

OMX Media Component

User's Manual: H.264 Encoder Part

32

— Preliminary —

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OMX Media Component H.264 Encoder Part

1. Overview

1.1. About This Document

This document is the User's Manual for OMX Media Component. It describes the specifications of H.264 Encoder Media Component. For the specifications that are common to OMX video encoders, see related documents [1] and [2].

1.2. H.264 Encoder Media Component Overview and Scope

Figure 1-1 illustrates the software stacks for the H.264 Encoder Media Component and shows the scope of this document. OMX Media Component H.264 Encoder Library is a library that provides H.264 Video encoding functions. It requires OMX Media Component Video Encoder Common Library and OMX Media Component Common Library.

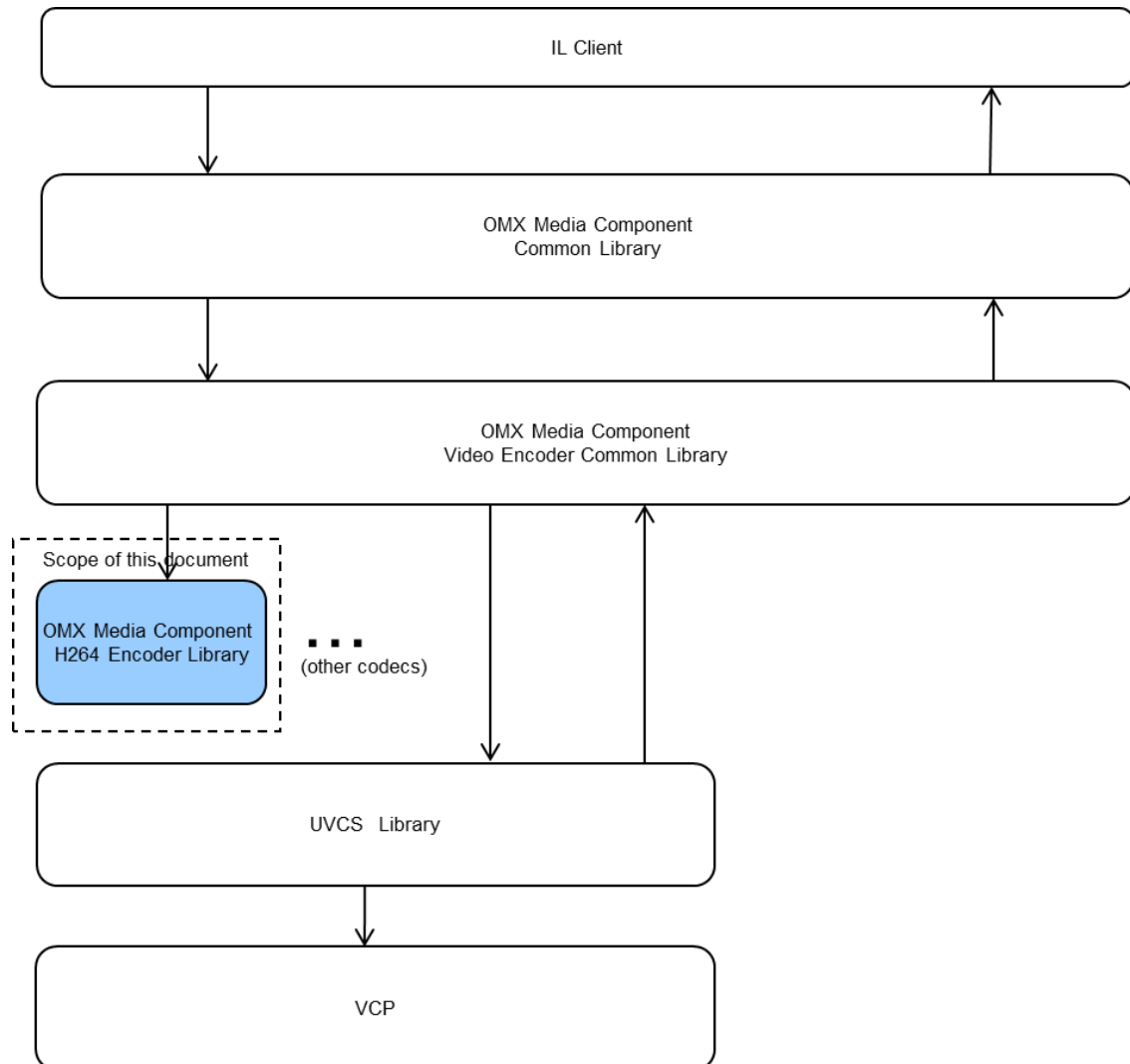


Figure 1-1 Software Stacks and Scope

This document describes the specifications of OMX Media Component H.264 Encoder library part. For the specifications of OMX Media Component Video Encoder Common Library and OMX Media Component Common Library, see related documents [1] and [2] respectively.

1.3. Required Header Files

Table 1-1 lists the header files that are required to use the OMX extended indexes and structures that are described in this document. Regarding the other header files, see related documents [1] and [2].

Table 1-1 Required Header Files

File name	Remarks
OMXR_Extension_h264.h	-
OMXR_Extension_h264e.h	-

1.4. Role Name and Component Name

Table 1-2 shows the role name and the component name for H.264 Encoder Media Component.

Table 1-2 Role Name and Component Name

Role name	Component name
video_encoder.avc	OMX.RENESAS.VIDEO.ENCODER.H264

1.5. Related Documents

Table 1-3 lists the related documents.

Table 1-3 List of Related Documents

No.	Document Name	Remarks
[1]	OMX Media Component User's Manual Common Part	The common specifications for OMX Media Component
[2]	OMX Media Component User's Manual Video Encoder Common Part	The common specifications for OMX Video Encoder Media Component
[3]	OpenMAX Integration Layer Application Programming Interface Specification Version 1.1.2, September 1, 2008	http://www.khronos.org/registry/omxil/specs/OpenMAX_IL_1_1_2_Specification.pdf

