System Requirements

Everbridge Control Center

5.74

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Hardware Overview

Control Center is predominantly an On-Premises, software-based solution, which is installed on a Network and Server infrastructure provided by the Everbridge Partner or End User, based on the required resiliency, and preference of the end user. It is a Client-Server based solution, with desktop clients connecting to multiple Windows Services.

Control Center can operate in a Disaster Recovery, or High Availability environment, using either Physical or Virtual Servers.

Customer Supplied Services

Several systems shall be provided by the Customer's IT Services, these include:

- Active Directory
- Domain Controller
- Read-Only Local Domain Controllers if required.
- NTP Time Sources
- SMTP Email Server
- Enterprise GIS Mapping Server, for example ESRI ArcGIS, shall be provided that will host maps, allowing Control Center to access WMTS/WMS Mapping services.

Solution Design

Redundancy

Control Center availability can be ensured by provision of sufficient hardware redundancy. This means that server hardware, network hardware and other infrastructure must be duplicated with methods of failover.

The Control Center server software can be deployed within a Windows Failover Cluster with at least two nodes and configured as an Active-Passive cluster.

Control Center redundancy is directly linked to database availability. Control Center cannot operate without continuous access to data and so the recovery time is directly linked to the recovery time of the database. As MS SQL Always On Availability Groups often have better recovery time than Failover Cluster Instances, it is recommended that a SQL Always On Availability Groups (AG) are used to ensure redundant data availability – however decisions have to be made based on specific needs and existing infrastructure.

It is assumed that network and power is designed to be redundant.

It is recommended that as a minimum, 2 primary physical servers are used, deployed accordingly (database is not listed here).

Primary Configuration

- Server 1 – Control Center Core Server – Primary – (Windows Clustering)
- Server 2 – Connection Manager Server – Primary – (Active/Active)

Failover Configuration

- Server 1 – Control Center Core Server – Failover – (Windows Clustering)
- Server 2 – Connection Manager Server – Native Failover – (Active/Active)

The choice of failover and recovery is dependent on the end user needs, it is possible to use High Availability and/or Disaster Recovery.

Appropriately dimensioned shared storage for the Windows Failover Cluster, and the chosen data availability method is required and to be provisioned by the customer or integrator.

A 10 GB link between core Server locations is recommended for SQL Replication and Failover resilience. However, while not recommended, a 1 GB link as a minimum may be used.

Where required, it is highly recommended to add additional Servers for Video Export, due to the possibility of video exporting affecting the Server Performance. This depends on volume of exports, and number of users exporting concurrently.

Dual homed network switches are required to provide resilient operation, independently of the other locations. These are to provide replication, viewing and device connection capabilities.

Scalability

Control Center scalability performance is determined by several factors, the biggest being.

- Number of clients
- Number of connected sub systems
- Number of sub-systems endpoints monitored and the frequency of state changes.
- Number of events monitored from sub-systems.

While all state changes and events are monitored, fewer alarms are typically shared with operators. The dynamic workflows and alarm processing has a significantly higher impact on performance than event processing.

Increased scale can be achieved in three ways.

- Better performing hardware; Faster disk IO, more memory, faster CPU
- Increased number of servers processing incoming events - this will allow Control Center to receive more state updates and events from sub-systems.
- Federation of sites – this will increase the number of alarms that can be processed in total and allow more client connections

The biggest performance impact is network speed and database disk access. It is therefore essential that a database SAN is chosen with maximum disk IO. We recommend an average network ping time of < 1ms.

The number of machines can only be predicted once the complete system configuration is known and will change as the system changes. We therefore recommend provision of a minimal hardware set on day one and a plan for a continuous growth while the system develops.

Example Federated Solution Design

The following diagrams describe an example solution design for six sites federated with one Hub.

