White Paper

XProtect Events & Analytics Integrations MIP SDK Decision Guide
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Target audience
This document is intended to assist decision makers and solution architects in the process of evaluating how to integrate an events and analytics application with XProtect Corporate.

Integration overview
Milestone XProtect VMS can both receive and send events. There are multiple ways you can send events into Milestone XProtect VMS, such as:

- User defined events
- Generic events
- Analytics events
- Milestone Analytics Definition (MAD) events
- Alarms

A simple event can be something like an input trigger, while an analytics event will contain extra information about the source and reason for the event.

All events are converted into uniform format within Milestone XProtect VMS, so events that are retrieved from Milestone XProtect VMS comply with this format. This includes operational status events.

A simple event integration may only require configuration, while most informative integrations will require some programming.

Following is an overview of the system architecture and where to integrate an events and analytics application with Milestone XProtect VMS.

The drawing above shows incoming events that are forwarded through Milestone XProtect VMS to the rule evaluation (top right image) and the event and alarm list in the XProtect Smart Client (bottom right image). This document provides an overview of what it takes to develop an integration and points at related resources and documentation for more details.
This document describes the integration with XProtect Corporate and XProtect Expert products. The integration to XProtect Professional is not described here, but it is similar to the integration with XProtect Expert – the configuration is only slightly different.

**Terminology**

**Event types**
This document refers to specific names used for events within Milestone XProtect VMS. These are introduced here:

- **User-Defined Event**: These can be sent into XProtect VMS, but also be sent out from XProtect VMS. They can contain references to one or more devices (for example, cameras). A built-in “Start Recording” on a referenced device is part of XProtect VMS from installation.

- **Generic Event**: These can only be sent into XProtect VMS. They consist of a text string – no formatting required. They are integrated via configuration with a match string.

- **Analytics Event and MAD event**: These are sent into XProtect VMS. They usually contain a reference to a camera and additional information about the analysis.

- **Alarm**: These are created when an Alarm Definition matches an event type, an event source, and within a defined time profile. An alarm is something the end-user would like to manage. (Note: Even if the sender sub-system or camera has a concept of an alarm; XProtect VMS will always consider it an event upon reception).

**Common features relevant for integration**
The following features are commonly used by the integration described in this document:

- XProtect Smart Client event list: a list of all events in the system
- XProtect Smart Client alarm list: a list of all open alarms, and a detailed window including video preview with overlay display, if event has a related camera defined
- Rule definition: a rule can be triggered by an event to perform many actions
- Alarm definition: rules to identify what events should create alarms that need operator attention

**Integration methods**
To provide maximum flexibility and allow optimal integration of different types of systems and applications, the Milestone Integration Platform offers three main integration options:

- **Protocol Integration**: A basic integration method particularly suited for integration of applications running in non-Windows environments.

- **Component Integration**: Lets you integrate MIP components into your application, which is useful when you want to use libraries provided by Milestone in your Windows-based application.
• **Plug-in integration**: The most advanced integration method. This allows you to embed your Milestone Solution Partner plug-in in the XProtect application environment, and run your plug-in as an integrated part of the XProtect software and its client applications.

### Sending events into Milestone XProtect VMS

#### Event integration through programming

In Milestone XProtect VMS: User-Defined Event

When sending User-Defined Events to Milestone XProtect VMS, you can include a parameter with one or more identifications, for example for a camera.

This integration type is suited for integrations that need to control a camera and perform a specific function, for example “Start Recording” on a camera identified by parameter, or a “Speed up” the recorded frames per second (FPS) on a camera.

User-Defined Event integrations can:

- trigger a rule including use of parameters
- be stored as all other events
- be viewed in the XProtect Smart Client
- trigger creation of an alarm

More documentation:

- In MIP SDK: Introduction to Events and Alarms
- In MIP SDK: For sending the event to XProtect VMS, search for “TriggerCommand“ – this is a command used when sending messages.

#### Event integration through configuration

In Milestone XProtect VMS: Generic Event
Generic Events are the simplest way to send events into Milestone XProtect VMS. This event type can work well for smaller installations, but can be difficult to work with in large installations, because there are no parameters on the event (for example, there is no identification of a camera).

Generic Event integrations can:

- trigger a rule
- be stored as all other events
- be viewed in the XProtect Smart Client
- trigger creation of an alarm

More documentation:

- In XProtect VMS product: available as part of the Management Client documentation
- In MIP SDK: See under “Protocol Integration” and “Generic Events”

**Event integration through programming**

In Milestone XProtect VMS: Analytics Event

Analytics events carry more information about an event than user-defined or generic event types. The Analytics Event can contain identification of the source (often a camera for video analytics), bounding boxes or other display enhancements.

You can send an Analytics Event to Milestone XProtect VMS using one of these techniques:
- Protocol: Send to port 9090 (default) on XProtect Event Server as XML
- Component: Use MIP SDK component to ensure correct format and send to XProtect VMS using SendMessage
- Plug-in: Use MIP SDK classes to format correctly and send to XProtect VMS using SendMessage

An alarm triggered by an Analytics Event will contain all the information from the Analytics Event, and will be able to show bounding boxes on top of video when viewing the alarm in the preview window.

**Event integration through programming**

In Milestone XProtect VMS: Milestone Analytics Definition (MAD)

Sending MAD events is similar to Analytics Events, except that this format was historically introduced first and has fewer features available. The resulting events and alarms are just like the Analytics Event integration described above.