1.6. Terminology

Table 1-4 lists the terms that are used in this document.

Table 1-4 Terminology

Term	Abbreviation	Description
Video Port Base	VPB	The base value of the port index of the Video Media Component. The port index values of the input and output ports are obtained by adding offset values to this base value.
UVCS	-	Renesas proprietary video codec software module that provides multi-processing function for video decoding and encoding. OMX Video Codec products contain UVCS library.
VCP	-	The abbreviation for Video Coding Processor. The VCP is the Renesas Hardware IP and provides video decoding and encoding functions for compressed video stream.

2. Functions

H.264 Encoder Media Component is a media component which provides functions to encode raw video to compressed stream according to H.264 codec standard. H.264 Encoder Media Component receives raw video data on the input port and emits the encoded video data on the output ports.

For the specifications that are common to OMX video encoders, see related document [2].

2.1. Function Details

2.1.1. Encode Functions

Table 2-1 shows the codec standard and functions that H.264 Encoder Media Component supports.

Table 2-1 Supported Codec Standard and Functions

Codec standard	ITU-T Rec. H.264 ISO/IEC 14496 Part-10 (H.264/MPEG-4 AVC)
Profile	Baseline Profile / Constrained Baseline Profile ^{Note1} / Main Profile / High Profile / Progressive High Profile ^{Note2} / Constrained High Profile ^{Note2}
Level	1 / 1b / 1.1 / 1.2 / 1.3 / 2 / 2.1 / 2.2 / 3 / 3.1 / 3.2 / 4 / 4.1 / 4.2
Unsupported tools	<ul style="list-style-type: none"> - ASO (Arbitrary Slice Order) - FMO (Flexible Macroblock Ordering) - RS (Redundant Slice) - PCAFF (Picture-Adaptive Frame-Field Coding) - MBAFF (Macroblock-Adaptive Frame-Field Coding) - Weighted Prediction
Picture size	<p><Progressive></p> <ul style="list-style-type: none"> - Width : 80 - 1920 (multiple of 8) - Height : 80 - 1080 (multiple of 8) <p><Interlace></p> <ul style="list-style-type: none"> - Width : 80 - 1920 (multiple of 8) - Height : 80 - 1080 (multiple of 8)
Bit rate	Maximum 40Mbps/s ^{Note3}
Frame rate	Maximum 60p / 60i ^{Note3}
Input format	YUV420 Semi-Planar format YUV420 Planar format
Output format	H.264 Elementary Stream (Annex B Byte stream format)

