



The Open Platform Company

White paper

Milestone Federated Architecture™

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Date: June 22, 2015

Table of Contents

Introduction	3
Purpose and target audience	3
What system design should I choose?	4
When to use distributed recording servers?	4
When to use Milestone Federated Architecture	5
When to use Milestone Interconnect	6
Milestone Federated Architecture usage example	8
Corporation with regional and branch offices	8
Technical overview	9
Creating a Milestone Federated Architecture hierarchy	11
Network traffic between sites in the federated hierarchy	12
User Experience	13
Management Client	13
Smart Client	13
Milestone Federated Architecture Licensing	16
Get an overview of license usage across the federated architecture	16
Summary and benefits	17
Benefits of using Milestone Federated Architecture	17

Introduction

Milestone Federated Architecture is a technology that allows multiple individual XProtect Corporate and XProtect Expert systems to be connected in a parent/child hierarchy of federated sites, where XProtect Expert though only can be a child site.

Each individual site in the federated hierarchy is a standard XProtect Corporate or XProtect Expert system, complete with management server, SQL server, recording server(s), failover server(s), and a number of cameras.

When individual XProtect Corporate or XProtect Expert systems are added to form a federated hierarchy, the individual systems will appear as one large system to administrators and users accessing it from the hierarchy's top-node, while still being as manageable as independent systems.

Through the Milestone Federated Architecture, users will have access to video, audio and other resources across all the individual XProtect Corporate and XProtect Expert systems in the federated hierarchy based on their user rights in each individual system. In addition, administrators have the ability to centrally manage sites within 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 installations covering multiple buildings, campuses or sites. It provides large operations with unlimited scaling, flexibility and accessibility for more efficient, cost-effective video surveillance across multiple sites.

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 surveillance system by utilizing Milestone Federated Architecture.

Furthermore after reading this whitepaper, the reader should be able to choose where to use Distributed Recordings Servers, where to use Milestone Federated Architecture and where to use Milestone Interconnect.

We assume that the reader have a general understanding of Milestone XProtect Corporate and XProtect Expert and their Management Client, the XProtect Smart

Client, as well as a general understanding of network infrastructure and Microsoft Active Directory.

The primary audience for this white paper might include (but are not limited to) the following audiences:

- Surveillance system architects/designers
- Large-scale surveillance project consultants
- Companies, organizations, universities, and governments with large-scale surveillance projects/installations

What system design should I choose?

To set up a surveillance system distributed over several sites, it is possible to choose between different system designs. Each system design define what types of servers that are present in each site and how the sites are connected.

For distributed systems, it is possible to choose between three different system designs:

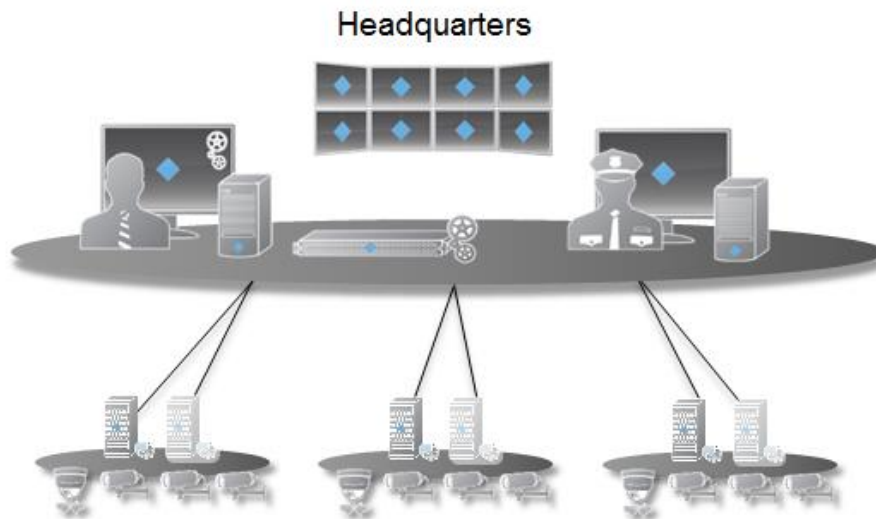
- Distributed recording servers
- Milestone Federated Architecture
- Milestone Interconnect

Which system designs to use is based on whether:

- All sites run on the same domain or different domains
- Local access is needed
- The quality and connectivity of the network connection between each site is good and stable or periodically unstable.

When to use distributed recording servers?

Distributed recording servers is a good choice, when a single system is distributed over multiple sites with no direct user access on any of the remote sites.



Branch offices running Recording Servers and optional Failover Recording Servers only

The management server is kept on the central site, but to ensure that all recordings are saved in case of network failure, each site has its own Recording Server and optionally a Failover Recording Server. During network failure it is not possible to log on to the remote sites, but when the network connection is restored, the recordings made during the network failure can be played back from the local recordings servers.

