Dell EMC Surveillance for Edesix Body-Worn Cameras

Functional Validation Guide

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Dell EMC Surveillance Lab Tested

DELL EMC

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CHAPTER 1

Introduction

This functional verification guide provides compatibility guidelines for Dell EMC storage arrays and storage clusters.

Solution overview

Law enforcement agencies use digital evidence from a variety of sources, including video from body-worn and surveillance cameras, still-camera photos, audio files, and additional evidence from the public sector. Edesix VideoBadge cameras are a lightweight option that, when paired with MyWitness Video Manager, provides a complete suite of services for automatic footage download, third-party integration, and footage policy implementation.

To effectively manage digital evidence and the cumulative impact on IT infrastructures, law enforcement agencies seek validated solutions that address the underlying system requirements. Dell EMC's approach to addressing body-camera system requirements provides an open and flexible architecture for several storage strategies relevant to the data flow and workload from body-worn cameras.

This solution meets the system requirements related to traditional on-premises storage (VNX, VNX-VSS, Isilon), on-premises object stores (Isilon Swift), private cloud storage (ECS, CloudArray), and hybrid cloud storage (CloudArray Cloud SP). Customers can deploy each type of storage independently or in combination to meet a broad scope of storage requirements and ultimately deliver an infrastructure strategy that meets their immediate needs and can scale to accommodate future requirements.

NOTICE

The information in this guide should be used only as compatibility guidelines and not as a performance baseline for sizing purposes.

Purpose and scope

This guide is intended for use by internal Dell EMC sales and pre-sales personnel, and qualified Dell EMC and Edesix partners.

This guide provides results from a functional test that we conducted to ensure the compatibility of VideoBadge cameras with Dell EMC storage. The test does not establish sizing guidelines.

This guide provides functional information regarding Edesix VideoBadge using the following storage solutions:

- Dell EMC Isilon ™
- EMC VNX™ and EMC VNX-VSS (Video Surveillance Storage)
- Dell EMC CloudArray™ with Dell EMC Elastic Cloud Storage™ (ECS™)
- Dell EMC CloudArray with Dell EMC Isilon Swift

CHAPTER 2

Solution components

This chapter provides information about the components configured in this solution.

VideoBadge cameras

The full range of VideoBadge body-worn cameras are designed to provide a range of features to meet all front-line workers' needs, from an extra-wide-angled lens to 16-hour battery life.

VideoBadge cameras are small, robust, lightweight devices with an area for an ID badge. The video and audio are kept securely on the camera, and the recordings are of evidential quality. All cameras are capable of recording both day and night.

VideoBadge camera models and features are as follows:

VB-100

- Sliding front plate used to initiate recording
- 6-8 hours of continuous WiFI streaming and recording (VB-320w), 12-14 hours of continuous WiFI streaming and recording (VB-340w)
- Up to 720p HD video, high-quality audio

VB-200

- Sliding front switch used to initiate recording
- 8 hours of continuous recording and 48 hours standby
- Up to 720p HD video, high-quality audio

VB-300

- Side pushbuttons used to initiate recording
- 6-8 hours of continuous WiFI streaming and recording (VB-320w), 12-14 hours of continuous WiFI streaming and recording (VB-340w)
- 700 kbps WiFi streaming , 64 kbps audio with digest or open authentication
- 150-degree-diagonal field of view
- New accessories available

VideoBadge cameras support the following resolutions:

- 1280 x 720
- 848 x 480

MyWitness Video Manager

MyWitness Video Manager is the comprehensive back-office video management system for VideoBadge cameras. VideoManager maintains a searchable audit log for each piece of VideoBadge recorded footage and includes encryption key management security to keep data secure. VideoManager is fully network capable and can support deployments of all sizes. The video from the VideoBadge cameras is categorized and stored to a Dell EMC storage solution using VideoManager.

Dell EMC Elastic Cloud Storage (ECS)

ECS is a complete software-defined cloud storage platform that supports the storage, manipulation, and analysis of video surveillance and unstructured data on a massive

scale on commodity hardware. ECS is specifically designed to support the mobile, cloud, and Big Data workloads that are similar to large-scale workloads.

