VIVOTEK
A Delta Group Company

ADMINISTRATION GUIDE

FOR

MILESTONE® XPROTECT AND VIVOTEK DEEP SEARCH PLUGIN

Version 2.4
2023/6/16th

WWW.VIVOTEK.COM

VIVOTEK may make changes to specifications and product descriptions at any time, without notice.

The following are trademarks of VIVOTEK INC. and may be used to identify VIVOTEK products only: VIVOTEK. Other product and company names contained herein may be trademarks of their respective owners.

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from VIVOTEK INC.

Revision History

Version	Comment
V1.0	Initial draft
V1.1	Added smart search agent
V1.2	1. Remove Running Speed Filter 2. Rename Plugin
V1.3	Add a check box to enable the camera to set the recording server as its NTP server
V1.4	1. Add vehicle filter 2. Add parking violation detection 3. Add restricted zone detection
V1.5	1. Fix the NTP server name check issue 2. Rename the plugin
V1.6	1. Fix a search error when the user draws a search area that is larger than fisheye FOV. 2. Add flow to configure a local NTP server.
V1.7	1. Add the VIVOTEK Deep Search plugin
V1.8	1. Add Architecture Overview 2. Add XProtect Smart Client Workspace diagram. 3. Update VIVOTEK Deep Search for Milestone naming, icon, and file path.
V1.9	1. Add: 9 FAQs
V2.0	1. File rename to “Administration Guide for Milestone XProtect and VIVOTEK Deep Search Plugin”. 2. Wording Correction
V2.1	1. Wording Correction.
V2.2	1. Correct Supported Milestone Version information.
V2.3	1. Update 9 FAQs: Add Search Limitation.
V2.4	1. Update images for 8 Deep Search Plug-in & Operation. 2. Add 9 FAQs: Storage Capacity for Deep Search Plugin Object Metadata. 3. Add 9 FAQs: Object metadata and video matching issue. 4. Add 9 FAQs: No object metadata on the existing camera.

Index

1. For Milestone® XProtect Users

Proprietary plugins are available for users who install VIVOTEK cameras with video content analysis (VCA) suite in a deployment managed by Milestone XProtect Corporate IP solutions. Note

The plugins enable VIVOTEK VCA rules and analytics events to overlay on cameras displayed in the XProtect Smart Client in both live and playback modes. The on-board Deep Learning VCA suite includes Intrusion Detection, Loitering Detection, Line Crossing Detection, Unattended Object Detection, Missing Object Detection, Face Detection, Crowd Detection, Running Detection, Parking Violation Detection, and Restricted Zone Detection.

The plugins also provide a forensic search function for the results detected by the VCA rules.

The plugins are designed for single-server operation. For multiple server operations, please contact VIVOTEK regional sales team for further updates.

- The VIVOTEK Smart Search Plugin, is designed for a single camera that monitors a specific area without the witness of providing specific time, or virtual images of the events. For example: Something was missing from the warehouse last week, it should be someone taking it out of the warehouse. We can use the smart search function with a specific time range and camera + detection area of the entrance by setting new VCA rules of Smart Motion +Human; Line Crossing, Intrusion, or Loitering to dig out the suspects.
- The VIVOTEK Deep Search Plugin is designed for single or multiple cameras that can generate attribute metadata (which follows the ONVIF analytics specifications) and filter the criteria in a specific area or multiple scenes.

  Where the witness indicates those details (or gives rough ideas) of the human with gender and/or vehicle types, and clothes color factors, within a specific time range. These rough ideas are used to filter detected objects (humans/vehicles) and displayed with actual videos that are recorded on the Milestone XProtect system. Even more, users can indicate specific rules and attributes of searching objects on the specific camera to narrow down the results as evidence and then export the video data.

NOTE:

The VIVOTEK VCA Plugin applies to (2020 or later version):

XProtect Professional / XProtect Professional +/ XProtect Expert / XProtect Corporate / XProtect Express / XProtect Express+ / XProtect Essential+

The VIVOTEK Smart Search Plugin applies to:

XProtect Express (+) 2022 or later version / XProtect Professional (+) 2022 or later version / XProtect Expert 2020 or later version / XProtect Corporate 2020 or later version

The VIVOTEK Deep Search Plugin applies to:

XProtect Express (+) 2022 or later version / XProtect Professional (+) 2022 or later version / XProtect Expert 2022 or later version / XProtect Corporate 2022 or later version

Plugins do not apply to:

XProtect Go / XProtect Essential (+)

2. Check the NTP server

Time synchronization between the camera and Milestone XProtect server is very important for keeping metadata synced with the video. To synchronize cameras and servers, you can use an NTP server. In general, an NTP server is either a public domain time service (e.g., time.google.com) or a local server that synchronizes to an external NTP server. Because there probably exists some time difference between cameras in the network, it is recommended that you set up an NTP server on the computer which runs the Milestone XProtect servers and synchronizes all cameras to it.

Follow these instructions to configure your local computer as an NTP server:

(1) Open the Windows command prompt.
(2) Issue the following command to stop the Windows time service:
`net stop w32time`
(3) Launch Windows Run (by pressing Windows Key + R), enter regedit, and click OK to open the Regitry Editor.
(4) Go to *Computer\HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\W32Time\Parameters*
(5) Create a DWORD registry key **LocalNTP** (or double-click it) and set its value to 1.
(6) Go to
Computer\HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\W32Time\ TimeProviders\NtpServer
(7) Double-click **Enabled** and set its value to 1.
(8) Go to *Computer\HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\W32Time\Config*
(9) Double-click **AnnounceFlags** and set its value to 5.
(10) Close the Regitry Editor.
(11) Issue the following command to start the Windows time service
`net start w32time`
(12) Close the Windows command prompt.

For more information about setting up a local NTP server, please see How to Configure a Local NTP Server on HPE docs.

3. Getting Started

Complete the following procedure as the prerequisites for installing Milestone's XProtect Smart Client and the plug-in:

(1) Download VIVOTEK's VCA plug-in from VIVOTEK's Camera's download page for appropriate plug-ins (for x64 or x86 versions[1]).

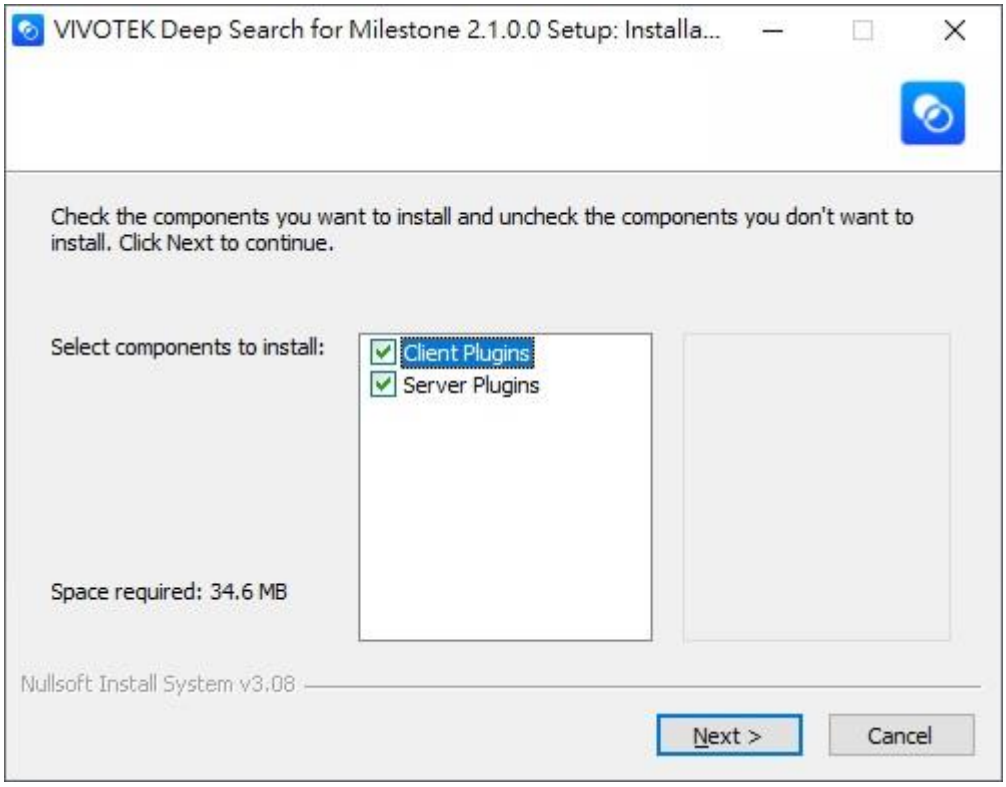
(2) Install the **.NET framework 4.7** Runtime[2]. The .NET framework is essential for installing XProtect Smart Client.

(3) Install the **DirectX runtime (9.29.1974)**[3] and above. The DirectX runtime is also necessary for the plug-in for managing DirectX components, especially for older Windows XP Systems.

(4) Install the Milestone XProtect Smart Client 2022 R1 or above. For related server plugin version requirements, please refer to the **NOTE:** of **1. For Milestone® XProtect Users**.

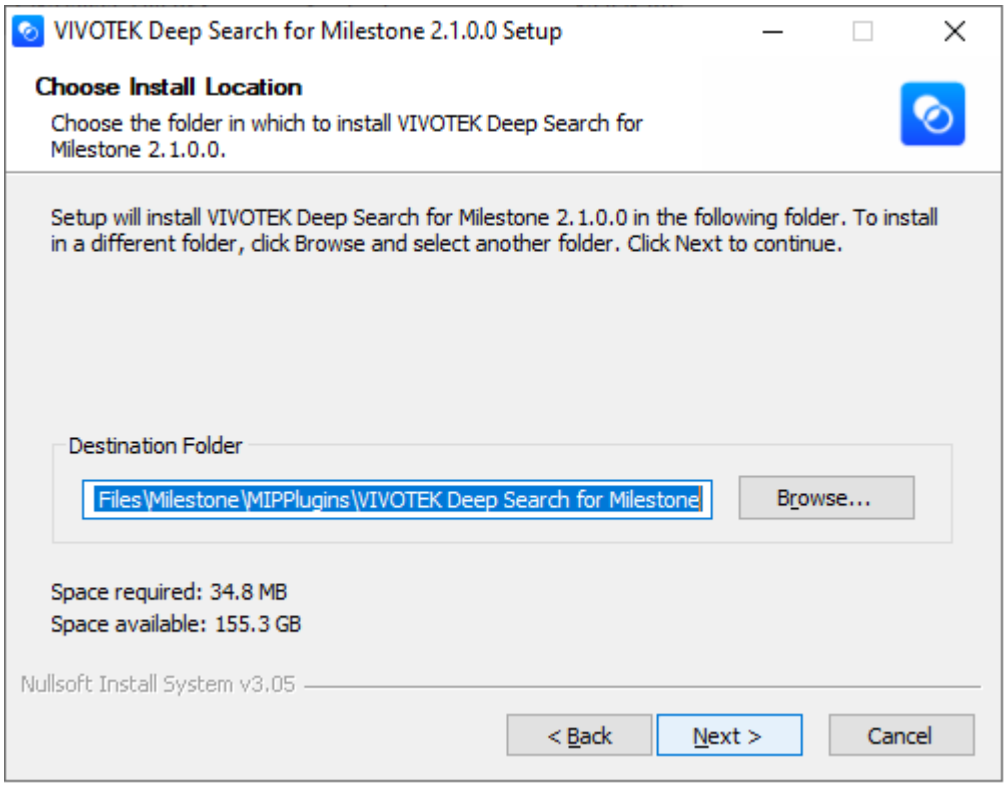
(5) Execute the VIVOTEK VCA Plug-in installer file:

a. Select components to install, client, or server plugins. Click "Next" to proceed with the installation.

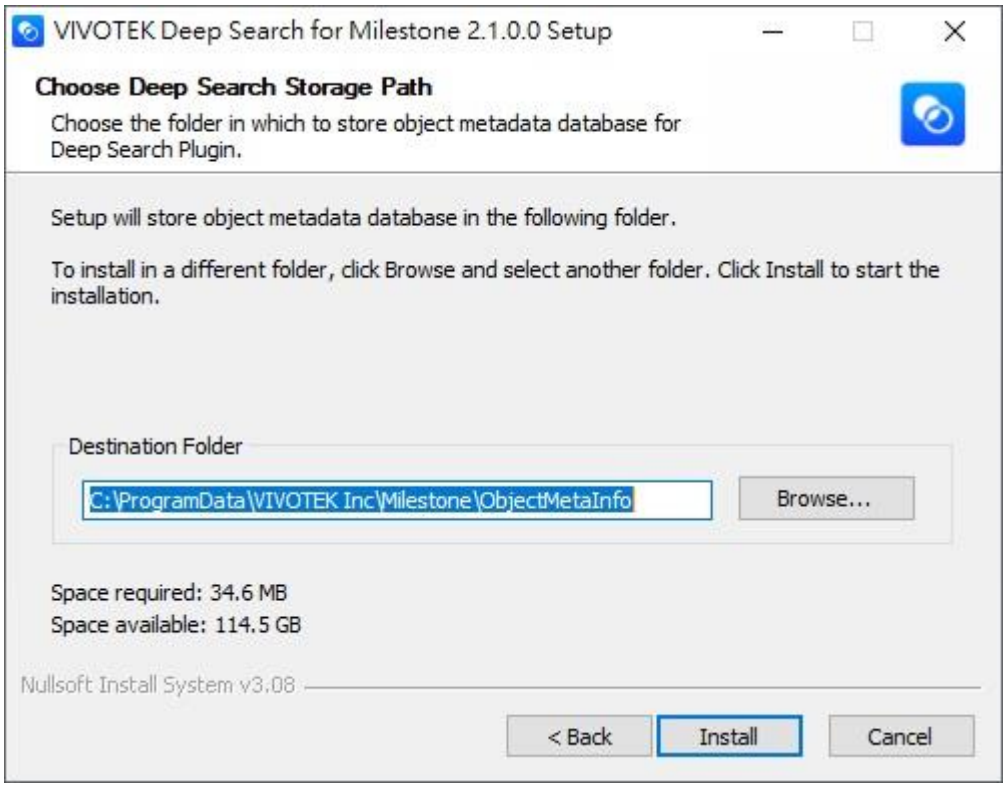


b. By default, a sub-folder named **MIPPlugins** is available under the XProtect Smart Client installation path. The default file path should look like the following:
C:\Program Files\Milestone\MIPPlugins\VIVOTEK Deep Search for Milestone

[1] OS supports extends from Windows 8.1 to Windows 10.
[2] .Net Framework: https://dotnet.microsoft.com/download/dotnet-framework/net47
[3] DirectX: http://www.microsoft.com/en-us/download/details.aspx?id=8109



c. Select deep search metadata storage path. The default file path should look like the following: **C:\ProgramData\VIVOTEK Inc\Milestone\ObjectMetaInfo**



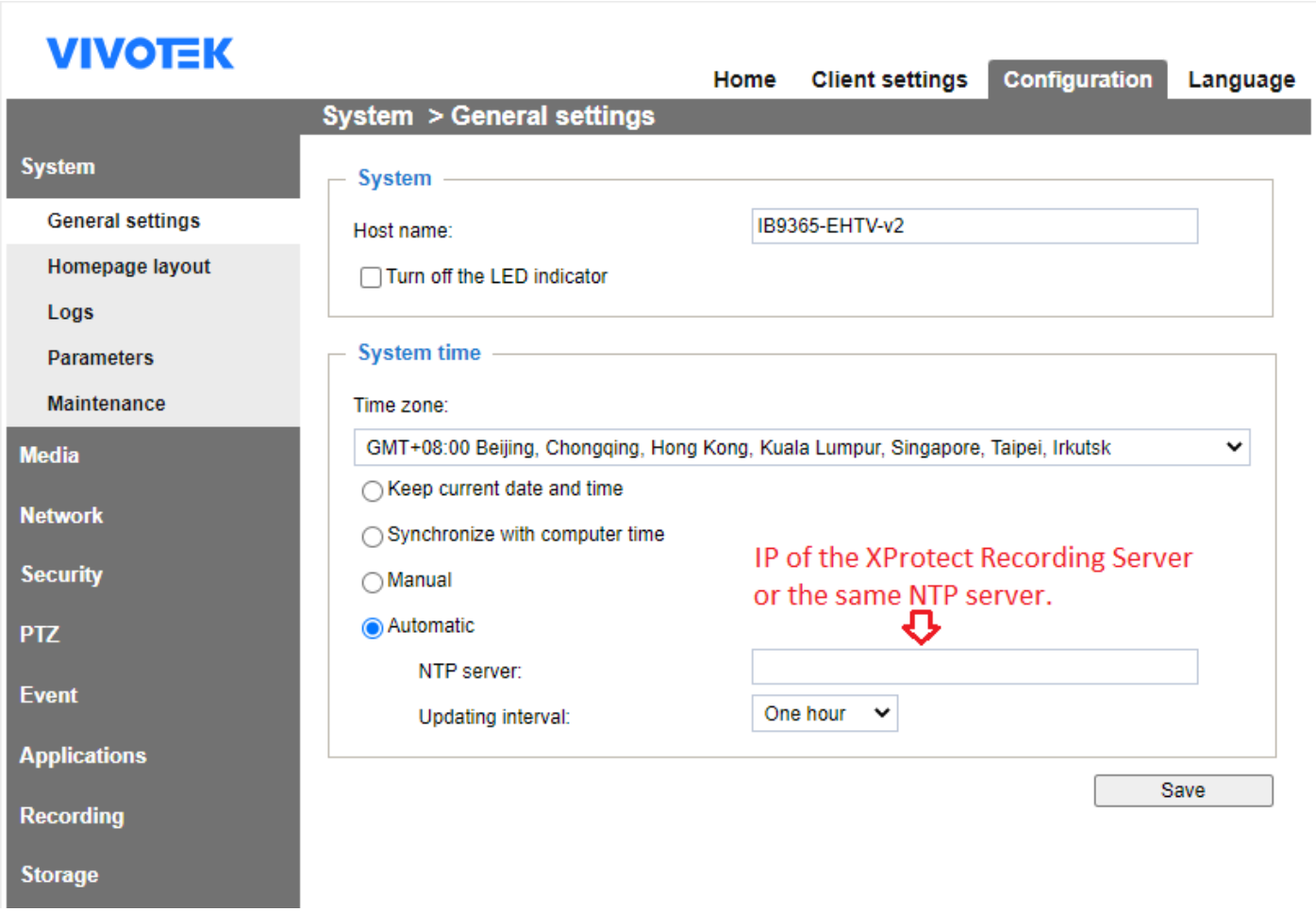
For storage capacity concerns, it is recommended to store Object Metadata in a separate location with a larger disk capacity, ensuring that it does not impact server operations.

d. Click Install to proceed with the installation.

