White Paper

Milestone Federated Architecture

Prepared by:

John Rasmussen, Platform Architect

milestone

Table of Content

Introduction

Milestone Federated Architecture is a technology that allows individual XProtect Corporate and XProtect Expert installations (sites) to be tied together in a hierarchy of federated sites.

When individual XProtect Corporate or XProtect Expert sites are tied together in a federated hierarchy, the individual sites will appear as one large system to administrators and users, while still being as manageable as individual sites.

Through Milestone Federated Architecture, users will have access to video, audio, metadata, and other resources across the individual sites in the hierarchy based on their user rights per individual site. In addition, administrators can centrally manage sites in the hierarchy through the Management Client based on administration rights on the individual sites in the hierarchy.

Milestone Federated Architecture is the perfect solution for large-scale installations covering multiple buildings, campuses, or physical locations. It provides unrestricted scaling, flexibility, and accessibility for more efficient, cost-effective video surveillance across multiple sites.

XProtect Corporate and XProtect Expert share the same architecture and components and throughout this white paper they are referred to as 'XProtect® VMS products'.

Purpose and target audience

The purpose of this white paper is to give a general overview of Milestone Federated Architecture, the technology behind it, its implementation, its benefits, and the problems it solves.

This white paper should enable the reader to understand the architecture and technology behind Milestone Federated Architecture, as well as how to design and implement a large-scale multisite XProtect VMS system by utilizing Milestone Federated Architecture.

It is assumed that the reader has a general understanding of the XProtect VMS products, the XProtect Management Client and the XProtect Smart Client, as well as a general understanding of network infrastructure and Microsoft Active Directory.

The primary audience for this white paper is individuals or organizations that wish to deploy multiple independent XProtect VMS installations (sites) and at the same time be able to view all the XProtect VMS sites and their devices as one large VMS system with seamless access to configuration and live and recorded media across all sites. The target group might include (but is not limited to) the following audiences:
- Surveillance system architects/designers
- Large-scale surveillance project consultants
- Companies, organizations, universities, etc. with large-scale surveillance projects/installations

# Designing a multisite video surveillance system

There are several ways to design a multisite surveillance system. This whitepaper focuses on using Milestone Federated Architecture to tie the sites together, thus it will not cover the other design options.

Please see the System Architecture Guide for IT Professionals whitepaper, in order to get an overview of the different ways multisite XProtect VMS systems can be designed and implemented.

Milestone Federated Architecture Overview

A Milestone Federated Architecture hierarchy consists of at least two stand-alone XProtect VMS systems that are linked together to create a Milestone Federated Architecture hierarchy.

