3visionD **3D Smart Track**

User Manual

Table of Contents

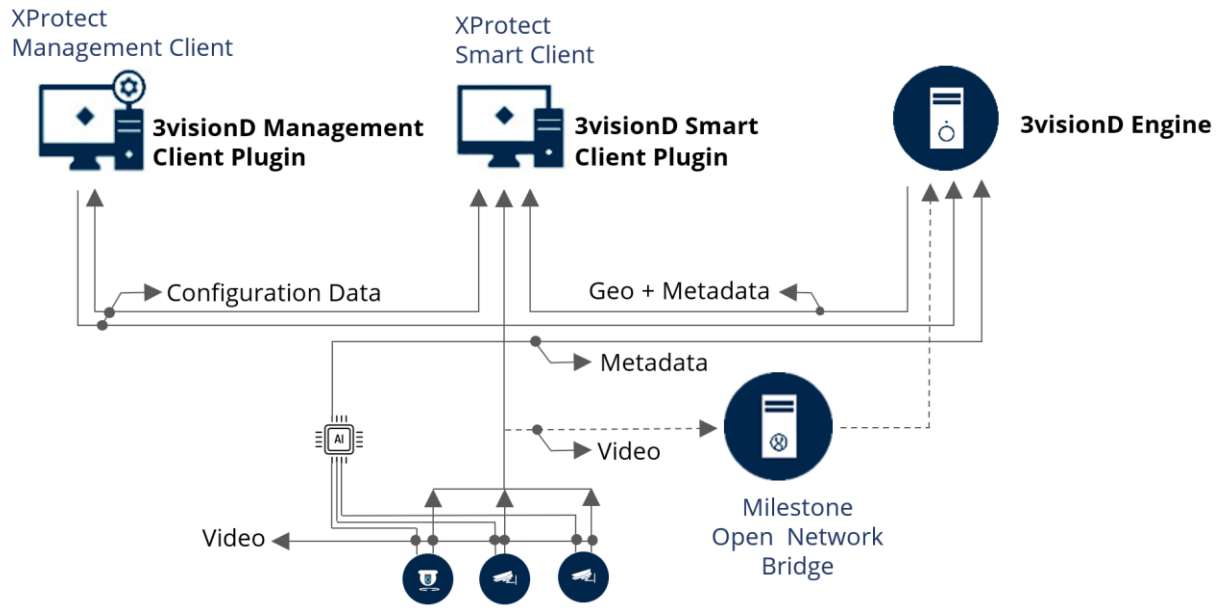
System description

3visionD plugin implements visual tracking functionality to Milestone XProtect VMS and adds the following functionalities:

1. Geo tagging each object detected in camera video stream.
2. Displaying detected objects on Live Maps.
3. Automatic PTZ camera control over live video stream.
4. Automatic PTZ camera control over Live map.
5. Automatic PTZ camera control using metadata.
6. EDGE analytics devices integration.

3visionD Plugin is integrated in both Milestone XProtect Management Client and XProtect Smart Client.

Diagram below presents system overview, it's components and their integration points.



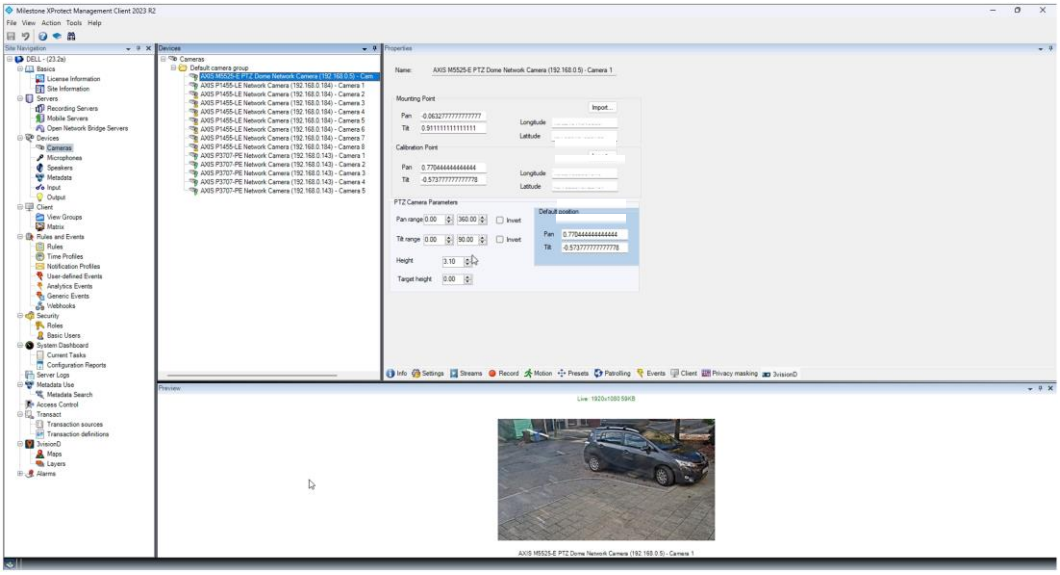
3visionD Management Client plugin is used for system configuration. It contains maps and cameras configuration data as well as definitions of layers and their functionalities. 3visionD Smart Client Plugin and 3visionD Engine module are accessing configuration data from this plugin.

3visionD Smart Client Plugin is used for real time control of Live maps, PTZ cameras and video analytics. This plugin uses custom Camera control item and Live maps control item to

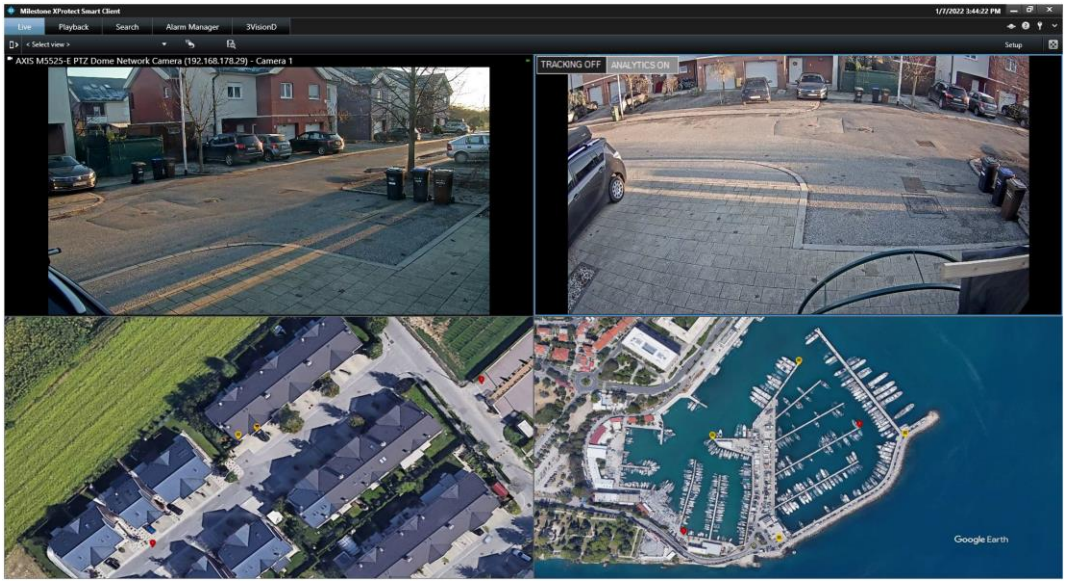
displays video and maps inside XProtect Smart Client. Plugin reads configuration data, systems events and MQTT data for management of alarms, PTZ cameras and Live maps.

3VisionD Engine is standalone module that reads MQTT messages from video cameras or AI EDGE devices, and then re-publishes them with geo location data based upon specific camera parameters that are acquired from XProtect Management Client.

Image below shows 3visionD Management Client Plugin with camera specific camera data displayed in Properties frame. This example shows data for PTZ camera.



Milestone XProtect Smart Client with 3visionD Smart Client Plugin is presented in image below.



Milestone default control for PTZ camera is on top left side window, 3visionD video control item is displayed on top right side and two 3visionD Live Maps are displayed on the bottom.

3visionD Plugin Feature list

Short overview of a 3visionD plugin main features is presented here.

1. Manual control of PTZ camera(s)
2. Automatic control of PTZ camera(s)
3. Displaying detected objects on Live Maps
4. Analytics features are:
    - Reading MQTT messages from edge devices
    - Geo tagging detected objects
    - Adding dimensions attributes to detected objects
5. 3visionD Smart Search
    - Search for motion inside selected Live map area
    - Search using object dimensions attributes
    - Search for People
    - Search for Vehicles
    - Search for Animals

1. Manual control of PTZ camera(s)

3visionD plugin enables manual control of PTZ cameras simply by using mouse pointer over a Live map or a video stream. Manual control of PTZ cameras is used in scenarios where closeup remote inspection of certain area is required by security officer.

Usually, one supervised site has several different types of cameras, dome, bullet, thermal and PTZ cameras. 3visionD plugin tracking engine enables the manual control of PTZ camera by placing mouse pointer over:

- Live Map or a,
- Live video stream

Simply by placing a mouse pointer over live video or over a Live Map, and activating the tracking functionality, one or more PTZ cameras will be directed in that area. Level of zoom is automatically applied for each PTZ camera based upon its distance to selected location.

PTZ camera following a mouse pointer over live video stream or Live Map.

Image on the left shows the example for a manual control of PTZ camera over video stream. For example, when alarm is activated on a blue car panoramic image does not provide much details for inspection (image on the left). To quickly direct PTZ camera for a closeup look, security officer will place a mouse pointer in front of the blue car over panoramic camera live video stream (mouse pointer inside yellow circle) then, 3visionD plugin will direct PTZ camera in selected location and automatically apply the level of zoom (see left image below). Using this feature security officer can immediately direct the PTZ camera in suspicious area for a closeup inspection.

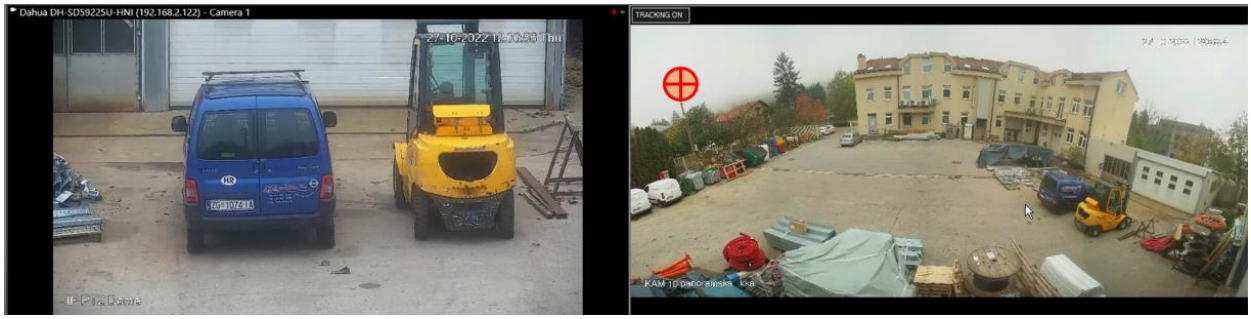
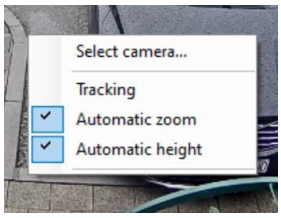


Image on the right side shows PTZ camera mounting location from this example. Mounting location is marked with red cross icon in panoramic camera live stream.

3visionD plugin thus, enables live video stream from any camera to be used for manual PTZ camera control. Any number of PTZ cameras can be controlled with mouse pointer regardless of their mounting position and mounting height. Therefore, by controlling several PTZ cameras at once, security officer can inspect single location from different angles.

Manual tracking over live video stream functionality is activated with right mouse button click. This click opens up the popup menu where tracking options can be selected (see image below).



Automatic zoom level and height correction functionality for PTZ camera(s) can also be activated from this popup menu.

Automated zoom is adjusted using the calibration points, and automatic height is set as a PTZ camera parameter (Targeted height) in Management Client plugin.

When tracking a pedestrian, recommended targeted height is set to 1.5 meters so that PTZ camera is automatically controlled to track pedestrian upper body. This height can be changed using Increment Height parameter in Management Client Plugin.

Tracking shortcuts

During manual tracking, level of zoom and targeted object height can also be manually adjusted on top of the calculated values.

Shift + Mouse wheel – add/reduce level of zoom on top of the calculated value.

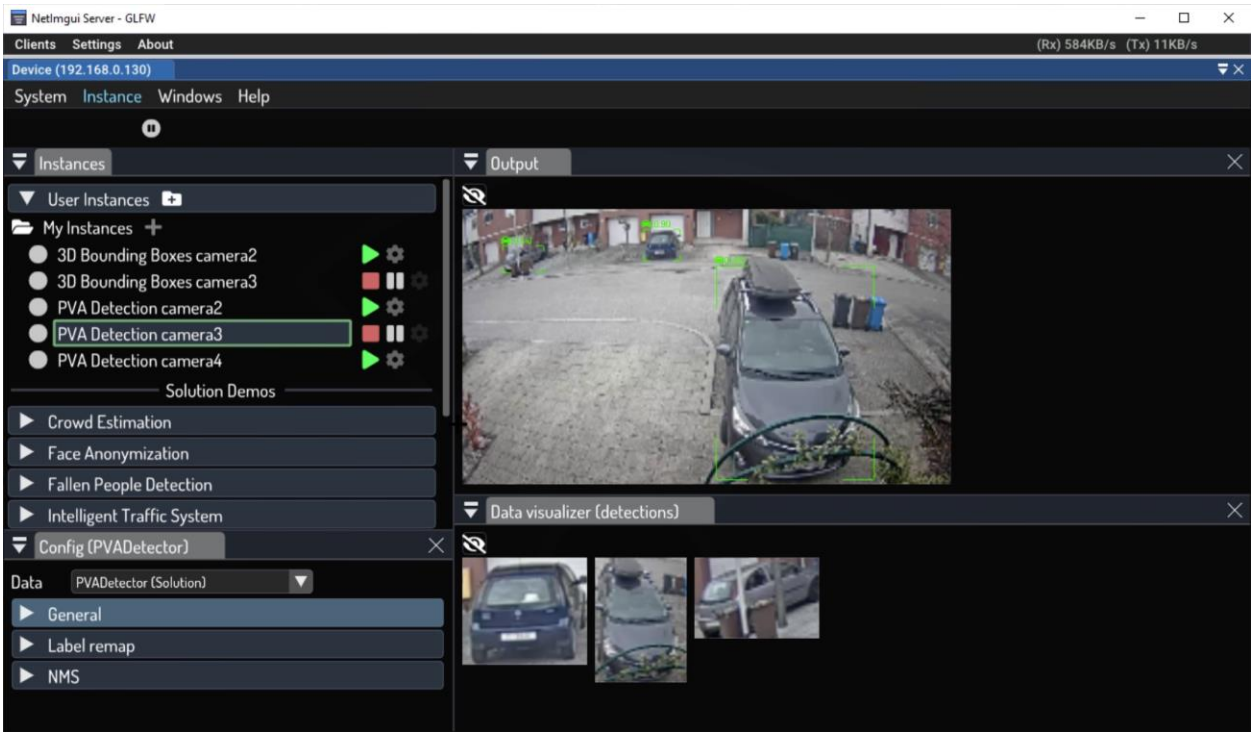
Ctrl + Mouse wheel – add/reduce targeted height based by increment height value.

2. Automatic control of PTZ camera(s)

This functionality enables PTZ camera(s) to be controlled directly from Smart Client Plugin using results from video analysis. PTZ camera is automatically tracking object detected in video stream.

Automatic control of PTZ camera(s) is activated when automated tracking is selected in a XProtect Smart Client 3visionD camera control item. Once selected, 3visionD plugin is reading MQTT messages from EDGE devices and displays every detected object location on a Live Map. Once tracking criteria's are meet, PTZ camera automated tracking is activated.

Image below shows the 3VisionD analytics module that detects people, vehicles and animals. This module sends MQTT messages that are received by XProtect Smart Client.



Based upon detected object, automated PTZ camera tracking is activated and PTZ camera direction, zoom level and target height are automatically controlled based upon configuration data from 3visionD Management Client Plugin. Depending on the configuration, object can be tracked with one or several PTZ cameras. Furthermore, in

different system setup several PTZ cameras can track several objects, this functionality is achieved using layers on a Live Map.

3. Live Maps as integration platform

Live maps are using icons to display the site overview in real time. Icons are displaying camera's locations, their calibration points and current location of the objects detected by video analytics. Live maps are also displaying the layers and active area for automatic and manual PTZ camera control, as well as areas where alarms are automatically activated.

All cameras located inside the area of the map will be automatically displayed on the map, and any number of cameras can be integrated into one Live Map.

Live maps are displaying:

- Live Map calibration points
- Cameras mounting location and their calibration points
- Layers (PTZ, Alarm, Calibration Points)
- Location of every detected object on site detected by video analytics

Live map is a jpeg image that displays top view of a supervised site. It can be image exported from Google Earth™, image capture by drone or blueprint of the area and etc.

Before an image is used as Live Map, calibration process must be performed on an image. Calibration process for a single image is a simple procedure of marking two points on an image and "connecting" them with their corresponding geo coordinates.

4. Analytics

3visionD XProtect Smart Client camera control item can be set to read MQTT messages from EDGE devices. This data is combined with camera parameters from 3visionD Management plugin and based upon user defined criteria's, Live maps are updated, alarms are raised or tracking is activated.

Before analytics is activated, system must be calibrated. Management client plugin, for example, must have geo location of each camera and geo location of each camera calibration point. Live Map also must be calibrated using two calibration point calibration procedure. Camera specific factory data must also be entered in Management Client Plugin before tracking functionality can be activated. Since Live Map is integration point for all system elements, 3visionD plugin calibration starts with Live Map calibration.

As an example of Live Map functionality, image below shows one part of the Port of Split map.

Yellow icons are displaying camera locations (five dome cameras and one PTZ camera). In this scenario data collected from these cameras are used for berth management and parking management. Green rectangle presents free berth space or free vehicle parking space. Red rectangle is presenting occupied space and blue rectangle is presenting parking or docking violation. Like the vehicle that has been detected in restricted zone and boat that is using two docks. Detected persons are also displayed on a map.

With one look on a Live Map operator is overseeing all current events in port. If any part of the port requires detailed inspection PTZ camera can be used in manual tracking mode for a closeup inspection.

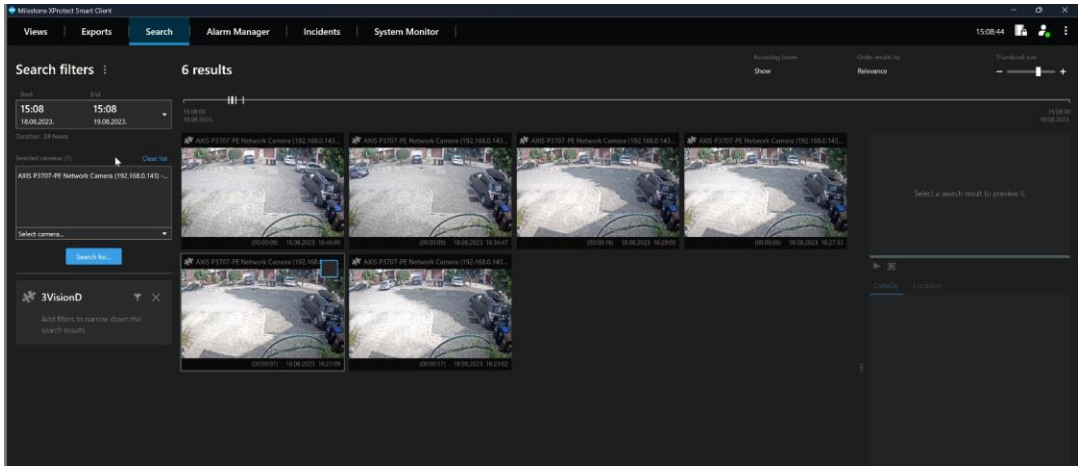
Layers are also supported by Live Maps, layer that activates automated PTZ camera tracking is one example of 3visionD plugin supported layers.

5. 3VisionD Smart Search Plugin

Smart search spans over several criteria's:

- Objects detected in map area.
- Object dimensions (width, height).
- Person, Vehicle or Animal

Image below shows results from one search.



Smart search plugin is searching metadata. Objects detected in selected area or objects of certain dimensions in selected area are some of the examples of Smart search metadata.

System features - examples

Remote forensic inspection – Mouse over Live Map

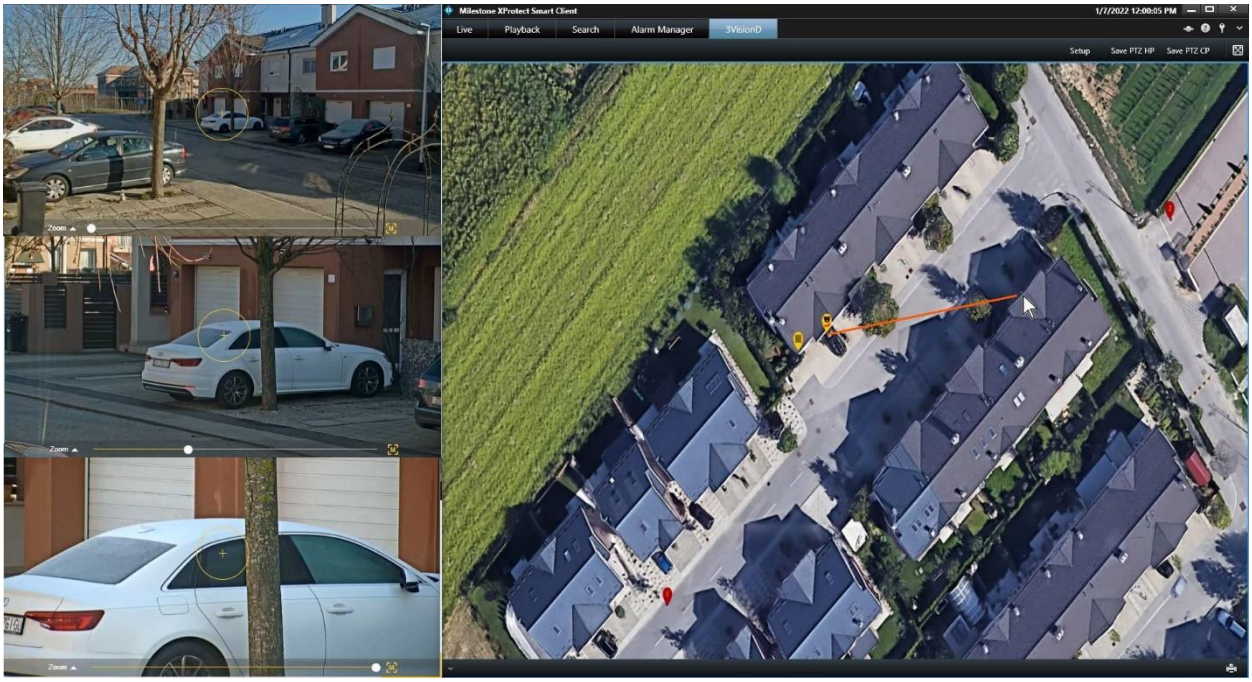
Instead of the physical walk on a site, security guard can use this functionality to control PTZ cameras as a remote virtual tour.