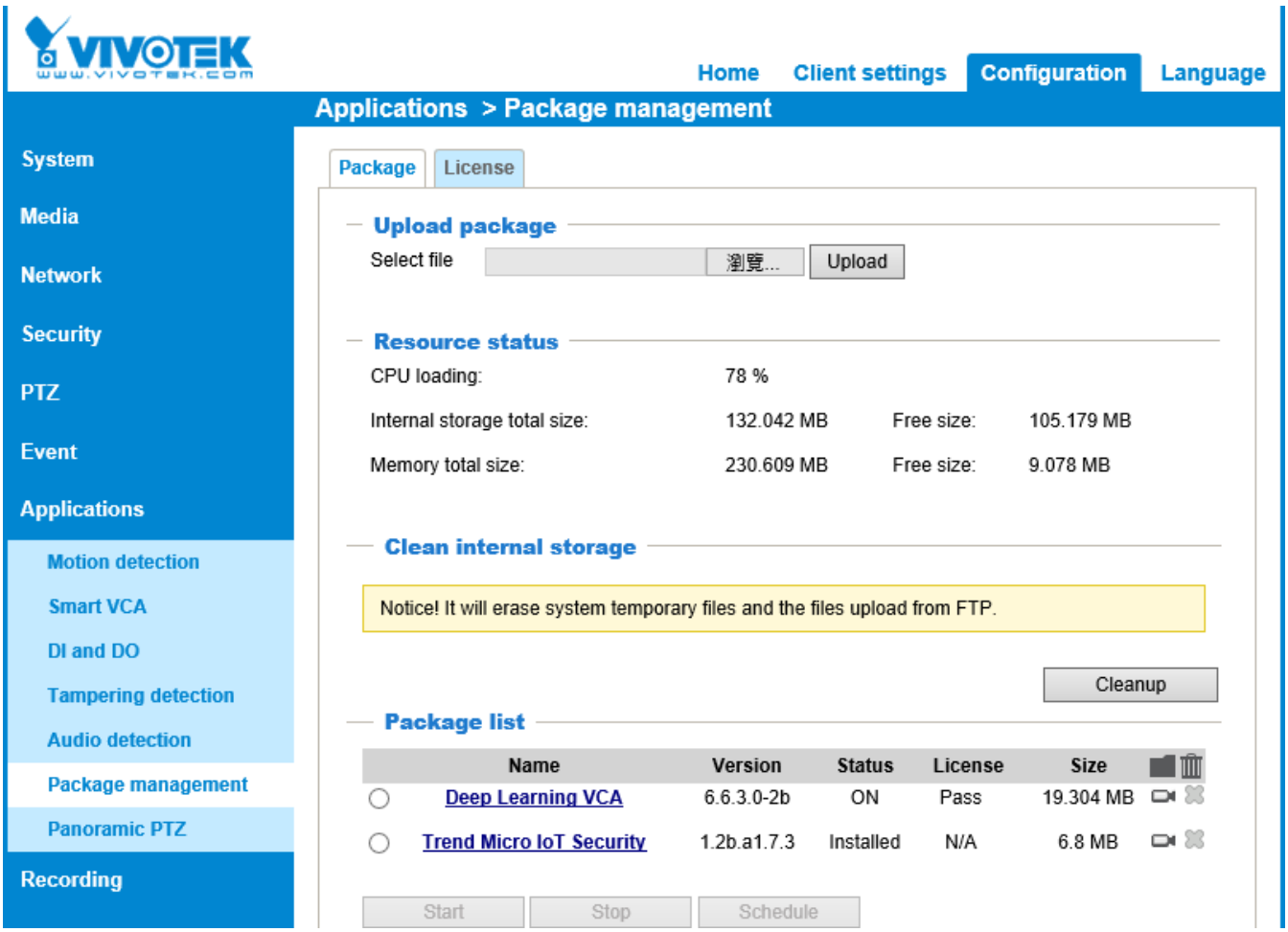
4. Prerequisites for Cameras

VIVOTEK Smart VCA is the next-generation video analytics suite running on VIVOTEK cameras for security applications. The onboard Smart VCA suite includes Intrusion Detection, Loitering Detection, Missing Object Detection, Unattended Object Detection, Line Crossing Detection, Face Detection, Running Detection, Restrict Zone Detection, and Parking Violation Detection. For related supported models and features, please visit:
https://blob.vivotek.com/downloadfile/SmartVca/camera-analytic-chart_en.pdf

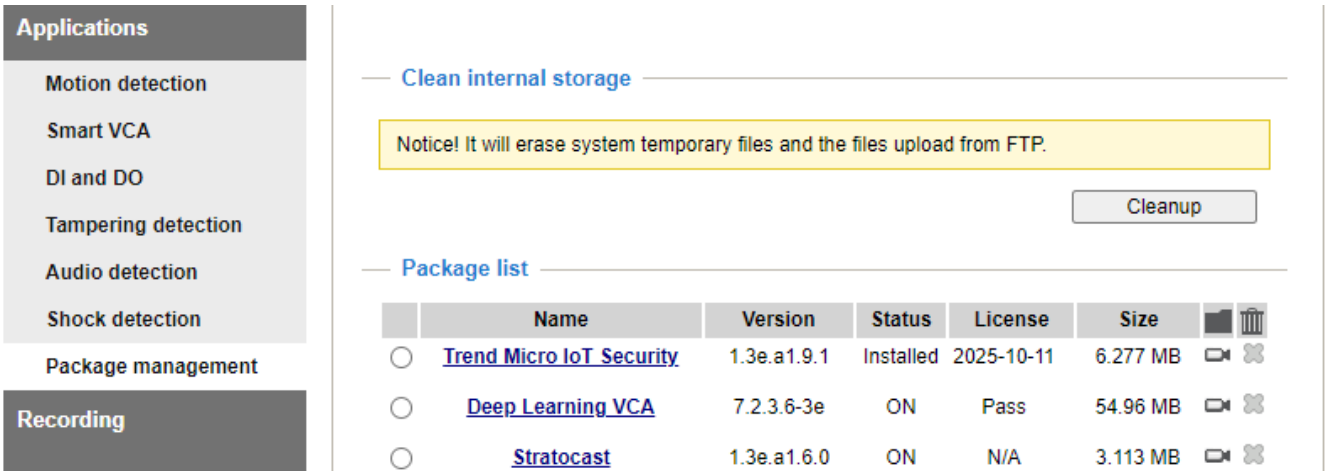
(1) **Attention:** Before you set up the Deep Learning VCA, please make sure the system time of the camera, must be synchronized with its NTP server as the same as the Milestone XProtect Recording Server (or setup to the XProtect Recording Server).



(2) For VIVOTEK Smart Search Plugin, please Install the Deep Learning VCA Package with version 6.6.3.0 or above with a valid license, and Firmware version n.2nnn.2n.nnx. (n= numbers, x = letters).



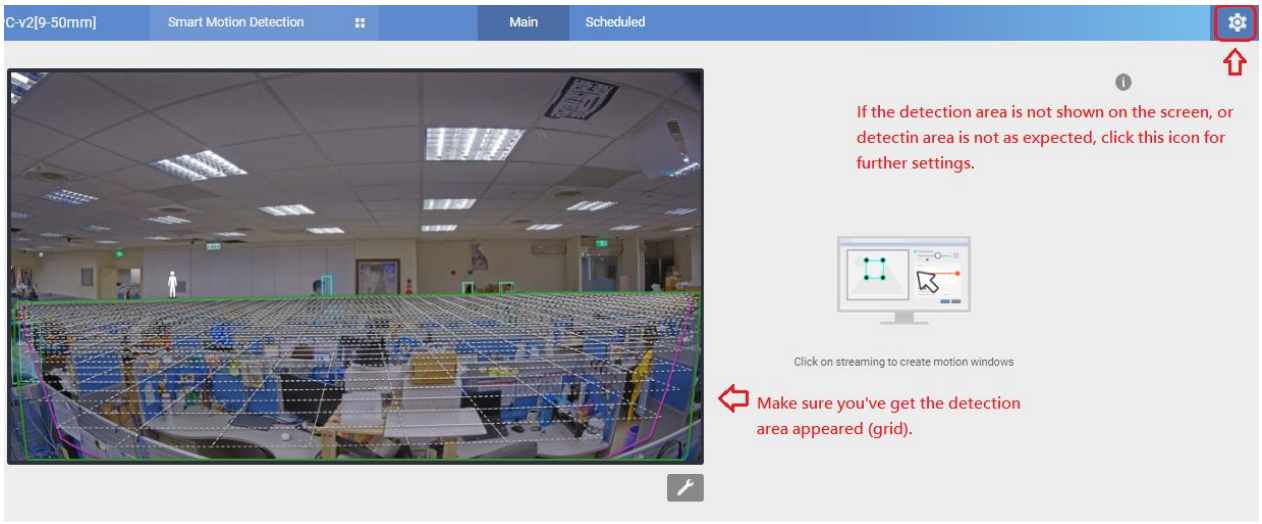
(3) For VIVOTEK **Deep Search Plugin**, please Install the Deep Learning VCA Package with version **7.2.3.6** or above with a valid license, and Firmware version n.2nnn.3n.nnx. (n= numbers, x = letters). The attribute extraction is not supported for the models of FD/IB9x65-A, FD/IB9x87-A, FD/IB9x67-v2, FD/IB/IT9x89-v2, which firmware version is n.2nnn.3n.nnx.



(4) Click on the VCA package to open the monitoring and configuration page.

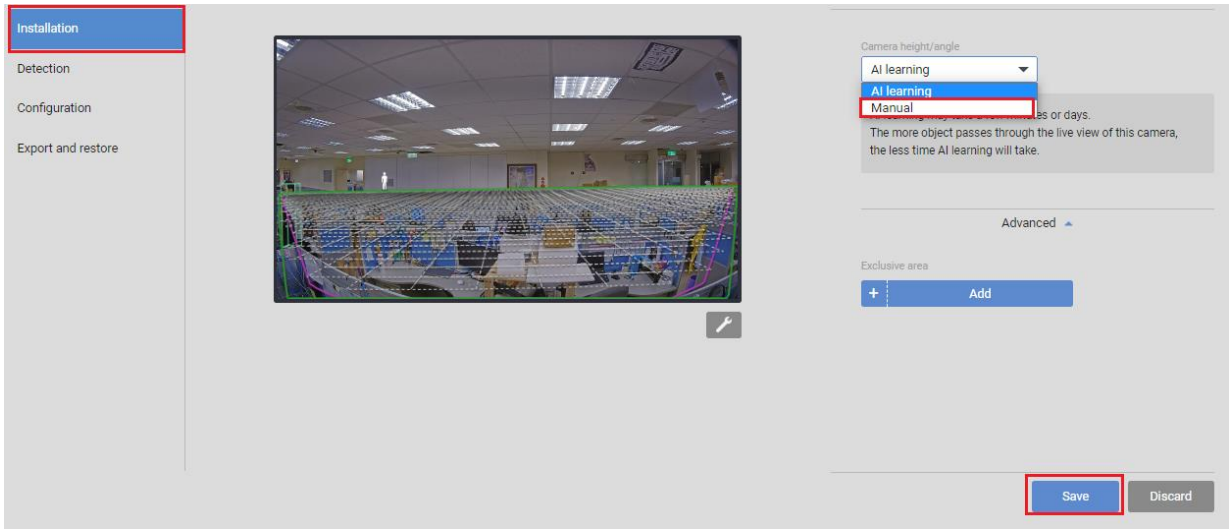
a. Make sure you've got the detection area that appeared (grid).

If the detection area is not shown on the screen or is not as expected, click the icon for further settings.

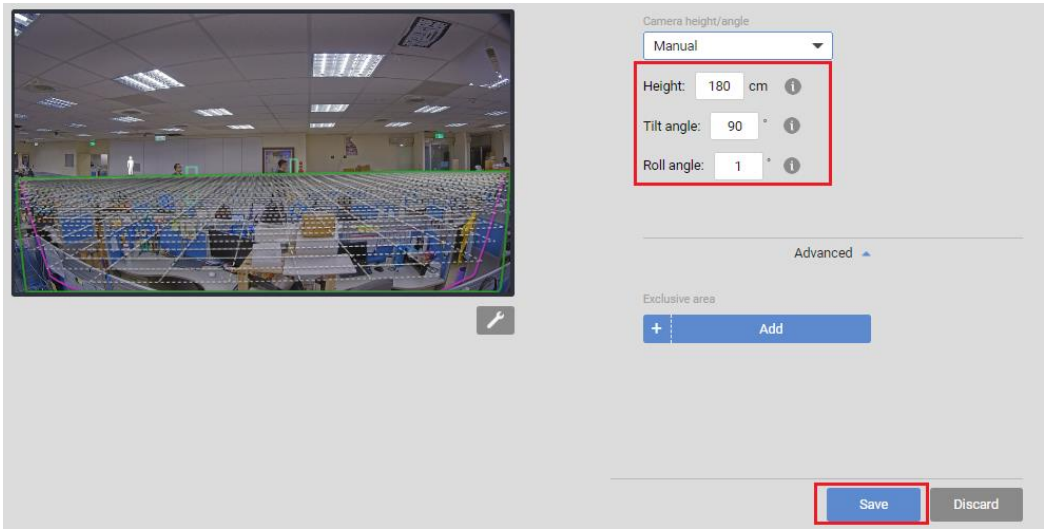


b. You can either choose AI learning (for auto-detection and setting) or Manual for the expected detection area you need.

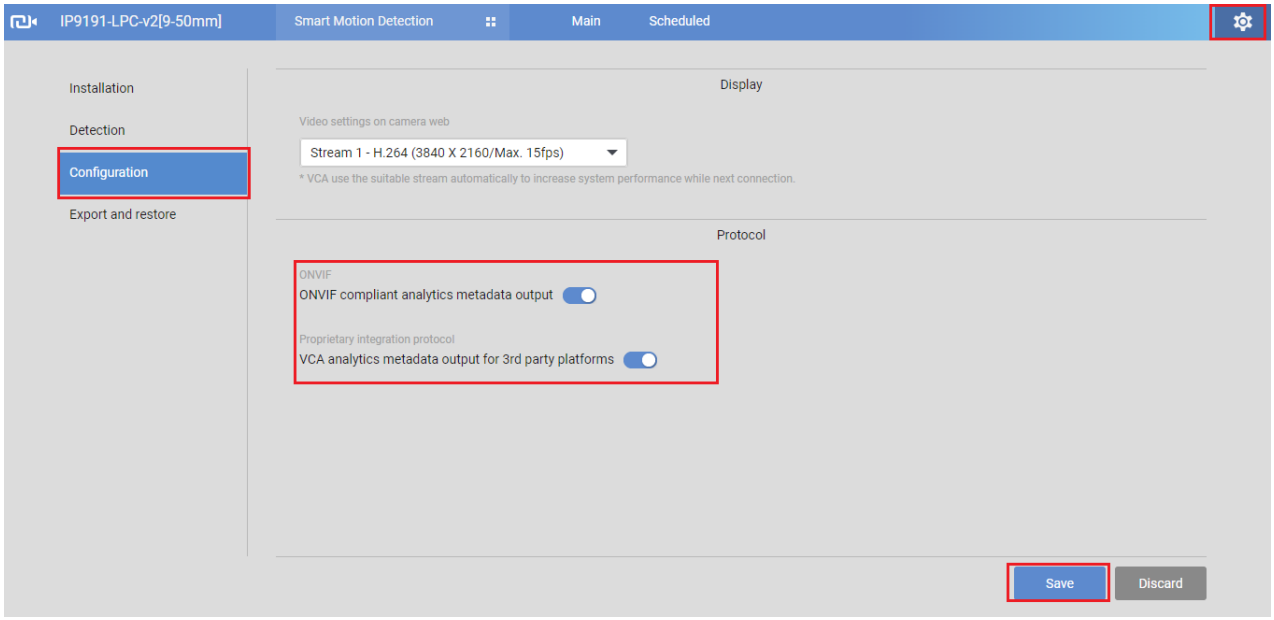
Installation > Camera height/angle > AI learning / Manual (updates) > Save



or



c. Enable Protocol Settings for VIVOTEK VCA & Search Plugins.
Configuration > Protocol > ONVIF Compliant analytics metadata output and VCA analytics metadata output for 3rd party platforms > Save