Note1: H.264 Encoder Media Component includes Constrained Baseline Profile in Baseline Profile.

Note2: H.264 Encoder Media Component includes Progressive High Profile and Constrained High Profile in High Profile.

Note3: Regarding the throughput, the following description should be noticed:

- The maximum throughput is different for each LSI. For the detail, see the LSI hardware manual.
- The throughput may fall depends on CPU load and bus traffic caused by the modules except OMX Media Component.

3. I/O Data Format

3.1. Buffer Payload

3.1.1. Input Buffer Payload

See related document [2].

3.1.2. Output Buffer Payload

H.264 Encoder Media Component outputs buffer as follows:

- One encoded frame data is stored into a single output buffer and not divided into multiple buffers.
- Multiple frame data are not stored into the same output buffer.
- In the case of the interlace encoding, a pair of field data is stored in a single buffer.
- In the case of the multiple slices, all NAL units are stored in a single buffer.
- The top buffer contains only SPS NAL and PPS NAL and does not contain Data NAL.
- The last buffer contains only End Of Sequence NAL and the End Of Stream NAL and does not contain Data NALs.

Figure 3-1 illustrates the output buffer sequence.

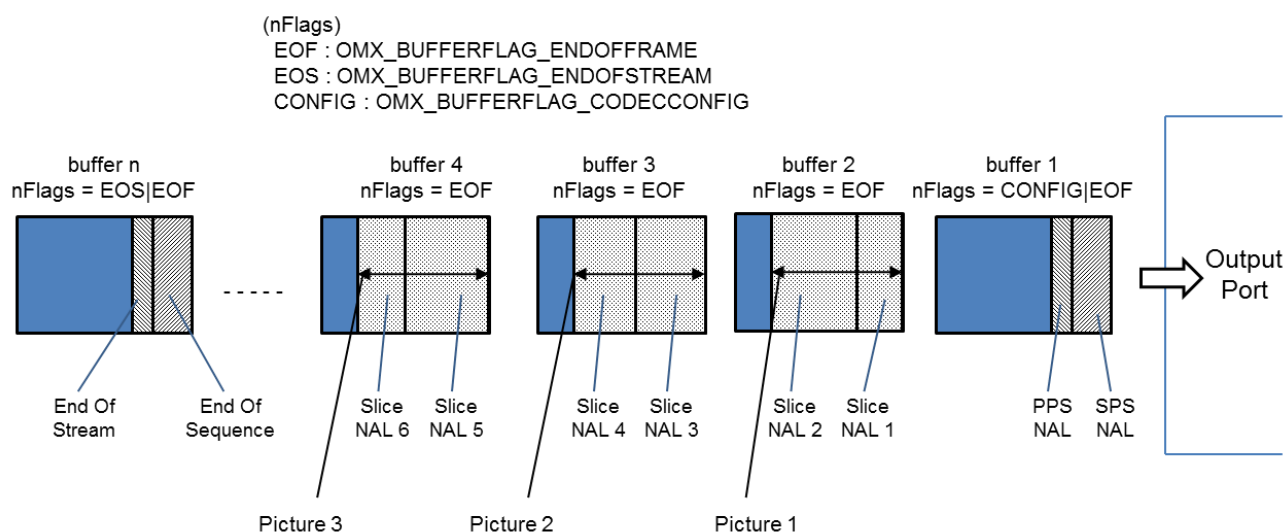


Figure 3-1 Example of Output Buffer Sequence

Figure 3-2 illustrates the output buffer sequence when the *bSequencHeaderWithIDR* member of the OMXR_MC_VIDEO_PARAM_SEQUENCE_HEADER_WITH_IDRTYPE structure (see section 6.4) is set to OMX_TRUE. In this case, SPS NAL and PPS NAL are prepended to every IDR frame except the top IDR frame.