Virtual tour functionality allows security officer to control PTZ cameras simply by placing and moving a mouse pointer over Live map thus controlling PTZ camera(s) direction and their level of zoom. PTZ camera(s) are directed in real world location following a mouse pointer over the Live map. This functionality replaces joystick and other PTZ camera control hardware with a pc mouse.

3visionD plugin also controls the amount of zoom for each individual PTZ camera. In addition to automated level of zoom, mouse scroll wheel is also used to manually add or reduce the additional amount of zoom on top of the automatically calculated zoom value.

Image below shows simple example where PTZ camera is directed in location where mouse pointer is pointing on a Live map. Level of zoom in this example is automatically adjusted.

Pressing a Ctrl button and scrolling the mouse wheel button additional level of zoom is added or reduced from zoom calculated value.



Images on a left side are showing the difference between various zoom levels. Top image presents image with zoom level that is zero meaning that automatic control of zoom level is not activated.

Middle image displays the image where zoom is automatically adjusted.

Bottom image presents zoom level that has been manually added on top of automatically calculated zoom level for even detailed inspection.

This type of control of PTZ cameras enables virtual walk around supervised site simply by moving mouse pointer over Live Map.

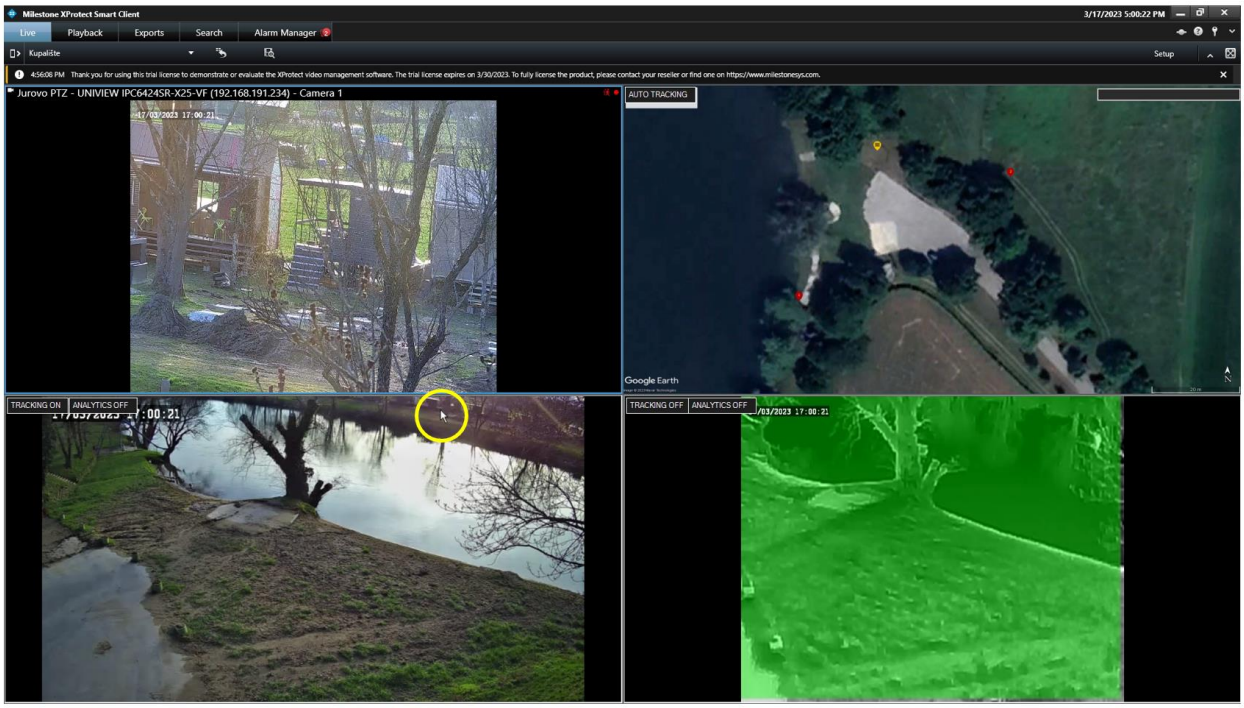
Remote forensic inspection – Mouse over Video Stream

This functionality enables the control of PTZ cameras with a mouse pointer over a live video stream.

Videos from panoramic cameras, dome and thermal cameras that have no zoom functionality does not provide image with enough details about distant objects. Therefore, 3visionD plugin is using live video stream from this “Non-moving” cameras to direct one or more PTZ cameras in required location. This functionality is used, for example, when a person face, standing in the distance, cannot be recognized in camera video feed. Then, by placing a mouse pointer on that person one or more PTZ cameras will be directed in that location and zoom level will be automatically applied. Now, detailed zoomed image of that person is displayed in PTZ camera(s) video stream.

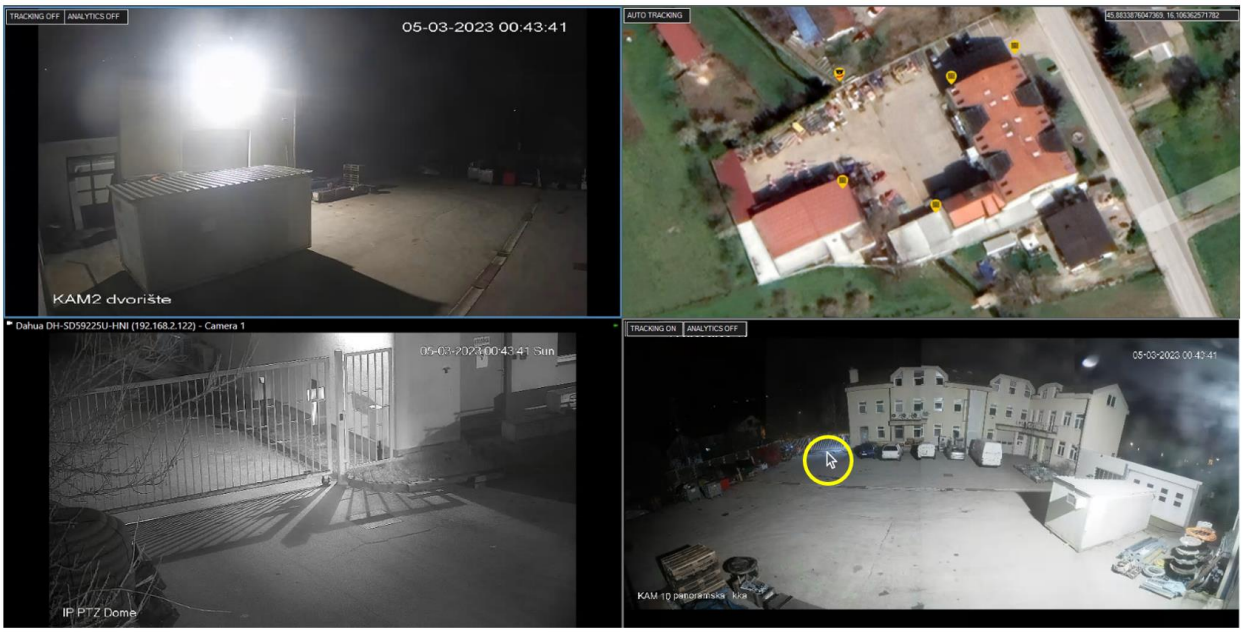
Image below shows XProtect Smart Client view of one remote site supervising the river bank. Video stream from dome camera and thermal camera are displayed along with a video feed from PTZ camera and map of the area.

In scenario where closeup inspection of the area in front of the house across the river is required, mouse pointer is placed over dome camera video stream (lower left window), and Smart client plugin will direct PTZ camera in that location. Yellow circle shows the position of a mouse pointer over dome camera live video stream in lower left window and in upper left window stream from PTZ camera is displayed.



As already stated, video stream from any type of camera and any number of cameras can be used to control one or more PTZ camera.

Another example is presented in image below. In upper left window XProtect Smart Client is displaying view from dome camera, panoramic camera view is displayed in downright window. PTZ camera video stream is displayed in down left window.



Live map is displaying each camera location and camera type is displayed in XProtect Smart Client upper right corner. Both dome and panoramic camera are set to control PTZ camera.

Mouse pointer location targeting warehouse entrance is marked with yellow circle. Once tracking is activated PTZ camera is directed in location of warehouse entrance.

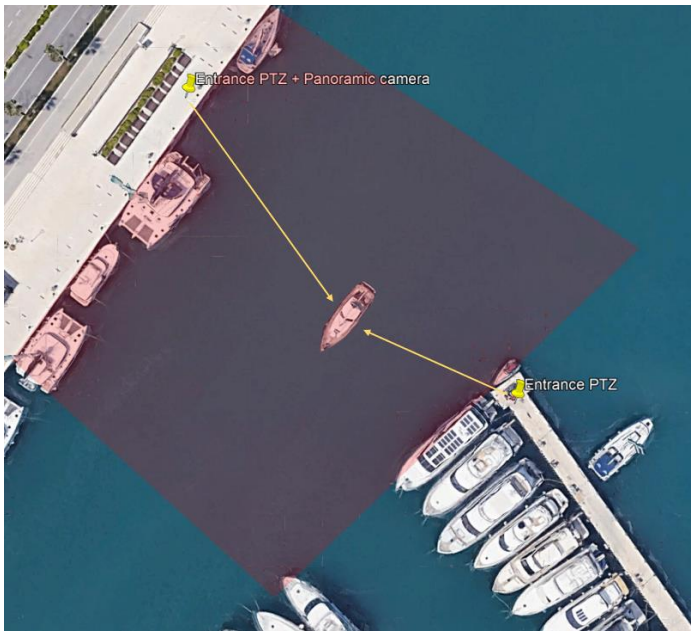
Multiple PTZ cameras tracking single object

3visionD plugin supports simultaneously tracking of a single object with several PTZ cameras. City surveillance and stadiums are some of the examples where multiple PTZ cameras can be used to capture the person or group of persons from multiple angles.

Here, Marina Split will be used as an example of multiple camera tracking. Image below shows the marina entrance where boats are required to be tracked with two PTZ cameras mounted on opposite directions.

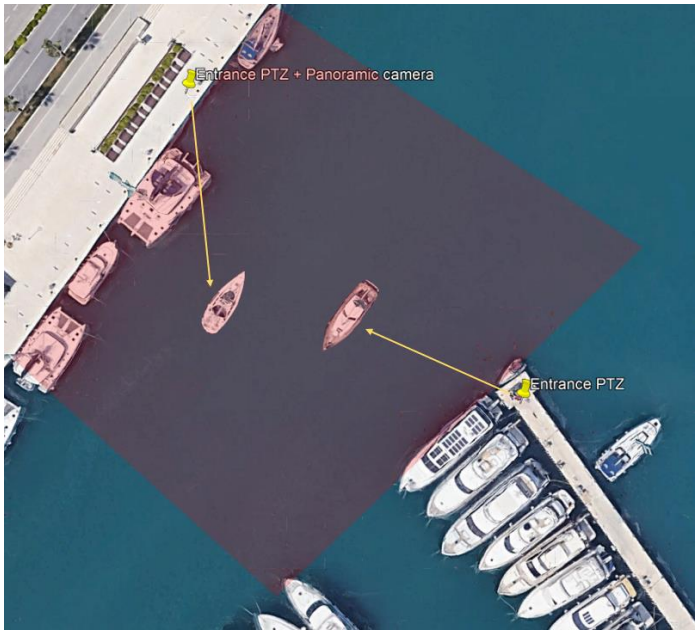
In total, two PTZ cameras and one panoramic camera are mounted in marina entrance. Panoramic camera video stream is used for boat detection and PTZ cameras are used for real time boat tracking. Red area is marking PTZ Active area layer for both PTZ cameras.

When boat is detected in panoramic camera video stream its location is display on a Live map. Automatic PTZ camera tracking functionality is then activated, and both PTZ cameras are directed to track the boat. Automatic control of zoom level for each camera is also applied.



Multiple PTZ cameras tracking Multiple objects

When multiple boats are detected in panoramic camera video stream each PTZ camera is set to track the nearest boat, see the image below.



Distance from each PTZ camera to each boat is calculated and minimum distance criteria is applied.

Multiple cameras - Manual tracking

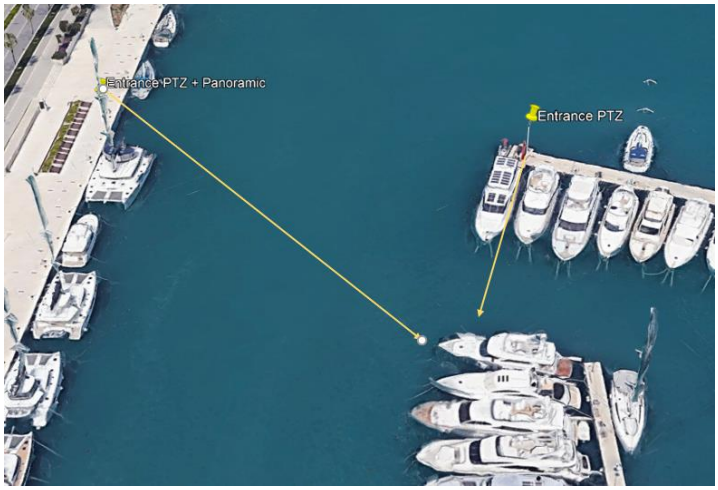
PTZ camera manual control enables the user to use Live Map and to control and direct any number of PTZ cameras.

Image below shows the Marina Split example where two PTZ cameras are directed in one, manually selected location.

Manual control of PTZ cameras enables the user to have virtual guard functionality and to inspect any location on site in more details.

This manual control of PTZ cameras overrides automatic camera control. 3visionD analytics engine or third-party EDGE analytics are operational during manual PTZ camera tracking and every detected object is displayed on a Live Map but, automatic control of PTZ cameras is override.

Regardless of the functionality activated in 3visionD plugin every detected object is always displayed on Live Map.



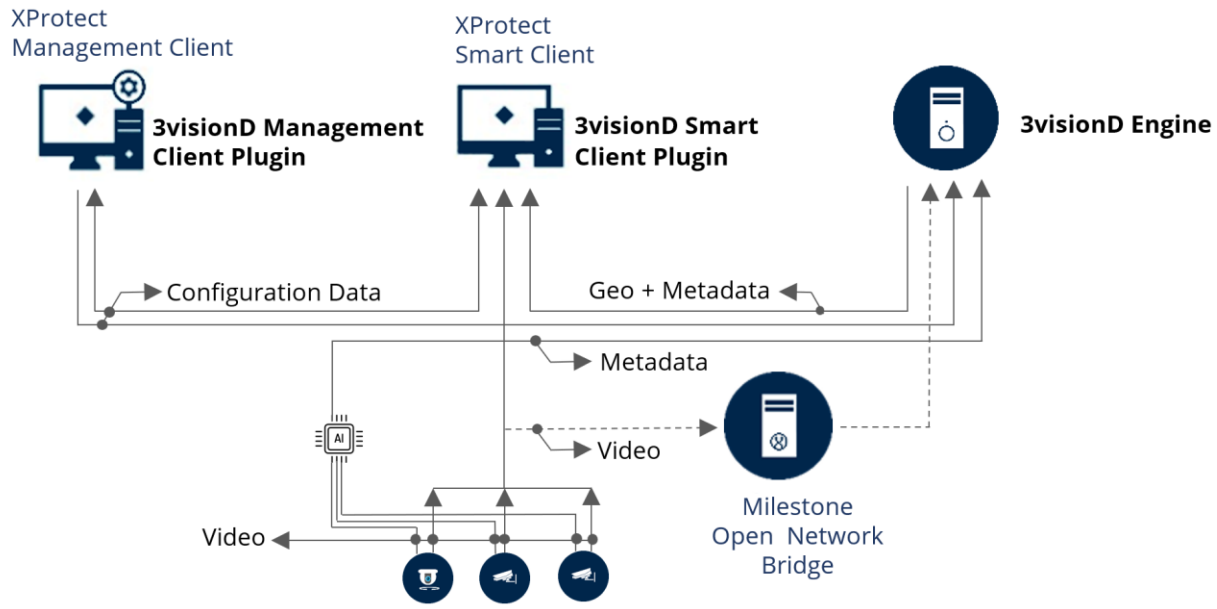
Analytics engine

3visionD Analytics is using video camera as visual sensor and any camera can be used as visual sensor. Camera parameters for each camera are stored in 3visionD Management client plugin and every object detected in camera field of view is automatically geo-tagged, so that output data from visual sensor is MQTT stream of geo-tagged object.

Analytics engine input are MQTT messages from EDGE devices or metadata stream from video cameras. Analytics engine is reading metadata stream or MQTT messages from any number of cameras or EDGE devices on site. Detected objects are displayed as icons on a Live map. Live map is one unifying platform that displays metadata from all cameras. It also displays the location of each camera on site.

This functionality enables 3visionD plugin to control PTZ cameras based upon metadata received from all cameras on site. For example, metadata from ten dome cameras can be used to control two PTZ cameras. Image below presents video stream and data flow for 3visionD Video analytics engine.

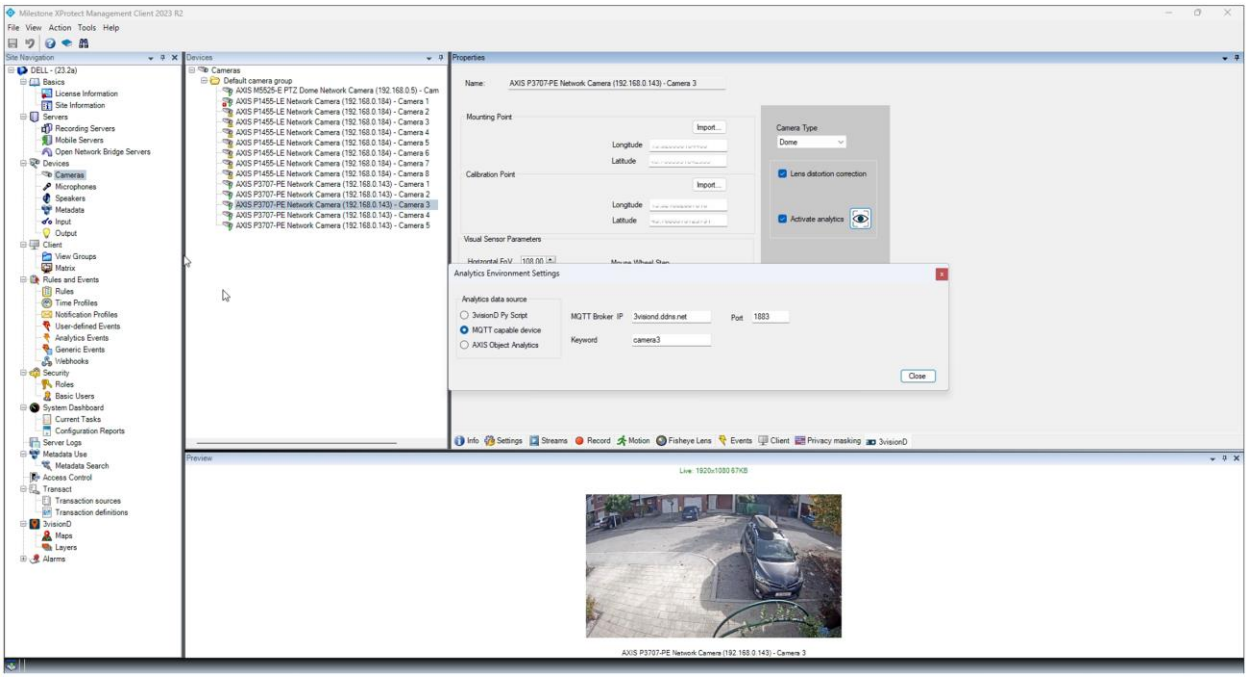
3visionD Engine is standalone background service that reads MQTT messages from EDGE devices and metadata stream from video cameras. It combines video analytics data with camera specific data to produce output MQTT messages that contains geo tagged objects.



3visionD Management Client Plugin

Configuration parameters for video Analytics are read from 3visionD Management Client Plugin. For each camera, analytics is enabled when Activate Analytics checkbox is checked. Clicking on the settings icon (👁) new window is opened where Analytics Environment Settings are set (see image bellow):

- 3visionD Py script is a Python script for object motion detection.
- MQTT engine reads MQTT topics from 3visionD engine.
- Axis Object Analytics will read metadata stream from Axis AOA cameras.