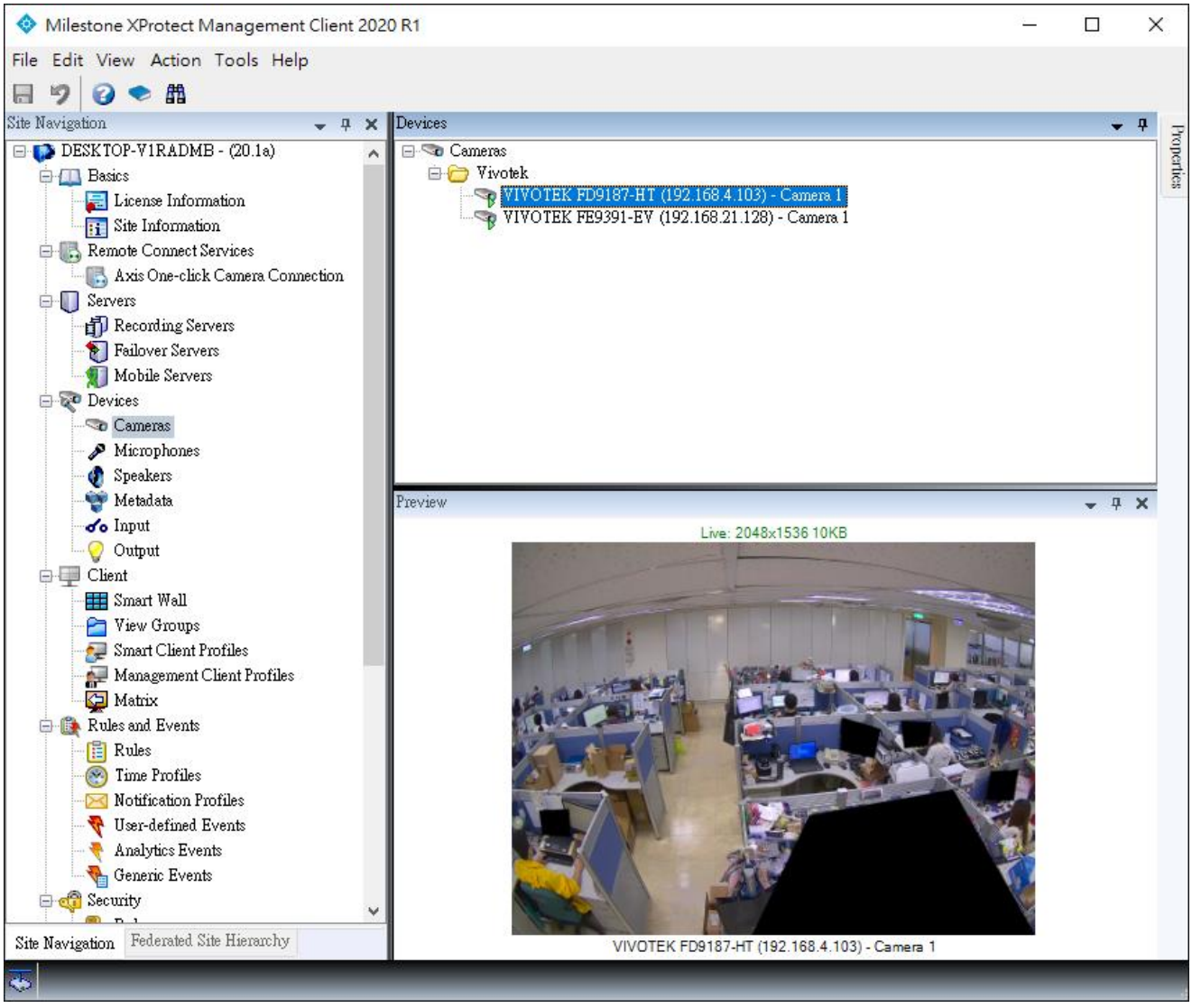
- The "ONVIF compliant analytics metadata output" provides the default bounding box (yellow frame) that can display "live & playback" views for human or vehicle objects.
- The "VCA analytics metadata output for 3rd party platforms" delivers the VCA rules, human/vehicle identified bounding box under "live & playback" views, and "item preview" in the search workspace. This may require higher storage capacity for "MediaDatabase". For some complicated scenarios, the metadata file size may reach 300~750MB per hour per camera with this feature enabled (internal). For the Smart Search plugin, this feature may require keeping its search function. For the Deep Search feature itself, the object metadata may require 20MB per day without this feature enabled.

(5) For more VCA event rule settings, please follow the Smart VCA manual to setup VCA rules and events:
http://download.vivotek.com/downloadfile/solutions/vadp/smart-vca-manual_en.pdf

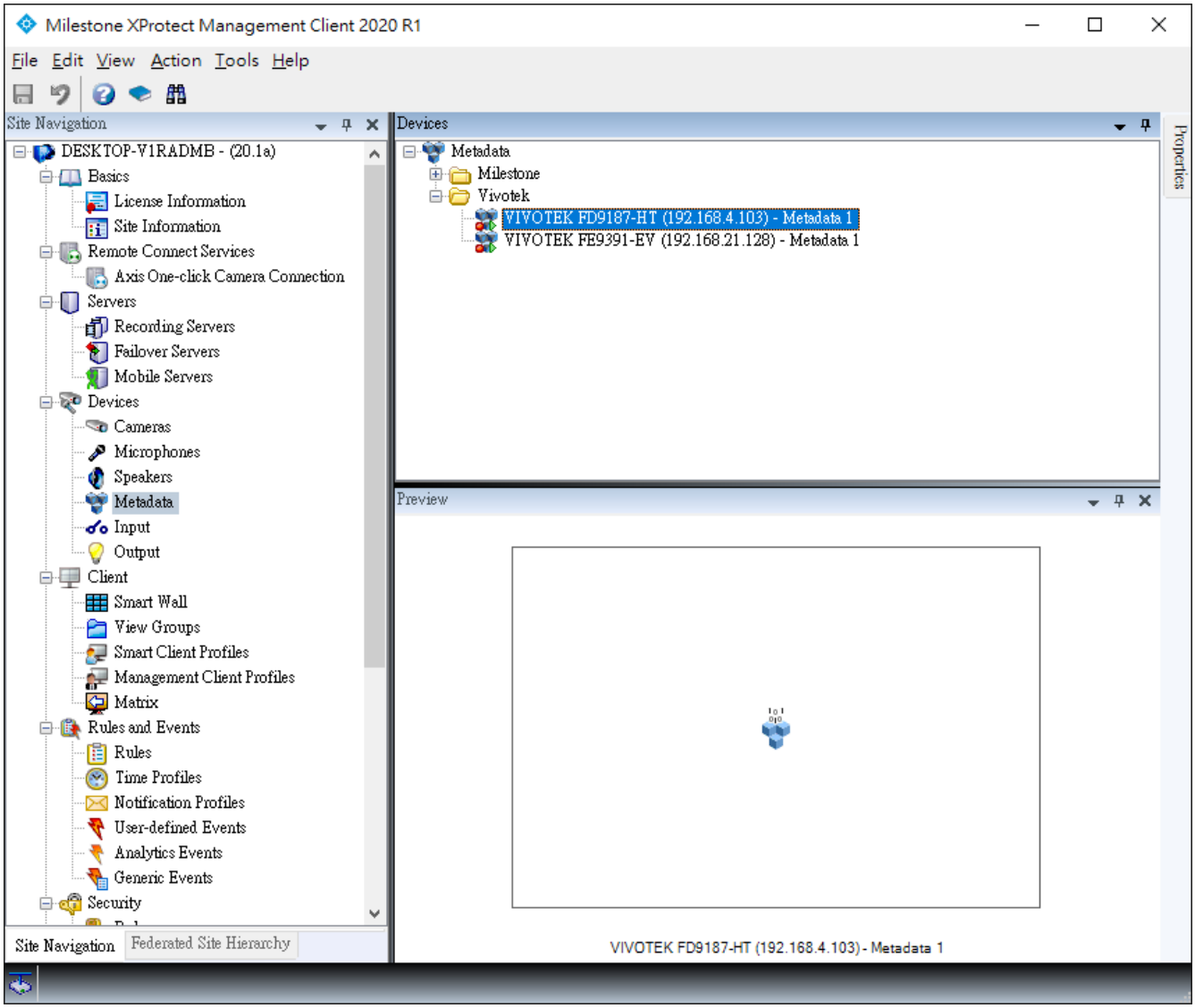
5. Setup VCA Cameras

Server Side

(1) Make sure your VCA cameras have already been added as "**Hardware Devices**" in the XProtect Recording Server of the XProtect Management Client, here we used Milestone XProtect Corporate as an example. (Related server plugin version requirements, please refer to the **NOTE:** of **1. For Milestone® XProtect Users**.)



(2) Make sure your VCA cameras have relative metadata stream enabled.



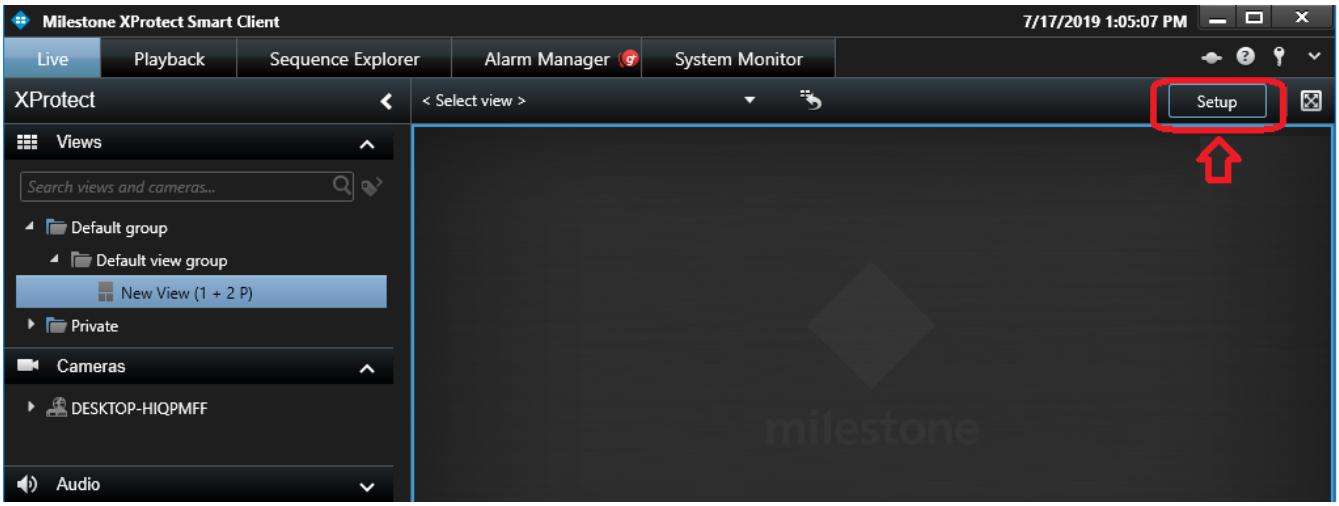
6. VIVOTEK VCA Plug-in & Operation

This plugin will overlay VIVOTEK VCA rules and analytics events on cameras displayed in the XProtect Smart Client in both live and playback mode.

Client Side

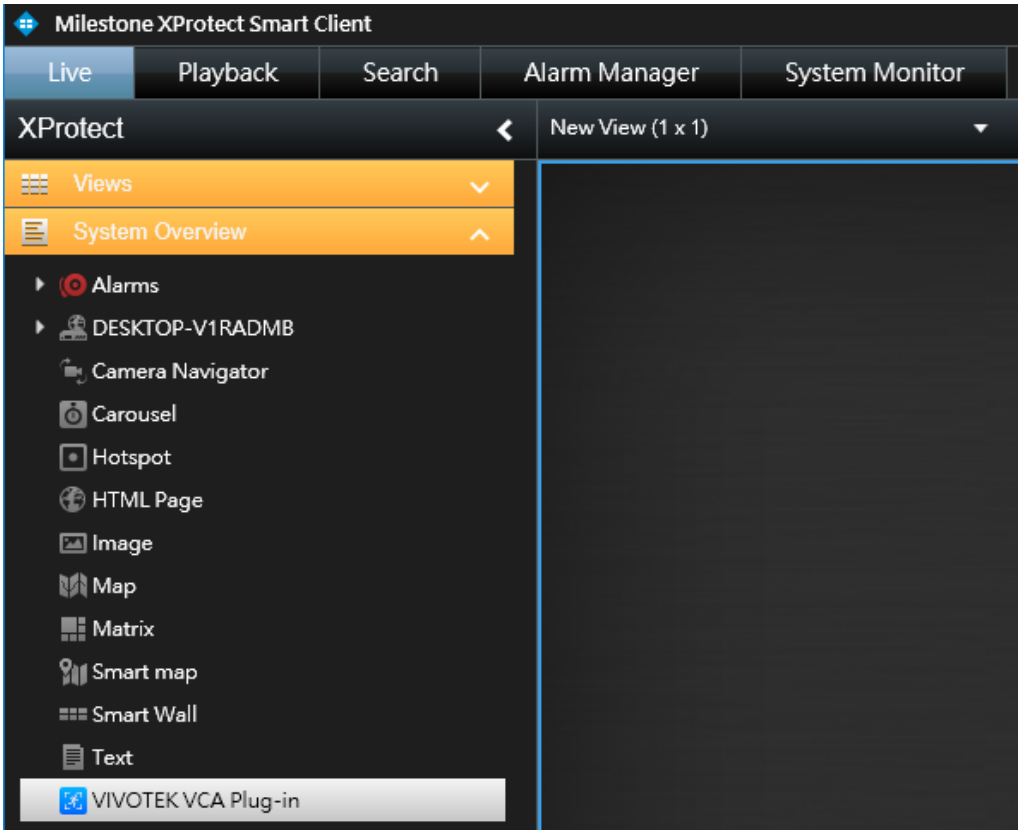
(1) Start the XProtect Smart Client and log in to your Milestone XProtect server.

(2) On the Live View window, click on "**Setup**".

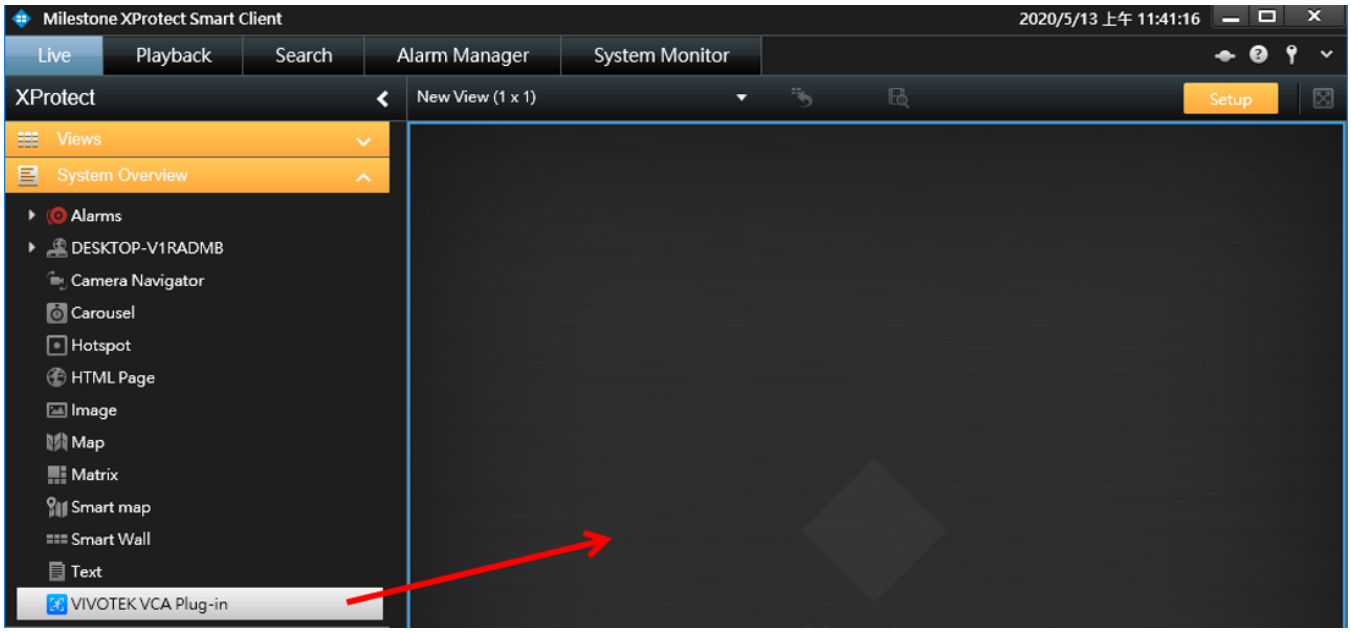


(3) On the Setup Window, search for the "**VIVOTEK VCA Plug-in**" by dragging the pull-down menu on the "**System Overview**" pane to the bottom.