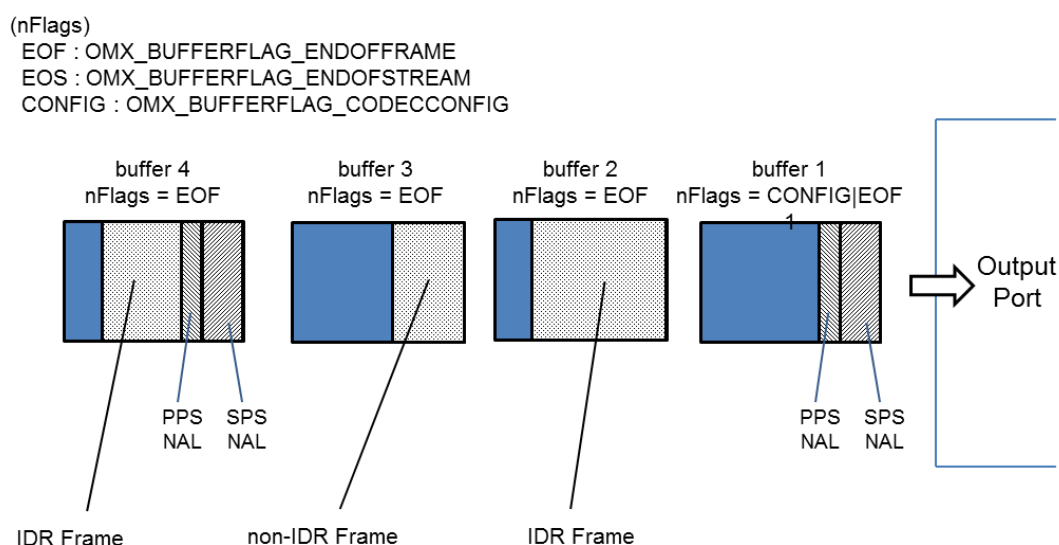


Figure 3-2 Example of Output Buffer Sequence (bSequencHeaderWithIDR=OMX_TRUE)

3.2. Input Picture Data Format

See related document [2].

3.3. Output Stream Data Format

The output stream data format of H.264 Encoder Media Component is H.264 Annex B Byte stream format. Figure 3-3 illustrates the output stream data format.

