**Milestone Systems
Custom Development EMEA**

XProtect® Smart Client
Alarm Matrix 2.0

Getting stated Guide

milestone

Table of Content

Target Audience

This document is aimed at system users and provides descriptions on how to install, configure and maintain the XProtect® Smart Client Alarm Matrix 2.0 Integration. The solution is developed as a XProtect® Smart Client plug-in which provides direct and real-time access to all Milestones alarms, by automatically displaying the alarms with corresponding video when they happen.

The manual only covers the necessary configuration steps in the XProtect® Smart Client and briefly explains how to define the required Milestone Events and Alarms in order to use them with XProtect® Smart Client Alarm Matrix integration.

To benefit from this document, you should have thorough knowledge of:

- Milestone XProtect® Video Management Software
- Milestone XProtect® Smart Client

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General Description

The Milestone XProtect® Smart Client Alarm Matrix enables the users to get direct and real-time access to all Milestones alarms, by automatically displaying the alarms when they happen. The Alarm Matrix will, when a new alarm is received, display the relevant cameras from the alarm in both a playback and a live display. Both the playback and the live view can independently be configured to display either source camera of the alarm, related cameras on the alarm or both. The playback view will play the video in a loop starting from a pre-configured number of seconds (pre-alarm buffer) before the alarm and play for a configured number of seconds (loop interval). The Alarm Matrix is developed as a XProtect® Smart Client view item that can be dragged into a XProtect® Smart Client view. Therefore, more than one Alarm Matrix view item can be displayed at the same time. When more than one Alarm Matrix is used at the same time, new alarms will be distributed between all active (currently show) Alarm Matrix view items to enable the operator to view as many concurrent alarms as there are active Alarm Matrix view items.

Please note that even though the Alarm Matrix plug-in constantly monitors the VMS for new Alarms it will only store the Alarms that can be assigned to an active Alarm Matrix view item. This means that if an alarm is received while the XProtect® Smart Client is not displaying an Alarm Matrix view item, that Alarm will never be displayed in any Alarm Matrix view item.

Installation

Prerequisites

Before you start, make sure that the following is available:

- Milestone XProtect® video management software (such as Milestone XProtect® Corporate) along with an appropriate version of a Milestone XProtect® Smart Client. The solution is smoke tested against various Smart Client versions as old as 2016 R2; however, the recommended version for this release is 2017 R3 or newer.

Installation Procedure

The XProtect® Smart Client Alarm Matrix plug-in must be installed on the machine running the Milestone XProtect® video management software. On a system with multiple machines, the plug-in needs to be installed on the machines that runs Milestone XProtect® Smart Client.

The following describes how to install the plug-in:

1. Install Milestone XProtect® Smart Client Alarm Matrix by running the following installer application: MilestoneAlarmMatrixPluginInstaller_x64.msi
2. When the installation wizard starts, click 'Next' to continue.
3. Click 'Next' to confirm the installation.
4. When the installation has completed, click 'Close'.

The Milestone XProtect® Smart Client Alarm Matrix plug-in contains two different XProtect® Smart Client plug-ins. These are typically installed in the following locations;

C:\Program Files\Milestone\MIPPlugins\AlarmMatrix

C:\Program Files\Milestone\XProtect Smart Client\plugin\VideoOS.CustomDevelopment.AlarmMatrix

Before doing any configuration of the plug-in, please read the Licensing section of this document.

Licensing

The Milestone XProtect® Smart Client Alarm Matrix Integration plug-in requires a valid MIP licensing to work. The license is based on the SLC of the Milestone XProtect® video management software. Initially, a trial period of 30 days is automatically granted along with installation of the plug-in.

That is, for testing purposes, anyone can install and immediately start testing XProtect® Smart Client Alarm Matrix as a fully functional product for the following 30 days.

To obtain a permanent license; however, the distributor must know the SLC of the Video Management System (VMS) system on which the plug-in has been installed. Collect the SLC and send it to the distributor, preferably via email.

Once the license is added onto the SLC by Milestone Systems, the corresponding XProtect® VMS system must be re-activated for the license to take effect.

Configuration

Alarm Matrix View Configuration

Upon completion of the installation, log in to XProtect® Smart Client and click the "*Setup*" button located in the upper right corner.

Create or open the view layout in which the Alarm Matrix should be placed.

Locate the Alarm Matrix icon within the System Overview section in the XProtect® Smart Client-side panel.

Left-click it to drag it and drop it on a view of your preference.

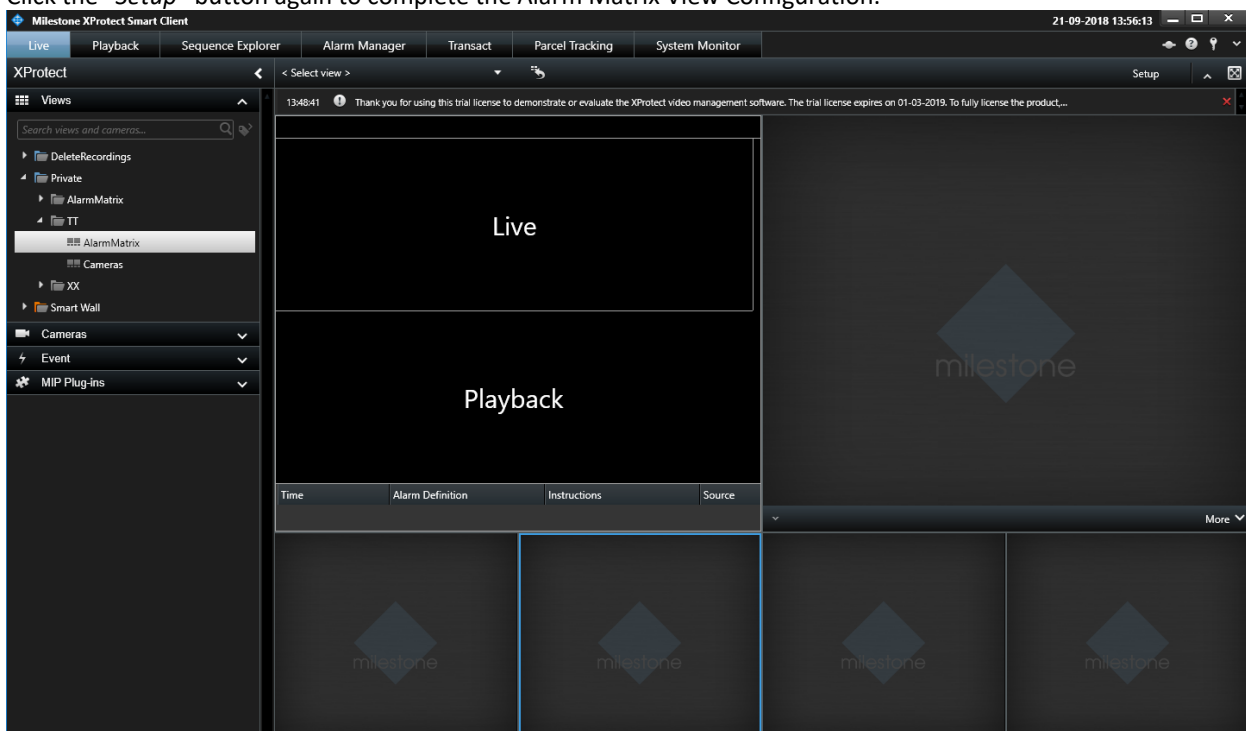Click the "*Setup*" button again to complete the Alarm Matrix View Configuration.

