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Milestone Systems

XProtect® MIP SDK Application Catalog

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Contents

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Scope for this document

Milestone Integration Platform (MIP) enables fast and flexible integration between Milestone XProtect Video Management Software and other third-party applications. The MIP Software Development Kit (SDK) allows system developers to video-enable applications and security systems fast and easily.

The Software Development Kit for the Milestone Integration Platform includes a suite of Protocols, Components and Plug-ins for integration of various software and applications.

The document is intended as a combination of inspiration and a catalog of possible solutions when you develop an integration. The document describes the scenario that could be the background for implementing a solution, as well as the prerequisites and what you need to implement the required solution.

Introduction to Milestone Integration Platform Software Development Kit (MIP SDK)

Welcome to the MIP SDK documentation – your entrance to the Milestone Integration Platform Software Development Kit (MIP SDK). The MIP SDK helps you find inspiration and solutions for your specific development task.

A MIP plug-in is able to execute in a number of Milestone products, making it easy to support multiple products with a single developed plug-in. For example, the MIP Environment lets developers:

- Add simple ways of system control, for example for handling devices with PTZ, events, and outputs

- Store Milestone Solution Partner-developed configurations

- Share Milestone Solution Partner configurations between applications

- Assign identical administrator look and feel for both XProtect Enterprise and XProtect Corporate

- Add specific user controls to the Live, Playback, and Setup tabs in the Smart Client

- Add customized options menu configuration for common parameters, for example for using private and shared views between all users

- Make customized graphics overlays superimposed on live or recorded video, for example for video content analysis (analytics) applications

- Access recorded images for post-processing management
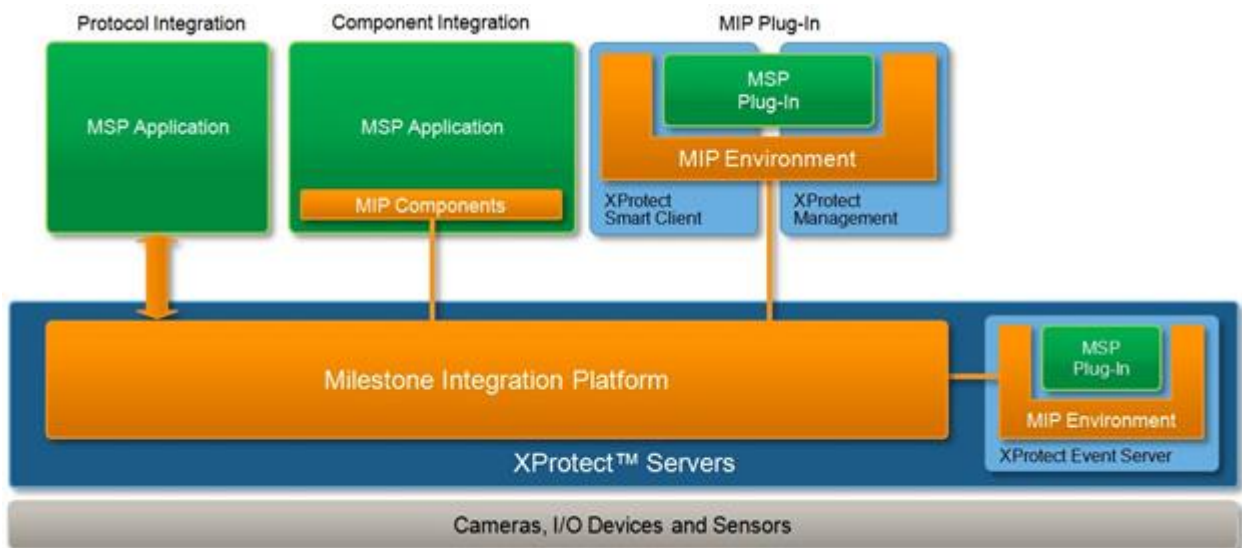
The MIP SDK operates with three ways of integration, which is reflected in the menu structure of the MIP SDK:

- **Protocol Integration** - Useful when you want to write code for any platform that addresses the Milestone network protocols directly.

- **Component Integration** - Useful when you want to link your Windows-based application to libraries from Milestone.

- **MIP Plug-in** - Useful when you want to create a MIP plug-in to embed your C# code in a Milestone application.

Protocol integration

When a Milestone Solution Partner (MSP) application executes on a non-Microsoft operating system, or is developed by using another non .NET supported language, you can access Milestone configuration, get live or recorded video, send control commands, and events to the Milestone server.

The following protocols are available:

- Server Command SOAP Protocol – for login and configuration access

- Recorder Command SOAP Protocol – for device control

- Image Server XML Protocol – for device control

- Image Server TCP/IP Raw Protocol – for access to live and recorded video

- Central Protocol for retrieving live updates regarding status changes and events from XProtect Enterprise and XProtect Professional systems

- Status Protocol for retrieving live updates regarding status changes and events from XProtect Corporate systems

- Analytics and MAD Event protocol for generating new events

MSP Application

- Can run under any operating system

- Can be implemented in any language

Component integration

When you develop the end-user application outside Milestone applications and use the MIP components to interact with the Milestone servers.

The components enable an application to:

- Display live and recorded video

- Send events to the Milestone system

- Issue control commands to the Milestone system or related devices, e.g. camera with PTZ and outputs

- Access Milestone configuration

Get live and recorded video streams The following components are available:

- ImageViewer ActiveX
- AudioPlayer ActiveX
- EngineManager ActiveX
- DirectShow filter
- MIP .NET Library
- Media Toolkit for C++ and C# applications

The ImageViewer activeX takes all the work out of setting up communication with the server because it decodes all supported codecs and the display of the video. Each ImageViewer ActiveX handles one video stream.

The AudioPlayer activeX takes all the work out of setting up communication with server because it decodes all supported codecs and plays the audio on the client PC. Each audioPlayer supports one audio stream.

The EngineManager activeX assists in getting the base configuration and it performs the login process on the servers. It is often used for HTML based applications.