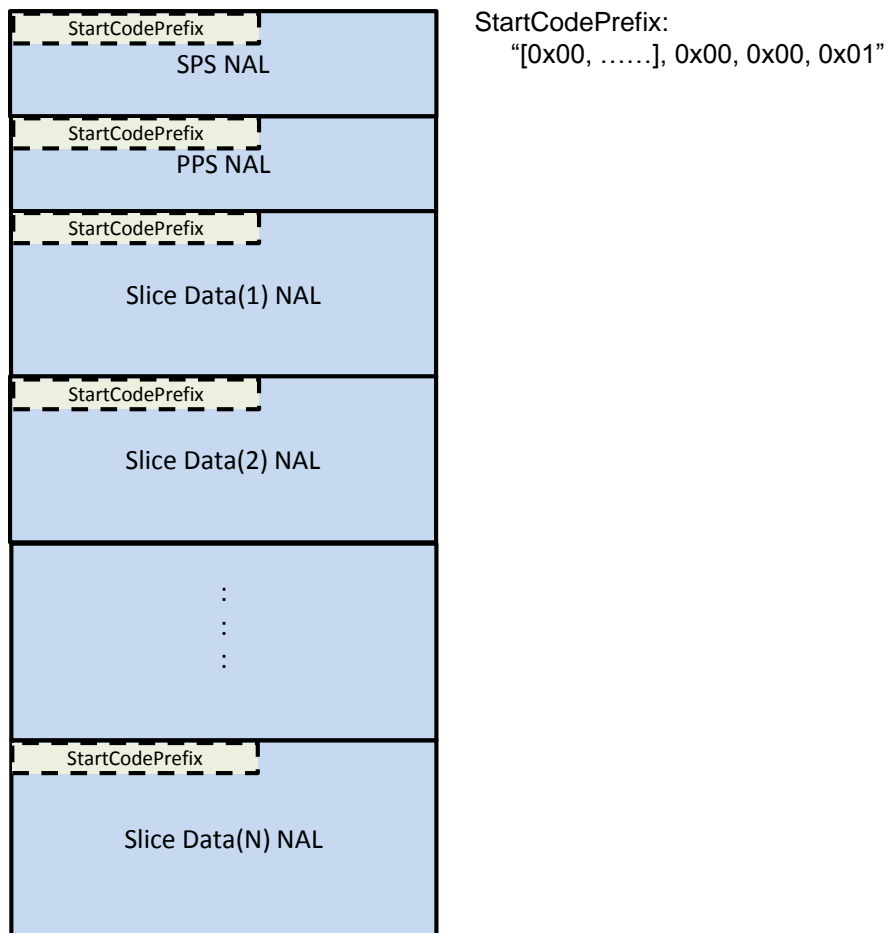


Figure 3-3 Output Stream Data Format

4. API Reference

See related document [2].

5. Indexes

5.1. Standard Indexes of H.264 Encoder Media Component

Table 5-1 lists the OpenMAX IL standard indexes that are available for H.264 Encoder Media Component.

Table 5-1 Available Standard Indexes for H.264 Encoder Media Component

Index	Description
OMX_IndexParamPortDefinition	See related document [2]
OMX_IndexParamVideoPortFormat	
OMX_IndexParamVideoBitrate	
OMX_IndexParamVideoProfileLevelQuerySupported	
OMX_IndexParamVideoProfileLevelCurrent	
OMX_IndexConfigVideoBitrate	
OMX_IndexConfigVideoFramerate	
OMX_IndexConfigVideoIntraVOPRefresh	See section 5.1.1
OMX_IndexParamVideoAvc	
OMX_IndexParamVideoQuantization	
OMX_IndexConfigVideoAVCIntraPeriod	See section 5.1.3

5.1.1. OMX_IndexParamVideoAvc

[Description] The index to access H.264 Video codec related parameters.

[Corresponding Structure] OMX_VIDEO_PARAM_AVCTYPE structure

[Notes] None

5.1.2. OMX_IndexParamVideoQuantization

[Description] The index to adjust the initial quantization parameters

[Corresponding Structure] OMX_VIDEO_PARAM_QUANTIZATIONTYPE structure

[Notes] None

5.1.3. OMX_IndexConfigVideoAVCIntraPeriod

[Description] The index to enable and configure the IDR and Intra periodicity.

[Corresponding Structure] OMX_VIDEO_CONFIG_AVCINTRAPERIOD structure

[Notes] None

5.2. Extended Indexes of H.264 Encoder Media Component

Table 5-2 lists the OMX extended indexes that are available for H.264 Encoder Media Component.