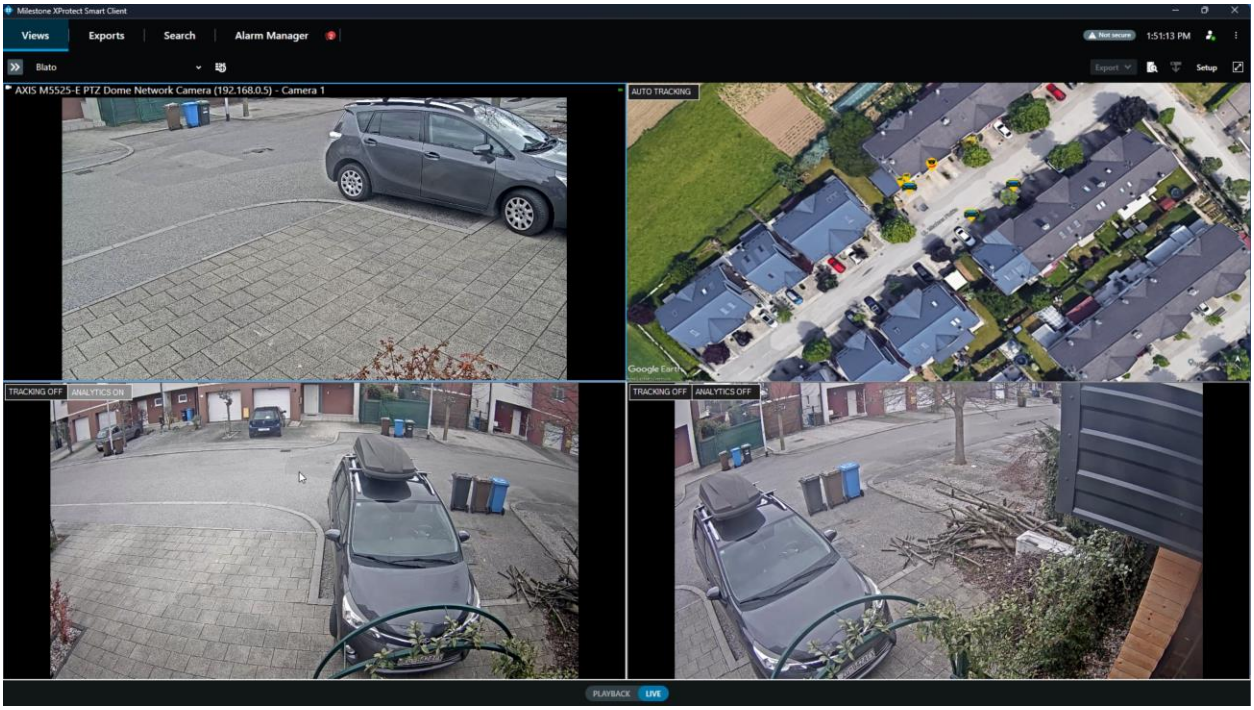
Smart Client Plugin

3visionD Camera View control item has Tracking and Analytics buttons on upper left side of the control. Their default values are TRACKING OFF and ANALYTICS OFF. Clicking on Analytics button will activate analytics for selected camera and XProtect Smart Client will start to read MQTT messaged published by 3visionD broker.

Image below shows 3visionD Camera View control.

Live Map - Analytics integration platform

3visionD Smart Client plugin together with a Live Map is one unified platform where metadata from several sources are read and where user defined criteria are executed, such as alarm activation, object tracking, object tracking with PTZ camera, multiple camera tracking, remote site inspection and etc. Image below shows analytics is activated in one camera and three vehicles detected by video analytics are displayed on map.



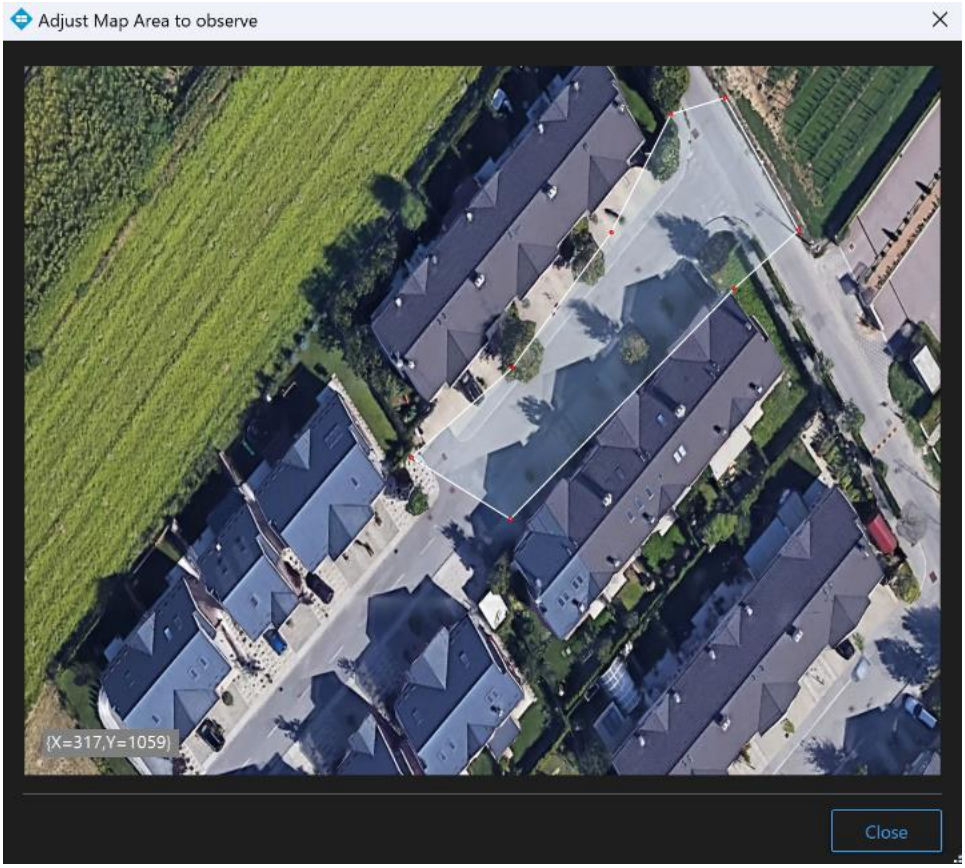
3visionD metadata search

3visionD metadata search is searching for objects inside one or more areas of the map.

For a given time interval and a given map area, search criteria for objects are:

- Person
- Vehicle
- Animal
- Object Width
- Object Height
- Object geo location

Image below shows the map with selected area where persons and vehicles will be searched for.



3visionD Plugin Installation

Before the 3visionD plugin installation following software packages must be installed:

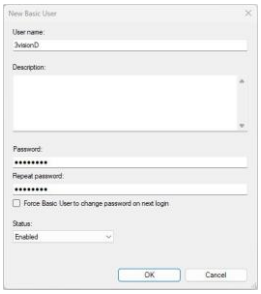
1. Milestone XProtect
2. Milestone Open Network Bridge

Then, a Milestone Open Network Bridge user must be added in XProtect Management Client.

Follow the Milestone instructions for installing Milestone XProtect and Milestone Open Network Bridge.

Creating Milestone Open Network Bridge user in XProtect Management Client

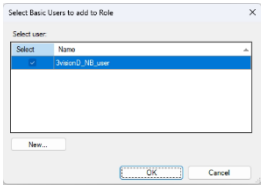
First, a basic User must be added to XProtect Management Client.



1. Start XProtect Management Client
2. Site Navigation pane, select Security node
3. Select Basic User node
4. in Basic User pane right click
5. select Create Basic User ….
6. Enter User name and password.

Adding the User role

User must be added as administrator



1. In Site Navigation pane, select Security node
2. select Roles node
3. in Roles pane click on Administrators
4. in role Settings pane select Add button
5. select Basic User
6. select the user checkbox
7. press OK button

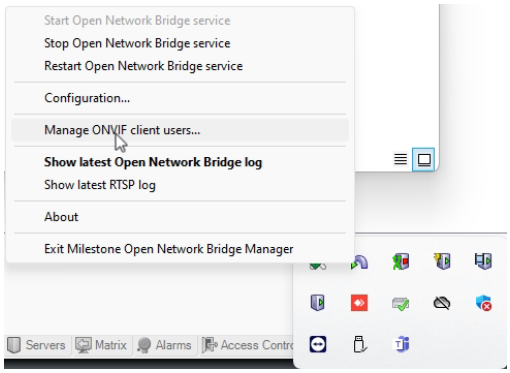
User is added in Role Settings list.

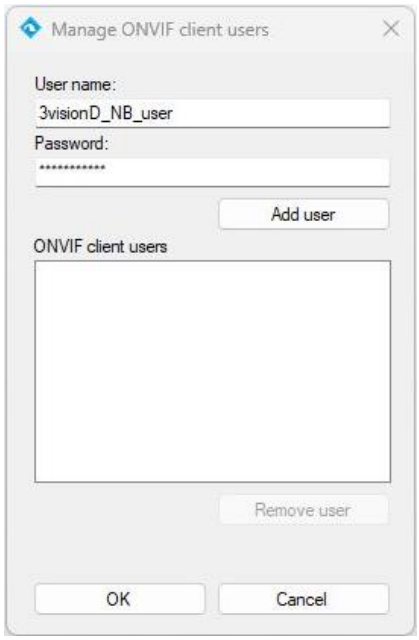
Adding User to Milestone Open Network Bridge ONVIF Client

At the end, same user must be added to ONVIF Client.

In windows taskbar select “Up” icon.

1. Right click on Milestone Open Network Bridge icon
2. Select Manage ONVIF client users …
3. Enter User name
4. Enter password
5. Click on Add user button
6. Click on OK button

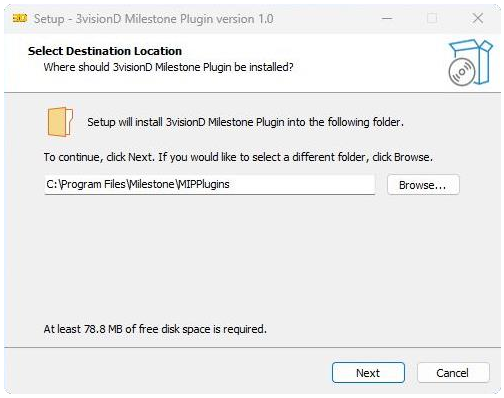




By adding a new basic user and defining it’s role as administrator in XProtect Management Client and adding this user to Milestone Open Network Bridge configuration procedure is finished and 3visionD plugin can now be installed.

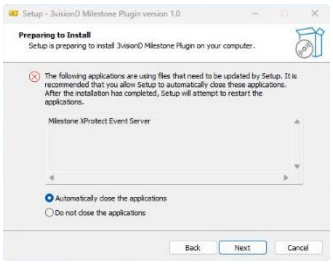
3visionD plugin installation

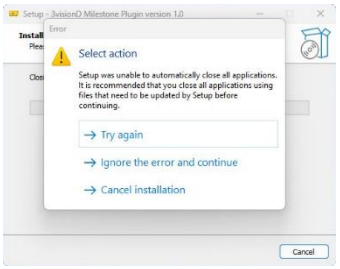
Installation is started by double clicking the 3visionD_Plugin_Setup icon. Installation procedure will install 3visionD plugin and it’s dependencies in default Milestone XProtect installation folder. (C:\Program Files\Milestone\MIPIPlugins)



Plugin installation files will be copied to Milestone XProtect installation path in MIPPlugins. Please make sure that selected folder is a folder where XProtect is installed.

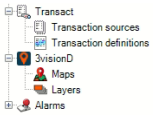
In this example XProtect is installed on C drive.



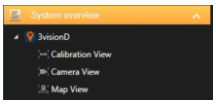


Installation procedure is stopping Milestone XProtect Event Server service. Sometimes this service is stopped from a second try, if that happens select “Try again”.

Now, installation procedure will install plugin and place required files in installation folder.



When plugin installation is finished start the Milestone XProtect Management Client and confirm that in Site Navigation panel 3visionD node is added.



In XProtect Smart Client go to Setup and in System overview and check if 3visionD node is added.

After 3visionD plugin installation system calibration is required. System calibration includes map and camera calibration.

System calibration

Live maps

Live Map is image of geographic area that, after is calibrated, is used as map. After the map has been calibrated every pixel in that image is presenting one geo coordinate. In order to use image as a map, image must not be distorted, rotated or tilted. Image must present true “Top View” of the site with direction to the north. Camera that captures the image must have pan and tilt angles set to zero and must be directed to face the north (see image below).

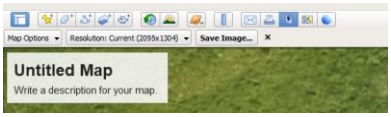
Following example shows how image exported from Google Earth™ is calibrated and used as a Live map.

Live Map first criteria is image resolution. Live Map must have 1920x1080 resolution (HD resolution).

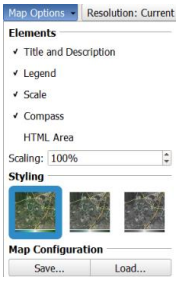
Image used as a Live Map must be in HD resolution (1920x1080). Live Map within the XProtect Smart Client can be resized to any resolution according to user need, but the original map used for calibration must be in HD resolution.

Saving image from Google Earth PRO

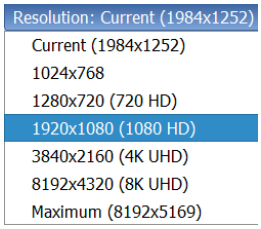
1. Open Google Earth PRO
2. Using search or move buttons navigate to Site location
3. Selecting File → Save → Save Image (Ctrl+Alt+s) will display new toolbar above the image (see image below).



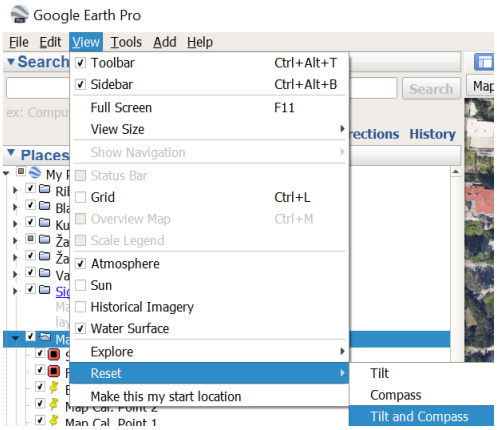
4. Select “Map Options” button



5. Uncheck “Title and Description”
6. Uncheck “Legend”
7. Uncheck “Scale”
8. Click on Resolution → select 1920x1080 (1080 HD)



9. Use mouse click + move to adjust the desired map view.
10. Set Top view by selecting View → Reset → Tilt and Compass



11. Click on Save Image button.

After the image is saved it is a good practice to check the image resolution. This can be done by using File Explorer.

Reading image resolution from File Explorer

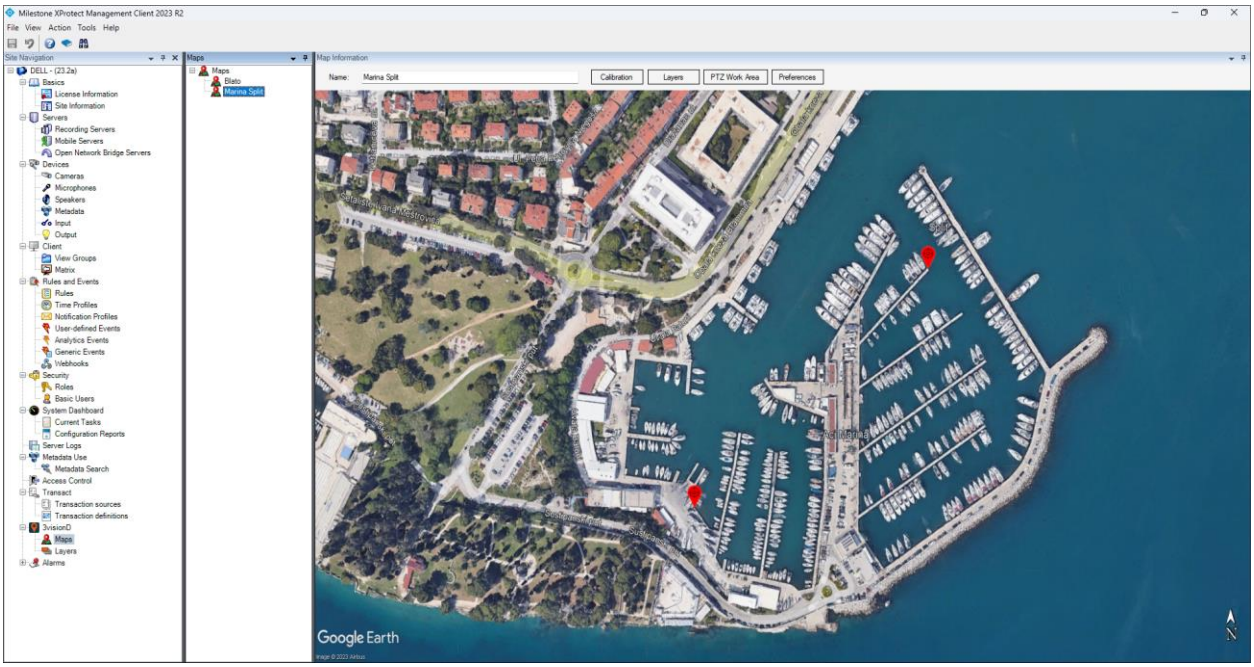
1. Open File Explorer and navigate to image file.
2. Right click on the image and select → Properties
3. Click on Details tab
4. In Image frame Image dimensions are displayed: 1920 x 1080 pixels

> ***Note 1: Image HD resolution & Tilt and Compass Reset***
>
> Image exported from Google Earth must be in HD resolution (1920x1080 pixels). Also, it is important to reset Tilt and Compass before the image is saved, otherwise camera icons will be misplaced on a map.

After the image is exported, two placemarks must are added in Google Earth Pro. These placemarks are used by 3visionD Management Client plugin during the map calibration procedure. Two placemarks are used for map calibration and also two placemarks are used to calibrate the camera.

Image below shows calibrated Live Map with two Placemarks used for Live Map calibration.

> ***Note 2: Map calibration points***
>
> Map calibration points has to follow one simple rule:
>
> Calibration Point 1 is always on the *lower left side* of the map in respect to centre
>
> Calibration Point 2 is always on the *upper right side* of the map in respect to centre



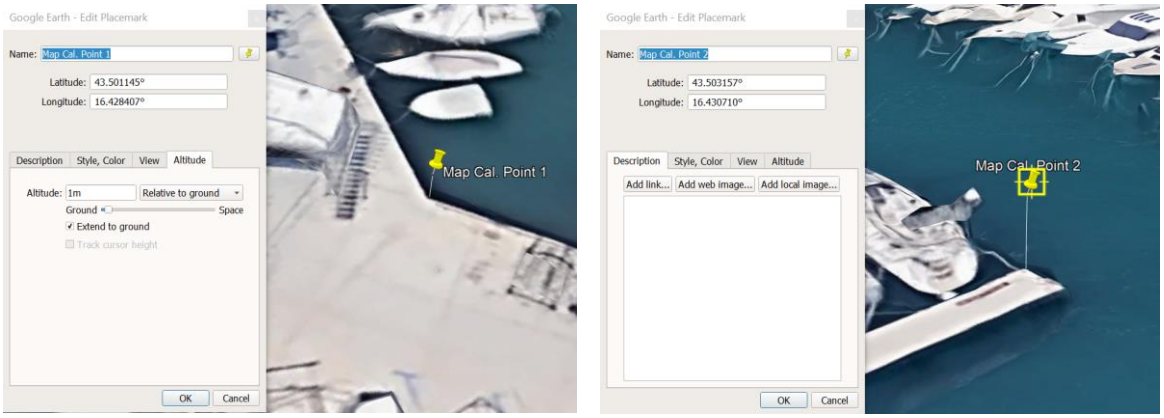
Live map calibration - Placemarks

As already stated, before an image is used as Live Map, image must be calibrated. Image calibration process is a procedure where pixels in the image are "connected" with geo coordinates. In this example these geo coordinates are the placemarks exported from Google Earth PRO.

Any two points on the map can be used as a placemarks for map calibration (please see Note 2 on page before). General rule for these placemarks is the usage of "easy to remember" places. Corner of the house, edge of the street, fire hydrant, shaft on the street are some of the examples of "easy to remember" places.

Once exported from Google Earth Pro, these placemarks are holding geo coordinates that will be connected with pixels in the image during image calibration procedure in Milestone XProtect Management Client 3visionD plugin.

Images below shows two "easy to remember" places.



Inserting placemark in Google Earth Pro

1. Open Google Earth Pro and navigate to site
2. Navigate to location that is on a **lower left side** of the map (see Note 2)
3. Zoom in on location
4. Press Ctrl + Left Shift + P to insert **first** placemark on a map
5. Name the Placemark (for example Map Cal. Point 1 – See left image above)
6. Select Altitude tab
7. Change "Clamped to Ground" option to "Relative to Ground" option
8. Check "Extend to Ground" checkbox
9. Use "Ground "slider to adjust Placemark height. Any height can be used.
10. Click on a flashing yellow square → hold the left mouse button and move Placemark on a map.
11. Release the mouse button to insert placemark.
12. Select OK when Placemark icon is placed in desired position.

After inserting Placemark on a map, it is a good practice to check if the placemark is in right location by rotating and tilting the map view.

13. Click “Shift” + hold “Left mouse button” and move mouse around to check if the Placemark is placed in correct location.

Placing a second Placemark

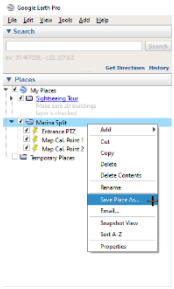
14. Navigate to location that is in **upper right side** of the map (see Note 2).
15. Zoom in on the location
16. Press Ctrl + Left Shift + P to drop **second** placemark on a map.
17. Name the Placemark (for example Map Cal. Point 2)
18. Select Altitude tab
19. Change “Clamped to Ground” option to “Relative to Ground” option
20. Check “Extend to Ground”
21. Use “Ground” slider to adjust Placemark height, any height can be used.
22. Click on a flashing yellow square → hold the left mouse button and move Placemark on a map.
23. Select OK when Placemark icon is placed in desired position.

Again, after placing a Placemark on a map, it is a good practice to check if the placemark is in right location by rotating and tilting the map view.

24. Click Shift + Left mouse button and move mouse to check if the Placemark is placed in correct location.

Save Google Earth Pro Placemarks

Geo location of Placemarks in Google Earth Pro are exported as kmz file. This file is saved on disc and imported in XProtect Management Client in process of Live Map calibration.



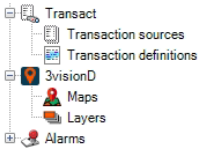
1. Right click on a Folder in Places View
2. Select Save Place As …
3. Name the file
4. Click OK.

After exporting Placemarks, Live Map is ready to be calibrated in 3visionD Management Client plugin.