Once a Milestone Federated Architecture hierarchy is created, it will form a hierarchy of parent and child sites as seen in the chart below, where the top site is the parent, and the other sites are children under the parent.
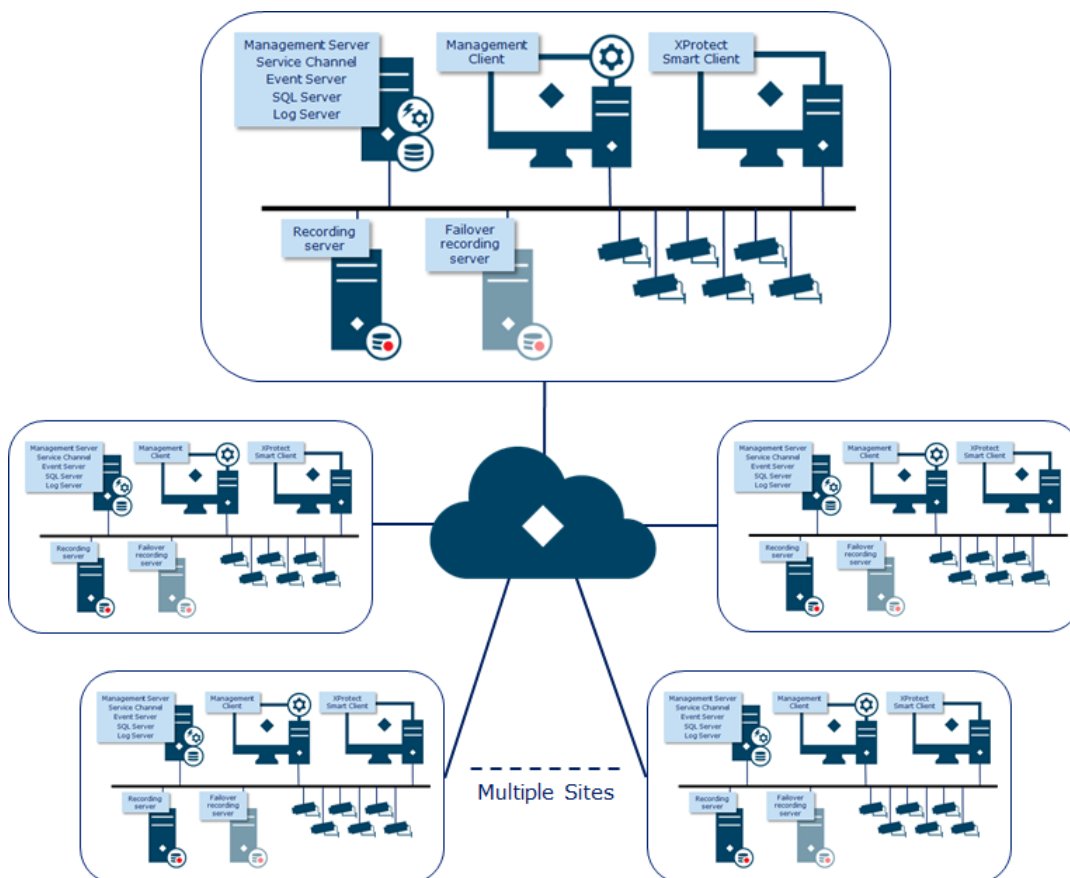
Note: XProtect Expert can only function as a child-site under an XProtect Corporate site so it cannot have underlying child-sites attached to it.

Each site in the hierarchy provides users and administrators with a login point to the hierarchy. Based on the specific permissions configured for the users per site, the users and administrators logging in will have access to the site they logged in to and the sites below it.

Milestone Federated Architecture example

As already mentioned, Milestone Federated Architecture can be used to provide scalability, centralized management, and seamless video access between geographically distributed sites within one large organization or between installations belonging to different organizations.

Corporation with regional and branch offices

A typical example for implementing Milestone Federated Architecture is a corporation with regional and branch offices as shown below.

In corporations with multiple offices, it is generally desirable for each installation to be tied into the overall corporate surveillance installation for central administration and monitoring, yet at the same time allow each branch office to have operational control over and access to their local surveillance installation.

With Milestone Federated Architecture, it is possible to log in, monitor and manage the distributed XProtect VMS systems centrally from both headquarters and regional offices, but also directly on each site. This is a key advantage in cases where a remote site for some reason is temporarily unable to communicate with the central headquarters' XProtect VMS system.

Furthermore, Milestone Federated Architecture provides surveillance system administrators with the ability to configure the system so that users' access is limited to specific sites and cameras or to certain cameras depending on a defined schedule.

For example:
- Grant users in each branch office access to view only cameras in their own branch office
- Grant security officers working at the central headquarters access to the remote site's outdoor cameras only during working hours, but allow them access to all cameras, both indoor and outdoor, during off hours

Configuring Milestone Federated Architecture

Prerequisites
To simplify the creation of the hierarchy, it is strongly recommended that all sites belong to the same domain, and that the management server service run under the same domain account on all sites.

In cases where the sites are on different domains or the management server service does not run under the same account, please refer to the XProtect VMS administrator manual for further information on how to set up the Milestone Federated Architecture or alternatively, use Milestone Interconnect.

For information about Milestone Interconnect, see the Milestone Interconnect white paper.

Adding site to a hierarchy
Once the XProtect VMS sites are installed according to the prerequisites, creating a Milestone Federated Architecture hierarchy or adding a site to an existing hierarchy can be done simply by adding a sub-site to an XProtect Corporate system using the XProtect Management Client.

