

# EMC DATA PROTECTION, FAILOVER AND FAILBACK, AND RESOURCE REPURPOSING IN A PHYSICAL SECURITY ENVIRONMENT

Genetec Omnicast, EMC VPLEX, Symmetrix VMAX, CLARiiON CX4

- Provide seamless local or metropolitan area failover and failback
- Enhance video analytical processing by offloading the recording engine
- Data protection using diverse EMC storage arrays in a local or metropolitan area

## EMC SOLUTIONS GROUP

### Abstract

This white paper explains how EMC VPLEX Metro can enhance Genetec's Omnicast physical security offering by providing a comprehensive failover, backup, and real-time video file re-purposing solution.

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## Executive summary

**Business case** Physical security analytics evaluates video, sound, and events such as doors' opening. Analytical processing of this nature can impose an intense high CPU load on the physical security servers. By allowing a secondary analytical server near simultaneous access to the video files, EMC® VPLEX™ resolves this issue.

Normally, when a physical security failover environment is implemented, the computing equipment and associated video files remain at rest. EMC VPLEX enhances the failover architecture by allowing the equipment and the failover video files to be used for video analytics. Many customers have asked for this ability of using the mirrored video for post processing analytics.

For disaster recovery, video files are typically mirrored to a remote site. EMC VPLEX Metro with Microsoft Cluster Shared Volumes (CSV) allows video files that are written from the Genetec Omnicast primary Archiver to be immediately available at a remote site for video analytics or video playback without impacting the primary production environment.

**Solution overview** Storage is a major component of a physical security installation. It is used as the file servers to manage video, capture video, and write video to disks. EMC VPLEX Metro is an industry leading solution that provides data resilience by extending the functionality of mirroring data, increasing the utility of video stored at the backup or failover site, and enhancing the Genetec Omnicast High Availability clustering and backup Archiver servers. The solution is equally suited for physical servers or virtual machines.

EMC provides a large range of storage arrays that can be used to store physical security video and audio files. For physical security customers requiring the maximum flexibility in mirrored video, storage can achieve their goals by using EMC VPLEX Metro. VPLEX Metro combined with Microsoft Cluster Service (MSCS) allows mirrored video to be available at a remote metropolitan site almost in real time. The data mirrored to the remote site can be used for analytic processing, video review, or Omnicast failover.

A VPLEX solution consisting of an EMC VPLEX Metro with either EMC Symmetrix® VMAX™, EMC CLARiiON® CX4, EMC VNX™, or a combination of these can be used to reduce footprint and greenhouse gases. VMware® ESX®/ESXi™ can be used for any or all Omnicast servers.

EMC storage for physical security solutions provides best-in-breed solutions for surveillance management and IT infrastructure. EMC solutions provide a flexible and highly scalable infrastructure that can meet a broad range of today's demanding physical security requirements. By using the surveillance management software from Genetec and IT infrastructure components from EMC, customers are assured that their investment will yield a high return on investment (ROI).

In addition, EMC storage technologies enable customers to nondestructively back up their primary servers, while the system remains online and available to users. As the customers' requirements change and become more sophisticated, the flexible and modular architecture of this EMC physical security solution allows the EMC storage technology to be enhanced to meet customer needs.

In the test case presented in this document, the virtual volume from the EMC VPLEX Metro consisted of storage from an EMC CLARiiON CX4-960 and an EMC Symmetrix VMAX storage array.

### Key results

This solution shows the following key results:

- As a failover solution it provides seamless access to all recorded video.
- For video analytics, this solution allows the failover Archiver to be utilized for video retrieval. Using this solution, the backup video LUN and the failover Archivers remain online and active, providing a distinct advantage over a typical mirrored Omnicast Archiver environment.

## Introduction

### Purpose

The purpose of this paper is to describe a robust Genetec Omnicast failover solution by utilizing an industry leading EMC VPLEX Metro solution. The paper is based on tests conducted at EMC.

### Scope

This paper shows that a Genetec Omnicast failover environment can be enhanced with a VPLEX connected to diverse storage arrays by:

- Providing additional utility for Genetec Omnicast failover Archivers
- Providing a significant reduction in the time during a failover situation
- Increasing availability through reducing most single points of failure

### Audience

This document is intended for existing or potential customers who want to improve their physical security data protection plan, enhance remote operations, and/or increase their video analytical post processing.