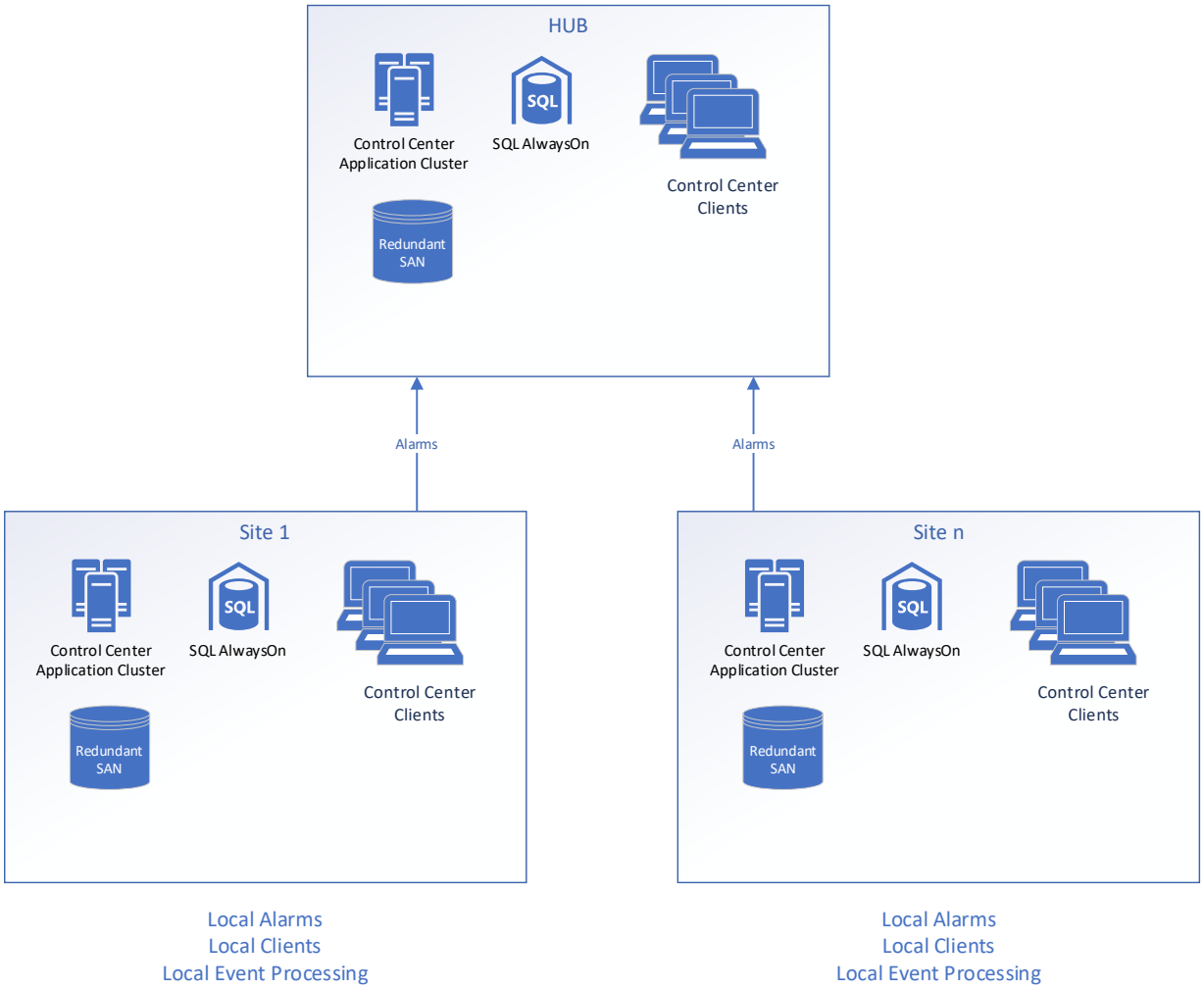


Figure 1 Federated Sites for Scale