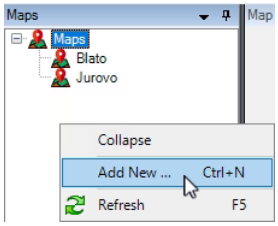
Live Map calibration

Importing image in XProtect Management Client

1. Open XProtect Management Client
2. In Site Navigation panel select 3visionD node
3. Select Maps node

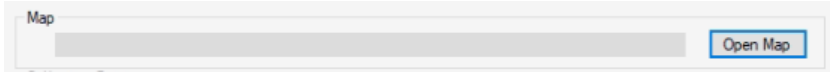


4. In Maps navigation panel Right click on Maps and select Add New



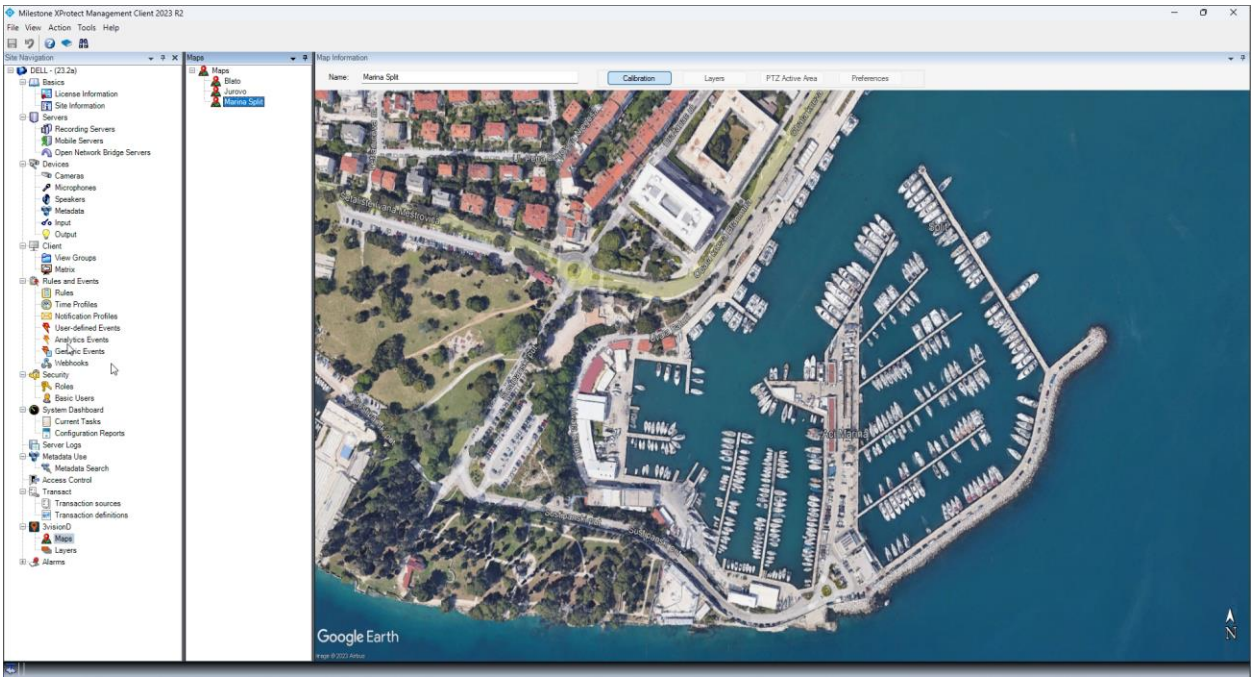
5. Type Name (in this example Marina Split)
6. Click OK
7. Click on a Marina Split map in Maps view
8. Clicking on Calibration button will open map calibration panel.

9. Click on Open Map Button



10. Navigate to folder that contains the Google Earth image and press OK
11. Press Close Button.

With these steps image is imported in XProtect Management Client.



Now this image needs to be calibrated and for that two calibration points are used.

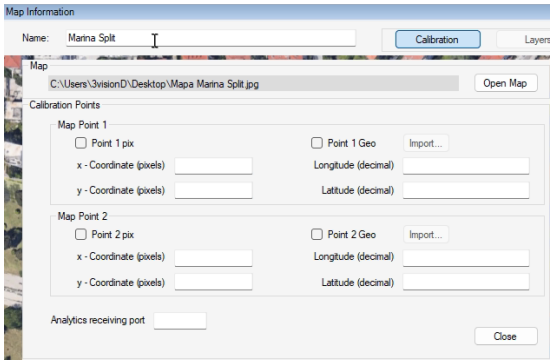
These two points in the image corresponds with two placemarks exported from Google Earth Pro (see Map calibration points). Marking the point in the image and connecting it with placemark from kmz file is a process of calibrating the image to be used as Live Map.

Live Map Calibration

First point

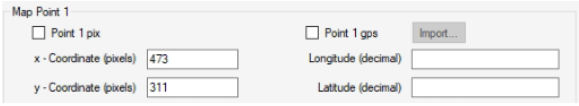
1. Select Map in Maps panel (Marina Split in this example)
2. Press Calibration Button (Map calibration panel is now visible)

3. Check **Point 1 pix** (Program will hide Map calibration panel until point on the image is clicked. To cancel the calibration press esc button).

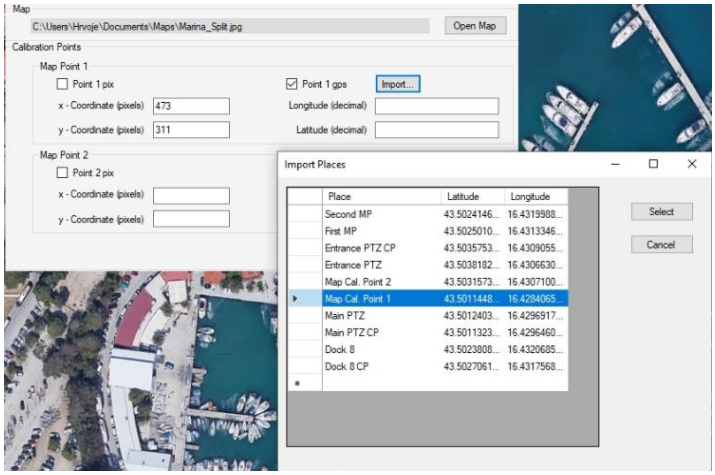


4. Move a mouse pointer over map calibration Point 1 and press the left mouse button.

5. Map calibration panel is now visible and location of Point 1 in pixels is displayed.



6. Select checkbox **Point 1 geo** and press Import Button.
7. Find and select saved .kmz file.
8. Press Open.
9. Select map calibration point 1 from list of saved placemark. (Map Cal. Point 1 in this example)

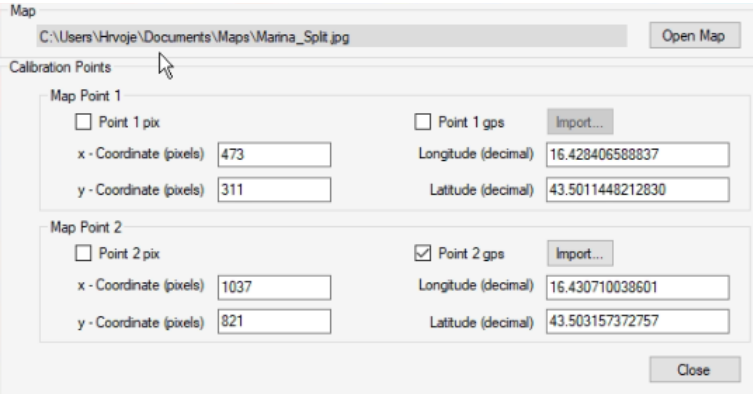


10. Click Select Button

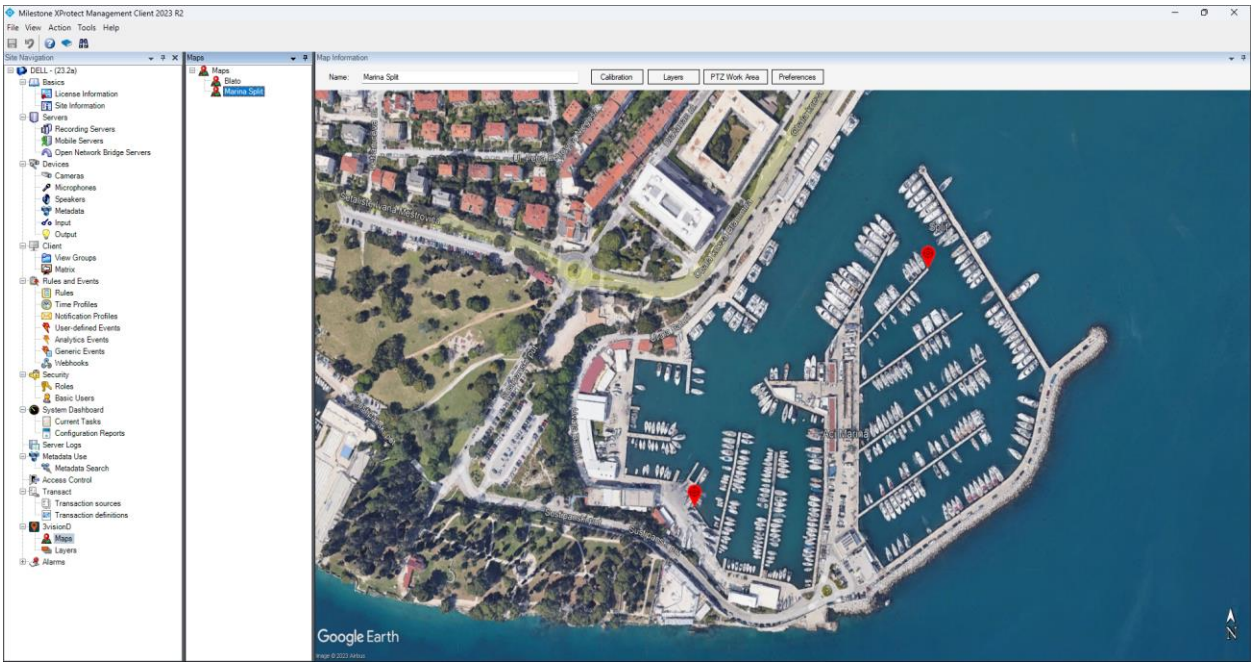
Second point map calibration

11. Check **Point 2 pix** CheckBox (Program hides Map calibration panel)
12. Move a mouse pointer over Point 2 on a map and press the left mouse button
13. Select checkbox **Point 2 geo** and press Import Button.
14. Select saved .kmz file and press Open.
15. Select map calibration point 2 (Map Cal. Point 2 in this example)
16. Click Select Button

Image below shows calibrated map data. Point 1 coordinates in pixels are connected with Placemark 1 geo coordinates. The same applies for point 2.



Map calibration process is now finished and image is now used as Live Map. Image below shows the Live Map Calibration Points as red icons.



After map calibration, cameras are calibrated with similar procedure. Based upon type of the camera, there are two different calibration procedures, one is for PTZ cameras and other one is for “Non-moving” cameras (Dome, Bullet, etc).

Purpose of camera calibration is their integration in a Live Map. Once camera is calibrated it is automatically placed on a Live Map.

Based upon camera calibration parameters, objects detected in camera field of view are also automatically placed on a Live Map, for example, person or vehicle detected in camera video stream is displayed on Live Map in real time.

Layers

Layers are used to add functionality to Live Maps. Layer is marked as coloured area on the map that can have one of the following functionalities:

- Alarm area
- Tracking area
- Observation area
- PTZ Active area

Alarm is raised when moving object enters the ***Alarm area***. Moving object is automatically tracked with PTZ camera (if PTZ camera is mounted and calibrated on site). Detected object current geo location, it's path is saved as metadata.

When moving object enters the ***Tracking area*** object is tracked with PTZ camera without the raising the alarm. Object geo location data it's path is saved as metadata.

When detected object enters ***Observation area*** its location is displayed on Live map.

PTZ Active area is defining working area for one PTZ camera. This is the area where PTZ camera is activated for automated tracking. Outside this area PTZ camera will not be activated. This area is linked with each individual PTZ camera.

PTZ active area is used when one object is tracked with several PTZ cameras. PTZ Active area is then used to limit the working area for each PTZ camera and prevent the PTZ camera to be directed in wall, trees and etc. One example is scenario where two PTZ cameras are mounted on a house. One in front and one in the back of the house. Activating the alarm in back of the house will trigger both PTZ cameras in tracking mode. Camera in back of the house will track the intruder as well as the camera in front of the house if PTZ active area is not set. But the camera in front of the house will be looking at the wall. Therefore, back of the house is excluded from PTZ active area for a camera mounted in front of the house. And vice versa.

Detection Categories are also defined in layers. When detected object is classified, certain functionality can be activated based upon object category. For example, when supervising school yard, detecting animal can activate tracking on PTZ camera.

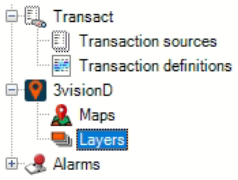
Detection categories are:

- All
- People
- Vehicles
- Animal

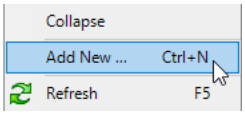
Detection categories settings are described in **3visionD Analytics and Smart search** part of this manual.

Adding layer to Live Map

1. In Site Navigation panel select 3visionD node and then Layers



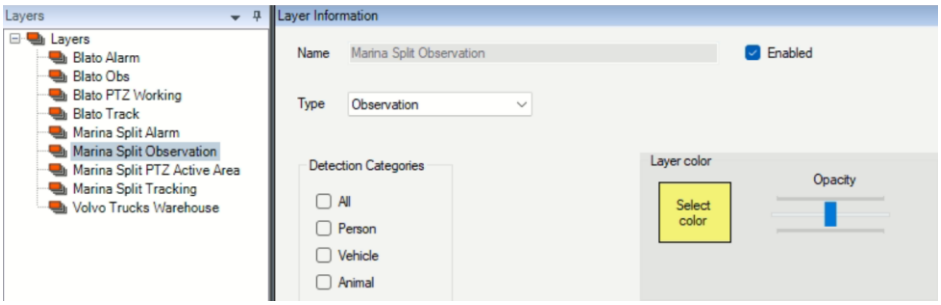
2. In Layers navigation panel right click and select “Add New”



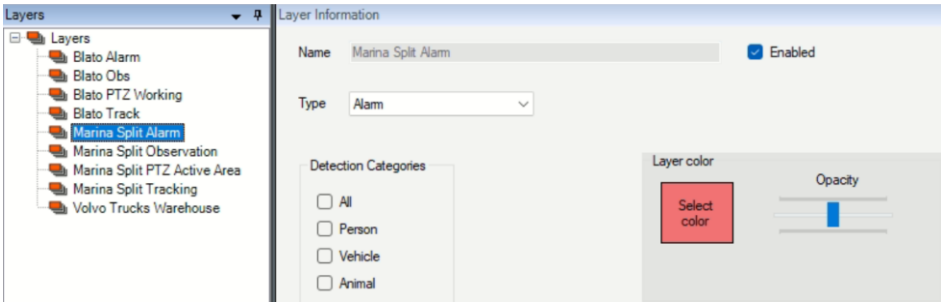
3. Type “Marina Split Observation” and press “OK” button.
4. Add four new layers with following names (in this example we have used following layer names):
    a. Marina Split Observation
    b. Marina Split Alarm
    c. Marina Split Tracking
    d. Marina Split PTZ Active Area

Now, each layer will be selected from Layers panel then in Layer Information panel, Type of alarm will be associated with each layer and layer colour will be selected.

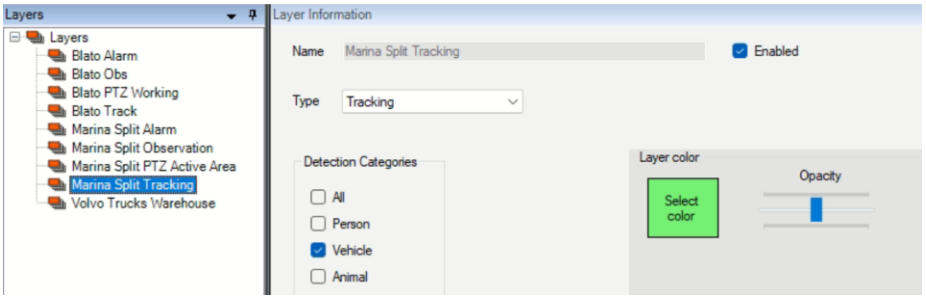
5. Click on **Marina Split Observation** layer and select layer functionality in Type dropdown box and choose layer colour. In this example we used:
    a. Observation functionality
    b. Yellow colour



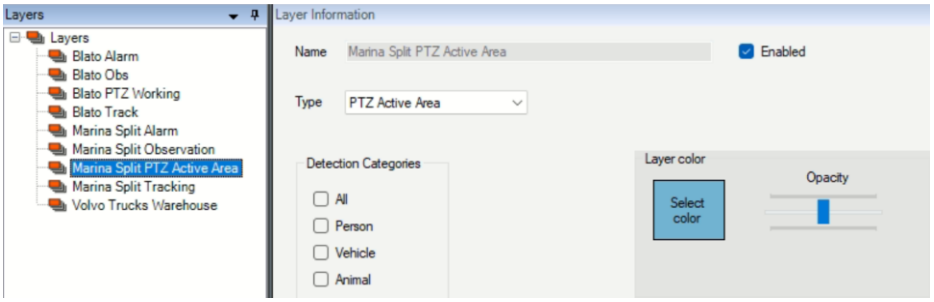
6. Click on **Marina Split Alarm** layer and select layer functionality in Type dropdown box and layer colour. In this example we used:
    a. Alarm functionality
    b. Red colour



7. Click on **Marina Split Tracking** layer and select layer functionality in Type dropdown box and layer colour. In this example we used:
    a. Tracking functionality
    b. Green colour



8. Click on **Marina Split PTZ Active Area** layer and select layer functionality in Type dropdown box and layer colour. In this example we used:
    a. Defining the area for PTZ camera tracking functionality
    b. Blue colour

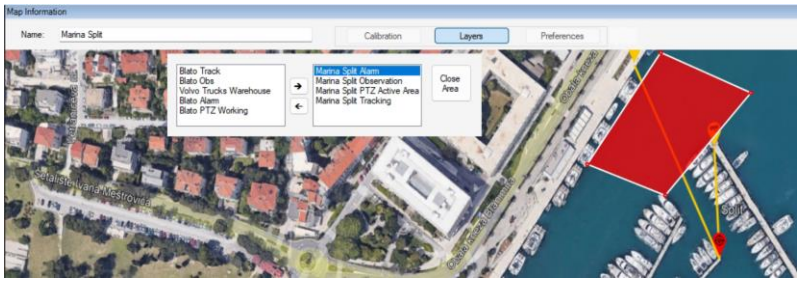


If requested surveillance scenario example requires every boat that enters or leaves the marina is tracked with PTZ camera and zoomed in, so that boat registration is captured in camera video stream and alarm to be raised at the same time Alarm layer at Marina Split entrance will be drawn.

Drawing PTZ Tracking Area Layer

9. In Milestone XProtect Management Client select 3visionD node
10. Select Maps
11. From Maps panel select Marina Split

12. In Map Information panel click on Layers button
13. Select Marina Split Alarm layer
14. Draw the area by clicking and dropping dots on the map
15. When finished select Close Area button
16. Press Layer button to close the layer frame.



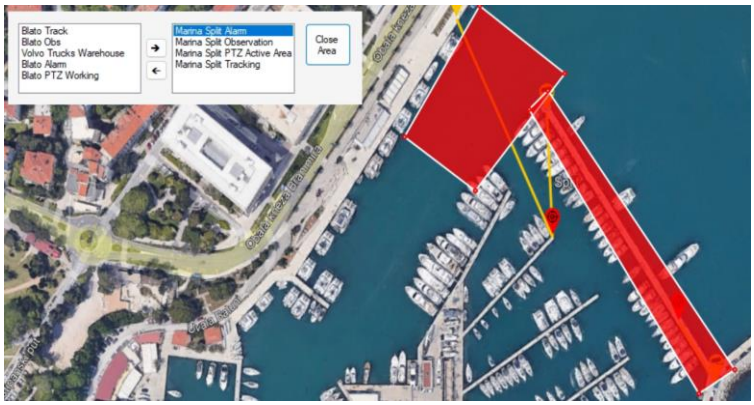
Layers floating window can be moved from default location with mouse “click & drag”.

Each point can be edited and moved by moving a mouse pointer in close proximity to a point, then red icon is changed into white icon indicating that point is selected. Then using “click & drag” move point in desired location.

If object detected in another area needs to be tracked with this PTZ camera, Alarm Area needs to be drawn for that area too. In this example this area is dock 8, see the image below.

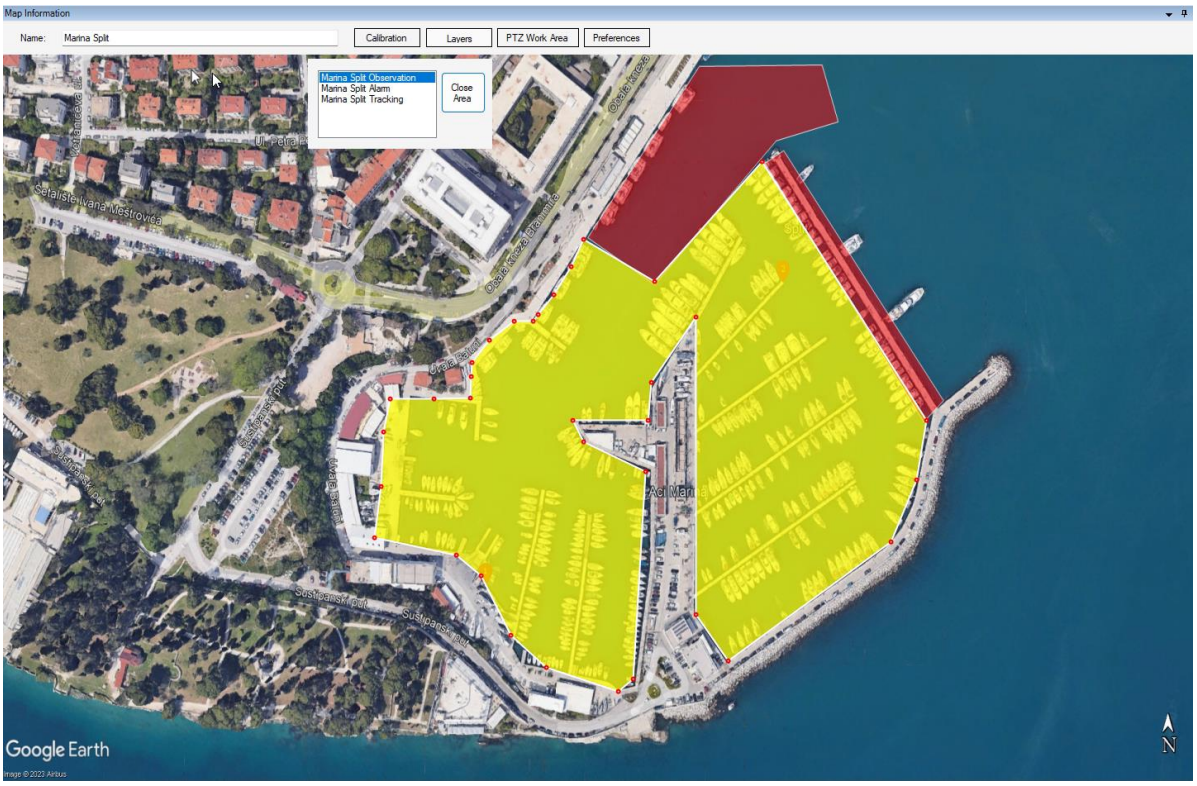
Adding additional area to PTZ Tracking Area

17. Press Layer button to open the layer frame
18. Select Marina Split Alarm layer (layer color is highlighted)
19. Draw additional Alarm area by clicking and dropping dots on the map
20. When finished select Close Area button



In this scenario every moving object inside Alarm area (Marina entrance and Gate 8) will initiate the alarm and activate PTZ tracking functionality.

