Security Management System - System Design Recommendations

Primary Servers

1. Primary servers are used for VMS and Video Analytics processing. Security Management System server software is installed on all primary servers.

2. Primary servers are mandatory in all deployments.

3. Since Security Management System provides built-in video analytics, separate VA servers are not needed. Same server can manage VMS and VA for a video channel. This helps in minimizing the camera connections and optimized working of the system with lower hardware resources utilization,

Calculating number of primary server computers

Following are the steps to calculate number of primary server computers required for a project.

Note – these calculations are valid for projects which include cameras that –
(a) support dual streaming and (b) up to 2 MegaPixel resolution for high resolution video stream.
For any other type of cameras, these calculations are not valid

1. Total number of IP cameras in the system – T

2. Total number of cameras for which 'video analytics' add-on feature is required – V
   Note – V will always be less than or equal to T

3. Total number of primary servers required = (T + V) / 80 => (rounded off to next integer value)

Example calculations –

For a project involving total 600 IP cameras with video analytics requirement for 100 cameras (from the 600 IP cameras),
T = 600
V = 100
Total number of primary servers required = (600 + 100) / 80 = 8.75 ~= 9 servers

Camera allocations

1. It is recommended to distribute the IP cameras equally across the available number of servers.

2. It is recommended to distribute the IP cameras which need VA, equally across the available number of servers.

Example -

For a project involving total 600 IP cameras with video analytics requirement for 100 cameras (from the 600 IP cameras),
T = 600
V = 100
Total number of primary servers required = (600 + 100) / 80 = 8.75 ~= 9 servers

Every primary server will manage 66-67 IP cameras, and video analytics will be enabled for 11-12 cameras from these 66-67 cameras.

Notes –

1. It is recommended to allocate maximum 80 processing modules per server (VMS for single camera is considered as 1 processing module and VA for single camera is considered as 1 processing module).
2. There is no restriction from the VMS software side, but the limitations are related to hardware capacities.
3. Following the recommendations ensures 24X7 smooth working of the IP video surveillance system.

Hardware recommendation for primary servers

1. Processor – Intel(R) Xeon(R) CPU 2GHz (8 cores) or better
2. RAM – 8GB or more
3. Server class motherboard
4. 2 Gigabit network cards with PCI Express interface
5. Operating System - Windows Server 2008 (R2) or Windows Server 2012 or Windows Server 2012 (R2) or Windows Server 2016
6. The storage device should be capable of providing the required throughput (bits per second) as required for the project. If network storage is used, recommended configuration is through iSCSI interface.
7. Local hard disk - minimum 100 GB free drive space where Security Management System server software is installed; minimum 50 GB drive free space on system drive, if its different than the one where Security Management System server software is installed

Notes –
1. These hardware recommendation points should be sent to the server computer hardware vendor for compliance.
2. The server computer hardware vendor needs to check each of the points and confirm that it is available in the offered server computer hardware
3. If any of these points is not compliant, there may be problems in the target solution running smoothly 24X7
4. Other points related to server computer hardware do not matter and can be selected as per server computer hardware vendor recommendations

Management servers

Security Management System is built with fully distributed architecture. Hence separate dedicated management server is an optional software component. It is typically used in projects which involve more than 10 primary servers, as per the project requirements.

Failover Servers

1. Failover servers manage failover processing. Security Management System server software (in failover mode) is installed on all failover servers.

2. Failover servers are not mandatory and are required only if the project requirements include failover management feature.

Calculating number of failover server computers

Security Management System supports all types of failover configurations – from 1 : N to N : N. Which means, it is possible to allocate one failover server for one or more primary servers.

The type of failover configuration used may be defined in the project requirements. If it is defined in project requirements, then number of failover servers need to be calculated depending on the project requirement details.

If the project requirement does not mention any specific failover configuration, recommended configuration can be used. In the recommended configuration, one failover server is allocated for up to 5 primary servers.

With recommended configuration, the number of failover servers required can be calculated as – Total number of failover servers required = 'Total number of primary servers' / 5

Example calculations with recommended configuration –

For a project involving total 600 IP cameras with video analytics requirement for 100 cameras (from the 600 IP cameras),
T = 600
V = 100
Total number of primary servers required = (600 + 100) / 80 = 8.75 ~= 9 servers
Number of failover servers required = 9 / 5 = 1.8 ~= 2 servers

Hardware recommendation for failover servers

Failover server hardware recommendation is same as primary servers.

Client Workstation Computers

1. The operators use the client workstation computers for all 'operator activities' which include live videos monitoring, recoded video playback, alarm handling, report generation, video export etc.

2. Security Management System client software is installed on all client workstation computers.

Calculating number of client workstation computers

The number of client workstations required depends on the project requirements.

1. For every operator console / control room, client workstation computers are needed to be allocated

2. It is recommended to view up to 64 cameras at a time on any client workstation computer. (4 monitors, each displaying 16 videos in 4X4 layout). If at any operator console / control room, more than 64 cameras are expected to be viewed simultaneously, multiple client workstation computers need to be allocated – each one for viewing up to 64 cameras at a time.