MSP application

- Could be IE HTML page
- Could be any Microsoft-based application

ActiveX (Milestone)

- ImageViewerActiveX
- EngineManagerActiveX
- AudioPlayerActiveX

DirectShow

- DirectShow filter for video access

.NET Library

- Access to Milestone server configuration
- Control commands
- Event triggering

Milestone Media Toolkit

- Access via both C++ and C#
- Able to retrieve from Imageserver, exported database and arcus servers
- Can specify resize, format, transcoding and more
- Possible to store result as new database, transcode to JPEG, or as RGB

MIP plug-in

When you integrate using MIP Plug-ins, you can utilize the Milestone administration tools, XProtect Event Server and XProtect Smart Client to host your application. This allows improved ease of use and help towards a common look and feel for the end user, while providing a single user interface for the operator.

A MIP plug-in can execute in a number of Milestone products. This makes it easy to support multiple products with a single developed plug-in.

The MIP Environment supports:

- An easy and more detailed access to configuration

- A simple way to control a system, e.g. devices with PTZ, events and outputs

- A possibility to store MSP developed configurations

- A Possibility to share MSP configuration between applications

- The same administrator look and feel for both XProtect Enterprise and XProtect Corporate

- A possibility to add specific user controls to XProtect Smart Client side panels:

    - Live panel

    - Playback panel

    - Setup panel

- A possibility to add options menu configuration for common parameter setup:

    - User private

    - Shared between all users

- A possibility to make graphics overlay on top of live or recorded video, e.g. for analytics

- An easy access to recorded images for post processing management

MIP enabled Applications

- XProtect Smart Client

- XProtect Enterprise/Professional/Express administrator

- XProtect Corporate/Expert management client

- XProtect Event Server

MIP Environment

- Unifies the environment for the MIP Plug-ins

MIP Plug-in

Plug-ins developed MSP's **Note:** MIP Environment is enabled on Microsoft C#.   **Note:** Media Toolkit can be used for both C# and C++

Solution catalog scenarios

This section lists a number of scenarios. The scenarios are meant as an inspiration for you when you consider the integrations that you would like to develop with a Milestone VMS. Each scenario sets the scene for one proposed solution and for what you want to achieve with this solution. It then outlines the prerequisites for the scenario, and includes an illustration with more detailed notes about the technical requirements.

Alarm and monitoring system

You want your system to provide an overview and to monitor a set of Milestone installations.

Prerequisites

You have an existing alarm and monitoring system.

Proposed Solution

The development effort focuses on the operational status of the Milestone servers and cameras. It includes video content alarms and it includes management of video analytics alarms.
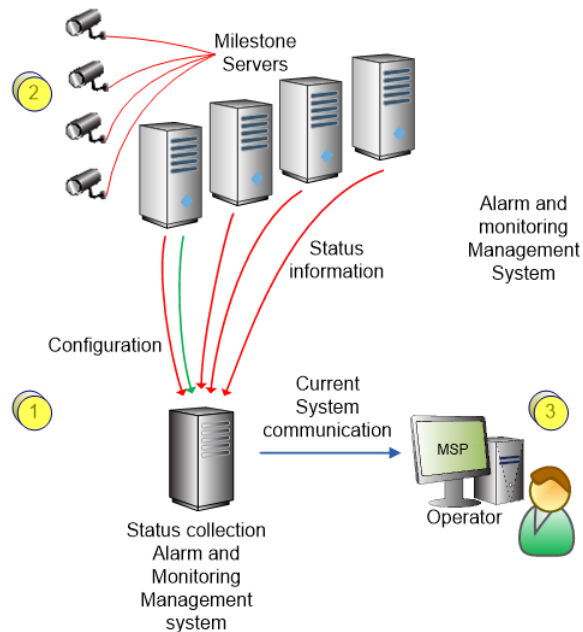
Alarm Management System (1)

- As an add-on to this system, the Milestone status and central protocols must be implemented.

- The red lines indicate that status information is sent from Milestone servers regarding the servers and attached devices (cameras) to the alarm management system.

- Events must also be sent in this flow, supporting dry contacts or the result of rule configured alerts.

Milestone Servers (2)

- A set of Milestone servers that needs to be monitored. No further development done here.

Operator User Interface (3)

- The operator continues to use well-known user interface. Video Content management can be added, but is not required.

Alternative user interface application

You can create an alternative user interface that your operators can use. This is relevant if you:

- Are on a non-Windows platform.

- Would like a browser-based application.

- Would like your own design and layout.

- Want to fine tune the interface to suit your particular needs.

Prerequisites

Your operators have access to a non-Milestone client.

Proposed Solution

You can develop an end-user application as an alternative to the Milestone XProtect Smart Client. You can do this by utilizing a set of Milestone protocols. You can choose for this application to use some of the MIP components that encapsulate the protocols or you can access the protocols directly.

The main protocols you need are:

- The Image Server protocol.

- The Server Command protocol, and

- The Recorder Command Protocol.

If you also require status and monitoring, you should include the Status and Central protocol.
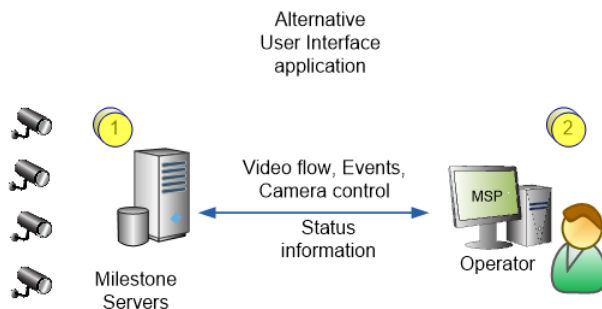
Milestone Server (1)

- No development is required here.

Operator Application (2)

- The entire application needs to be developed, and Milestone components may or may not be used. If this application is running on a Linux operating system, the activeX components cannot be used, but for Windows-based application some of the activeX's and other components may be relevant and can be used.

# Adding video content to an existing application

You have an existing system with a well-known user interface and you want to add video for further clarification, identification or documentation of incidents. This system could be a HTML based client for access control management, a retail statistics application written C++ or a transportation overview and status application.