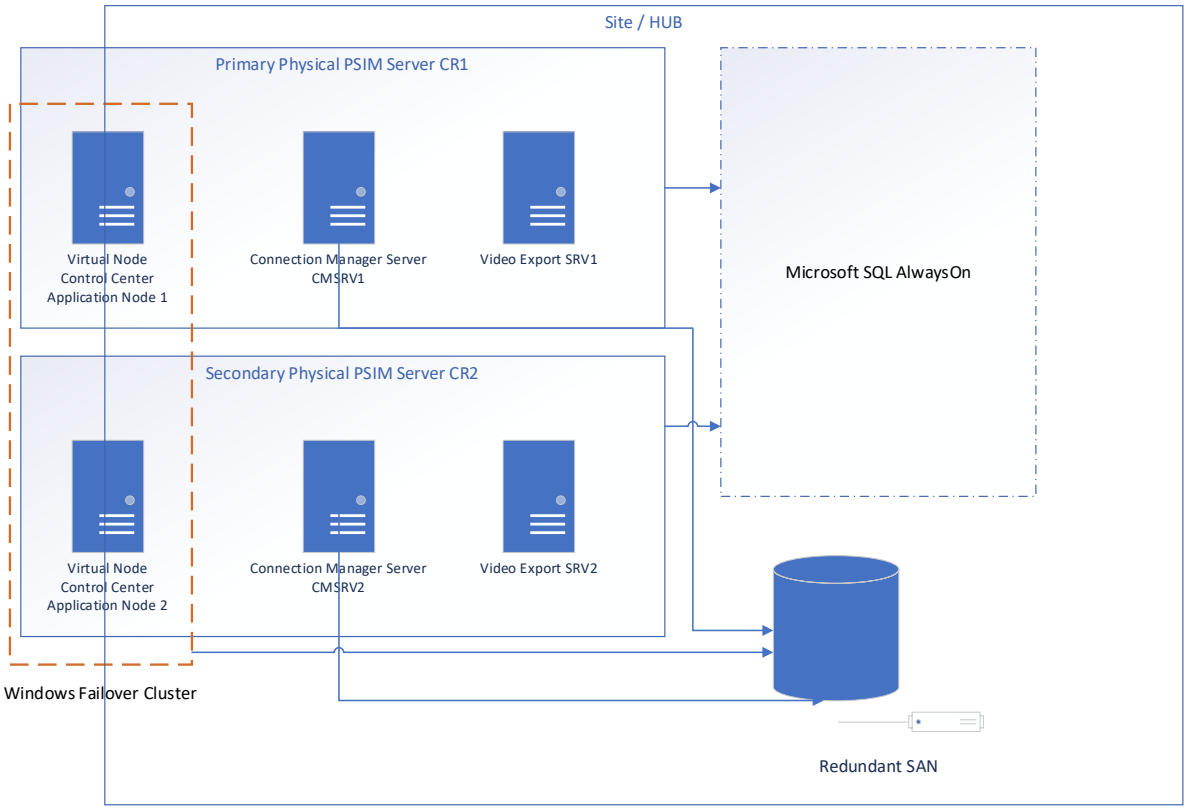
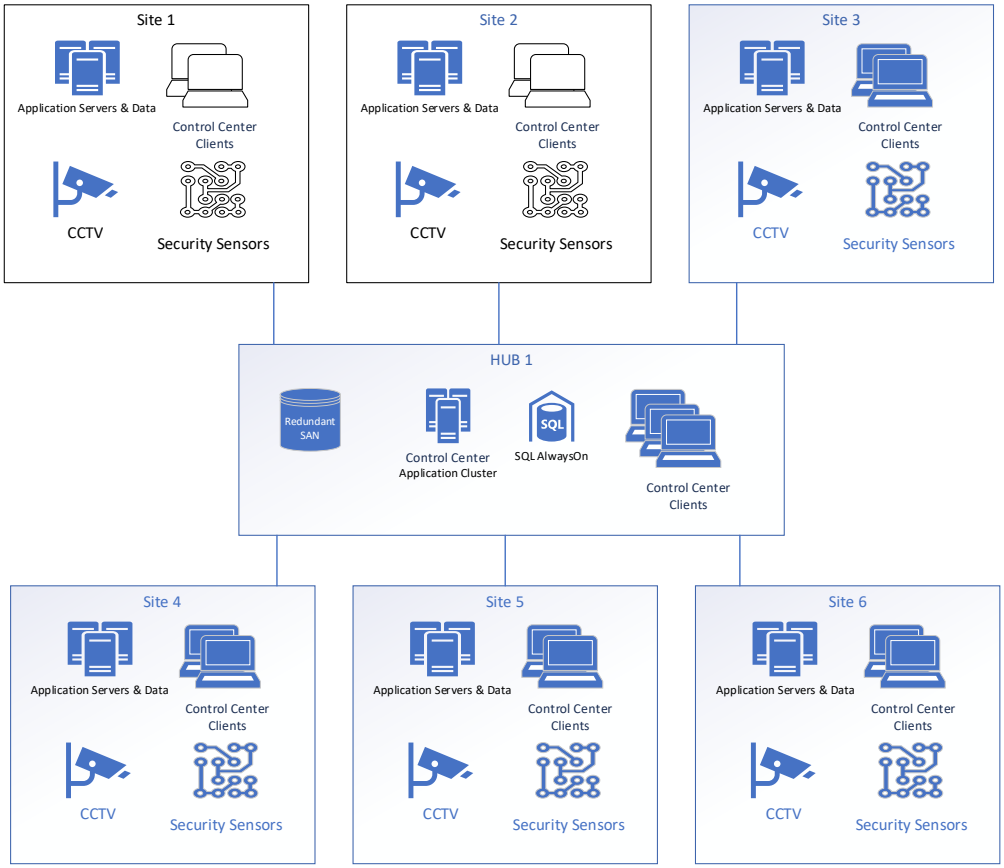


