

Advanced Media Framework – AV1 Video Encoder

Programming Guide

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Contents

- [Advanced Media Framework – AV1 Video Encoder - Programming Guide](#)
 - [Disclaimer](#)
 - [Copyright Notice](#)
 - [MIT license](#)
 - [Contents](#)
 - [1 Introduction](#)
 - [1.1 Scope](#)
 - [1.2 Pre-defined Encoder Usages](#)
 - [2 AMF Video Encoder VCN-AV1 Component](#)
 - [2.1 Input Submission and Output Retrieval](#)
 - [2.2 Encode Parameters](#)
 - [2.2.1 Static Properties](#)
 - [2.2.2 Dynamic Properties](#)

- 2.2.3 Frame Per-Submission Properties
- 2.2.4 ROI Feature
- 2.2.5 Encoder Statistics Feedback
- 2.2.6 SVC Properties
- 2.2.7 LTR Properties
- 2.2.8 SmartAccess Video
- 3 Sample Applications
 - 3.1 List of Parameters
 - 3.2 Command line example
 - 3.2.1 Transcoding application (TranscodeHW.exe)
 - 3.2.2 D3D application (VCEEncoderD3D.exe)
- 4 Annex A: Encoding & frame parameters description
 - Table A-1. Encoder parameters
 - Table A-2. Input frame and encoded data parameters
 - Table A-3. Encoder capabilities exposed in AMFCaps interface
 - Table A-4. Encoder statistics feedback
 - Table A-5. Encoder PSNR/SSIM feedback

1 Introduction

1.1 Scope

This document provides a complete description of the AMD Advanced Media Framework (AMF) Video Encoder Component. This component exposes the AMD Video Compression Engine, which provides hardware accelerated AV1 video encoding functionality.

Figure 1 provides a system overview of the AMF Video Encoder Component.

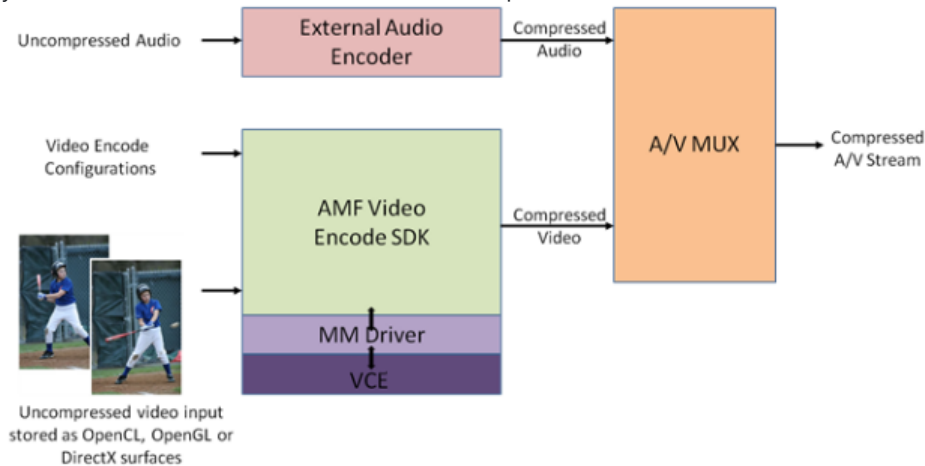


Figure 1 — System overview of the AMF Video Encode SDK

The AMF Video Encoder Component compresses RAW uncompressed video to an AV1 elementary bitstream.

The component does not provide a mechanism to handle audio compression, or stream multiplexing.

The component provides six different sets of pre-defined usages, which provide a convenient way for developers to configure the encoder to match the intended application use case. Advanced developers can also adjust encoding parameters to tailor the behavior to their specific application requirements.

1.2 Pre-defined Encoder Usages

The following table provides a brief overview of the encoding usage modes that have been defined:

Usage Mode	Intended use-cases	Comments
Transcoding	Transcoding, video editing	Favor compression efficiency and throughput over latency.
Ultra-low latency	Video game streaming	Optimize for extremely low latency use cases (e.g. cap the number of bits per frame), to enable high-interactivity applications.

Usage Mode	Intended use-cases	Comments
Low Latency	Video collaboration, remote desktop	Optimize for low latency scenarios, but allow occasional bitrate overshoots to preserve quality.
Webcam	Video conferencing	Optimize for a low-latency video conferencing scenario.
HQ	High quality mode	Optimize for best subjective video quality with possible loss of performance.
HQLL	High quality low latency mode	Optimize for good quality with low latency.

Table 1. Encoding usage modes

2 AMF Video Encoder VCN-AV1 Component

The AMF Video Encoder AV1 component provides hardware accelerated AV1 encoding using AMD's IP.

To instantiate the AMF Video Encoder component, call the `AMFFactory::CreateComponent` method passing

`AMFVideoEncoderHW_AV1` component IDs defined in the `public/include/components/VideoEncoderAV1.h` header.

2.1 Input Submission and Output Retrieval

The AMF Video Encoder component accepts `AMFSurface` objects as input and produces `AMFBuffer` objects for output.

2.2 Encode Parameters

Annex A provides the detailed description of encoding parameters (i.e., encoder properties) exposed by the Video Encoder AV1 component.

All properties are accessed using the `AMFPropertyStorage` interface of the Encoder object.

2.2.1 Static Properties

Static properties (e.g., profile, tier, level, usage) must be defined before the `Init()` function is called, and will apply until the end of the encoding session.

2.2.2 Dynamic Properties

All dynamic properties have default values. Several properties can be changed subsequently and these changes will be flushed to encoder only before the next `Submit()` call.

2.2.3 Frame Per-Submission Properties

Per submission properties are applied on a per frame basis. They can be set optionally to force a certain behavior (e.g., force frame type to IDR) by updating the properties of the `AMFSurface` object that is passed through the `AMFComponent::Submit()` call.

2.2.4 ROI Feature

Region of importance (ROI) feature provides a way to specify the relative importance of the macroblocks in the video frame. Encoder will further adjust the bits allocation among code blocks based on the importance, on top of the base rate control decisions. More important blocks will be encoded with relatively better quality.

The ROI map can be attached to the input frame on a per frame basis. Currently, the ROI map can only use system memory. The ROI map includes the importance values of each 64x64 SB, ranging from 0 (least important) to 10 (most important), stored in 32bit unsigned format. Refer to SimpleROI sample application for further implementation details.

2.2.5 Encoder Statistics Feedback

If an application sets the `AMF_VIDEO_ENCODER_AV1_STATISTICS_FEEDBACK` flag on for an input picture, the encoder will feedback to the application statistics for this specific picture. After the encoding ends, the application can retrieve by name the specific statistic(s) it is interested in. The supported encoder statistics are listed in Table A-3.

2.2.6 SVC Properties

Scalable Video Coding (SVC) is enabled by setting `AMF_VIDEO_ENCODER_AV1_NUM_TEMPORAL_LAYERS` to a value that is greater than 1. `AMF_VIDEO_ENCODER_AV1_NUM_TEMPORAL_LAYERS` is a dynamic property and can be changed at any time during an encoding session. To ensure proper support, `AMF_VIDEO_ENCODER_AV1_MAX_NUM_TEMPORAL_LAYERS` needs to be set before initializing the encoder to a value that is not smaller than the number of temporal layers. As an example, the maximum number of temporal layers shall be set to 4 if the number of temporal layers will be changed from 3 to 4 in an encoding session. The maximum number of temporal layers supported by the encoder can be queried from the encoder capabilities before initializing the encoder.

To define SVC parameters per layer, the following format must be used:

`TL<Temporal_Layer_Number>.QL<Quality_Layer_Number>.<Parameter_name>`

As an example, with two temporal layers, to configure "Target bitrate" for the base/first temporal layer and first quality layer, the following parameter should be used:

TL0.QL0.AMF_VIDEO_ENCODER_AV1_TARGET_BITRATE

To configure "Target bitrate" for the second temporal layer and first quality layer, the following parameter should be used:

TL1.QL0.AMF_VIDEO_ENCODER_AV1_TARGET_BITRATE

When setting per layer parameters, the equivalent non-SVC layer parameters should not be set for the encoder otherwise the per layer configuration will be overwritten.

Remark: quality layers are not supported. "QL0" must be used for quality layers.

The framerate for each layer should follow a fixed relationship as the table below:

Layer=2, framerate0:framerate1=1:1, here framerate0 means the framerate of layer0 and framerate1 means the framerate of layer1.

Layer=3, framerate0:framerate1:framerate2=1:1:2

Layer=4, framerate0:framerate1:framerate2:framerate3=1:1:2:4

2.2.7 LTR Properties

LTR (Long Term Reference) is to manually select a reference frame which can be far away to encode current frame. Normally, the encoder selects last frame as reference or a frame at lower layer in the SVC case.

In AV1, maximum of 8 reference frames are supported according to the spec. These 8 reference frames are shared by SVC and LTR. To use LTR, you need to set these properties as Static Properties:

AMF_VIDEO_ENCODER_AV1_MAX_LTR_FRAMES, Max number of LTR frames. The maximum value can be queried from

AMF_VIDEO_ENCODER_AV1_CAP_MAX_NUM_LTR_FRAMES. AMF_VIDEO_ENCODER_AV1_LTR_MODE default =

AMF_VIDEO_ENCODER_AV1_LTR_MODE_RESET_UNUSED; remove/keep unused LTRs (not specified in property

AMF_VIDEO_ENCODER_AV1_FORCE_LTR_REFERENCE_BITFIELD)

The LTR_MODE has two options:

```
enum AMF_VIDEO_ENCODER_AV1_LTR_MODE_ENUM
{
    AMF_VIDEO_ENCODER_AV1_LTR_MODE_RESET_UNUSED    = 0,
    AMF_VIDEO_ENCODER_AV1_LTR_MODE_KEEP_UNUSED
};
```

Reset_unused: encoder will discard all other LTR frames stored once a LTR frame is used as reference.

Keep_unused: encoder will not change other LTR frames stored once any LTR frame is used as reference. When we enable auto LTR mode in PA, this mode will be automatically selected internally and AMF_VIDEO_ENCODER_AV1_MAX_LTR_FRAMES will be set to 4 no matter what users set. For details of "auto LTR mode", please refer to AMF_Video_PreAnalysis_API document.