Prerequisites

You have an existing system where operators are handling events and alarms.

Proposed Solution

Expand this application with video content to the user interface.
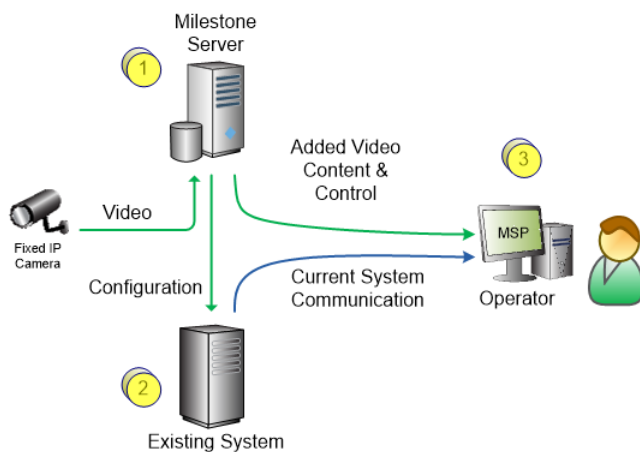
Milestone Server (1)

- No further development.

Existing System (2)

- The Milestone configuration is retrieved, and an application that can link between cameras and existing system devices must be developed.

- A method for sending relevant camera id's to the client is developed.

Operator Interface (3)

- The operator application must be developed to embed the Milestone ImageViewer activeX at the relevant place or in a pop-up window when you press an icon. The application gets relevant Milestone server and camera IDs from existing server and video content directly from the Milestone Server.

# XProtect Smart Client enhancement

You want to add user controls that enhance usability and ease workflow to the XProtect Smart Client.

Prerequisites

You are using the XProtect Smart Client.

Proposed Solution

Add enhancements to the XProtect Smart Client in the form of user control: the ability to select cameras, send commands or simply to add view items with buttons.
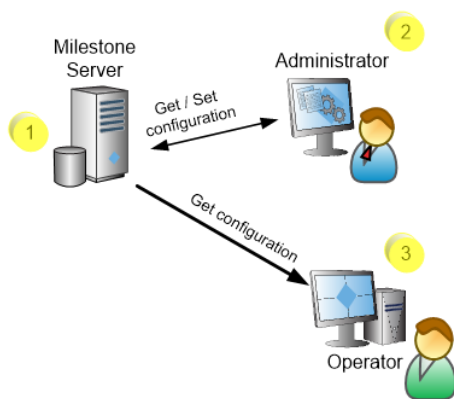
Sample

- ServerSideCarrousel, VideoReplay, InstantExport, DynamicView, RGBVideoEnhancement

Milestone Server (1)

- No Plug-in development on the server side.

Administrator (2)

- Optional plug-in development to set up common ways of doing presentations. Could be common information that needs to be configured for all XProtect Smart Clients, or a configuration that only an administrator should set up.

Smart Client (3)

- Plug-in development required for a ViewItem to create a user control, side panel, or overlay function.
- Could also be a video enhancement plug-in like de-warp application for fish-eye cameras (RGBVideoEnhancement sample)

Screenshots

XProtect Smart Client extensions shown in this example:

- Side panel to ease workflow

- Overlay to existing video

- View Items with specific functionality

- Add new print reports to the XProtect Smart Client

Analytics integration with own server

You have an analytics solution with cameras that send metadata to your server for storage and you want to overlay this metadata on live video in the XProtect Smart Client. (Please also check the Metadata Provider description later in this document).

Prerequisites

You have cameras that are capable of sending metadata to the server.

Proposed Solution

Implement an analytics integration where the camera provides metadata, and the analytics rules are based on this metadata.
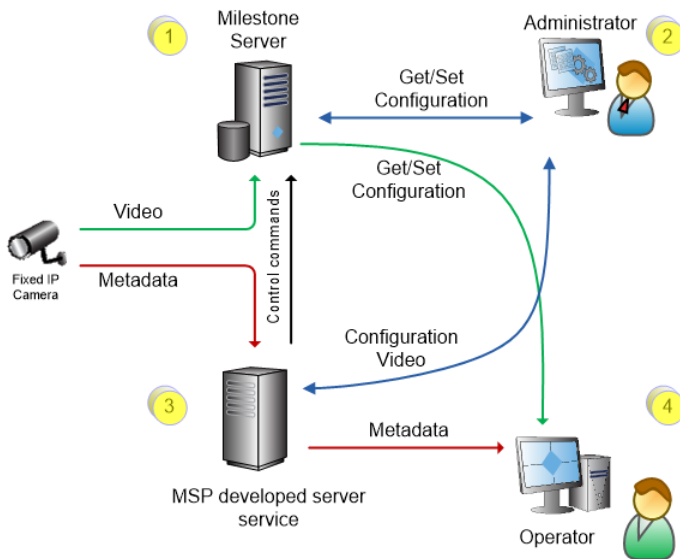
Milestone Server (1)

- No plug-in development required on the server.

- Some configuration stored here to understand how to contact the server at 3).

Administrator (2)

- Plug-in development required for selecting the cameras and passing on relevant connect information to the server at 3) – for example IP address and camera model.

### MSP Developed server service (3)

- Use configuration stored from 2) to connect to camera and to retrieve metadata.

- May use the MIP SDK to send control events to 1), for example "Start Recording".

XProtect Smart Client (4)

- Get configuration from 1), to connect to server at 3), and understand relationship between camera and analytics data.

- Plug-in development required for a ViewItem to create an overlay add-on that can show meta data on top of video, and/or make a list of events/alarms.

