Bosch Metadata and IVA Events in ONVIF
Analytic Events, Metadata and MIC 9000
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1 Scope

This document describes the usage of the Bosch edge Intelligent Video analysis (IVA) via the standard interface ONVIF. With ONVIF (Bosch FW 6.10 and higher) it is supported to receive Analysis Events based on the IVA rule engine on the edge and the metadata stream in the ONVIF format.


2 IVA Events via ONVIF

IVA Events via ONVIF are based on the IVA rule engine of the Bosch camera on the edge, the Bosch device supports up to eight IVA rules. The configuration of the rules needs to be done on the webpage of the device.

2.1 List of Supported IVA rules

- Object In Field
- Crossing Line
- Loitering
- Condition Change
- Following Route
- Removed Object
- Idle Object
- Entering Field
- Leaving Field
- Similarity Search
- Crowd Detection
- Counter (Alarm)

Supported Analytic AVIOTEC IP starlight 8000 (only available with this camera Model)

- Fire Alarm
- Smoke Alarm

ONVIF IVA event message contains the video source the event type and the rule name (see screenshot on page 3). All IVA events are part of the ONVIF request GetEventProperties, furthermore it is supported to dynamically create new IVA rules. In case a new IVA rule is created on the camera the GetEventProperties needs to request it by the ONVIF client again. Changes of created rules (eg. moving a crossing line etc.) do not require an update of the GetEventProperties.

Note: To be backward compatible all IVA events are transmitted as motion alarm event, too.
Example of IVA Event Messages:

<table>
<thead>
<tr>
<th>Event type</th>
<th>Event name</th>
<th>Analysis type</th>
<th>Video Source</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intrusion</td>
<td>Line cross</td>
<td>Line crossing</td>
<td>VideoSource1</td>
<td>False</td>
</tr>
<tr>
<td>Object</td>
<td>Area</td>
<td>Critical area</td>
<td>VideoSource1</td>
<td>False</td>
</tr>
<tr>
<td>Motion</td>
<td>Alarm</td>
<td>Motion Alarm</td>
<td>VideoSource1</td>
<td>False</td>
</tr>
<tr>
<td>Event</td>
<td>VCA</td>
<td>Configuration</td>
<td>VideoSource1</td>
<td>True</td>
</tr>
</tbody>
</table>

2.2 Configuration of OVA rules via the camera website

Camera webpage => Settings => Alarm => VCA => Configuration
3 ONVIF Metadata

3.1 Onvif Metadata Features coverage FW 6.50 an newer

- Object coordinates
- Center of Gravity
- Object ID
- Polygon points
- Bounding box coordinates
- Polygon points
- Geolocation information of Objects
- velocity of the objects in [m/s] *
- area/size information in [qm] *
- Class candidate *
  - Class;
    - Human
    - Face
    - Vehicle`
    - Other
  - Extension (more details)
    - Head
    - Group
    - SmallObject
    - Fire
    - Smoke
    - Car
    - Bike
    - Truck
    - Other
- counter as an event (only in the metadata stream)
- Event to Object mapping
  The events show the object ID of the object, which triggered the event
- Source information (line) of object for MIC fusion 9000

*Camera needs to be calibrated via website or Bosch tools

Note: The ONVIF Metadata (MetadataConfig1) must be added manually to the ONVIF profile
Note: Due error in the ONVIF Metadata Spec ‘Vehicle’ is signaled as ‘Vehical’
3.2 Example of the ONVIF Metadata stream:

![Example of the ONVIF Metadata stream](image)

3.3 Example of the ONVIF Metadata stream Event to Object Mapping

![Example of the ONVIF Metadata stream Event to Object Mapping](image)
4 MIC fusion 9000

The Bosch MIC fusion contains a visible and a thermal camera and provides fusion of the Metadata of both cameras.

MIC IP fusion 9000i

Concept: Fusion of Metadata from both camera streams

It is supported to use the MIC fusion in two modes (fusion mode needs to be disabled on camera)

1. Two channel device with two separate metadata streams
   The camera behaves like a normal multi-channel device with two independent video and metadata streams

2. Fusion of visible and thermal metadata information
   The camera fuses (merges) the two metadata streams into one, with this, the operator can get the thermal metadata information in the visible video and the other way around.
   The source information of the origin of the object is part of the ONVIF metadata object information and indicated like this:
   
   a. None line information => Object was detected in the currently viewed stream
   b. Object line ‘X’ => Object was detected on the other stream number X

Example:
The thermal stream is viewed (stream #2) and an object is detected in the visible stream (stream #1).
5 Appendix

5.1 Feature set on older FWs

With FW 6.10 and higher it is possible to receive metadata in the ONVIF format from Bosch cameras. The metadata contain following information for the bounding Boxes:
- Object coordinates
- Center of Gravity
- Object ID