There are two Frame Per-Submission Properties need be set to use LTR:

- AMF_VIDEO_ENCODER_AV1_MARK_CURRENT_WITH_LTR_INDEX, Mark current frame with LTR index. -1 means don't save current frame into LTR slots. 0 ~ N means save current frame into a LTR slot with index of 0 ~ N. Here N should be <= AMF_VIDEO_ENCODER_AV1_MAX_LTR_FRAMES - 1. When we use SVC encoding, only next base frame can be stored as LTR frame (i.e. only temporal layer number = 0 frames are allowed to be saved into LTR slot.)
- AMF_VIDEO_ENCODER_AV1_FORCE_LTR_REFERENCE_BITFIELD, force LTR bit-field. This is a bit-field mask that indicate which LTR slot can be used as reference for current frame. 0b1 means only slot 0 can be used as reference. 0b10 means only slot 1 can be used as reference. 0b100 means only slot 2 can be used as reference..... 0b0 means no LTR frame will be used as reference for current frame hence current frame will select short term reference frame (usually last frame) as reference. When there are multiple bits are enabled, for example: 0b1111 (=decimal 15), that means LTR slots 0,1,2 and 3 are all allowed to be selected as reference. In this case, the closest LTR frame to current frame will be selected. When we encode a key frame or switch frame, all save LTR slots will be cleared.

Referring to a LTR frame not existing in LTR slot will generate an Intra only frame.

2.2.8 SmartAccess Video

On supported APU + GPU systems, there is an opportunity to use SmartAccess Video. SmartAccess Video - an optimization logic which enables the parallelization of encode and decode streams across multiple Video Codec Engine (VCN) hardware instances – empowers apps to process streams faster through seamless job distribution across available hardware. With a simple enablement of the encoder and decoder control flags, the SmartAccess Video logic will optimally use hardware resources to benefit media apps. Follow the SMART_ACCESS_VIDEO tag in the documentation to search for the property flags to set. On systems without SmartAccess Video support, the SMART_ACCESS_VIDEO properties have no effect.

3 Sample Applications

The AMF Encoder Sample application show how to setup and use the AMF Video Encoder AV1 Component to encode video frames that are loaded from disk or rendered by the DirectX 3D engine.

3.1 List of Parameters

Sample applications support almost all visible encoder parameters (except `PictureStructure` , `EndOfSequence` , `EndOfStream`) and few additional parameters.

Additional parameters of `TranscodeHW` application:

Name	Type
CODEC	string
OUTPUT	string
INPUT	string
WIDTH	int
HEIGHT	int
ADAPTERID	int
ENGINE	string
FRAMES	int
THREADCOUNT	int
PREVIEWMODE	bool

Table 2. Additional miscellaneous parameters of `TranscodeHW` application

Name: <code>CODEC</code> Values: <code>AV1</code> or <code>av1</code> Default Values: <code>AV1</code> Description: Specify codec type.
Name: <code>OUTPUT</code> Values: File name, relative or absolute path Default Value: <code>NULL</code> Description: Output AV1 file for encoded data.
Name: <code>INPUT</code> Values: File name, relative or absolute path Default Value: <code>NULL</code> Description: Input file with frames.
Name: <code>WIDTH</code> Values: Frame width Default Value: <code>0</code> Description: Frame width.
Name: <code>HEIGHT</code> Values: Frame height Default Value: <code>0</code> Description: Frame height.
Name: <code>AdapterID</code> Values: Number Default Value: <code>0</code> Description: Index of GPU adapter.
Name: <code>ENGINE</code> Values: <code>DX9</code> , <code>DX11</code> Default Value: <code>DX11</code> Description: Specify Engine type.
Name: <code>FRAMES</code> Values: Number of frames to be encoded Default Values: <code>100</code>

Description: Number of frames to render.

Name: THREADCOUNT

Values: Number

Default Values: 1

Description: Number of session run ip parallel.

Name: PREVIEWMODE

Values: true , false

Default Values: false

Description: Preview Mode.

Additional parameters of VCEEncoderD3D application:

Name	Category
CODEC	string
OUTPUT	string
RENDER	string
WIDTH	int
HEIGHT	int
FRAMES	int
ADAPTERID	int
WINDOWMODE	bool
FULLSCREEN	bool
QueryInstanceCount	bool
UseInstance	int
FRAMERATE	int

Table 3. Miscellaneous parameters of VCEEncoderD3D application.

Name: CODEC

Values: AV1 Or av1

Default Value: AV1

Description: Specify codec type.

Name: OUTPUT

Values: File name, relative or absolute path

Default Value: NULL

Description: Output AV1 file for encoded data.

Name: RENDER

Values: DX9 , DX9Ex , DX11 , OpenGL , OpenCL , Host , OpenCLDX9 , OpenCLDX11 , OpenGLDX9 , OpenGLDX11 , OpenCLOpenGLDX9 , OpenCLOpenGLDX11 , HostDX9 , HostDX11 , DX11DX9 , Vulkan

Default Value: DX11

Description: Specifies render type.

Name: WIDTH

Values: Frame width

Default Value: 1280

Description: Frame width.

Name: HEIGHT

Values: Frame height

Default Value: 720

Description: Frame height.

Name: FRAMES
Values: Number of frames to be encoded
Default Value: 100
Description: Number of frames to render.
Name: ADAPTERID
Values: Number
Default Value: 0
Description: Index of GPU adapter.
Name: WINDOWMODE
Values: true , false
Default Value: false
Description: Shows rendering window for D3D sample application.
Name: FULLSCREEN
Values: true , false
Default Value: false
Description: Enables full screen.
Name: QueryInstanceCount
Values: true , false
Default Value: false
Description: If the flag is set, the number of independent VCE instances will be queried and printed.
Name: UseInstance
Values: 0 ... number of instances - 1
Default Value: Depends on usage
Description: If there are more than one VCE Instances, you can force which instance to use. Valid range is [0.. (number of instances - 1)] .
Name: FRAMERATE
Values: Render frame rate
Default Value: 0
Description: Render frame rate.

3.2 Command line example

3.2.1 Transcoding application (TranscodeHW.exe)

```
TranscodeHW.exe -input input.h264 -output out.mp4 -codec AV1 -width 1280 -height 720 -Av1Usage transcoding -
AV1RateControlMethod cbr -AV1TargetBitrate 100000
```

This command transcodes H264 elementary stream to AV1 video in .mp4 container. Encoder is created with "Transcoding" usage.

3.2.2 D3D application (VCEEncoderD3D.exe)

```
VCEEncoderD3D.exe -output VideoSample_1024x768.mp4 -codec AV1 -width 1024 -height 768 -AV1Usage transcoding -
AV1RateControlMethod cbr -AV1TargetBitrate 500000 -frames 400
```

This command encodes 400 frames through D3D renderer and creates an output file with the encoded data. Encoder is created with "Transcoding" usage. Initial configuration sets bitrate to a value of 500 kbits/sec.

4 Annex A: Encoding & frame parameters description

Table A-1. Encoder parameters

Name (Prefix "AMF_VIDEO_ENCODER_AV1_")	Type
USAGE	amf_int64
PROFILE	amf_int64
LEVEL	amf_int64
MAX_LTR_FRAMES	amf_int64
TILES_PER_FRAME	amf_int64
LTR_MODE	amf_int64

Name (Prefix "AMF_VIDEO_ENCODER_AV1_")	Type
MAX_NUM_REFRAMES	amf_int64
MAX_CONSECUTIVE_BPICTURES	amf_int64
ADAPTIVE_MINIGOP	amf_bool
ENCODING_LATENCY_MODE	amf_int64
FRAMESIZE	AMFSize
ALIGNMENT_MODE	amf_int64
PRE_ANALYSIS_ENABLE	amf_bool
MAX_NUM_TEMPORAL_LAYERS	amf_int64
ENABLE_SMART_ACCESS_VIDEO	amf_bool

Table 4. Encoder static parameters

Name: AMF_VIDEO_ENCODER_AV1_USAGE

Values: AMF_VIDEO_ENCODER_AV1_USAGE_ENUM : AMF_VIDEO_ENCODER_AV1_USAGE_TRANSCODING ,
AMF_VIDEO_ENCODER_AV1_USAGE_LOW_LATENCY , AMF_VIDEO_ENCODER_AV1_USAGE_ULTRA_LOW_LATENCY ,
AMF_VIDEO_ENCODER_AV1_USAGE_WEBCAM , AMF_VIDEO_ENCODER_AV1_USAGE_HIGH_QUALITY ,
AMF_VIDEO_ENCODER_AV1_USAGE_LOW_LATENCY_HIGH_QUALITY

Default Value: AMF_VIDEO_ENCODER_AV1_USAGE_TRANSCODING

Description: Selects the AMF usage (see 1.2).

Name: AMF_VIDEO_ENCODER_AV1_PROFILE

Values: AMF_VIDEO_ENCODER_AV1_PROFILE_ENUM : AMF_VIDEO_ENCODER_AV1_PROFILE_MAIN

Default Value: AMF_VIDEO_ENCODER_PROFILE_MAIN

Description: Selects the AV1 profile.

Name: AMF_VIDEO_ENCODER_AV1_LEVEL

Values: AMF_VIDEO_ENCODER_AV1_LEVEL_ENUM : AMF_VIDEO_ENCODER_AV1_LEVEL_2_0 , AMF_VIDEO_ENCODER_AV1_LEVEL_2_1 ,
AMF_VIDEO_ENCODER_AV1_LEVEL_2_2 , AMF_VIDEO_ENCODER_AV1_LEVEL_2_3 , AMF_VIDEO_ENCODER_AV1_LEVEL_3_0 ,
AMF_VIDEO_ENCODER_AV1_LEVEL_3_1 , AMF_VIDEO_ENCODER_AV1_LEVEL_3_2 , AMF_VIDEO_ENCODER_AV1_LEVEL_3_3 ,
AMF_VIDEO_ENCODER_AV1_LEVEL_4_0 , AMF_VIDEO_ENCODER_AV1_LEVEL_4_1 , AMF_VIDEO_ENCODER_AV1_LEVEL_4_2 ,
AMF_VIDEO_ENCODER_AV1_LEVEL_4_3 , AMF_VIDEO_ENCODER_AV1_LEVEL_5_0 , AMF_VIDEO_ENCODER_AV1_LEVEL_5_1 ,
AMF_VIDEO_ENCODER_AV1_LEVEL_5_2 , AMF_VIDEO_ENCODER_AV1_LEVEL_5_3 , AMF_VIDEO_ENCODER_AV1_LEVEL_6_0 ,
AMF_VIDEO_ENCODER_AV1_LEVEL_6_1 , AMF_VIDEO_ENCODER_AV1_LEVEL_6_2 , AMF_VIDEO_ENCODER_AV1_LEVEL_6_3 ,
AMF_VIDEO_ENCODER_AV1_LEVEL_7_0 , AMF_VIDEO_ENCODER_AV1_LEVEL_7_1 , AMF_VIDEO_ENCODER_AV1_LEVEL_7_2 ,
AMF_VIDEO_ENCODER_AV1_LEVEL_7_3

Default Value: AMF_VIDEO_ENCODER_AV1_LEVEL_6_2

Description: Selects the AV1 Level.