Screenshots

Screenshots
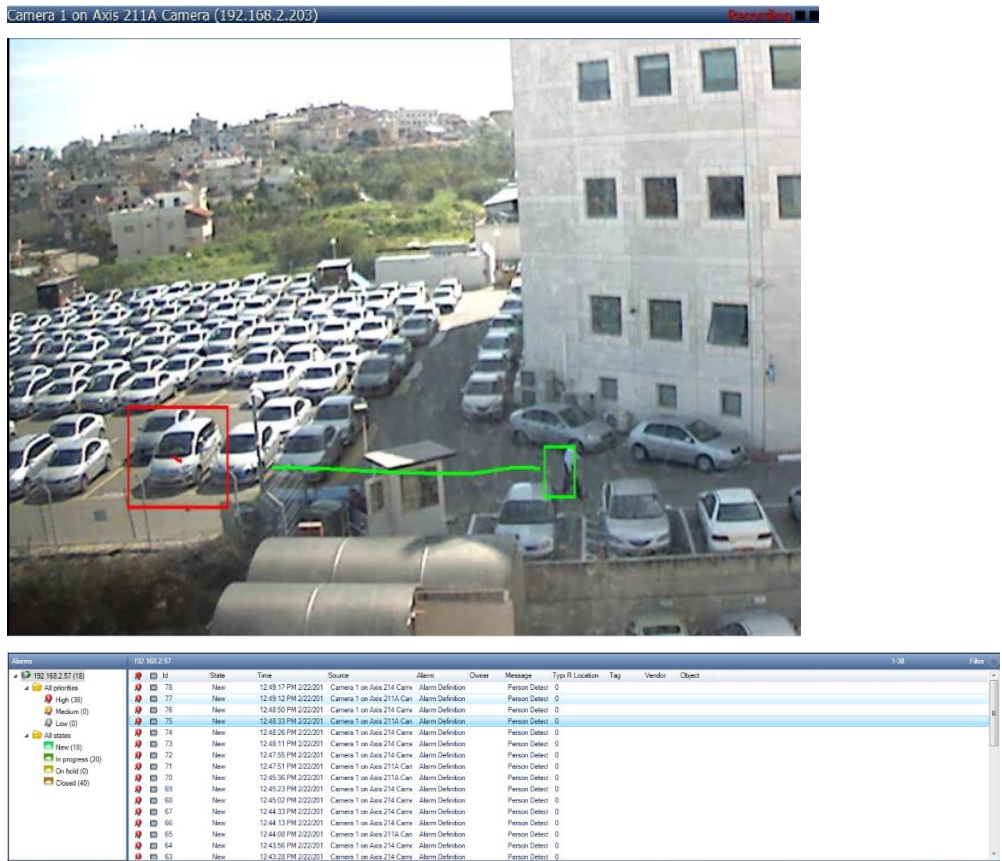
- Analytics from own server and with video from our ImageServer
- Vide can be retrieved via DirectShow, Media Toolkit or protocol integration

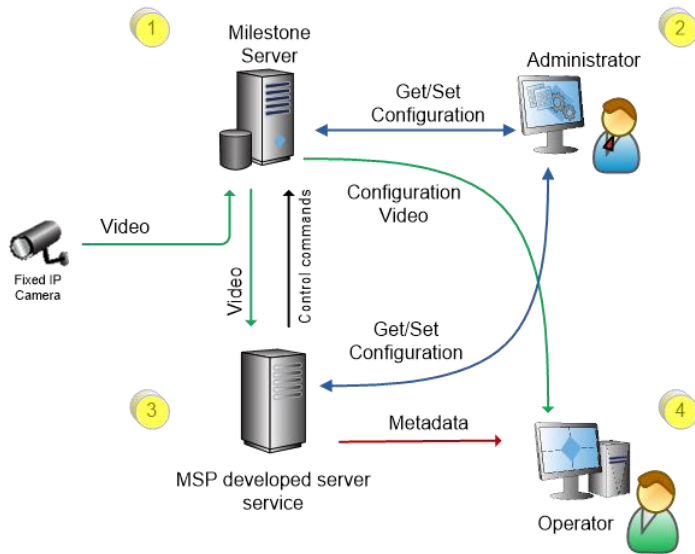# Analytics integration with own server and video from image server

You want to process video from a variety of camera manufacturers in one protocol.

Prerequisites

You are developing video analytics.

Proposed Solution

This solution lets you use one protocol to manage several cameras and lets you focus on developing analytics technology.

Milestone Server (1)

- No Plug-in development required on the server.

- Some configuration stored here to understand how to contact the server at 3).

Administrator (2)

- Plug-in development required for selecting the cameras and passing on server 3) address to the XProtect Smart Client plug-ins.

MSP developed server service (3)

- Use configuration stored from 2) to connect to ImageServer and retrieve live or recorded video.

- May use the MIP SDK to send control events to 1), for example "Start Recording".

XProtect Smart Client (4)

- Get configuration from 1), to connect to server at 3) and understand relationship between camera and analytics data.

- Plug-in development required for a ViewItem to create a ViewItem that can show meta data on top of video, and/or make a list of events/alarms. Could also show metadata on top of existing camera view item.

# Analytics integration with XProtect Event Server

You want to send events to Milestone VMS in MAD format for alarm generation and further management, and you want to provide metadata for overlay display on video that is displayed in the XProtect Smart Client.

Prerequisites

You have a Milestone ImageServer.

Proposed Solution

Integrate by using Media Toolkit, DirectShow filter or connect directly to the Image Server API. The analytics events data is sent to XProtect Event server for storage and alarm management.
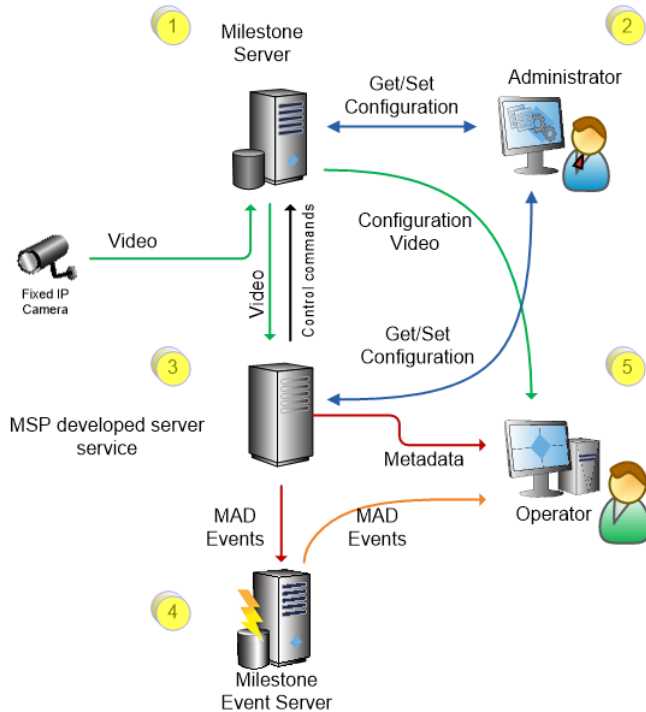
Milestone Server (1)

- No plug-in development is required on the server.