### Terminology

This paper includes the following terminology.

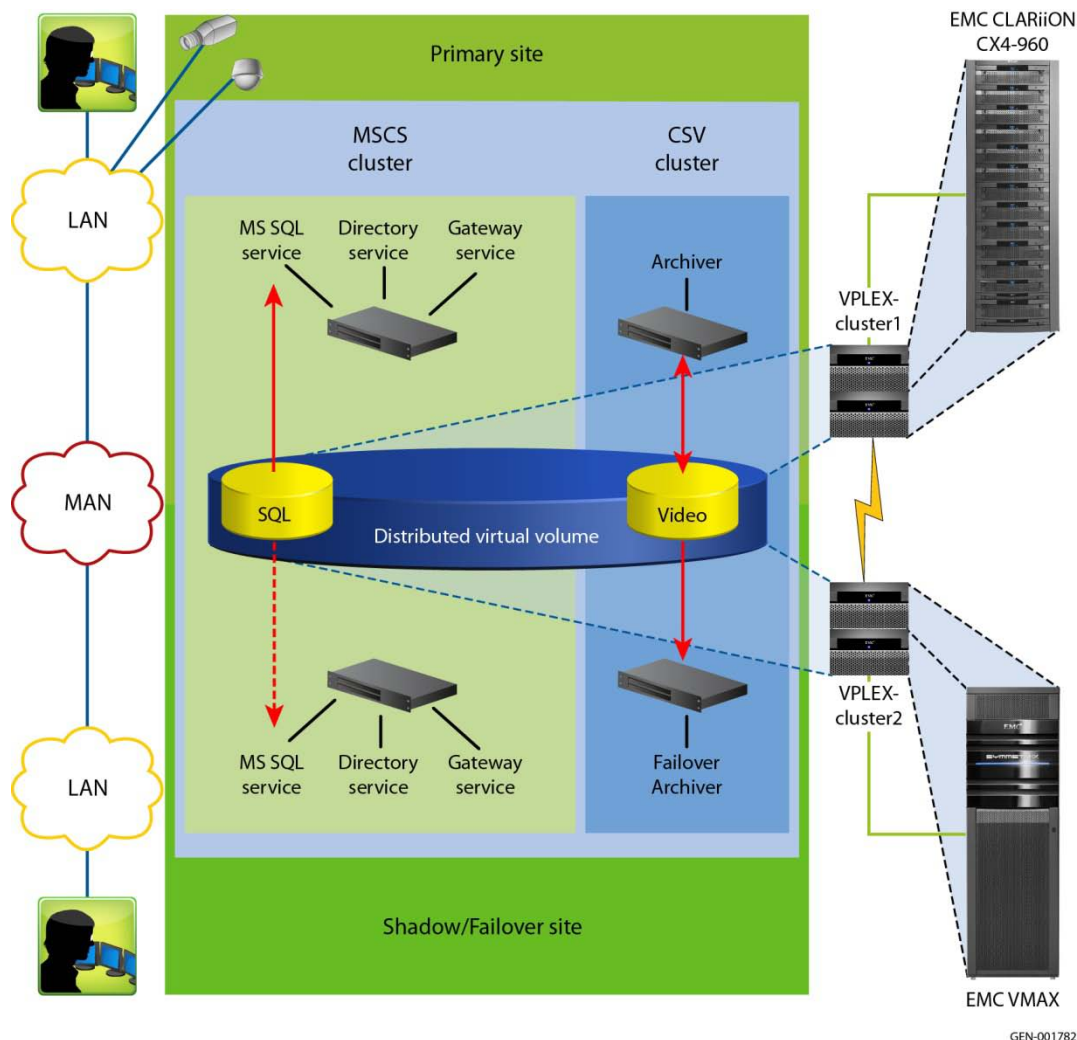
**Table 1. Terminology**

| Term                       | Definition   |
|----------------------------|--|
| Distributed Virtual Volume | A virtual volume with complete and synchronized copies of data (mirrors) in more than one cluster.   |
| EMC VPLEX Metro            | Provides distributed federation within, across, and between two clusters (within synchronous distances).   |
| VPLEX cluster              | Two or more VPLEX directors forming a single fault-tolerant cluster, deployed as one, two, or four Engines.  |
| Director                   | A CPU module. Runs C4LX and the VPLEX core software. There are two directors in each engine. Each director has dedicated resources and can function independently. |
| Engine                     | A populated chassis, containing two directors.   |
| Omnicast                   | A physical security solution from Genetec  |

## Solution details: VPLEX Metro for Omnicast

### Overview

EMC tested failover scenarios using an EMC VPLEX Metro and a Microsoft Cluster Server (MSCS). This combination of products provided failover capability for Microsoft SQL, Omnicast directory service, and Omnicast gateway service. A second MSCS cluster was used to provide Cluster Shared Volumes (CSV) allowing two Windows Server 2008 systems to simultaneously share the video disk.