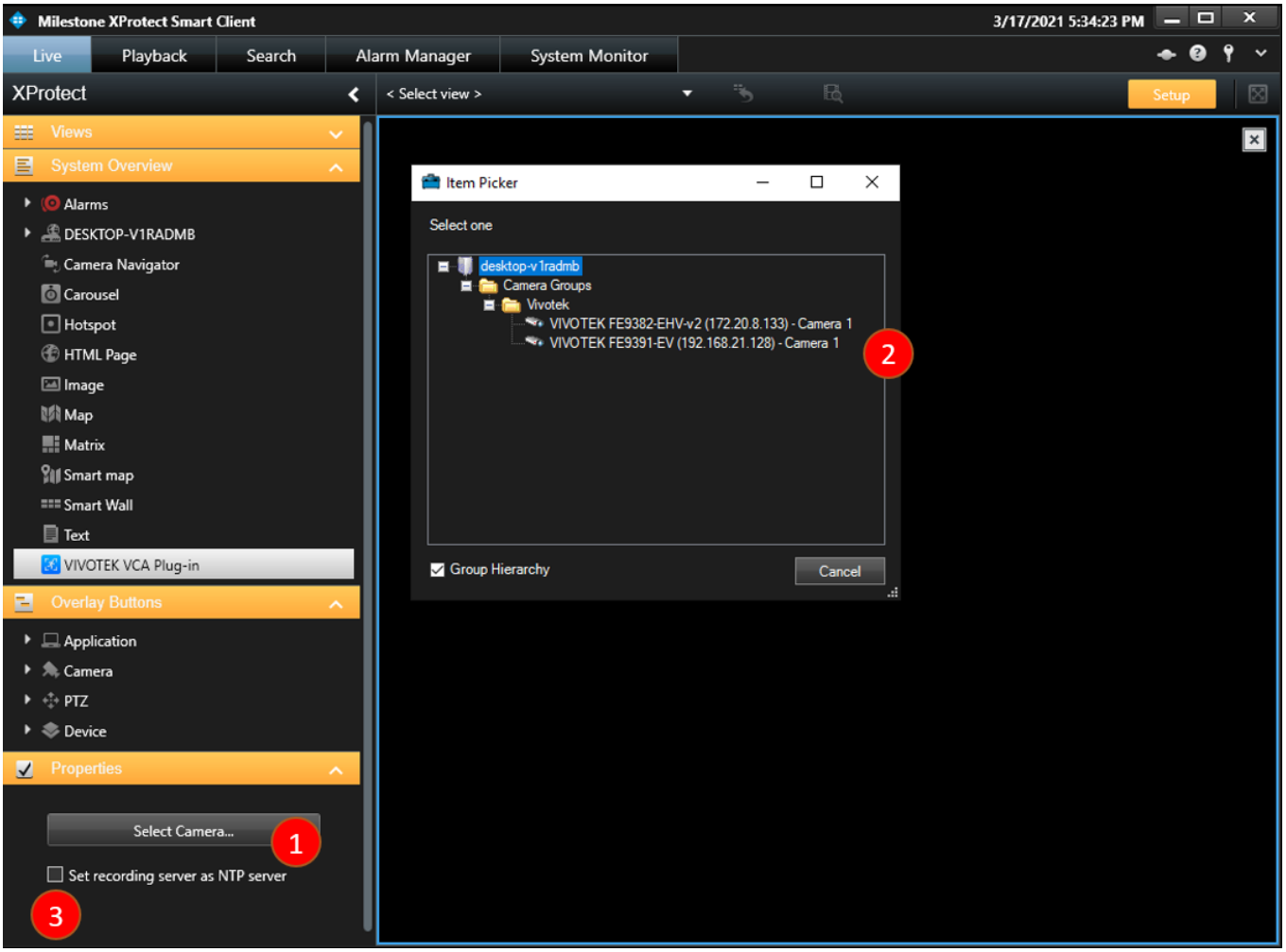
Please note, if you install the plug-in when your XProtect Smart Client is started, re-start the XProtect Smart Client utility.



(4) Click and drag the "**VIVOTEK VCA Plug-in**" to a view cell. When done, the view cell will be highlighted by a light blue outer frame.



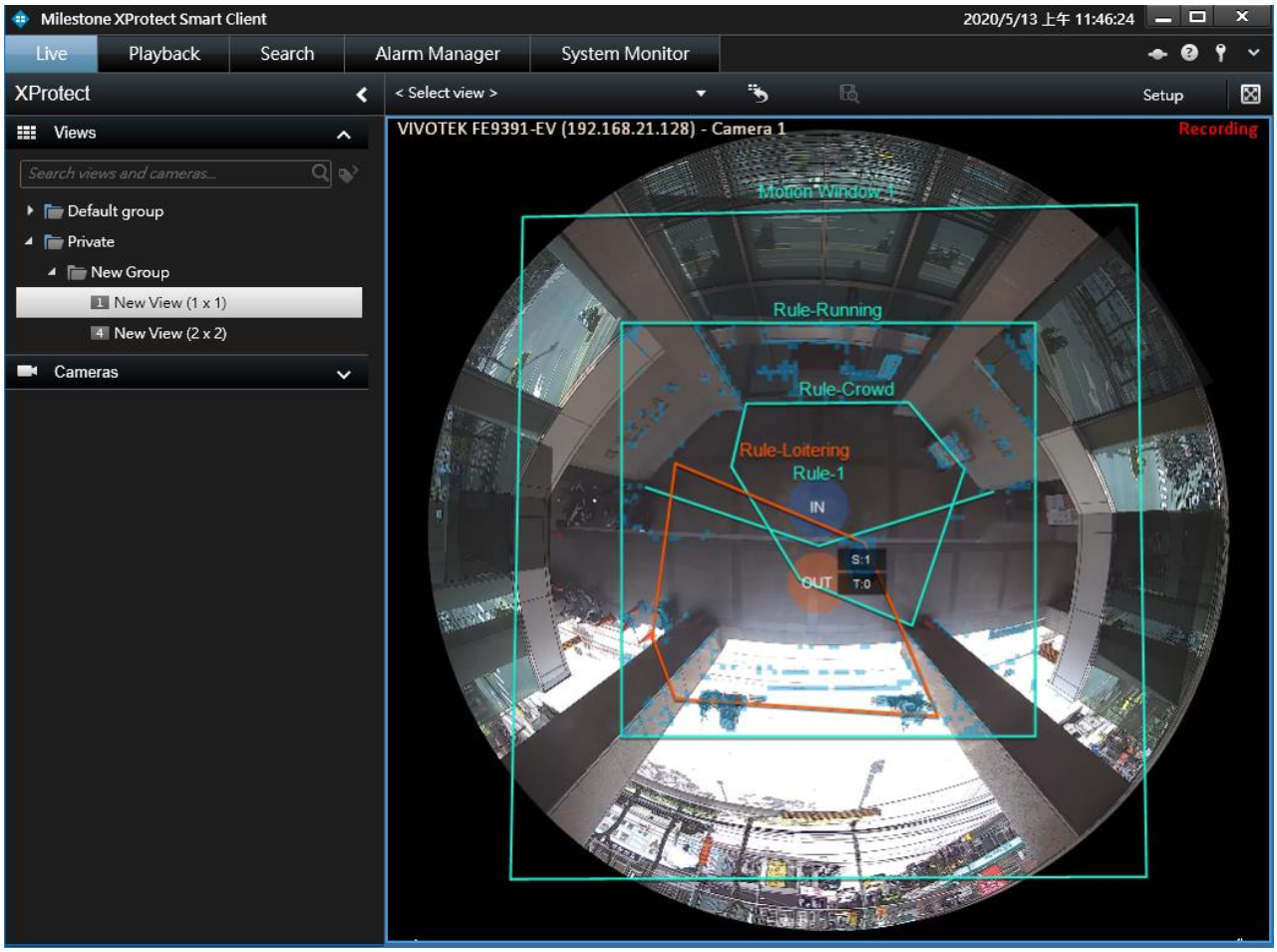
(5) Locate the Properties panel and click on the Item Picker pane. An Item Picker window will prompt. Unfold the device tree and select a VIVOTEK Camera.
A camera snapshot will be shown on the view cell after a few seconds for connecting to the server.



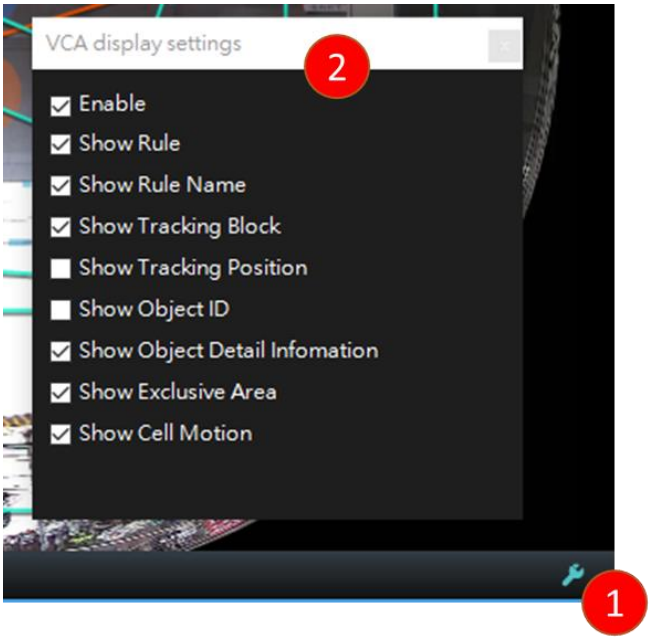
Optionally, selecting the "**Set recording server as NTP server**" check box enables the camera

to set the XProtect Recording Server as its NTP server. The target camera will try to synchronize time to the server periodically and metadata can match video more closely.

(6) You can now click on the "**Setup**" button and return to the "**Live**" view or "**Playback**" window. VIVOTEK VCA rules and analytics events overlay will display as shown in the picture below.

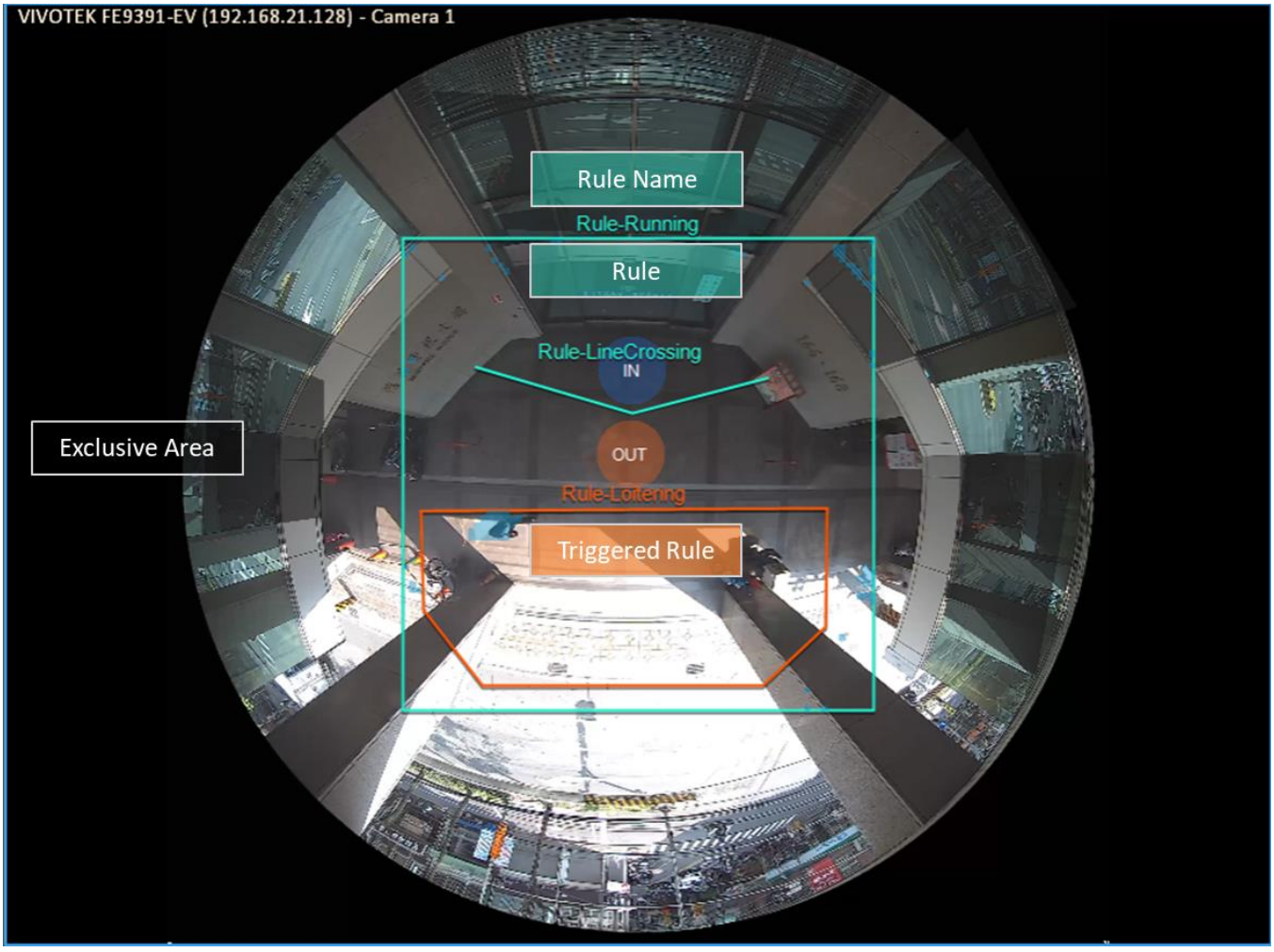


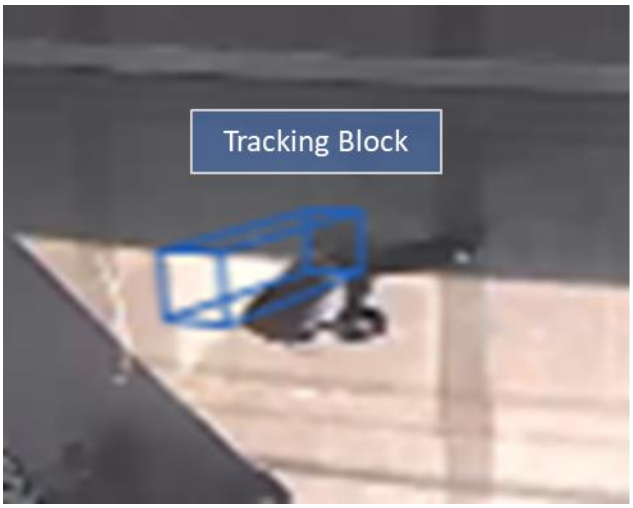
(7) When a view cell is moused over, the toolbar will be shown. Click the "**Tool**" button and the VCA display settings window will pop up. This window is also available when users right-click on the screen.

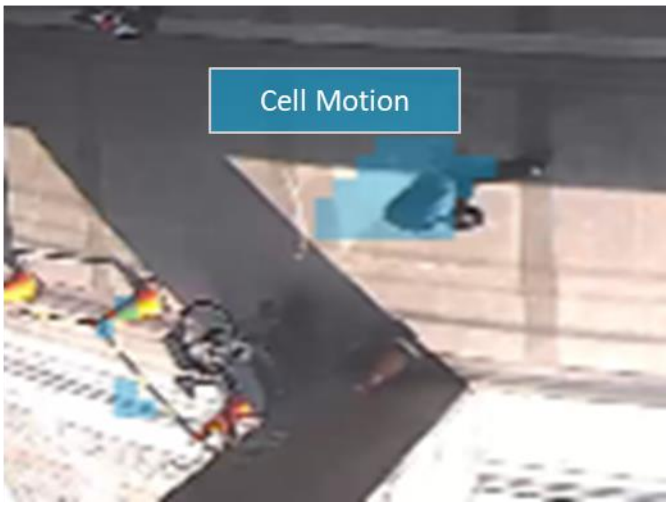


The following display settings can be configured in the “VCA display settings” window:

- **Enable:** It is a main switch to show or hide the whole VCA information.
- **Rule:** The VCA rules you created on the Camera Settings page. If an analytics event is triggered, the color of the rule will turn to orange color.
- **Rule Name:** The name of the VCA rule. It is available only if “Show Rule” is enabled.
- **Tracking Block:**
  1) The vertical bounding box surrounding a standing or walking human form.
  2) The purple bounding box surrounding a vehicle form.
- **Tracking Position:** The beginning and current positions of a tracked standing or walking human.
- **Object ID:** The ID number of a detected object (people). It is available only if the “Show Tracking Position” is enabled.
- **Object Detail Information:** It is available only if “Show Tracking Position” is enabled. The detailed information includes
  1) **Speed Level**: speed threshold for detecting running objects.
  2) **Time Duration of Stay**: calculated duration of stay of the detected objects in the scene.
- **Exclusive Area:** The Exclusive areas you created in the Camera Settings page.
- **Cell Motion:** Displays the motion cells around a moving object.





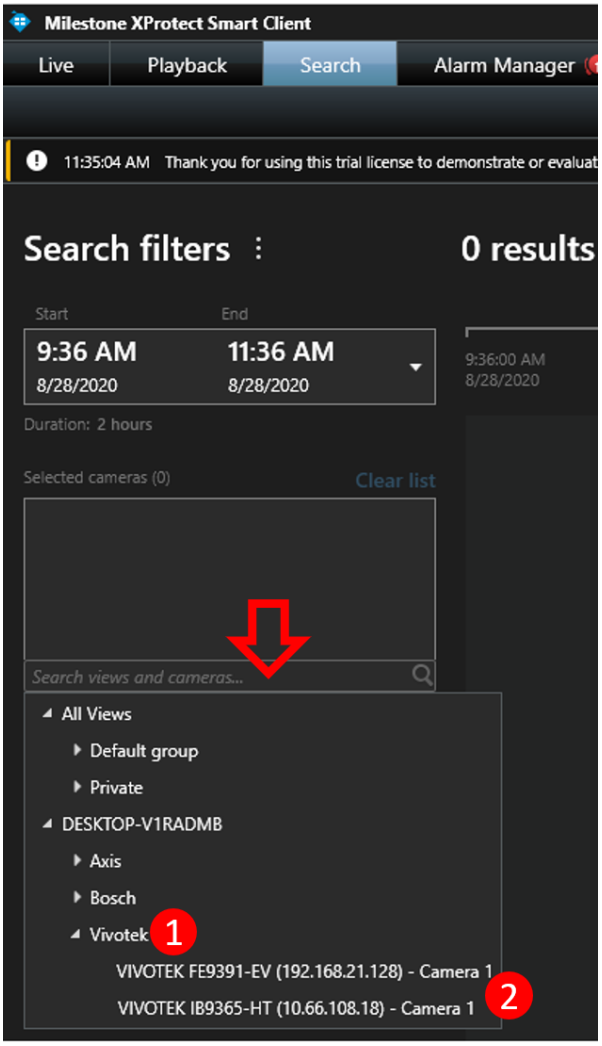


7.VIVOTEK Smart Search Plug-in & Operation

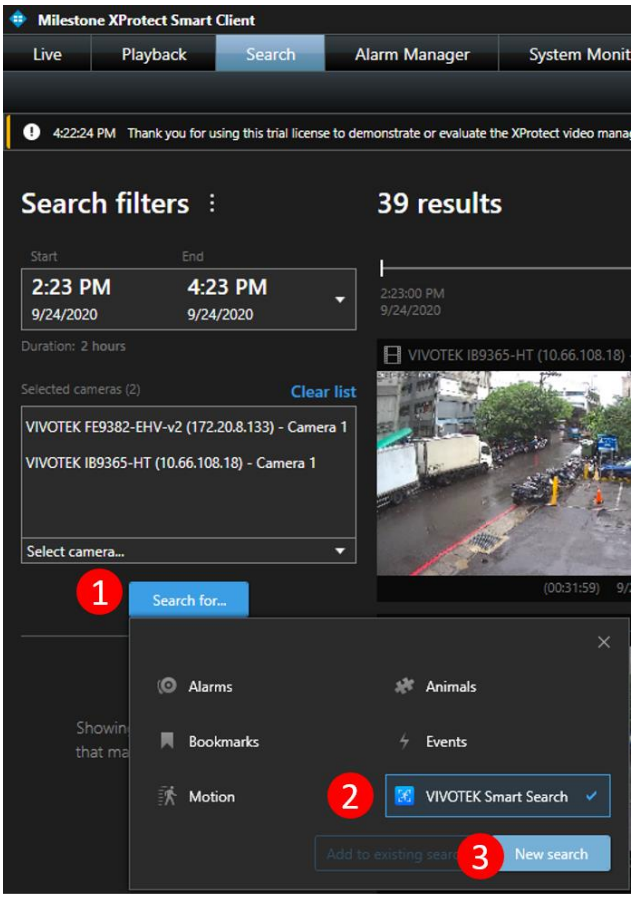
This plugin provides a forensic search function for the results detected by the VCA rules. After Milestone XProtect Recording Server records video and metadata stream data from a VCA camera, users can use this plug-in to search video by metadata. While starting a search process with a user-edited search filter, XProtect Smart Client will retrieve metadata and video from the database and check if any data fits the search filter. The search results will display on a storyboard.