Table 5-2 Available extended indexes for H.264 Encoder Media Component

Index	Description
OMXR_MC_IndexParamVideoPictureMemoryAlloc	See related document [2]
OMXR_MC_IndexParamVideoSequenceHeaderWithIDR	See section 5.2.1
OMXR_MC_IndexParamVideoAVCSyntaxOption	See section 5.2.2

5.2.1. OMXR_MC_IndexParamVideoSequenceHeaderWithIDR

[Description]	The index to enable H.264 Encoder Media Component to prepend SPS and PPS to every IDR frame.
[String]	“OMX.RENESAS.INDEX.PARAM.VIDEO.SEQUENCE.HEADER.WITH.IDR”
[Corresponding Structure]	OMXR_MC_VIDEO_PARAM_SEQUENCE_HEADER_WITH_IDRTYPE structure
[Notes]	None

5.2.2. OMXR_MC_IndexParamVideoAVCSyntaxOption

[Description]	The index to enable H.264 Encoder Media Component to prepend option syntax.
[String]	“OMX.RENESAS.INDEX.PARAM.VIDEO.AVC.SYNTAX.OPTION”
[Corresponding Structure]	OMXR_MC_VIDEO_PARAM_AVC_SYNTAX_OPTION structure
[Notes]	None

5.3. Valid Indexes for OpenMAX IL Macro Functions

Table 5-3 shows which index is available for each port and which OpenMAX IL Macro function can be called to access the index.

Table 5-3 Valid Indexes and OpenMAX IL Macro Function

PortIndex	Index	Get/Set Parameter		Get/SetConfig	
		Get	Set	Get	Set
VPB+0	OMX_IndexParamPortDefinition	See related document [2]			
	OMX_IndexParamVideoPortFormat				
	OMX_IndexConfigVideoFramerate				
	OMXR_MC_IndexParamVideoPictureMemoryAlloc				
VPB+1	OMX_IndexParamPortDefinition	See related document [2]			
	OMX_IndexParamVideoPortFormat				
	OMX_IndexParamVideoBitrate				
	OMX_IndexParamVideoProfileLevelQuerySupported				
	OMX_IndexParamVideoProfileLevelCurrent				
	OMX_IndexConfigVideoBitrate				
	OMX_IndexConfigVideoFramerate				
	OMX_IndexConfigVideoIntraVOPRefresh				
	OMX_IndexParamVideoAvc	X	X	-	-
	OMX_IndexParamVideoQuantization	X	X	-	-
	OMX_IndexConfigVideoAVCIntraPeriod	-	-	X	X
	OMXR_MC_IndexParamVideoSequenceHeaderWithIDR	X	X	-	-
	OMXR_MC_IndexParamVideoAVCSyntaxOption	X	X	-	-

X : Valid
- : Invalid

6. Structures

Table 6-1 lists H.264 Encoder Media Component specific structures.

Table 6-1 H.264 Encoder Media Component Specific Structures

Structure Name	Description
OMX_VIDEO_PARAM_AVCTYPE	See section 6.1
OMX_VIDEO_PARAM_QUANTIZATIONTYPE	See section 6.2
OMX_VIDEO_CONFIG_AVCINTRAPERIOD	See section 6.3
OMXR_MC_VIDEO_PARAM_SEQUENCE_HEADER_WITH_IDRTYPE	See section 6.4
OMXR_MC_VIDEO_PARAM_AVC_SYNTAX_OPTION	See section 6.5

Table 6-2 shows the notation for the access attribute of a structure member described in this section.

Table 6-2 Notation for the access attribute of a structure member

Member Name	Get	Set
Indicates the member name	Indicates the access attribute of the member in the OMX_GetParameter() or OMX_GetConfig(). “R” means IL client can get a value from the member. “W” means IL client must specify a value for the member.	Indicates the access attribute of the member in the OMX_SetParameter() or OMX_SetConfig(). “W” means IL client must/can specify a value for the member. “-“ means a specified value is ignored and not reflected.

6.1. OMX_VIDEO_PARAM_AVCTYPE

[Definition] See related document [3] section 4.3.18.

