

# IVS – Smart features

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# 1. Introduction, important information

This guide summarizes the following Smart features of the IVS system:

- **Smart MetaData** – managing and enabling metadata sent by the cameras,
- **SmartLive** – real-time, server-side detectors based on metadata sent by the cameras,
- **SmartAI** – object category identification on the server side for SmartLive detectors,
- **SmartSearch** – retrospective object search based on metadata sent by the cameras.

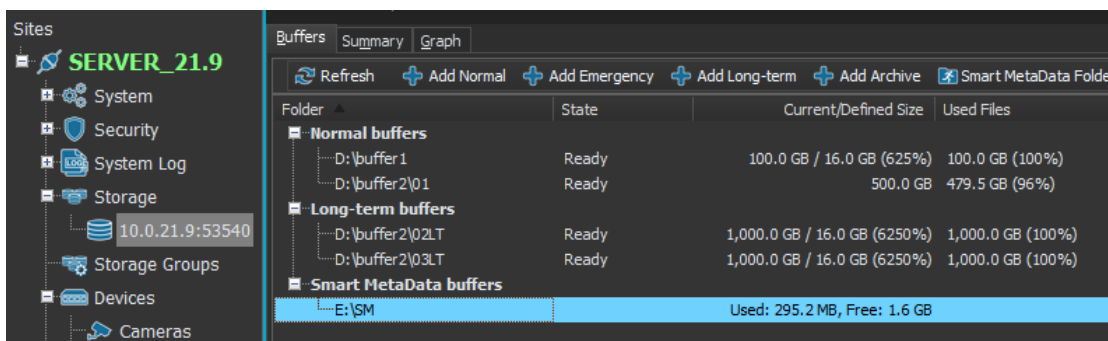
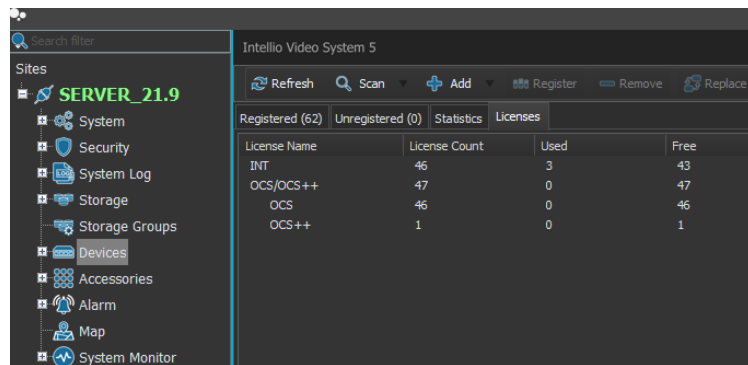
For a complete overview of the system structure and configuration, refer to the *IVS Installation Manual* documentation.



# 2. Enable Smart MetaData processing

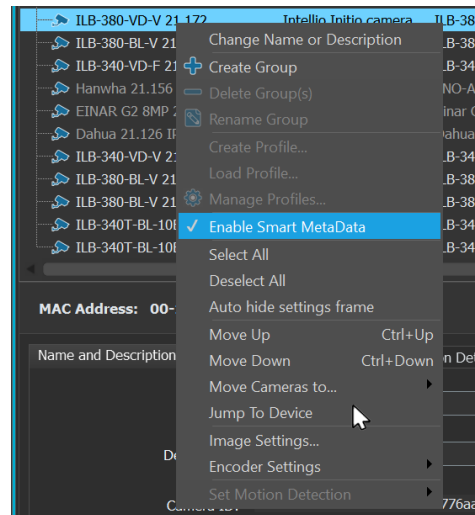
To use any Smart feature, it is essential to enable metadata reception in IVS for **Intellio Initio (ILB)** cameras, as well as for **Hanwha** or **Hikvision** protocol-registered cameras that transmit metadata about moving objects alongside the video stream.