**Figure 1. Solution overview**

EMC VPLEX presents a globally coherent LUN image to the application and mirrors write operations between the local and remote arrays. In Figure 1, the primary Archiver writes and reads data from a VPLEX virtual volume. This distributed virtual volume consists of a CLARiiON CX4-960 and a Symmetrix VMAX.

Two forms of MSCS are deployed. The CSV MSCS cluster, shown in Figure 1 as CSV cluster, does not provide failover capability but provides the necessary mechanism allowing two Windows servers to actively share the same disk (LUN).

The MSCS cluster shown in Figure 1 is a High Availability (HA) cluster providing failover capability for individual Omnicast services, Microsoft SQL service, as well as

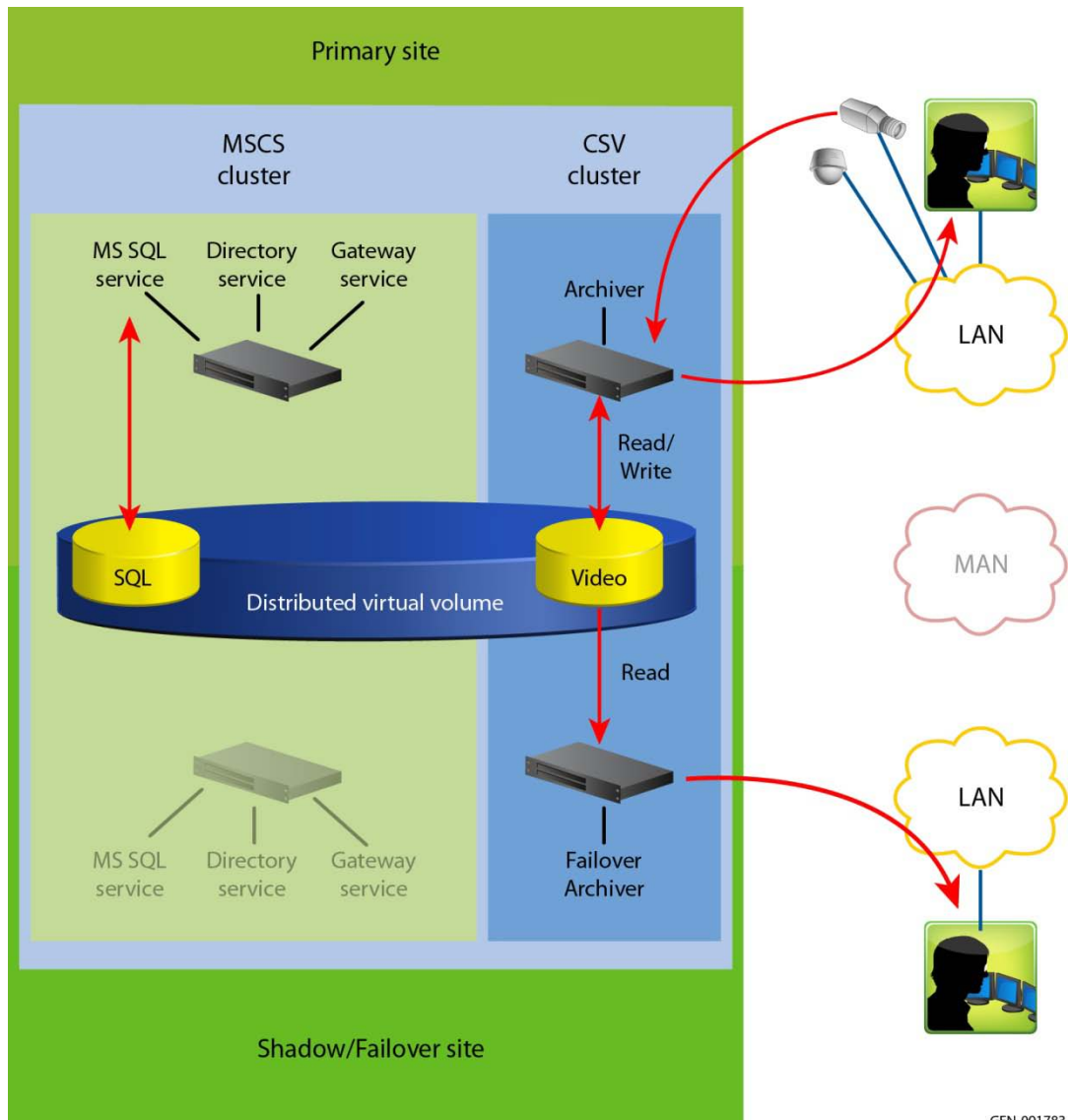
disaster recovery. In the event of a failure, the protected services will be activated at the failover site.