ECS provides GUI, RESTful API, and CLI interfaces for provisioning, managing, and monitoring storage resources. Storage services provided by the unstructured storage engine (USE) ensure that video is available and protected against data corruption, hardware failures, and data center disasters. The USE enables global namespace management and replication across geographically dispersed data centers and enables the following storage services:

Object service

Lets you store, access, and manipulate video and unstructured data. The object service is compatible with existing Amazon S3, Centera™ content addressable storage (CAS), and Atmos™ APIs.

Hadoop Distributed File System (HDFS)

Helps you use your ECS infrastructure as a big data repository that you can run Hadoop analytic applications against (in place).

The provisioning service manages the provisioning of video surveillance storage resources and user access. Specifically, it handles user management, authorization, and authentication for all provisioning requests, resource management, and multitenancy.

You can scale up, scale out, and add users, applications, and services, as well as manage your local and distributed storage resources for your surveillance data through a single view.

Dell EMC CloudArray

CloudArray provides cloud-integrated storage that extends high-performance storage arrays with cost-effective cloud capacity. CloudArray technology simplifies storage management for video files and provides on premises and off premises protection by providing access to a private or public cloud storage tier through standard interfaces (iSCSI, NAS).

CloudArray takes advantage of local storage, also known as cache, which serves two purposes. The first is to provide local performance for file ingest, which often eliminates the effects of cloud latency. The second is to serve as a buffer for read/write operations.

CloudArray is offered as both a physical appliance and a virtual appliance that can be deployed either on site or in a cloud compute environment. CloudArray uses cache storage for performance acceleration. User-defined policies dictate how much data is kept in the local cache. CloudArray can manage multiple policies and caches simultaneously, each of which can be individually configured to support the needs of the different application workloads.

The physical appliance is a dedicated server that comes with built-in CloudArray software. The size of the hardware appliance determines the total amount of local cache available. The appliance's storage can be carved into multiple, smaller caches to provide greater granularity and flexibility. In a CloudArray physical appliance, the total amount of cache available is predetermined based on the hardware configuration.

In a virtual appliance, the cache can be any local storage accessible by the CloudArray software. A CloudArray virtual appliance can be mapped to multiple different storage types based on requirements. For example, a CloudArray virtual appliance can be mapped to solid-state drives (SSDs) for a cache associated with high-performance or

production systems and to SATA drives for archive or other data with lower performance and availability requirements.

EMC VNX and EMC VNX-VSS storage platforms

The VNX-VSS series is a purpose-built block storage system solution for the video surveillance workload that brings storage reliability, simplicity, and affordability to the distributed environments on your video surveillance network.

The VNX and VNX-VSS series can be used to address both distributed and large-scale centralized surveillance needs where block-only (iSCSI, Fibre Channel) connectivity is required. For applications that support block-only connectivity, the VNX series of storage arrays can scale to multiple petabytes for large-scale centralized deployments.

The VNX series is ideal for surveillance data that requires enhanced storage capabilities and is designed for a wide range of environments from mid-tier through enterprise. The VNX series includes offerings with file-only, block-only, and unified (block and file) implementations.

Both the VNX and VNX-VSS series systems are managed through Unisphere™, which is a simple and intuitive user interface that integrates information from varied sources across multiple applications and environments into a single display.

Dell EMC Isilon clustered storage system

Isilon scale-out network-attached storage (NAS) was designed and developed specifically to address the needs of storing, managing, and accessing digital content and unstructured data such as surveillance video. An Isilon cluster provides simple dynamic scaling to increase or decrease the total capacity of the Isilon cluster.

An Isilon clustered storage system is composed of multiple nodes. These nodes are integrated with the Isilon OneFS™ operating system, which is a distributed network file system that unifies a cluster of nodes into a single shared resource.

The single namespace across the multinode cluster enables equal access to video files no matter which node is currently connected. Isilon SmartConnect™ provides load balancing across the cluster nodes to ensure the even distribution of video files.

CHAPTER 3

Solution configuration

This chapter provides information about the components configured in this solution.

Body-worn camera storage architecture

Surveillance data can consume vast amounts of storage while still requiring access to both live and archived video. The demand for surveillance storage is increasing due to higher camera resolutions, increased numbers of deployed cameras, and extended retention times for the video. These factors are forcing the need for greater storage performance and scale.