Notes –

1. It is recommended to use maximum layout of 5X5. Using higher layouts like 6X6 or higher will result in very small display area available for each of the videos. The videos displayed in such higher layouts will be too small for live monitoring for operators.

2. The 'viewing up to 64 cameras at a time' on every client workstation computer recommendation is for simultaneous viewing. It is possible to use a single client workstation for monitoring say 256 cameras using carousel / video flipping feature available in the Security Management System client software. When carousel / video flipping is enabled, the displayed videos get changed after user defined interval (e.g. every 1 minute) and videos from next set of cameras is displayed. Hence only up to 64 cameras are displayed at a time, but across the carousel cycle of 4 video switch, all 256 cameras will be visible.

3. In typical configuration, a client workstation computer has one monitor allocated for 'monitoring'. This monitor is kept physically closer to the operator and operator can perform actions like playback video viewing, report generation, video export, alarm management etc. on it. There can be additional monitors which may be associated with higher resolution displays or videos wall and are used for live video display.

Video walls

Security Management System client software does not require any special configuration to work with video walls.

There are 2 ways to use a video wall with client workstation computer –

1. The display output ports from client workstation are connected to input ports of the video wall. This is the simplest configuration in which each section of video wall simply acts as independent monitor connected to the client workstation computer

2. The display output ports from client workstation are connected to display input ports of 'video wall controller device'. 'Video wall controller device' provides means to configure the display on the video wall. Feasibility of this option depends on the video wall being used. The 'video wall controller device' and the display configuration tools are available from the video wall manufacturer. Inputs and support from video wall manufacturer is needed to set up the video wall display.

Hardware recommendation for client workstation computers

(A) Client workstation computer for viewing up to 8 cameras at a time -

1. Processor – 4 core 2GHz processor
2. RAM – 4GB or more
3. Gigabit network card
4. Graphics card 1 GB or more
5. Operating System - Windows 7 / Windows 8 / Windows 8.1 / Windows 10
6. Local hard disk - minimum 100 GB free drive space where Security Management System client software is installed; minimum 50 GB drive free space on system drive, if it is different than the one where Security Management System client software is installed

(B) Client workstation computer for viewing more cameras at a time, up to 64 cameras

1. Processor – 8 core 2GHz processor
2. RAM – 8GB or more
3. Gigabit network card
4. Graphics card 4 GB or more
5. Operating System - Windows 7 / Windows 8 / Windows 8.1 / Windows 10
   (64 bit OS version is recommended)
6. Local hard disk - minimum 100 GB free drive space where Security Management System client software is installed; minimum 50 GB drive free space on system drive, if it is different than the one where Security Management System client software is installed

System Design Notes

1. There should be no video monitoring (video viewing) happening on any of the servers. Servers should run in optimized mode, after the settings are done. All video monitoring is expected to be performed from client workstation computers

2. If video monitoring is expected on any server computer, it is recommended to add one more client workstation computer, physically placed near the server computer. Client computer should be used for video monitoring.
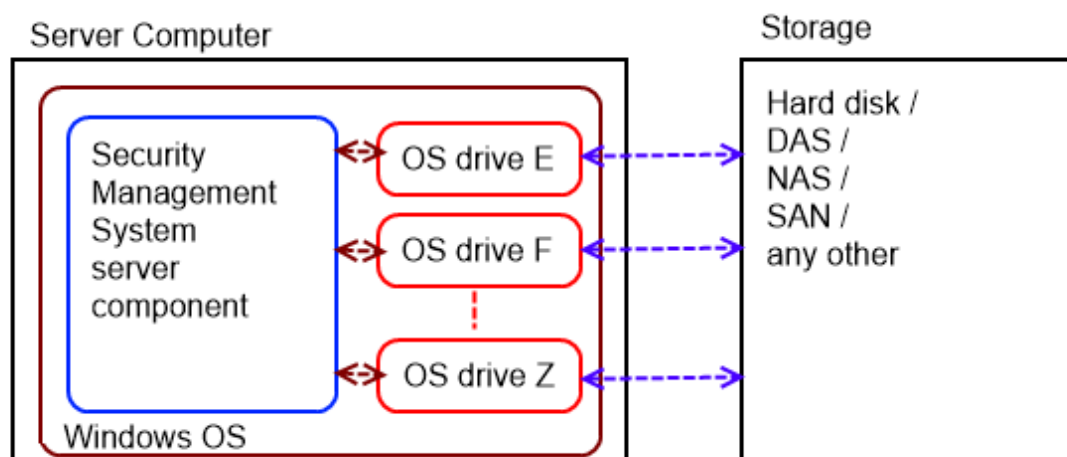
Storage

The storage is associated with Security Management System server components. It is used for recording videos, configurations and other data from the system.

Security Management System supports all types of storages including local hard disk drives, directly attached storage (DAS), network attached storage (NAS), storage area network (SAN).

Any suitable storage can be selected, based on the project requirement, cost, storage device capacity and performance; and other setup and maintenance parameters.

Storage configuration

The Security Management System server components use 'Drives' available in the Windows OS for data storage.