This is done in the following way:
1. Right-click the current site in the '*Federated Site Hierarchy*' pane
2. Select '*Add Site to Hierarchy…*' in the context menu
3. Enter the address of the new site (including http:// or https://) and click '*OK*'
4. The Management Client will now connect to the site and add it to the hierarchy

Once added, the site will be shown in the '*Federated Site Hierarchy*' pane (5) under the parent server. The site is now included in the hierarchy.
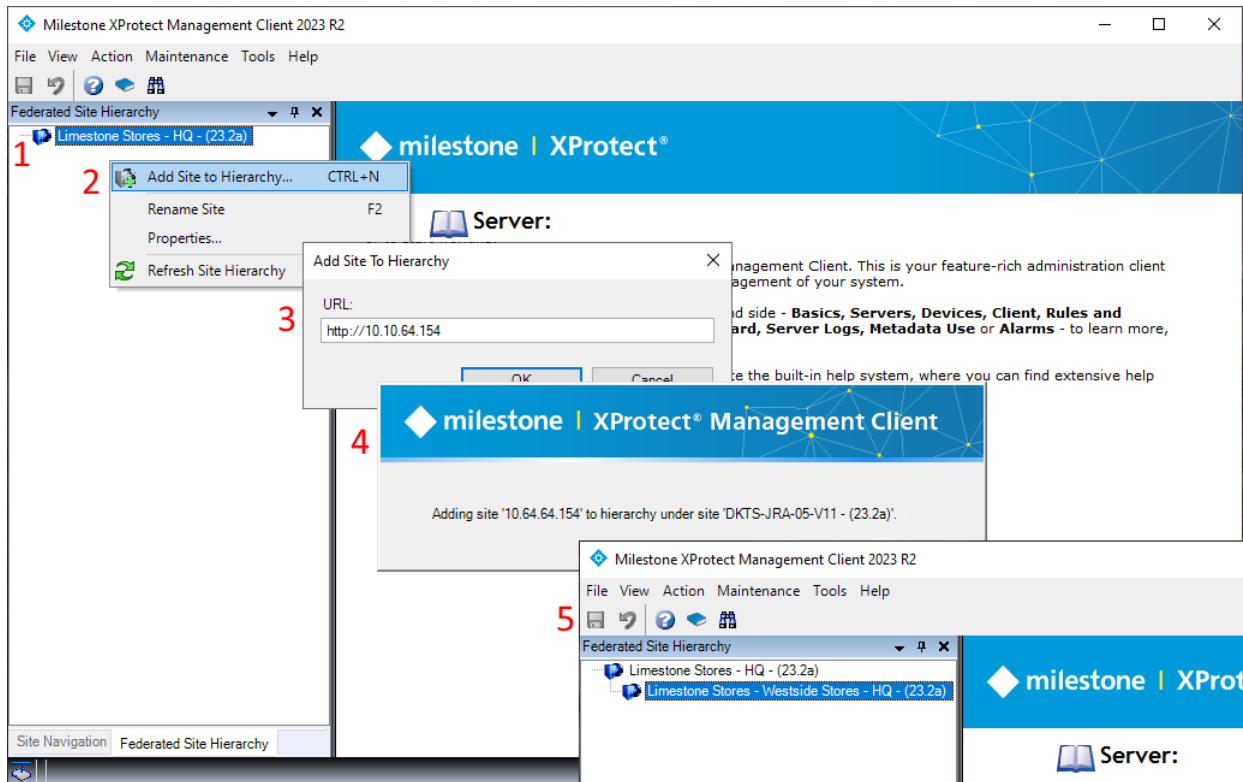
XProtect Management Client
Federated Site Hierarchy, flow for attaching a site to the hierarchy

Note:
The functionality and features available on the sites in the Milestone Federated Architecture hierarchy is determined by the product and version used on the individual sites.

Network traffic between sites
The Milestone Federated Architecture hierarchy has a scheduled synchronization task that runs between the sites every 10 minutes, as well as every time a new site is added to or removed from the hierarchy.