VNX and VNX-VSS provide high-performance and fault-tolerant storage options for video storage data. Isilon provides file or local object stores in highly expandable storage options that meet the current and future needs for surveillance data. Both Isilon and VNX/VNX-VSS options provide partners and customers the benefit of locally secured video storage.

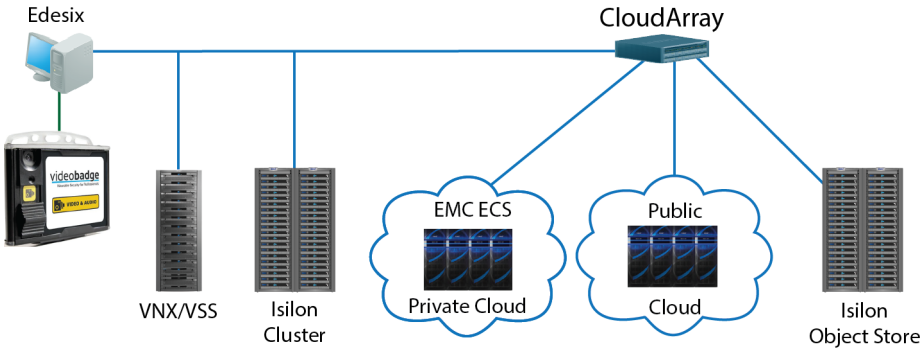
ECS enabled with CloudArray provides a cost-effective means to meet the current and future needs for surveillance data. By deploying CloudArray, partners and customers can receive the benefits of private or hybrid cloud storage without needing to integrate directly with the cloud storage platform.

In the case of body-worn cameras, public safety organizations and the public safety quadrants within corporate environments have unexpected exponential requirements for storage that is dedicated to body-worn camera video. This expansion can be due to a number of factors including:

- New deployment of body-worn cameras
- Expansion of existing body-worn camera deployment
- Higher body-worn camera resolution and/or frame rate
- Increased retention period to meet compliance related to legal proceedings and governmental retention policies

The following figure shows connectivity options.

Figure 1 Overview of connectivity options



VNX/VNX-VSS architecture

Dell EMC Surveillance Labs continually test video management systems (VMS) from multiple body camera vendors to ensure compatibility with Dell EMC local storage systems and CloudArray on multiple private and public cloud services.

The data flow from the camera to either a VNX or VNX-VSS starts when the body camera transfers its video to a workstation running a video server.

The Dell EMC Surveillance Labs also functionally validated that body camera video files can be stored to an iSCSI-attached VNX or VNX-VSS storage array. After the

video is copied to the array, a video server can be used to review video and manage archived video based on preset retention policies.

Body camera connectivity options

Body-worn devices can be configured using different Dell EMC storage systems, such as VNX/VSS, Isilon, and CloudArray.

VNX and VSS (iSCSI)

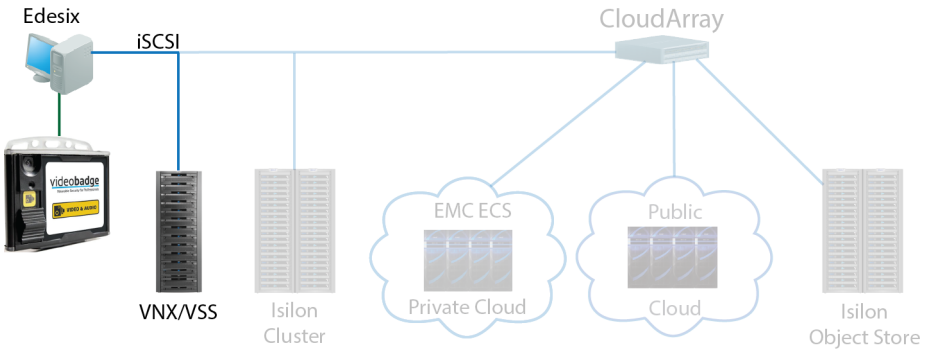
A video server is attached to VNX or VSS storage using an iSCSI initiator. The video server ingests video files from the body camera client that is stored on VNX/VSS storage.

Isilon share (CIFS)

The video server mounted shares are created on the Isilon scale-out storage cluster. The video server ingests video files from the body camera client that is stored on the Isilon cluster. Depending on the capabilities of the body camera application, the Isilon shares can be mounted via the Server Message Block (SMB) Protocol or NFS.

