VAPIX® version 3

Trigger Data in the Video Stream

AXIS COMMUNICATIONS

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1 Overview

1.1 Description

Trigger data describes different conditions in Axis video products, for example digital input states, motion detection and video loss. This document describes the form of the trigger data for the streaming formats available in products with firmware 5.00 and above.

In this document, MPEG-4 is short for MPEG-4 Part 2.

1.2 History

Version	Date	Comment
1.00	2009-Mar-02	Initial version

2 Prerequisites

2.1 Identification

Property: Properties.API.HTTP.Version=3
Firmware: 5.00 and above

2.2 Dependencies

The parameters (see section 5) are managed through the general parameter handling CGI param.cgi. See VAPIX® HTTP API for more information.

3 Common Examples

Example 1: Trigger tags.

```
A0:0;IO0:0;IO1:1;IO2:1;IO3:0;V0:0;M0:1;ML0:035;T0:1
```

In this example, audio is not triggered, input 0 and 3 are not triggered, and input 1 and 2 are triggered. Video source 0 has video. Motion is detected for window 0. Motion level for window 0 is 35 and camera tampering is triggered on video source 0.

Example 2: In this example, we will consider a video encoder with four video inputs and four image configurations, one for each video input. The video encoder has four digital input ports. We have configured one motion detection window per video input.

Enable user data and include trigger data:

```
http://myserver/axis-cgi/param.cgi?action=update
&Image.I0.MPEG.UserDataEnabled=yes
&Image.I1.MPEG.UserDataEnabled=yes
&Image.I2.MPEG.UserDataEnabled=yes
&Image.I3.MPEG.UserDataEnabled=yes
&Image.TriggerDataEnabled=yes
```

Restart the video encoder for these settings to take effect.

The default configuration is:

```
root.Image.I0.TriggerData.IOEnabled=yes
root.Image.I0.TriggerData.AudioEnabled=yes
```

```
root.Image.I0.TriggerData.TamperingEnabled=yes
root.Image.I0.TriggerData.MotionDetectionEnabled=yes
root.Image.I0.TriggerData.MotionLevelEnabled=no
root.Image.I0.TriggerData.VideoLossEnabled=yes
root.Image.I0.TriggerData.UserTriggers=

root.Image.I1.TriggerData.IOEnabled=yes
root.Image.I1.TriggerData.AudioEnabled=yes
root.Image.I1.TriggerData.TamperingEnabled=yes
root.Image.I1.TriggerData.MotionDetectionEnabled=yes
root.Image.I1.TriggerData.MotionLevelEnabled=no
root.Image.I1.TriggerData.VideoLossEnabled=yes
root.Image.I1.TriggerData.UserTriggers=

root.Image.I2.TriggerData.IOEnabled=yes
root.Image.I2.TriggerData.AudioEnabled=yes
root.Image.I2.TriggerData.TamperingEnabled=yes
root.Image.I2.TriggerData.MotionDetectionEnabled=yes
root.Image.I2.TriggerData.MotionLevelEnabled=no
root.Image.I2.TriggerData.VideoLossEnabled=yes
root.Image.I2.TriggerData.UserTriggers=

root.Image.I3.TriggerData.IOEnabled=yes
root.Image.I3.TriggerData.AudioEnabled=yes
root.Image.I3.TriggerData.TamperingEnabled=yes
root.Image.I3.TriggerData.MotionDetectionEnabled=yes
root.Image.I3.TriggerData.MotionLevelEnabled=no
root.Image.I3.TriggerData.VideoLossEnabled=yes
root.Image.I3.TriggerData.UserTriggers=
```

For image configuration 0 this would result in a trigger data block similar to this:

```
A0:0;IO0:0;IO1:0;IO2:0;IO3:0;M0:0;T0:0;V0:0;
```