Figure 2 Site/HUB



As with any system, load must be considered. As the demand for services increase supporting resources will need to be scaled appropriately to meet the increasing usage requirements. This section will outline the recommended architecture configured to support growth and maximize the performance of Control Center.

The diagram above depicts the initial configuration for both the Hub and Node(s). This is a virtual machine platform solution. This enables the expansion of Control Center without the recurring need of additional space, power, and cooling.

The Control Center server configuration is broken down into 3 components.

- Control Center Application Services Server
- Connection Manager Application Server
- Video Export Server

Control Center Video Export Servers will not require scaling 1 per site. While it supports failover, only one is required for standard operation.

As shown, there is a second VM host server. This is incorporated as redundancy. It is not required as a part of a solution, but high availability is best practice.

Using VM architecture allows for adjustable scaling. Meaning that if there is little or no performance degradation, there may be little need to scale out immediately. A solution design based on a virtual environment infrastructure will allow you to finetune memory, vCPU/CPU, and storage quickly and easily.

Connection Managers

The Connection Manager service hosts the integration (connector) for each sub-system and executes any server-side functionality related to executing sub-system commands or receiving sub-system data. One Connection Manager can host connections to many systems, but the Connection Manager can also be partitioned so that a specific service connects to a specific system. It can run on multiple servers which means that if a large number of events are to be received from a specific sub-system, a dedicated Connection Manager can be deployed. The Connection Manager can filter unwanted events before passing them to the core application services.

Two Connection Managers can be configured in failover mode to provide redundancy outside of a failover cluster.

Here the diagram depicts Connection Manager scaling as needed. Control Center load is primarily determined by the number of alarms and events. However, it is important to consider the number of alarms that are generated, and the actions triggered by those alarms, i.e., camera pop-ups and process guidance.

