

VAPIX[®] VERSION 3

Audio API

Audio API

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1 Overview

1.1 Description

Audio is supported by several of Axis network camera and video encoder models. Integrating audio with network video reduces the need and costs for extra cabling and allows audio to be transmitted to and/or from any point on the network, including remote locations.

Audio can be streamed on its own over HTTP, both ways. It could also be integrated with MPEG-4 or H.264 video streamed over RTP/RTSP, streamed from server to client. Audio configurations are global; one of the allowed per-stream setting is audio enabling/disabling.

In addition to remote monitoring and recording, audio can be used in event handling. Events can be configured to trigger on audio alarms, which are generated when the sound level rises above, passes or falls below a predefined alarm level.

To synchronize audio and video you need to stream the video over RTP/RTSP.

Note

The `audio/param.cgi` from VAPIX 1 is removed. Use `param.cgi` instead (see examples below and the document VAPIX® Parameter Management).

1.1.1 Audio modes

Axis network video products can support some or all of the following audio modes:

Full duplex – Simultaneous two-way audio. Multiple clients can receive audio, but only one client at a time can transmit audio.

Half duplex – Two-way audio, but only in one direction at a time.

Simplex – Speaker only – One-way audio where audio is transmitted from the client to the Axis product.

Simplex – Microphone only – One-way audio where audio is transmitted from the Axis product to the client. Multiple clients can receive audio at the same time.

1.1.2 Audio compression formats

Axis network video products can support all or some of the following audio compression formats

Compression	MIME type	Bit rate (kbit/s)	Sample rate (kHz)
G.711 μ -law	audio/basic	64	8
Axis μ -law 128	audio/axis-mulaw-128 ¹	128	16
G.726	audio/G726-32	32	8
	audio/G726-24	24	8
AAC	audio/mpeg4-generic	8, 12, 16, 24, 32	8
	audio/mpeg4-generic	12, 16, 24, 32, 48, 64	16
	audio/mpeg4-generic	16, 24, 32, 48, 64, 128	32

1. Variant of G.711 μ -law with doubled sample rate and bit rate. Only applicable for client-to-server communication.

AAC is usually transferred through RTP/RTSP; transfer via HTTP is supported but not recommended. AAC is not supported for multipart audio.

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1.2 Prerequisites

1.2.1 Identification

Property: `Properties.API.HTTP.Version=3, Properties.Audio.Audio=yes`

Firmware: 5.00 and later

Product category: Products with audio support (see the product's datasheet)

1.2.2 References

All VAPIX® references are available at:

<http://www.axis.com/vapix>

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2 Common Examples

Example 1:

Limit the maximum number of clients that can receive audio at the same time.

```
http://myserver/axis-cgi/param.cgi?action=update&Audio.MaxListeners=5
```

Example 2:

Configure the audio source parameters.

```
http://myserver/axis-cgi/param.cgi?action=update
&AudioSource.A0.Name=Dynamic%20Microphone
&AudioSource.A0.AudioEncoding=g726
&AudioSource.A0.InputType=mic
&AudioSource.A0.MicrophonePower=no
```

Example 3:

Play a media stream (including both video and audio) using RTSP.

```
PLAY rtsp://myserver/axis-media/media.amp?videocodec=h264&audio=1 RTSP/1.0
CSeq: 2
User-Agent: Axis AMC
Session: 12345678
Authorization: Basic cm9vdDpwYXNz
```

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3 Parameters

3.1 Audio parameters

Common audio parameters used for all audio configurations.

[Audio]

Parameter	Default value	Valid values	Access control	Description
DuplexMode	Product-dependent	full ¹ half ¹ get post ¹	admin: read, write operator: read, write viewer: read	The audio mode. full = Full duplex. Simultaneous two-way audio. half = Half duplex. Two-way audio, but only in one direction at a time. get = Simplex. Retrieve audio from the server. post = Simplex. Send audio to the server.
MaxListeners	10 ¹ or 20 ¹	0 ... 20 ¹	admin: read, write operator: read, write viewer: read	Maximum number of simultaneous audio clients (does not affect multicast delivery).
ReceiverBuffer ¹	120	0 ... 9999	admin: read, write operator: read, write	The receiving audio buffer size in milliseconds.
ReceiverTimeout	1000	0 ... 9999	admin: read, write operator: read, write	The receiving audio timeout in milliseconds. When the Axis video product is receiving audio data from a client, the session is terminated if no data is received in this time span.
NbrOfConfigs	Product-dependent	An unsigned integer	admin: read operator: read	The number of audio configurations.
DSCP	0	0 ... 63	admin: read, write	The Differentiated Services Codepoint for audio Quality of Service (QoS).

