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Technical Information

# **Bosch IVA on the edge via Onvif**

## **IVA Events and Metadata**

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## Bosch IVA on the edge via Onvif – IVA Events and Metadata

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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.

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

#### 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)

Onvif IVA Event message contains the **Video source** the **event type** and the **rule name** (see screenshot on page 3).

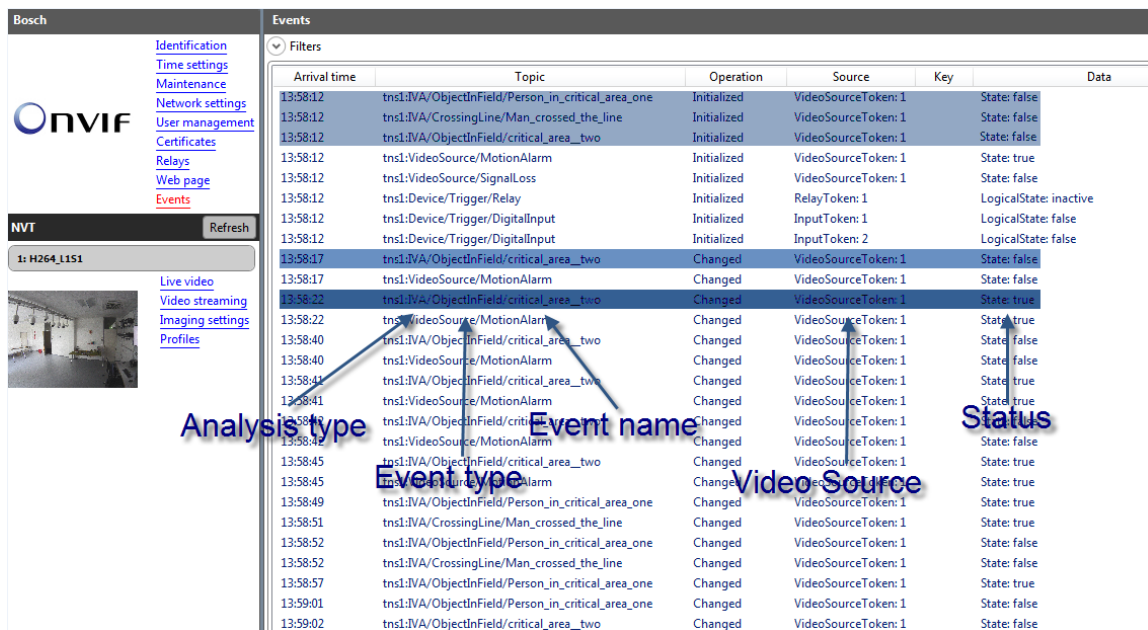
All IVA Events are part of the Onvif request **GetEventProperties**, furthermore it is supported to dynamically create new IVA rules. In case a new IVA rule is created on the camera the *GetEventProperties* needs to be requested by the Onvif client again. Changes of created rules (eg. Moving a crossing 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

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## Bosch IVA on the edge via Onvif – IVA Events and Metadata

Example of IVA Event Messages:



Arrival time	Topic	Operation	Source	Key	Data
13:58:12	tns1:IVA/ObjectInField/Person_in_critical_area_one	Initialized	VideoSourceToken: 1	State: false	
13:58:12	tns1:IVA/CrossingLine/Man_crossed_the_line	Initialized	VideoSourceToken: 1	State: false	
13:58:12	tns1:IVA/ObjectInField/critical_area_two	Initialized	VideoSourceToken: 1	State: false	
13:58:12	tns1:VideoSource/MotionAlarm	Initialized	VideoSourceToken: 1	State: true	
13:58:12	tns1:VideoSource/SignalLoss	Initialized	VideoSourceToken: 1	State: false	
13:58:12	tns1:Device/Trigger/Relay	Initialized	RelayToken: 1	LogicalState: inactive	
13:58:12	tns1:Device/Trigger/DigitalInput	Initialized	InputToken: 1	LogicalState: false	
13:58:12	tns1:Device/Trigger/DigitalInput	Initialized	InputToken: 2	LogicalState: false	
13:58:17	tns1:IVA/ObjectInField/critical_area_two	Changed	VideoSourceToken: 1	State: false	
13:58:17	tns1:VideoSource/MotionAlarm	Changed	VideoSourceToken: 1	State: false	
13:58:22	tns1:IVA/ObjectInField/critical_area_two	Changed	VideoSourceToken: 1	State: true	
13:58:22	tns1:VideoSource/MotionAlarm	Changed	VideoSourceToken: 1	State: true	
13:58:40	tns1:IVA/ObjectInField/critical_area_two	Changed	VideoSourceToken: 1	State: false	
13:58:40	tns1:VideoSource/MotionAlarm	Changed	VideoSourceToken: 1	State: false	
13:58:41	tns1:IVA/ObjectInField/critical_area_two	Changed	VideoSourceToken: 1	State: true	
13:58:41	tns1:VideoSource/MotionAlarm	Changed	VideoSourceToken: 1	State: true	
13:58:42	tns1:IVA/ObjectInField/critical_area_two	Changed	VideoSourceToken: 1	State: true	
13:58:42	tns1:VideoSource/MotionAlarm	Changed	VideoSourceToken: 1	State: true	
13:58:45	tns1:IVA/ObjectInField/critical_area_two	Changed	VideoSourceToken: 1	State: true	
13:58:45	tns1:VideoSource/MotionAlarm	Changed	VideoSourceToken: 1	State: true	
13:58:49	tns1:IVA/ObjectInField/Person_in_critical_area_one	Changed	VideoSourceToken: 1	State: true	
13:58:51	tns1:IVA/CrossingLine/Man_crossed_the_line	Changed	VideoSourceToken: 1	State: true	
13:58:52	tns1:IVA/ObjectInField/Person_in_critical_area_one	Changed	VideoSourceToken: 1	State: false	
13:58:52	tns1:IVA/CrossingLine/Man_crossed_the_line	Changed	VideoSourceToken: 1	State: false	
13:58:57	tns1:IVA/ObjectInField/Person_in_critical_area_one	Changed	VideoSourceToken: 1	State: true	
13:59:01	tns1:IVA/ObjectInField/Person_in_critical_area_one	Changed	VideoSourceToken: 1	State: false	
13:59:02	tns1:IVA/ObjectInField/critical_area_two	Changed	VideoSourceToken: 1	State: false	

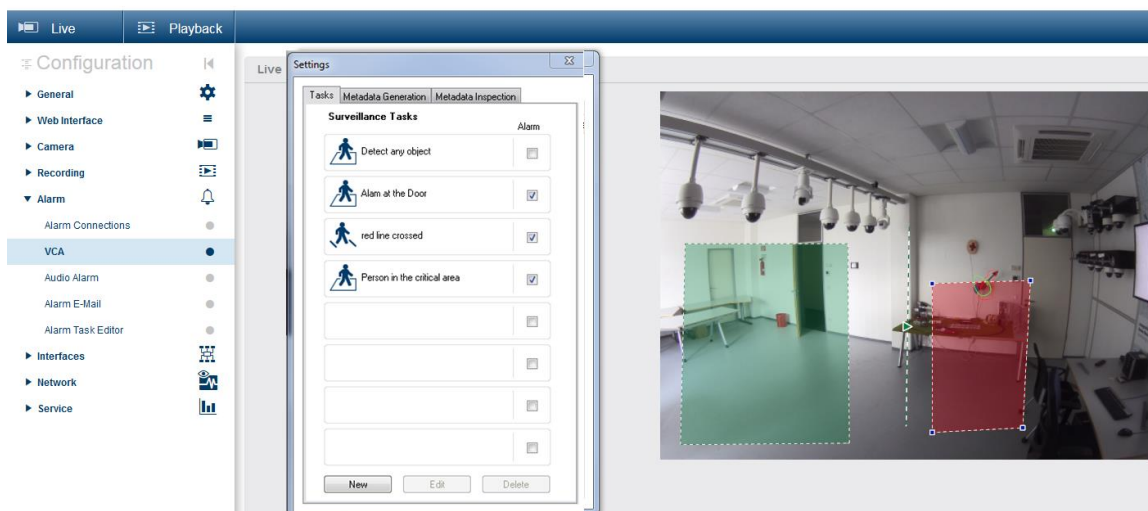
Annotations in the screenshot:

- Analysis type: points to the Topic column.
- Event name: points to the Topic column.
- Event type: points to the Operation column.
- Video Source: points to the Source column.
- Status: points to the Key column.

## Configuration of IVA rules via the Camera Website

Camera webpage=> Settings=> Alarm => VCA => Configuration

DINION IP ultra 8000 MP



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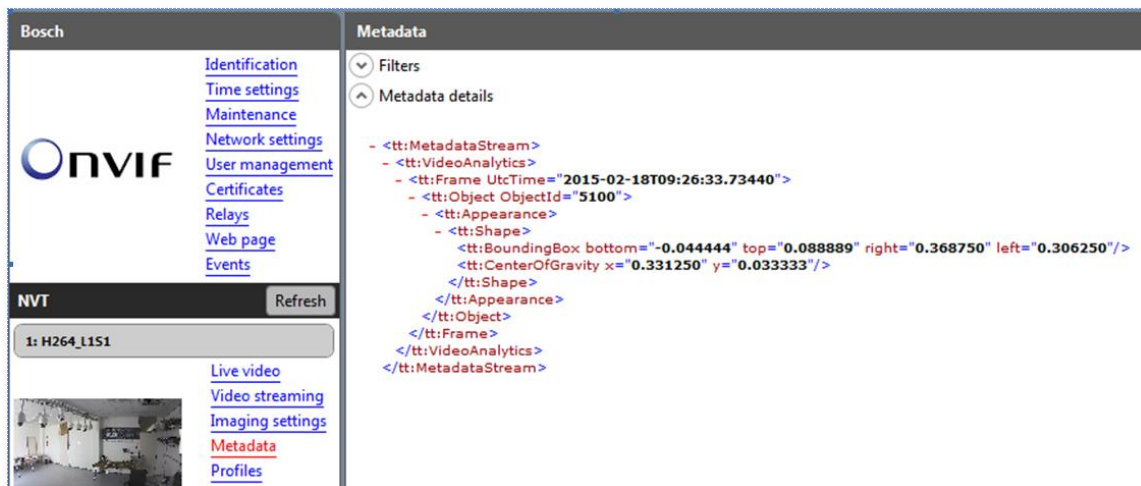
## Bosch IVA on the edge via Onvif – IVA Events and Metadata

### 3 Onvif Metadata

With FW 6.11 and higher it is possible to receive metadata in the ONVIF format from Bosch cameras. The metadata contain the **object coordinates** for Bounding Boxes, **Center of Gravity**, the **Object ID** furthermore the **Event messages (Temper Events and IVA)** are part of it too.

**Note:** The Onvif Metadata (MetadataConfig1) must be added manually to the Onvif Profile.

#### 3.1 Example of the Onvif Metadata stream (Object coordinates)



The screenshot shows the Bosch Onvif web interface. On the left, there is a navigation menu with links for Identification, Time settings, Maintenance, Network settings, User management, Certificates, Relays, Web page, and Events. Below the menu, there is a section for NVT (Network Video Transport) with a Refresh button and a list of cameras, including '1: H264\_L1S1'. A small video thumbnail is visible below the camera list. On the right, the 'Metadata' section is expanded to show 'Metadata details'. The metadata stream is displayed as XML code, showing a bounding box and center of gravity for an object with ID '5100'.