When tracking of every moving object inside Marina is required, Tracking layer is drawn over the map covering the entire marina (see image below).



Position and path of every moving object in marina, regardless of the camera that has detected that movement, is recorded.

With this functionality any number of cameras can be installed in marina for outdoor or indoor surveillance.

PTZ Active Area

Another feature of Live Map layers is a definition of PTZ camera Active area. This is the area where, once activated, PTZ camera will track moving object. Each PTZ Active Area is connected to one specific PTZ camera. Once defined, all other areas are excluded from PTZ tracking and considered as privacy areas. Objects detected outside PTZ Active area are not tracked by PTZ camera.

PTZ Active Area vs PTZ Tracking Area

As already stated, PTZ Active Area is defined for each PTZ camera individually. PTZ Active Area for one camera can overlap with PTZ Active Area of another PTZ camera so that moving object in overlapping area is tracked with both PTZ cameras.

By default, PTZ Active Area is equivalent to Tracking Layer. But there are some scenarios where PTZ cameras tracking needs to be more restrictive and where PTZ Active Area is to be implemented instead of Tracking layer. Image below presents one of those scenarios (outdoor warehouse surveillance example).

Image above will show implementation of privacy area on a Live map. Image that is used as a Live Map has been edited and all areas that are not supervised are removed from image and displayed as white area.

There are two PTZ camera on a Live map, one on position 1 and the other one on position 2. There is also one dome camera displayed on position 3. Dome camera field of view is marked with semi-transparent blue area.

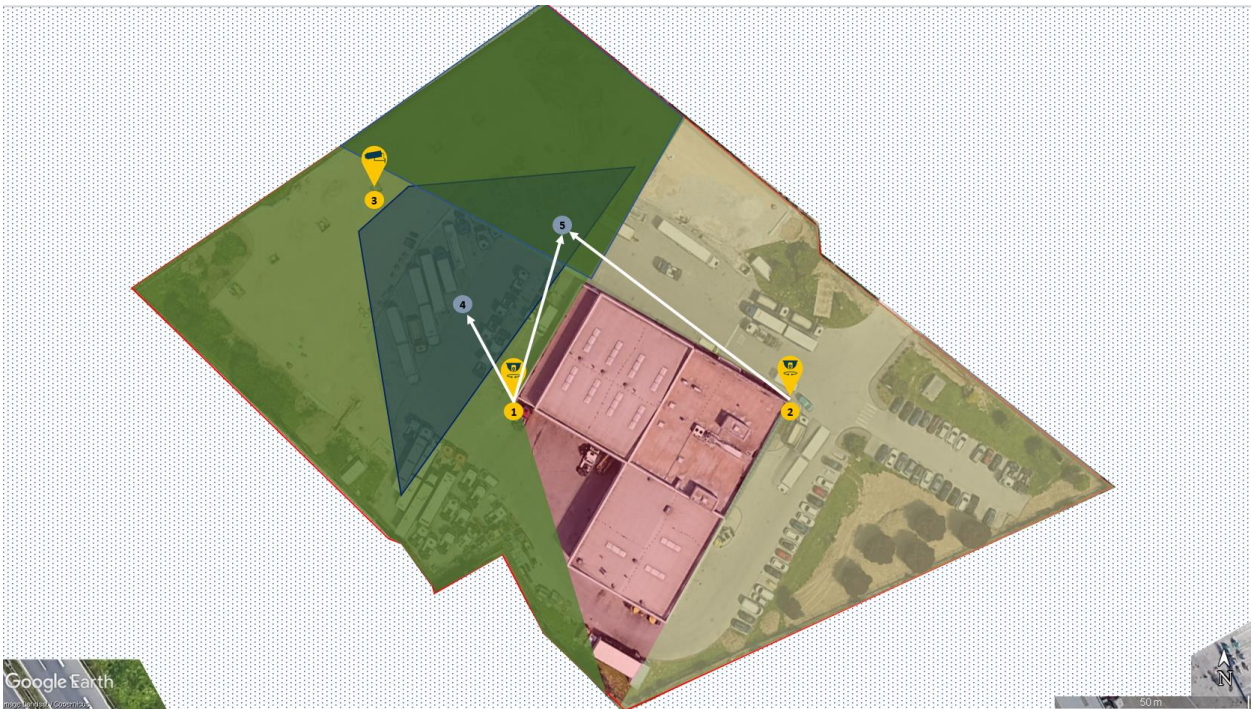
In this scenario, dome camera has detected motion on position marked with number 4.

Since entire site is marked as a PTZ Alarm area, once motion has been detected, both cameras will be directed to track the detected moving object.

Video stream from PTZ camera on location 1 will capture and display moving object, but video stream from PTZ camera on location 2 will capture and display image of the building wall since between PTZ camera 2 and detected moving object is a building.

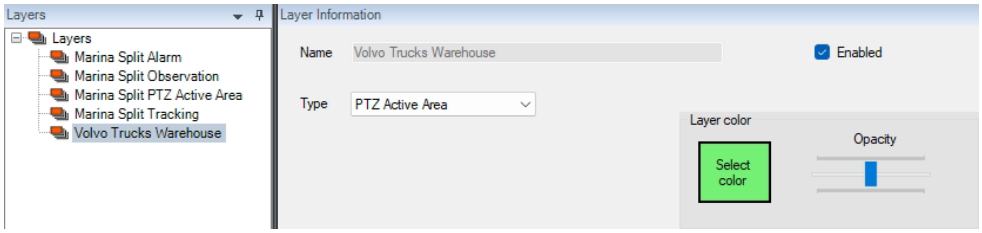
This problem is solved by using PTZ Active Areas for each PTZ camera presented in the image bellow. Image shows two PTZ Active Area, and for each PTZ camera PTZ Tracking area is marked as green area with different level of transparency.

When moving object is detected on location marked with number 4, PTZ Active area function will activate only PTZ camera 1, and when moving object is detected in location marked with number 5 (overlapping area) PTZ Active area function will activate PTZ cameras 1 and 2. Dark green area in upper part of the map is the overlapping area for PTZ camera 1 and 2 and booth cameras are activated in this area.

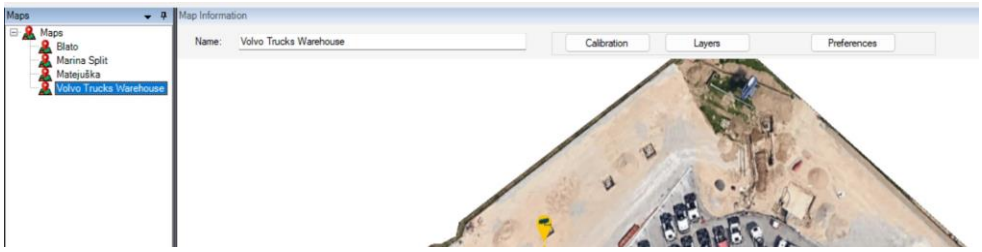


Drawing PTZ Active Area

1. In Site Navigation panel select 3visionD and then select Layers
2. In Layer information panel select Type - PTZ Active and select it's colour



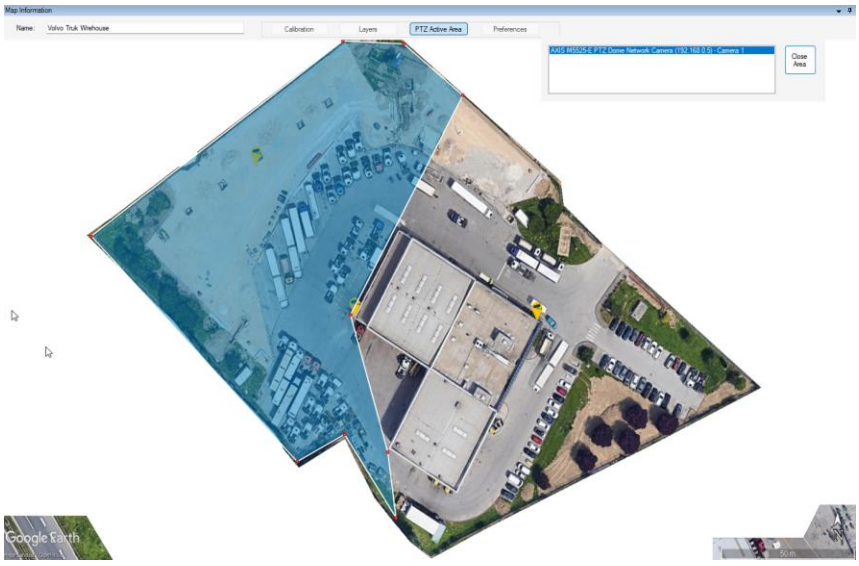
3. Select Volvo Truck Warehouse map



4. In Map Information panel click on PTZ Active Area button. This button opens new frame that has list of PTZ cameras in XProtect Management Client.

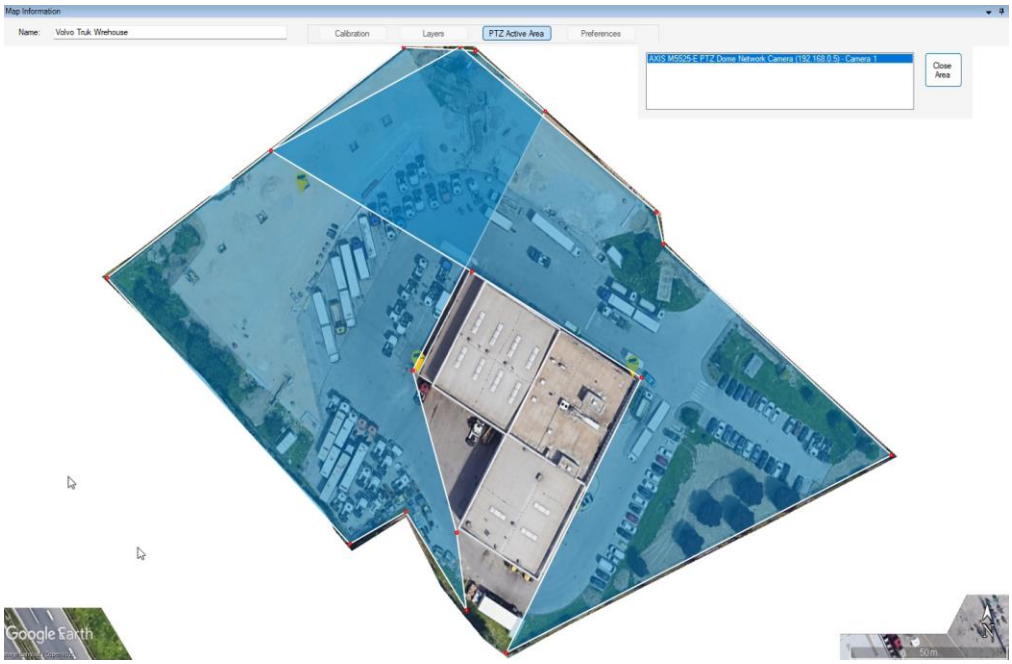
5. Select the PTZ camera whose Working Area will be defined.
6. Using left mouse button click on the map to drop point on it, when finished click on Close Area button
7. Click on save icon .

Image below shows PTZ Active Area for Camera 1.



8. Again, select the PTZ camera whose Working Area will be defined (Camera 2).
9. Using left mouse button draw points on the map, when finished click on Close Area button
10. Click on save icon .

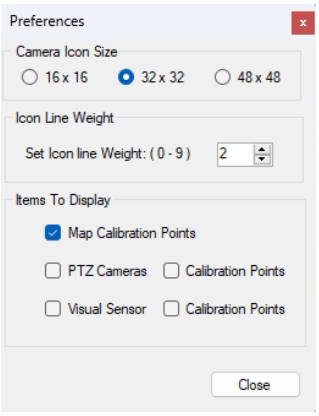
Image below shows PTZ Active Area for Camera 2.



11. Overlapping area on top of the image is seen as a darker area. In this area both PTZ cameras are set to track the moving object.
12. Click on a save icon to save PTZ Active Area

Map preferences

Map preferences are set on a Preferences frame, to open, click on “Preferences” button.



Camera icon size sets the size of the icon that will be displayed on the map.

Icon Line Weight is the weight of the line between camera icon and camera calibration point icon. It also defines line weight between PTZ camera mounting location and the object that is being tracked once tracking is activated.

Items to display frame is a set of checkboxes that sets icons to be displayed on a map.

Camera Calibration for Non-moving cameras (Dome, Bullet, …)

As already stated, placing camera icon on a map is automated process done by the 3VisionD Management Client Plugin, but first, camera must be calibrated before it can be used as visual sensor. Term “visual sensor” defines video camera as a device that exports metadata such as detected person or vehicle geo location based upon their location in the video stream.

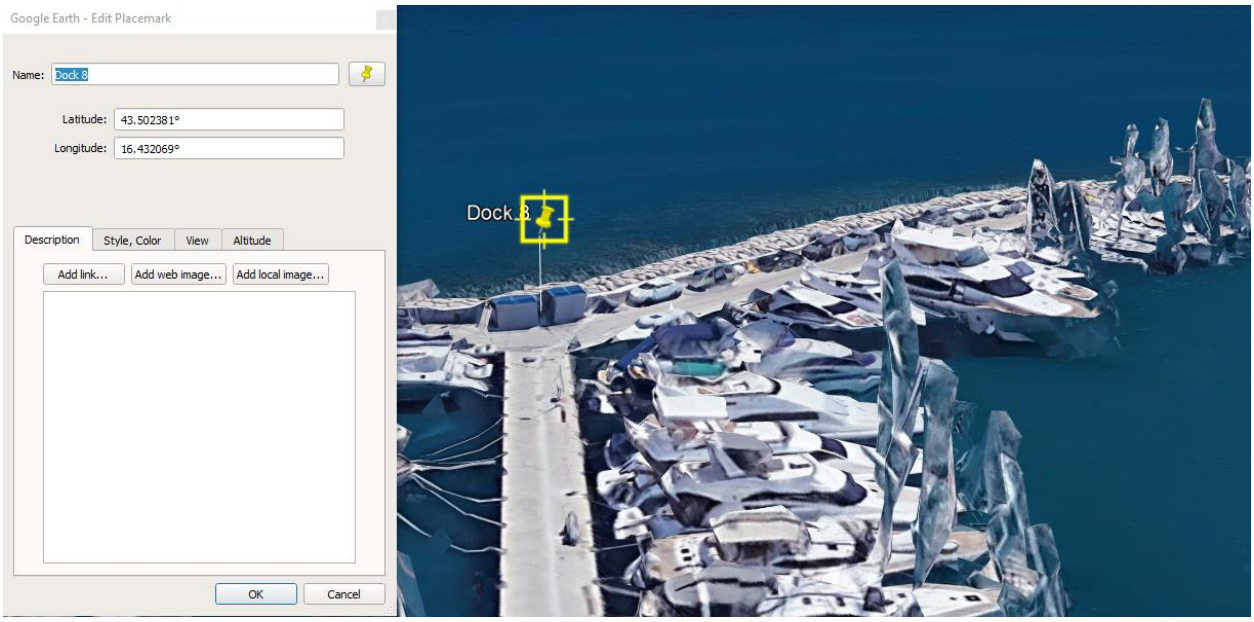
Similar to map calibration process, camera calibration is also done in Google Earth Pro by placing only two Placemarks on the map.

Each camera is calibrated by using two Placemarks and they are;

1. First calibration placemark is camera mounting location
2. Second calibration placemark is camera video stream centre point

First calibration point

Image below shows Marina Split example and camera mounting location on Dock 8. This location is camera first calibration point and is marked by a placeholder in a Google Earth. Adding a placemark in this location is defining camera mounting position geo data.



Adding a placemark for camera Mounting location in Google Earth PRO

1. Navigate to location where camera is mounted.
2. Zoom in
3. Press “Ctrl + Left Up + P” to drop Placemark on a map.

4. Name the Placemark (in this example Dock 8)
5. Select Altitude tab
6. Replace Clamped with ground option with Relative to Ground
7. Check Extend to Ground
8. In Altitude textbox type in the camera height or use Ground slider to adjust camera height.
9. For accurate positioning click on a flashing yellow square → hold the left mouse button and move Placemark on a map.
10. Select OK when icon is placed in camera mounting position.

It is a good practice to check camera mounting position from different angles. To change viewing angle:

11. Click Shift + Left mouse button and move mouse to check if the Placemark is placed in a required position.

Second calibration point is location where centre of camera video stream is pointing. This point is shown as a red cross in image below. In this example red cross presents middle of the image and this point is second calibration point.

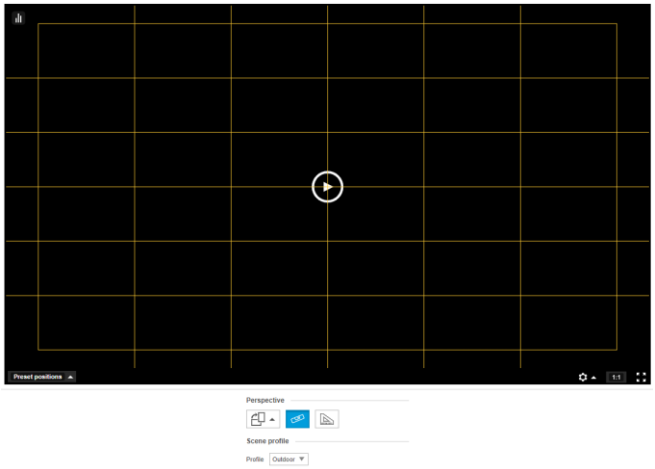
Finding centre point in video stream for second calibration point.

First step is to display image centre point via grid or a cross icon over live stream. There are two ways to do this:

- Using Camera Levelling guides (build in feature in some cameras) or,
- Using 3visionD Calibration View control inside a XProtect Management Smart Client

1. Video Camera Levelling guides

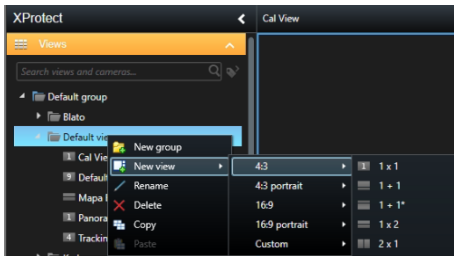
Some cameras have the option for image levelling by using orientation grid feature. Image below shows orientation grid in Axis camera.



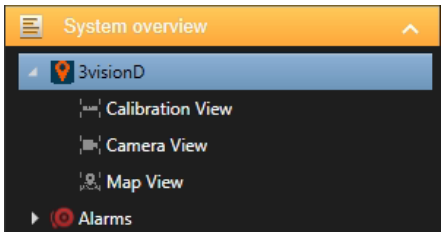
Video stream centre point is clearly seen in this image. Camera video stream is display on the screen by pressing play button.

2. Using 3visionD Calibration View control in XProtect Smart Client

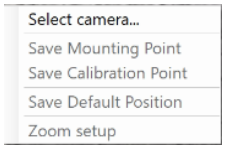
1. Open XProtect Smart Client
2. Press Setup Button to add new View
3. Right click on Default View and select New View → 4:3 →1x1
4. Name it, for example, Calibration View



5. In System overview select 3visionD
6. Drag and Drop 3visionD Calibration View control to 1x1 – Calibration View



7. Press Setup Button
8. Right click on the view → Select Camera



9. Select camera from a list (Gate 8 camera in this example)

Camera video stream with red cross in the middle of video stream is now displayed and second calibration point can now be calibrated.

Using one of this two procedures video camera field of view centre point is found and the next step is to find geo coordinate of this point.

Again, there are two ways to find geo coordinate. By using:

- GNSS receiver
- Google Earth Pro

Using a GNSS receiver is out of the scope for this manual so only Google Earth Pro is presented in this manual.

Finding geo coordinate of camera centre point using Google Earth Pro

This procedure includes measurements of two distances from camera centre point to any two points on a map. These points are named measuring points and marked in images below as MP1 and MP2. These measuring points can be house corners, man holes, street intersection points or any points that are easy to spot on a map.

Procedure for finding geo coordinates of video centre point is the following:

*In Google Earth Pro, **circle is drawn** from first measuring point with measured distance as radius. Then, **line is drawn** from second measuring point to point on a circle. Line length is equal to measured length. End line point must meet two criteria's:*

1. *End point ends at the circle.*
2. *Line length is equal to measured length.*

Inserting a Placemark in intersection point between circle and line will add geo coordinates to this point.

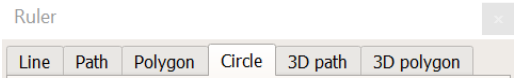
Marina Split Example

In this example we will find geo coordinates for camera mounting location and camera video stream centre point by using the same procedure.