- Address information stored on 1) for how to connect to 3).

Administrator (2)

- Plug-in development required for selecting the cameras and passing on to server 3).

MSP Developed server (3)

- Retrieving video from the Milestone ImageServer via Media Toolkit, DirectShow filter or direct TCP/IP connection to the Milestone ImageServer. Analytics results are sent to the XProtect Event server via MIP SDK used on server 3).

Milestone XProtect Analytics (4)

- Milestone XProtect Event server stores MAD alerts. No plug-in development required here. Alarm rule and management as for all other events.

XProtect Smart Client (5)

- No plug-in development required here because the standard plug-in for alarm management is used to display analytics alarms.

Screenshots

Configuration within XProtect Management Client

Disk management integration

You want to fine-tune the disk management system and therefore you want to understand the Milestone VMS disk requirements and usage.

Prerequisites

You are developing disk storage systems.

Proposed Solution

Use the Milestone VMS Management Client/Administrator to get detailed information about configuration and usage.
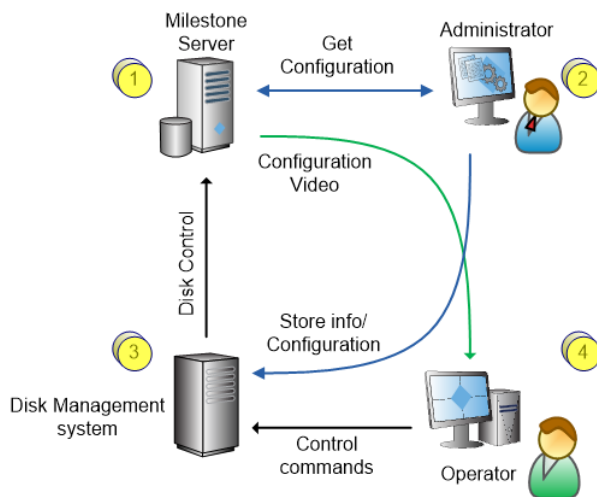
Milestone Server (1)

- No plug-in development is required on the server.

Administrator (2)

- You need plug-in development to get the disk-size information out of the Milestone configuration. You can pick folder paths, camera lists, frame rate and resolution from the configuration and store it on the 3) Disk management system, or on the Milestone server for the specific plug-in. As an example, the plug-in's own configuration contains a copy of relevant parameters.

Disk Management System (3)

- You can either fetch the configuration items from the Milestone system via the MIP SDK when it's stored as a specific plug-in configuration, or you can have it sent when the administrator application is running.

XProtect Smart Client (4)

- No plug-in development required here, unless the disk management system can display status or some overview relevant for the operators.

Access Control Module (ACM) integration

You have a non-Milestone access control system that cannot be modified and you want to integrate events and alarms coming from this system to the Milestone system using the Milestone Access Control Module.

Prerequisites

You have a non-Milestone access control system and a Milestone Server.

Proposed Solution

In this drawing we assume that the integration is done within the Milestone Event Server, using the ACM (Access Control Module).   The plug-in is only running in the Event Server and provides connection for the access control system into Milestone VMS.
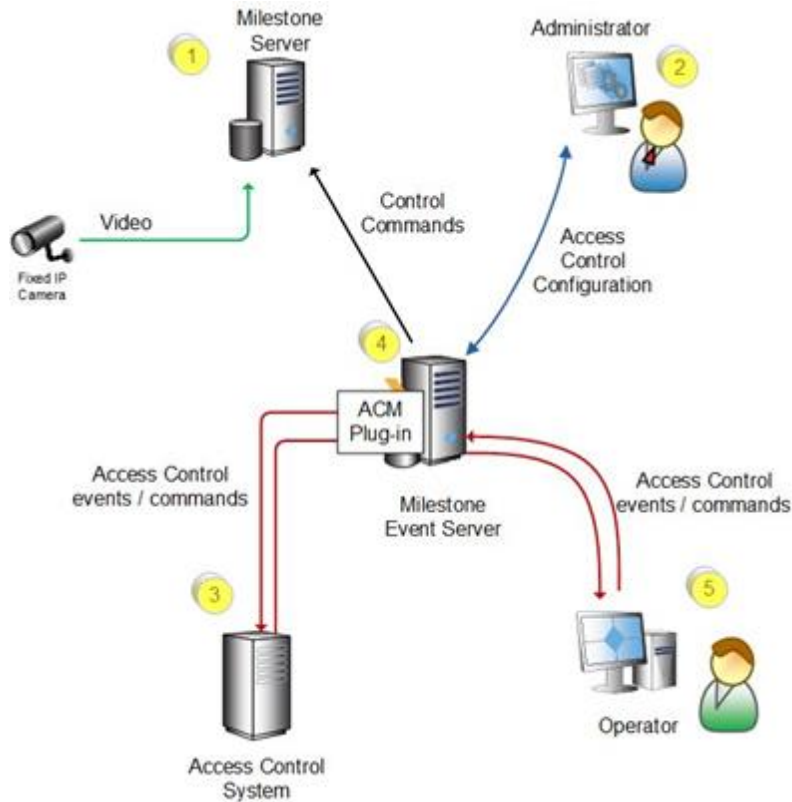
Milestone Server (1)

- No Plug-in development is required on the server.

Administrator (2)

- No plug-in development is required for the administrator.
- The ACM translates definitions in the plug-in (running in the Event Server) to user interface (in the Management Client)

Existing Access control system (3)

- No plug-in development done here.