Omnicast provides a failover Archiver that automatically takes over when the primary Archiver fails. The failover Archiver does not record video while the primary Archiver is active, but the failover Archiver is active and can recall video from its video disk.

Utilizing the Active/Active capability of the VPLEX clusters coupled with the Active/Active capability of CSV, the primary Archiver can continually record video to the video disk and the failover Archiver can immediately have access to that video for playback or can pass the video to an analytic service.

**Data flow during normal operation**

Figure 2 illustrates the data flow during normal operation.



GEN-001783

**Figure 2. Data flow during normal operation**

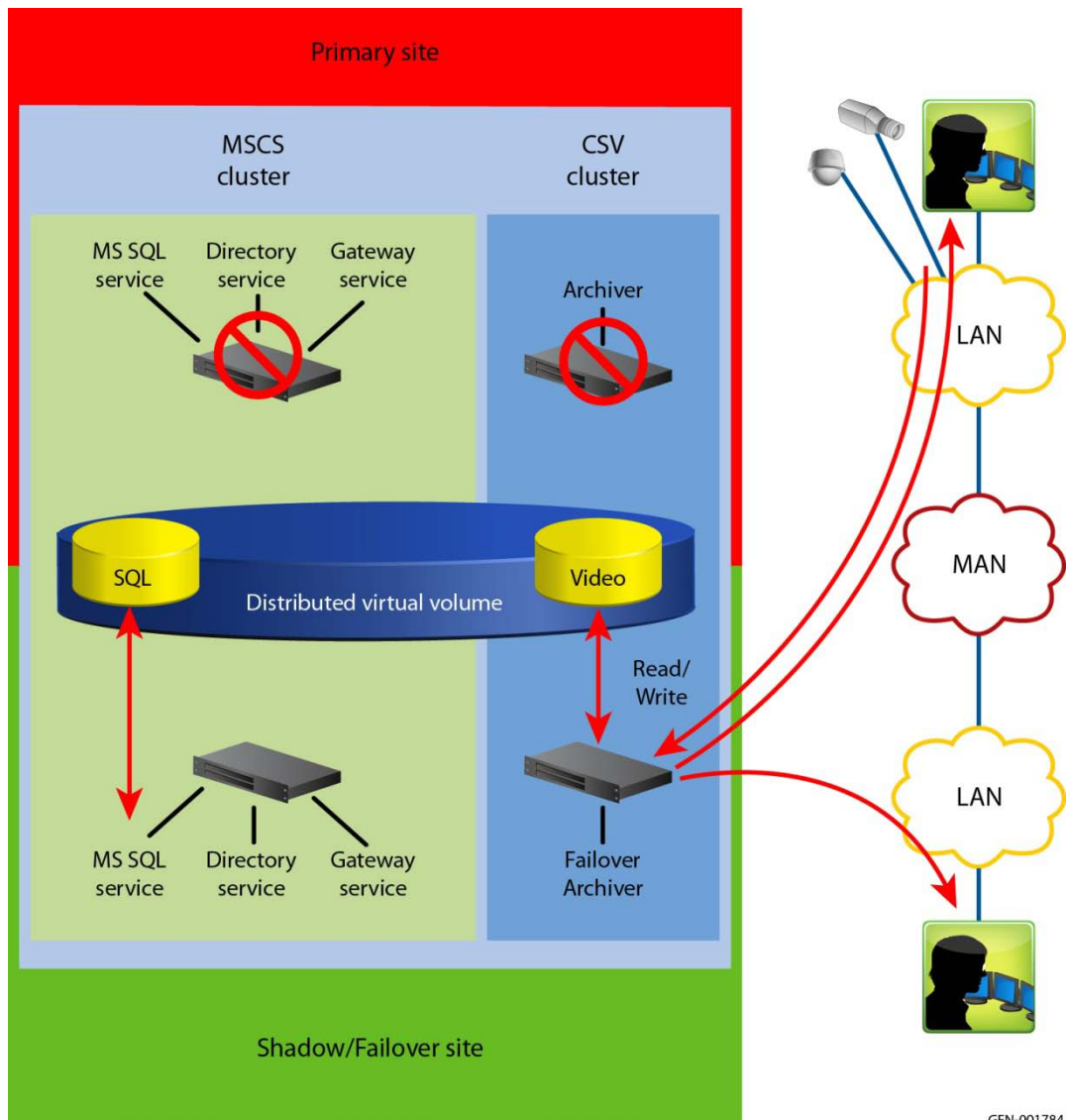
The data flow is as follows:

1. The primary Archiver writes to the distributed virtual volumes

2. If the VPLEX cluster at the primary site fails, the VPLEX Metro will initiate a complete and synchronized copy of the video (mirrors) to the EMC storage array at the primary site
3. VPLEX Metro maintains the distributed virtual volumes with complete and synchronized copies of the video (mirrors) across the VPLEX Metro clusters
4. Security personnel view live video and record video from the primary Archivers
5. Video is being reviewed at the shadow/failover site by using the failover Archiver that is retrieving video from its local copy

**Data flow during site failover**

Figure 3 represents the data flow after a full primary site failure:



GEN-001784

**Figure 3. Data flow during site failover**

The data flow is as follows:

1. The failover Archiver writes to the distributed virtual volumes video streams that are not affected by the primary site failure

2. VPLEX Metro maintains the distributed virtual volumes. If the VPLEX cluster at the primary site remains active, VPLEX Metro will maintain the distributed virtual volumes with complete and synchronized copies of the video (mirrors) across the VPLEX Metro clusters. If the VPLEX cluster at the primary site has failed, the VPLEX Metro cluster at the failover site will continue to write to the EMC storage array at the failover site
  3. Security personnel view live video and record video by using the failover Archiver
  4. Video may be reviewed at the shadow/failover site by using the failover Archiver
- Note** Although Figure 3 represents a full-site failover, this solution works equally well for any number of components or Omnicast services that fail (planned or unplanned).

### Methods of service failover

When a failure occurs, the failed service or services will either be failed over to the failover site. Or, in the case of the Omnicast Archivers, the failover Archiver will acquire the cameras automatically:

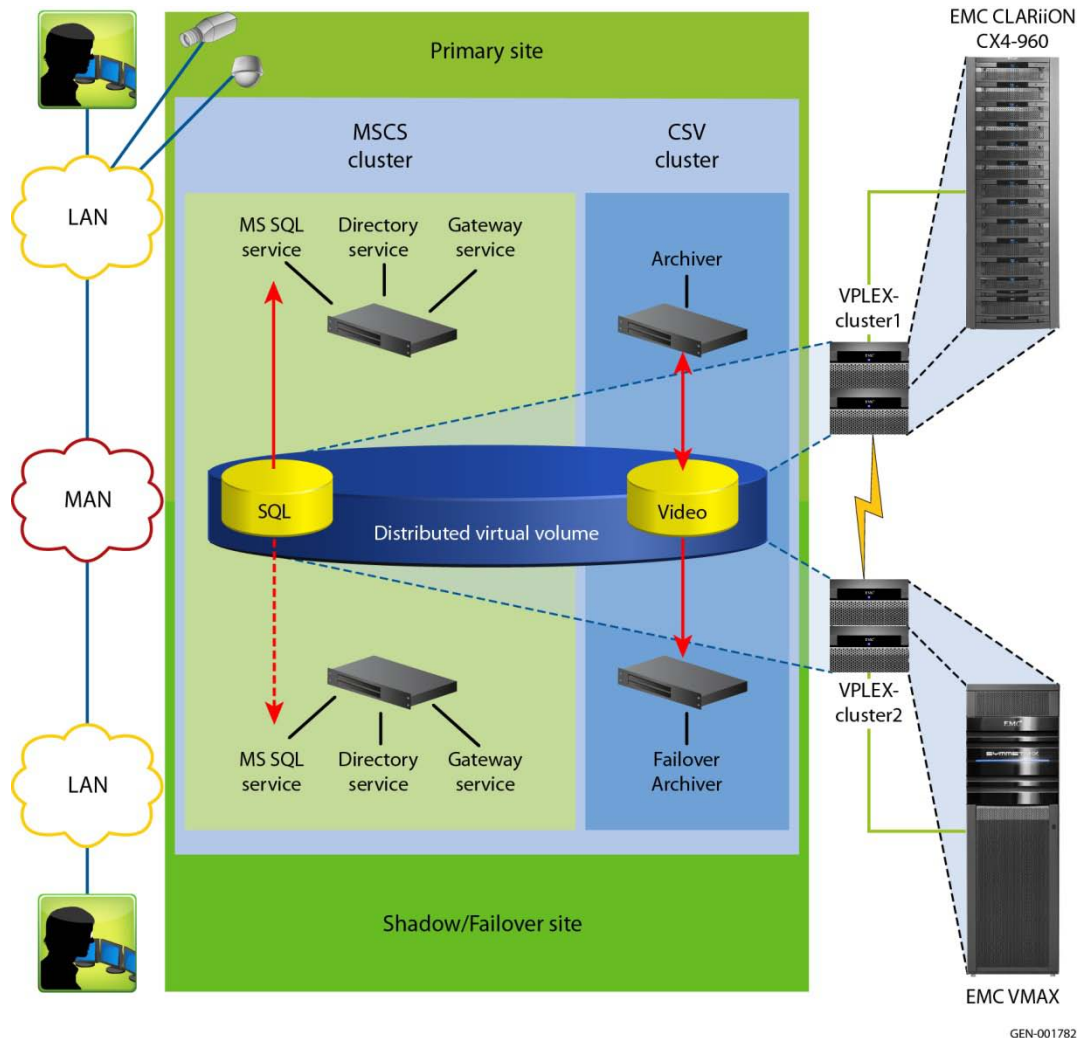
- Microsoft Cluster Server (MSCS) provides a failover with HA of all Omnicast services other than the Archivers. MSCS maintains the configuration for each service between the primary and failover hosts. A failure simply involves bringing up the failed service on the failover host. Microsoft SQL service uses VPLEX Metro for its SQL database and SQL log, allowing the database to remain as current as possible.
- Omnicast provides a failover mechanism where cameras are defined to the Archiver (for example, primary Archiver) and a failover Archiver. MSCS provides Cluster Shared Volume that allows the Archiver and the failover Archiver to simultaneously access the video files attached to the VPLEX virtual distributed volume. In this configuration, the active Archiver writes video files to the video archive. The failover Archiver is detached from the cameras, but still has the ability to retrieve video. When an Archiver failover (or failback) occurs, the Archiver that is not actively recording recognizes the other Archiver that has stopped and quickly attaches the defined cameras and starts writing video files.

When a failback to the primary site occurs, the data flow will be back to the normal operation condition as illustrated in Figure 2.

# Configuration

## Environment profile

The solution test was done based on the configuration shown in Figure 4. Read the Solution details: VPLEX Metro for Omnicast section for more information.



**Figure 4. Environment profile**

## Hardware and software resources

The hardware and associated Omnicast services for the test are as follows:

- The VPLEX installation consisted of two sets for two redundant nodes separated by a metropolitan distance.
- Two Genetec Omnicast servers were installed running Microsoft SQL, directory, and gateway services. One server was considered as the primary server and the second server as the failover server.
- Two Genetec Omnicast Archiver servers were installed with one being considered as the Primary Archiver and the other as the failover server.
- A Microsoft Cluster Servers (MSCS) was installed providing a high availability (HA) cluster environment for Microsoft SQL, directory service, and the gateway service.

- MSCS was used for implementing Clustered Shared Volumes (CSV). In a Microsoft Windows environment, CSV is required to manage disk access between hosts accessing the same volume.
- IP cameras were connected to the IP network.
- The primary Omnicast Archiver was connected to an EMC CLARiiON CX4-960 storage array.
- The failover Omnicast Archiver was connected to an EMC Symmetrix VMAX storage array.
- There were two data networks involved, one network for IP traffic and the other for the Storage Area Network (SAN).