For image configuration 1:

```
A0:0;IO0:0;IO1:0;IO2:0;IO3:0;M1:0;T1:0;V1:0;
```

For image configuration 2:

```
A0:0;IO0:0;IO1:0;IO2:0;IO3:0;M2:0;T2:0;V2:0;
```

For image configuration 3:

```
A0:0;IO0:0;IO1:0;IO2:0;IO3:0;M3:0;T3:0;V3:0;
```

Example 3: Continuation of example 2: The UserTriggers parameter. Here we include all trigger states in the trigger data block for image configuration 0:

```
Image.I0.TriggerData.IOEnabled="yes"
Image.I0.TriggerData.AudioEnabled="yes"
Image.I0.TriggerData.MotionDetectionEnabled="no"
Image.I0.TriggerData.MotionLevelEnabled="no"
Image.I0.TriggerData.TamperingEnabled="no"
Image.I0.TriggerData.VideoLossEnabled="no"
Image.I0.TriggerData.UserTriggers="M0;M1;M2;M3;ML0;ML1;ML2;ML3;T0;T1;T
2;T3;V0;V1;V2;V3"
```

This will result in a trigger data block similar to this:

```
A0:0;IO0:0;IO1:0;IO2:0;IO3:0;M0:0;M1:0;M2:0;M3:0;ML0:000;ML1:000;ML2:0
00;ML3:000;T0:0;T1:0;T2:0;T3:0;V0:0;V1:0;V2:0;V3:0;
```

4 Trigger Data Blocks

The trigger data block contains the states of all triggers of interest, as opposed to just including a changed state in one block when it occurs. This allows the receiving application to lose blocks without necessarily losing a changed state.

The trigger data block, same for all supported video formats, is a block of text containing trigger states in this format:

```
<trigger>:<state>;<trigger>:<state>;...
```

where <*trigger*> is a tag for the trigger and <*state*> is a text describing the state. The following table lists defined trigger tags and their possible states.

Trigger tag	**Description**	**States**
A0 ... A*n*	Status for audio trigger for source 0 to *n*, where *n* is the total number of audio sources minus one.	1 0
IO0 ... IO*n*	Status for digital input 0 to *n*, where *n* is the total number of inputs minus one. Note that state "1" means that the input has triggered, which isn't necessarily the same as that the input is high. Each input can be configured when to trigger.	0 1
V0 ... V*n*	Video loss status for video source 0 to *n*, where *n* is the total number of video sources minus one. State "0" means that there is no video for that video source.	0 1
M0 ... M*n*	Motion detection status for window 0 to *n*, where *n* is the total number of motion detection windows minus one. State "1" means that motion has been detected for this window, i.e. the motion level is above the configured threshold.	0 1
ML0 ... ML*n*	Motion detection level for window 0 to *n*, where *n* is the total number of motion detection windows minus one.	000 ... 100
T0 ... T*n*	Camera tampering status for source 0 to *n*, where *n* is the total number of video sources minus one. State "1" means that camera tampering has been detected for that video source.	0 1

New trigger tags may be added in the future. Any trigger tags not understood by the interpreter should simply be ignored.

4.1 MJPEG

For MJPEG the trigger data block is included as a comment header for each image. The image may contain several comments in this format:

Field	Value	Size (bytes)	Description
marker	0xFF 0xFF	2	JPEG comment marker.
length	4...260	2	Length of the comment.
axis_id	0x0A	1	This marks the comment as defined by Axis.
trigger_id	0x03	1	This marks the comment as trigger data.
data		length-4	The payload = the trigger data block.

4.2 MPEG-4 Part 2

For MPEG-4 the trigger data block is included as "user data" in the GOV header. The GOV header may contain several data blocks following each other in this format. The GOV header is inserted into the MPEG-4 stream at regular intervals, typically every 5th frame. A new GOV header can also be forced to be inserted as soon as possible when a trigger changes state. This is done for I/O triggers to reduce the latency.

Field	Value	Size (bytes)	Description
marker	0x00, 0x00, 0x01, 0xB2	4	User data start code.
axis_id	0x0A	1	This marks the user data as defined by Axis.
trigger_id	0x03	1	This marks the user data as trigger data.
data	1...256	Length of trigger data	The payload = the trigger data block.

4.3 H.264

For H.264 the trigger data block is included as "user data" in the SEI NAL units marked as type user data unregistered. The SEI header is inserted into the H.264 stream at regular intervals, typically every 5th frame. A new SEI header can also be forced to be inserted as soon as possible when a trigger changes state. This is done for I/O triggers to reduce the latency.