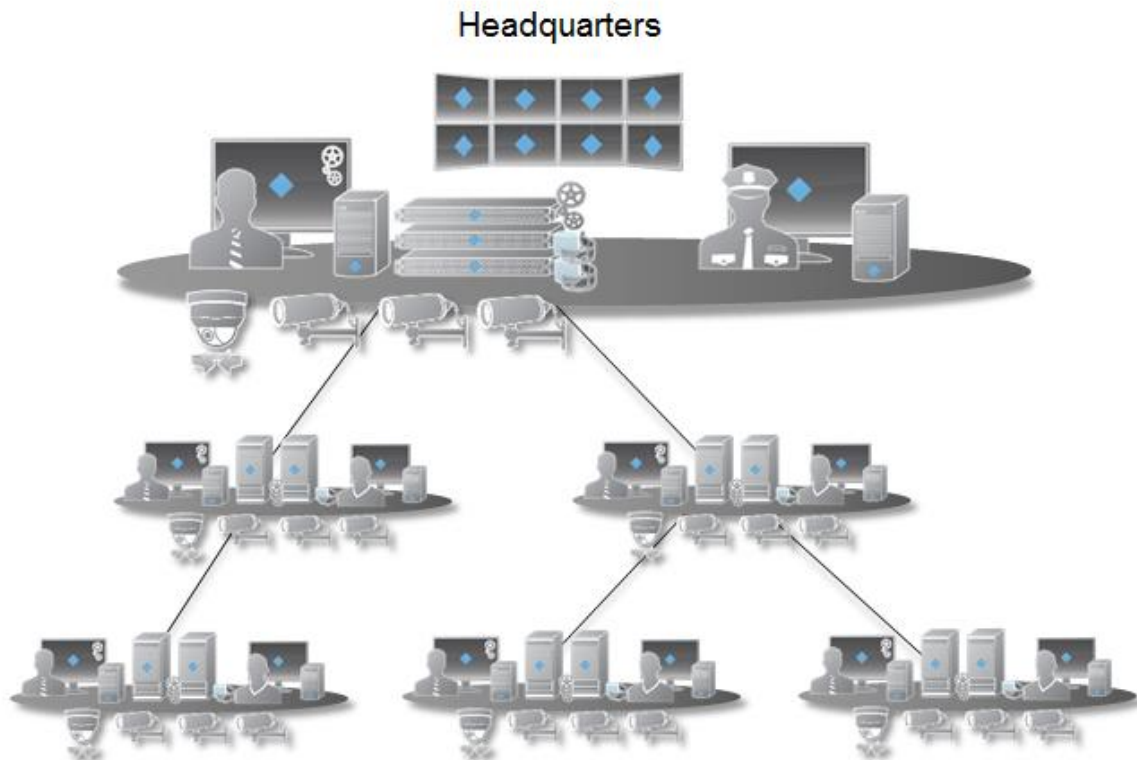
This system design is an excellent solution for a minor chain of banks or retail stores, where there is no need for monitoring the video cameras locally. All cameras are monitored from a central surveillance team placed at the central site, often the chain's head quarter.

In this solution, we have:

- A separate Recording Server and an optional Failover Recording Server on each site
- User access from the central site only
- Stable network connections between the central and each remote site

When to use Milestone Federated Architecture

If local users in each branch of a bank or retail chain in the distributed system need to access the system locally, a complete system should be installed on each local site. In this way, local security personnel can monitor live video and have access to stored recordings on the Recording Server at all times, including during periods where the network connection to the central site is down.