Client Side

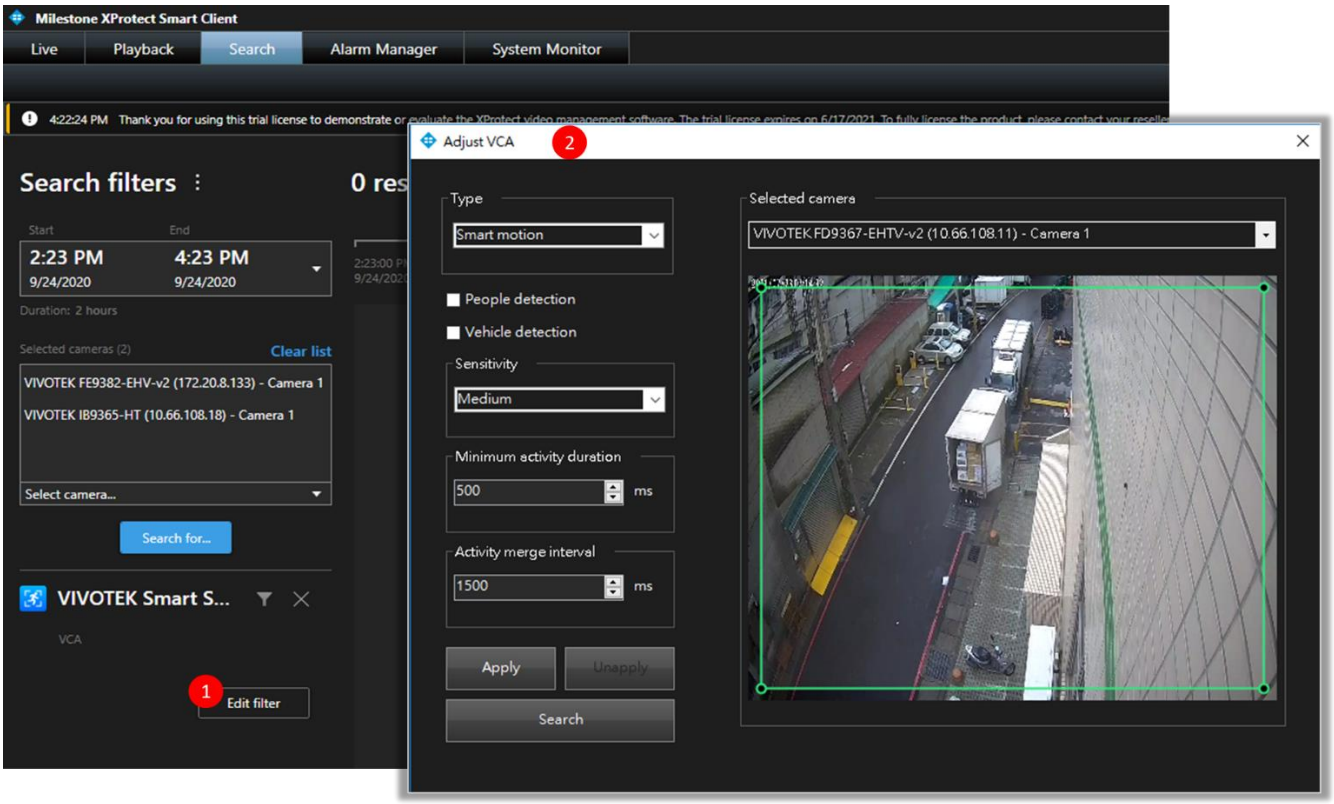
(1) Start the XProtect Smart Client and log in to your Milestone XProtect server.
(2) On the Search Agent window, click on "**Search**".
(3) Set search interval and select camera items by their group folder or individual items directly.



(4) Click "**Search for…**" and select "**VIVOTEK Smart Search**" then click "**New search**".

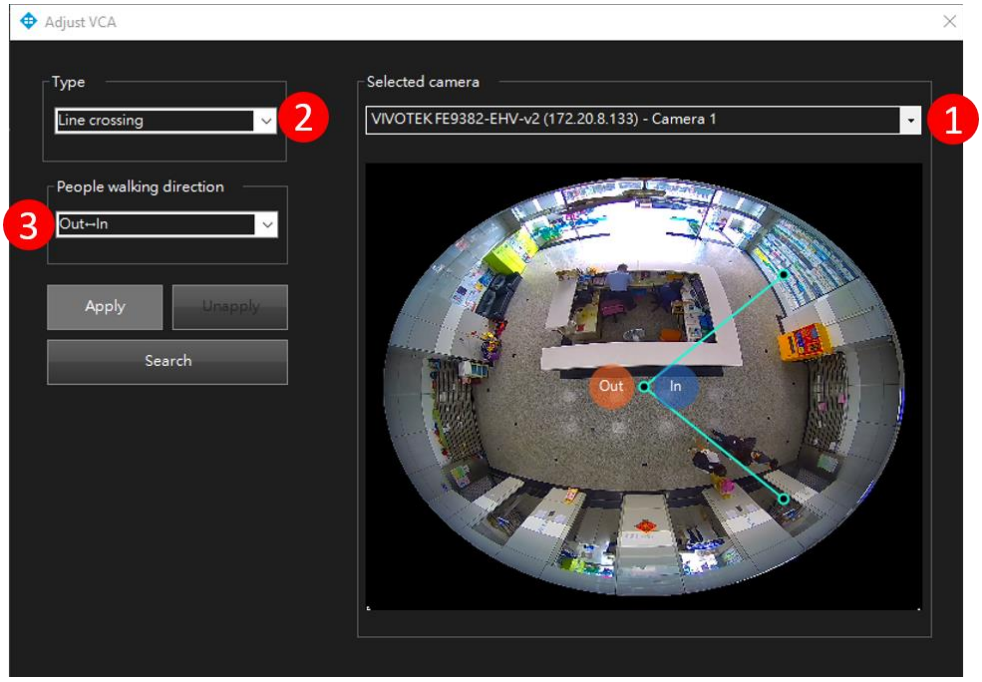


(5) In the "**VIVOTEK Smart Search**" category selection, click "**Edit filter**", and the "**Adjust VCA**" setting panel will pop up.

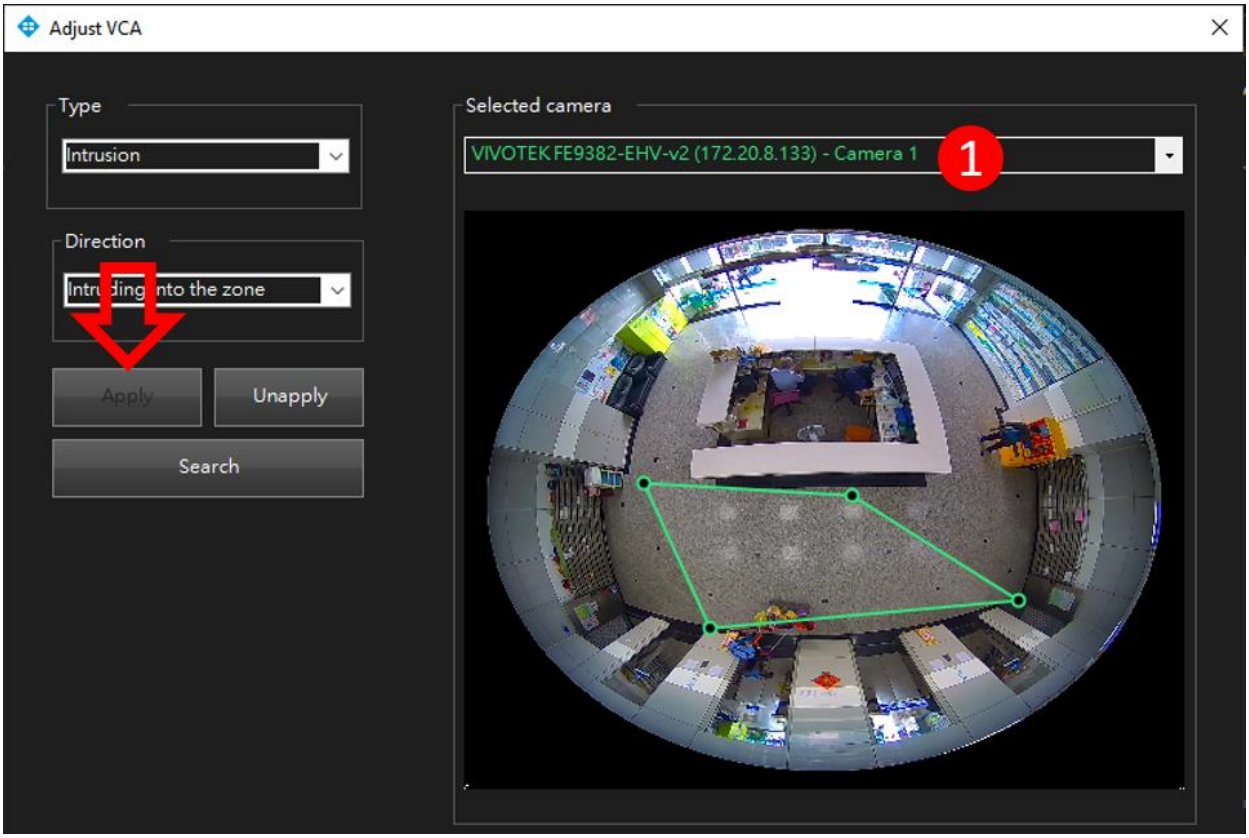


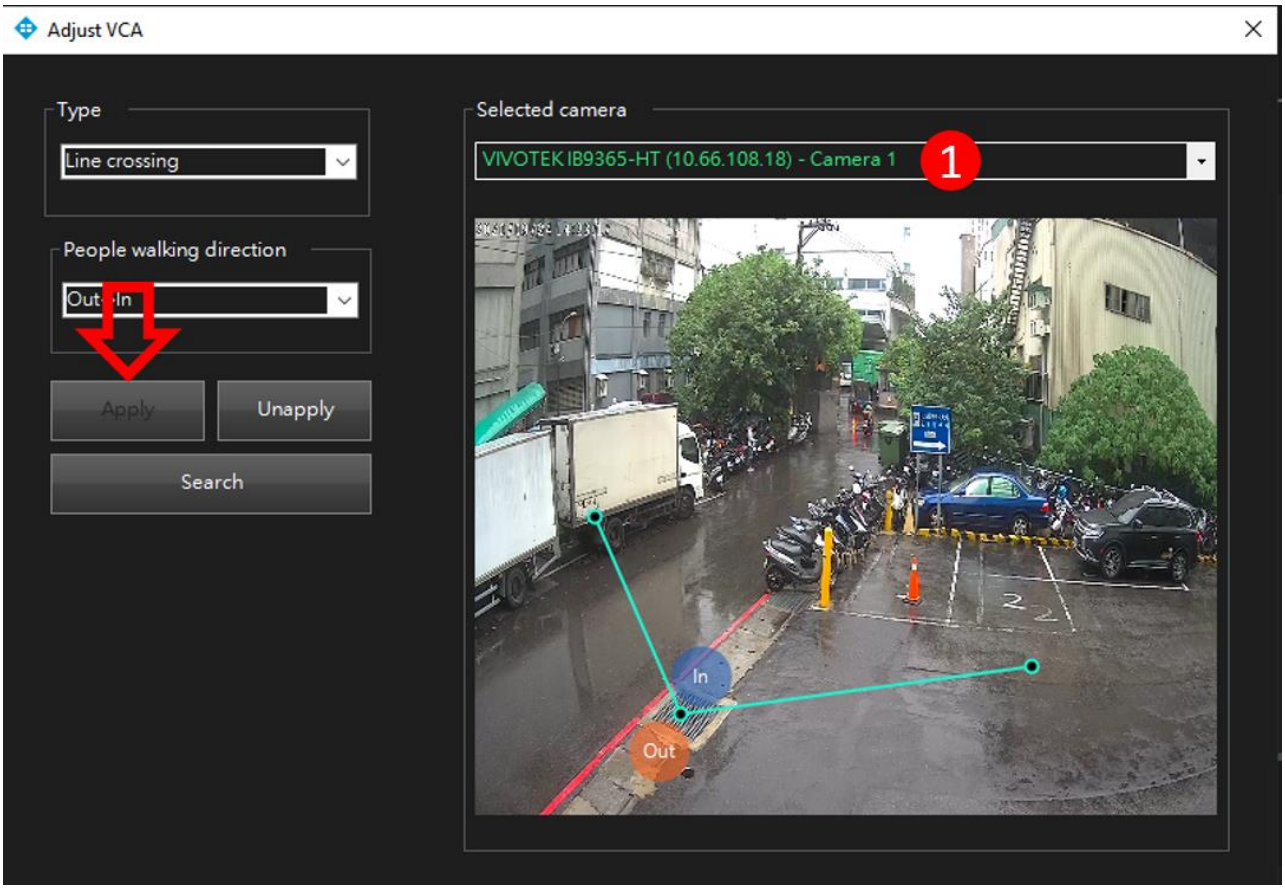
(6) In the "**Adjust VCA**" panel, the user can select a camera from the "**Selected camera**" area, and its playback preview will be shown immediately. Users can then select a rule in the "**Type**" area

and configure its properties. Additionally, users can adjust the detection lines or polygons on the playback preview.

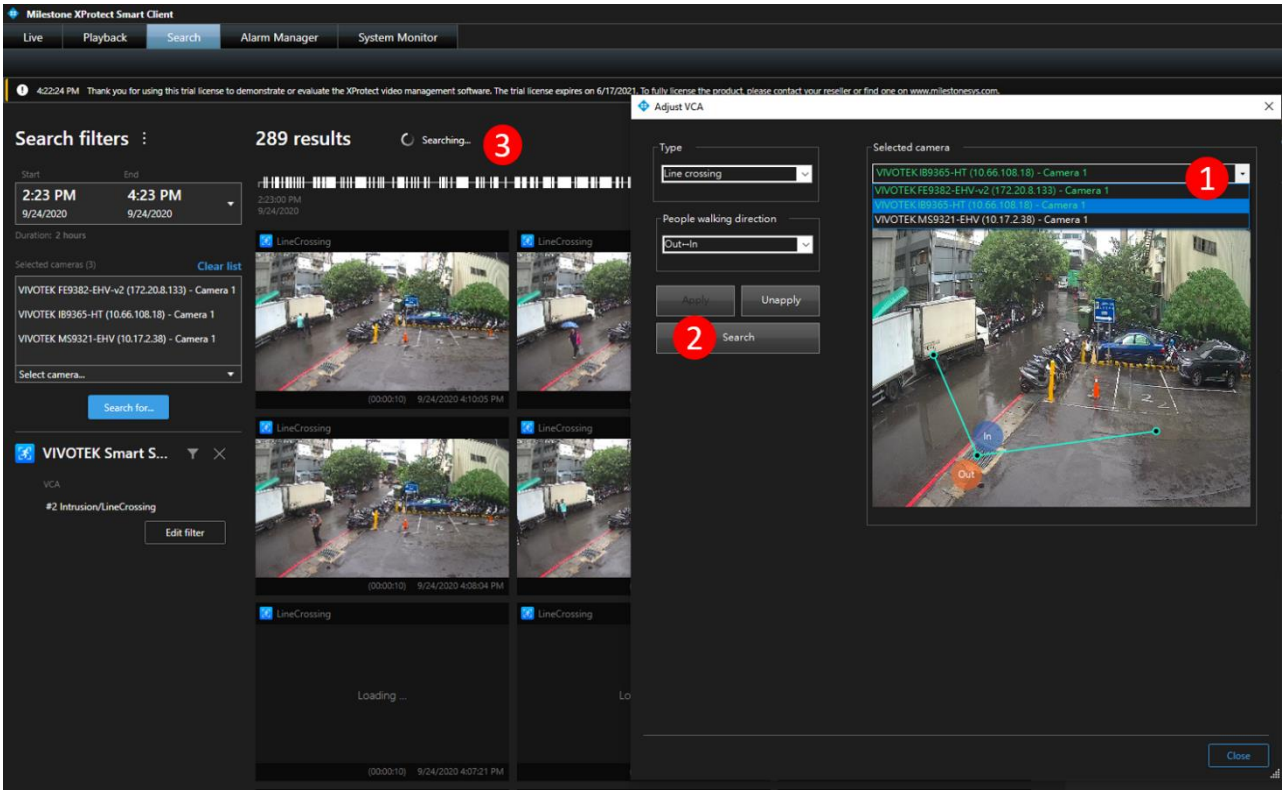


(7) After setting the rule and its properties, click "**Apply**" to save these values. The camera item text color will turn "**green**" to indicate that all settings have been applied to the camera. See the following two screenshots for the Intrusion and Line crossing rule types.