To process Smart MetaData, check and enable the following:

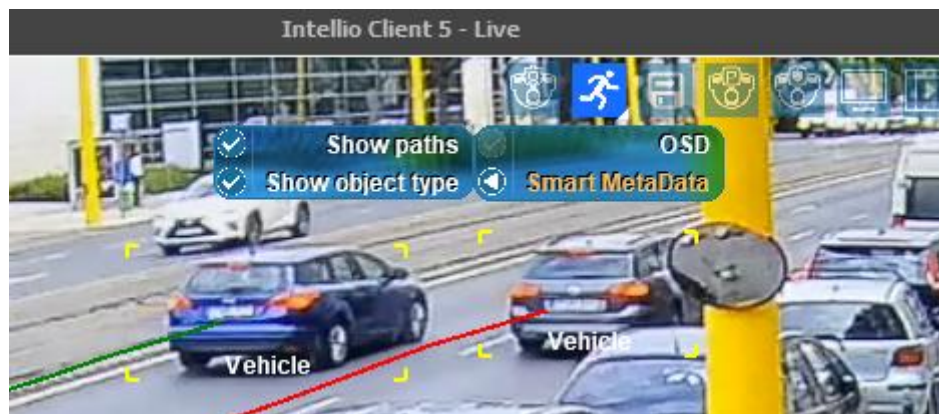
- For Hanwha and Hikvision cameras, make sure a sufficient number of **OCS++** camera licenses are available. You can verify this under **System Configuration / Devices / Licenses**.  
If there are not enough OCS++ licenses, a warning window will appear. To resolve this, extend your server's product key with the necessary number of OCS++ licenses as described in the *System management* documentation.
- On every server in the Site, specify the **Smart MetaData buffer** storage location under **System Configuration / Storage** where the metadata will be saved.



- Enable **Smart MetaData** processing for the camera in **System Configuration / Cameras** by right-clicking the specific camera and selecting the option from the menu. The feature icon  indicates whether it is enabled:  If this option does not appear, it means the camera does not support moving object detection or metadata transmission, or additional camera-side configuration may be required.



- Verify that the camera's live view, along with the Smart MetaData OSD overlay, shows **bounding box corners around moving objects**. If these do not appear, the camera likely does not support moving object detection or metadata transmission, or further camera-side configuration may be necessary.



Standard **Intellio Initio (ILB)** cameras are factory-set to transmit metadata along with the video stream to the server.

For **Intellio Thermal** and **PTZ** cameras, metadata transmission may need to be enabled in the Video/Audio menu under the metaData Settings tab or Display VCA Info parameter. Also, in the Alarms / Smart Detectors menu, enable (and verify) an Intrusion detector set for the full image that detects all object types.

On **Hanwha** camera web interfaces, enable IVA Attributes and disable the BestShot feature.

For **Hikvision** cameras, metadata information may also need to be enabled on the camera's web interface.

Additional general conditions:

- The moving object should move across the image and cover at least twice its own length. The object must be detected before it reaches the detector's mask or rule area. For example, in the case of a line-crossing detector, draw the detection line far enough from the image edge so the camera can detect the object before it crosses the line.
- Set a Violation Time for each detector type to avoid unnecessary metadata processing caused by short-lived objects mistakenly identified as moving objects by the camera (e.g., moving leaves or blades of grass).

### 3. SmartLive: server-side, real-time detectors based on Smart MetaData

Using metadata from moving objects detected by **Intellio Initio (ILB)** cameras, and certain **Hanwha** and **Hikvision** cameras, the following server-side detectors can be created: Motion, Intrusion, Direction Detection, and Tripwire. Depending on their configuration, detectors created in this menu provide instant alerts/alarms.

**Important:** Create detectors carefully, as enabling server-side post-validation (SmartAI) may cause significant CPU load on the server.

Before creating server-side detectors, check that all necessary prerequisites from the [previous](#) section are properly configured and enabled.

This section only describes the settings under the Detector tab of the Detector settings window. For details on the other tabs, please refer to the documentation titled **System Detectors and the IVS Alarm System**.

#### 3.1. Object filter

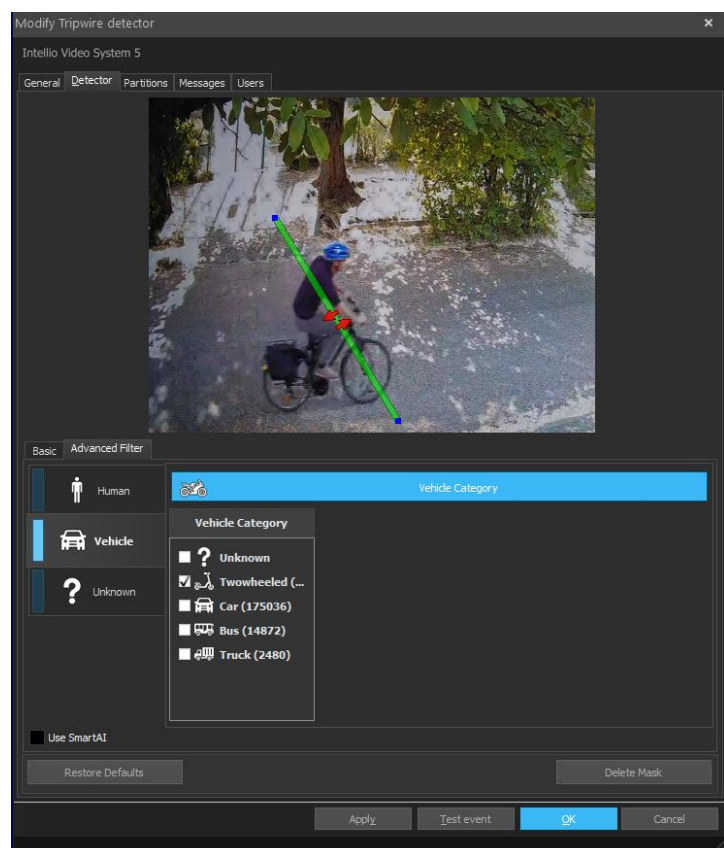
For any detector type, an event will be triggered if two conditions are met:

- the moving object violates the motion/direction rule set for that detector type, and
- the camera identifies the object as resembling a **Person** or **Vehicle**, depending on which category is enabled.

Recognition of the **Unknown** category can also be enabled separately, for cases when the camera cannot determine the type of the moving object, or when no category information is provided.

Depending on the camera manufacturer/model, additional subcategories may also be available for use as filter criteria. For example, the detector can be set to trigger only if a two-wheeled vehicle violates the detection rule.

If no category is selected, the detector will trigger for any type of object that violates the rule.



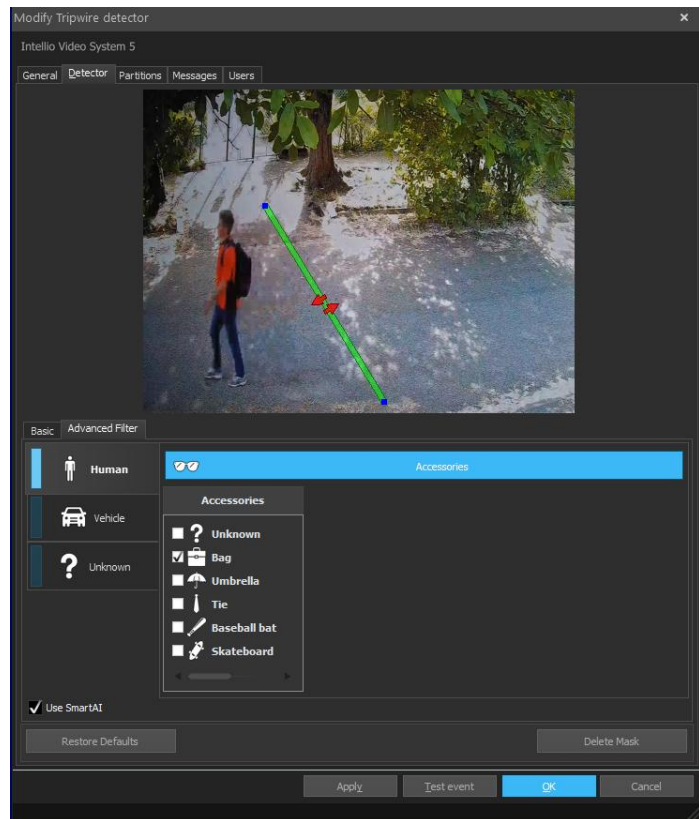
Next to each subcategory, a number in parentheses indicates how many objects of that subcategory the camera has recognized over a recent period - across the entire image, regardless of the detector's drawn area. This helps you verify whether the camera has ever recognized the subcategory you intend to use for filtering. Check these numbers a few days after installing/enabling the camera to see what types of objects typically pass by, and use this information to fine-tune your detector's trigger conditions.

### 3.2. SmartAI

If the camera only transmits the movement and size of moving objects - meaning it does not provide category information, or the provided category data is insufficient - you can enable server-side classification and validation of object categories. To do this, activate the **SmartAI** feature in the bottom-left corner of the **Advanced Filter** tab. Then, select the object categories and subcategories you want the detector to trigger on - for example, when people carrying bags pass through the detection area.

For SmartAI to function properly, the following conditions must be met:

- The moving object must appear in a high-resolution, clear (not blurry), well-lit image section.
- The detector's masks/rules should be placed, whenever possible, in areas free from background clutter, obstructions, or other objects (stationary or moving) that belong to different categories than expected.



Be cautious when creating server-side detectors with the SmartAI function enabled, as it can cause significant load on the server. The label **"by SmartAI"** will appear at the end of the Event if the moving object's category for that event was determined using the SmartAI function.