Figure 1: Alarm Matrix View Configuration

Several Alarm Matrix view items can be added to a single view, and several views can be displayed by the XProtect® Smart Client using floating windows or secondary displays.

When new alarms are triggered in the VMS, the Alarm Matrix plug-in will automatically recognize these alarms and match them against a configured filter (which by default will match all alarm definitions but can be more granular as described in the section **Alarm Matrix Options**).

If a new alarm is matched by the filter, the Alarm Matrix plug-in will assign the alarm to the next available Alarm Matrix view item. When an alarm changes state to Closed, the alarm will automatically be removed from the Alarm Matrix view item to which it is currently assigned (if it is the currently displayed alarm of the Alarm Matrix, the Alarm Matrix will change to display another alarm from the list of assigned alarms using the functionality described under the "*Mode*" property of the **Alarm Matrix Properties**).

This will enable the operator to instantly view all new alarms in a series of Alarm Matrix view items. If the VMS has more new alarms than currently active Alarm Matrix View Items, the Alarm Matrix Plug-In will start from the first active Alarm Matrix and start assigning several alarms to the same Alarm Matrix view items. This led to a situation where the Alarm Matrix view items have more than one alarm assigned. The Alarm Matrix will only be displaying one alarm at the time but keep the rest of the assigned alarms in a list that can be displayed using the "*Show Alarm List*" property. The Alarm Matrix will utilize the functionality mode configured in the "*Mode*" property to determine which of the alarms in the list should currently be displayed.

When displaying an alarm, the Alarm Matrix is designed to play the alarm in a loop, which means that the live video will be continuously displaying the live video stream and the playback video streams will be displaying video from the timestamp of the alarm minus the number of seconds defined in the "*Pre-buffer*" setting of the Options menu and play it for the number of seconds defined in the "*Loop Interval*" setting of the Options menu.

To populate the Alarm Matrix with alarms, the Video Management System needs to be configured to create alarms on events. A brief introduction to creating alarms can be found in the section Alarm Definition, for a more in-depth description please refer to the manual of your chosen VMS.

Alarm Matrix Properties

A set of properties can be configured for each individual Alarm Matrix view item, to customize the view and functionality of the view item.

The properties of the Alarm Matrix view item are configured using the standard XProtect® Smart Client functionality as on any other XProtect® Smart Client view item in the "*Properties*" section located in the XProtect® Smart Client-side panel. The Properties section will only be visible when the XProtect® Smart Client is in Setup mode.

To enter Setup mode and customize the properties of an Alarm Matrix view item, click on "*Setup*" button located in the upper right corner of the XProtect® Smart Client, select the Alarm Matrix view item user control of the Alarm Matrix you want to customize and locate the Properties panel in the side panel.
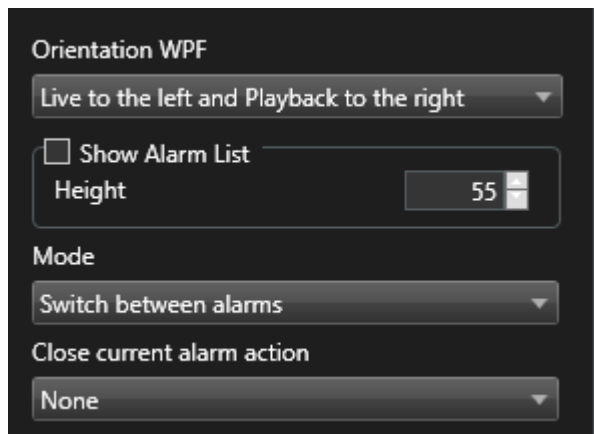
Figure 2: Alarm Matrix Properties

The "*Orientation*" property enables the operator to customize the orientation of the live and playback section of the Alarm Matrix view item. By clicking on the corresponding dropdown box, it is possible to set live and playback streams side by side horizontally or on top of each other vertically. It is also possible to populate live and playback streams left to right / right to left or up to down or down to up respectively.

The "*Show Alarm List*" property enables the operator to display a list of all the alarms currently being assigned to the Alarm Matrix view item. The Alarm Matrix alarm list will be displayed in the bottom of the Alarm Matrix and is not affected by the selected orientation of the view item. By enabling the checkbox "*Show Alarm List*" the "*Height*" property will be enabled to allow the operator to specify the height of the Alarm List. When deselecting the "*Show Alarm List*" checkbox, the Alarm Matrix will not display the alarm list, but will remember the last selected height for future use. The higher the alarm list, the more alarms can be viewed in the list without the need for scrolling. When displaying more than one Alarm Matrix at the same time the new alarms will automatically be distributed between the Alarm Matrix view items.

The "*Mode*" property enables the operator to change between two different functionality modes for the specific Alarm Matrix view item. The two functionality modes that are available for selection in the "*Mode*" combo box is "*Switch between alarms*" and "*Display latest alarm*".

When the Alarm Matrix is set in "*Switch between alarms*" mode the Alarm Matrix view item will automatically switch to the next alarm in its alarm list when the alarm has been played (the number of seconds configured in the "*Loop Interval*" of the Options Menu) one time. If only one alarm is assigned to the Alarm Matrix view item that alarm will automatically be the next alarm and as an effect the alarm will constantly be played in loop (for description of the Alarm Matrix loop concept, please refer to the **Alarm Matrix View Configuration** section of this document).

When the Alarm Matrix is set in "*Display latest alarm*" mode the Alarm Matrix view item will always be playing the latest alarm in its alarm list in a loop (for description of the Alarm Matrix loop concept, please refer to the **Alarm Matrix View Configuration** section of this document). When a new alarm is assigned to the Alarm Matrix view item, the Alarm Matrix view item will change to play that new alarm in a loop. Should the currently displayed

alarm be closed, the Alarm Matrix view item will automatically move to the latest received not closed alarm in its alarm list and start playing that alarm in a loop.