Scaling Control Center would be approximately done at every 10,000 devices. As stated above, this is of course based on the number of events and alarms, which will be specific to the project.

Control Center Scaling Example

Control Room Client Requirements

Control Center is based on Thick Client Workstations, with multiple monitor support, based on Microsoft Windows 64-bit Operating systems. Windows 10 and Windows 11 are supported.

Video Walls

Control Center can support video walls in two ways:

- A Control Center Video Wall Client workstation can support up to 4 video outputs, with multiple workstations configured in combination to provide Rich Multimedia output from Control Center, including mapping, Video, Alarm information, Dashboards, Graphics, and other visual information that is available from a Control Center client.

- A Dedicated Video wall controller such as Christie, or Barco (other vendors can be supported through driver development) that allows Control Center clients to interact with the Video Wall controller and present the information from the relevant sources.

Staging and Testing

We recommend that a dedicated staging environment is deployed for the purpose of testing new configurations, software etc.

Control Center Prerequisites

Please see *Control Center Installation Guide* for more information.

Hardware Specifications

The following information is provided as a guide, specific requirements for each Control Center deployment should be discussed with Everbridge, who would be happy to consider the specific needs of the project.

As a guideline, the following specification has been tested to meet the following metrics.

- Number of events per second: 300
- Number of security sensors: 60,000
- Number of clients: 200

MSSQL-Server Specification (Multiple for Redundancy as required)	
Base:	(12 vCPU) 2x Intel Xeon E5-2640v3 2.6GHz (or most recent)
Memory:	96 GB RDIMM Dual Rank
RAID Controller:	Dedicated RAID card
Network:	4x 1GB Minimum
	2x 10GB - for connection to SAN
Power Supply:	Dual, Hot Plug
Operating Systems:	Windows Server 2019/2022
Databases	Microsoft SQL Server 2019, 2022 CAL Licenses: 1 per Control Center Workstation/Video Wall Client. It is recommended that this is confirmed with a Microsoft volume license agent. SQL Enterprise Edition Required for Always on Availability Groups (lowest recovery time). See Microsoft documentation.
Monitors:	VGA / KVM as required

Primary and Failover Server Configuration (Control Center Only)	
Base:	(8 vCPU) 2x Intel Xeon E5-2630v 3 2.4GHz (or most recent)
Memory:	64 GB RDIMM Dual Rank

RAID Controller:	Dedicated RAID card
	OS: RAID 10, 4x 512GB Solid State Drives
Network:	4x 1GB Minimum
	2x 10GB - for connection to SAN
Power Supply:	Dual, Hot Plug
Operating Systems:	Windows Server 2019/2022
Monitors:	VGA / KVM as required

The Control Center Connection Managers can be separated from the Control Center Application Server depending on system load requirements.

Connection Manager Server Specification (Multiple for redundancy and scale)	
Base:	(4 vCPU) 1x Intel Xeon E5-2630v 3 2.4GHz (or most recent)
Memory:	16 GB RDIMM Dual Rank
RAID Controller:	Dedicated RAID card
	OS: RAID 1
Network:	1GB
Power Supply:	Dual, Hot Plug
Operating Systems:	Windows Server 2019/2022
Monitors:	VGA / KVM as required

The video export server hosts the Video Export Service (VES) which allows for the export of video from any VMS. It is not a requirement to host the VES on separate server(s) in systems with low demands on Video Export.

Video Export Server	
Base:	(8 vCPU) 1x Intel Xeon E5-2630v 3 2.4GHz (or most recent)
Memory:	32 GB RDIMM Dual Rank

RAID Controller:	Dedicated RAID card
	OS: RAID 1, 2x 500GB SAS/SSD Drives
	Data (for Export): RAID 5, 15k SAS/SSD sized for storage - recommended minimum 3TB of useable storage
Network:	4x 1GB Minimum
Power Supply:	Dual, Hot Plug
Operating Systems:	1x Windows Server 2019/2022 or Windows 10
Monitors:	VGA / KVM as required
	CAL Licenses: As required, 1 per Control Center Workstation, Video Wall Client. It is recommended to speak to a Microsoft volume license agent to confirm the requirements.