XProtect Event Server (4)

- The ACM loads and executes the plug-in you develop. This plug-in owns the communication between the access control system and Milestone ACM. The ACM owns further communication to management client, Smart Clients, event and alarm handling.

XProtect Smart Client (5)

- No plug-in development is required

- Screen shots below show some of the built-in user interface coming with ACM.

Screenshots

- Access Control events in a scrolling panel using playback on click feature

- Access Request fly-out – showing video, commands and states related to the access control system.

- Access control event overview and event details with preview
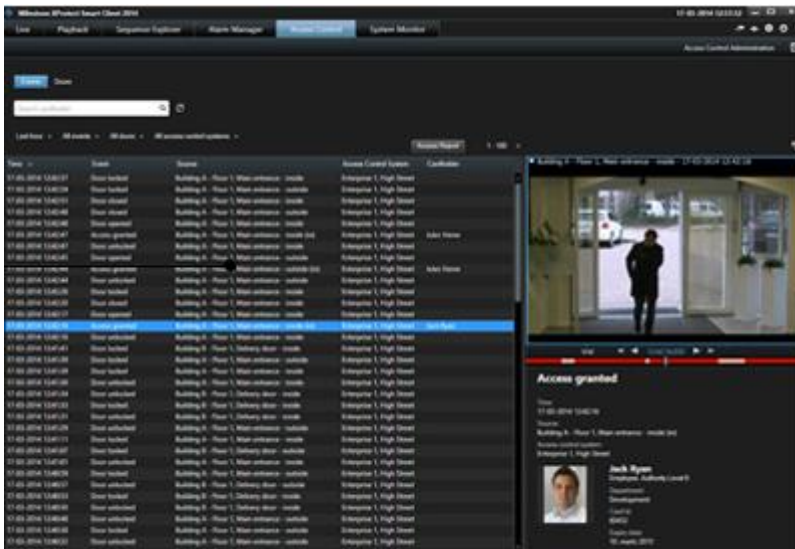
Matrix wall notification

You want to add notifications and display video based on events generated by Milestone.

You can use the matrix command feature in the Milestone VMS to push notification to a matrix server without delay. You can do this when you must react immediately on a given event.

The matrix command contains a reference to a camera.

The sender of the matrix command can for example be a MIP plug-in that runs in the XProtect Event Server and that lets the VMS system forward the command to the destination that the end-user has defined.

Prerequisites

You have your own application and want to receive notifications on particular video events.

Proposed Solution

Implement a VMS Matrix server service in the current MSP application to receive matrix events and start showing live video.
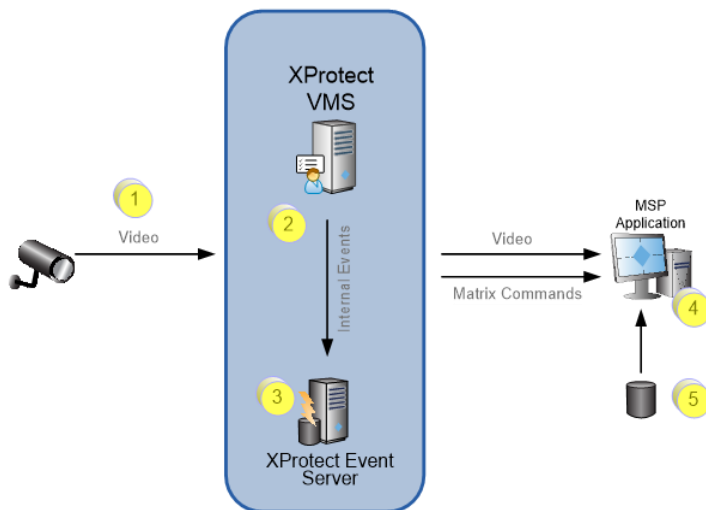
Cameras (1)

- Live video that comes from the associated cameras.

VMS (2)

- Configure rules to trigger designated commands or alarms.

MSP-plugin (3)

- An MSP-plugin that runs within the Event Server digests the events, alarms, and other actions and uses it to create and issue Matrix commands.

Existing MSP client application (4)

- The application listens for matrix commands that come from the VMS system, and handles the commands as appropriate. It can for example start showing live video. MIP components can be used to display the video. Some configuration development on the matrix-server may be required for the MSP client application.

External database (5)

- An external database contains the relevant information to be displayed together with the live video.

Metadata provider

You would like to provide metadata that relates to cameras.

You have information from a non-video source that still relates to one or more cameras.

It could be GPS position of a truck with multiple cameras mounted, or measurement of some kind e.g. temperature or water level.

Prerequisites

You have a source that can provide the base data.

Proposed Solution

Implement a service that can retrieve data from one or more sources, convert to extended ONVIF format and forward to Milestone VMS system.

Develop a plug-in for the Smart Client to present the metadata on top of video.

Note: If the metadata provided is in form of bounding boxes, Smart Client can display without any plug-in development.
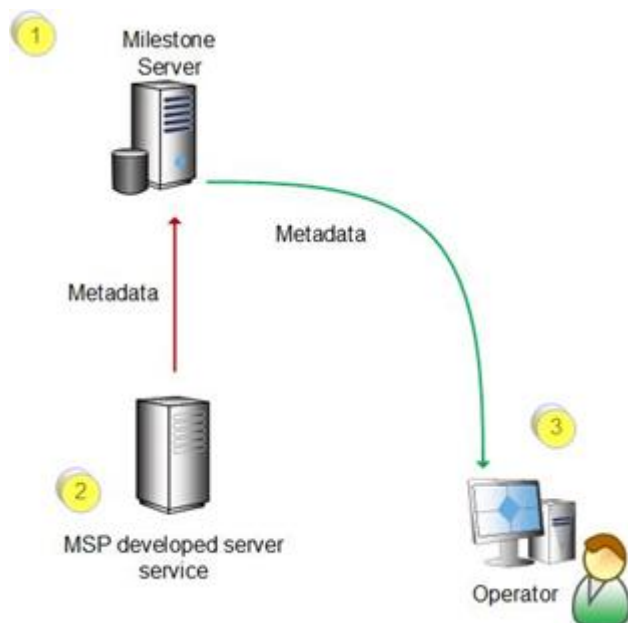
VMS (1)