The "*Close current alarm action*" property enables the operator to select a specific XProtect® Smart Client action upon which the specific Alarm Matrix view item will close its currently displayed alarm. The Alarm Matrix Plug-in provides four XProtect® Smart Client Actions named "*Alarm Matrix Close Action 1*", "*Alarm Matrix Close Action 2*", "*Alarm Matrix Close Action 3*" and "*Alarm Matrix Close Action 4*". Each of these actions is a generic but unique instance that can be activated by the XProtect® Smart Client. The XProtect® Smart Client can be configured to trigger an action on a Keyboard key press in the Options menu (under the section "*Keyboard*"), but actions can also be activated in a series of other ways by the XProtect® Smart Client. When assigning one of the Alarm Matrix Close actions to an Alarm Matrix view item, the Alarm Matrix view item will start listening for that specific action. When the configured XProtect® Smart Client action is activated, the Alarm Matrix view item will automatically instruct the VMS to change state, on the alarm it is currently displaying, to the state closed. Using this functionality, it is possible for the operator to utilize the Alarm Matrix to close the alarm he/she is currently investigating using a key pressed on the keyboard or a connected joystick.

The XProtect® Smart Client can be configured to trigger actions by mapping keyboard keys, joystick keys etc., using Smart Client script commands which can be triggered through Smart Client Script file (used when starting the Smart Client) or through the scripting engine in a HTML page loaded in the HTML view item.

Activating Alarm Matrix Close Action by Keyboard mappings

A very easy way to activate an Alarm Matrix close action is by setting up a keyboard mapping to automatically activate the action when a specific key or key combination is pressed on the keyboard. To create this mapping go to the general '*Settings*' of XProtect® Smart Client and then to '*Keyboard*' section from there. Under '*Application*' within '*Categories*' section, you will see Alarm Matrix Close Action 1,2,3,4 etc.
To create the mapping, press the shortcut key or key combination, select a specific Alarm Matrix Close Action and press the "*Assign*" button.
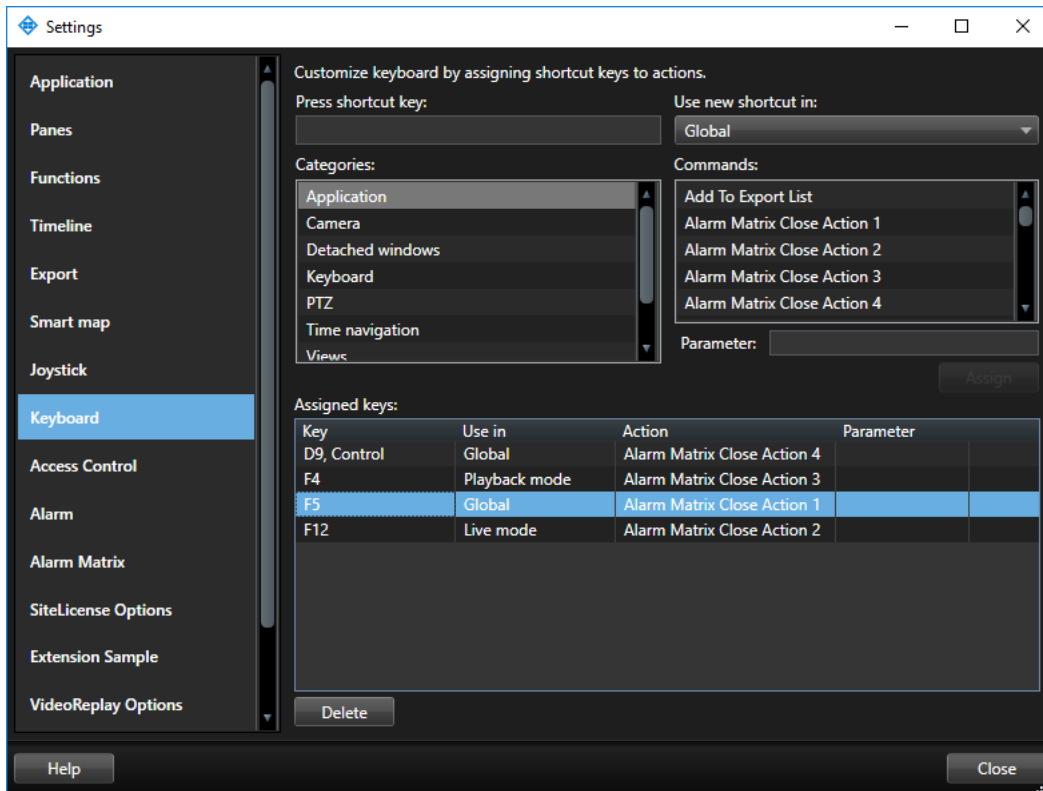
Figure 3: Alarm Matrix Close Actions configuration

Alarm Matrix Options

Since Alarm Matrix integration comes solely as a XProtect® Smart Client plug-in, all options regarding its functionality are managed within XProtect® Smart Client as well. Clicking on the "Settings" icon of the XProtect® Smart Client, located on the upper right corner, "*Alarm Matrix Options*" can be reached by locating the corresponding tab on the pop-up Settings window.

The Alarm Matrix Options is split into the three tabs; General, Alarm Definitions and Smart Wall and Pop-up.

General Settings tab

The General Settings Tab contains the following categories:

- **Timer Settings**   Time settings for the playback loop can be configured
- **Video Feeds**   Configure which cameras to display in Live and Playback view
- **Sound on Alarm**   Enable a sound to be played in loop on Alarm
- **View Item Border**   Configure border and possible flashing on Alarm Matrix view item
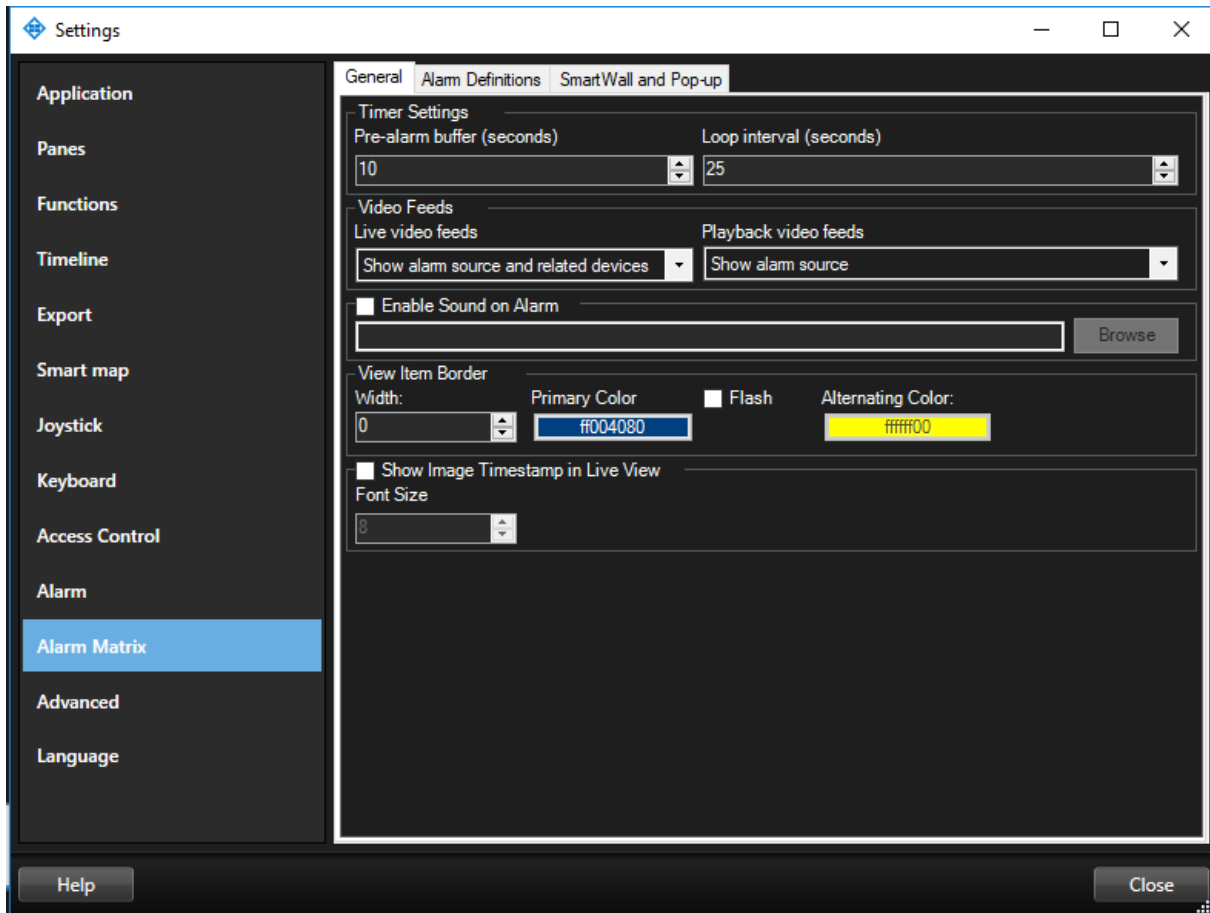- **Timestamp in Live**   Enable an overlay with image timestamp in Live view