The following figure shows a body camera configuration where a video server stores the video to the VNX or VSS array via an iSCSI connection.

Figure 2 VNX/VSS body camera architecture



Isilon architecture

The data flow from the camera to an Isilon server starts when the VideoBadge camera transfers its video to the workstation that is running VideoManager.

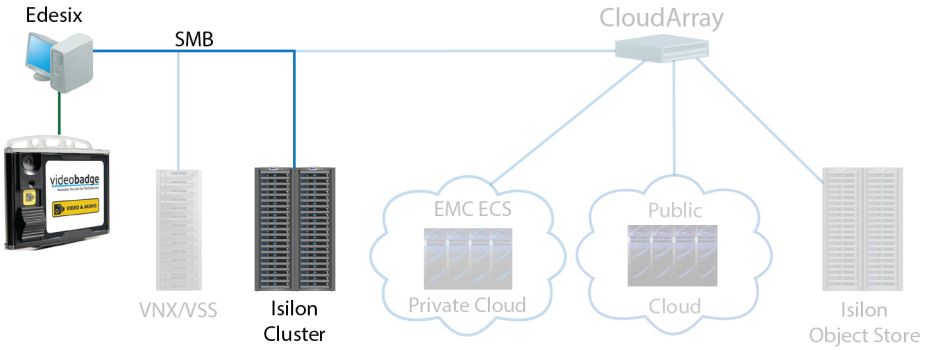
The Dell EMC Surveillance Lab also functionally validated that the Edesix video files can be stored to an SMB attached Isilon scale-out storage device. After the video is copied to the cluster, VideoManager can be used to review and manage archived video based on preset retention policies.

An Isilon cluster provides simple dynamic scaling to increase or decrease the total capacity of the cluster, which can determine the amount of storage available to VideoManager.

The Isilon OneFS operating system provides a single namespace across the multi-node cluster. This single namespace design enables equal access to the files no matter which node VideoManager is connected to. Isilon SmartConnect provides the ability to load balance across the nodes of the cluster.

The following image shows a body camera configuration in which VideoManager stores the video to Isilon through a SMB or iSCSI connection.

Figure 3 Isilon body camera architecture



CloudArray architecture

The Dell EMC Surveillance Lab tested both ECS and Isilon Swift object storage enabled by CloudArray, which enables the video server to use both Private Cloud (ECS) and basic object storage via Isilon Swift.

CloudArray enables the use of multiple cloud service providers for basic object storage that are compatible with CloudArray without the need for direct integration. We also tested hybrid cloud functionality on the following platforms using CloudArray with a Dell EMC cloud service provider over a public network:

- ECS (private cloud)
- Isilon Swift (private object storage)
- S3 compatible Service Provider

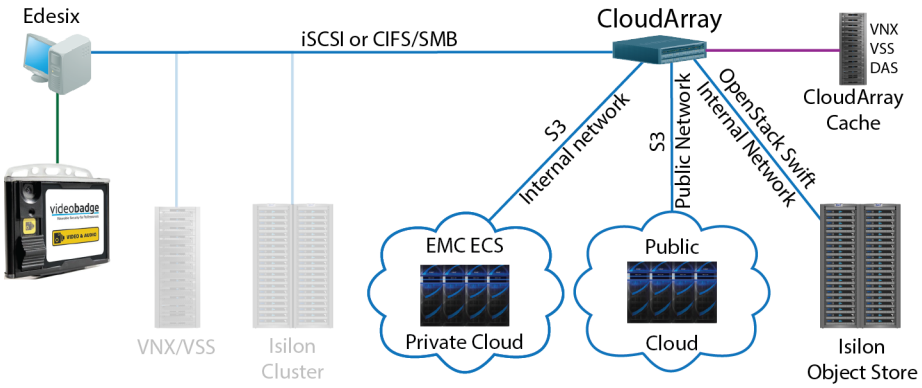
The video server can be connected to CloudArray using iSCSI or Common Internet File System (CIFS) protocols. Body camera video is ingested and is stored to CloudArray and then CloudArray in turn seamlessly handles the write, read, and delete operations to the object store related to normal end-user and application activity.