Name: AMF_VIDEO_ENCODER_AV1_MAX_LTR_FRAMES

Values: 0 ... 8

Default Value: 0

Description: The number of long-term references controlled by the user.

Remarks:

- When == 0 , the encoder can not use LTRs during encoding.
- When > 0 , the user has control over all LTR.
- With user control of LTR, Intra-refresh features are not supported.
- The actual maximum number of LTRs allowed depends on SVC setting and AV1 Level limits, encoding resolution, and DPB size. The DPB size limit impacts the maximum number of LTR allowed.

Name: AMF_VIDEO_ENCODER_AV1_TILES_PER_FRAME

Values: >=1

Default Value: 1

Description: Sets the number of tiles per frame.

Remarks:

- The frame automatically gets split into tiles evenly based on the the tile size limitations in the AV1 spec.
 - `MAX_TILE_WIDTH` = 4096, which means there will be an automatic vertical split of the frame if the width is above 4096 pixels; otherwise there will not be any vertical split.
 - `MAX_TILE_AREA` = 4096 * 2304, which means if tile width is 4096 pixels, the maximum tile height is 2304 pixels, there will be an automatic horizontal split of the frame if frame height is bigger than 2304 pixels; Maximum tile height can be calculated based on tile width, `MAX_TILE_AREA/{tile width}`.
 - Split will be done automatically in order to satisfy AV1 spec, regardless if `AMF_VIDEO_ENCODER_AV1_TILES_PER_FRAME` is set or not.
- A frame can be horizontally split into more tile rows by setting `AMF_VIDEO_ENCODER_AV1_TILES_PER_FRAME`.
 - `MAX_TILE_WIDTH` and `MAX_TILE_AREA` constrain the minimum number of tiles.
 - A frame can be split into more tile rows by setting `AMF_VIDEO_ENCODER_AV1_TILES_PER_FRAME`, remember {number of tiles} = {number of tile columns} * {number of tile rows}.
 - If the user set value cannot be satisfied, it will be adjusted internally to a number close to the user set value instead.
- Additionally, for multiple-tile cases, the output would still be frame by frame if `AMF_VIDEO_ENCODER_AV1_OUTPUT_MODE` property is set `AMF_VIDEO_ENCODER_AV1_OUTPUT_MODE_FRAME`, but there will be multiple tiles within each frame.

Name: `AMF_VIDEO_ENCODER_AV1_LTR_MODE`

Values: `AMF_VIDEO_ENCODER_AV1_LTR_MODE_ENUM` : `AMF_VIDEO_ENCODER_AV1_LTR_MODE_RESET_UNUSED`,
`AMF_VIDEO_ENCODER_AV1_LTR_MODE_KEEP_UNUSED`

Default Value: `AMF_VIDEO_ENCODER_AV1_LTR_MODE_RESET_UNUSED`

Description: Remove/keep unused LTRs not specified inside the LTR reference bitfield.

Name: `AMF_VIDEO_ENCODER_AV1_MAX_NUM_REFRAMES`

Values: 0 ... 8

Default Value: 1

Description: Maximum number of reference frames.

Name: `AMF_VIDEO_ENCODER_AV1_MAX_CONSECUTIVE_BPICTURES`

Values: 0 ... 0 or 127

Default Value: 0 or 127

Description: Maximum number of consecutive B Pictures. The default value is determined by

`AMF_VIDEO_ENCODER_AV1_CAP_BFRAMES`. If `AMF_VIDEO_ENCODER_AV1_CAP_BFRAMES` is true, the default value is 127; otherwise, it is 0.

Name: `AMF_VIDEO_ENCODER_AV1_ADAPTIVE_MINIGOP`

Values: true, false

Default Value: false

Description: Disable/Enable Adaptive MiniGOP, can enable with PA enabled.

Name: `AMF_VIDEO_ENCODER_AV1_ENCODING_LATENCY_MODE`

Values: `AMF_VIDEO_ENCODER_AV1_ENCODING_LATENCY_MODE_ENUM` : `AMF_VIDEO_ENCODER_AV1_ENCODING_LATENCY_MODE_NONE`,
`AMF_VIDEO_ENCODER_AV1_ENCODING_LATENCY_MODE_POWER_SAVING_REAL_TIME`,
`AMF_VIDEO_ENCODER_AV1_ENCODING_LATENCY_MODE_REAL_TIME`, `AMF_VIDEO_ENCODER_AV1_ENCODING_LATENCY_MODE_LOWEST_LATENCY`

Default Value associated with usages:

- Transcoding: `AMF_VIDEO_ENCODER_AV1_ENCODING_LATENCY_MODE_NONE`
- Ultra low latency: `AMF_VIDEO_ENCODER_AV1_ENCODING_LATENCY_MODE_LOWEST_LATENCY`
- Low latency: `AMF_VIDEO_ENCODER_AV1_ENCODING_LATENCY_MODE_NONE`
- Webcam: `AMF_VIDEO_ENCODER_AV1_ENCODING_LATENCY_MODE_NONE`
- HQ: `AMF_VIDEO_ENCODER_AV1_ENCODING_LATENCY_MODE_NONE`
- HQLL: `AMF_VIDEO_ENCODER_AV1_ENCODING_LATENCY_MODE_LOWEST_LATENCY`

Description: Choose different mode to balance encoder latency with power consumption.

Name: `AMF_VIDEO_ENCODER_AV1_FRAMESIZE`

Values: Width: 256 – 8192 Height: 128 – 4352

Default Value: 0,0

Description: Frame width/Height in pixels, maximum value is hardware-specific, should be queried through `AMFCaps`.

Name: AMF_VIDEO_ENCODER_AV1_ALIGNMENT_MODE

Values: AMF_VIDEO_ENCODER_AV1_ALIGNMENT_MODE_ENUM : AMF_VIDEO_ENCODER_AV1_ALIGNMENT_MODE_64X16_ONLY ,
AMF_VIDEO_ENCODER_AV1_ALIGNMENT_MODE_64X16_1080P_CODED_1082 , AMF_VIDEO_ENCODER_AV1_ALIGNMENT_MODE_NO_RESTRICTIONS

Default Value: AMF_VIDEO_ENCODER_AV1_ALIGNMENT_MODE_64X16_ONLY

Description: AV1 alignment Mode.

Name: AMF_VIDEO_ENCODER_AV1_PRE_ANALYSIS_ENABLE

Values: true , false

Default Value associated with usages:

- Transcoding: false
- Ultra low latency: false
- Low latency: false
- Webcam: false
- HQ: true
- HQLL: false

Description: Some encoder properties require this property to be set. Enables the pre-analysis module. Refer to *AMF Video PreAnalysis API* reference for more details on the pre-analysis module and its settings under different usages.

Name: AMF_VIDEO_ENCODER_AV1_MAX_NUM_TEMPORAL_LAYERS

Values: Maximum number of temporal layers supported <= 4

Default Value: 1

Description: Sets the maximum number of temporal layers. It shall not be exceeded by the number of temporal layers. The maximum number of temporal layers supported is determined by the corresponding encoder capability.

Name: AMF_VIDEO_ENCODER_AV1_ENABLE_SMART_ACCESS_VIDEO

Values: true , false

Default Value: false

Description: When set to true , enables the SmartAccess Video feature, which optimally allocates the encoding task on supported APU/GPU pairings.

Name (Prefix "AMF_VIDEO_ENCODER_AV1_")	Type
TARGET_BITRATE	amf_int64
PEAK_BITRATE	amf_int64
RATE_CONTROL_METHOD	amf_int64
QVBR_QUALITY_LEVEL	amf_int64
RATE_CONTROL_SKIP_FRAME	amf_bool
MIN_Q_INDEX_INTRA	amf_int64
MAX_Q_INDEX_INTRA	amf_int64
MIN_Q_INDEX_INTER	amf_int64
MAX_Q_INDEX_INTER	amf_int64
Q_INDEX_INTRA	amf_int64
Q_INDEX_INTER	amf_int64
FRAMERATE	AMFRate
VBV_BUFFER_SIZE	amf_int64
INITIAL_VBV_BUFFER_FULLNESS	amf_int64
ENFORCE_HRD	amf_bool
RATE_CONTROL_PREENCODE	amf_bool

Name (Prefix "AMF_VIDEO_ENCODER_AV1_")	Type
AQ_MODE	amd_int64
FILLER_DATA	amf_bool
HIGH_MOTION_QUALITY_BOOST	amf_bool

Table 5. Encoder rate-control parameters

Name: AMF_VIDEO_ENCODER_AV1_TARGET_BITRATE

Values: >0

Default Value: 20 mbps

Description: Sets the target bitrate, bit/s based on use case.

Name: AMF_VIDEO_ENCODER_AV1_PEAK_BITRATE

Values: >= TargetBitrate

Default Value associated with usages:

- Transcoding: 30 mbps
- Ultra low latency: 20 mbps
- Low latency: 20 mbps
- Webcam: 20 mbps
- HQ: 80 mbps
- HQLL: 30 mbps

Description: Sets the peak bitrate, use for HRD model.