Figure 4: Alarm Matrix Options

Timer Settings

In the "*Timer Settings*" category, it is possible to adjust how many seconds before the timestamp of the alarm the playback should start, as well as for how many seconds' video should be played before looping. The "*Pre-alarm buffer*" specifies the number of seconds before the timestamp of the alarm the playback should start, to enable the operator to get an understanding of what happens just before the alarm is triggered. The "*Loop interval*" specifies for how long the video playback is played before looping.

Video Feeds

In the "*Video Feeds*" category, it is possible to configure which feeds should be displayed in the live and the playback area of the Alarm Matrix view item. The "*Live video feeds*" specifies which video feeds should be displayed in the live area of the Alarm Matrix view item. The "*Playback video feeds*" specifies which video feeds should be displayed in the playback area of the Alarm Matrix view item. For both the "*Live video feeds*" and the "*Playback video feeds*" one of the following configurations can be selected; "*Show alarm source*", "*Show related devices*" and "*Show alarm source and related devices*".

When selecting the "*Show alarm source*" only the source of the alarm will be displayed in the selected area (live or playback). If the source is not a camera, no video feed will be displayed in the selected area (live or playback).

When selecting the "*Show related devices*" all the related devices configured on the alarm will be displayed (but not the source of the alarm). Related devices can be setup in the Alarm Definition, can be inherited from the event triggering the alarm definition or can be set programmatically if the alarm is triggered programmatically. If the alarm does not have any cameras as related devices, no video feed will be displayed in the selected area (live or playback).

When selecting the "*Show alarm source and related devices*" both the source of the alarm (if the source is a camera) and all the related cameras configured on the alarm will be displayed in the selected area (live or playback). If neither the source is a camera, nor any related cameras has been configured on the alarm no video will be displayed in the selected area (live or playback).

Sound on Alarm

By checking the "*Enable Sound on Alarm*" checkbox in the same category, users can add a sound notification when new alarms are unhandled (not in the state Closed). This can be done by adding a **.wav** file using corresponding "*Browse*" section.

View Item Border

It is possible to customize the border of the Alarm Matrix view items. The "*Width*" specifies the width of the border in number of pixels. The "*Primary Colour*" specifies the primary colour of the border - to change colour, click on the button and select a colour in the colour picker dialog box. The "*Flash*" check box enables the border to flash between the primary and the alternating colour every 1.5 second. The "*Alternating Colour*" specifies the alternating colour used when flashing the border - to change colour, click on the button and select a colour in the colour picker dialog box.

Timestamp in Live

To provide the operator certainty that the live image is updated and live, the Alarm Matrix view item can display the image timestamp of the live video stream as an overlay timestamp on the video. To enable this feature, check the "*Show Image Timestamp in Live View*" checkbox and specify the desired font size on the "*Font Size*" control.

Alarm Definitions tab

By default, Alarm Matrix integration is configured to run against all alarms defined in the VMS system; however, it is possible to select exactly which alarm definitions the Alarm Matrix plug-in should react on.
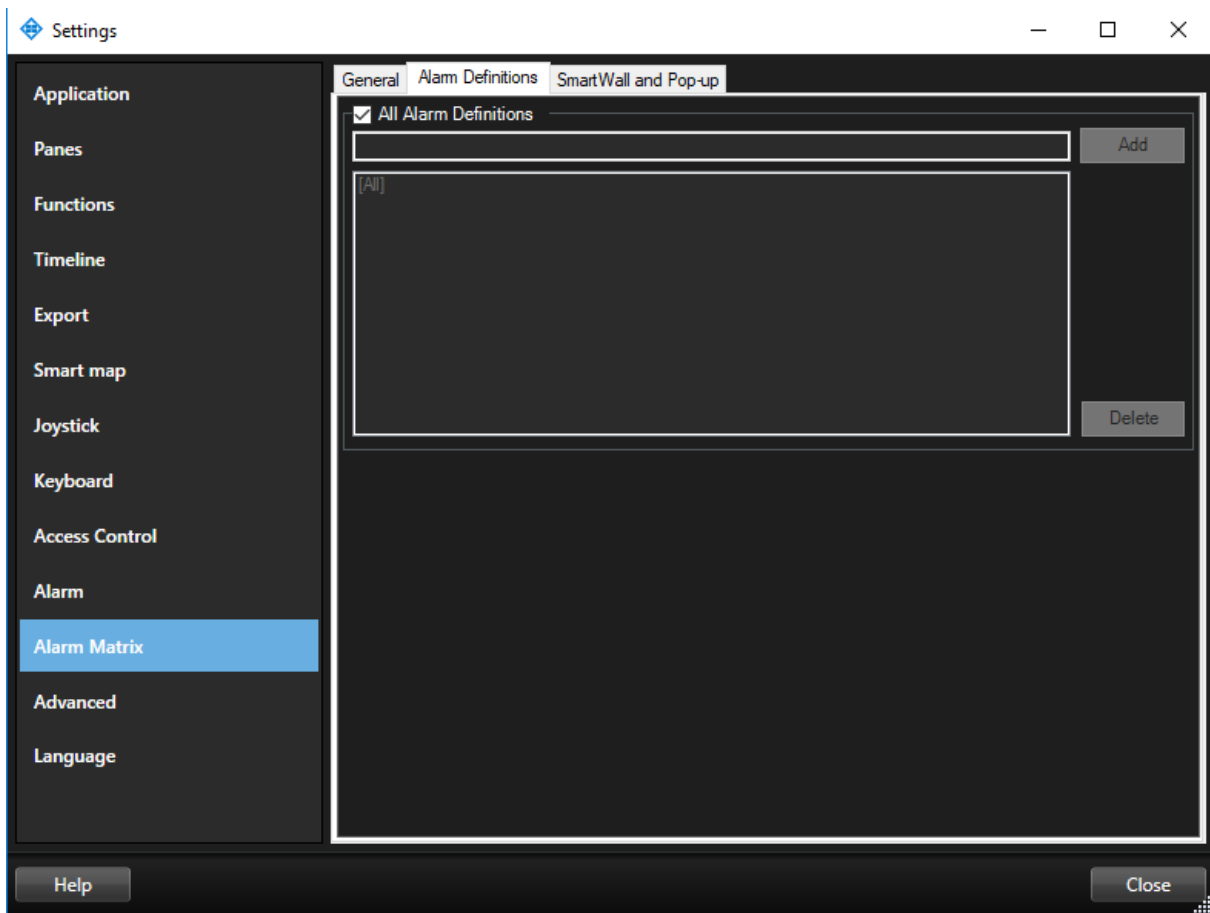
Figure 5: Alarm Matrix Options – Alarm Definitions

