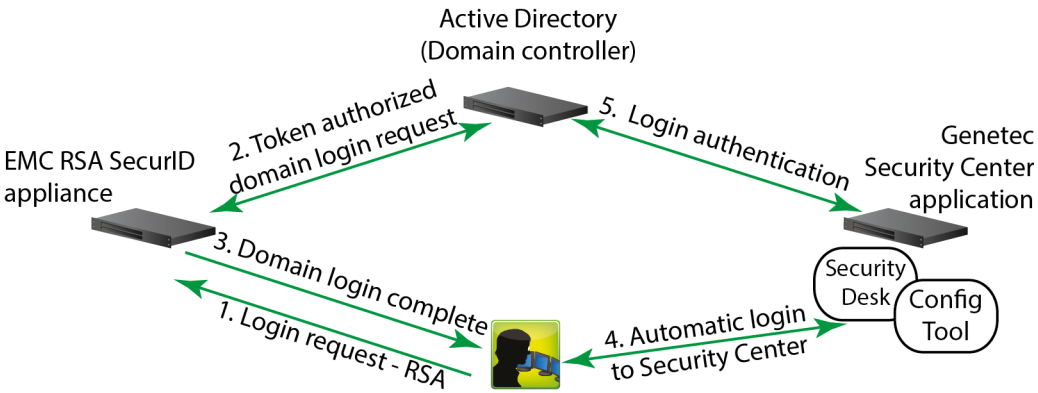
For more information, refer to the EMC white paper entitled *EMC Physical Security-Enabled By RSA SecurID Two-Factor Authentication with Genetec Omnicast Client Applications*.

Procedure

1. The login request using RSA authentication (token) sends the request to the EMC RSA SecurID appliance.
2. If the user credentials are correct, the EMC RSA SecurID appliance proxies the login to Active Directory, and Active Directory authenticates the login into the requested Windows domain.
3. The Windows domain server completes the login.
4. The user accesses the requested application.

   The user may be required to press **Enter** before continuing into the application (this is application-specific).
5. User credentials are verified to ensure that the user has access rights for the requested application.

The following figure shows the login process:



CHAPTER 7

Conclusion

This chapter summarizes this reference architecture:

EMC Storage

EMC Physical Security enabled by EMC storage arrays, optional EMC RSA security, and Genetec Security Center products are an ideal solution for surveillance management and IT infrastructure. The solution provides a flexible and highly scalable infrastructure that can meet a broad range of demanding physical security requirements.

The Avnet enabled video surveillance solution provides a certified enterprise class server that is pre-integrated. The Avnet server is architected around Security Center, network, and storage.

As requirements change and become more sophisticated, this EMC Physical Security solution's flexibility and modular architecture can be enhanced to meet any customer's individual needs.

EMC surveillance lab test environment

The surveillance lab is constantly upgraded with the most recent software releases.

At the time of the most recent test the lab was configured as follows:

- VMware ESXi 5.5 and ESXi 6.0
- 20-core ESXi host at 2.2 GHz or greater
- 128 GB memory or greater per ESXi host
- Each virtualized Video Management Software (VMS) host:
  - 4 vCPUs
  - 8 vCPUs
  - 8 GB memory
  - Network adaptor type: VMXNET3 (GbE and 10 GbE), E1000, or VMXNET2 (GbE only)
  - Isolated VLAN for storage if not FC

The EMC surveillance lab's host hardware met and exceeded the minimum system requirements for an ESXi/ESX installation.

During all the tests, the virtual CPU (vCPU), memory, and network were configured according to Genetec best practices. The VMware vSphere configuration was in accordance with the *VMware Compatibility guide* (www.vmware.com/resources/compatibility/search.php). EMC PowerPath® is used for block storage (FC and iSCSI) and is recommended for block storage implementations.

Watermarking and motion detection require additional vCPU and memory.

The Genetec SVR was configured as follows:

- Cisco UCS Blades B230
- 256 GB Memroy
- 10gE network