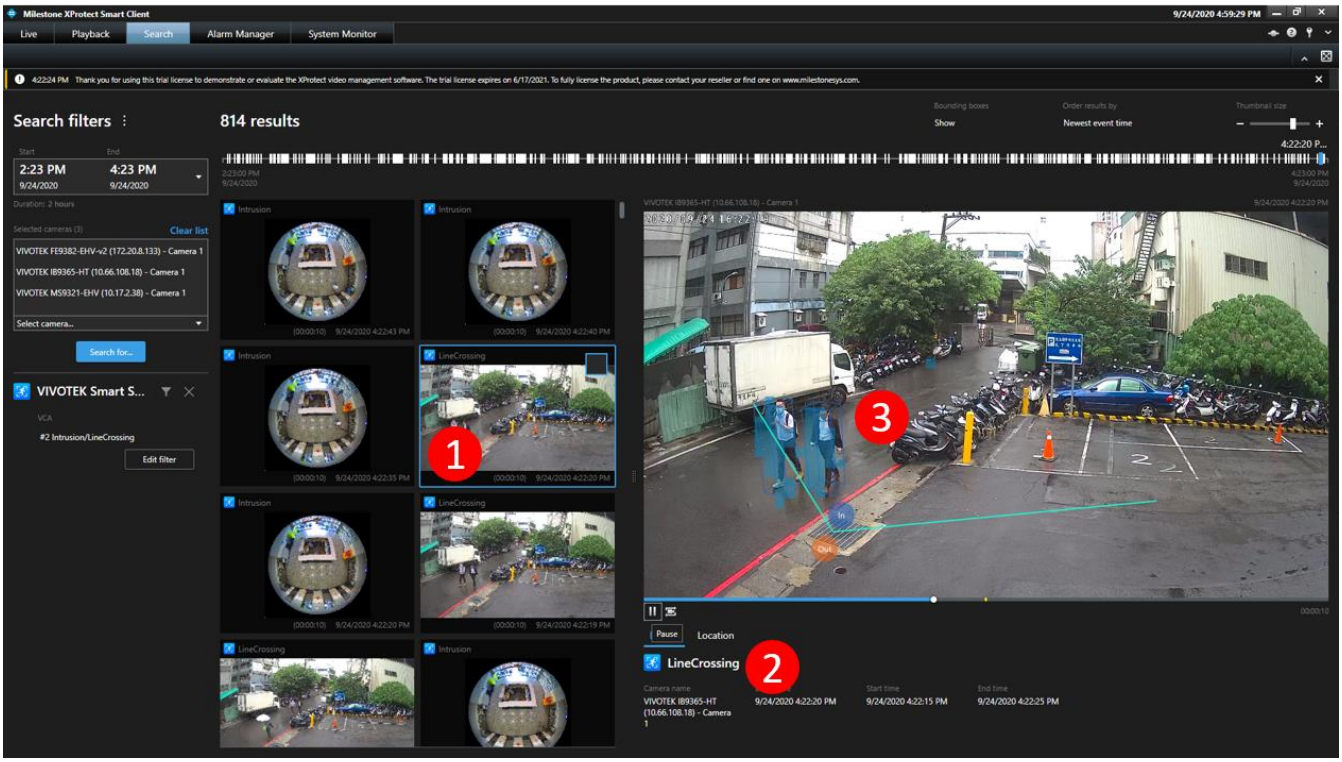


(8) Check whether all cameras have their criteria settings and click the "**Search**" button to start the search. The search results will display on a storyboard while searching is running in the background.



(9) Click on any of search results to watch the recorded video clips in a side preview window. Plugin will draw the rule and metadata information (cell motion and tracking blocks) on the preview

window.



(10) Double-click on any of the search results to watch the recorded video clips in a full-screen preview window. Plugin will also draw the rule and metadata information (cell motion and tracking blocks) on the preview window.

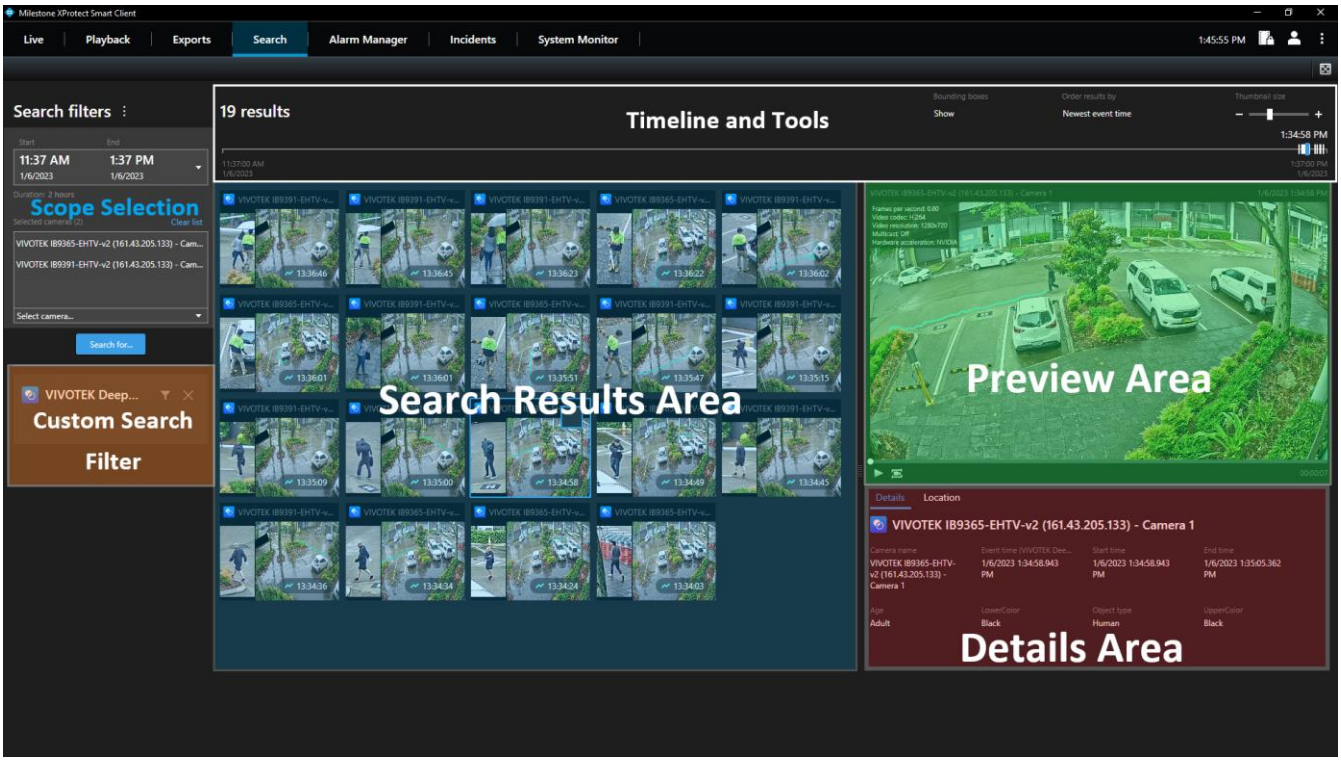
8. VIVOTEK Deep Search Plug-in & Operation

VIVOTEK Deep Search Plug-in consists of two parts: the server side and the client side. The Deep Search server-side plugin is loaded and executed in the XProtect Event Server. It will download object metadata from Deep Learning VCA cameras. The Deep Search client-side plugin is loaded and executed in the XProtect Smart Client. Users can edit the search filter and send query requests to the server-side plugin. While receiving the results from the server-side plugin, the client-side plugin will convert the results into visualizations and send them to the XProtect Smart Client for display.

Server Side

Please restart Milestone XProtect Event Server after installing the server-side plugin.

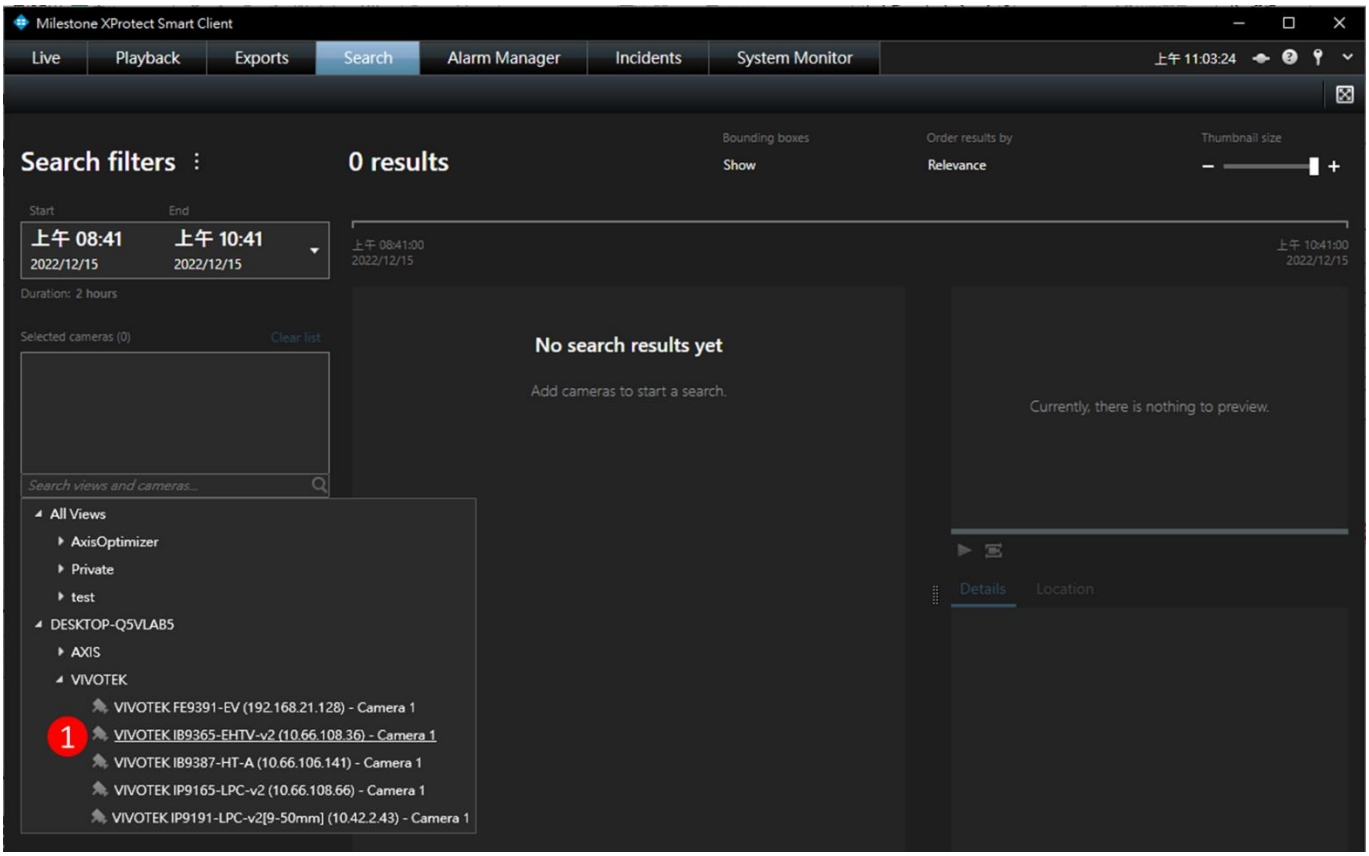
Client Side



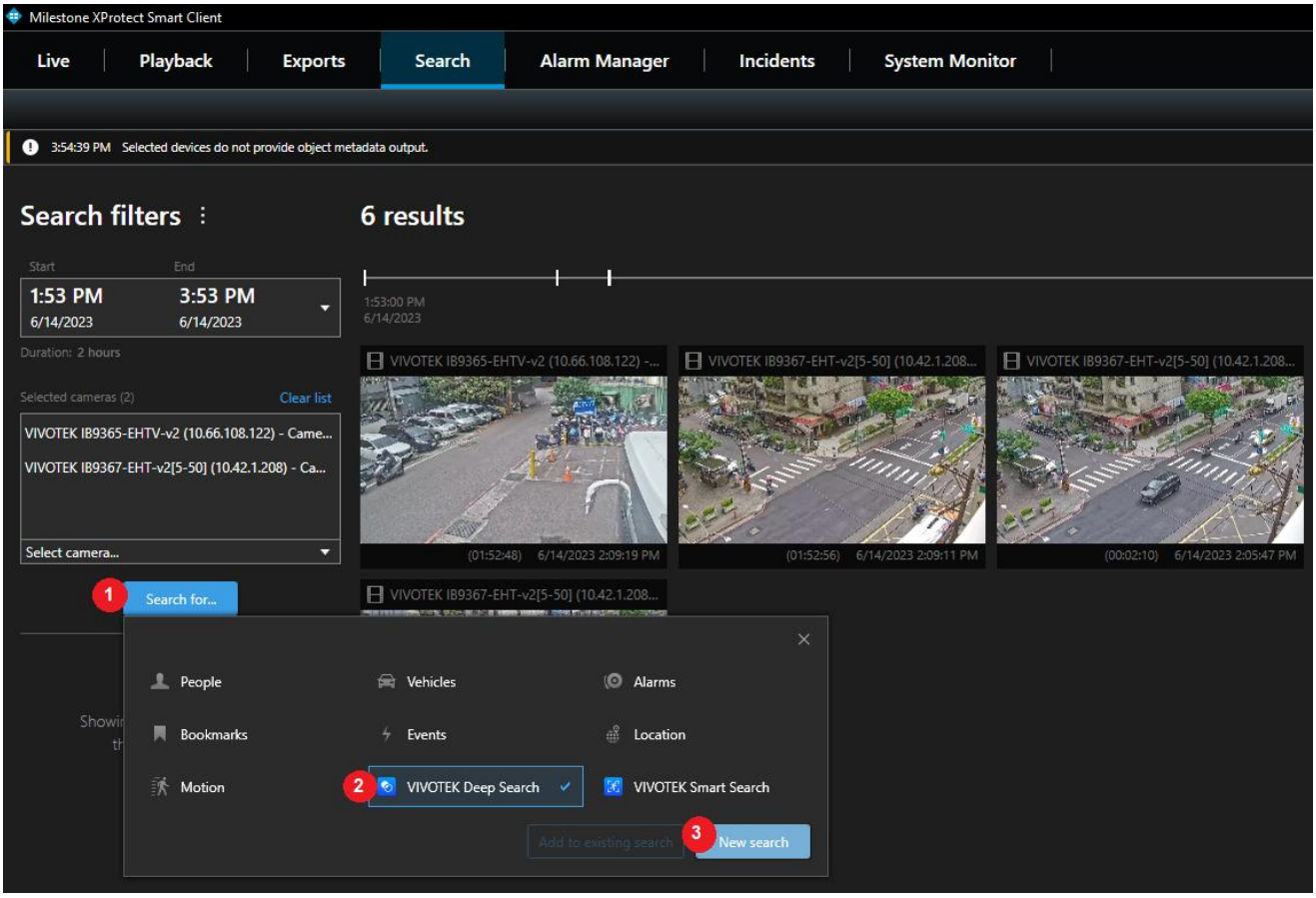
(1) Start the XProtect Smart Client and login to your Milestone XProtect server.

(2) On the Search Agent window, click on "**Search**".

(3) Set search interval and select camera items by their group folder or individual items directly.