Field	Value*	Size (bytes)	Description
uuid_iso_iec_11578	0xAA,0xAA,0xAA,0xAA, 0xAA,0xAA,0xAA,0xAA, 0xAA,0xAA,0xAA,0xAA, 0xAA,0xAA,0xAA,0xAA	16	Axis UUID identifier
Length	0x##, 0x##	2	Size of user data (starting from Axis ID)

Field	Value*	Size (bytes)	Description
Axis ID	0x0A, 0x03	2	This marks the user data as trigger data.
Data		Length – 2	The payload = the trigger data block.

* The #s are replaced by the symbols 0…9,A…F.

5 Parameters

5.1 Enable user data in H.264/MPEG-4

Note: The network camera/video encoder must be restarted for these parameters to take effect.

[Image.I#.MPEG]*

Parameter	Default value	Valid values	Access control	Description
UserDataEnabled	no	yes, no	w:op r:op	Enable/disable inclusion of user data in the H.264 SEI header and the MPEG-4 GOV header.
ConfigHeaderInterval	5	An integer	w:op r:op	The interval at which configuration headers are inserted into the H.264 or MPEG-4 stream before a SEI or GOV. A configuration header is always inserted at the start of the stream. *n* = Headers inserted before every *n*th SEI/GOV. 0 = No extra headers inserted.

* The # is replaced by an integer starting from zero, e.g. Image.I0.MPEG

5.2 Enable trigger data

Note: The network camera/video encoder must be restarted for this parameter to take effect.

[Image]

Parameter	Default value	Valid values	Access control	Description
TriggerDataEnabled	no	yes, no	w:op r:op	Include trigger data in the video stream.

5.3 Trigger data parameters

For each image configuration Image.I#, the TriggerData parameters specify the triggers included in the trigger data. The UserTriggers parameter can be used to include only a few triggers or triggers from other image configurations.

[Image.I#.TriggerData]*

Parameter	Default value	Valid values	Access control	Description
AudioEnabled	yes	yes, no	w:op r:op	Include audio trigger states. yes = Include the states of all audio triggers for image configuration #. To include just some audio triggers, set to “no” and use UserTriggers instead.
IOEnabled	yes	yes, no	w:op r:op	Include digital input triggers. yes = Include the states of all digital input triggers for image configuration #. To include just some digital input triggers, set to “no” and use UserTriggers instead.
MotionDetectionEnabled	yes	yes, no	w:op r:op	Include motion detection triggers. yes = Include the motion detection states of all windows that belong to image configuration #. To include just some window states or window states belonging to other image configurations, set to "no" and use UserTriggers instead.
MotionLevelEnabled	no	yes, no	w:op r:op	Include motion detection level triggers. yes = Include the motion detection levels of all windows that belong to image configuration #. To include just some window levels or window levels belonging to other image configurations, set to "no" and use UserTriggers instead.
TamperingEnabled	yes	yes, no	w:op r:op	Include camera tampering triggers. yes = Include the camera tampering state of image configuration #. Use UserTriggers to include tampering states for other image configurations.
VideoLossEnabled	yes	yes,	w:op	Include video loss status.

Parameter	Default value	Valid values	Access control	Description
		no	r:op	yes = Include video loss status for image configuration #. Use UserTriggers to include video loss states for other image configurations.
UserTriggers		A string	w:op r:op	Include user-defined triggers in the trigger data for image configuration #. The string should be in the format "<*trigger1*>;<*trigger2*>;<*trigger3*>;...". See example 3 in section 3.

* The # counts the image configurations and is replaced by an integer starting from zero, e.g. Image.I0.TriggerData. The number of image configurations is given by the Image.NbrOfConfigs parameter.

6 References

All VAPIX references are available at
http://www.axis.com/techsup/cam_servers/dev/cam_http_api_index.php

VAPIX® Axis H.264 SEI Header – User Data

VAPIX® HTTP API version 3

VAPIX® Parameter Specification

VAPIX® RTSP API