NOTE: Client Workstations with 3D Support. The use of 3D maps and images will require optimized workstations with the ability to smoothly render these Maps/Images accurately. This specification may change based on Vendor recommendations.

Workstation Client Specification	
Base:	Intel Core i9 CPU, 1
Memory:	16 GB RAM,
HDD Drive:	250 GB SSD for OS (System Drive)
HDD Storage	Dependent on solution size
Network Port:	Integrated 1GB LAN
Graphics Card:	NVIDIA RTX 2060 graphics card
Sound:	Optional
Operating Systems:	Windows 10, Windows 11
CD/DVD Drive:	Optional
Monitors:	1x 22" 1920x1080 Widescreen monitor
	1x 22" 1920x1080 Widescreen monitor

Control Center Video Wall Client *For Solutions where Control Center Client Workstations are used to drive Video Walls.*	
	For up to 8x 4K Displays, 24x 1080p Displays
Base:	Intel Core i9 CPU, 1
Memory:	16GB DDR4 2133Mhz RAM
HDD Drive:	256 GB Solid State Drive
Network Port:	Integrated 1GB LAN
Graphics Card:	Nvidia or equivalent, 4GB GPU, 4xDisplay Connectors, Latest DirectX and OpenGL support, 4096x2160@60Hz Resolution

Sound:	As required
Operating Systems:	Windows 10, Windows 11

Staging and Test Environment

Staging/Testing Server Specification (All in One)	
Base:	(8 vCPU) 2x Intel Xeon E5-2640v3 2.6GHz (or most recent)
Memory:	128 GB RDIMM Dual Rank
RAID Controller:	Dedicated RAID card
	OS: RAID 10, 4x 512GB Solid State Drives
Network:	2x 1GB Minimum OS: RAID 10, 4 x 512 GB Solid State Drives SQL: RAID 10, 4 x 512 GB Solid State Drives
Power Supply:	Dual, Hot Plug
Operating Systems:	The following instances of Windows Server are required:
	Windows Server 2019/2022
Monitors:	VGA / KVM as required

Shared Storage

In failover deployments and deployments where the database availability requires shared storage, shared storage is required to allow resources to access and manage a single data set. When shared storage is used to host the SQL Server database files it must offer high-performance to support the level of read/write transactions required by the application. The specification/design of such a storage solution is a specialist area and Everbridge is not best placed to offer specific recommendations.

Shared Storage Volumes (Failover Deployment)	
Control Center	1 x 5 GB disk to host the MSMQ and application services
Microsoft SQL	1 x 100 GB (minimum) disk for SQL live data (sizes dependent on data retention and solution scale)

	1 x 100 GB (minimum) disk for SQL backup data (sizes dependent on data retention and solution scale)

Hardware Specifications – Small System

Solution Assumptions

The guidelines are based on the following assumptions about the initial size of the solution:

- Number of connected endpoints: 1,000
- Control Room Clients: 3
- Integration Modules: Video, Access Control, Intercom, BMS
- 1,000 endpoints can be classed as a small Control Center solution.
- It is assumed that there will be limited video export use.
- Two servers will be used for core service redundancy. Two servers will be used for Connection Manager redundancy.

Specification Summary (Recommended)

Production Environment

Equipment Type	Quantity	Control Center Components
Application Server	2	Server Service Alarm Types Service Notification Service Rules Engine Service GIS Service Monitoring Service Security Service Video Export
Database Server	2	
Video Export Server	1	Video Export Service
Connection Manager Server	2	Connection Manager Service
Workstations	3	Windows Client
Database Application & Storage		See separate section

Staging Environment

Everbridge recommends that a stand-alone, smaller environment is setup to be used for configuration testing, patch testing etc.