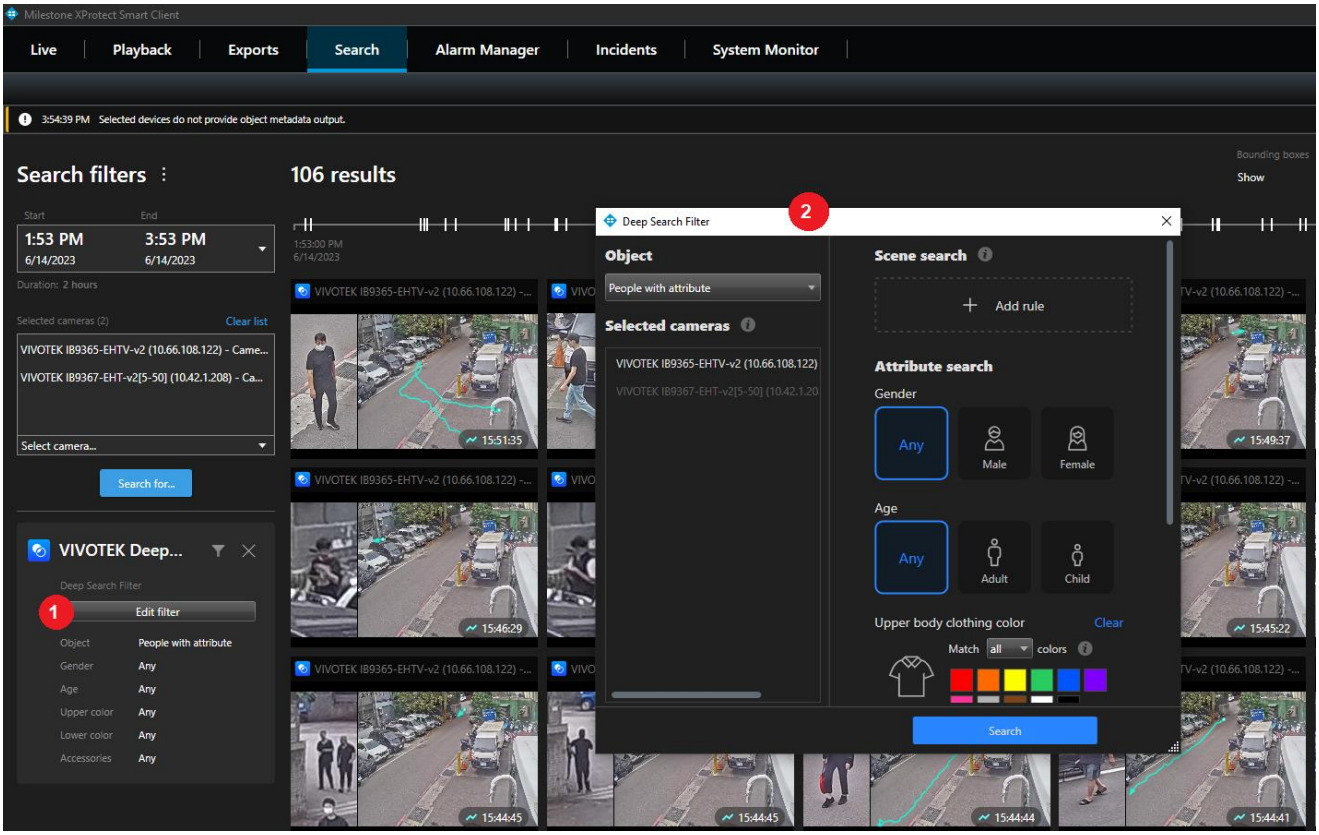


(4) Click "**Search for…**" and select "**VIVOTEK Deep Search**" then click "**New search**".



The default search will filter the object for "People with attribute".

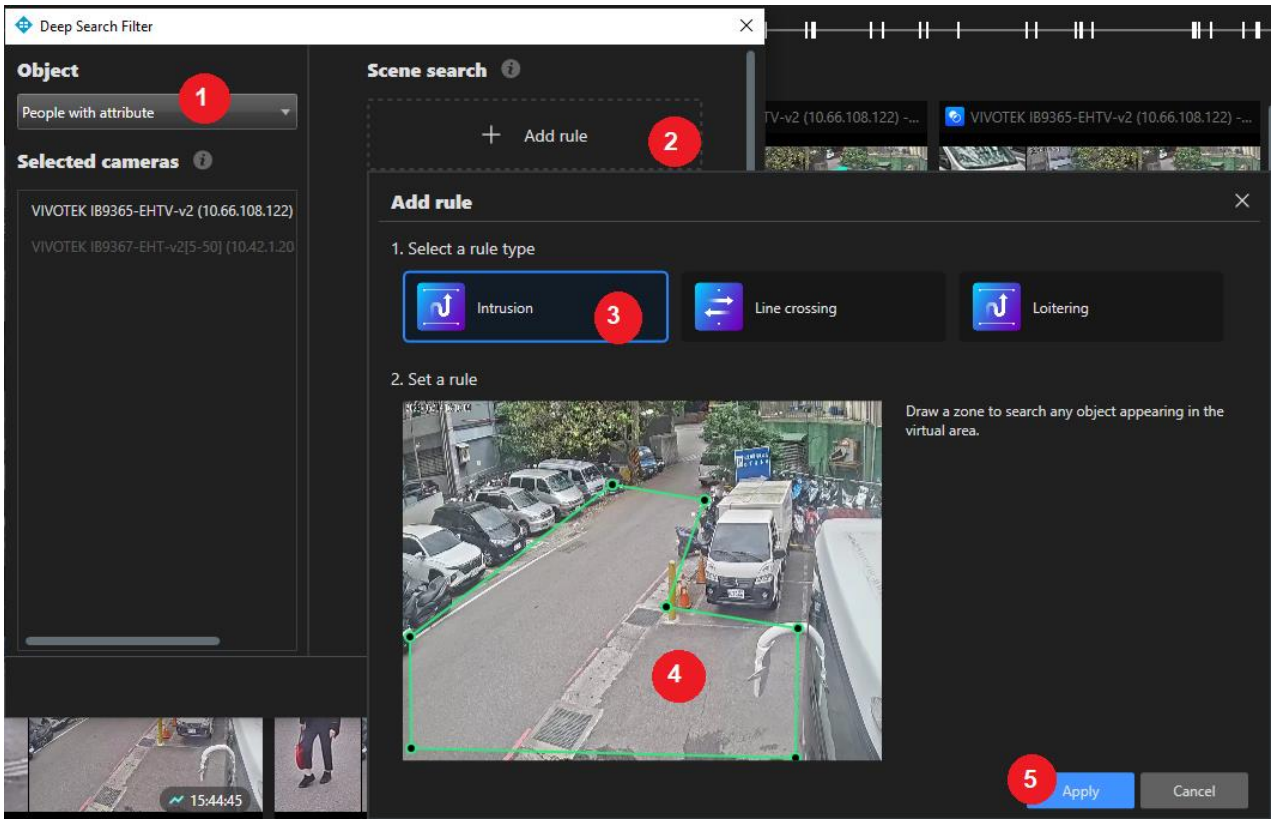
(5) In the "**VIVOTEK Deep Search**" category selection, click "**Edit filter**".



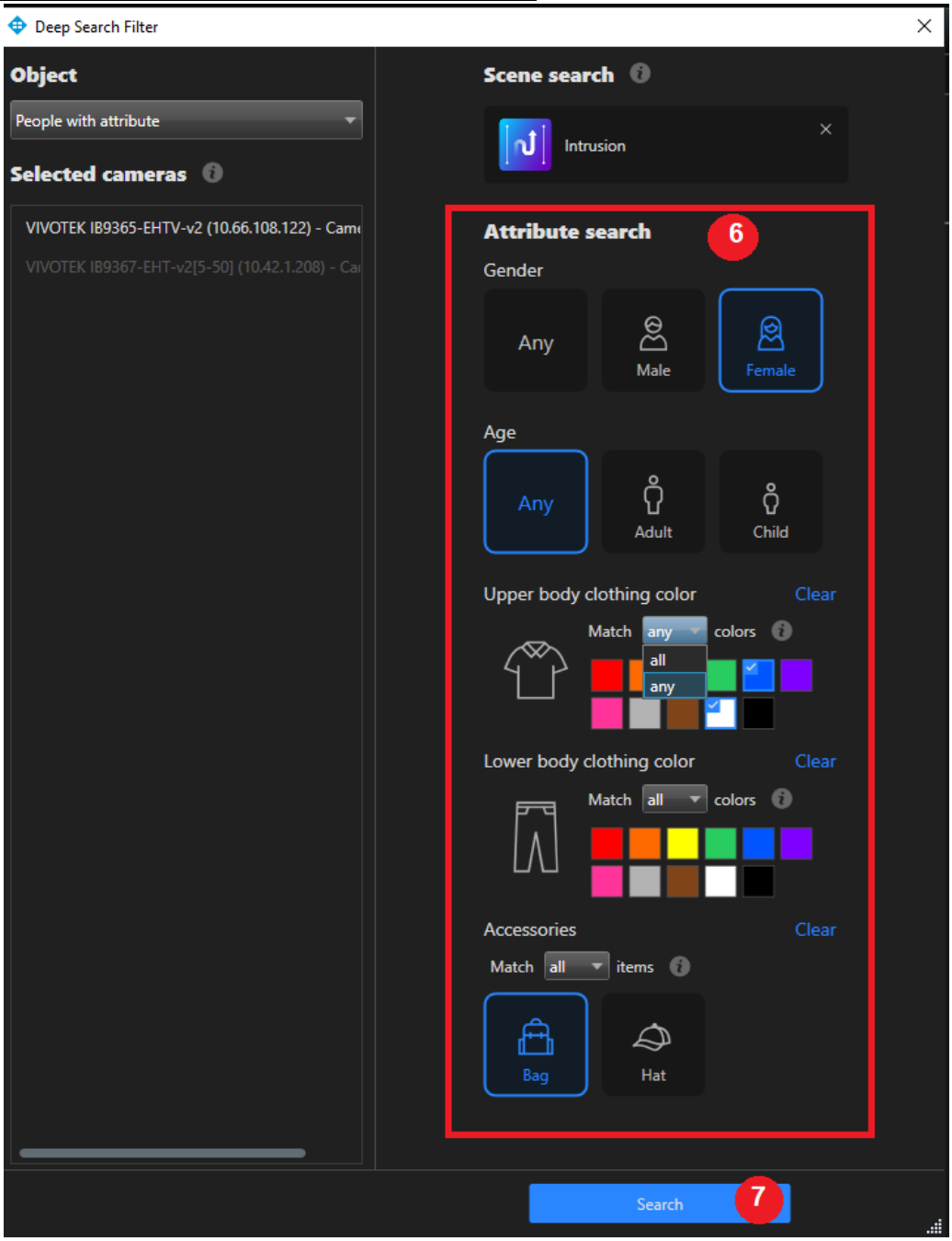
(6) Edit the filter with the attributes that are looking for.

Sample 1: Search "People with attribute" and "Scene search" in a camera.

1. Choose "**Object**": "**People with attribute**"
   (1) Only the cameras with object metadata capability will be listed in "**Selected cameras**".
   (2) The camera name in white text color is a supported item, otherwise, it is gray.
2. Click the "**+ Add rule**" button.
   (1) Filter by rule is supported only on a single camera.
3. Select a rule type: Intrusion Detection, Line Crossing Detection, and Loitering Detection.
4. Click on the camera snapshot to setup rule points
5. Click the "**Apply**" button to save rule settings.

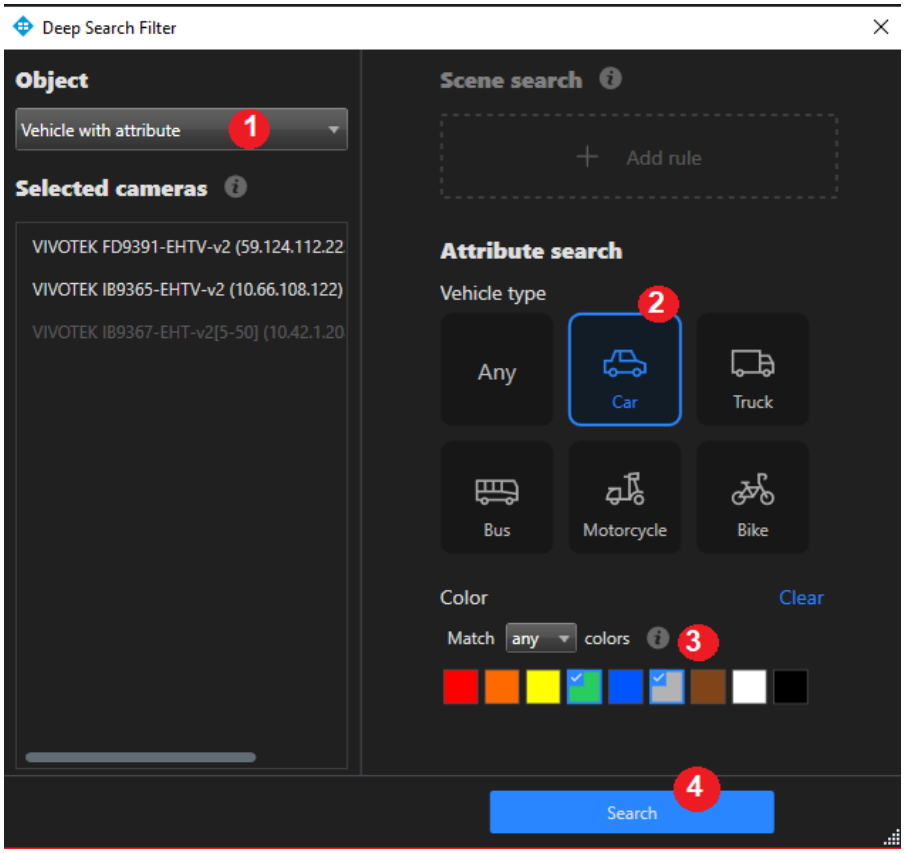


6. Edit people attributes: "**Gender**", "**Age**", "**Upper body**", "**Lower body**", and "**Accessories**".
   There are maximum 3 colors selectable for "Upper body" or "Lower body".
   If you select more than one colors, Deep Search will get results where "all" seleced colors are met, or get result where at least one (any) of the selected color is met.
7. Click "**Search**" to get the filtered results.



Sample 2: Search "Vehicle with attribute" in multiple cameras.

1. Choose "**Object**": "**Vehicle with attribute**"
    a. Only the cameras with object metadata capability will be listed in "**Selected cameras**".
    b. The camera name in white text color is a supported item, otherwise, it is gray.
2. Select a "**Vehicle type**"
3. Select "**Color**"
    a. Motorcycles and bikes do not support color attributes.



4. Click "Search" button to apply the settings and start a new search process.
5. The search results will display on a storyboard while searching is running in the background.

Search results area:

- The left image is an object thumbnail.
- The right image is a camera snapshot and an object trace overlay on it.
- The start time is displayed in the lower right corner.

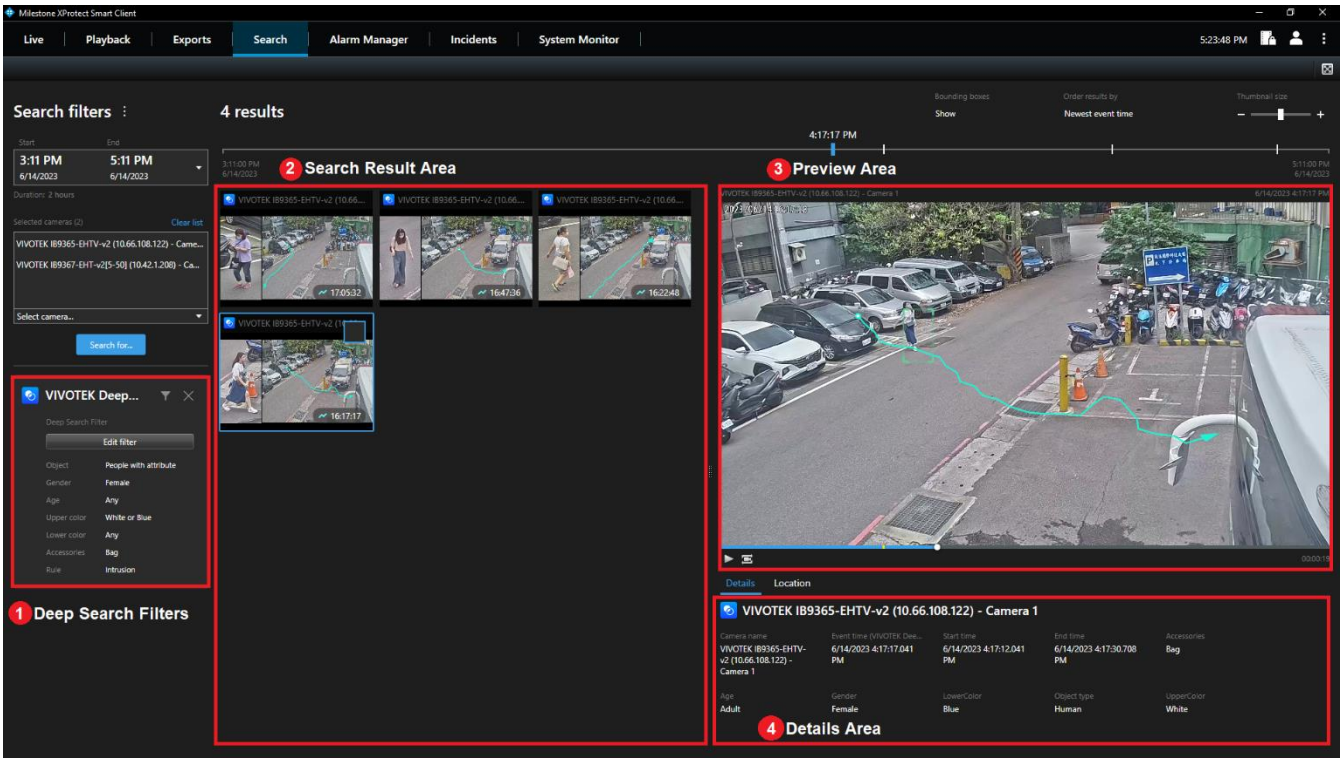
Preview area:

- An object trace overlay on the image view item.