Name: AMF_VIDEO_ENCODER_AV1_RATE_CONTROL_METHOD

Values: AMF_VIDEO_ENCODER_AV1_RATE_CONTROL_METHOD_ENUM : AMF_VIDEO_ENCODER_AV1_RATE_CONTROL_METHOD_UNKNOWN , AMF_VIDEO_ENCODER_AV1_RATE_CONTROL_METHOD_CONSTANT_QP , AMF_VIDEO_ENCODER_AV1_RATE_CONTROL_METHOD_LATENCY_CONSTRAINED_VBR , AMF_VIDEO_ENCODER_AV1_RATE_CONTROL_METHOD_PEAK_CONSTRAINED_VBR , AMF_VIDEO_ENCODER_AV1_RATE_CONTROL_METHOD_CBR , AMF_VIDEO_ENCODER_AV1_RATE_CONTROL_METHOD_QUALITY_VBR , AMF_VIDEO_ENCODER_AV1_RATE_CONTROL_METHOD_HIGH_QUALITY_VBR , AMF_VIDEO_ENCODER_AV1_RATE_CONTROL_METHOD_HIGH_QUALITY_CBR

Default Value associated with usages:

- Transcoding: AMF_VIDEO_ENCODER_AV1_RATE_CONTROL_METHOD_PEAK_CONSTRAINED_VBR
- Ultra low latency: AMF_VIDEO_ENCODER_AV1_RATE_CONTROL_METHOD_LATENCY_CONSTRAINED_VBR
- Low latency: AMF_VIDEO_ENCODER_AV1_RATE_CONTROL_METHOD_PEAK_CONSTRAINED_VBR
- Webcam: AMF_VIDEO_ENCODER_AV1_RATE_CONTROL_METHOD_PEAK_CONSTRAINED_VBR
- HQ: AMF_VIDEO_ENCODER_AV1_RATE_CONTROL_METHOD_PEAK_CONSTRAINED_VBR
- HQLL: AMF_VIDEO_ENCODER_AV1_RATE_CONTROL_METHOD_PEAK_CONSTRAINED_VBR

Description: Selects the rate control method:

- CQP – Constrained QP,
- VBR_LAT - Latency Constrained VBR,
- VBR - Peak Constrained VBR,
- CBR - Constant Bitrate,
- QVBR – Quality VBR,
- HQVBR – High Quality VBR,
- HQCBR – High Quality CBR.

Remarks:

- When SVC encoding is enabled, some rate-control parameters can be configured differently for a particular SVC-layer. An SVC-layer is denoted by an index pair [SVC-Temporal Layer index][SVC-Quality Layer index] . E.g. The bitrate may be configured differently for SVC-layers [0][0] and [1][0] .
- We restrict all SVC layers to have the same Rate Control method.
- QVBR, HQVBR and HQCBR are only supported if PreAnalysis is enabled.

- QVBR, HQVBR and HVCBR target improving subjective quality with the possible loss of objective quality (PSNR SSIM or VMAF).

Name: AMF_VIDEO_ENCODER_AV1_QVBR_QUALITY_LEVEL

Values: 1 – 51

Default Value: 23

Description: Sets the quality level for QVBR rate control method.

Remarks:

- Only available for QVBR rate control method.

Name: AMF_VIDEO_ENCODER_AV1_RATE_CONTROL_SKIP_FRAME

Values: true , false

Default Value associated with usages:

- Transcoding: false
- Ultra low latency: true
- Low latency: true
- Webcam: true
- HQ: false
- HQLL: false

Description: Enables skip frame for rate control.

Name: AMF_VIDEO_ENCODER_AV1_MIN_Q_INDEX_INTRA

Values: 1 – 255

Default Value: 1

Description: Sets the minimum QIndex for Intra frame.

Name: AMF_VIDEO_ENCODER_AV1_MAX_Q_INDEX_INTRA

Values: 1 – 255

Default Value: 255

Description: Sets the maximum QIndex for Intra frame.

Name: AMF_VIDEO_ENCODER_AV1_MIN_Q_INDEX_INTER

Values: 1 – 255

Default Value: 1

Description: Sets the minimum QIndex for Inter frame.

Name: AMF_VIDEO_ENCODER_AV1_MAX_Q_INDEX_INTER

Values: 1 – 255

Default Value: 255

Description: Sets the maximum QIndex for Inter frame.

Name: AMF_VIDEO_ENCODER_AV1_Q_INDEX_INTRA

Values: 1 – 255

Default Value: 26

Description: Sets the constant QIndex for Intra frames.

Remarks: Only available for CQP rate control method.

Name: AMF_VIDEO_ENCODER_AV1_Q_INDEX_INTER

Values: 1 – 255

Default Value: 26

Description: Sets the constant QIndex for Inter frames.

Remarks: Only available for CQP rate control method.

Name: AMF_VIDEO_ENCODER_AV1_FRAMERATE

Values: 1*FrameRateDen ... 120* FrameRateDen

Default Value: 30 fps

Description: Frame rate numerator/denominator. Input is : AMFRate for example, the code below will set the frame rate to $30000 / 1001 = 29.97$ FPS: `pEncoder->SetProperty(AMF_VIDEO_ENCODER_AV1_FRAMERATE, ::AMFConstructRate(30000, 1001));`

Name: AMF_VIDEO_ENCODER_AV1_VBV_BUFFER_SIZE

Values: >0

Default Value associated with usages:

- Transcoding: 20 mbits
- Ultra low latency: 735 kbits
- Low latency: 4 mbits
- Webcam: 2 mbits
- HQ: 40 mbits
- HQLL: 10 mbits

Description: Sets the VBV buffer size in bits based on use case, use for HRD model.

Name: AMF_VIDEO_ENCODER_AV1_INITIAL_VBV_BUFFER_FULLNESS

Values: 0 – 64 , 0 = 0% , 64 = 100%

Default Value: 64

Description: Sets the initial VBV buffer fullness, use for HRD model.

Name: AMF_VIDEO_ENCODER_AV1_ENFORCE_HRD

Values: true , false

Default Value associated with usages:

- Transcoding: false
- Ultra low latency: true
- Low latency: false
- Webcam: false
- HQ: false
- HQLL: false

Description: Disables/enables constraints on rate control to meet HRD model requirement(s) with peak_bitrate, VBV buffer size and VBV buffer fullness settings.

Name: AMF_VIDEO_ENCODER_AV1_RATE_CONTROL_PREENCODE

Values: true , false

Default Value associated with usages:

- Transcoding: false
- Ultra low latency: false
- Low latency: false
- Webcam: false
- HQ: true
- HQLL: false

Description: Pre-analysis assisted rate control.

Name: AMF_VIDEO_ENCODER_AV1_AQ_MODE

Values: AMF_VIDEO_ENCODER_AV1_AQ_MODE_ENUM : AMF_VIDEO_ENCODER_AV1_AQ_MODE_NONE , AMF_VIDEO_ENCODER_AV1_AQ_MODE_CAQ

Default Value associated with usages:

- Transcoding: AMF_VIDEO_ENCODER_AV1_AQ_MODE_NONE
- Ultra low latency: AMF_VIDEO_ENCODER_AV1_AQ_MODE_NONE
- Low latency: AMF_VIDEO_ENCODER_AV1_AQ_MODE_NONE
- Webcam: AMF_VIDEO_ENCODER_AV1_AQ_MODE_NONE
- HQ: AMF_VIDEO_ENCODER_AV1_AQ_MODE_CAQ
- HQLL: AMF_VIDEO_ENCODER_AV1_AQ_MODE_CAQ

Description: Similar to VBAQ in HEVC and AVC, By default, disable Adaptive Quality Mode. This feature cannot be used together with the CQP rate control method.

Name: AMF_VIDEO_ENCODER_AV1_FILLER_DATA

Values: true , false

Default Value: false

Description: Enable filler data for CBR usage.

Name: AMF_VIDEO_ENCODER_AV1_HIGH_MOTION_QUALITY_BOOST

Values: true , false

Default Value associated with usages:

- Transcoding: false
- Ultra low latency: false
- Low latency: false
- Webcam: false
- HQ: true
- HQLL: true

Description: Enable high motion quality boost mode to pre-analyze the motion of the video and use this information to improve encoding.

Name (Prefix "AMF_VIDEO_ENCODER_AV1_")	Type
MAX_COMPRESSED_FRAME_SIZE	amf_int64
HEADER_INSERTION_MODE	amf_int64
SWITCH_FRAME_INSERTION_MODE	amf_int64
SWITCH_FRAME_INTERVAL	amd_int64
GOP_SIZE	amd_int64
CDEF_MODE	amd_int64
INTRA_REFRESH_MODE	amf_int64
INTRAREFRESH_STRIPES	amf_int64
B_PIC_PATTERN	amf_int64

Table 6. Encoder picture-control parameters

Name: AMF_VIDEO_ENCODER_AV1_MAX_COMPRESSED_FRAME_SIZE

Values: 0 – no limit

Default Value: 0

Description: Maximum compressed frame size in bits that rate control algorithm will try to limit. May still larger than this number in some cases.

Name: AMF_VIDEO_ENCODER_AV1_HEADER_INSERTION_MODE

Values: AMF_VIDEO_ENCODER_AV1_HEADER_INSERTION_MODE_ENUM : AMF_VIDEO_ENCODER_AV1_HEADER_INSERTION_MODE_NONE , AMF_VIDEO_ENCODER_AV1_HEADER_INSERTION_MODE_GOP_ALIGNED , AMF_VIDEO_ENCODER_AV1_HEADER_INSERTION_MODE_KEY_FRAME_ALIGNED

Default Value: AMF_VIDEO_ENCODER_AV1_HEADER_INSERTION_MODE_NONE

Description: Sets the headers insertion mode.

Name: AMF_VIDEO_ENCODER_AV1_SWITCH_FRAME_INSERTION_MODE

Values: AMF_VIDEO_ENCODER_AV1_SWITCH_FRAME_INSERTION_MODE_ENUM AMF_VIDEO_ENCODER_AV1_SWITCH_FRAME_INSERTION_MODE_NONE , AMF_VIDEO_ENCODER_AV1_SWITCH_FRAME_INSERTION_MODE_FIXED_INTERVAL

Default Value: depends on USAGE

Description: Switch frame insertion mode.

Name: AMF_VIDEO_ENCODER_AV1_SWITCH_FRAME_INTERVAL

Values: >0

Default Value: depends on USAGE

Description: The interval between two inserted switch frames. Valid only when

AMF_VIDEO_ENCODER_AV1_SWITCH_FRAME_INSERTION_MODE is AMF_VIDEO_ENCODER_AV1_SWITCH_FRAME_INSERTION_MODE_FIXED_INTERVAL .

Name: AMF_VIDEO_ENCODER_AV1_GOP_SIZE

Values: >0

Default Value associated with usages:

- Transcoding: 30
- Ultra low latency: 300
- Low latency: 300
- Webcam: 30

- HQ: 30
- HQLL: 30

Description: The period to insert key frame in fixed size mode. 0 means only insert the first frame (infinite GOP size).