To configure the list of specific alarm definitions the Alarm Matrix should listen for uncheck the checkbox "**All Alarm Definitions**", and manually add all the alarm definitions the Alarm Matrix should listen for. An alarm definition is entered by entering the name of the Alarm Definition in the text box (please note that this is case-sensitive, so the name needs to be the exact same as the Alarm Definition is given in the Management Application or Management Client) and click the "*Add*" button located next to the text box. Alarm definitions can be removed again by selecting the Alarm Definition in the list box and clicking the "*Remove*" button. When re-checking the "*All Alarm Definitions*" the Alarm Matrix plug-in will return to listening for all alarm definitions.

Smart Wall and Pop-up Settings tab
The Alarm Matrix plug-in can be configured to automatically open a floating window to display a new incoming alarm in case no Alarm Matrix view items is currently active (displayed on the screen). This feature enables the Alarm Matrix plug-in to run in the background during normal operation, and only display incoming alarms in a floating window when needed. The floating window will automatically be closed when the all the alarms displayed in the floating window is closed.
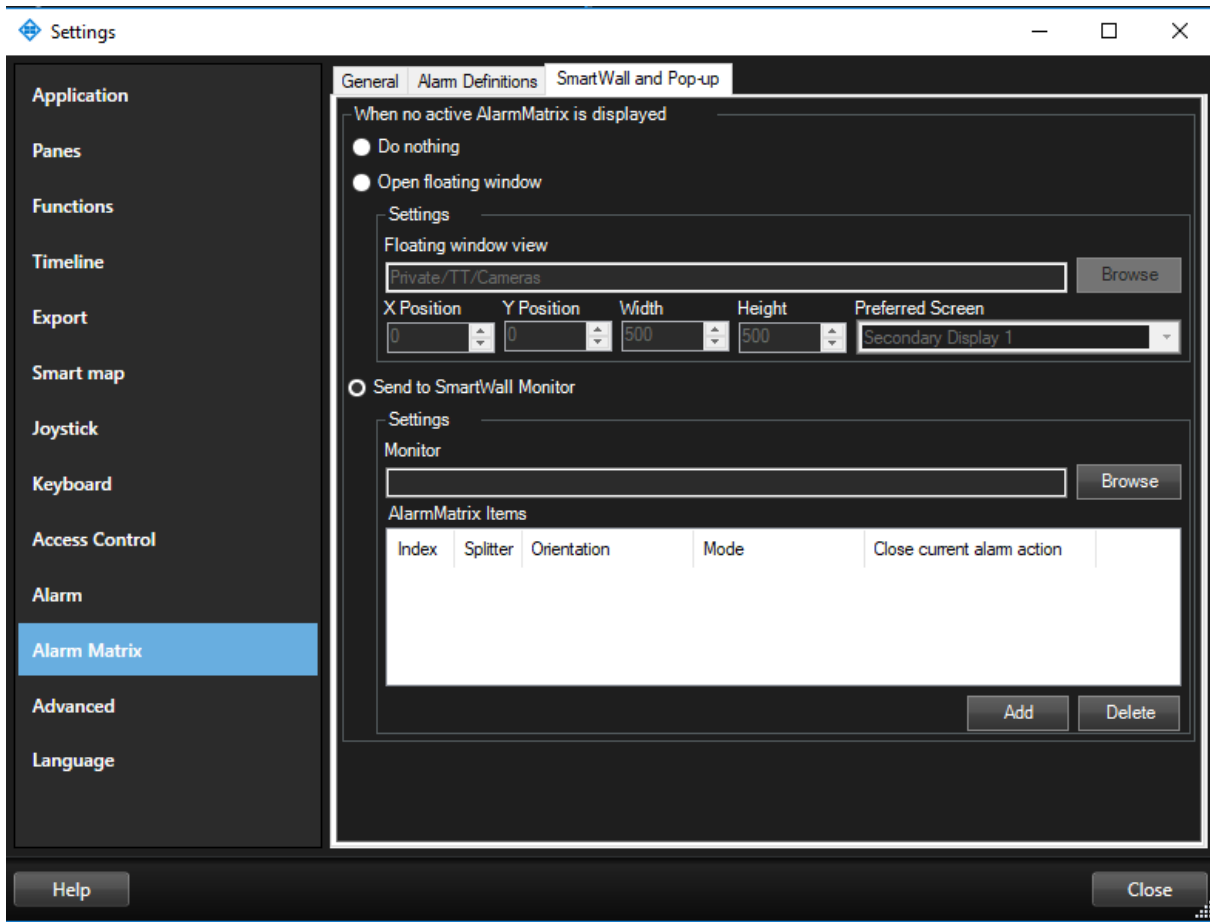
Figure 6: Alarm Matrix Options – Smart Wall and Pop-Up

To configure a floating window to be displayed, check the "*Open floating window*" checkbox. Next, configure which view should be displayed in the floating window using the "*Browse*" button to select the view (please ensure that the selected view contains at least one Alarm Matrix view item for this functionality to proper function). Then define the location and size of the window using the "*X-Position*", "*Y-Position*", "*Width*" and "*Height*". Finally, it's possible to select a different screen than the primary display in the "*Preferred Screen*".

Please note that alarms are only populated on a floating view in case Alarm Matrix is not simultaneously active on another view.