The synchronization communicates site identity information only and uses less than 1 MB each time. In addition to the data sent during scheduled synchronization, video or configuration data will be sent when a user or administrator views live or recorded video, logs in to a site, or configures a site. In these cases, the amount of data transmitted depends on what is being accessed.
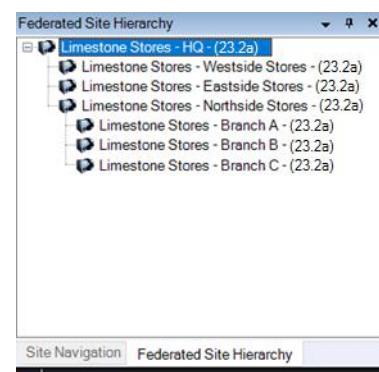
Client Experience

Management Client

Milestone Federated Architecture provides administrators with the experience of a unified large-scale system with easy access to all sites, servers, and devices in the hierarchy. It also frees the administrators from the challenges of designing, implementing, and managing everything in one extremely large and complex system.

Administrators using the XProtect Management Client to log in to a site attached to a Milestone Federated Architecture hierarchy will notice a new tab, '*Federated Site Hierarchy,* at the bottom of the '*Navigation*' pane.

Selecting this tab will display the Milestone Federated Architecture hierarchy from the site that the administrator is currently logged in to and down in the hierarchy. Administration of the different sites in the hierarchy is done by selecting the site in the hierarchy's tree view, right-clicking it and selecting '*Log into Site*'.

A new XProtect Management Client login window will be presented with the site address prefilled. Once the username and password have been entered, the site can be viewed and managed. If dual authentication is used on the site, you will be presented with a second dual authentication dialog.
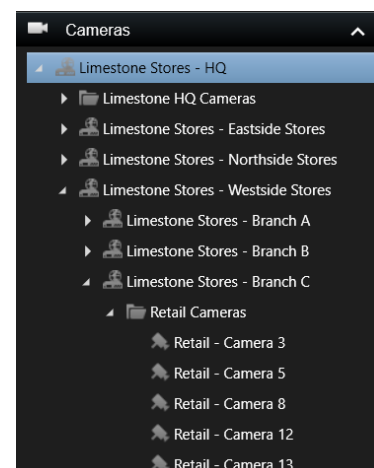

XProtect Management Client
Federated Site Hierarchy overview

Smart Client

Smart Client users logging in to a site attached to a Milestone Federated Architecture hierarchy will experience the same Smart Client layout, functions, and way to use the Smart Client as they are used to when accessing a stand-alone site.

The only difference is that in some dialogs and panes (like the 'Cameras' pane to the right) an extra layer will be added to the tree structure, allowing the user to access resources across the different sites in the hierarchy.

XProtect Smart Client
Federated Site Hierarchy overview

Views in a Milestone Federated Architecture hierarchy

A view created in the XProtect Smart Client can contain a mix of cameras and other items from the different sites in the hierarchy. This makes it easy to provide the XProtect Smart Client users with an experience of easy and seamless access to all cameras and resources across all sites in the Milestone Federated Architecture hierarchy.

Note: The created views are always stored on the site the user is logged in to and can only be accessed by users logged into this site. This means that the views created and stored on any child sites in the hierarchy cannot be accessed from the parent site or any other sites when logged in to the Milestone Federated Architecture hierarchy.

Evidence lock and Video Restrictions
Evidence lock is a feature that enable users to extend the retention time for selected recording sequences beyond the normal retention time, thus preventing potential evidence from being deleted before the investigation and export of evidence has been completed.

Video restrictions (which includes restrictions to any related audio and metadata for the camera in question) is a feature that enable users to restrict other users' access to live and/or recorded video sequences, thus ensuring that only users with specifically granted permissions can view the live and/or recorded media.

For both features, specific permissions are required for the users that should be allowed to manage and view evidence locked or restricted video.

When creating an evidence lock or video restriction that include cameras from multiple sites in the Milestone Federated Architecture hierarchy, an individual evidence lock or video restriction will be created for each site that manages the devices included in the evidence lock or video restriction. This ensures that all the live and/or recorded media are protected by an evidence lock or video restriction on all sites in question. Furthermore, it enables users with the right permissions on the individual sites to view and manage the evidence locks and video restrictions on their local sites, or any child sites to their local site.

Milestone interconnected cameras
If one or more sites using Milestone Interconnect is added to the Milestone Federated Architecture hierarchy, interconnected cameras will be listed as any other camera on the federated site and can be operated as such.

Smart Map
Integration of the XProtect Smart Client's Smart Map feature is fully supported in Milestone Federated Architecture.