The data flow from the camera to either a private cloud or a public cloud starts with the body camera transferring its video to a workstation or server, typically through a client or application agent.

The video server mounted shares are created on the Isilon scale-out storage cluster, and the video server ingests video files from the body camera client that is stored on the Isilon cluster. Depending on the capabilities of the body camera application, the Isilon shares can be mounted via CIFS (SMB) or NFS.

The following image shows a body camera configuration where VideoManager stores the video to the Isilon storage cluster through an OpenStack Swift connection.

Figure 4 Local object store, private cloud, and public cloud via CloudArray



CloudArray Cache

CloudArray uses a local cache called CloudArray Cache. CloudArray Cache is either direct attached storage (DAS), an iSCSI-attached VNX/VSS, or an Isilon cluster.

When a video server writes to the CloudArray, it first writes to cache and marks the file as a dirty page. A dirty page is an indicator that the video file resides only on the cache and has not been copied to cloud storage, but that it will be copied to cloud storage based on a least recently used (LRU) algorithm. This LRU approach ensures that any video that must be reviewed immediately is available locally, thus avoiding file transfers from the cloud. The LRU method minimizes the network utilization and latency related to cloud retrieval when video is viewed, and ultimately improves the end-user experience.

The video is then copied to ECS or public cloud storage that supports the API protocol, such as S3, which is compatible with AT&T Cloud Storage. After the video is copied to the cloud's object store, the video exists simultaneously on the cache and the object store, and the dirty page indicator is removed. CloudArray eventually purges the cached version of the video. Although CloudArray works on the block level, conceptually the video file purge occurs when CloudArray Cache is nearly full. Video selected for removal is the oldest video based on when it was last accessed.

Note

The Dell EMC Surveillance Lab used the Amazon S3 protocol to test this solution. The lab also functionally validated that based video files and unstructured surveillance data for evidence management can be stored to AT&T Cloud Storage.

The size of the cache is based on implementation requirements and cache retention considerations including the rate of file ingest, frequency of video recall, and private cloud or public cloud connectivity. We recommend a cache of 12 TB or greater so that it is sufficient to accommodate the timeframe that encompasses 95 percent of the expected video reviews.

When video is recalled for review, it is read directly from the cache. If the cached copy was removed, the video is recalled from cloud storage and again placed on the cache. Once the video is recalled from the object store to the cache, it resides on the cache as if it was newly accessed.

CHAPTER 4

Testing and validation

This chapter describes the testing used to validate this solution.

Test summary

Our functional test determined that VideoManager can be used to successfully review the video from the VideoBadge camera using Dell EMC storage solutions. For more information about server sizing guidelines, refer to the VideoBadge system specifications.

We tested the following Dell EMC storage solutions:

- Dell EMC Isilon
- EMC VNX and VNX-VSS
- Dell EMC CloudArray with Dell EMC Elastic Cloud Storage (ECS)
- Dell EMC CloudArray with Dell EMC Isilon Swift

The VideoBadge cameras create a file for every 0.99 GB of video data and supports the following two resolutions:

1280 x 720

FPS: 30
Camera usable space: 14.7 GB
11 files in 1 charge with 10 files of 0.99 GB and the 11th file of 884 MB
Duration of video data in each file: 24 min, 26 sec
Camera storage usage: 3.84 GB free, 10.8 GB used
File format: .MP4
Video encoding format: H264

848 x 480 resolution

FPS: 30
Camera usable space: 14.7 GB
6 files in 1 charge with 5 files of 0.99 GB, and the 6th file of 580 MB
Duration of video data in each file: 52 min, 19 sec
Camera storage usage: 9.14 GB free, 5.56 GB used
File format: .MP4
Video encoding format: H264

Using CloudArray, we tested playback with the video coming from CloudArray Cache and then from the object store. When video is read from the object store, it is brought first to the cache and then CloudArray serves the video to the requester. No meaningful difference in recall time exists between reading from cache and reading from the object store on a local private cloud.

Our testing discovered no appreciable differences in latency between retrieving video from CloudArray Cache and retrieving video from ECS or Isilon Swift on a private cloud on our lab network.

Testing for the public cloud scenario showed longer video recall times from the private cloud, but recall times may vary within a public cloud. The design of public cloud architecture includes too many factors to derive a video recall time that can be universally applied.