Operation

Alarm Matrix in Smart Client views

Once a Milestone Event is fired (with a corresponding Alarm Definition configured), the corresponding alarms which are set to be triggered upon the event is activated. The activation of an alarm runs Alarm Matrix integration on Smart Client.
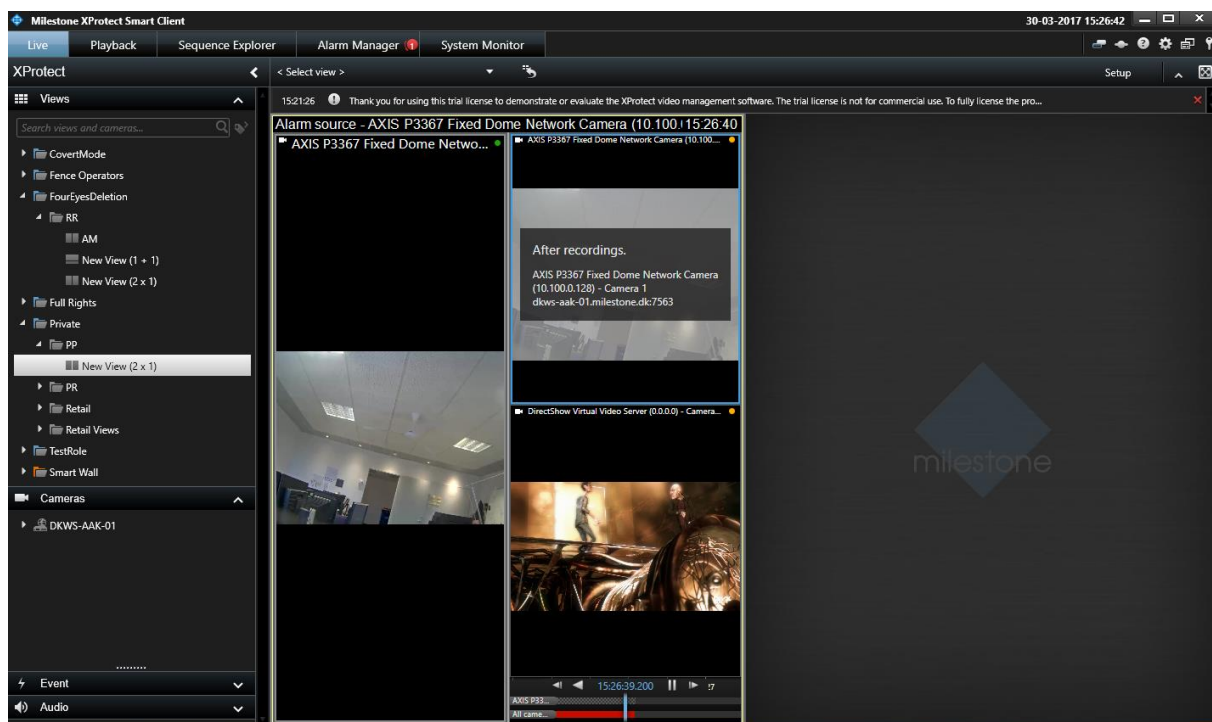

Figure 7: Alarm Matrix Operation

In the screenshot displayed above (Figure 7) the camera that is the source of the event is shown live in the left side of the Alarm Matrix view item. The right side of the Alarm Matrix view item displays the source camera as well as one related camera in a playback loop.

The playback part of the view item provides a playback controller to enable the operator to manually navigate in the video.

Alternatively, in case there is no active Alarm Matrix element on the view, a floating window pops up upon activation of an alarm as shown in the below screenshot (Figure 8).
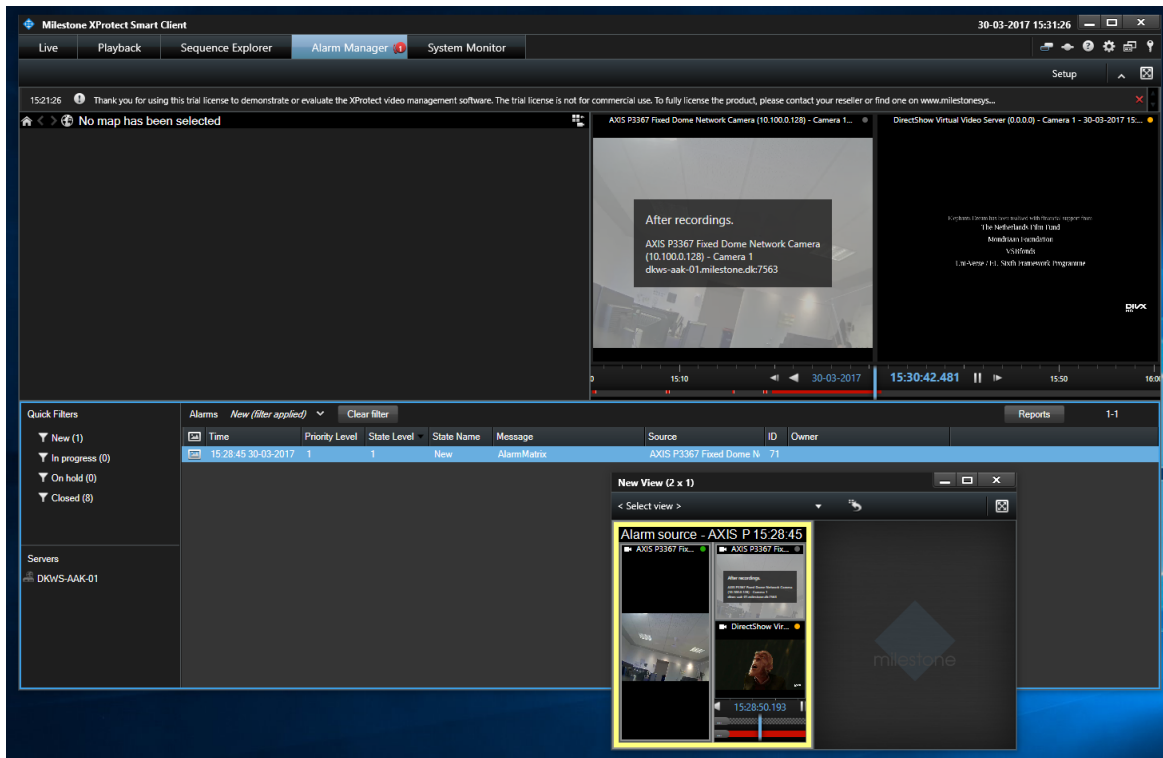
Figure 8: Alarm Matrix Operation with Floating Window feature enabled.