1. Product/release-dependent. Check the product's release notes.

3.2 Audio configuration

Audio configuration settings. Each audio configuration has its own parameter group.

Note

The # in `Audio.A#` is replaced by a group number starting from zero, e.g. `Audio.A0`.

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[Audio.A#]

Parameter	Default value	Valid values	Access control	Description
Enabled	no	yes no	admin: read, write operator: read, write viewer: read	Enable/disable the audio for the specific audio configuration.
HTTPMessageType	singlepart	singlepart multipart	admin: read, write operator: read, write viewer: read	How audio should be streamed. Some proxies require multipart streaming.
Name		A string	admin: read, write operator: read, write	Name of the configuration
Source	0	An integer ¹	admin : read, write operator: read, write	The audio source a specific audio configuration is connected to.
AlarmLevel ¹	50	0 ... 100	admin: read operator: read	Alarm level in percent of the maximum amplitude of the audio samples. The alarm level is used in event setup. Events can be configured to trigger when the sound level rises above or falls below the alarm level.
AlarmResolution ¹	50	0 ... 100	admin: read operator: read	The length of the audio sample used for the audio alarm calculation. The parameter is expressed as percent of a block of 1024 samples, e.g. 50% corresponds to 512 samples. The actual sample time is the number of samples divided by the sample rate, e.g. 512 samples at 8 kHz correspond to 64 ms. An audio alarm is generated when the mean level for a sample exceeds the AlarmLevel. A shorter AlarmResolution makes the alarm calculation more sensitive.

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[Audio.A#] (Continued)

AlarmLowLimit ¹	50 ¹	0 ... 10000	admin: read operator: read	The lowest configurable alarm limit (AlarmLevel=0%) in basis points (1/10000) of the maximum amplitude value.
AlarmHighLimit ¹	6500 ¹	0 ... 10000	admin: read operator: read	The highest configurable alarm limit (AlarmLevel=100%) in basis points (1/10000) of the maximum amplitude value.

1. Product/release-dependent. Check the product's release notes.

3.3 Number of audio sources

The number of audio sources.

[AudioSource]

Parameter	Default value	Valid values	Access control	Description
NbrOfSources	1 ¹	An unsigned integer	admin: read operator: read viewer: read	The number of audio sources.

1. Product/release-dependent. Check the product's release notes.

3.4 Audio source settings

Audio source settings. Each audio source has its own parameter group.

Note

The # in `AudioSource.A#` is replaced by an integer starting from zero, e.g. `AudioSource.A0`.

[AudioSource.A#]

Parameter	Default value	Valid values	Access control	Description
Name	Audio	A string	admin: read, write operator: read, write	Name of the audio source.
AudioEncoding	aac ¹	g711 ² g726 ² aac ²	admin: read, write operator: read, write viewer: read	The audio codec.
InputType	Hardware-dependent	internal ¹ mic line ¹	admin: read, write operator: read, write	The source from where the audio is captured.
MicrophonePower	yes	yes no	admin: read, write operator: read, write	Enable/disable power on the audio input connector.
InputGain	0	mute a number ¹	admin: read, write operator: read, write	Gain (in dB) for sound sent from the Axis product.