Regional and branch offices with Milestone XProtect Corporate or XProtect Expert

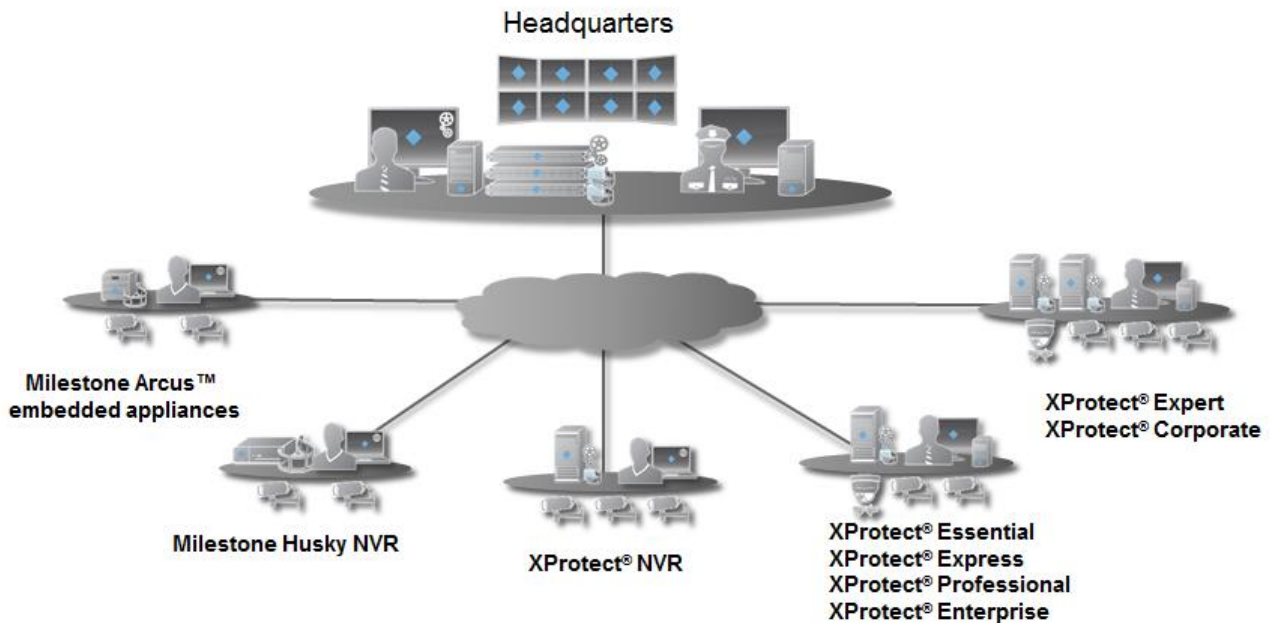
Each site can then be set up in a parent/child hierarchy with Milestone Federated Architecture. This enables the total system to be managed and monitored from the central parent system at the chain's head quarter as well as each local system is able to manage themselves and eventual child sites that are placed under them.

In this solution, we have:

- All sites on the same domain
- Each site running a complete XProtect Corporate or XProtect Expert system with their own servers
- Stable network connections between all sites

When to use Milestone Interconnect

Milestone Interconnect connect different types of Milestone systems on different domains to a centrally managed and distributed system where all or some of the network connections between the local systems are unstable or intermittent.



Branch offices with Milestone Arcus, Husky NVR and XProtect products

This could be the case, if:

- The system include mobile systems like busses with an installed surveillance system that only have network connections at stations or depots
- If a merger is made with another company that already use their own distributed Milestone surveillance system
- A Milestone partner wants to offer a system monitoring service towards multiple independent customers and their Milestone installations
- Connections to remote or small sites that use for instance Milestone Arcus™ or Milestone Husky™ is needed.

In this solution, we have:

- All or some sites running on different domains
- All sites run on a separate system, but not all sites use the same Milestone surveillance system
- Unstable or intermittent network connections are present at some or all local systems

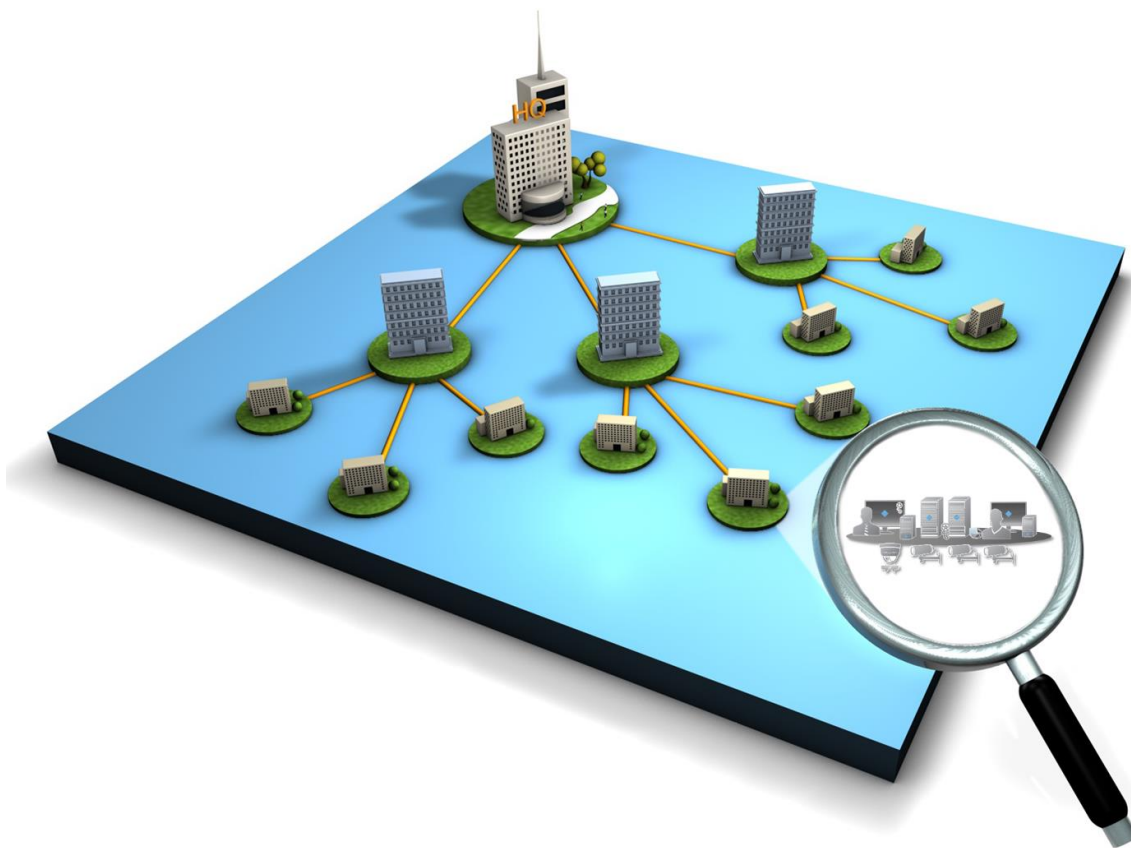
Read more about Milestone Interconnect in the [Milestone Interconnect whitepaper](#).