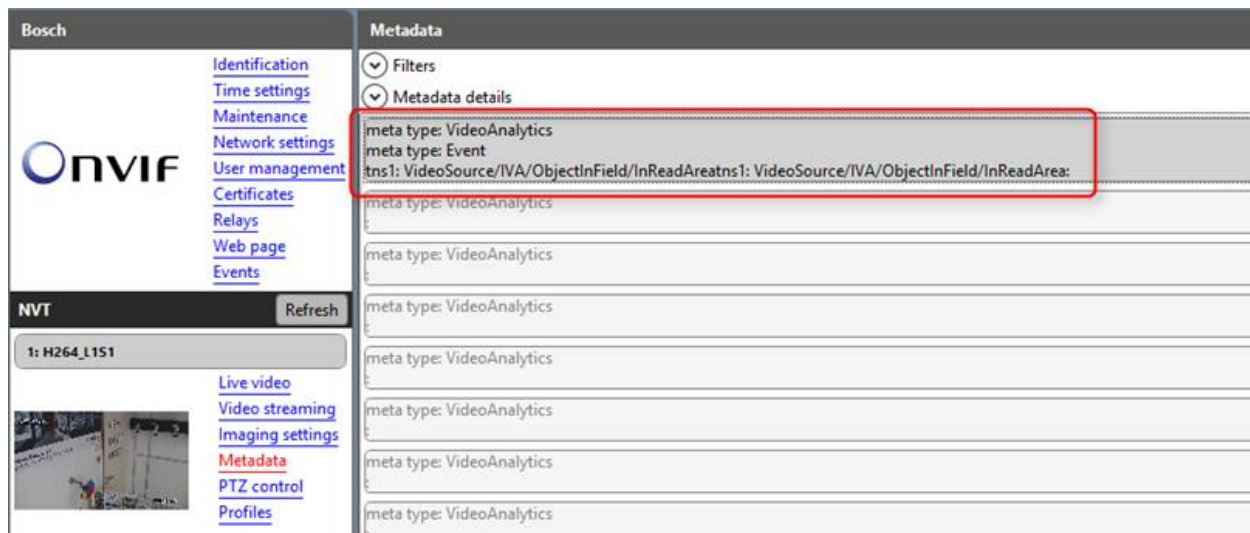
```

<tt:MetadataStream>
  <tt:VideoAnalytics>
    <tt:Frame UtcTime="2015-02-18T09:26:33.73440">
      <tt:Object ObjectID="5100">
        <tt:Appearance>
          <tt:Shape>
            <tt:BoundingBox bottom="-0.044444" top="0.088889" right="0.368750" left="0.306250"/>
            <tt:CenterOfGravity x="0.331250" y="0.033333"/>
          </tt:Shape>
        </tt:Appearance>
      </tt:Object>
    </tt:Frame>
  </tt:VideoAnalytics>
</tt:MetadataStream>
  
```

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## Bosch IVA on the edge via Onvif – IVA Events and Metadata