Customized Close Actions for the current Alarm Matrix

As stated above, it is possible to close the current Alarm Matrix through custom defined keyboard actions. If you refer to Figure 3, you will see that there are currently 4 different Alarm Matrix Close Actions present in the XProtect® Smart Client. The first column lists the actual keyboard keys that realize the corresponding Alarm Matrix Close Action and the second column states on which tab of the XProtect® Smart Client this customized close action is authorized.
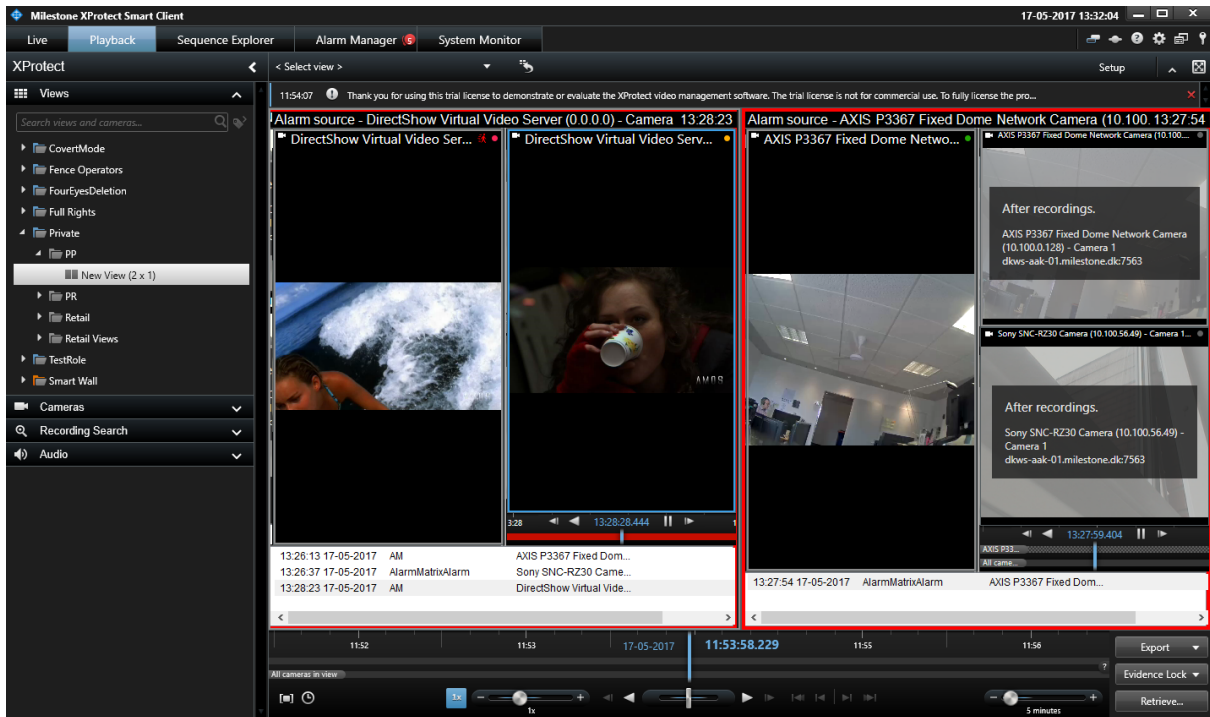
Figure 9: Alarm Matrix Close Action

Currently, Alarm Matrix Close Action 1 is already configured for the 1st Alarm Matrix located on the left-hand side of the above screenshot and Alarm Matrix Close Action 4 is already configured for the other one located on the right. (See Figure 3). On the Figure 7 located above, there are 3 active alarms in the 1st Alarm Matrix located on the left and only 1 active alarm located on the right.

Clicking on **F5** button of the Keyboard will close the active alarm on the 1st Alarm Matrix as shown below.
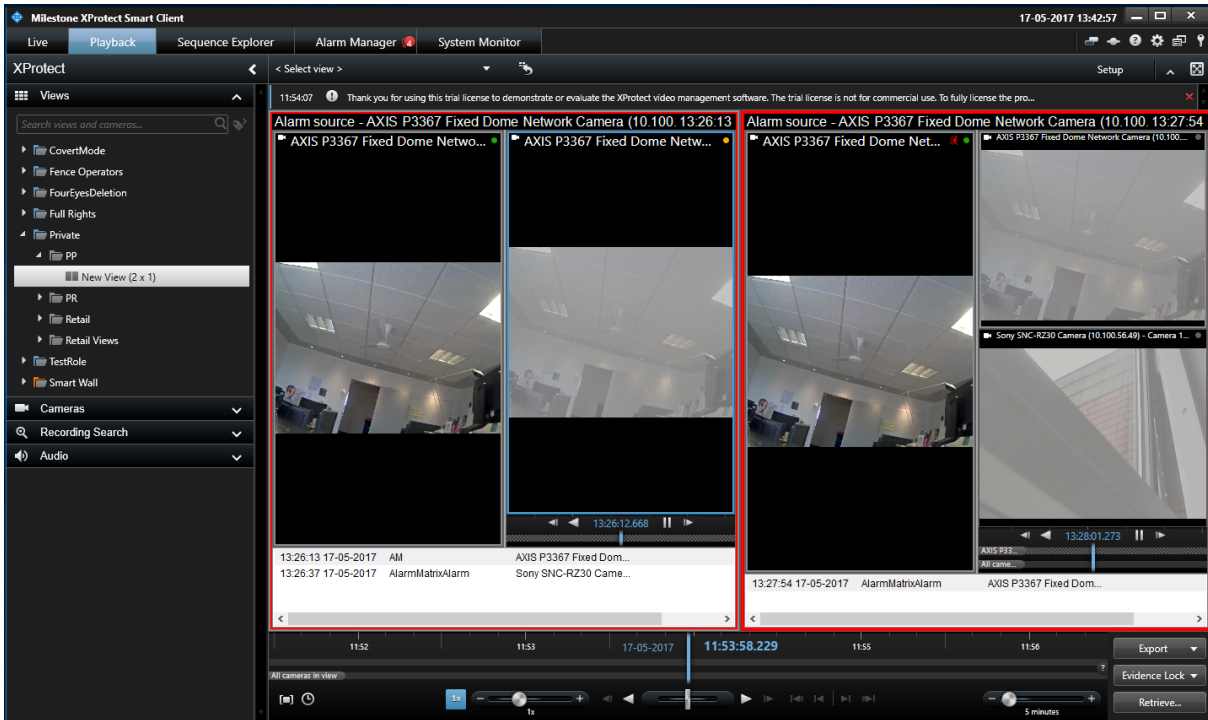
Figure 10: Alarm Matrix Close Action 1 in effect