Milestone Federated Architecture usage example

As already mentioned Milestone Federated Architecture can be used to allow for scalability, centralized management, and seamless video sharing between geographically distributed sites within one large corporation or between installations belonging to different operational entities.

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 office to have operational control over their own surveillance installation.

Milestone Federated Architecture makes it possible to monitor and manage distributed surveillance systems centrally from headquarters or regional offices, but also enables

local management and monitoring – a key advantage whenever a site is temporarily offline from the corporate network. Milestone Federated Architecture also allows a corporation to house surveillance operations in separate premises for monitoring during off hours or to perform more advanced system administration from headquarters.

Milestone Federated Architecture offers surveillance system administrators the ability to configure the system so different entities or users can access different cameras depending on a defined schedule. For instance, an administrator might want to give surveillance guards access to outdoor cameras on sub-sites during working hours, but allow them to access all cameras during off hours. Another example is giving users on a local site access to cameras only during working hours.

Technical overview

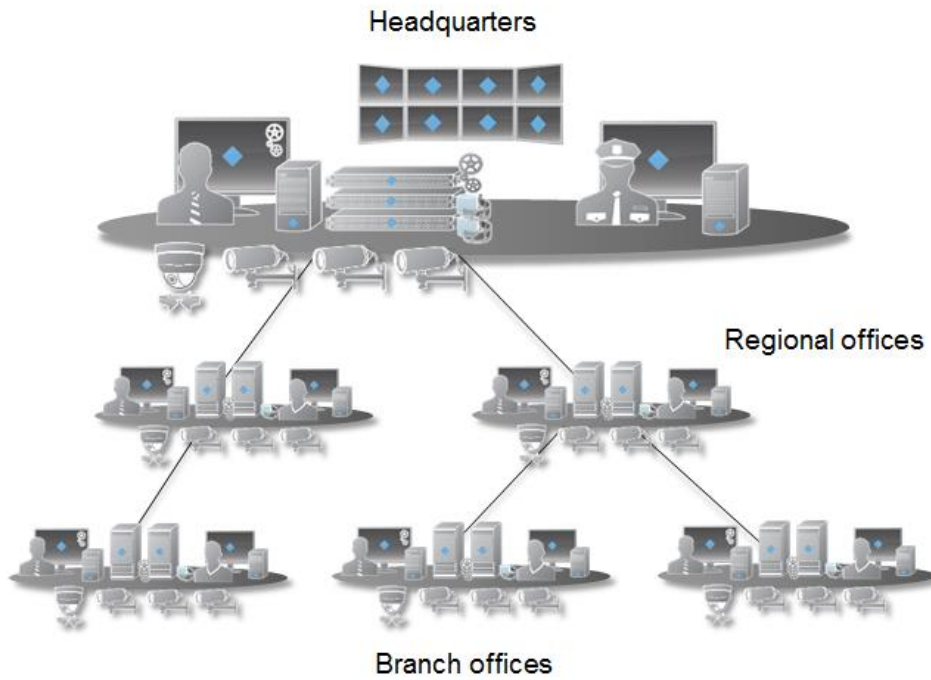
A Milestone Federated Architecture hierarchy consists of two or more independent XProtect Corporate and XProtect Expert systems that are linked together.

Each independent system functions as a complete stand-alone XProtect Corporate or XProtect Expert system with the following standard components:

- Management server
- SQL server
- Recording server(s) with hardware devices (cameras/encoders)
- Failover recording server(s)
- Event server
- Mobile Server
- Viewing and administration clients

Note: XProtect Expert only function as a child-site to an XProtect Corporate site, and can thus not have an underlying child-site attached to it.

In essence, each system in the federated hierarchy is installed and configured as a standard stand-alone XProtect Corporate or XProtect Expert system. This includes rules, time schedules, users and rights for administrators and users.



By connecting these independent XProtect Corporate or XProtect Expert systems, Milestone Federated Architecture allows users and administrators logged in on a federated system to access child sites and resources that are placed below the site they login to in the site hierarchy.