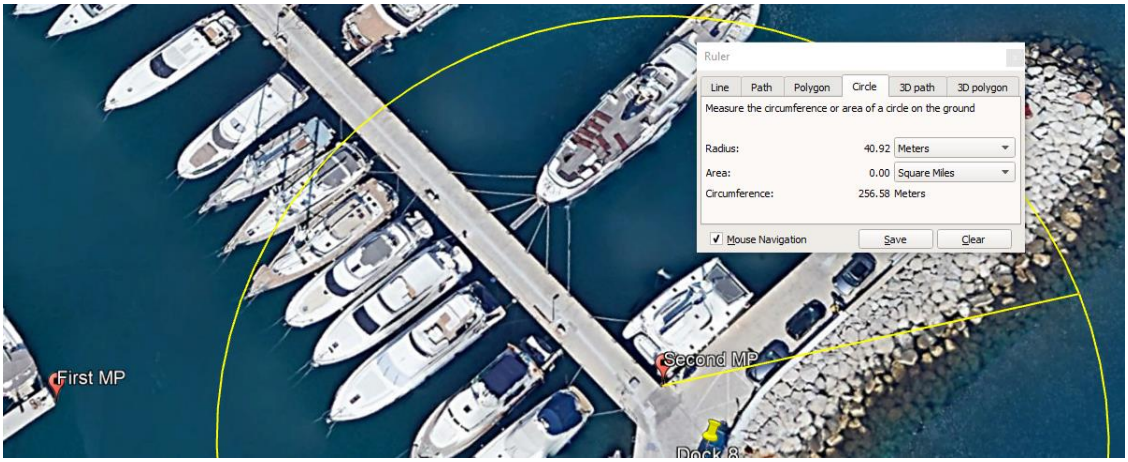
1. Two distances are measured from video camera stream centre point to any two “easy to find” places that are seen in Google Earth Pro.
2. In this example, “easy to find” places are two corner points that are marked as First MP and Second MP. See the image below.

Note 2: Camera measuring points must be on the same height level.

3. On site, distance is measured from video stream centre point to First MP and distance from video stream centre point to Second MP.
4. These measured distances will be used to draw one circle and one line in Google Earth Pro.
5. Start Google Earth Pro and check that Terrain layer in Layers panel is unchecked.
6. Insert Placemark for First MP and Second MP
7. Click on Show Ruler icon
8. Select Circle tab

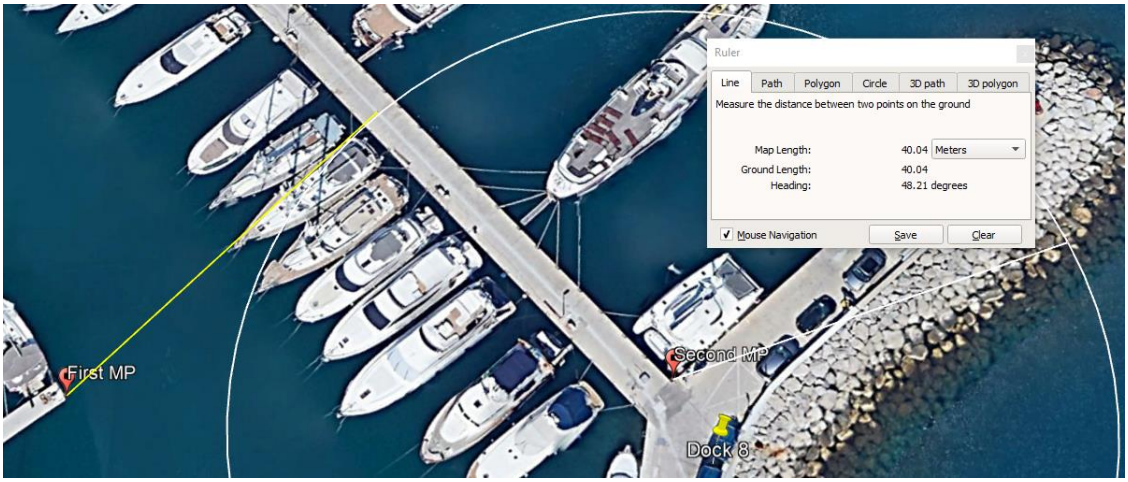


9. Draw circle from Second MP with radius that is equal to measured distance (in this example 40,92 m see image below)

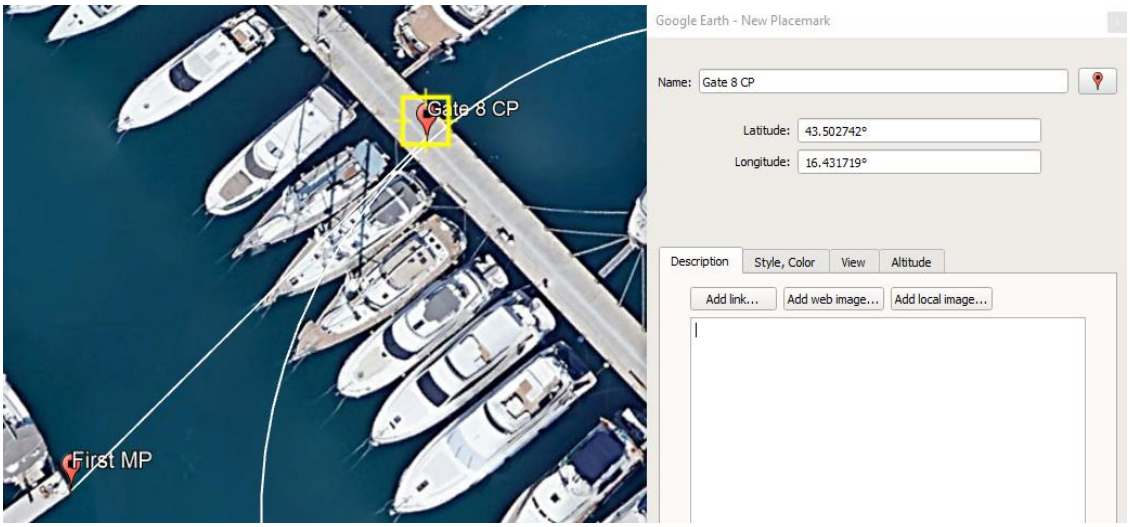


10. Now, select Line tab.

11. Draw line from First MP to a point that has measured value (in this example 40,04 m) and that ends at the circle (see image below). End of the line, that is 40,04 metre long must be on the circle.



12. This point (intersection between line and circle) is a camera second calibration point. Insert Placemark at this position and save it as kmz file.

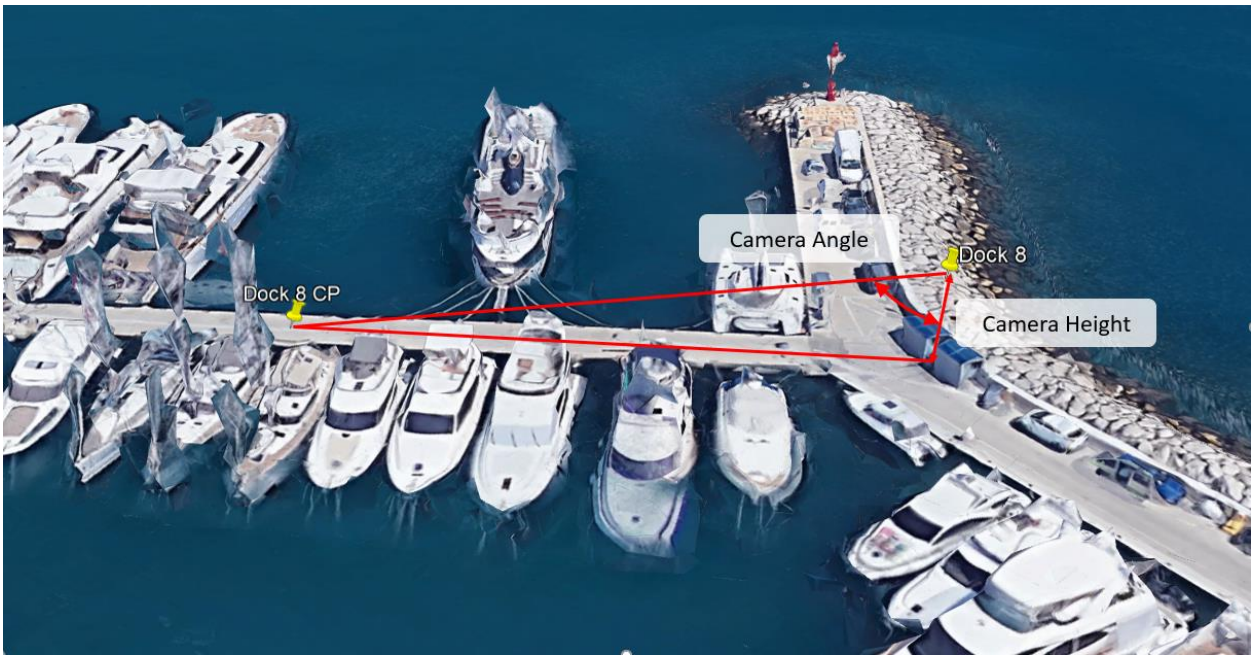


Intersection point between circle and a line is camera second calibration point (Gate 8 CP) and by inserting the Placemark in that location will have define it's geo coordinates.

Building corners, shafts, street corners, road marks are some of the examples of Placemarks that can be used as MP points (measuring points).

Camera Angle

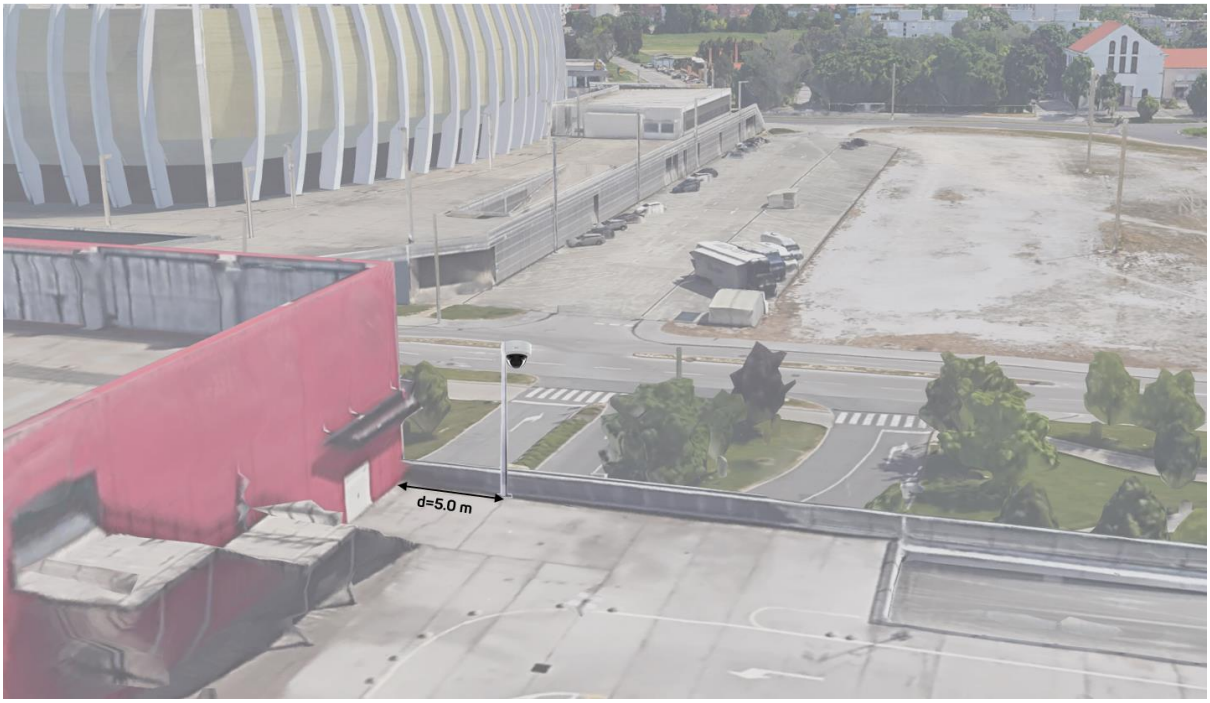
Camera second calibration point is also used to measure camera angle. This is the angle between camera video stream centre point and line from camera towards the ground. Image below shows camera angle and camera height.



Camera angle and camera height are also measured on site and those measurements are entered in XProtect Smart Client.

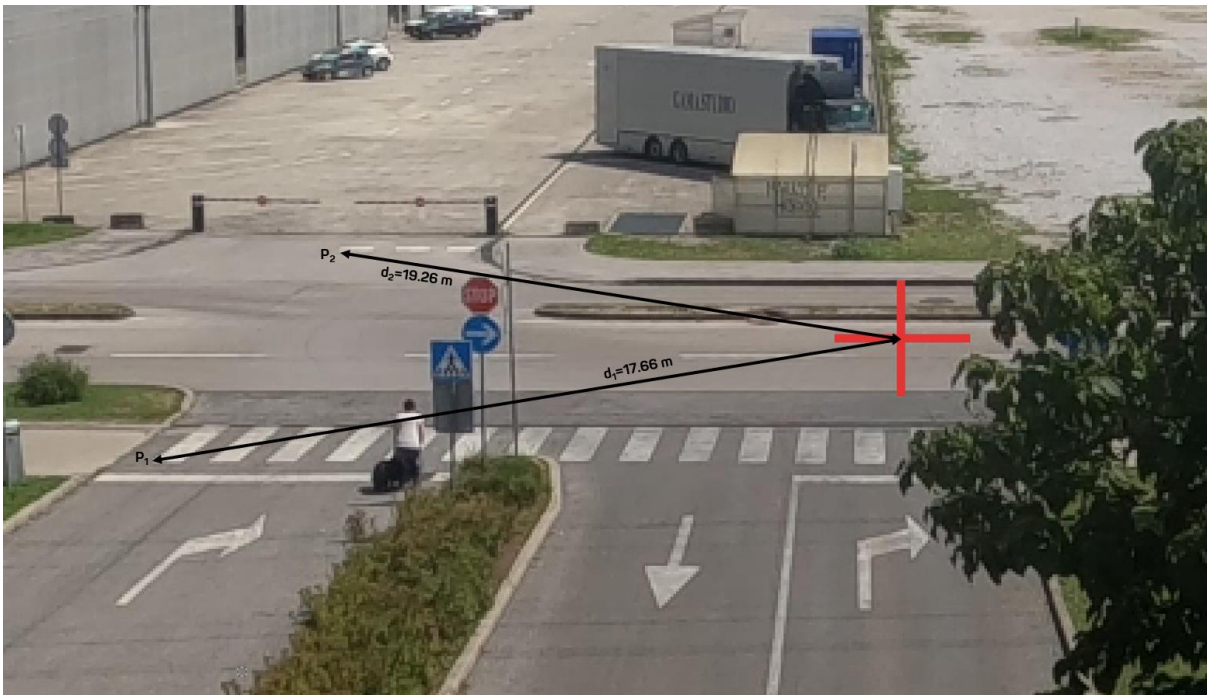
Second example - find geo coordinates of camera and video stream centre point

Second example of finding video camera centre point is Arena Zagreb example. In this scenario technician have mounted camera on a pole and have measured camera distance from edge of the building (d=5 meters, see image below)

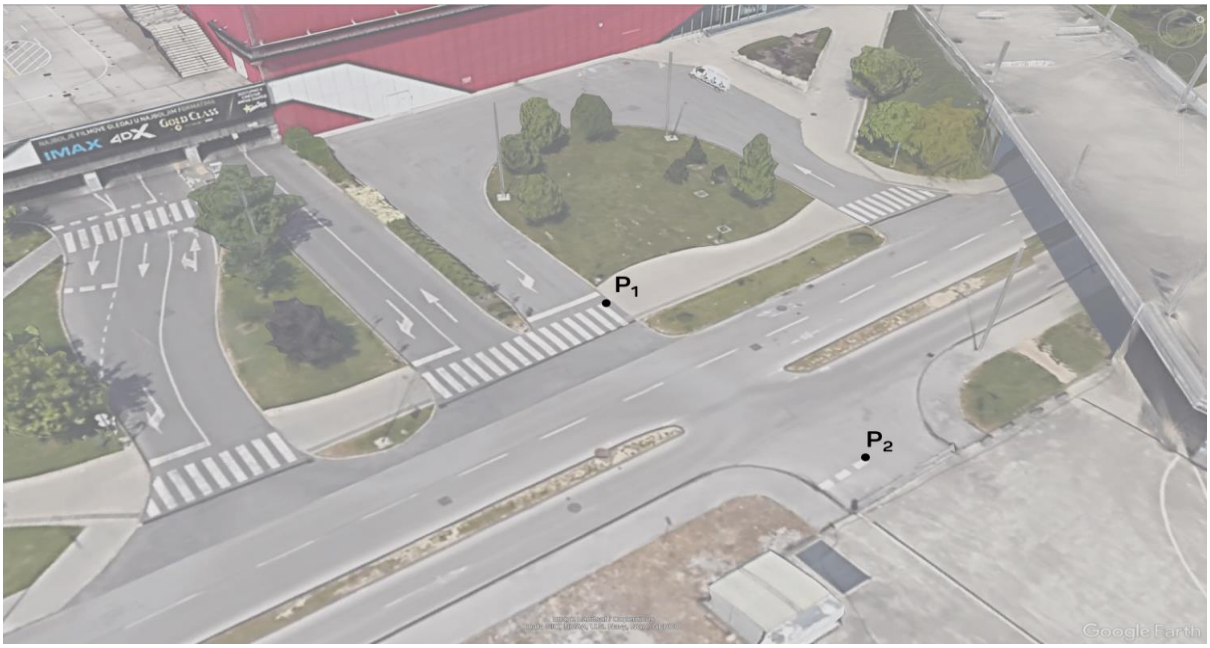


Operator in surveillance centre is receiving camera video feed in 3visionD calibration control item. Image below shows video feed from this camera and a red cross in its centre is marking the video stream centre point.

Operator will direct technician to go to that location and request for two distance measurements to be taken. From centre point to point P_1 and from centre point to P_2, (see image below).



Points P_1 and P_2 are points that are seen in Google Earth Pro application. Operator is free to choose any points, there are no restrictions there.



Based upon this data operator can determine geo coordinates for camera mounting position and camera video stream centre point.

In Google Earth Pro operator is drawing circle that has centre in P_2 and has radius that equals the measured distance of d_2=19.26 meters.

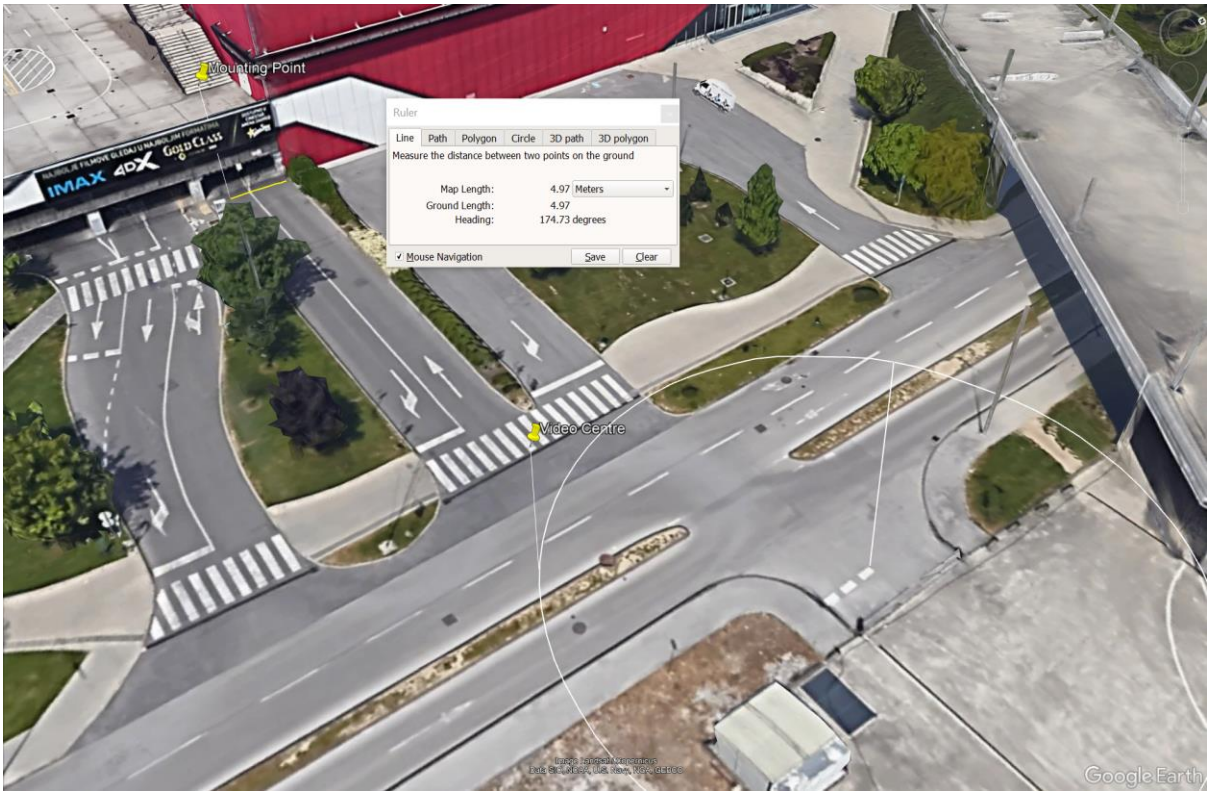
Now, from point P_1 line is drawn. Point P_1 is starting point of that line. End point of that line has to meet two criteria's:

3. End point is at the circle.
4. Line length equals d_1=17.66 m.

Location of video stream centre point is intersection point of circle a line when line has length of 17.6 m. Inserting placemark in this position will defined geo coordinates for video stream centre point.

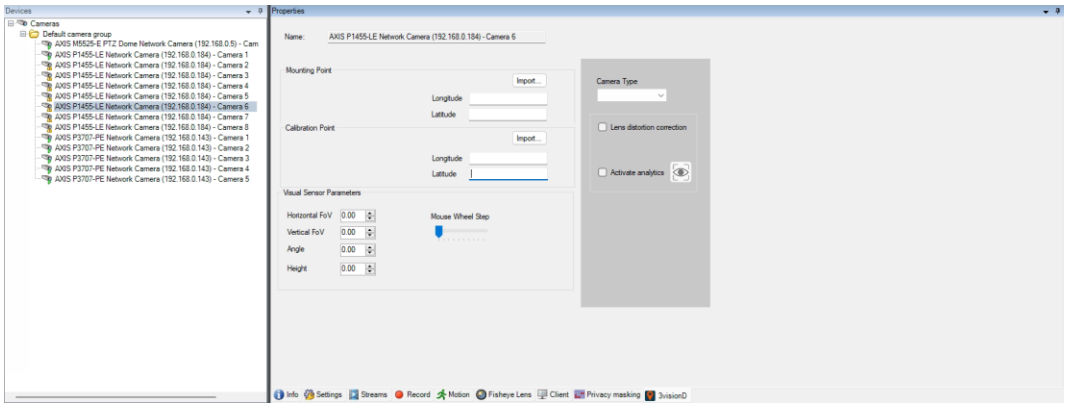
For camera mounting point line is drawn from building corner along the fence with length of 5 meters (see image below).