To close the only existing alarm in the 2nd Alarm Matrix, we just need to click on **Ctrl + 9** simultaneously.
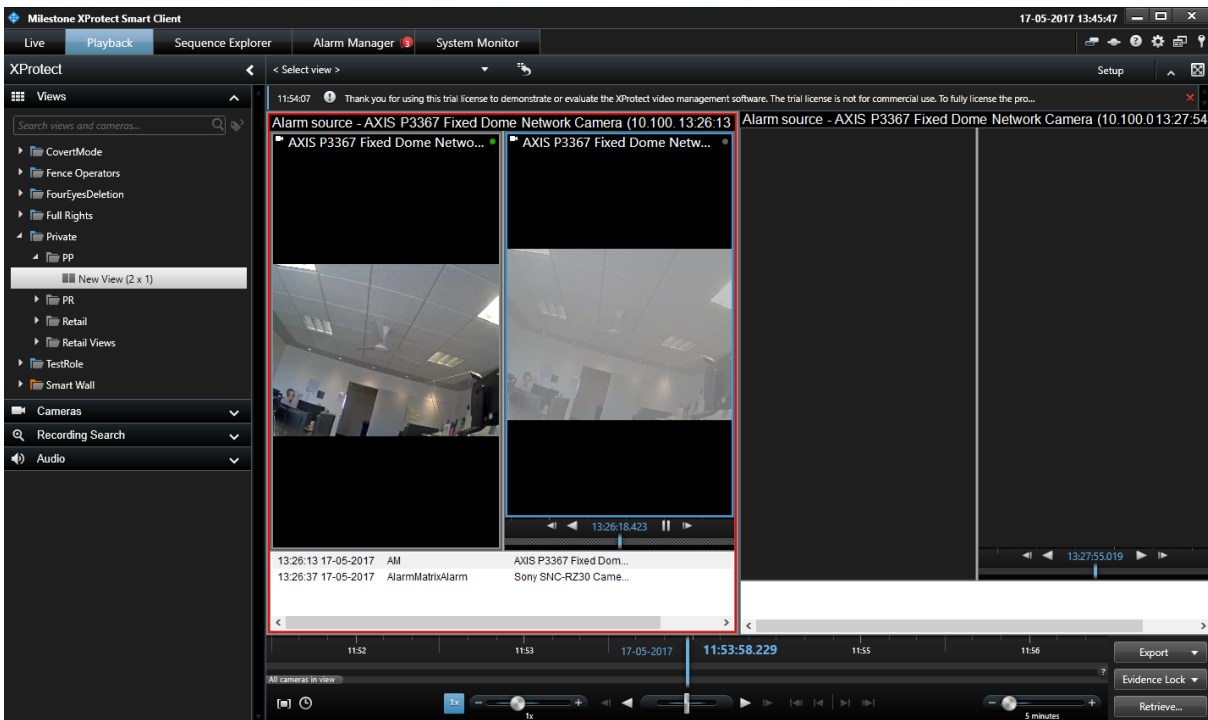

Figure 11: Alarm Matrix Close Action 4 in effect

The above screenshot shows the state of the XProtect® Smart Client after Alarm Matrix Close Action 4 is executed.

Appendix

Alarm Definition

To populate the Alarm Matrix with alarms, the Video Management System needs to be configured to create alarms on events. The following section provides a very basic introduction to configuring alarms. For a more detailed description please refer to the product documentation of your selected video management system.

Alarms are created using Alarm Definitions. An Alarm Definition is used by the Milestone Event Server to create Milestone Alarms when a Milestone Event is recognized to match the Alarm Definition (by the configured triggering event and source). Practically all Milestone Events can be used in the Alarm Definition, but for simplicity the following description uses Analytic Events, which can easily be simulated and can origin from any source.

To define a new alarm for Alarm Matrix integration, make sure that the events which are needed to trigger the alarms must be already available in the system.

Navigate to the "*Alarms*" section of Milestone XProtect® Management Client application. Right click on "*Add New*" section on the "*Alarm Definitions*" tab.
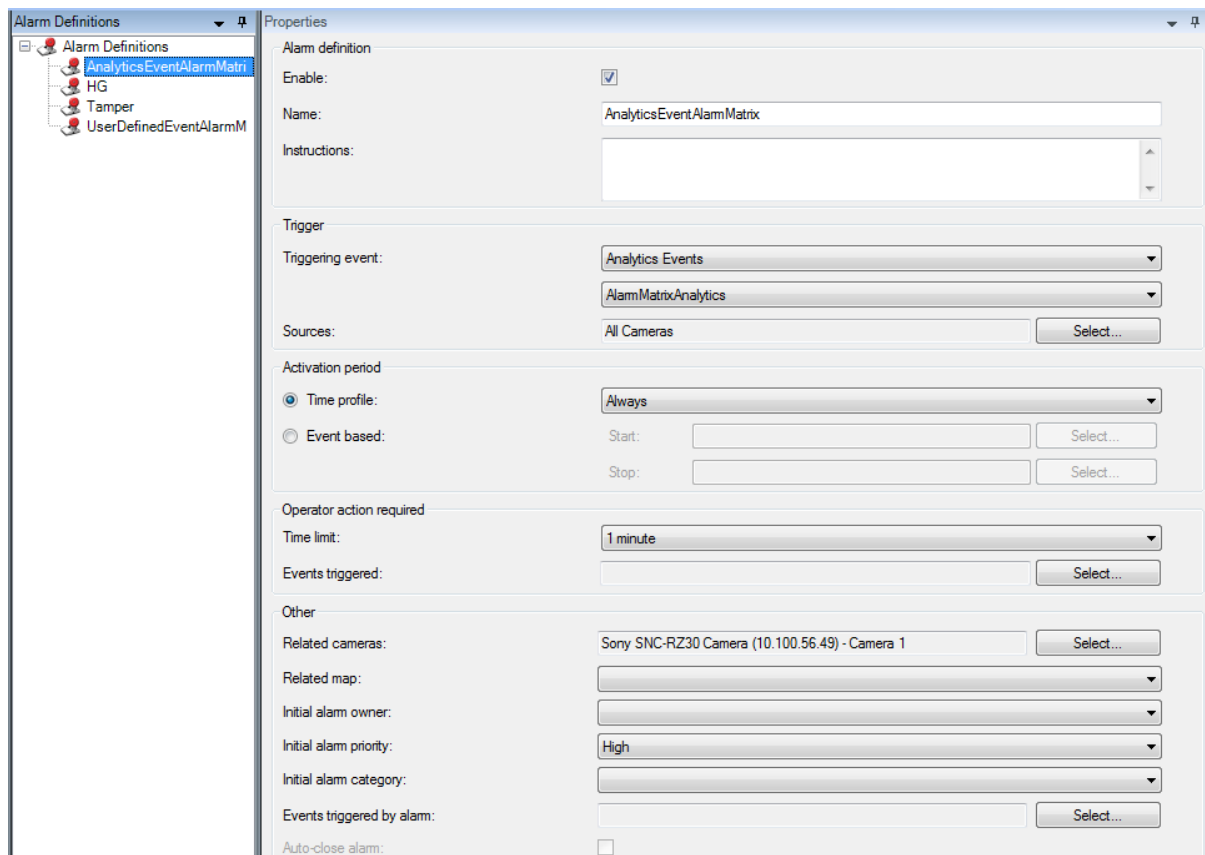

Figure 12: Defining a new user defined alarm for Alarm Matrix

As seen on the above picture, the user can define a name of his/her preference and description regarding the new alarm being defined. As a triggering event, an Analytics Event which already exists in the system is selected among the list of available events. The cameras which can trigger this alarm must also be defined during alarm definition. In this example, all cameras are enabled as alarm sources even though anything can be an analytics event source. Another field that a user can define is related cameras. In the example pictured above, a Sony SNC RZ30 series camera is defined as a related camera for this specific alarm.

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