Name: AMF_VIDEO_ENCODER_AV1_CDEF_MODE

Values: AMF_VIDEO_ENCODER_AV1_CDEF_MODE_ENUM : AMF_VIDEO_ENCODER_AV1_CDEF_DISABLE , AMF_VIDEO_ENCODER_AV1_CDEF_ENABLE_DEFAULT

Default Value: AMF_VIDEO_ENCODER_AV1_CDEF_ENABLE_DEFAULT

Description: Disable/enable the CDEF filter.

Name: AMF_VIDEO_ENCODER_AV1_INTRA_REFRESH_MODE

Values: AMF_VIDEO_ENCODER_AV1_INTRA_REFRESH_MODE_ENUM : AMF_VIDEO_ENCODER_AV1_INTRA_REFRESH_MODE_DISABLED , AMF_VIDEO_ENCODER_AV1_INTRA_REFRESH_MODE_GOP_ALIGNED , AMF_VIDEO_ENCODER_AV1_INTRA_REFRESH_MODE_CONTINUOUS

Default Value: AMF_VIDEO_ENCODER_AV1_INTRA_REFRESH_MODE_DISABLED

Description: The mode of intra refresh.

Name: AMF_VIDEO_ENCODER_AV1_INTRAREFRESH_STRIPE

Values: >=1 , how many stripes in a frame for intra refresh

Default Value: N/A

Description: Valid only when intra refresh is enabled.

Name: AMF_VIDEO_ENCODER_AV1_B_PIC_PATTERN

Values: 0 ... 127

Default Value: 0

Description: Sets the number of consecutive B-pictures in a GOP. BPicturesPattern = 0 indicates that B-pictures are not used.

Name (Prefix "AMF_VIDEO_ENCODER_AV1_")	Type
QUALITY_PRESET	amf_int64
QUERY_TIMEOUT	amf_int64
INPUT_QUEUE_SIZE	amf_int64
EXTRA_DATA	AMFBufferPtr
OUTPUT_MODE	amf_int64

Table 7. Encoder miscellaneous parameters

Name: AMF_VIDEO_ENCODER_AV1_QUALITY_PRESET

Values: AMF_VIDEO_ENCODER_AV1_QUALITY_PRESET_ENUM : AMF_VIDEO_ENCODER_AV1_QUALITY_PRESET_HIGH_QUALITY , AMF_VIDEO_ENCODER_AV1_QUALITY_PRESET_QUALITY , AMF_VIDEO_ENCODER_AV1_QUALITY_PRESET_BALANCED , AMF_VIDEO_ENCODER_AV1_QUALITY_PRESET_SPEED

Default Value associated with usages:

- Transcoding: AMF_VIDEO_ENCODER_AV1_QUALITY_PRESET_BALANCED
- Ultra low latency: AMF_VIDEO_ENCODER_AV1_QUALITY_PRESET_SPEED
- Low latency: AMF_VIDEO_ENCODER_AV1_QUALITY_PRESET_SPEED
- Webcam: AMF_VIDEO_ENCODER_AV1_QUALITY_PRESET_QUALITY
- HQ: AMF_VIDEO_ENCODER_AV1_QUALITY_PRESET_QUALITY
- HQLL: AMF_VIDEO_ENCODER_AV1_QUALITY_PRESET_QUALITY

Description: Selects the quality preset in HW to balance between encoding speed and video quality.

Name: AMF_VIDEO_ENCODER_AV1_QUERY_TIMEOUT

Values: 0 ... 50

Default Value associated with usages:

- Transcoding: 0 (no wait)
- Ultra low latency: 0 (no wait)
- Low latency: 0 (no wait)
- Webcam: 0 (no wait)
- HQ: 50

- HQLL: 50

Description: Timeout for QueryOutput call in ms. Setting this to a nonzero value will reduce polling load when QueryOutput is called; it will be blocked until the frame is ready or until the timeout is reached.

Name: AMF_VIDEO_ENCODER_AV1_INPUT_QUEUE_SIZE

Values: 1 ... 32

Default Value: 16

Description: Set encoder input queue size. For high-resolution sequence, recommend to set a smaller value to save storage. For low-resolution sequence, recommend to set a larger value to improve encoding speed.

Name: AMF_VIDEO_ENCODER_AV1_EXTRA_DATA

Values: AMFBufferPtr

Default Value: NULL

Description: Buffer to retrieve coded sequence header.

Name: AMF_VIDEO_ENCODER_AV1_OUTPUT_MODE

Values: AMF_VIDEO_ENCODER_AV1_OUTPUT_MODE_ENUM : AMF_VIDEO_ENCODER_AV1_OUTPUT_MODE_FRAME , AMF_VIDEO_ENCODER_AV1_OUTPUT_MODE_TILE

Default Value: AMF_VIDEO_ENCODER_AV1_OUTPUT_MODE_FRAME

Description: Defines encoder output mode.

Name (Prefix "AMF_VIDEO_ENCODER_AV1_")	Type
SCREEN_CONTENT_TOOLS	amf_bool
PALETTE_MODE	amf_bool
FORCE_INTEGER_MV	amf_bool
ORDER_HINT	amf_bool
FRAME_ID	amf_bool
TILE_GROUP_OBU	amf_bool
ERROR_RESILIENT_MODE	amf_bool
COLOR_BIT_DEPTH	amf_int64
CDF_UPDATE	amf_bool
CDF_FRAME_END_UPDATE_MODE	amd_int64

Table 8. Encoder configuration

Name: AMF_VIDEO_ENCODER_AV1_SCREEN_CONTENT_TOOLS

Values: true , false

Default Value: true

Description: If true , allow enabling screen content tools by AMF_VIDEO_ENCODER_AV1_PALETTE_MODE_ENABLE and AMF_VIDEO_ENCODER_AV1_FORCE_INTEGER_MV ; if false , all screen content tools are disabled.

Name: AMF_VIDEO_ENCODER_AV1_PALETTE_MODE

Values: true , false

Default Value: true

Description: If true , enable palette mode; if false , disable palette mode. Valid only when AMF_VIDEO_ENCODER_AV1_SCREEN_CONTENT_TOOLS is true .

Name: AMF_VIDEO_ENCODER_AV1_FORCE_INTEGER_MV

Values: true , false

Default Value: false

Description: If true , enable force integer MV; if false , disable force integer MV. Valid only when AMF_VIDEO_ENCODER_AV1_SCREEN_CONTENT_TOOLS is true .

Name: AMF_VIDEO_ENCODER_AV1_ORDER_HINT

Values: true , false

Default Value: false

Description: Code order hint; if `false`, don't code order hint.

Name: `AMF_VIDEO_ENCODER_AV1_FRAME_ID`

Values: `true`, `false`

Default Value: depends on `USAGE`

Description: If `true`, code frame id; if `false`, don't code frame id.

Name: `AMF_VIDEO_ENCODER_AV1_TILE_GROUP_OBU`

Values: `true`, `false`

Default Value: depends on `USAGE`

Description: If `true`, code `FrameHeaderObu` + `TileGroupObu` and each `TileGroupObu` contains one tile; if `false`, code `FrameObu`.

Name: `AMF_VIDEO_ENCODER_AV1_ERROR_RESILIENT_MODE`

Values: `true`, `false`

Default Value: depends on `USAGE`

Description: If `true`, enable error resilient mode; if `false`, disable error resilient mode.

Name: `AMF_VIDEO_ENCODER_AV1_COLOR_BIT_DEPTH`

Values: `AMF_COLOR_BIT_DEPTH_ENUM`: `AMF_COLOR_BIT_DEPTH_UNDEFINED`, `AMF_COLOR_BIT_DEPTH_8`, `AMF_COLOR_BIT_DEPTH_10`

Default Value: `AMF_COLOR_BIT_DEPTH_8`

Description: Sets the number of bits in each pixel's color component in the encoder's compressed output bitstream.

Name: `AMF_VIDEO_ENCODER_AV1_CDF_UPDATE`

Values: `true`, `false`

Default Value: `true`

Description: If `false`, disable CDF update. If `true`, enable CDF update.

Name: `AMF_VIDEO_ENCODER_AV1_CDF_FRAME_END_UPDATE_MODE`

Values: `AMF_VIDEO_ENCODER_AV1_CDF_FRAME_END_UPDATE_MODE_ENUM`: `AMF_VIDEO_ENCODER_AV1_CDF_FRAME_END_UPDATE_MODE_DISABLE`, `AMF_VIDEO_ENCODER_AV1_CDF_FRAME_END_UPDATE_MODE_ENABLE_DEFAULT`

Default Value: `AMF_VIDEO_ENCODER_AV1_CDF_FRAME_END_UPDATE_MODE_DISABLE`

Description: CDF frame end update mode.

Name (Prefix "AMF_VIDEO_ENCODER_AV1_")	Type
<code>INPUT_COLOR_PROFILE</code>	<code>amf_int64</code>
<code>INPUT_TRANSFER_CHARACTERISTIC</code>	<code>amf_int64</code>
<code>INPUT_COLOR_PRIMARIES</code>	<code>amf_int64</code>
<code>OUTPUT_COLOR_PROFILE</code>	<code>amf_int64</code>
<code>OUTPUT_TRANSFER_CHARACTERISTIC</code>	<code>amf_int64</code>
<code>OUTPUT_COLOR_PRIMARIES</code>	<code>amf_int64</code>
<code>INPUT_HDR_METADATA</code>	<code>AMFBufferPtr</code>

Table 9. Encoder color conversion parameters

Name: `AMF_VIDEO_ENCODER_AV1_INPUT_COLOR_PROFILE`

Values: `AMF_VIDEO_CONVERTER_COLOR_PROFILE_ENUM`: `AMF_VIDEO_CONVERTER_COLOR_PROFILE_UNKNOWN`, `AMF_VIDEO_CONVERTER_COLOR_PROFILE_601`, `AMF_VIDEO_CONVERTER_COLOR_PROFILE_709`, `AMF_VIDEO_CONVERTER_COLOR_PROFILE_2020`, `AMF_VIDEO_CONVERTER_COLOR_PROFILE_JPEG`, `AMF_VIDEO_CONVERTER_COLOR_PROFILE_FULL_601`, `AMF_VIDEO_CONVERTER_COLOR_PROFILE_FULL_709`, `AMF_VIDEO_CONVERTER_COLOR_PROFILE_FULL_2020`, `AMF_VIDEO_CONVERTER_COLOR_PROFILE_COUNT`

Default Value: `AMF_VIDEO_CONVERTER_COLOR_PROFILE_UNKNOWN`

Description: Color profile of the input surface. SDR - Setting this parameter (`COLOR_PROFILE`) can fully describe a surface for SDR use case. HDR – For HDR use case the `TRANSFER_CHARACTERISTIC`, `COLOR_PRIMARIES`, and `NOMINAL_RANGE` parameters describe the surface.