Cameras from all sites can be placed freely on the global Smart Map. If the cameras have their GPS location and orientation parameters set on the child sites in the hierarchy, they will be placed on the correct location in the Smart Map automatically.

Map
Integration of the XProtect Smart Client's Map feature is fully supported in Milestone Federated Architecture.

If the Map feature in the Smart Client is used in a federated hierarchy, each site in the hierarchy must have its own maps defined. It is then possible to use "hot zones" to link to maps on the child sites. When an XProtect Smart Client user clicks on a hot zone that links to a child site, the Smart Client will connect to the child site's event server and show that site's map.

One limitation to this is that a map level can only contain devices from the local site. It is not possible to mix cameras from separate sites in one map layer.

Bookmark
The bookmark feature is fully supported in Milestone Federated Architecture.
Each bookmark is stored per camera on the individual sites in the hierarchy. Adding and viewing bookmarks works in the same way as on a stand-alone system. Similarly, access to adding, deleting, editing, and viewing bookmark depends on user rights per camera in the different sites.

Alarm Manager
The Alarm Manager is fully supported in the XProtect Smart Client running in a Milestone Federated Architecture hierarchy.

The XProtect Smart Client has a dedicated '*Alarm Manager*' tab listing alarms from all sites in the Milestone Federated Architecture hierarchy. If needed, alarms from just a single site can be viewed by selecting the specific site in the '*Alarm Manager*'s site tree view.

XProtect Smart Wall
Integration and user control of the Milestone XProtect Smart Wall is fully supported in Milestone Federated Architecture

Using the XProtect Smart Wall together with Milestone Federated Architecture hierarchy requires the following:
- The Smart Wall must be defined on the same site as the users controlling it are logged in to – typically the topmost parent site
- The user account used for the Smart Client powering the Smart Wall monitors must have sufficient permissions on all sub-sites in the hierarchy to display the cameras

License Overview

Milestone Federated Architecture is included in the XProtect Corporate and XProtect Expert base licenses and does not require any additional license purchase.

If using the same XProtect Corporate SLC (Software License Code) on multiple sites, it is possible to see an overview of the license usage per site – no matter if the sites are connected to a Milestone Federated hierarchy or not.

On the XProtect Management Client's, '*License Information*' page, click the '*License Details – All sites...*' link
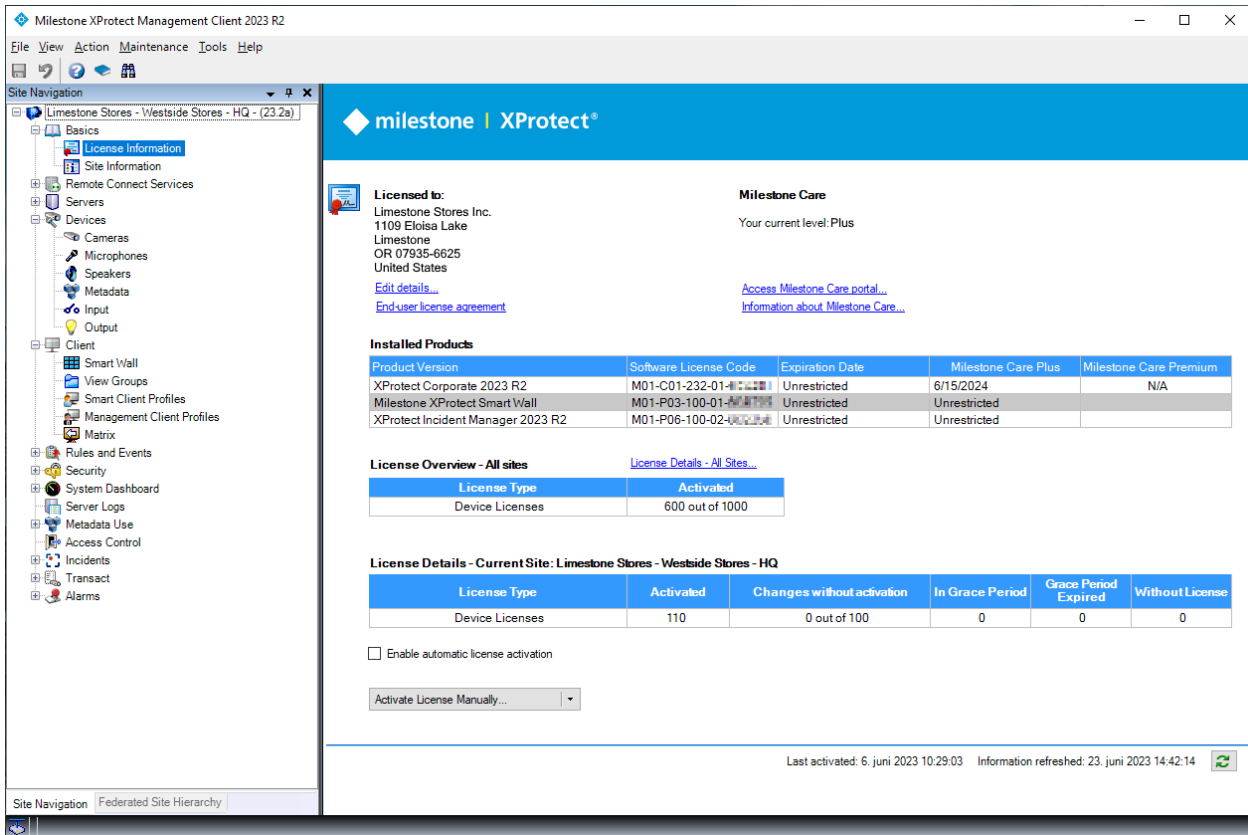
XProtect Management Client
License Information