- Recording server stores and distributes metadata
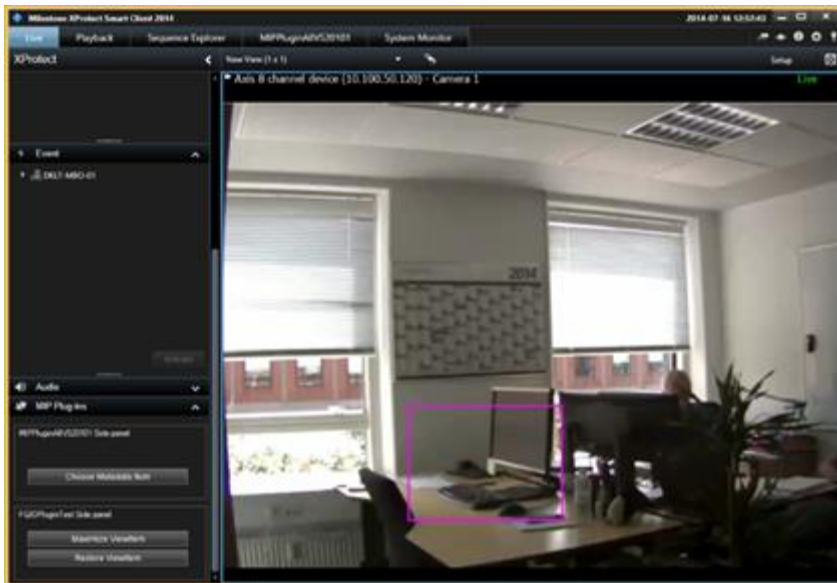
MSP Solution (2)

- Retrieve data from external source, reformat and forward it to VMS recording server.

MSP-plugin (3)

- For non-Bounding-box metadata, a MSP-plugin that runs within the Smart Client to retrieve and format it for display on top of live and recorded video.

Screenshot

Bounding box display on top of live video:

Metadata consumer

You would like to use bounding box metadata to optimize a CPU utilization used for face recognition.

You have a service that retrieves video from the VMS recording server, and would now like to also retrieve metadata to optimize performance.

The metadata is retrieved similar to how video is retrieved. Both coming from the Recording Server.

The bounding box metadata and possible associated object id, can help optimizing the CPU usages as well as avoid duplicate findings of the same person.

Prerequisites

You have a face recognition application.

Proposed Solution

Implement a service that can retrieve video and metadata from a recording server.   The video is decoded by use of MIP Media toolkit library to BGR format, and the metadata is utilized for only performing partial analytics on the images.   When a good hit is found further analysis of same object is not required.

The face recognition result could be stored within the developed service, or forwarded as a new metadata stream into the VMS recorder.
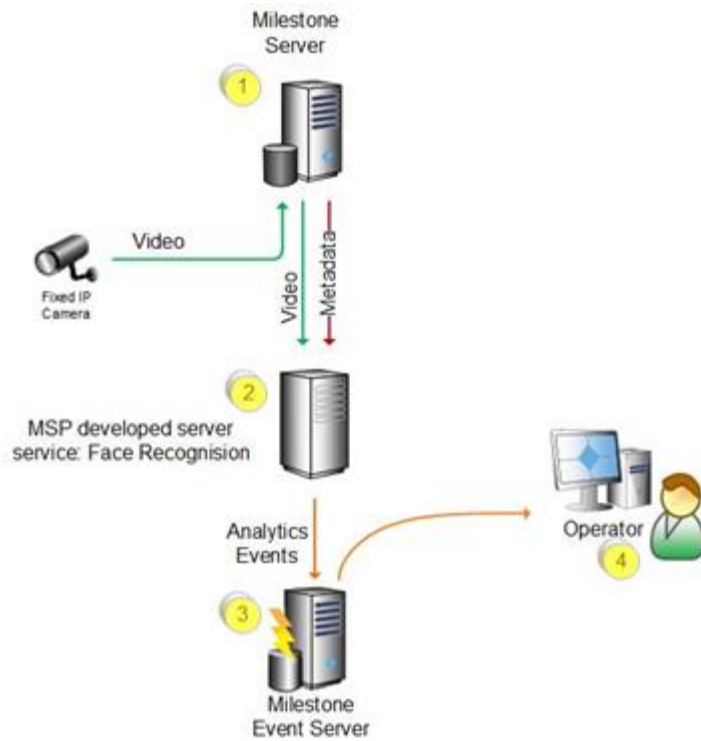
VMS (1)

- Recording Server provides video and metadata

MSP Solution (2)

- Retrieve video and metadata from recording server

- Analyze video with assistance of the metadata information

- Found faces being matched on a specific list, result on an analytics event being sent to the Event Server

Event Server(3)

- Stores analytics event and perform alarm management.

- Forwards analytics events to Smart Client users.

Smart Client (4)

- Utilizes event and alarm management to manage alarms.

- A MSP Plugin could be developed, to display personalized details – see the residential verification section.

Remote video viewer via low bandwidth

You would like to show live and recorded video in a browser application of your own.

The end user is accessing the VMS system from the internet, possible having low bandwidth because of wireless connection.

You would like to embed a video component into your own HTTP/JavaScript based application for video verification.

Prerequisites

You have an application based in HTML and JavaScript.

Proposed Solution

Use the Milestone Mobile Server interface for retrieving live and recorded video.

The Mobile Server automatically adjust frame rate and resolution to the available bandwidth.

