Bosch Metadata and IVA Events in ONVIF

Analytic Events, Metadata and MIC 9000

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Revision History

Version / Issue	Date	Editor / Author	Description of Change
1.1	4.March.21	Hafizoglu Huseyin Tughan (BT-VS/MKI)	Updated document dates.
1.0	06.June.16	Eichhorn Andre (BT-VS/MKI)	First official release of Bosch Metadata and Analytics Events in ONVIF

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.

Further information on the Bosch IVA: http://www.boschsecurity.com/hdsecurity/Default.aspx?language=en&tab=inteligent-video-analysis

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 v**ideo 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.*

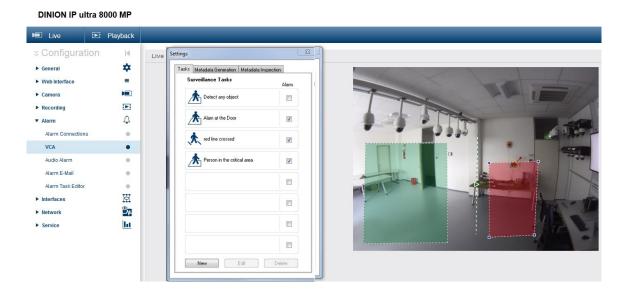**Note:** To be backward compatible all IVA events are transmitted as **motion alarm** event, too.

Example of IVA Event Messages:

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
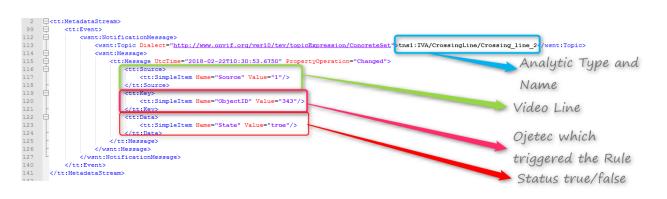

*Camera needs to be calibrated via website or Bosch tools

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:

```
1   <tt:MetadataStream>
2       <tt:VideoAnalytics>
3           <tt:Frame UtcTime="2018-02-22T10:30:51.48510">
4               <tt:Object ObjectId="343">
5                   <tt:Appearance velocity="13.23" area="252.61">
6                       <tt:Shape>
7                           <tt:BoundingBox bottom="-0.52" top="-0.23" right="-0.07" left="-0.60"/>
8                           <tt:CenterOfGravity x="-0.33" y="-0.37"/>
9                           <tt:Polygon>
10                              <tt:Point x="-0.57" y="-0.48"/>
11                              <tt:Point x="-0.54" y="-0.48"/>
12                              <tt:Point x="-0.51" y="-0.47"/>
13                              <tt:Point x="-0.47" y="-0.47"/>
14                              <tt:Point x="-0.44" y="-0.46"/>
15                              <tt:Point x="-0.41" y="-0.45"/>
16                              <tt:Point x="-0.37" y="-0.45"/>
17                              <tt:Point x="-0.34" y="-0.43"/>
18                              <tt:Point x="-0.31" y="-0.43"/>
19                              <tt:Point x="-0.28" y="-0.43"/>
20                              <tt:Point x="-0.24" y="-0.43"/>
21                              <tt:Point x="-0.21" y="-0.44"/>
22                              <tt:Point x="-0.18" y="-0.44"/>
23                              <tt:Point x="-0.14" y="-0.43"/>
24                              <tt:Point x="-0.11" y="-0.43"/>
25                              <tt:Point x="-0.08" y="-0.42"/>
26                              <tt:Point x="-0.07" y="-0.41"/>
27                              <tt:Point x="-0.07" y="-0.38"/>
28                              <tt:Point x="-0.06" y="-0.37"/>
29                              <tt:Point x="-0.06" y="-0.35"/>
30                              <tt:Point x="-0.06" y="-0.33"/>
31                              <tt:Point x="-0.07" y="-0.31"/>
32                              <tt:Point x="-0.08" y="-0.30"/>
33                              <tt:Point x="-0.08" y="-0.26"/>
34                              <tt:Point x="-0.11" y="-0.23"/>
35                              <tt:Point x="-0.14" y="-0.23"/>
36                              <tt:Point x="-0.18" y="-0.23"/>
37                              <tt:Point x="-0.21" y="-0.24"/>
38                              <tt:Point x="-0.24" y="-0.25"/>
39                              <tt:Point x="-0.28" y="-0.25"/>
40                              <tt:Point x="-0.31" y="-0.28"/>
41                              <tt:Point x="-0.34" y="-0.31"/>
42                              <tt:Point x="-0.37" y="-0.33"/>
43                              <tt:Point x="-0.41" y="-0.35"/>
44                              <tt:Point x="-0.44" y="-0.35"/>
45                              <tt:Point x="-0.47" y="-0.35"/>
46                              <tt:Point x="-0.51" y="-0.35"/>
47                              <tt:Point x="-0.54" y="-0.34"/>
48                          </tt:Polygon>
49                      </tt:Shape>
50                      <tt:Class>
51                          <tt:ClassCandidate>
52                              <tt:Type>Vehical</tt:Type>
53                              <tt:Likelihood>87.00</tt:Likelihood>
54                          </tt:ClassCandidate>
55                          <tt:Extension>
56                              <tt:OtherTypes>
57                                  <tt:Type>Car</tt:Type>
58                                  <tt:Likelihood>87.00</tt:Likelihood>
59                              </tt:OtherTypes>
60                          </tt:Extension>
61                      </tt:Class>
62                      <tt:GeoLocation lon="49.4698867" lat="11.0806473" elevation="0.00"/>
63                  </tt:Appearance>
64              </tt:Object>
65          </tt:Frame>
66      </tt:VideoAnalytics>
67  </tt:MetadataStream>
```