### 3.2 Example IVA Event in the Onvif Metadata stream



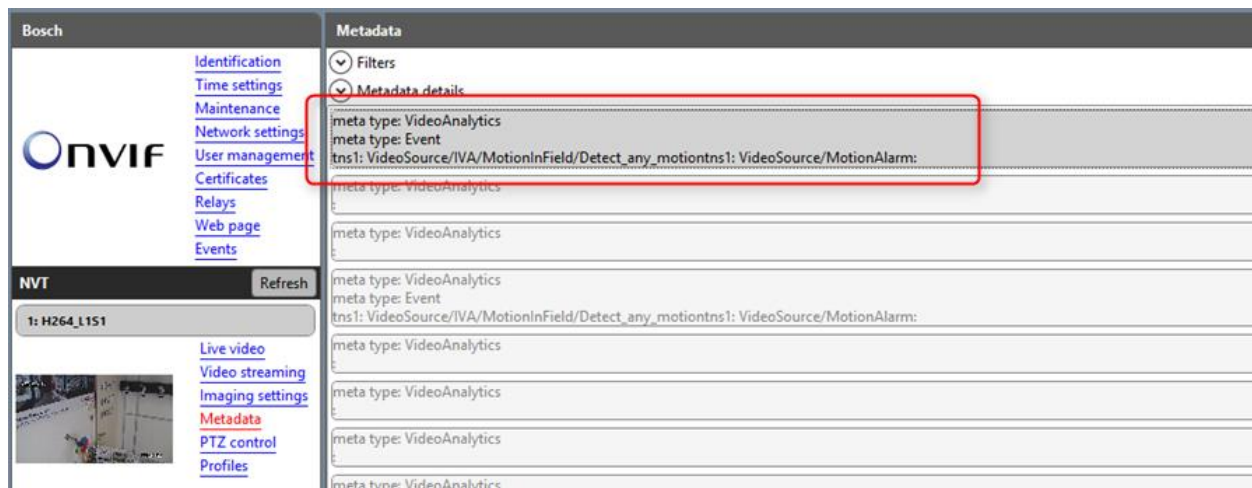
```

- <tt:Event>
- <wsnt:NotificationMessage>
  <wsnt:Topic Dialect="http://www.onvif.org/ver10/tev/topicExpression/ConcreteSet">tns1:VideoSource/IVA/ObjectInField/InReadArea</wsnt:Topic>
- <wsnt:Message>
- <tt:Message UtcTime="2015-06-23T09:18:11.32940" PropertyOperation="Changed">
- <tt:Source>
  <tt:SimpleItem Name="Source" Value="1"/>
</tt:Source>
- <tt:Data>
  <tt:SimpleItem Name="State" Value="true"/>
</tt:Data>
</tt:Message>
</wsnt:Message>
</wsnt:NotificationMessage>
- <wsnt:NotificationMessage>
  <wsnt:Topic Dialect="http://www.onvif.org/ver10/tev/topicExpression/ConcreteSet">tns1:VideoSource/IVA/ObjectInField/InReadArea</wsnt:Topic>
- <wsnt:Message>
- <tt:Message UtcTime="2015-06-23T09:18:11.32940" PropertyOperation="Changed">
- <tt:Source>
  <tt:SimpleItem Name="Source" Value="1"/>
</tt:Source>
- <tt:Data>
  <tt:SimpleItem Name="State" Value="false"/>
</tt:Data>
</tt:Message>
</wsnt:Message>
</wsnt:NotificationMessage>
</tt:Event>
  
```

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## Bosch IVA on the edge via Onvif – IVA Events and Metadata

### 3.3 Example Motion+ Event in the Onvif Metadata stream



The screenshot displays the Bosch Onvif web interface. On the left, there is a navigation menu with links for Identification, Time settings, Maintenance, Network settings, User management, Certificates, Relays, Web page, and Events. Below the menu, there is a section for NVT (Network Video Transport) with a Refresh button and a video thumbnail for camera 1: H264\_L151. The main area shows the Metadata stream. A red box highlights the 'Metadata details' section, which contains the following information:

```
meta type: VideoAnalytics  
meta type: Event  
tns1: VideoSource/IVA/MotionInField/Detect_any_motiontns1: VideoSource/MotionAlarm:
```

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## Bosch IVA on the edge via Onvif – IVA Events and Metadata

# 4 Appendix

## 4.1 GetEventProperties Description

### 2. GetEventProperties

#### Description:

The WS-BaseNotification 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 FilterDialects, Schema files and topics supported by the device.