The images coming from the Mobile Server is defined to come in JPEGs, to enable broad browser and OS support.
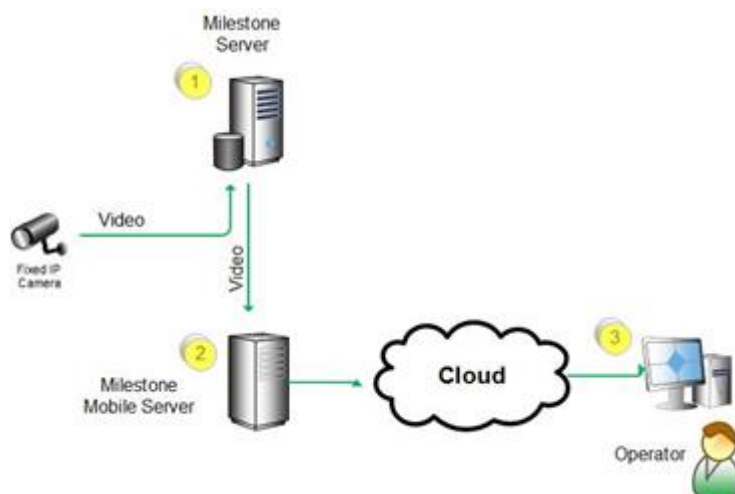
VMS (1)

- Recording Server provides video

Mobile Server (2)

- Retrieve video and forward to operator via internet
- When under bandwidth pressure, the frame rate and resolution is adjusted

MSP Application (3)

- Retrieves and display video

Residential verification

You want to use residential verification to determine if an alarm that goes off in a private home was triggered by one of the family members or an unknown person. You could also be a security company that specializes in hosted surveillance of residential homes. The security company would like to add live video to become more cost efficient when directing security guards to new locations.

Prerequisites

you have an existing residential security system.

Proposed Solution

Send snapshot images when the home security alarm is triggered and live images are requested for a defined period of time.

Video communication only becomes active after an alarm has happened, for example via a motion sensor or door open sensor when the house is in a locked-down state.
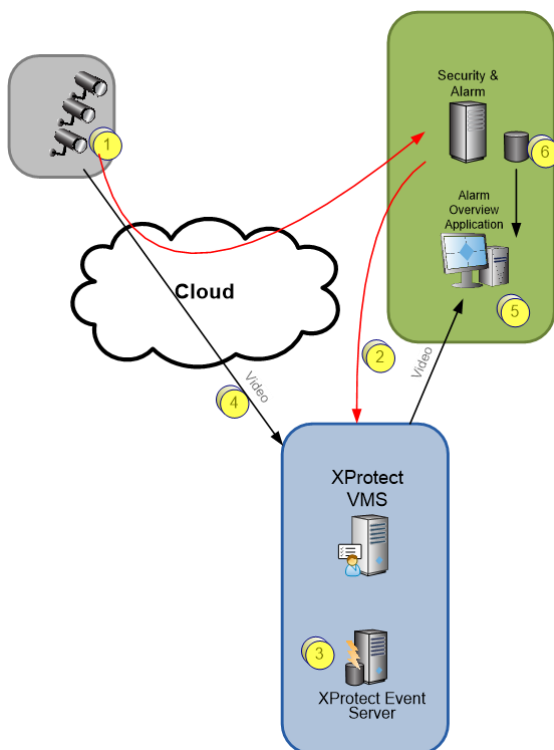
Home Security System (1)

- Residential installation with a home security system that contains a few snapshot cameras and one or more IP cameras. A detector notifies the central alarm system.

Existing Alarm Security System (2)

- Alarm security system forwards the alarm in a MAD format to Milestone VMS.

Existing Event Server (3)

- The Event Server receives MAD events including the captured snapshot images.

MAD Event (4)
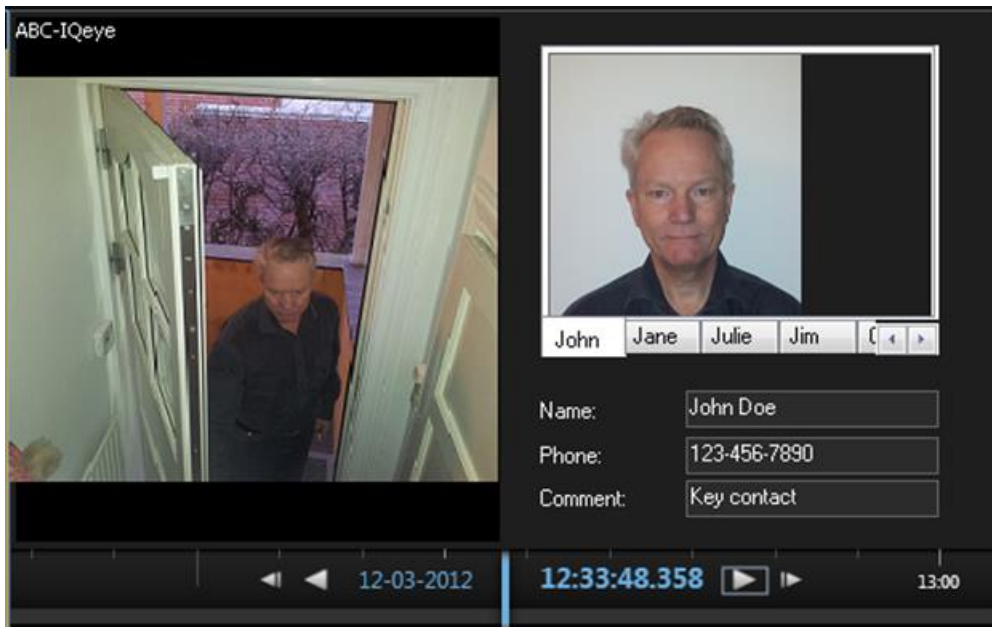
- Live video is requested, recorded and viewed.

Alarm Overview Application (5)

- Operator checks MAD snapshot image with the images of each of the family members.

MAD Check Database(6)

- Database that contains the family members that live at the specific residence.

Screenshots

This screenshot is an example of an alarm preview. On the left hand side you see the video that was recorded right after the alarm went off. On the right hand side you see a set of images of the family that lives in the house. The operator has selected the tab John to check if the person on the video matches his image. If he does, the operator can conclude that the alarm was in fact a false alarm – or if there is no match, he can conclude that this is a break-in and send a guard to the location.

helpfeedback@milestone.dk