- ObjectId
- velocity and Object size
- Bounding Box
- Polygons
- Object Type
- Geolocation

3.3 Example of the ONVIF Metadata stream Event to Object Mapping

```
2    <tt:MetadataStream>
99       <tt:Event>
112          <wsnt:NotificationMessage>
113              <wsnt:Topic Dialect="http://www.onvif.org/ver10/tev/topicExpression/ConcreteSet">tns1:IVA/CrossingLine/Crossing_line_2</wsnt:Topic>
114              <wsnt:Message>
115                  <tt:Message UtcTime="2018-02-22T10:30:53.6750" PropertyOperation="Changed">
116                      <tt:Source>
117                          <tt:SimpleItem Name="Source" Value="1"/>
118                      </tt:Source>
119                      <tt:Key>
120                          <tt:SimpleItem Name="ObjectID" Value="343"/>
121                      </tt:Key>
122                      <tt:Data>
123                          <tt:SimpleItem Name="State" Value="true"/>
124                      </tt:Data>
125                  </tt:Message>
126              </wsnt:Message>
127          </wsnt:NotificationMessage>
140      </tt:Event>
141  </tt:MetadataStream>
```

- Analytic Type and Name
- Video Line
- Ojetec which triggered the Rule
- Status true/false

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 steams 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:
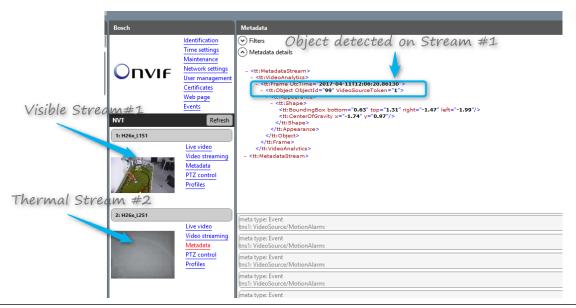
    a. None line information => Object was detected in the currently viewed stream
    b. Object line 'X '=> Object was detected on the other stream number X

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

5 Appendix

5.1 Featureset 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

2. **GetEventProperties**

Description:

The WS-BaseNotification specification defines a set of OPTIONAL WS-ResouceProperties. 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 FilterDialects, Schema files and topics supported by the device.

SOAP action:

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

Input:

[GetEventProperties]

Output:

[GetEventPropertiesResponse]
- **TopicNamespaceLocation** - unbounded; [anyURI]
  List of topic namespaces supported.
- **FixedTopicSet** [FixedTopicSet]
  True when topicset is fixed for all times.
- **TopicSet** [TopicSet]
  Set of topics supported.
- **TopicExpressionDialect** - unbounded; [TopicExpressionDialect]
  Defines the XPath expression syntax supported for matching topic expressions.