Time	Detector	Message	Source	State
2024-05-22 17:54:28	Line1 AI 21.185	Tripwire direction violated (Human(92%), (Bag) by SmartAI)	ILB-380-BL-V E2-3F 21.185	Event
2024-05-22 17:54:24	Line1 AI 21.179	Tripwire direction violated (Human(91%), (Umbrella) by SmartAI)	ILB-380-BL-V E2-B4 21.179	Event

If the **"by SmartAI"** label does not appear at the end of the event for a detector with SmartAI enabled, it may indicate that the server was overloaded with too many category recognition requests at that moment. This can happen due to high CPU usage or a large number of detector alerts being triggered almost simultaneously, exceeding the server's processing capacity. In such cases, the category information provided by the camera will be stored for the event(s), instead of the result from server-side SmartAI processing.

Check the detector settings and review the number of enabled detectors to match the server's available resources. It is strongly recommended to set a Violation Time for each detector type, so that short-lived objects (like moving leaves or grass mistakenly detected as motion) are filtered out during basic metadata processing and do not unnecessarily load SmartAI analysis.

The SmartAI processing speed depends on and can be influenced by the following factors:

- **CPU type and performance;** CPU base clock speed and power-saving settings. It is recommended to set the power profile to Maximum Performance and set the minimum processor state to 100%.
- **Video stream settings:** resolution, frame rate, compression method, bitrate, keyframe interval. For best results, match the keyframe interval to the frame rate - at minimum, use one keyframe per second, but if bandwidth and storage allow, set it more frequently (e.g., for 20 fps, use a keyframe interval of 5 or 10).
- Proper **masking** and **Violation Time** settings in each detector type.

### 3.3. Intrusion detector

The Intrusion detector will return an event if the imaginary centre of the moving object passes through the boundaries of the masked area. It does not give a signal/alarm if the movement occurs inside or outside the area.

Draw the corner points of the area to be monitored using the left mouse button, then press the right mouse button after the last corner point. The corner points of the polygon can be moved later, but it is not possible to remove or add them, in which case delete the polygon and redraw it.

As the detector indicates the crossing of boundary lines, draw the mask so that objects are detected on both sides of the boundary lines, so that, for example, if you want to detect an entry into an area, the camera can detect the object while it is still outside the area, so that the path of the object can be formed when it crosses the boundary line.

Additional parameters for the detector:

#### Forbidden direction

By default, the event images of entering and exiting the masked area are also displayed for detection. From the drop-down menu, you can narrow the condition search to generate only entry or only exit events.

#### Violation time

The time between entering the area and leaving it or the time the object disappears can be used to narrow down the detection search. For example, it is possible to detect moving objects that violate the mask boundaries for a short time by setting a value of 100 milliseconds a few times (this can reduce the number of false events). For example, you can filter out objects that violate the boundaries of the area and stay inside the area for a longer period of time by setting a value of 1000 milliseconds a few times. So, an intrusion will generate an event if the movement within the selected area is maintained for at least the violation time or the object does not exit/appear within the violation time. In the case of exit, no event will occur if the object moves back into the area within the violation time.

For an explanation of the parameters under the **Advanced Filter** tab, see the [Object Filter](#) and [SmartAI](#) chapters above. It is strongly recommended to specify a violation time, especially if you also enable SmartAI's object category validation.

Press the **Restore Defaults** button to restore the detector to its default settings. The **Delete Mask** button removes only the mask and allows you to draw a new mask.

### 3.4. Motion detector

Detects a moving object within the area defined by the mask if the imaginary centre of the moving object moves within the defined area. If no mask is defined, the moving object is detected over the entire camera image. Only one mask can be defined.

Draw the corner points of the area to be monitored using the left mouse button, then press the right mouse button after the last corner point. The corner points of the polygon can be moved later, but it is not possible to remove or add them, in which case delete the polygon and redraw it.

Additional parameters for the detector:

#### Violation time

The motion will be triggered if the motion time of the object inside the mask is maintained for at least the violation time. By slightly increasing the violation time, you can filter for movements that have only momentarily violated the mask, thus reducing the number of events that are incorrectly flagged. Also, by setting a longer violation time, slow moving objects will trigger an event. No event will occur if, after the movement has started, the moving object ceases to move (e.g. it is occluded by another object) and the duration of this is shorter than the violation time.

For an explanation of the parameters under the **Advanced Filter** tab, see the [Object Filter](#) and [SmartAI](#) chapters above. It is strongly recommended to specify a mask and the Violation time, especially if you also enable SmartAI's object category validation.