A dialog will be opened, showing a complete overview of the license usage per site (for the sites using the same SLC as the site logged in to).
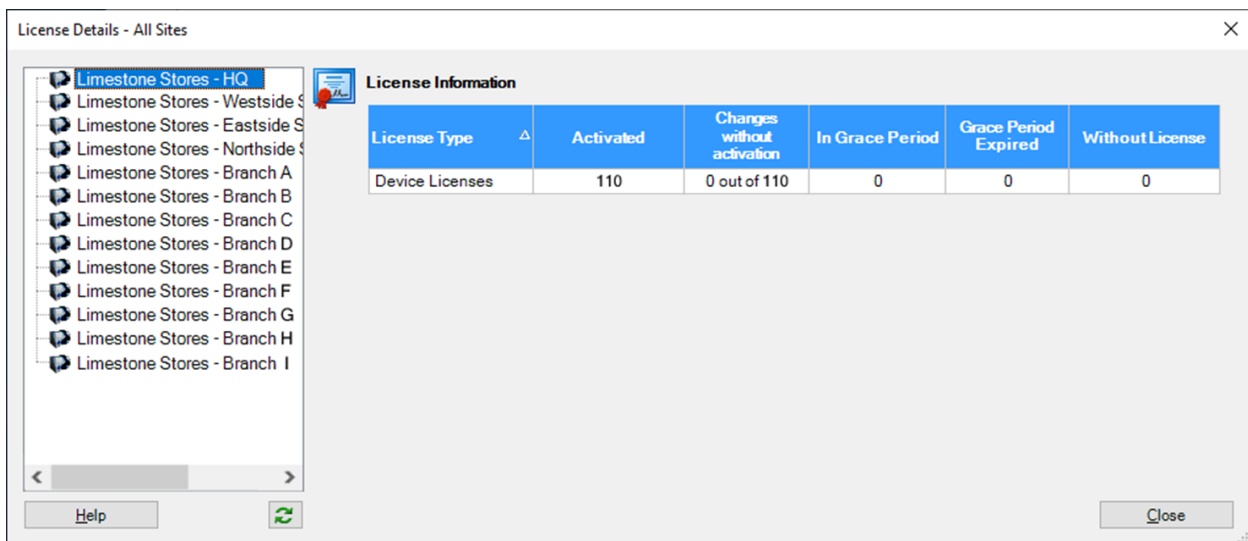
XProtect Management Client
License Details – All sites

Summary and benefits

Milestone Federated Architecture offers surveillance system architects, designers and administrators the possibility to implement a large-scale surveillance system that span multiple physical locations.