This provides full flexibility in system design and allows using any type of storage with Security Management System. As long as the storage is able to reflect one or more 'drives' in Windows OS, Security Management System is able to access it and use it for data storage.

The storage configuration involves configuring associated windows OS drive(s) on the server computer, where Security Management System server software is installed.

1. The driver letters do not matter. They can be any letters. E, F etc. drive letters are used in the image above, just as an example

2. After storage configuration, the drives should be visible in standard Windows Explorer, which indicates successful configuration of storage for use in Security Management System.

Storage types

Security Management System supports all types of storages including local hard disk drives, directly attached storage (DAS), network attached storage (NAS), storage area network (SAN).

Following are a few guidelines while selecting specific storage type for any project –

1. Local hard disk drives

    (a) Please confirm that sufficient storage throughput (write throughput as well as read throughput) is available. The storage throughput can be tested using 'Storage Throughput Test Application' tool available with Security management System.

2. Directly attached storage (DAS)

    (a) Please confirm that sufficient storage throughput (write throughput as well as read throughput) is available. The storage throughput can be tested using 'Storage Throughput Test Application' tool available with Security management System.

3. Network attached storage (NAS)

    (a) NAS devices can be configured with 2 options – network sharing configuration and iSCSI configuration. The 'network sharing' type configuration provides considerably low storage throughput as compared to 'iSCSI' configuration. It is highly recommended to use iSCSI configuration when using NAS. The NAS used hence should support iSCSI configuration

    (b) Please confirm that sufficient storage throughput (write throughput as well as read throughput) is available. The storage throughput can be tested using 'Storage Throughput Test Application' tool available with Security management System.

4. Storage area network (SAN)

    (c) SAN can be configured with 2 options – network sharing configuration and iSCSI configuration. The 'network sharing' type configuration provides considerably low storage throughput as compared to 'iSCSI' configuration. It is highly recommended to use iSCSI configuration when using SAN. The SAN used hence should support iSCSI configuration

    (d) Please confirm that sufficient storage throughput (write throughput as well as read throughput) is available. The storage throughput can be tested using 'Storage Throughput Test Application' tool available with Security management System.

5. Any other type of storage

    (a) Any other type of storage can be used with Security Management System. As long as the storage is able to reflect one or more 'drives' in Windows OS, Security Management System is able to access it and use it for data storage.

(b) Please confirm that sufficient storage throughput (write throughput as well as read throughput) is available. The storage throughput can be tested using 'Storage Throughput Test Application' tool available with Security management System.

Storage space calculation

Please use the 'storage space calculator' tool available with Security Management System to calculate the storage space required.

Primary servers –

The storage space requirement is calculated for each of the primary servers.
The 'storage space calculator' tool requires following inputs –
1. Number of IP cameras allocated to the server
2. Recording stream configuration – video resolution and frame-rate
3. Type of recording – continuous / scheduled / rule based etc
4. Expected recording duration (in days)

All these inputs are dependent on the project requirement.

Failover servers –

Additional storage space is required for failover servers and needs to be calculated separately. However, this is typically not as high as primary servers.

The expected recording duration for failover servers is the maximum expected down time for a primary server. This is the time expected for resolving the issue in the primary server, which typically is 3 to 7 days.
The expected recording duration for failover servers can be finalized based on project requirements and the inputs from the server computers hardware vendor.

The storage space requirement is calculated for each of the failover servers.
The 'storage space calculator' tool requires following inputs –
1. Maximum number of IP cameras allocated to primary server monitored by the failover server
2. Recording stream configuration – video resolution and frame-rate (same as that used for primary server storage space calculation)
3. Expected recording duration for failover state (in days)

Complete system –

The storage space requirement for complete system is the sum of the storage space requirement for all the primary servers and all the failover servers in the system.

Notes –

1. The storage space requirement values calculated from the 'storage space calculator tool' are for actual usable space available for the server computer (and hence the VMS software).
2. There may be overheads like RAID configuration, HDD size not matching the available usable space etc. Hence the raw storage space would be higher than these calculated values. This depends on the storage configuration expected to be done for the target project.
3. It is recommended to confirm with storage vendor, that after all configurations to the storage, the actual usable space available will be as per the calculations for the storage space requirement for each primary server and each failover server

Recording drive size

The storage configuration involves configuring associated windows OS drive(s) on the server computer, where Security Management System server software is installed.

The number of drives can be one or more. There is no restriction on number of drives from Security Management System.

Each drive can be of any size (gigabytes / terabytes). There is no restriction on drive size from Security Management System.

Following are a few guidelines for selecting number of drives and drive sizes during storage configuration –

1. Security Management System assigns a drive for each camera for recording. All data associated with this camera is recorded on this assigned drive.

2. Security Management System tries to intelligently distribute the cameras across all available drives, considering the drive sizes; for maximum possible recording duration.

3. Manual override for the drive assignment for every camera is also available in Security Management System.

4. It is recommended to have one drive for up to 16 cameras managed by a Security Management System server software.

5. It is recommended to have equal sizes for all drives.

6. Recommendations from storage manufacturer should be considered for optimum working of the storage - for throughput, performance, hardware life etc.

The best possible number of drives and drive sizes can be chosen based on these guidelines