## Testing and validation

### Overview

The test conducted by EMC was designed to test the failover capabilities and resource repurposing of both the failover servers and the video data existing at the failover site.

### Test scenarios

These test scenarios were designed based on a common customer requirement to do post video analytics using the video stored at the failover site.

In addition to the customer requirement, the test scenarios were also designed to illustrate the ability for very high availability and to show how the VPLEX can mirror various array classes such as:

- EMC CLARiiON CX4 at the remote site with the cameras
- EMC Symmetric VMAX at the central site acting as the failover site

#### Scenario A

Configure the Genetec directory and gateway services along with the Microsoft SQL server on a primary host residing in a two-host MSCS cluster. Test the failover and failback of the Genetec services and Microsoft SQL in the MSCS HA clustered environment.

#### Scenario B

Configure a Genetec Archiver and Genetec failover Archiver using the VPLEX in conjunction with Microsoft Cluster Shared Volume.

- Test the failover and failback of the Archiver between the two sites
- Test the ability to read video from the backup Archiver while the primary Archiver was actively adding video to the LUN

#### Scenario C

Force a full site failover to verify the failover of all Genetec components.

### Test results

The test results for the test scenarios are shown in this section.

#### Scenario A

This scenario represents a common MSCS cluster configuration. The Distributed Virtual Volume provided by VPLEX Metro allowed the MSCS cluster to operate as if the hosts were all attached to the same local storage. The Genetec directory and gateway services are not storage dependant, so no mirror function was involved.

In the lab environment, the failover or failback of all or any single service occurred in less than 10 seconds. In a production environment, there may be situations where a failed server might cause a Microsoft SQL recovery to occur, which would extend the duration of Microsoft SQL to recover.

#### Scenario B

- Failing the Archiver over to the failover Archiver using 30 or less cameras occurred in less than 10 seconds. Failback was equally quick.
- The Archiver LUN and the failover Archiver LUN, derived from the Distributed Virtual Volume of the VPLEX Metro, coupled with CSV allowed the Archiver to

write and review video while the failover Archiver was being used for reviewing video. This is the mechanism required for video analysis.

### Scenario C

Full-site failover was done by powering off the primary servers or powering down the SAN at the primary site. Failover occurred in 10 seconds after the problem was created.

Detaching either storage array from the SAN was not recognized by the Genetec Omnicast servers as an issue because the VPLEX Metro continued to provide the distributed virtual volumes. After the storage array that was taken off line was brought back online, VPLEX Metro synchronized the arrays.

## Conclusion

### Summary

VPLEX Metro enhances the normal MSCS Omnicast failover in the following aspects:

- Removal of a storage array due to maintenance, upgrade, or error will not cause video recording to be suspended.
- During a failover event, all video will be accessible to the failover Archiver.
- The mirrored video that is normally at rest at the failover site is now available from the failover Archiver for analytical processing almost in real time.

### Findings

Tests showed the robustness and flexibility of this solution. The following are the findings:

- As a failover solution it provides seamless access to all recorded video.
- For video analytics this solution allowed the failover Archiver to be utilized for video retrieval. Normally, both the backup video LUNs and failover Archivers remain online but unused. This solution can be continuously utilized for a better ROI of customers.

## References

### Product documentation

For additional information, see the product documents listed below.

- *EMC VPLEX Site Preparation Guide*
- *EMC VPLEX Security Configuration Guide*
- *EMC VPLEX Getting Started Guide*
- *EMC VPLEX 5.0 Pre-installation Configuration Worksheet*
- *EMC VPLEX 5.0 Release Notes*
- *EMC Best Practices Guide for AC Power Connections in Two-PDP Bays*
- *EMC AC Power Configuration Worksheet*
- *40U-C Unpacking and Setup Guide*
- *EMC VPLEX CLI Guide*
- *Implementation and Planning Best Practices for EMC VPLEX Technical Notes*
- *Customer Service Procedure: EMC Secure Remote Support Gateway, available in the*

### Other documentation

For additional information, see the documentation listed below.

- Application Download Area on the Global Services website
- VPLEX procedure generator
- The VPLEX GUI online help 2