Press the **Restore Defaults** button to restore the detector to its default settings. The **Delete Mask** button removes only the mask and allows you to draw a new mask.

### 3.5. Direction detector

During the visual adjustment of the detector, only a single polygon can be created. Within this area, the prohibited direction is defined by arrows in the adjustment window, the arrow heads can be touched and moved. The red arrow indicates the forbidden direction, while the blue arrows indicate the "tolerance" of the direction of movement. By setting the blue arrows to a small angle, the detector will only give a result if the direction of movement of the imaginary centre of the object within the mask is almost perfectly aligned with the direction of the red arrow. For large arrow angles (maximum 90°), it will give an event even for directions that are already close.

Use the left mouse button to draw the corner points of the area you want to monitor, then press the right mouse button after the last corner point. The vertices of the polygon can be moved later, but it is not possible to remove or add them, in which case delete the polygon and redraw it.

Additional parameters for the detector:

### Violation time

The directional movement within the mask, limited by the direction angle (red arrow) and the tolerance angles (blue arrows), will only produce an event if it is maintained for at least the duration of the violation time. By increasing the violation time, you can filter for movements that have only momentarily violated the forbidden direction, thus reducing the number of event images that are displayed incorrectly. No event image will be generated if, after the start of the movement within the mask, the moving object disappears (e.g. is occluded by another object) and the duration of this disappearance is shorter than the violation time.

For an explanation of the parameters under the **Advanced Filter** tab, see the [Object Filter](#) and [SmartAI](#) chapters above. It is strongly recommended to specify a mask and the Violation time, especially if you also enable SmartAI's object category validation.

Press the **Restore Defaults** button to restore the detector to its default settings. The **Delete Mask** button removes only the mask and allows you to draw a new mask.

## 3.6. Tripwire detector

This detector gives an event when the set line is crossed in the forbidden direction. Lines with multiple breakpoints can be placed on the image. The imaginary centre of the moving object must cross the line.

The way the lines are drawn is similar to drawing a polygon mask, except that the **breakpoints** must be selected with the **left mouse button**. You can use the **right mouse button** to **close** the composite line. A special feature of a composite line is that the lines can cross, but this is rarely necessary in practice.

To edit a previously created line, click on the line. The breakpoints of the line will then turn blue, indicating the possibility of modification.

You can make the necessary changes by dragging the breakpoints (left mouse button). You can also move the edges, not just the corners. To do this, drag the selected edge by pressing the left mouse button.

Corners/edges cannot be removed from a line. In this case, you must remove the selected line and then recreate the desired line.

Additional parameters for the detector:

### Forbidden direction

By default, line crossings from both directions are taken into account by the detector when generating events. If you want to narrow down the search to one direction, select the appropriate one from the drop-down menu. The forbidden direction is always indicated by the red arrow.

### Violation time

In the case of a line crossing, if another crossing by the same object occurs within the violation time, only the last event will be reported by the detector (to filter out short duration false events). If another crossing occurs outside the violation time, it will be treated as a new event by the detector. No event will be generated if the moving object disappears after the crossing (e.g. is occluded by another object) and the duration of this disappearance is shorter than the violation time.

For an explanation of the parameters under the **Advanced Filter** tab, see the [Object Filter](#) and [SmartAI](#) chapters above. It is strongly recommended to specify a violation time, especially if you also enable SmartAI's object category validation.

Press the **Restore Defaults** button to restore the detector to its default settings. The **Delete Mask** button removes only the line and allows you to draw a new line.

## 4. SmartSearch: search with post-generated Virtual detectors

Virtual detectors can be used to retrieve post-determinable events that were not detected by previously established detectors, or that may have been detected too many times for effective retrieval. In this case, a Virtual Detector can be created that would have detected the desired event, and other detections that are redundant can be filtered out. For the purpose of creating a detector, it does not matter that it is created after the event has occurred, as it is designed for post-event search.

A virtual detector can be created in the **Intelligent Motion Search** or **Intelligent Object Search** interface for **Intellio Initio** cameras, or for **Hanwha** or **Hikvision** registered cameras that transmit moving object metadata generated by the camera along with the video stream. With these types of detectors, a past event can be quickly and easily retrieved. Their use is identical to that of conventional detectors, except that they scan in recorded footage.

You can find information about creating Virtual Detectors, and using the **Intelligent Motion Search** and **Intelligent Object Search** interfaces in the *User Manual*.

## 5. Further steps

For an overview of additional system settings, please refer to the *IVS Installation Manual* documentation.