The MAD format is supported to be backwards compatible, but Milestone recommends using the Analytics Event format for new development.

**Event integration through programming**

In Milestone XProtect VMS: Alarm

You can send complete alarms directly to the XProtect Event Server. This will then bypass the alarm definition configured by the end-user.
This can be relevant if another system already has processed some rules, and concluded that an alarm should be created – as it needs operator attention. This integration should be used with care, because the end-user’s administrator will NOT be able to control or disable these alarms. Also consider that alarms in one system may very well be considered as events in the next system.

Retrieving events, alarms and status from Milestone XProtect VMS

PSIM applications can retrieve information about the status for all devices to display operation status, and retrieve copies of all events to display changes. Events and alarms can be retrieved from three major APIs:

- From the Status API directly from each Recording Server
- From the Alarm Command service provided from the Event Server
- By a plug-in in the Event Server

The Status API contains the events and status information when they originated from the camera or the Recording Server itself, for example camera inputs and events created from the Recording Server. The Event Server collects the events and status from all Recording Servers, and all events, Analytics Events, MAD Events and Generic Events. The Event Server exposes all of these events for plug-ins loaded within the Event Server, and for applications using the Alarm Command service.
Retrieving system status events

The Recording Server handles events from devices and also creates recorder-specific events:

- Hardware events, for example from input sensors or created by the camera
- Recorder events, such as “motion detect” or “camera not responding”
- Recorder events about the recorder itself, for example “Disk full”

The events are exposed through the Status API. The Status API also provides information about status and statistics for the devices and the recorder. The protocol is accessed directly through the SOAP service or through a set of component classes. More documentation:

- In MIP SDK: Protocol Integration, Status SOAP Protocol
  - WSDL available at MIPSDK\WSDL\RecorderStatusService2.wsdl
- In MIP SDK: Component Integration:
  - Status Viewer
  - Status Viewer – Multi Site
  - Status Console
  - Status Session Console

Retrieving events and alarms
The Event Server collects events from all recorders and MIP integrations. These events are then available for MIP plug-ins loaded within the Event Server, and available for applications polling for events or alarms on the Alarm Command service.

The services have two types: one for Event Servers installed with Corporate and Expert systems, and another for all other systems. Milestone suggests you use the MIP SDK components classes to instantiate the correct one.

For Component and Plug-in solutions, the message system is used for both creating new events and alarms with message IDs NewEventCommand and NewAlarmCommand, and can be retrieved by listening for NewEventIndication and NewAlarmIndication.

Using these messages is very effective for plug-ins running in the Event Server.

More documentation:
- In MIP SDK: Protocol Integration: MIPSDK\WSDL\AlarmCommandWSDL
- In MIP SDK: Component Integration: Search for AlarmCommand
  - Sample: Alarm Viewer
- In MIP SDK: Plug-in Integration: Search for AlarmCommand

**Analyzing video from XProtect video**

Retrieve video from Milestone XProtect Image Server and send Analytics Events to XProtect VMS

Video is retrieved from a Recording Server, analyzed by a third-party vendor’s service, and the resulting Analytics Events are forwarded to the Event Server for storage, rule and alarm handling, as well as display in the XProtect Smart Client.

The result of the analytics service could also be a metadata stream (described in the Metadata Integrations with Milestone XProtect: MIP SDK Decision Guide).

By retrieving a video stream from an XProtect Recording Server, a third-party vendor system only needs to support the one protocol, but can in effect support all the camera models supported by Milestone XProtect VMS.

For decoding of video images, the MIP SDK contains components that can be used to decode any supported codec in XProtect VMS and present it in standard RGB and other formats to the partners’ own analytics engine.
The resulting analytics can either be sent to the Event Server when meeting user-defined criteria, for example line crossed, or sent to the Recording Server as continues metadata stream describing the video.

More documentation:

- In MIP SDK: Protocol integration: Analytics and MAD events
- In MIP SDK: Component integration: Media Live Viewer, Media Live Service C++
- In MIP SDK: Plug-in integration: not recommended for video analytics handling (that is, video processing should be performed in dedicated services)

**Enhancing video in XProtect Smart Client**

**XProtect Smart Client video overlay (1/2)**

A background plug-in in the XProtect Smart Client can retrieve metadata stream information from the Recording Server or a third-party vendor’s own service, and display this information as overlay on live and recorded video.

The XProtect Smart Client handles the live and recorded video, while the background plug-in focusses on formatting the overlay at the time stamp that matches the video.

More documentation:

- In MIP SDK: Plug-in Integration – Architecture section with ‘Video Display and Overlay’
- In MIP SDK: Samples: Smart Client Overlay on Event, Analytics Overlay
When displaying an alarm with the relevant video preview, it is possible to have a background plug-in to display extra information as overlay or in the information panel. A plug-in listens for a specific message that identifies the displayed alarm, looks up the detailed information via the content of the alarm, and formats relevant information on top of the video.

More documentation:

- In MIP SDK: Plug-in Integration – Architecture section with ‘Video Display and Overlay’
- In MIP SDK: Samples: Smart Client Overlay on Event, Analytics Overlay, Access Control (MIPSDK v2.0)
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 150,000 sites worldwide. Founded in 1998, Milestone is a stand-alone company in the Canon Group.