Inserting placemark in this position will define geo coordinates for a camera mounting location.

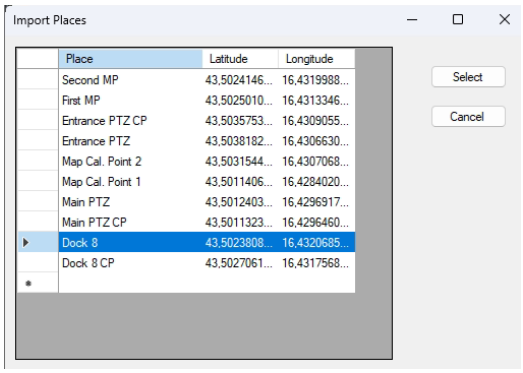


Importing camera Placemark data in 3visionD Management Client Plugin

1. Open Milestone XProtect Management Client.
2. In Site Navigation under Devices select Cameras and navigate to camera.
3. In Properties panel (on the right side) select 3visionD tab.

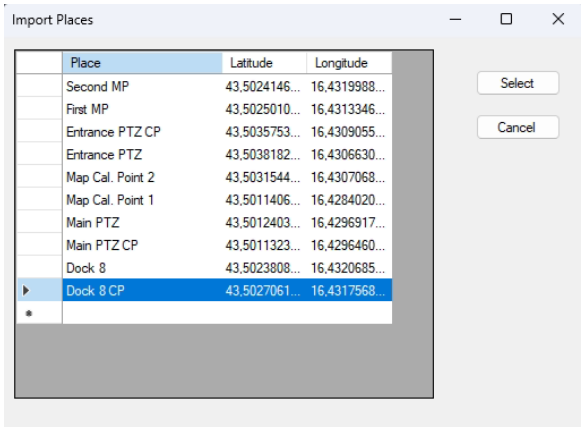


4. Under **Mounting Point** frame press Import button.
5. Navigate to kmz file and press OK.
6. Under Import Place select camera mounting placemark (Dock 8 for this example)
7. Pressing Select Button will populate Longitude and Latitude data for camera mounting point. See images below.



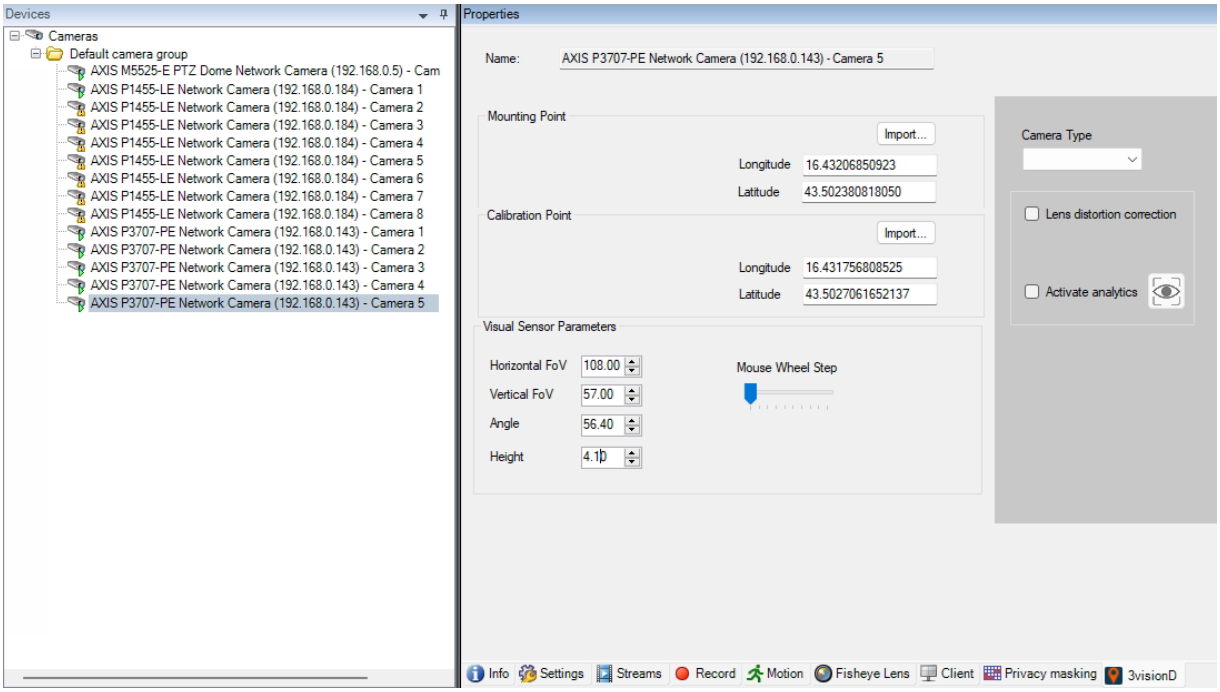
After mounting point, camera video stream centre point geo location is imported.

8. Under **Calibration Point** frame press Import button.
9. Navigate to kmz file and press OK.
10. Under Import Place select camera calibration placemark (Dock 8 CP for this example)
11. Pressing Select Button will populate Longitude and Latitude data for camera calibration point. See images below.



Camera Horizontal FoV, Vertical FoV, Angle and Height

Camera horizontal and vertical field of view are factory data and are usually found in camera datasheet. Camera Angle and camera Height are dependent upon camera mounting location. These values are measured on site for each individual camera. Image below shows 3VisionD calibration tab that holds camera angle and height for this example.



Camera type determines the type of lens distortion algorithm to be used if lens distortion correction checkbox is activated.

Camera Types can be:

- Dome
- Panoramic
- Fisheye

Lens distortion correction checkbox activates 3visionD algorithm for distortion removal.

Activate analytics checkbox is activating 3visionD analytics application.

Camera Calibration – PTZ Camera

As already stated, from 3visionD plugin point of view there are generally two types of video cameras. Non-movable (dome, panoramic, etc) and movable PTZ cameras or devices on PT platforms.

Camera calibration process for non-movable cameras was explained in preceding paragraph. Calibrating PTZ camera differs slightly from “Non movable” camera calibration. PTZ camera calibration uses two points and one default point.

1. First calibration point is camera mounting location (as with non-movable cameras).
2. Second calibration point can be any point.
3. Default point is a camera default position. This is a point where PTZ camera is directed once automated or manual tracking is deactivated.

PTZ camera calibration procedure requires camera to be directed into first calibration point. In this position camera is looking directly towards the ground (see image below). Values of pan and tilt are saved for this calibration point as calibration point one.

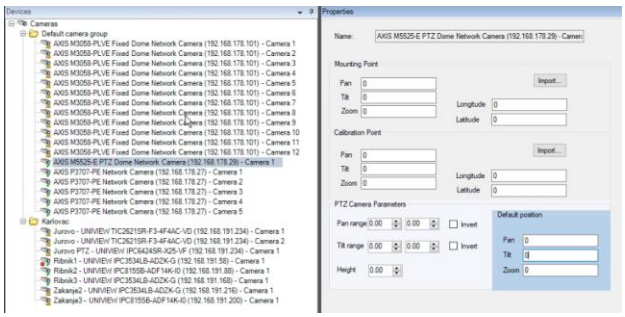
Then, camera is moved into any position and values of pan and tilt in this position are saved as second calibration point.

For PTZ camera calibration example, Marina Split again will be used and image below shows the PTZ camera mounted at the Marina entrance beacon.

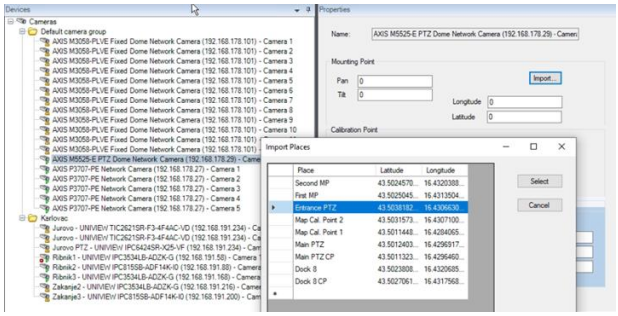
PTZ camera first calibration point is camera mounting point. Second calibration point is any location of operator choice, in this example Map calibration point 2 will be used as a PTZ camera Second calibration point as one “Easy to remember” place.

PTZ Camera Calibration procedure – XProtect Management Client

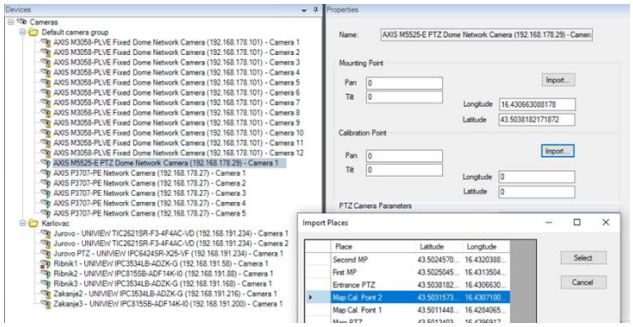
1. In Google Earth PRO insert Placeholder in PTZ camera mounting point and save it in existing kmz file (in this example Placeholder name is Entrance PTZ).
2. Open Milestone XProtect Management Client
3. Under Devices select PTZ Camera
4. Select PTZ camera under Device's tab
5. Under Properties panel select 3VisionD tab



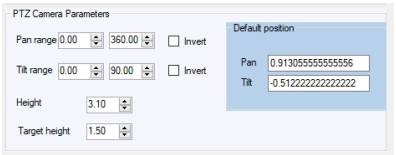
6. Under **Mounting Point** frame select Import button.
7. Navigate to kmz file and select OK button.
8. Select PTZ camera mounting Placemark from a list and press Select button (Entrance PTZ in this example, see image below).



9. Under **Calibration Point** frame select Import button.
10. Navigate to kmz file and select OK button.
11. Select PTZ camera Calibration Place from a list and press Select button (Map Cal Point 2 in this example, see image below)



12. Under PTZ Camera Parameters frame enter pan and tilt range and PTZ camera mounting height. This data is camera specific data and are found in camera datasheet.



13. Inverted pan and tilt value are activated PTZ camera is moving in opposite direction due to specific camera values during camera calibration process. See following paragraph – Positive pan and tilt direction.
14. Height value is a PTZ camera mounting height.
15. Target height is a tracking object height (recommended value when tracking person).

Pan, tilt and zoom values for:

- mounting point
- calibration point
- default position

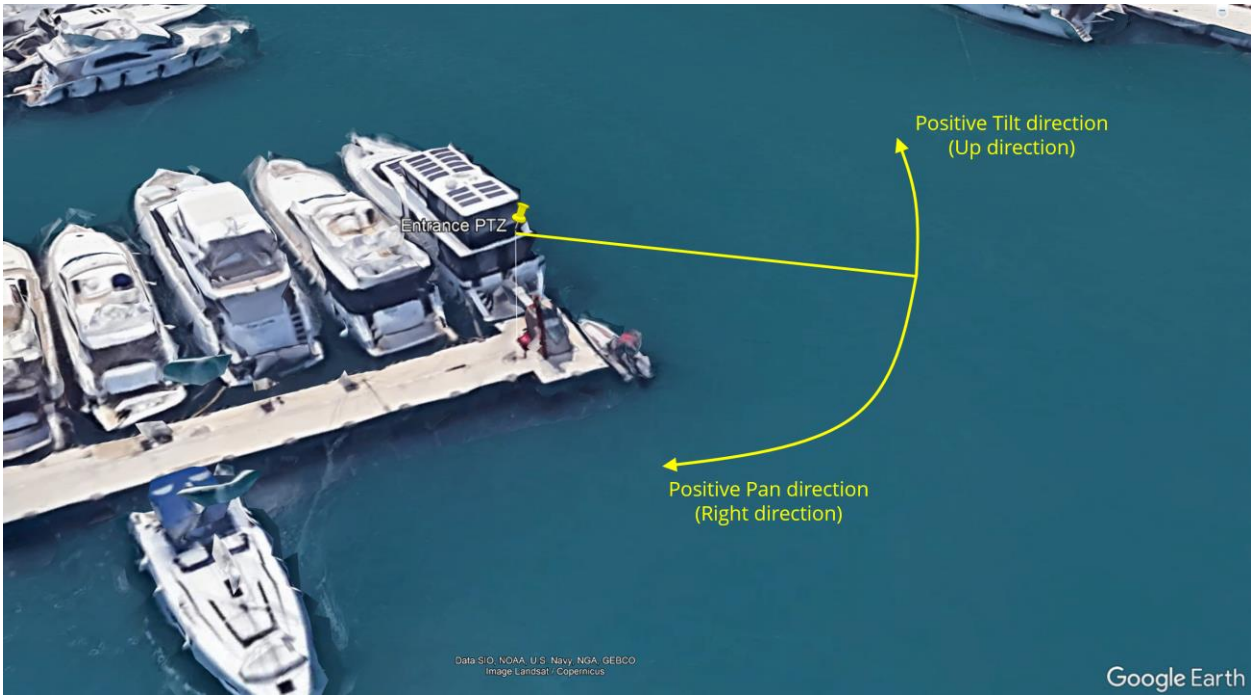
are set in a XProtect Smart Client.

Positive pan and tilt direction

Image below shows positive pan and tilt directions. Reference point is PTZ camera mounting location. When camera pan value is raising and a camera moves in right direction, looking it from a camera point of view, pan has a positive direction.

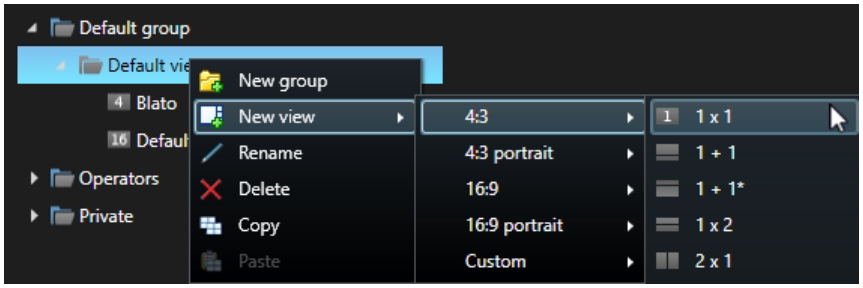
Same applies to tilt, when camera tilt value is raising and a camera moves in upwards direction, looking it from a camera point of view, tilt has a positive direction.

Otherwise, values are inverted.

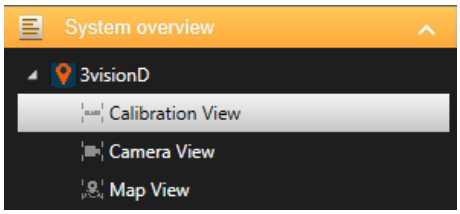


PTZ Camera Calibration procedure – XProtect Smart Client

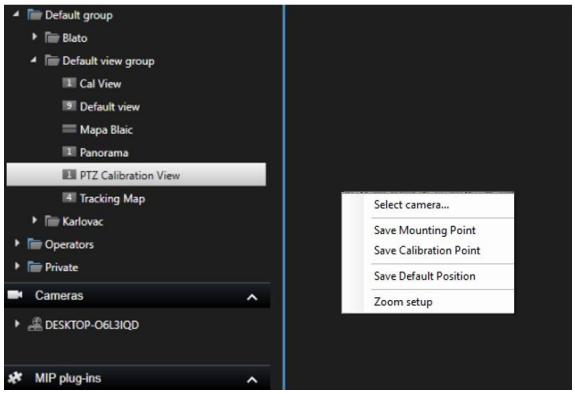
1. Open XProtect Smart Client and select Setup button on the top right side
2. Right click on Default View and select New View → 4:3 →1x1
3. Name it, for example, PTZ Calibration View



4. In System Overview select 3visionD
5. Drag and Drop 3visionD Calibration View control to 1x1 View



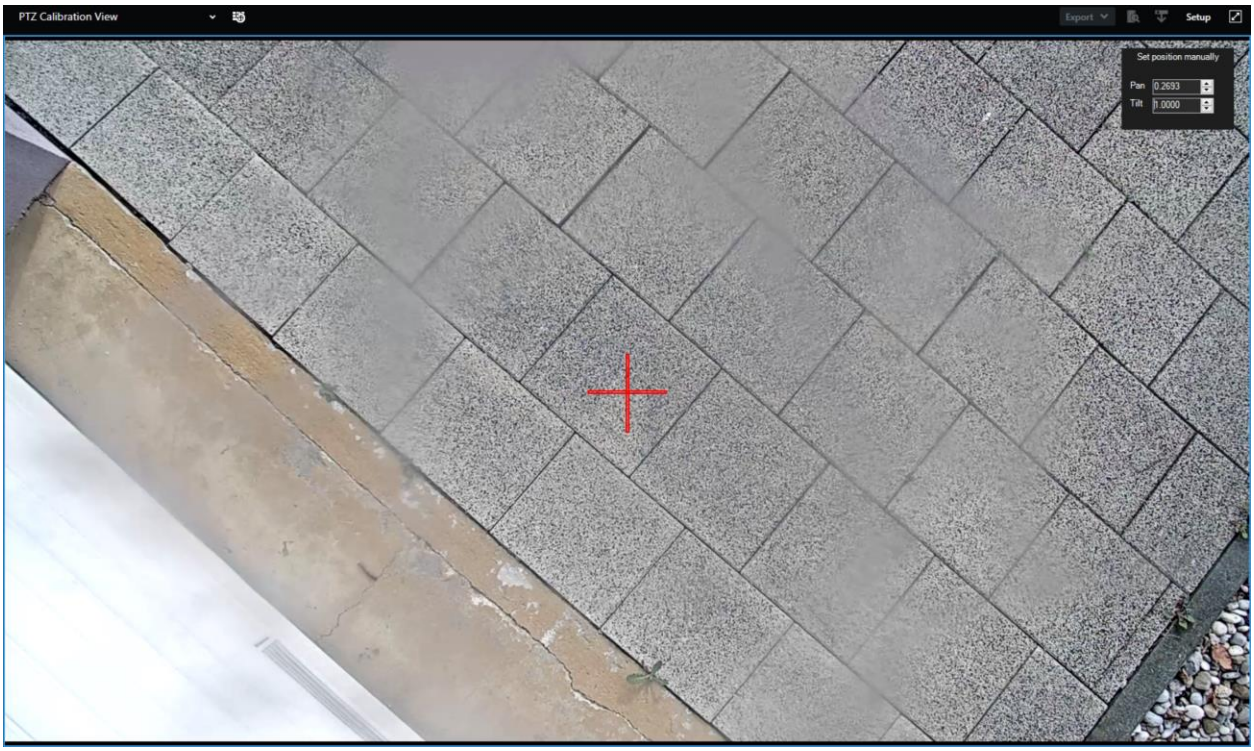
6. Press Setup Button to close View setup.
7. Right click on the view → Select Camera



8. Select camera from a list of cameras
9. Right click and select PTZ camera

PTZ Camera calibration

10. Move PTZ camera so its image centre is looking directly towards the ground (see image below). Upper right corner enables the pan and tilt values to be set manually. In this example Axis PTZ camera is used and tilt value of 1 sets PTZ camera directly towards the ground. This point is PTZ camera calibration point 1.



11. Click on right mouse button and select Save Mounting Point
12. Move PTZ camera using pan and tilt channels into second calibration point (in this example it is Map Cal Point 2)
13. Right click and select Save Calibration Point

PTZ camera default position

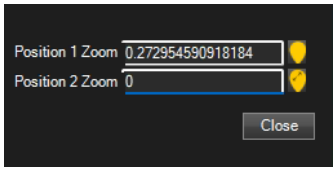
Default camera position is the position where PTZ camera is directed when manual or automatic tracking is deactivated. When camera is in idle state it is set into default camera position. For example, entrance is one of the commonly used PTZ camera default position, so, once tracking is deactivated PTZ camera is moved into default position overlooking at the entrance.

14. Move PTZ camera using pan and tilt channels into any location that will be used as default location.
15. Right click and select – Save Default Position

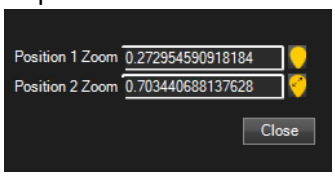
PTZ camera zoom calibration

PTZ camera zoom is calibrated using two points. Any two points can be used.

1. Move PTZ camera in point that is closer to camera that point 2 will be.
2. Use mouse wheel to adjust the level of zoom for point 1.
3. Press zoom icon. Image below shows level of zoom in point 1.



4. Move PTZ camera in point away from a point 1.
5. Use mouse wheel to adjust the level of zoom in this point.
6. To save the level of zoom press zoom icon. Image below shows the level of zoom in point 2.