Equipment Type	Quantity	Control Center Components
Application Server	1	Auditing Service Server Service Alarm Types Service Notification Service Rules Engine Service GIS Service Monitoring Service Security Service Sensor Service Video Export Service Connection Manager Service(s)
Workstations	1	Windows Client
Database Application & Storage		See separate section

Virtual Nodes and Workstations

Application Server Node	
Virtual Core Count	8 vCPU
Virtual RAM	96 GB
Storage	OS: 250GB Application: 250GB
Operating System	Windows Server 2019 Windows Server 2022

Database Server	
Virtual Core Count	12 vCPU
Virtual RAM	96 GB
Storage	OS: 250GB Application: 1TB
Operating System	Windows Server 2019 Windows Server 2022

Connection Manager Server	
Virtual Core Count	4 vCPU
Virtual RAM	16 GB
Storage	OS: 250GB Application: 250GB
Operating System	Windows Server 2019

	Windows Server 2022

Workstation Computer	
CPU	Intel i9 or equivalent
RAM	16 GB DDR4 2133MHz RAM
Storage	256GB Solid State Drive
GPU	Nvidia Quadro P620 (2GB RAM)
Operating System	Windows 10/11

Data Storage

Storage is required for Control Center configuration data, cached data, and operational data. Data use of the configuration is heavily dependent on the number of high-resolution images in use. Operational data is heavily dependent on the volume of events processed by the system and the data retention required. The following are guidelines for initial data storage allocation.

Configuration data and log files: 250GB config data

Operational data and log files: Recommend 1TB for DB and logs

Control Center performance is determined by storage access speeds. Everbridge recommends SSD as the storage medium to ensure satisfactory read and write speeds.

To maintain balance between both performance and resilience, it is recommended to use an external, centralized SAN based storage solution with capacity to provide shared storage for the cluster Quorum disk, Control Center (MSMQ and generic shared storage) and SQL (database storage) cluster as well as redundancy. Storage should be added to the cluster using standard, supported methods, such as iSCSI initiator or LUN presentation to further present storage drives through to the virtual machines as required.

Application Redundancy

To achieve solution resilience and redundancy, Everbridge recommends that at least two application server nodes are configured as a Windows Failover cluster. Control Center supports the Windows Failover Clustering (WSFC) features so that a second instance of Control Center can be started with no user intervention if a server or Control Center fails.

Shared storage must be available and preferably an always available SAN.

MSMQ must be setup as a high availability resource group.

Database Redundancy

Control Center is heavily dependent on data access and the application services cannot operate without access to the database. It is therefore important to ensure reliable access as well as redundancy.

Everbridge recommends AlwaysOn availability groups as the most reliable system design to achieve availability and redundancy.

Appendix I - Video Systems

In all cases, video from the VMS will be routed from the edge device, DVR or NVR recorder directly to the viewing workstation, therefore, when deploying services such as QoS, and Firewall rules, there needs to be consideration for this, as follows:

- Video from the edge device could be in-excess of 10Mbps per encoded stream, any implementation of QoS on the network will influence the ability to receive or transmit video.
- QoS profiles should be defined as “Mission Critical, Real-Time services – like the priority used for IP-TV, or VOIP.
- Networks need to be Low latency, low jitter, high Speed.
- Diverse routing should be implemented for resilience.
- Port management needs to allow all the required ports to allow traffic use, this may not be constant use depending on the sub system connection. Port 80 traffic for example may only occur when a device discovery command is broadcast to the network, however if Port 80 is blocked, then the scan will not return the required results.
- Multicast for video has benefits but is not always supported by the sub system SDK.
- The number of concurrent video feeds that can be shown within the Control Center client is determined by the performance of the manufacturer SDK on the specified hardware. The prerequisites of the manufacturer also have to be met by the client workstation in order to display video.