With FW 6.40 the ONVIF Metadata support is extended by:
- Polygon points
- Class candidate *
  - Human
  - Car
  - Truck
  - Bike
- Likelihood
- Bounding box coordinates for AVIOTEC camera (Fire/Smoke)
- Source information (line) of object for MIC fusion 9000

With FW 6.50 the ONVIF Metadata support is extended by:
- Geolocation information of Objects
- velocity of the objects in [m/s] *
- area/size information in [qm] *
- Class candidate *
  - Class;
    - Human
    - Face
    - Vehicle'
    - Other
  - Extension (more details)
    - Head
    - Group
    - SmallObject
    - Fire
    - Smoke
    - Car
    - Bike
    - Truck
    - Other
- counter as an event (only in the metadata stream)
- Event to Object mapping
  The events show the object ID of the object, which triggered the event
5.2 GetEventProperties Description

The GetEventProperties specification defines a set of OPTIONAL WS-ResourceProperties. This specification does not require the implementation of the WS-ResourceProperty interface. Instead, the subsequent direct interface shall be implemented by an ONVIF compliant device in order to provide information about the filterObjects, schema files, and topics supported by the device.

**SOAP action:**

http://www.onvif.org/ver10/events/wsdl/EventPortType/GetEventPropertiesRequest

**Input:**

```
[GetEventProperties]
```

**Output:**

```
[GetEventPropertiesResponse]
```

- **propertySet** - unbounded; [anyURI]
  - List of property sets supported.
  
- **[TopItem] propertySet**
  - True when propertySet is read for all times.
  
- **[TopItem] topicSet**
  - Set of topics supported.
  
- **[TopItem] topicExpressionSet**
  - unbounded; [TopicExpressionDialect]
  
- **[TopItem] topicExpressionDialect**
  - unbounded; [TopicExpressionDialect]
  
- **MessageContentFilterDialect** - unbounded; [anyURI]
  
- **MessageContentFilterDialect**
  
- **MessageContentFilterTime**
  
- **MessageContentFilterData**
  
- **MessageContentFilterTime**
  
- **MessageContentFilterData**
  
- **MessageContentFilterTime**
  
- **MessageContentFilterData**
  
- **MessageContentFilterTime**
  
- **MessageContentFilterData**
  
- **MessageContentFilterTime**
  
- **MessageContentFilterData**
  
- **MessageContentFilterTime**
  
- **MessageContentFilterData**
  
- **MessageContentFilterTime**
  
- **MessageContentFilterData**
  
- **MessageContentFilterTime**
  
- **MessageContentFilterData**

False => IVA Rules can be changed dynamically.
5.3 Example of GetEventPropertiesResponse of IVA event

```xml
<GetEventPropertiesResponse>
  <topic:name:space:location: http://www.onvif.org/specs/0/10/topic:space/topicnames.xml/>
  <proto:TopicSet>
    <proto:Device>
      <proto:DeviceID>
        <collectionField/>
        <Detect_on_occupied proto:topic="true">
          <MessageClassification proto:Property="true">
            <Source>
              <SimpleItemDescription Name="Source" Type="#ReferenceToken"/>
            </Source>
            <Data>
              <SimpleItemDescription Name="State" Type="#boolean"/>
            </Data>
          </MessageDescription>
        </Detect_on_occupied>
        <CrossingLine>
          <Detect_on_crossed proto:topic="true">
            <MessageClassification proto:Property="true">
              <Source>
                <SimpleItemDescription Name="Source" Type="#ReferenceToken"/>
              </Source>
              <Data>
                <SimpleItemDescription Name="State" Type="#boolean"/>
              </Data>
            </MessageDescription>
          </Detect_on_crossed>
          <Person_in_critical_area proto:topic="true">
            <MessageClassification proto:Property="true">
              <Source>
                <SimpleItemDescription Name="Source" Type="#ReferenceToken"/>
              </Source>
              <Data>
                <SimpleItemDescription Name="State" Type="#boolean"/>
              </Data>
            </MessageDescription>
          </Person_in_critical_area>
        </CrossingLine>
      </proto:DeviceID>
    </proto:Device>
  </proto:TopicSet>
</GetEventPropertiesResponse>
```
5.4 Add Metadata configuration to ONVIF profile

<table>
<thead>
<tr>
<th>Bosch</th>
<th>ONVIF</th>
<th>NVT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identification</td>
<td>Profiles</td>
<td>Refresh</td>
</tr>
<tr>
<td>Time settings</td>
<td>Metadata Configuration: MetadataConf1</td>
<td></td>
</tr>
<tr>
<td>Maintenance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Network settings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>User management</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Certificates</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FAQs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Web page</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Events</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

![Image of metadata configuration in ONVIF profile](image-url)
Security Systems

Bosch Metadata and
Analytic
Events in ONVIF

Data subject not change without notice
Printed in Germany
June 06, 2016

Robert Bosch GmbH
C/CCD
Postfach 10 60 50
70049 Stuttgart
Germany

Bosch.CorporateDesign@de.bosch.com