Details area:

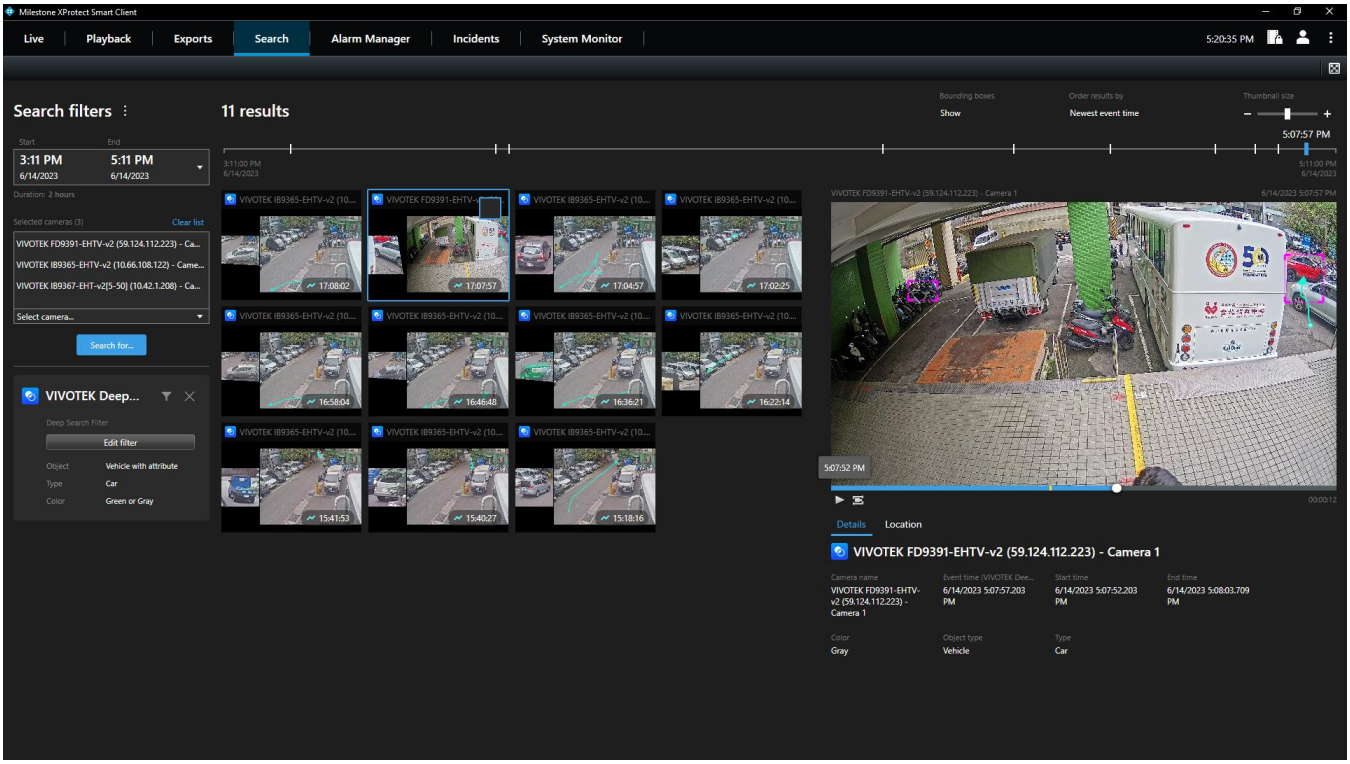
- Displays properties of selected result, including camera name, time, and object attributes.

Sample 1: Search “People with attribute” and filter by rule in a camera. Results display



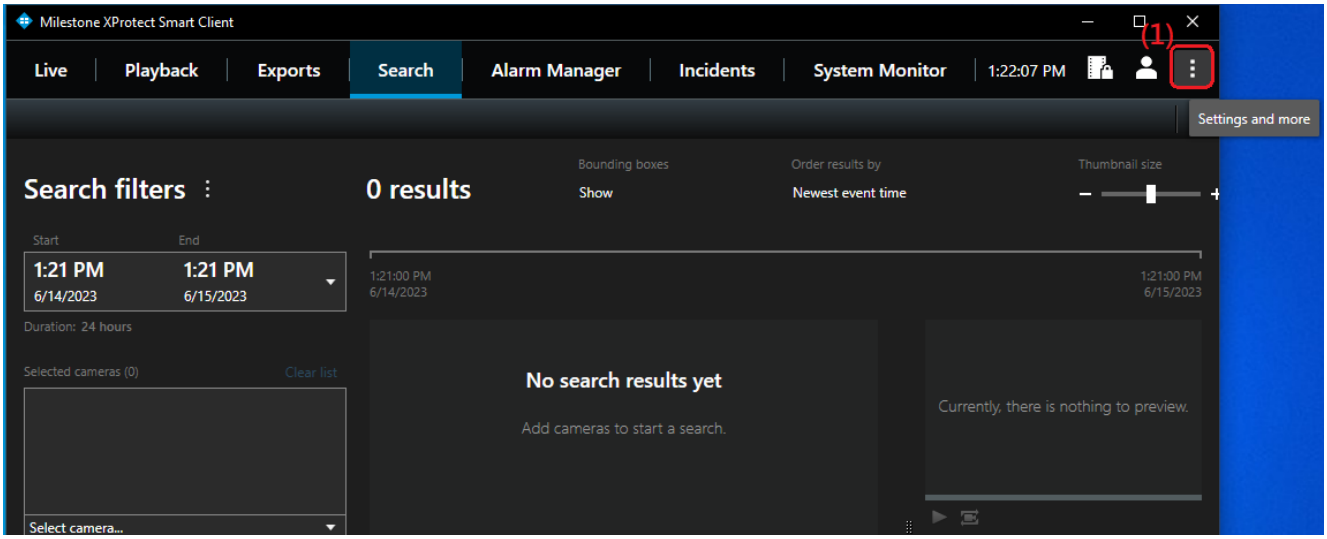
Sample 2: Search “Vehicle with attribute” in multiple cameras. Results display

As you can see, there were two different scenses in the Search Result Area.

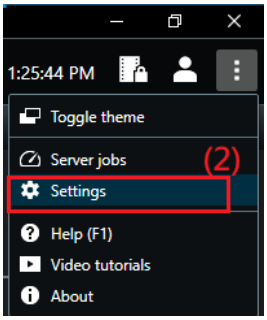


Note: By default, the search results display up to 1,000 objects. However, you have the option to adjust the number of objects displayed on XProtect Smart Client by changing the settings. The range for limiting the displayed objects can be set between 100 and 50,000 per search.

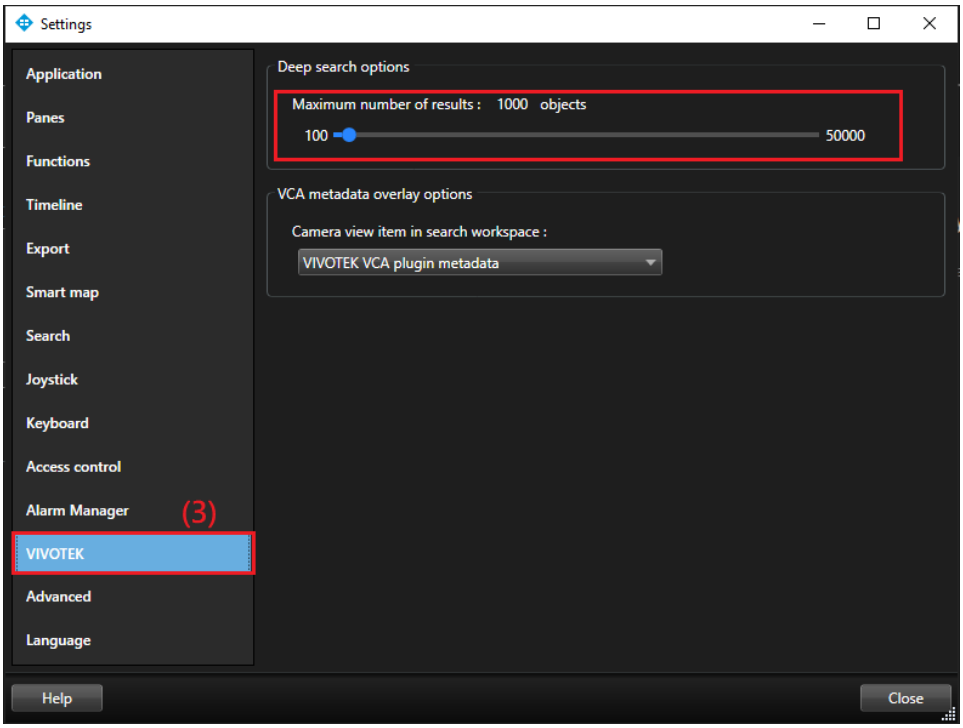
(1) Click the icon for “Settings and more”.



(2) Choose “Settings”.



(3) Select “VIVOTEK” to adjust the “Maximum number of results” for objects between 100 and 50,000. Each adjustment must be made in increments of 100.



9. FAQs

What are the differences for the search features?

- **The Smart Search Plugin**, is designed for a single camera that monitors a specific area without the witness of providing a specific time range, or virtual images of the events.
  For example:
  There was something missing from the warehouse last week, it should be someone taking it out of the warehouse. We can use the smart search function with a specific time range and camera + detection area of the entrance by setting new VCA rules of Smart Motion +Human; Line Crossing, Intrusion, or Loitering to dig out the suspects.

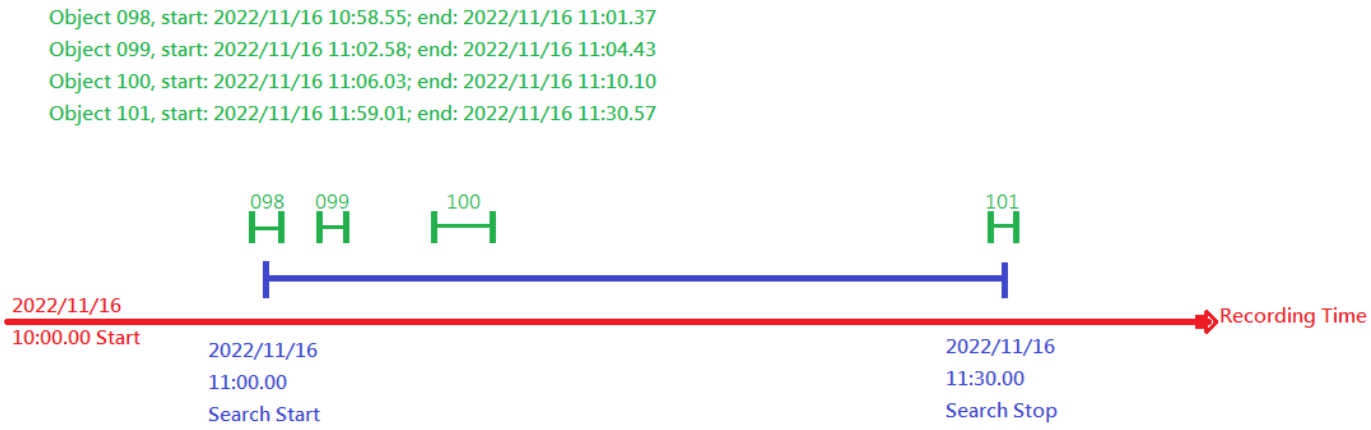
- **The Milestone XProtect Search + VIVOTEK Attribute Extraction** (attribute metadata), is basically for single or multiple cameras that are able to generate attribute metadata (which follows the ONVIF analytics specifications) and filter the criteria in a specific area or multiple scenes.
  Where the witness indicates those details (or gives rough ideas) of the human with gender and/or height and/or vehicle types, colors, etc factors, within a specific time range. These rough ideas are used to filter with detected objects (humans/vehicles) and displayed with actual videos that are recorded on the Milestone XProtect system.

- **The Deep Search plugin**, is designed for single (with scene search + attribute) or multiple cameras (with attribute) user scenarios that combine both advantages for previous smart search and attribute search at the same time.
  Scene search with attributes from a single camera or attributes with the best shot with key attribute search by multiple cameras. With this new Deep Search for Milestone, users can get more flexible and instant objects search of narrow down the key videos and then providing the necessary video clips as evidence

What is the search period limitation on deep search?

The new Deep Search is an object-based design, where the setting of the end of the searching period is less than the object ending time, and the searching result will be dropped for the latest object.

For example, object 098 will be recorded and searchable and displayed on the search result of XProtect Smart Client; but object 101 will be ignored due to its ending time being out of the search period.



Why the search result is not as expected?

The camera side object metadata will be cleaned up after camera restore to factory default. This may also reflect to the Deep Search results on Milestone XProtect. Therefore, the search result (of acquiring the object metadata from camera side) may missing before the camera started its restore to factory default setting.

Besides of this, if the target camera is offline, the searching speed on the offlined camera may take longer of acquiring the video streams from the server.

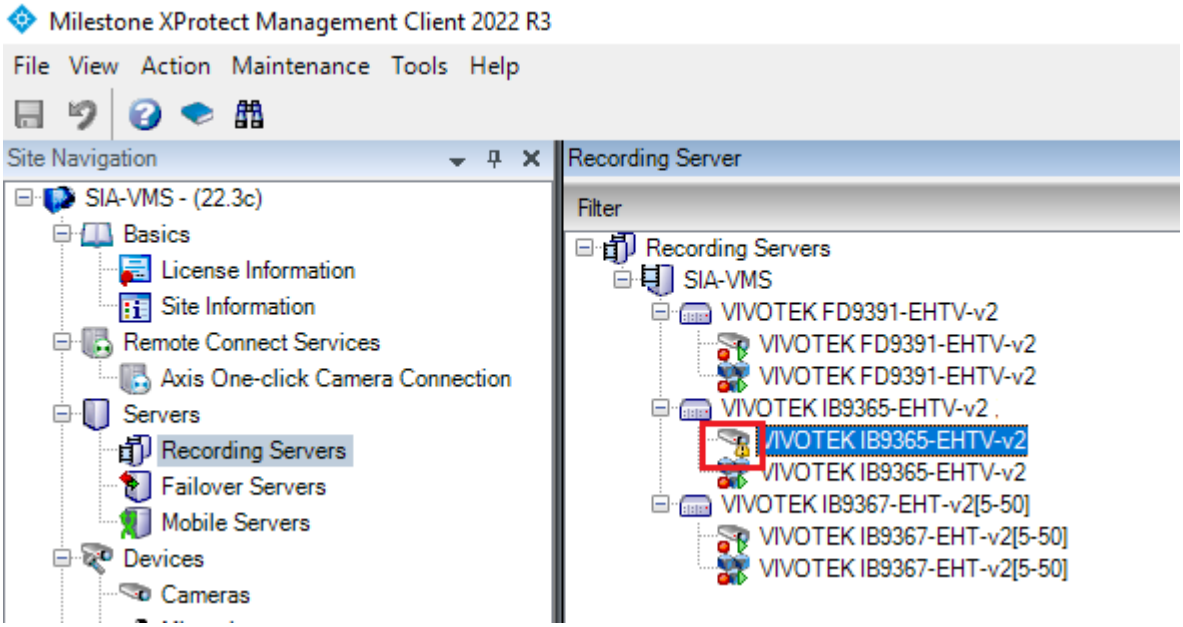
Why the object was not matched from the playback and preview are?

The main reason for object not appearing together with the bounding box in the video is the time delay between the object's metadata timeline and the time of the videos are received on the Milestone XProtect Recording Server. To avoid this latency issue, please synchronize the VIVOTEK cameras and the Milestone XProtect Recording Server with the same NTP server, and enable automatic time synchronization from the camera browser settings.

Why the Deep Search Plugin is not functioning properly that has no object searching results on the XProtect Smart client after running for a period of time?

If object search results are not available for the camera after a certain period of time (despite previously being able to retrieve object metadata from the same camera using the same firmware and package version), ensure a stable network connection between the camera and the XProtect Server.

- For example, if the camera is unresponding on the Milestone XProtect Recording Server, the Deep Search Plugin will be unable to query any objects from the camera database.



- Solution: Please follow the steps below to re-establish the operation of the Camera VCA feature and the connection with the Milestone XProtect Server.
  (1) Please stop the camera VCA package (DeepLearning VCA / Smart Tracking Advance, etc.) from the camera web browser.
  (2) Reboot the selected camera from the camera browser.
  (3) Disable the camera from Milestone XProtect Recording Server.
  (4) After the camera reboot process, restart the camera VCA package from the camera web browser.
  (5) Enable the camera from Milestone XProtect Recording Server.
  (6) Wait for 5-10 mins, and make sure there are objects passing through for object metadata search.

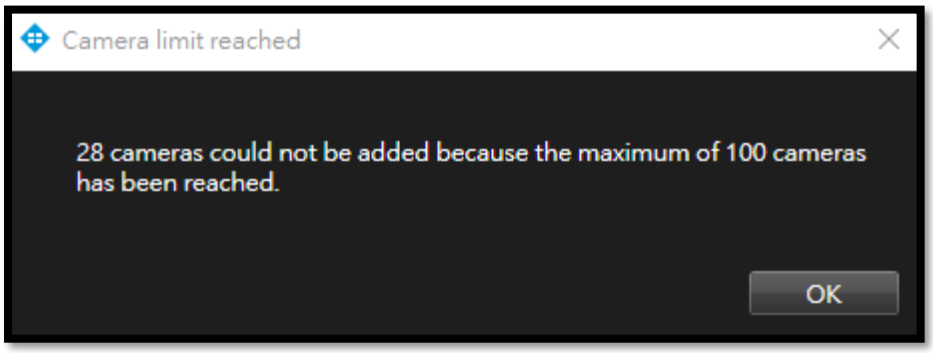
How to calculate the storage capacity needs for VIVOTEK Cameras with Deep Search Object metadata?

Based on our internal evaluations, each object (human/vehicle) is estimated to generate approximately 6,000B ~ 8,000B of data, which includes the best-shot image.

- For instance, in a highly active environment, such as a building entrance or a parking lot, the daily object rates may achieve 86,400 objects.
- The data above is for reference only. Actual data size may vary depending on the complexity of the object and its features.

What is the maximum number of cameras that Milestone XProtect supports when using the VIVOTEK Deep Search Plugin?

The VIVOTEK Deep Search Plugin is subject to the same limitation as the Milestone XProtect Smart Client, which allows a maximum of **100** cameras to use the plugin simultaneously.



How to manage the deep search metadata on Milestone XProtect?

The Deep Search Plugin has followed the Retention time settings (4) of the Milestone XProtect Recording Server. If the Storage configuration has a “7 days” setting of keeping recording data (incl. video, metadata), the Deep Search DB will also keep the object metadata for 7 days only.

In addition to the recorded data, you must keep the camera enabled, so that you can find the recorded data on XProtect Smart Client. If the device is not listed on the XProtect Recording Server, please enable “Show disabled devices” (3), and enable (5) the camera that would be used for Deep Search.