Name: `AMF_VIDEO_ENCODER_AV1_INPUT_TRANSFER_CHARACTERISTIC`

Values: `AMF_COLOR_TRANSFER_CHARACTERISTIC_ENUM`: `AMF_COLOR_TRANSFER_CHARACTERISTIC_UNDEFINED`, `AMF_COLOR_TRANSFER_CHARACTERISTIC_BT709`, `AMF_COLOR_TRANSFER_CHARACTERISTIC_UNSPECIFIED`,

AMF_COLOR_TRANSFER_CHARACTERISTIC_RESERVED , AMF_COLOR_TRANSFER_CHARACTERISTIC_GAMMA22 ,
AMF_COLOR_TRANSFER_CHARACTERISTIC_GAMMA28 , AMF_COLOR_TRANSFER_CHARACTERISTIC_SMPTE170M ,
AMF_COLOR_TRANSFER_CHARACTERISTIC_SMPTE240M , AMF_COLOR_TRANSFER_CHARACTERISTIC_LINEAR ,
AMF_COLOR_TRANSFER_CHARACTERISTIC_LOG , AMF_COLOR_TRANSFER_CHARACTERISTIC_LOG_SQRT ,
AMF_COLOR_TRANSFER_CHARACTERISTIC_IEC61966_2_4 , AMF_COLOR_TRANSFER_CHARACTERISTIC_BT1361_ECG ,
AMF_COLOR_TRANSFER_CHARACTERISTIC_IEC61966_2_1 , AMF_COLOR_TRANSFER_CHARACTERISTIC_BT2020_10 ,
AMF_COLOR_TRANSFER_CHARACTERISTIC_BT2020_12 , AMF_COLOR_TRANSFER_CHARACTERISTIC_SMPTE2084 ,
AMF_COLOR_TRANSFER_CHARACTERISTIC_SMPTE428 , AMF_COLOR_TRANSFER_CHARACTERISTIC_ARIB_STD_B67

Default Value: AMF_COLOR_TRANSFER_CHARACTERISTIC_UNDEFINED

Description: Characteristic transfer function of the input surface used to perform the mapping between linear light components (tristimulus values) and a nonlinear RGB signal. Used (alongside COLOR_PRIMARIES and NOMINAL_RANGE parameters) to describe surface in HDR use case.

Name: AMF_VIDEO_ENCODER_AV1_INPUT_COLOR_PRIMARIES

Values: AMF_COLOR_PRIMARIES_ENUM : AMF_COLOR_PRIMARIES_UNDEFINED , AMF_COLOR_PRIMARIES_BT709 ,
AMF_COLOR_PRIMARIES_UNSPECIFIED , AMF_COLOR_PRIMARIES_RESERVED , AMF_COLOR_PRIMARIES_BT470M ,
AMF_COLOR_PRIMARIES_BT470BG , AMF_COLOR_PRIMARIES_SMPTE170M , AMF_COLOR_PRIMARIES_SMPTE240M , AMF_COLOR_PRIMARIES_FILM ,
AMF_COLOR_PRIMARIES_BT2020 , AMF_COLOR_PRIMARIES_SMPTE428 , AMF_COLOR_PRIMARIES_SMPTE431 , AMF_COLOR_PRIMARIES_SMPTE432 ,
AMF_COLOR_PRIMARIES_JEDEC_P22 , AMF_COLOR_PRIMARIES_CCCS

Default Value: AMF_COLOR_PRIMARIES_UNDEFINED

Description: Color space primaries for the input surface which are the maximum red, green, and blue value permitted within the color space. Used (alongside TRANSFER_CHARACTERISTIC and NOMINAL_RANGE parameters) to describe surface in HDR use case.

Name: AMF_VIDEO_ENCODER_AV1_OUTPUT_COLOR_PROFILE

Values: AMF_VIDEO_CONVERTER_COLOR_PROFILE_ENUM : AMF_VIDEO_CONVERTER_COLOR_PROFILE_UNKNOWN ,
AMF_VIDEO_CONVERTER_COLOR_PROFILE_601 , AMF_VIDEO_CONVERTER_COLOR_PROFILE_709 , AMF_VIDEO_CONVERTER_COLOR_PROFILE_2020 ,
AMF_VIDEO_CONVERTER_COLOR_PROFILE_JPEG , AMF_VIDEO_CONVERTER_COLOR_PROFILE_FULL_601 ,
AMF_VIDEO_CONVERTER_COLOR_PROFILE_FULL_709 , AMF_VIDEO_CONVERTER_COLOR_PROFILE_FULL_2020 ,
AMF_VIDEO_CONVERTER_COLOR_PROFILE_COUNT

Default Value: AMF_VIDEO_CONVERTER_COLOR_PROFILE_UNKNOWN

Description: Color profile of the compressed output stream. SDR - Setting this parameter (COLOR_PROFILE) can fully describe a surface for SDR use case. HDR – For HDR use case the TRANSFER_CHARACTERISTIC , COLOR_PRIMARIES , and NOMINAL_RANGE parameters describe the surface. Determines the optional VUI parameter “matrix_coefficients”.

Name: AMF_VIDEO_ENCODER_AV1_OUTPUT_TRANSFER_CHARACTERISTIC

Values: AMF_COLOR_TRANSFER_CHARACTERISTIC_ENUM : AMF_COLOR_TRANSFER_CHARACTERISTIC_UNDEFINED ,
AMF_COLOR_TRANSFER_CHARACTERISTIC_BT709 , AMF_COLOR_TRANSFER_CHARACTERISTIC_UNSPECIFIED ,
AMF_COLOR_TRANSFER_CHARACTERISTIC_RESERVED , AMF_COLOR_TRANSFER_CHARACTERISTIC_GAMMA22 ,
AMF_COLOR_TRANSFER_CHARACTERISTIC_GAMMA28 , AMF_COLOR_TRANSFER_CHARACTERISTIC_SMPTE170M ,
AMF_COLOR_TRANSFER_CHARACTERISTIC_SMPTE240M , AMF_COLOR_TRANSFER_CHARACTERISTIC_LINEAR ,
AMF_COLOR_TRANSFER_CHARACTERISTIC_LOG , AMF_COLOR_TRANSFER_CHARACTERISTIC_LOG_SQRT ,
AMF_COLOR_TRANSFER_CHARACTERISTIC_IEC61966_2_4 , AMF_COLOR_TRANSFER_CHARACTERISTIC_BT1361_ECG ,
AMF_COLOR_TRANSFER_CHARACTERISTIC_IEC61966_2_1 , AMF_COLOR_TRANSFER_CHARACTERISTIC_BT2020_10 ,
AMF_COLOR_TRANSFER_CHARACTERISTIC_BT2020_12 , AMF_COLOR_TRANSFER_CHARACTERISTIC_SMPTE2084 ,
AMF_COLOR_TRANSFER_CHARACTERISTIC_SMPTE428 , AMF_COLOR_TRANSFER_CHARACTERISTIC_ARIB_STD_B67

Default Value: AMF_COLOR_TRANSFER_CHARACTERISTIC_UNDEFINED

Description: Characteristic transfer function of the compressed output stream used to perform the mapping between linear light components (tristimulus values) and a nonlinear RGB signal.

Used (alongside COLOR_PRIMARIES and NOMINAL_RANGE parameters) to describe surface in HDR use case.

Name: AMF_VIDEO_ENCODER_AV1_OUTPUT_COLOR_PRIMARIES

Values: AMF_COLOR_PRIMARIES_ENUM : AMF_COLOR_PRIMARIES_UNDEFINED , AMF_COLOR_PRIMARIES_BT709 ,
AMF_COLOR_PRIMARIES_UNSPECIFIED , AMF_COLOR_PRIMARIES_RESERVED , AMF_COLOR_PRIMARIES_BT470M ,
AMF_COLOR_PRIMARIES_BT470BG , AMF_COLOR_PRIMARIES_SMPTE170M , AMF_COLOR_PRIMARIES_SMPTE240M , AMF_COLOR_PRIMARIES_FILM ,
AMF_COLOR_PRIMARIES_BT2020 , AMF_COLOR_PRIMARIES_SMPTE428 , AMF_COLOR_PRIMARIES_SMPTE431 , AMF_COLOR_PRIMARIES_SMPTE432 ,
AMF_COLOR_PRIMARIES_JEDEC_P22 , AMF_COLOR_PRIMARIES_CCCS

Default Value: AMF_COLOR_PRIMARIES_UNDEFINED

Description: Color space primaries for the compressed output surface which are the maximum red, green, and blue value permitted within the color space.

Used (alongside `TRANSFER_CHARACTERISTIC` and `NOMINAL_RANGE` parameters) to describe surface in HDR use case.

Name: `AMF_VIDEO_ENCODER_AV1_INPUT_HDR_METADATA`

Values: `AMFBuffer`

Default Value: `NULL`

Description: Buffer to retrieve coded sequence header.

Name (Prefix "AMF_VIDEO_ENCODER_AV1_")	Type
NUM_TEMPORAL_LAYERS	amf_int64

Table 10. Encoder SVC parameters

Name: `AMF_VIDEO_ENCODER_AV1_NUM_TEMPORAL_LAYERS`

Values: Maximum number of temporal layers supported

Default Value: `1`

Description: Sets the number of temporal layers. SVC with temporal scalability is enabled when the number of layers is greater than 1. The maximum number of temporal layers supported is determined by the corresponding encoder capability.

Remarks:

- Actual modification of the number of temporal layers will be delayed until the start of the next temporal GOP.
- Intra-refresh feature is not supported with SVC.

Name (Prefix "AMF_VIDEO_ENCODER_AV1_")	Type
TL<TL_Num>.QL0.<Parameter_name>	

Table 11. Encoder SVC per-layer parameters

Name: `TL<TL_Num>.QL0.<Parameter_name>`

Values: Parameter-specific values

Default Value: `N/A`

Description: Configures rate-control parameter per SVC layer.