Access to the child sites further down in the hierarchy depends on what user rights the logged in user have on each of the child sites. If a user does not have a user account on the child site, the user will not have access to it.

Creating a Milestone Federated Architecture hierarchy

To create a Milestone Federated Architecture all sites should use the same version of a XProtect product. Also, beware, that available functionality depends on the systems being used.

As a prerequisite a Management Server should be installed on all sites, all sites should belong to the same domain, and the management service should run under the same Active Directory Account across all systems.

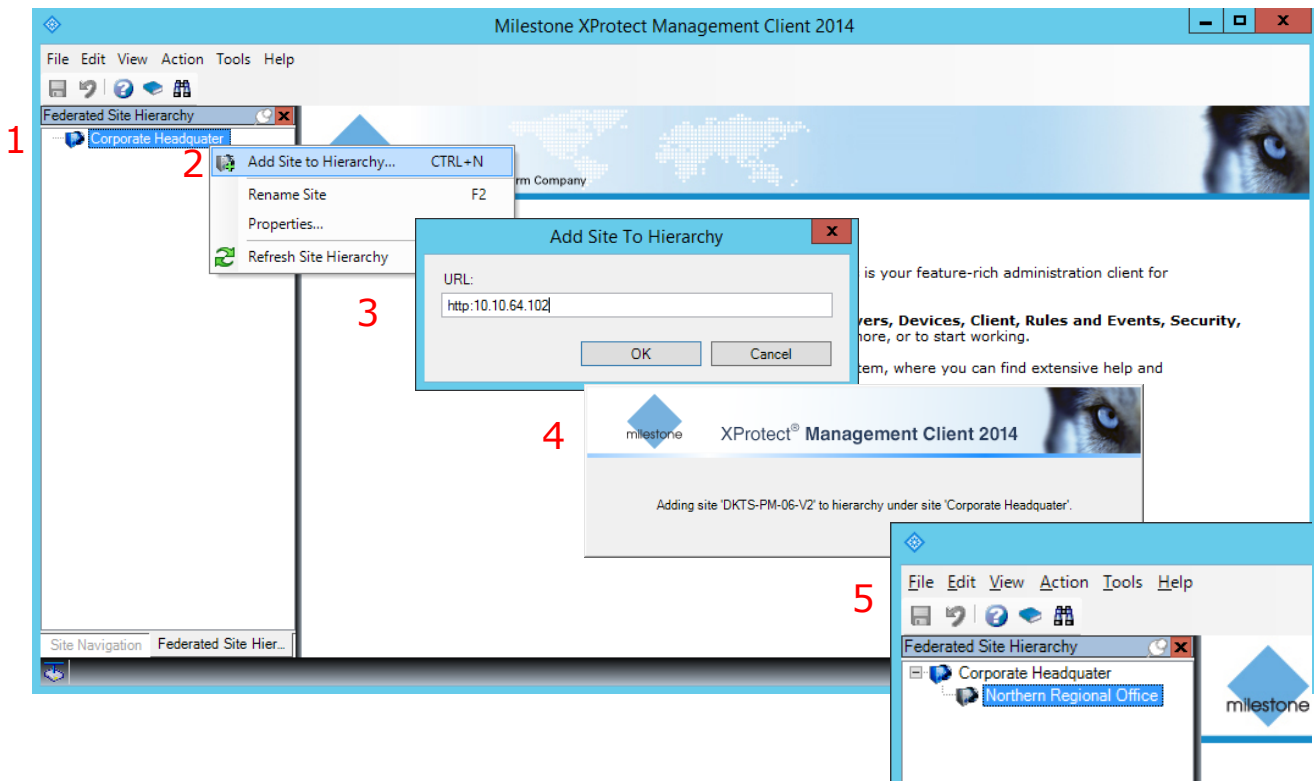
In cases where the sites are on different domains or the Management Server service does not run under the same account, please consult the manual for further information on how to set up the Milestone Federated Architecture or alternatively, use Milestone Interconnect instead.

How to create a Federated Architecture

Once the system sites are installed using the prerequisites, creating a Milestone Federated Architecture hierarchy is done simply by adding a sub-site to the current XProtect Corporate system. This is done using the XProtect Management Client:

1. Right-click the current server in the **Federated Site Hierarchy** pane to the utmost left side of the window.
2. Select **Add Site to Hierarchy** in the context menu
3. Enter the address of the new site and click the **OK** button
4. The Management Client will now connect to the site and add it to the hierarchy
5. Once added, the site will be listed in the tree view in the **Federated Site Hierarchy** pane indented under the parent server. The site is now ready to be used.

The screenshot below illustrate the described steps for adding a site to the federated hierarchy.



To administrate the different sites, the user need to be an administrator on both the system logged into and the child sites the user want to administrate. To administrate a child site simply click on the desired site in the hierarchy's tree view to connect the management client at the selected site. Once connected the configuration of the child site will be displayed in the **Site Navigation** pane.