7. Press Close button.

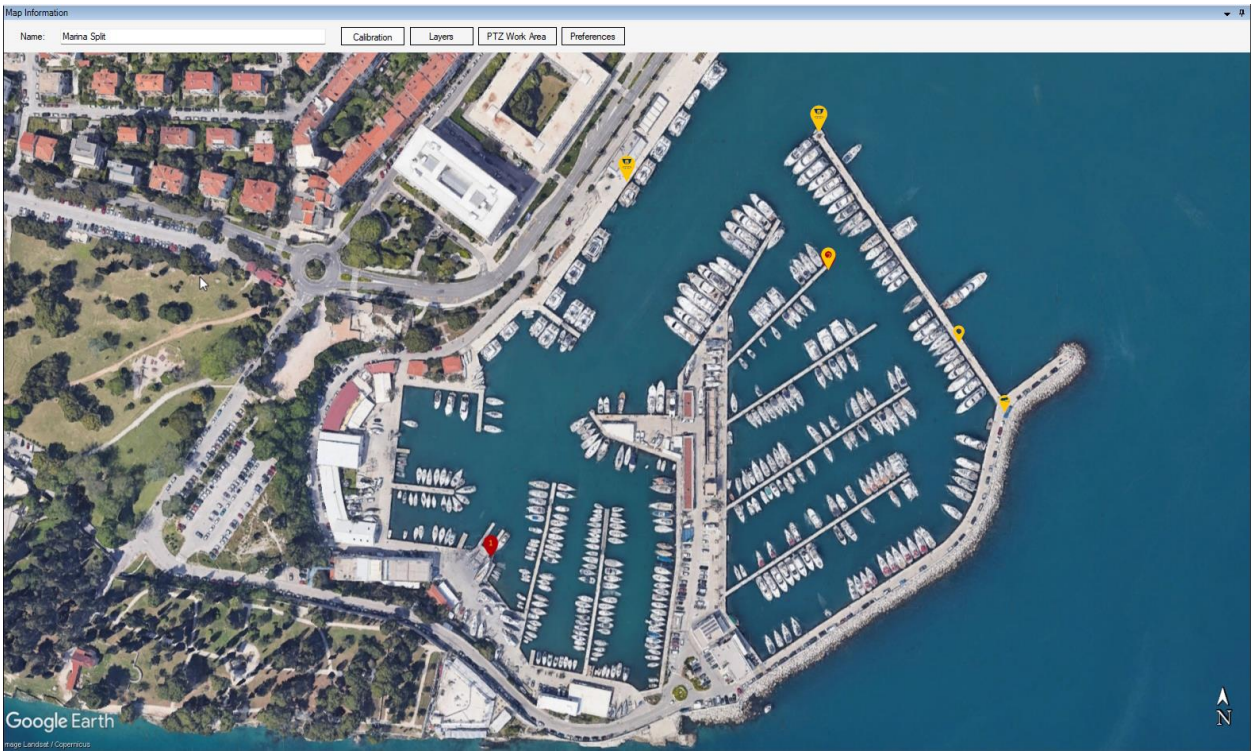
Using reference values in these two points, level of zoom in any point is calculated.

With this procedure PTZ camera is now calibrated.

After the camera calibration it is always the good practice to go in XProtect Management Client and check the camera position on the map. If the system has not displayed the camera icon in correct location, it is a clear sign that calibration procedure was faulty. Icon location on a Live map must be in the same locations as in Google Earth Pro.

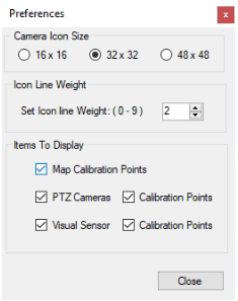
Image below shows the Live map with camera mounting positions and camera calibration points. Red icons in the Live map are map calibration points.

In this example Map calibration point 2 and PTZ camera calibration point are the same point and are clearly seen in the image as two overlapping icons (red and yellow).



Live map – preferences

Preferences frame is used to adjust the size of the icons and to set what icons will be displayed on the map.



Camera Icon Size sets the size of the icon on the map ***and Icon Line Weight*** sets the length weight between camera icon and camera calibration point icon.

Check boxes are setting the visibility for each selected item.

After the map calibration it is a good practice to uncheck Map and Cameras Calibration Points so that maps displays only the cameras icons.

3visionD Analytics and Smart search

3visionD analytics and smart search supports server side and EDGE side analytics.

3visionD Video Analytics uses 3visionD engine that inserts geo tag to every object detected in video stream. Detected objects dimensions (height and width) are calculated too. This functionality enables PTZ camera tracking functionality, multicamera tracking, 3D map imports for automated terrain correction*, real time map display of detected objects from any number of video cameras and much more. Following functionality is supported;

- Automated geo-tagging for outdoor environments
- Object localization in meters for indoor environments*
- Automated PTZ camera tracking (single or multiple cameras)
- Automated tracking across multiple cameras
- Live maps, display data from any number of cameras on a single map
- Layers over maps (Google earth, Open street, ...)

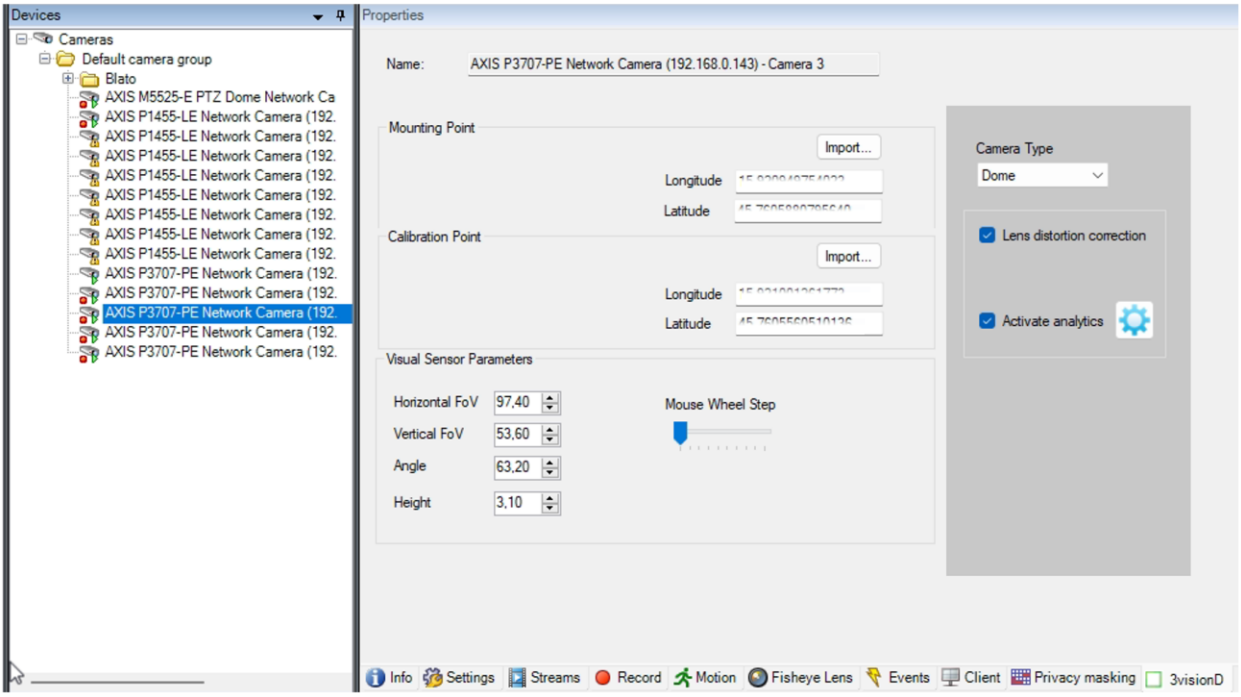
* Available on request

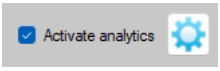
CVEDIA AI Video Analytics is used where more detailed analytics is required. CVEDIA AI Video Analytics exports data for every detected object in video stream. 3visionD engine module will receive data from all video streams, geo tagged every detected object and display their location on a Live map. Based upon selected layers, object type and its current location are saved.

Axis Object Analytics as EDGE analytics for object classification is supported. AOA offers the two types of classification available:

- Humans and vehicles
- Humans and vehicle types: cars, buses, trucks, bikes (motorcycles/bicycles).

Configure Video Analytics – XProtect Management Client



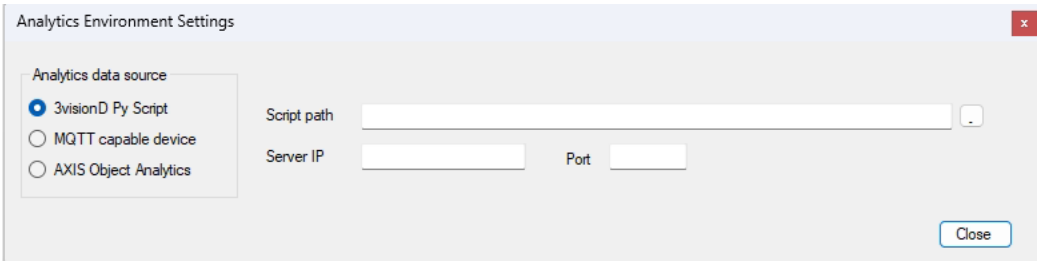


For each camera, analytics is enabled in XProtect Management Client with “Activating analytics” checkbox.

Gear icon is opening configuration window where one of the analytics options is selected.

3visionD Video Analytics (Py Script)

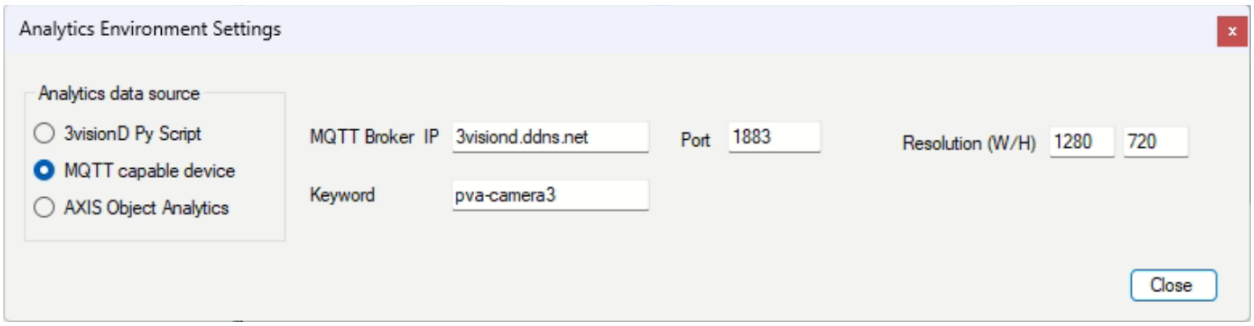
Python script is used for 3visionD Video Analytics. It is standalone application that is activated from XProtect Smart Client. Script receives video from Milestone Open Network Bridge and performs video analysis. Output data are sent via UDP port to XProtect Smart Client.



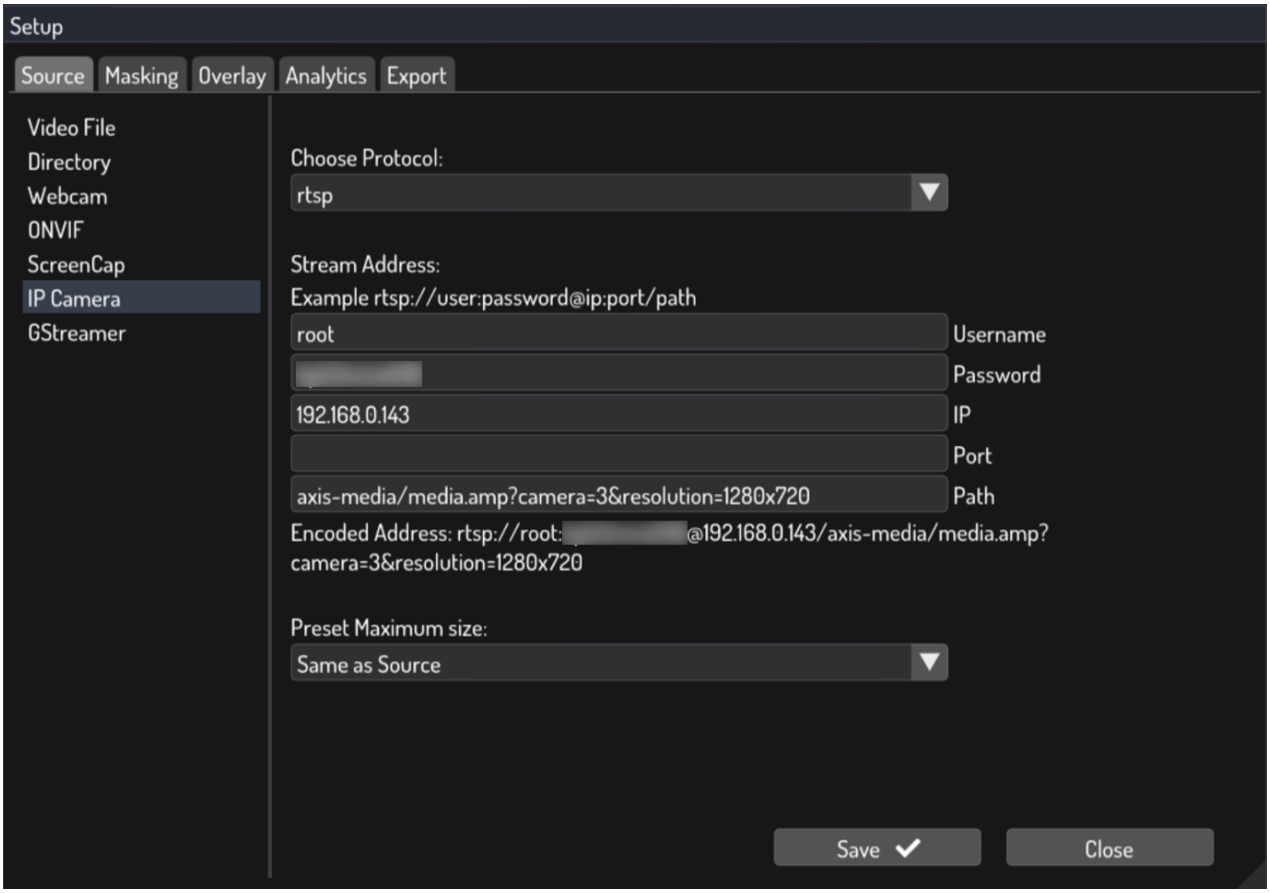
Script path is the location where script is saved. Server IP and the Port are the source parameters.

CVEDIA AI Video Analytics (MQTT capable device)

CVEDIA AI video analysis outputs MQTT messages containing information's about detected objects. 3visionD Smart Client plugin is setup to be MQTT Client that receives those messages.

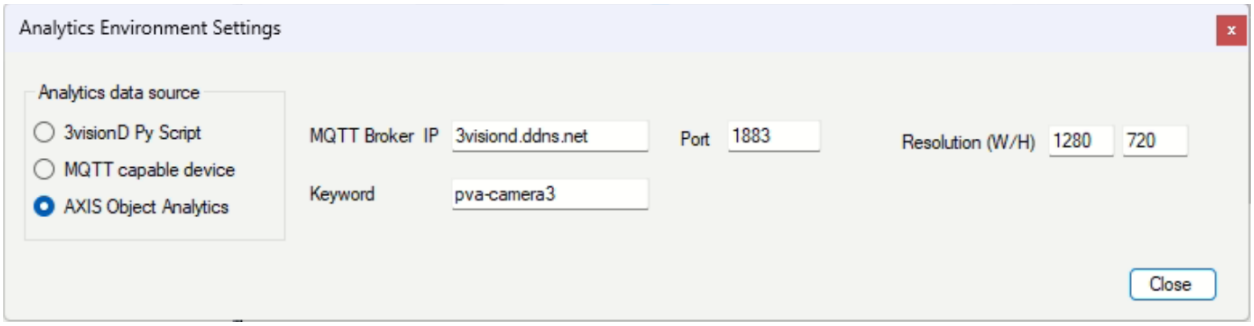


MQTT Broker IP, Port and Keyword are the MQTT settings and the Resolution is the image resolution set as CVEDIA parameter. Image below shows one example of CVEDIA configuration. Axis camera with configuration string that sets camera 3 resolution to 1280x720.



Axis Object Analytics

Axis cameras that support EDGE analytics are exporting metadata stream. 3visionD Smart Client plugin is setup to read metadata stream.



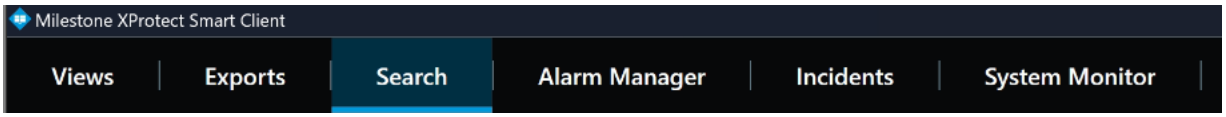
Activate Video Analytics – XProtect Smart Client

Video analytics adds detected objects metadata to recorded video so that metadata search will return videos containing detected objects.

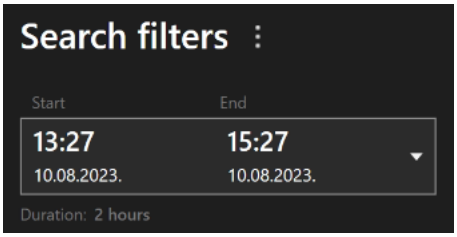
3visionD plugin will create metadata depending on the detector used (Axis Object Analytics or CVEDIA).

To start search

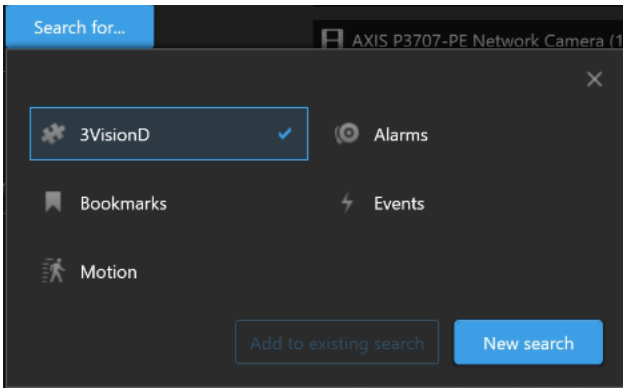
1. To start search in smart client tabs press on the Search tab.



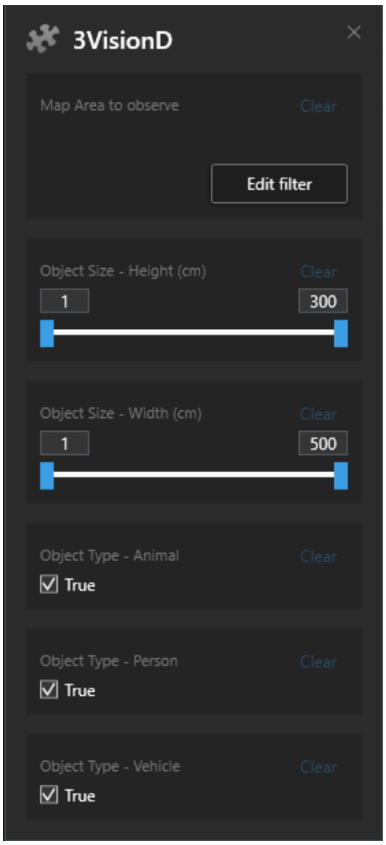
2. In Search filters select time interval.



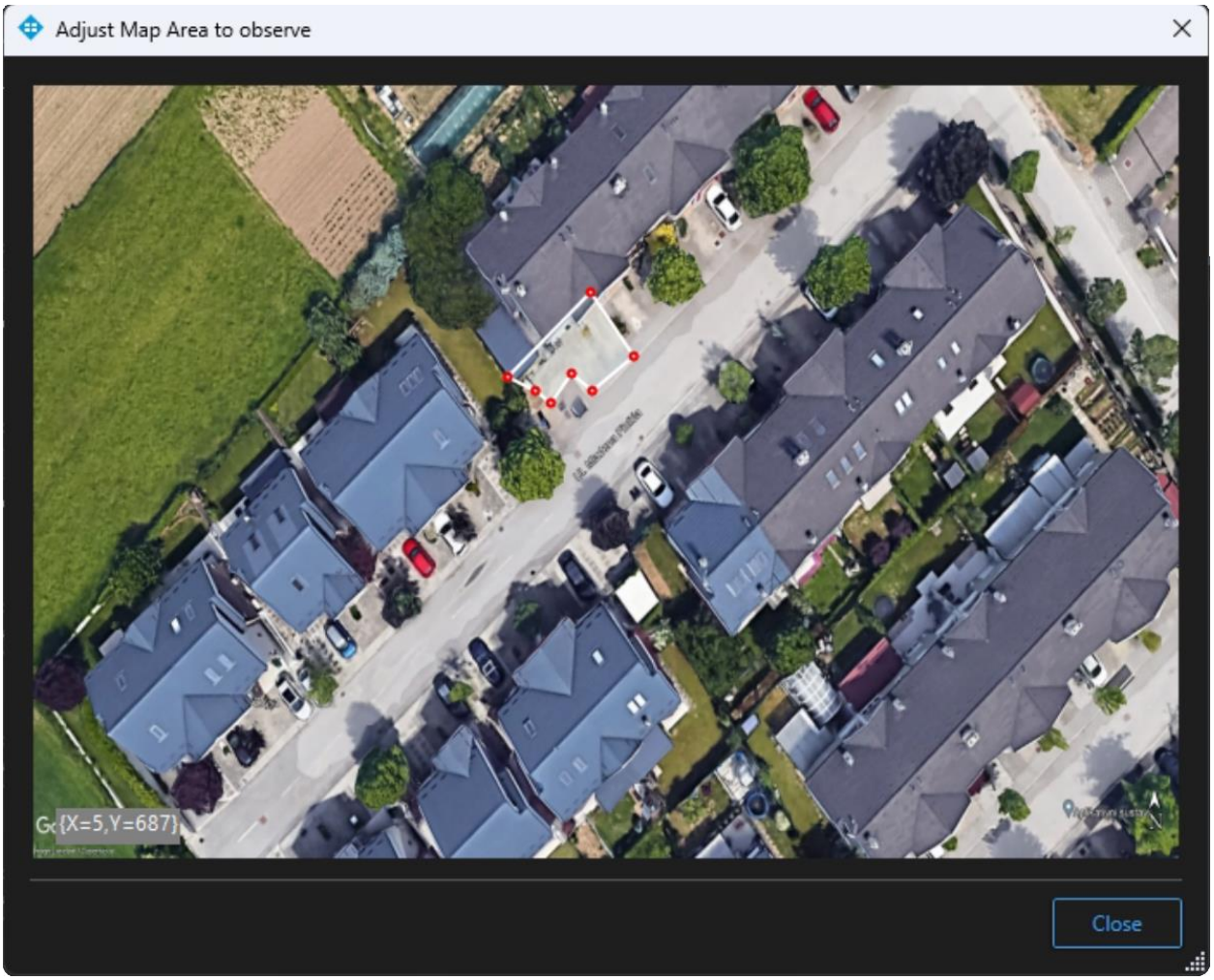
3. Press Search for... button and select 3VisionD



4. Press New search button
5. In 3visionD pop out window select Edit filter button



6. In custom area frame select “Edit filter” button
7. Mark the area on the map by clicking on it. Once finished select Close button to close the form. See image below.
8. For deleting the points that defines the area click inside the area with right mouse button and click on a “Clear Area” floating button.
9. In object type Frame select the type of object that needs to be included in search.


Adjust Map Area to observe
{X=5,Y=687}
Close

3visionD SIA

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