- TL_Num — temporal layer number
- QL0 - quality layer 0
- Parameter_name — rate-control parameter name (see below with `AMF_VIDEO_ENCODER_AV1_ prefix`)

Rate-control parameters supported:

- `TARGET_BITRATE`
- `PEAK_BITRATE`
- `VBV_BUFFER_SIZE`
- `FRAMERATE`
- `Max_Q_INDEX_INTRA`
- `Max_Q_INDEX_INTER`
- `Min_Q_INDEX_INTRA`
- `Min_Q_INDEX_INTER`
- `Q_INDEX_INTRA`
- `Q_INDEX_INTER`
- `FILLER_DATA`
- `RATE_CONTROL_SKIP_FRAME`
- `ENFORCE_HRD`
- `MAX_COMPRESSED_FRAME_SIZE`

Table A-2. Input frame and encoded data parameters

Name (Prefix "AMF_VIDEO_ENCODER_AV1_")	Type
FORCE_INSERT_SEQUENCE_HEADER	amf_bool
FORCE_FRAME_TYPE	amf_int64

Name (Prefix "AMF_VIDEO_ENCODER_AV1_")	Type
MARK_CURRENT_WITH_LTR_INDEX	amf_int64
FORCE_LTR_REFERENCE_BITFIELD	amf_int64
ROI_DATA	AMF_SURFACE_GRAY32
STATISTICS_FEEDBACK	amf_bool
PSNR_FEEDBACK	amf_bool
SSIM_FEEDBACK	amf_bool
BLOCK_Q_INDEX_FEEDBACK	amf_bool

Table 12. Frame per-submission parameters

Name: AMF_VIDEO_ENCODER_AV1_FORCE_INSERT_SEQUENCE_HEADER

Values: true, false

Default Value: false

Description: If true, force insert sequence header with current frame.

Name: AMF_VIDEO_ENCODER_AV1_FORCE_FRAME_TYPE

Values: AMF_VIDEO_ENCODER_AV1_FORCE_FRAME_TYPE_ENUM : AMF_VIDEO_ENCODER_AV1_FORCE_FRAME_TYPE_NONE , AMF_VIDEO_ENCODER_AV1_FORCE_FRAME_TYPE_KEY , AMF_VIDEO_ENCODER_AV1_FORCE_FRAME_TYPE_INTRA_ONLY , AMF_VIDEO_ENCODER_AV1_FORCE_FRAME_TYPE_SWITCH , AMF_VIDEO_ENCODER_AV1_FORCE_FRAME_TYPE_SHOW_EXISTING

Default Value: AMF_VIDEO_ENCODER_AV1_FORCE_FRAME_TYPE_NONE

Description: Forces the frame type.

Name: AMF_VIDEO_ENCODER_AV1_MARK_CURRENT_WITH_LTR_INDEX

Values: -1 ... MaxOfLTRFrames -1

Default Value: N/A

Description: If != -1, the current picture is coded as a long-term reference with the given index. Remarks:

- When the user controls N LTRs (using the corresponding Create parameter), then the LTR Index the user can assign to a reference picture varies from 0 to N-1. By default, the encoder will "use up" available LTR Indices (i.e. assign them to references) even if the user does not request them to be used.
- When LTR is used with SVC encoding, only base temporal layer pictures can be coded as LTR. In this case, the request to mark the current picture as LTR would be delayed to the next base temporal layer picture if the current picture is in an enhancement layer. If the user submits multiple requests to mark current as LTR between base temporal layer pictures, then only the last request is applied.

Name: AMF_VIDEO_ENCODER_AV1_FORCE_LTR_REFERENCE_BITFIELD

Values: Bitfield MaxOfLTRFrames (max possible 8 bits)

Default Value: 0

Description: Force LTR Reference allowed bitfield. If == 0, the current picture should predict from the default reference. If != 0, the current picture should predict from one of the LTRs allowed by the bitfield (bit# = LTR Index#).

Remarks:

- E.g. if Bit#0 = 1, then the existing LTR with LTR Index = 0 may be used for reference. The bitfield may allow more than one LTR for reference, in which case the encoder is free to choose which one to use. This bitfield also disallows existing LTRs not enabled by it from current/future reference.
- E.g. if Bit#1 = 0, and there is an existing reference with LTR Index = 1, then this LTR Index will not be used for reference until it is replaced with a newer reference with the same LTR Index.

Name: AMF_VIDEO_ENCODER_AV1_ROI_DATA

Values: Video surface in AMF_SURFACE_GRAY32 format

Default Value: N/A

Description: Importance value for each 64x64 block ranges from 0 (least important) to 10 (most important), stored in 32bit unsigned format.

Name: AMF_VIDEO_ENCODER_AV1_STATISTICS_FEEDBACK

Values: true (on), false (off)

Default Value: false

Description: Signal encoder to collect and feedback encoder statistics.

Name: AMF_VIDEO_ENCODER_AV1_PSNR_FEEDBACK

Values: true (on), false (off)

Default Value: false

Description: Signal encoder to calculate PSNR score.

Name: AMF_VIDEO_ENCODER_AV1_SSIM_FEEDBACK

Values: true (on), false (off)

Default Value: false

Description: Signal encoder to calculate SSIM score.

Name: AMF_VIDEO_ENCODER_AV1_BLOCK_Q_INDEX_FEEDBACK

Values: true (on), false (off)

Default Value: false

Description: Signal encoder to collect and feedback block level QIndex values.

Name (Prefix "AMF_VIDEO_ENCODER_AV1_")	Type
OUTPUT_FRAME_TYPE	amf_int64
OUTPUT_MARKED_LTR_INDEX	amf_int64
OUTPUT_REFERENCED_LTR_INDEX_BITFIELD	amf_int64
OUTPUT_BUFFER_TYPE	amf_int64
RECONSTRUCTED_PICTURE	AMFSurface

Table 13. Encoded data parameters

Name: AMF_VIDEO_ENCODER_AV1_OUTPUT_FRAME_TYPE

Values: AMF_VIDEO_ENCODER_AV1_OUTPUT_FRAME_TYPE_ENUM : AMF_VIDEO_ENCODER_AV1_OUTPUT_FRAME_TYPE_KEY , AMF_VIDEO_ENCODER_AV1_OUTPUT_FRAME_TYPE_INTRA_ONLY , AMF_VIDEO_ENCODER_AV1_OUTPUT_FRAME_TYPE_INTER , AMF_VIDEO_ENCODER_AV1_OUTPUT_FRAME_TYPE_SWITCH , AMF_VIDEO_ENCODER_AV1_OUTPUT_FRAME_TYPE_SHOW_EXISTING

Default Value: N/A

Description: Type of encoded frame.

Name: AMF_VIDEO_ENCODER_AV1_OUTPUT_MARKED_LTR_INDEX

Values: -1 ... MaxOfLTRFrames -1

Default Value: N/A

Description: Marked as LTR Index. If != -1 , then this picture was coded as a long-term reference with this LTR Index.

Name: AMF_VIDEO_ENCODER_AV1_OUTPUT_REFERENCED_LTR_INDEX_BITFIELD

Values: Bitfield MaxOfLTRFrames (max possible 8 bits)

Default Value: N/A

Description: Referenced LTR Index bitfield. If != 0 , this picture was coded to reference long-term references. The enabled bits identify the LTR Indices of the referenced pictures (e.g. if Bit #0 = 1 , then LTR Index 0 was used as a reference when coding this picture).

Name: AMF_VIDEO_ENCODER_AV1_OUTPUT_BUFFER_TYPE

Values: AMF_VIDEO_ENCODER_AV1_OUTPUT_BUFFER_TYPE_ENUM : AMF_VIDEO_ENCODER_AV1_OUTPUT_BUFFER_TYPE_FRAME , AMF_VIDEO_ENCODER_AV1_OUTPUT_BUFFER_TYPE_TILE , AMF_VIDEO_ENCODER_AV1_OUTPUT_BUFFER_TYPE_TILE_LAST

Default Value: N/A

Description: Encoder output buffer type.

Name: AMF_VIDEO_ENCODER_AV1_RECONSTRUCTED_PICTURE

Values: AMFSurface

Default Value: N/A

Description: Returns reconstructed picture as an AMFSurface attached to the output buffer as property AMF_VIDEO_ENCODER_RECONSTRUCTED_PICTURE of AMFInterface type.

Table A-3. Encoder capabilities exposed in AMFCaps interface

Name (prefix with AMF_VIDEO_ENCODER_AV1_CAP_)	Type
NUM_OF_HW_INSTANCES	amf_int64
MAX_THROUGHPUT	amf_int64
REQUESTED_THROUGHPUT	amf_int64
COLOR_CONVERSION	amf_int64
PRE_ANALYSIS	amf_bool
MAX_BITRATE	amf_int64
MAX_PROFILE	amf_int64
MAX_LEVEL	amf_int64
MAX_NUM_TEMPORAL_LAYERS	amf_int64
MAX_NUM_LTR_FRAMES	amf_int64
SUPPORT_TILE_OUTPUT	amf_bool
WIDTH_ALIGNMENT_FACTOR	amf_int64
HEIGHT_ALIGNMENT_FACTOR	amf_int64
BFRAMES	amf_bool

Table 14. Encoder capabilities exposed in AMFCaps interface

Name: AMF_VIDEO_ENCODER_AV1_CAP_NUM_OF_HW_INSTANCES

Values: 0 ... number of instances - 1

Description: Number of HW encoder instances.

Name: AMF_VIDEO_ENCODER_AV1_CAP_MAX_THROUGHPUT

Values: Integers, >=0

Description: MAX throughput for AV1 encoder in MB (16 x 16 pixels).

Name: AMF_VIDEO_ENCODER_AV1_CAP_REQUESTED_THROUGHPUT

Values: 0 ... number of instances - 1

Description: Currently total requested throughput for AV1 encode in MB (16 x 16 pixels).

Name: AMF_VIDEO_ENCODER_AV1_CAP_COLOR_CONVERSION

Values: AMF_ACCELERATION_TYPE

Description: Type of supported color conversion.

Name: AMF_VIDEO_ENCODER_AV1_CAP_PRE_ANALYSIS

Values: true , false

Description: Pre analysis module is available.

Name: AMF_VIDEO_ENCODER_AV1_CAP_MAX_BITRATE

Values: Integers, >=0 **Description:** Maximum bit rate in bits.