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[AudioSource.A#] (Continued)

OutputGain ¹	0	mute an integer ¹	admin: read, write operator: read, write	Gain (in dB) for sound sent to the Axis product.
SampleRate	Hardware-dependent	8000 ¹ 16000 ¹	admin: read, write operator: read, write	Clock rate (in Hz) for the audio sampling.
BitRate	Encoder-dependent	g711: 64000 g726: 24000, 32000 aac (8 kHz): 8000, 12000, 16000, 24000, 32000 aac (16 kHz): 12000, 16000, 24000, 32000, 48000, 64000 aac (32 kHz): 16000, 24000, 32000, 48000, 64000, 128 000	admin: read, write operator: read, write	The output bit rate (in bits per second).
AudioSupport	yes	yes no	admin: read, write operator: read viewer: read	Enable/disable audio from this audio source. If the audio source is turned off with this parameter, no audio will be transmitted even if Audio.A#.Enabled=yes.
InputPort ¹	1	An integer	admin: read, write operator: read, write	Set which audio input port to use if the device got more than one.
MicrophoneBalanced	no ¹	yes no	admin: read, write operator: read, write	Enable/disable balanced audio source.
MicrophonePowerType	electret2_5v ¹	electret electret3_0v electret2_5v electret2_0v p12 p48	admin: read, write operator: read, write	The power types to use for the microphone. To set a value it is assumed that MicrophonePower is set to yes.
SpeakerAmp ¹	no	yes no	admin: read, write operator: read, write	Enable/disable speaker amplifier.

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[AudioSource.A#] (Continued)

AlarmLevel	50	0 .. 100	admin: read, write operator: read, write viewer: read	Configures the input level, in percentage value of the maximum amplitude value one sample can have, that triggers an audio alarm. Audio alarms can be used as a trigger to start image upload, different types of notifications, PTZ movement, etc. This parameter replaces the old Alarm-parameters in the Audio-group. The audio level is expressed in dBFS, where the maximum level is 0 dBFS and the minimum level is -90 dBFS for 16-bit audio. This parameter has values from 0 to 100 (as in percent) where 100 percent is mapped to 0 dBFS.
LevelIndicator ¹	no	yes no	admin: read, write operator: read, write	Enable/disable the audio level indication by e.g. a LED.
PTZAlarmControl ¹	yes	yes no	admin: read, write operator: read, write viewer: read	Enable/disable audio level alarm during PTZ movement. Camera movement could create noises that trigger alarms. If set to <i>yes</i> no alarms will trigger during PTZ movement.

1. Product/release-dependent. Check the product's release notes.
2. Product-dependent. Check the corresponding Properties parameter.

3.5 Properties parameters

[Properties.Audio]

Parameter	Default value	Valid values	Access control	Description
Audio	Product-dependent	yes no	admin: read operator: read viewer: read	The product has audio support.
Format	g711, g726, aac ¹	A string	admin: read operator: read viewer: read	Comma-separated list of supported audio encoder formats.

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[Properties.Audio] (Continued)

DuplexMode	Product-dependent	A string	admin: read operator: read viewer: read	Comma-separated list of supported duplex modes.
InputType	Product-dependent	A string	admin: read operator: read viewer: read	Comma-separated list of supported input types.
Decoder.Format	Product-dependent	A string	admin: read operator: read viewer: read	Comma-separated list of supported audio decoder formats.
Source.A#.Input	Product-dependent	yes no	admin: read operator: read viewer: read	Says if the AudioSource.A# has an audio input.
Source.A#.Output	Product-dependent	yes no	admin: read operator: read viewer: read	Says if the AudioSource.A# has an audio output.

1. Product-dependent. Check the product's release notes.

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4 HTTP API

4.1 Audio data request

Request and configure an audio stream.

Access control: viewer

Method: GET

Syntax:

```
http://<servername>/axis-cgi/audio/receive.cgi? [&<argument>=<value>]
```

With the following argument and values:

Argument	Valid values	Description
audio=<int>	0,1	Enable (1) or disable (0) audio.
camera=<int>	1... ¹	Select the audio configuration in Audio.A#. Note: The argument has a different value than the corresponding parameter. E.g. if the argument camera=1 then the parameter group is Audio.A0.
httpype=<string>	singlepart multipart	Choose streaming method. Some proxies require multipart streaming. Default: As defined by the parameter Audio.A#.HTTPMessageType
audiochannel=<int>	1... ¹	Select the audio source in AudioSource.A#. Note: The argument has a different value than the corresponding parameter. E.g. if the argument audiochannel=2 then the parameter group is AudioSource.A1.

1. The number of audio configurations/audio sources may differ between different cameras and video servers. See the product's specification.