  The following TopicExpressionDialects are mandatory for an ONVIF compliant device :
  - http://docs.oasis-open.org/wsn/t-1/TopicExpression/Concrete
  - http://www.onvif.org/ver10/tev/topicExpression/ConcreteSet.
- **MessageContentFilterDialect** - unbounded; [anyURI]
  Defines the XPath function set supported for message content filtering.

  The following MessageContentFilterDialects should be returned if a device supports the message content filtering:
  - http://www.onvif.org/ver10/tev/messageContentFilter/ItemFilter.
  A device that does not support any MessageContentFilterDialect returns a single empty url.
- **ProducerPropertiesFilterDialect** - optional, unbounded; [anyURI]
  Optional ProducerPropertiesDialects. Refer to Web Services Base Notification 1.3 (WS-BaseNotification) for advanced filtering.
- **MessageContentSchemaLocation** - unbounded; [anyURI]
  The Message Content Description Language allows referencing of vendor-specific types. In order to ease the integration of such types into a client application, the GetEventPropertiesResponse shall list all URI locations to schema files whose types are used in the description of notifications, with MessageContentSchemaLocation elements.

  This list shall at least contain the URI of the ONVIF schema file.
- xsd:any

False => IVA Rules can be changed dynamically

5.3   Example of GetEventPropertiesResponse of IVA event

```xml
<tev:GetEventPropertiesResponse>
    <tev:TopicNamespaceLocation>http://www.onvif.org/onvif/ver10/topics/topicns.xml</tev:TopicNamespaceLocation>
    <wsnt:FixedTopicSet>false</wsnt:FixedTopicSet>
    <wstop:TopicSet>
      <tns1:VideoSource>
      ...
      <tns1:Device>
      ...
      </tns1:Device>
      <tns1:IVA>
        <ObjectInField>
          <Detect_any_object wstop:topic="true">
            <tt:MessageDescription IsProperty="true">
              <tt:Source>
                <tt:SimpleItemDescription Name="Source" Type="tt:ReferenceToken"/>
              </tt:Source>
              <tt:Data>
                <tt:SimpleItemDescription Name="State" Type="xs:boolean"/>
              </tt:Data>
            </tt:MessageDescription>
          </Detect_any_object>
        </ObjectInField>
        <ObjectInField>
          <Alarm_at_the_Door wstop:topic="true">
            <tt:MessageDescription IsProperty="true">
              <tt:Source>
                <tt:SimpleItemDescription Name="Source" Type="tt:ReferenceToken"/>
              </tt:Source>
              <tt:Data>
                <tt:SimpleItemDescription Name="State" Type="xs:boolean"/>
              </tt:Data>
            </tt:MessageDescription>
          </Alarm_at_the_Door>
        </ObjectInField>
        <CrossingLine>
          <Red_line_crossed wstop:topic="true">
            <tt:MessageDescription IsProperty="true">
              <tt:Source>
                <tt:SimpleItemDescription Name="Source" Type="tt:ReferenceToken"/>
              </tt:Source>
              <tt:Data>
                <tt:SimpleItemDescription Name="State" Type="xs:boolean"/>
              </tt:Data>
            </tt:MessageDescription>
          </Red_line_crossed>
        </CrossingLine>
        <ObjectInField>
          <Person_in_critical_area wstop:topic="true">
            <tt:MessageDescription IsProperty="true">
              <tt:Source>
                <tt:SimpleItemDescription Name="Source" Type="tt:ReferenceToken"/>
              </tt:Source>
              <tt:Data>
                <tt:SimpleItemDescription Name="State" Type="xs:boolean"/>
              </tt:Data>
            </tt:MessageDescription>
          </Person_in_critical_area>
        </ObjectInField>
      </tns1:IVA>
    </wstop:TopicSet>
    <wsnt:TopicExpressionDialect>http://www.onvif.org/ver10/tev/topicExpression/ConcreteSet</wsnt:TopicExpressionDialect>
    <wsnt:TopicExpressionDialect>http://docs.oasis-open.org/wsn/t-1/TopicExpression/Concrete</wsnt:TopicExpressionDialect>
    <tev:MessageContentFilterDialect>http://www.onvif.org/ver10/tev/messageContentFilter/ItemFilter</tev:MessageContentFilterDialect>
    <tev:MessageContentSchemaLocation>http://www.onvif.org/onvif/ver10/schema/onvif.xsd</tev:MessageContentSchemaLocation>
  </tev:GetEventPropertiesResponse>
```

5.4 Add Metadata configuration to ONVIF profile