Key features of Milestone Federated Architecture are:

- Versatile architecture with unrestricted scalability and operational flexibility
- Easy deployment and management with very few steps to add sites to the hierarchy
- Easy management of all sites in the Milestone Federated Architecture hierarchy even though all sites are not running on the same XProtect product or version
- The ability to bring geographically dispersed installations into one centrally managed system
- A unified and seamless management and operator interface throughout the hierarchy
- Flexible and comprehensive user and administrator rights with both global and local access
- Graphical overview of the entire surveillance installation via the Smart Map function
- Integrated support for standard product functionality such as Alarm management, XProtect Smart Wall, Bookmarks and Evidence lock.

Benefits of using Milestone Federated Architecture

Milestone Federated Architecture offers benefits in several areas:

1. Scalability
   - Milestone Federated Architecture allows surveillance system architects, designers, and integrators to design, implement and grow a large-scale surveillance system in manageable parts
   - Milestone Federated Architecture provides the flexibility to create, add and delete sites depending on:
     - Organizational structure
     - Network infrastructure
     - Usage
     - Security
     - Political or legal requirements
2. Manageability and user privileges
   - Users and administrators can be granted access to any combination of sites - from a single site to all sites in the federated hierarchy
   - Milestone Federated Architecture does not limit the accessibility and management features of the local XProtect Corporate and XProtect Expert sites
3. Network and Performance

- When designing the individual sites, the administrator does not have to consider the network and performance of the entire system but can focus on optimizing the design and network layout for just the site in question
- Connecting the site to the hierarchy only requires a network connection from the local site to the other sites
- Milestone Federated Architecture does not require any special features in the used network equipment. All traffic is by default standard TCP/IP unicast traffic

4. Server simplicity
   - Milestone Federated Architecture does not require extra servers on the individual sites to be part of a federated hierarchy, everything is included in the standard XProtect product servers

5. Redundancy and fault tolerance
   - Milestone Federated Architecture adds extra fault tolerance to XProtect Expert and XProtect Corporate by dividing the system into logical/physical sites that can operate independently of each other in case of failures
   - Local administrators and users can log in, view video, and manage their local site even when the network connection to the federated hierarchy is broken
   - If the connection to a site in the hierarchy is lost, it does not compromise access for global users to cameras on sites that are still online. Only cameras from the disconnected site will be unavailable
   - Standard methods for implementing network redundancy can be used to minimize the risk of losing network connection
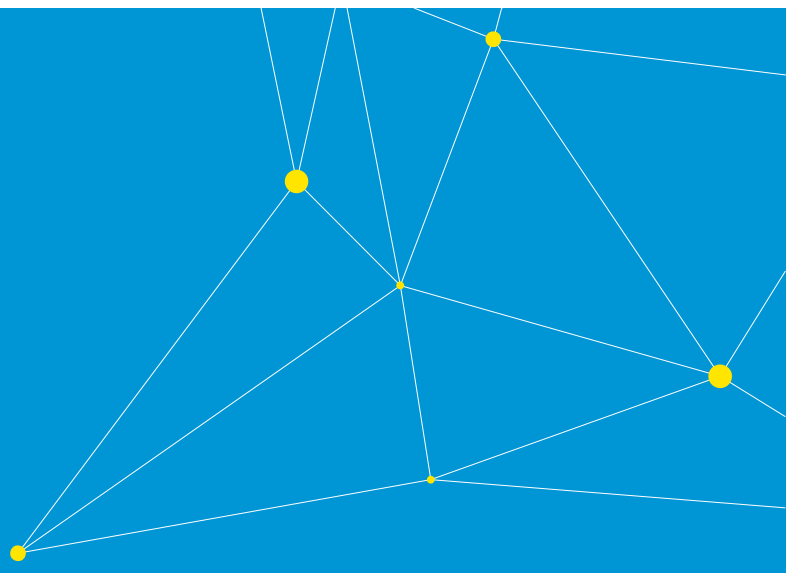
Milestone Systems is a leading provider of open platform video management software; technology that helps the world see how to ensure safety, protect assets and increase business efficiency. Milestone enables an open platform community that drives collaboration and innovation in the development and use of network video technology, with reliable and scalable solutions that are proven in more than 500,000 sites worldwide. Founded in 1998, Milestone is a stand-alone company in the Canon Group.