#### SOAP action:

http://www.onvif.org/ver10/events/wsd/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

## 4.2 Example PullMessages Response of a line cross event

```
<tev:PullMessagesResponse>
  <tev:CurrentTime>2015-02-20T10:10:12Z</tev:CurrentTime>
  <tev:TerminationTime>2015-02-20T10:11:12Z</tev:TerminationTime>
  <wsnt:NotificationMessage>
    <wsnt:Topic Dialect="http://www.onvif.org/ver10/tev/topicExpression/ConcreteSet">tns1:IVA/CrossingLine/Red_Line</wsnt:Topic>
    <wsnt:Message>
      <tt:Message UtcTime="2015-02-20T10:10:11.952" PropertyOperation="Changed">
        <tt:Source>
          <tt:SimpleItem Name="Source" Value="1"></tt:SimpleItem>
        </tt:Source>
        <tt:Data>
          <tt:SimpleItem Name="State" Value="true"></tt:SimpleItem>
        </tt:Data>
      </tt:Message>
    </wsnt:Message>
  </wsnt:NotificationMessage>
</tev:PullMessagesResponse>
```

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## Bosch IVA on the edge via Onvif – IVA Events and Metadata

### 4.3 Example of *GetEventPropertiesResponse* of a IVA Event

```

<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>
  
```



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## Bosch IVA on the edge via Onvif – IVA Events and Metadata