Network traffic between sites in the federated hierarchy

A federated hierarchy will have a scheduled site configuration synchronization task running every 10 minutes, as well as every time a site is added or removed. This synchronization contains only site identity information data and each time will send less than 1 MB. In addition to the data sent during synchronization, video or configuration data will also be sent when a user or administrator views live or recorded video or configures the system. The amount of data in this case depends on what and how much video is being viewed.

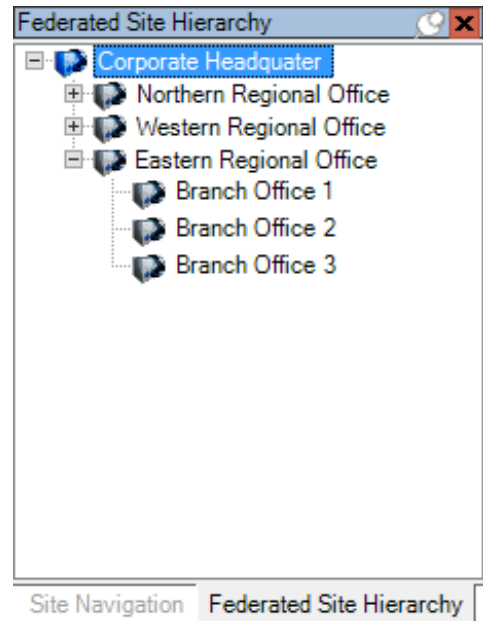
User Experience

Management Client

Milestone Federated Architecture gives administrators the experience of one big system with easy access to all sites with servers and devices in the hierarchy, but frees them from the challenges of managing everything in one extremely large system.

Administrators using the Management Client logged in on a Federated Architecture system will notice a new tab in the bottom of the **Navigation** pane, called **Federated Site Hierarchy**. This tab will display the site hierarchy as seen from the home site that the administrator is logged in to and further down in the hierarchy.

Administration of the different sites in the federated hierarchy is done by selecting the site in the hierarchy's tree view. The Management Client will then connect to the selected site and show the settings from it as if the user were logged in directly to the site. This is done without the administrator being presented with a new login dialog box - the credentials from the current login are re-used.

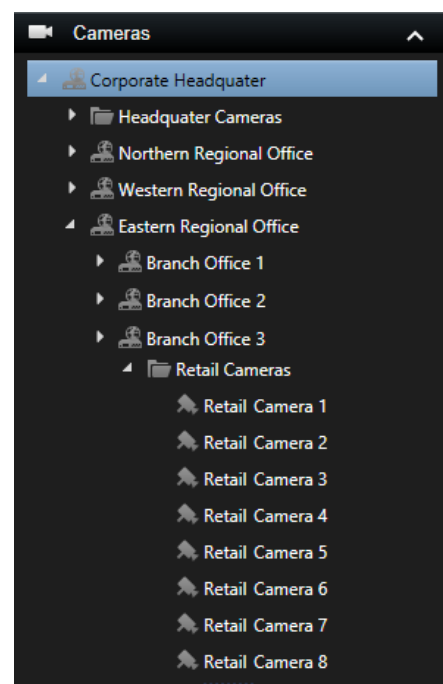


Smart Client

Smart Client users logged in on a Milestone Federated Architecture hierarchy will experience little difference from what they are used to seeing when logging in on a stand-alone system. The one notable difference will be the hierarchy tree view in dialog boxes and panes where resources can be picked or used. (See the depicted example of the **Cameras** pane from the Smart Client).

Views in federated hierarchy

When creating views, it is possible to mix cameras and other view items from different sites in the hierarchy in the same view. Just as in stand-alone systems, the views will be stored on the site where the user is logged in. Only views available on the site from which the user



is currently logged in can be accessed. Views created on other sites in the hierarchy will not be accessible.

Once views have been configured for users, they will not experience any changes compared to accessing views and cameras on a stand-alone system. The system will appear to them just as one large system.

Evidence lock

With the evidence lock feature, recordings can be write protected by overruling the local systems retention policy. This prevents evidence recordings from being deleted because of local retention policies.

The evidence lock on a child site is created in the same way as on the system the user are logged into as the feature works seamlessly across multiple sites. In case the evidence lock contains cameras distributed across multiple sites there will be created an evidence lock per site the user have included cameras from.

Milestone interconnected cameras

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

Maps

Integration of the 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 event server installed and maps defined. It is then possible to link the maps from the different sites together by using 'hot zones'.

Instead of linking to a sub-map stored on the parent site, the map will link to a map on a child site. In other words, selecting such a hot zone in the Smart Client will redirect the client to connect to the child site's event server and show the map. This gives the user the experience of one big, integrated system.

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

Bookmarks

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 it does on a stand-alone system.

Similarly, access to adding, deleting, editing and viewing the bookmarks is dependent on user rights per camera in the different sites.