Example 1:

Request an audio stream:

```
http://myserver/axis-cgi/audio/receive.cgi
```

4.2 Singlepart audio data response

Example 2:

Request a singlepart audio stream using HTTP.

```
http://myserver/axis-cgi/audio/receive.cgi?httpype=singlepart
```

4.2.1 Successful request

If the request was successful, the server returns a continuous flow of audio packets. The content type is only set at the beginning of the connection. When the connection is up and running audio packets will come one after another without any extra information between the packets.

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Return

Successful response to a HTTP request. Here, singlepart audio data with G.711 μ -law compression is returned.

HTTP Code: 200 OK

Content-Type: <audio MIME>d

Body:

```
<audio data>
<audio data>
<audio data>
...
```

4.2.2 Failure – Bad request

If the specified parameter value is invalid, the server returns 400 Bad Request.

Return

HTTP Code: 400 Bad Request

Body:

```
<body>
```

4.3 Multipart audio data response

Example 3:

Request a multipart audio stream using HTTP.

```
http://myserver/axis-cgi/audio/receive.cgi?httptype=multipart
```

4.3.1 Successful request

If the request was successful, the server returns a continuous flow of audio packets. The content type is "multipart/x-mixed-replace" and each audio packet ends with a boundary string. The message body contains a block of binary data. The content length provides the size of each block of coded audio which varies for different codecs: G.711 has 512 bytes block size, G.726 32 kbit/s has 256 bytes and G.726 24 kbit/s has 192 bytes. AAC is not supported.

Return

Successful response to a HTTP request. Here, multipart audio data with G.726 32 kbit/s compression is returned.

HTTP Code: 200 OK

Content-Type: multipart/x-mixed-replace; boundary=<myboundary>

Body:

```
--myboundary \r\n
Content-Type: audio/G726-32\r\n
Content-Length: 256\r\n

<Audio data>\r\n
--myboundary\r\n
Content-Type: audio/G726-32\r\n
Content-Length: 256\r\n

<Audio data>\r\n
--myboundary\r\n
Content-Type: audio/G726-32\r\n
```

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```
Content-Length: 256\r\n
<Audio data>\r\n
--myboundary\r\n
Content-Type: audio/G726-32\r\n
Content-Length: 256\r\n
<Audio data>\r\n
--myboundary\r\n
```

4.3.2 Failure – Bad request

If the specified parameter value is invalid, the server returns 400 Bad Request.

Return

HTTP Code: 400 Bad Request

Body:

```
<body>
```

4.4 Transmit audio data

Example 4:

Check what audio formats your Axis product can transmit. For a complete list of audio formats supported by VAPIX® see [page 5](#).

```
http://myserver/axis-cgi/param.cgi?action=list&group=Properties.Audio.Decoder
```

Transmit a singlepart audio data stream.

Access control: viewer

Method: POST

Syntax:

```
http://<servername>/axis-cgi/audio/transmit.cgi
```

Content-Type: <Audio MIME>

Content-Length: <any value>

Body

```
<Audio data>
```

There are no arguments to this CGI.

When an audio stream is transmitted, the server receives a continuous flow of audio packets. The content type is only set at the beginning of the connection together with the content length that can have any value. When the connection is up and running the audio packets will come right after another without any extra information between the packets. The message body contains a block of binary data.

Example 5:

Transmit singlepart audio using G.711 μ -law (authorization omitted).

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```
POST /axis-cgi/audio/transmit.cgi HTTP/1.0
Content-Type: audio/basic
Content-Length: 9999999
Connection: Keep-Alive
Cache-Control: no-cache
Authorization: Basic cm9vdDpwYXNz
```

```
<Audio data>
<Audio data>
<Audio data>
...
```

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5 Audio in the RTSP API

Media streams transmitted over RTSP contain audio by default if parameters `Audio.A#.Enabled` and `AudioSource.A#.AudioSupport` are enabled. Audio can also be requested through the arguments `audio` described in section 4.1 *Audio data request*, but `AudioSource.A#.AudioSupport` must be enabled. All arguments described in section 4.1 *Audio data request*, except `httptype`, are valid for the RTSP API. For more information about the RTSP API, see the document VAPIX® Video Streaming API.