### 4.4 Example Metadata stream with events

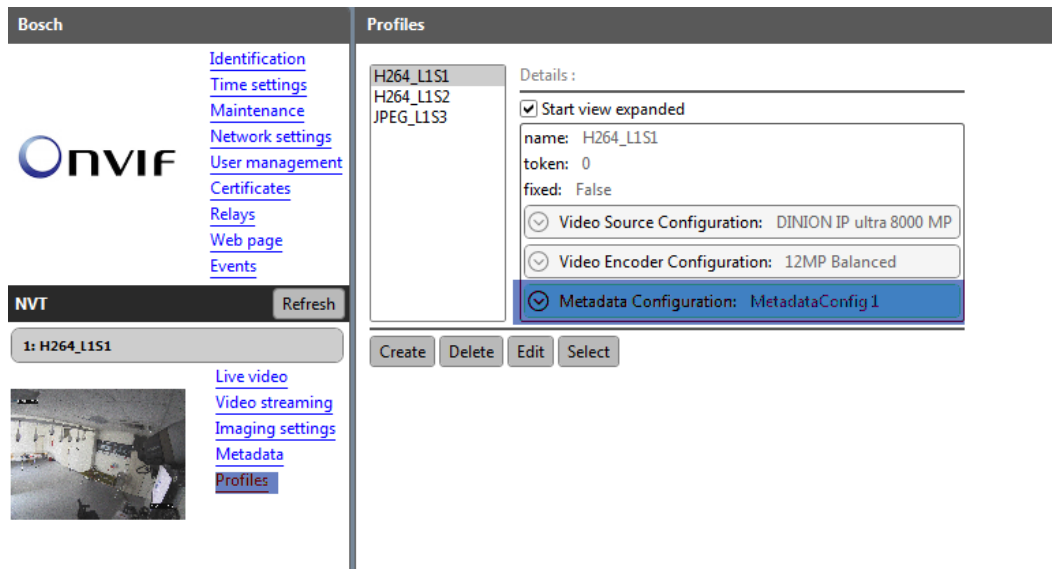
```

<tt:MetadataStream>
- <tt:VideoAnalytics>
- <tt:Frame UtcTime="2015-04-22T10:00:02.37080">
- <tt:Object ObjectId="129">
- <tt:Appearance>
- <tt:Shape>
<tt:BoundingBox bottom="-0.244444" top="-0.188889" right="-0.737500" left="-0.837500"/>
<tt:CenterOfGravity x="-0.793750" y="-0.211111"/>
</tt:Shape>
</tt:Appearance>
</tt:Object>
</tt:Frame>
</tt:VideoAnalytics>
- <tt:Event>
- <wsnt:NotificationMessage>
  <wsnt:Topic Dialect="http://www.onvif.org/ver10/tev/topicExpression/ConcreteSet">tns1:VideoSource/IVA/Detect_any_ob-
  ject</wsnt:Topic>
  - <wsnt:Message>
  - <tt:Message UtcTime="2015-04-22T10:00:02.37080" PropertyOperation="Changed">
  - <tt:Source>
  <tt:SimpleItem Name="Source" Value="1"/>
  </tt:Source>
  - <tt>Data>
  <tt:SimpleItem Name="State" Value="true"/>
  </tt>Data>
  </tt:Message>
  </wsnt:Message>
  </wsnt:NotificationMessage>
- <wsnt:NotificationMessage>
  <wsnt:Topic Dialect="http://www.onvif.org/ver10/tev/topicExpression/ConcreteSet">tns1:VideoSource/IVA/Detect_any_ob-
  ject</wsnt:Topic>
  - <wsnt:Message>
  - <tt:Message UtcTime="2015-04-22T10:00:02.37080" PropertyOperation="Changed">
  - <tt:Source>
  <tt:SimpleItem Name="Source" Value="1"/>
  </tt:Source>
  - <tt>Data>
  <tt:SimpleItem Name="State" Value="false"/>
  </tt>Data>
  </tt:Message>
  </wsnt:Message>
  </wsnt:NotificationMessage>
- <wsnt:NotificationMessage>
  <wsnt:Topic Dialect="http://www.onvif.org/ver10/tev/topicExpression/ConcreteSet">tns1:VideoSource/IVA/TEST_FIELD</wsnt:Topic>
  - <wsnt:Message>
  - <tt:Message UtcTime="2015-04-22T10:00:02.37080" PropertyOperation="Changed">
  - <tt:Source>
  <tt:SimpleItem Name="Source" Value="1"/>
  </tt:Source>
  - <tt>Data>
  <tt:SimpleItem Name="State" Value="true"/>
  </tt>Data>
  </tt:Message>
  </wsnt:Message>
  </wsnt:NotificationMessage>
- <wsnt:NotificationMessage>
  <wsnt:Topic Dialect="http://www.onvif.org/ver10/tev/topicExpression/ConcreteSet">tns1:VideoSource/IVA/TEST_FIELD</wsnt:Topic>
  - <wsnt:Message>
  - <tt:Message UtcTime="2015-04-22T10:00:02.37080" PropertyOperation="Changed">
  - <tt:Source>
  <tt:SimpleItem Name="Source" Value="1"/>
  </tt:Source>
  - <tt>Data>
  <tt:SimpleItem Name="State" Value="false"/>
  </tt>Data>
  </tt:Message>
  </wsnt:Message>
  </wsnt:NotificationMessage>
</tt:Event>
</tt:MetadataStream>
  
```

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## Bosch IVA on the edge via Onvif – IVA Events and Metadata

### 5 Add Metadata Configuration to Onvif Profile



The screenshot shows the Bosch Onvif web interface. On the left, there is a navigation menu with the Onvif logo and various settings links: Identification, Time settings, Maintenance, Network settings, User management, Certificates, Relays, Web page, and Events. Below the menu, there is a section for 'NVT' with a 'Refresh' button and a list of profiles, currently showing '1: H264\_L1S1'. A small video preview window is visible below the profile list.

The main area is titled 'Profiles' and shows a list of profiles: H264\_L1S1, H264\_L1S2, and JPEG\_L1S3. The 'H264\_L1S1' profile is selected, and its details are shown in a form:

- Start view expanded
- name: H264\_L1S1
- token: 0
- fixed: False
- Video Source Configuration: DINION IP ultra 8000 MP
- Video Encoder Configuration: 12MP Balanced
- Metadata Configuration: MetadataConfig1

At the bottom of the profile details, there are buttons for 'Create', 'Delete', 'Edit', and 'Select'.