Alarm Manager

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

The Smart Client has a dedicated **Alarm Manager** tab in which alarms across all sites in the entire Milestone Federated Architecture hierarchy is listed. In extension to viewing alarms from all sites in the hierarchy it is also possible to view alarms from a specific site only, simply by selecting the site in the Alarm Manager's site tree view.

Smart Wall

Integration and user control of the Milestone Smart Wall is fully supported in Milestone Federated Architecture with the addition of the following requirements:

- The Smart Wall to view and control must be installed on the same site where the users controlling it are logging in.
- The user account used when logging in on the Smart Client powering the Smart Wall monitors must have sufficient user rights on all sub-sites in the hierarchy in order to display live images from the cameras.

With sufficient administrative rights on the child sites, the user can add any camera from the child sites in the federated architecture to the smart wall situated at the site, where the user logged in.

Milestone Federated Architecture Licensing

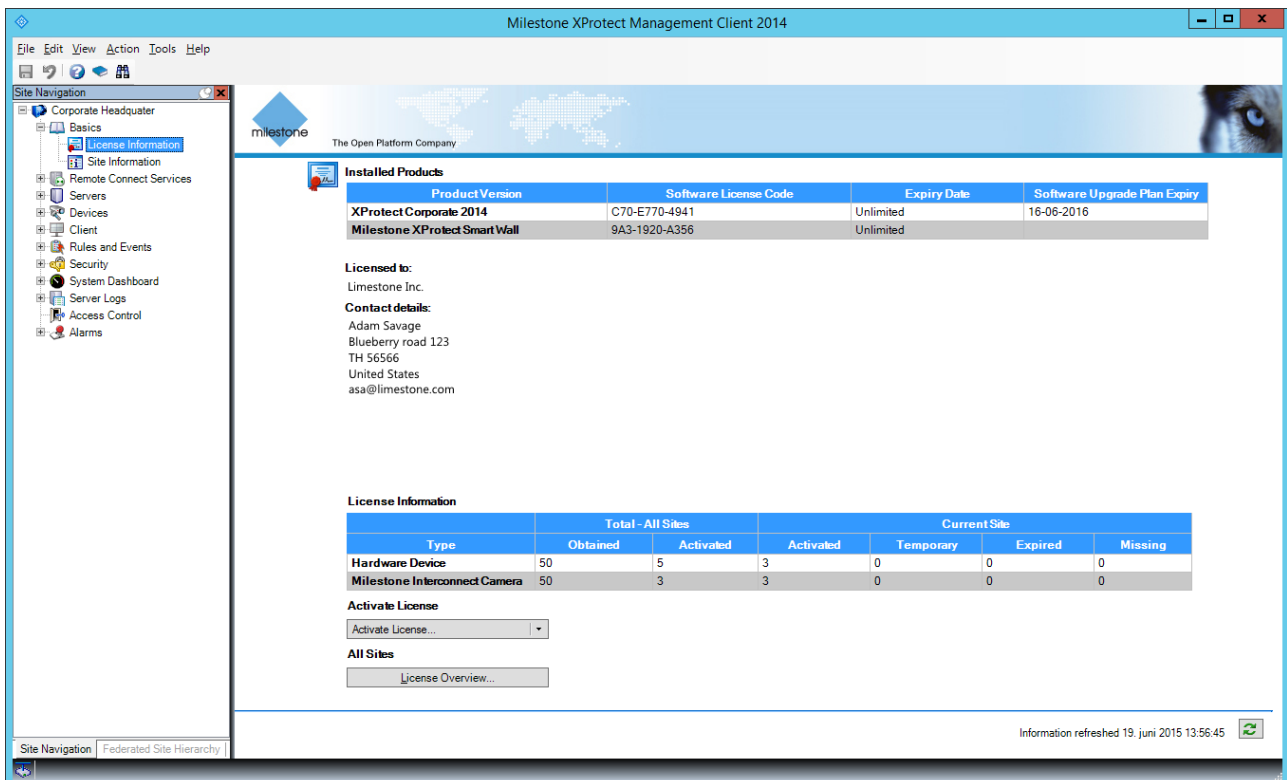
Milestone Federated Architecture is free to use and does not need any specific license to be used even for deployments across systems owned by different legal entities.

Earlier it was free to use within the same legal entity, but separate licenses for each connected legal entity had to be obtained. This is no longer needed.

Get an overview of license usage across the federated architecture

From the **License information** page in the Management Client it is possible to get an overview of the licenses used on the same Software License Code across the sites in the federated architecture.

Just click **License Information** in the **Site Navigation** pane.



The screenshot shows the Milestone XProtect Management Client 2014 interface. The 'Site Navigation' pane on the left is expanded to 'License Information'. The main content area displays the following information:

Installed Products

Product Version	Software License Code	Expiry Date	Software Upgrade Plan Expiry
XProtect Corporate 2014	C70-E770-4941	Unlimited	16-06-2016
Milestone XProtect Smart Wall	9A3-1920-A356	Unlimited	

Licensed to:
Limestone Inc.