Name: AMF_VIDEO_ENCODER_AV1_CAP_MAX_PROFILE

Values: AMF_VIDEO_ENCODER_AV1_PROFILE_ENUM : AMF_VIDEO_ENCODER_AV1_PROFILE_MAIN

Description: Maximum value of code profile.

Name: AMF_VIDEO_ENCODER_AV1_CAP_MAX_LEVEL

Values: AMF_VIDEO_ENCODER_AV1_LEVEL_ENUM : AMF_VIDEO_ENCODER_AV1_LEVEL_2_0 , AMF_VIDEO_ENCODER_AV1_LEVEL_2_1 , AMF_VIDEO_ENCODER_AV1_LEVEL_2_2 , AMF_VIDEO_ENCODER_AV1_LEVEL_2_3 , AMF_VIDEO_ENCODER_AV1_LEVEL_3_0 , AMF_VIDEO_ENCODER_AV1_LEVEL_3_1 , AMF_VIDEO_ENCODER_AV1_LEVEL_3_2 , AMF_VIDEO_ENCODER_AV1_LEVEL_3_3 , AMF_VIDEO_ENCODER_AV1_LEVEL_4_0 , AMF_VIDEO_ENCODER_AV1_LEVEL_4_1 , AMF_VIDEO_ENCODER_AV1_LEVEL_4_2 , AMF_VIDEO_ENCODER_AV1_LEVEL_4_3 , AMF_VIDEO_ENCODER_AV1_LEVEL_5_0 , AMF_VIDEO_ENCODER_AV1_LEVEL_5_1 , AMF_VIDEO_ENCODER_AV1_LEVEL_5_2 , AMF_VIDEO_ENCODER_AV1_LEVEL_5_3 , AMF_VIDEO_ENCODER_AV1_LEVEL_6_0 , AMF_VIDEO_ENCODER_AV1_LEVEL_6_1 , AMF_VIDEO_ENCODER_AV1_LEVEL_6_2 , AMF_VIDEO_ENCODER_AV1_LEVEL_6_3 ,

AMF_VIDEO_ENCODER_AV1_LEVEL_7_0 , AMF_VIDEO_ENCODER_AV1_LEVEL_7_1 , AMF_VIDEO_ENCODER_AV1_LEVEL_7_2 ,
AMF_VIDEO_ENCODER_AV1_LEVEL_7_3

Description: Maximum value of codec level.

Name: AMF_VIDEO_ENCODER_AV1_CAP_MAX_NUM_TEMPORAL_LAYERS

Values: 1 ... Maximum number of temporal layers supported

Description: The cap of maximum number of temporal layers.

Name: AMF_VIDEO_ENCODER_AV1_CAP_MAX_NUM_LTR_FRAMES

Values: Integers, >=0

Description: The cap of maximum number of LTR frames. This value is calculated based on current value of
AMF_VIDEO_ENCODER_AV1_MAX_NUM_TEMPORAL_LAYERS .

Name: AMF_VIDEO_ENCODER_AV1_CAP_SUPPORT_TILE_OUTPUT

Values: true , false

Description: If tile output is supported.

Name: AMF_VIDEO_ENCODER_AV1_CAP_WIDTH_ALIGNMENT_FACTOR

Values: Integers, >=0

Description: This is used for querying the av1 picture width alignment factor

Name: AMF_VIDEO_ENCODER_AV1_CAP_HEIGHT_ALIGNMENT_FACTOR

Values: Integers, >=0

Description: This is used for querying the av1 picture height alignment factor

Name: AMF_VIDEO_ENCODER_AV1_CAP_BFRAMES

Values: true , false

Description: This is used for querying av1 b frame support

Table A-4. Encoder statistics feedback

Statistic Name (prefix "AMF_VIDEO_ENCODER_AV1")	Type
STATISTIC_FRAME_Q_INDEX	amf_int64
STATISTIC_AVERAGE_Q_INDEX	amf_int64
STATISTIC_MAX_Q_INDEX	amf_int64
STATISTIC_MIN_Q_INDEX	amf_int64
STATISTIC_PIX_NUM_INTRA	amf_int64
STATISTIC_PIX_NUM_INTER	amf_int64
STATISTIC_PIX_NUM_SKIP	amf_int64
STATISTIC_BITCOUNT_RESIDUAL	amf_int64
STATISTIC_BITCOUNT_MOTION	amf_int64
STATISTIC_BITCOUNT_INTER	amf_int64
STATISTIC_BITCOUNT_INTRA	amf_int64
STATISTIC_BITCOUNT_ALL_MINUS_HEADER	amf_int64
STATISTIC_MV_X	amf_int64
STATISTIC_MV_Y	amf_int64
STATISTIC_RD_COST_FINAL	amf_int64
STATISTIC_RD_COST_INTRA	amf_int64
STATISTIC_RD_COST_INTER	amf_int64
STATISTIC_SAD_FINAL	amf_int64

Statistic Name (prefix "AMF_VIDEO_ENCODER_AV1")	Type
STATISTIC_SAD_INTRA	amf_int64
STATISTIC_SAD_INTER	amf_int64
STATISTIC_SSE	amf_int64
STATISTIC_VARIANCE	amf_int64

Table 15. Encoder statistics feedback

Name: AMF_VIDEO_ENCODER_AV1_STATISTIC_FRAME_Q_INDEX

Description: Rate control base frame/initial QIndex.

Name: AMF_VIDEO_ENCODER_AV1_STATISTIC_AVERAGE_Q_INDEX

Description: Average QIndex of all encoded SBs in a picture. Value may be different from the one reported by bitstream analyzer when there are skipped SBs.

Name: AMF_VIDEO_ENCODER_AV1_STATISTIC_MAX_Q_INDEX

Description: Max QIndex among all encoded SBs in a picture. Value may be different from the one reported by bitstream analyzer when there are skipped SBs.

Name: AMF_VIDEO_ENCODER_AV1_STATISTIC_MIN_Q_INDEX

Description: Min QIndex among all encoded SBs in a picture. Value may be different from the one reported by bitstream analyzer when there are skipped SBs.

Name: AMF_VIDEO_ENCODER_AV1_STATISTIC_PIX_NUM_INTRA

Description: Number of the intra encoded pixels.

Name: AMF_VIDEO_ENCODER_AV1_STATISTIC_PIX_NUM_INTER

Description: Number of the inter encoded pixels.

Name: AMF_VIDEO_ENCODER_AV1_STATISTIC_PIX_NUM_SKIP

Description: Number of the skip mode pixels.

Name: AMF_VIDEO_ENCODER_AV1_STATISTIC_BITCOUNT_RESIDUAL

Description: The bit count that corresponds to residual data.

Name: AMF_VIDEO_ENCODER_AV1_STATISTIC_BITCOUNT_MOTION

Description: The bit count that corresponds to motion vectors.

Name: AMF_VIDEO_ENCODER_AV1_STATISTIC_BITCOUNT_INTER

Description: The bit count that are assigned to inter SBs.

Name: AMF_VIDEO_ENCODER_AV1_STATISTIC_BITCOUNT_INTRA

Description: The bit count that are assigned to intra SBs.

Name: AMF_VIDEO_ENCODER_AV1_STATISTIC_BITCOUNT_ALL_MINUS_HEADER

Description: The bit count of the bitstream excluding header.

Name: AMF_VIDEO_ENCODER_AV1_STATISTIC_MV_X

Description: Accumulated absolute values of horizontal MV's.

Name: AMF_VIDEO_ENCODER_AV1_STATISTIC_MV_Y

Description: Accumulated absolute values of vertical MV's.

Name: AMF_VIDEO_ENCODER_AV1_STATISTIC_RD_COST_FINAL

Description: Frame level final RD cost for full encoding.

Name: AMF_VIDEO_ENCODER_AV1_STATISTIC_RD_COST_INTRA

Description: Frame level intra RD cost for full encoding.

Name: AMF_VIDEO_ENCODER_AV1_STATISTIC_RD_COST_INTER

Description: Frame level inter RD cost for full encoding.

Name: AMF_VIDEO_ENCODER_AV1_STATISTIC_SATD_FINAL

Description: Frame level final SAD for full encoding.

Name: AMF_VIDEO_ENCODER_AV1_STATISTIC_SATD_INTRA

Description: Frame level intra SAD for full encoding.

Name: AMF_VIDEO_ENCODER_AV1_STATISTIC_SATD_INTER

Description: Frame level inter SAD for full encoding.

Name: AMF_VIDEO_ENCODER_AV1_STATISTIC_SSE

Description: Frame level SSE (only calculated for AV1).

Name: AMF_VIDEO_ENCODER_AV1_STATISTIC_VARIANCE

Description: Frame level variance for full encoding.

Statistic Name	Type
BLOCK_Q_INDEX_MAP	AMFSurface

Table 16. Encoder block level feedback

Name: AMF_VIDEO_ENCODER_AV1_BLOCK_Q_INDEX_MAP

Description: AMFSurface of format AMF_SURFACE_GRAY32 containing block level QIndex values.

Table A-5. Encoder PSNR/SSIM feedback

Statistic Name (prefix "AMF_VIDEO_ENCODER_AV1")	Type
STATISTIC_PSNR_Y	amf_double
STATISTIC_PSNR_U	amf_double
STATISTIC_PSNR_V	amf_double
STATISTIC_PSNR_ALL	amf_double
STATISTIC_SSIM_Y	amf_double
STATISTIC_SSIM_U	amf_double
STATISTIC_SSIM_V	amf_double
STATISTIC_SSIM_ALL	amf_double

Table 17. Encoder statistics feedback

Name: AMF_VIDEO_ENCODER_AV1_STATISTIC_PSNR_Y

Description: PSNR Y.

Name: AMF_VIDEO_ENCODER_AV1_STATISTIC_PSNR_U

Description: PSNR U.

Name: AMF_VIDEO_ENCODER_AV1_STATISTIC_PSNR_V

Description: PSNR V.

Name: AMF_VIDEO_ENCODER_AV1_STATISTIC_PSNR_ALL

Description: PSNR YUV.

Name: AMF_VIDEO_ENCODER_AV1_STATISTIC_SSIM_Y

Description: SSIM Y.

Name: AMF_VIDEO_ENCODER_AV1_STATISTIC_SSIM_U

Description: SSIM U.

Name: AMF_VIDEO_ENCODER_AV1_STATISTIC_SSIM_V

Description: SSIM V.

Name: AMF_VIDEO_ENCODER_AV1_STATISTIC_SSIM_ALL

Description: SSIM YUV.