Contact details:
Adam Savage
Blueberry road 123
TH 56566
United States
asa@limestone.com

License Information

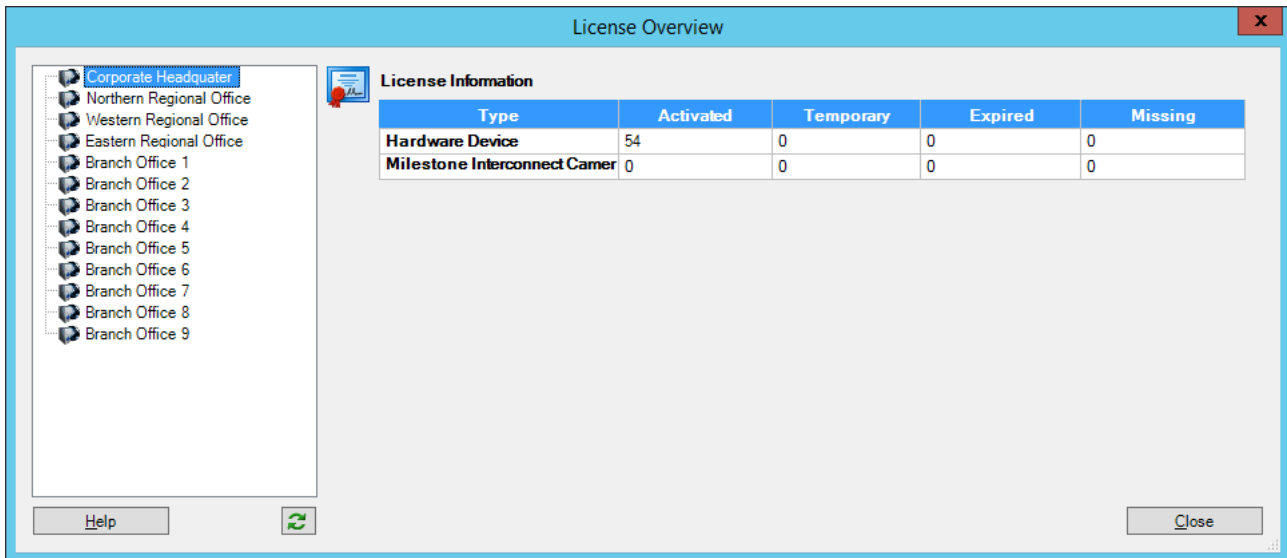
Type	Total - All Sites		Current Site			
	Obtained	Activated	Activated	Temporary	Expired	Missing
Hardware Device	50	5	3	0	0	0
Milestone Interconnect Camera	50	3	3	0	0	0

Activate License
Activate License... [v]

All Sites
License Overview...

Information refreshed 19. juni 2015 13:56:45

At the bottom of the License page, click the **License Overview** button to open a dialog. Here it is possible to browse through all the connected sites in the federated architecture and get a complete overview of all licenses used on each of the sites in the hierarchy.



Summary and benefits

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

Key features of Milestone Federated Architecture are:

- Versatile architecture with unlimited scalability and operational flexibility
- Easy deployment and management with very few steps to add sites to the hierarchy
- The ability to bring geographically dispersed installations into one centrally managed system
- A unified and seamless management and operator interface throughout the hierarchy
- Flexible user and administrator rights with both global and local access
- Graphical overview of the entire surveillance installation via the map function
- Integrated alarm management

Benefits of using Milestone Federated Architecture

Milestone Federated Architecture offers benefits in a number of 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 to all systems in the federated hierarchy.
 - Milestone Federated Architecture does not limit the accessibility and management features of the local XProtect Expert and XProtect Corporate systems.
 3. Performance
 - Each system in the hierarchy needs a network connection to the rest of the hierarchy through a firewall or a router with Network Address Translation (NAT).
 - When designing the local system, the designer does not have to consider that the system is part of a large, complex network.
 4. Server and network simplicity
 - Milestone Federated Architecture does not require extra servers on each federated site for the site to be part of the federated hierarchy.
 - Milestone Federated Architecture does not require any special features in the used network equipment. All traffic are by default standard TCP/IP unicast traffic.
 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.
 - Local administrators and users can log in, view video, and manage the 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.



The Open Platform Company

About Milestone Systems

Founded in 1998, Milestone Systems is the global industry leader in open platform IP video management software. The XProtect platform delivers powerful surveillance that is easy to manage, reliable and proven in thousands of customer installations around the world. With support for the widest choice in network hardware and integration with other systems, XProtect provides best-in-class solutions to video enable organizations – managing risks, protecting people and assets, optimizing processes and reducing costs. Milestone software is sold through authorized and certified partners. For more information, visit www.milestonesys.com

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