[Index] OMX_IndexParamVideoAvc

Member Name	Get	Set
<i>nSize</i>	W	W
<i>nVersion</i>	W	W
<i>nPortIndex</i>	W	W
<i>nSliceHeaderSpacing</i>	R	W
<i>nPFrames</i>	R	W
<i>nBFrames</i>	R	W
<i>bUseHadamard</i>	R	-
<i>nRefFrames</i>	R	W
<i>nRefIdx10ActiveMinus1</i>	R	-
<i>nRefIdx11ActiveMinus1</i>	R	-
<i>bEnableUEP</i>	R	-
<i>bEnableFMO</i>	R	-
<i>bEnableASO</i>	R	-
<i>bEnableRS</i>	R	-
<i>eProfile</i>	R	W
<i>eLevel</i>	R	W
<i>nAllowedPictureTypes</i>	R	-
<i>bFrameMBsOnly</i>	R	-
<i>bMBAFF</i>	R	-
<i>bEntropyCodingCABAC</i>	R	-
<i>bWeightedPPrediction</i>	R	-
<i>nWeightedBipredictionMode</i>	R	-
<i>bconstIpred</i>	R	-
<i>bDirect8x8Inference</i>	R	-
<i>bDirectSpatialTemporal</i>	R	-
<i>nCabacInitIdc</i>	R	-
<i>eLoopFilterMode</i>	R	W

[Details]

nSize

Write Value	The size of the structure in bytes.
Read Value	-
Initial Value	-
Notes	-

nVersion

Write Value	The version number of OpenMAX IL specifications 1.1.2
Read Value	-
Initial Value	-
Notes	-

nPortIndex

Write Value	VPB + 1
Read Value	-
Initial Value	-
Notes	-

nSliceHeaderSpacing

Write Value	0, 5 – 8160
Read Value	(Current setting)
Initial Value	0
Notes	<ul style="list-style-type: none"> - If this member is 0, the slice partitioning is disabled. - If this member is set to non-zero value, the value is rounded up to the nearest multiple of the number of the horizontal macroblocks. - If the specified value exceeds the number of the supported total macroblocks, the value automatically calculated as following: $nSliceHeaderSpacing = \text{horizontal macroblocks} \times \text{vertical macroblocks}$

nPFrames

Write Value	0 – 119
Read Value	(Current setting)
Initial Value	29
Notes	<ul style="list-style-type: none"> - If 0 is specified, all the frames are encoded with IDR frame. - The value larger than the maximum is rounded down to the maximum. - The setting of the <i>nPFrames</i> and the <i>nBFrames</i> member must fulfill the following condition: $1 + nPFrames + (nPFrames * nBFrames) \leq 120$ If not fulfilled, the value of the <i>nPFrames</i> member is automatically reduced to fulfill the condition. - The available setting depends on the other parameters. For the combination of the available settings, see Table 6-3.

nBFrames

Write Value	0 – 3
Read Value	(Current setting)
Initial Value	0
Notes	<ul style="list-style-type: none"> - The value larger than the maximum is rounded down to the maximum. - The setting of the <i>nPFrames</i> and the <i>nBFrames</i> member must fulfill the following condition: $1 + nPFrames + (nPFrames * nBFrames) \leq 120$ If not fulfilled, the value of the <i>nPFrames</i> member is automatically reduced to fulfill the condition. - The available setting depends on the other parameters. For the combination of the available settings, see Table 6-3. - The value of the <i>nBFrames</i> must be less than or equal to <i>nBufferCountActual</i> - 2, which is member of the OMX_VIDEO_PORTDEFINITIONTYPE structure for the output port. Otherwise the encode operation results in an error.

bUseHadamard

Write Value	-
Read Value	OMX_TRUE
Initial Value	OMX_TURE
Notes	This member is not supported.

nRefFrames

Write Value	0 – 2
Read Value	(Current setting)
Initial Value	1
Notes	<ul style="list-style-type: none"> – The value larger than the maximum is rounded down to the maximum. – The available setting depends on the other parameters. For the combination of the available settings, see Table 6-3.

nRefIdx10ActiveMinus1

Write Value	-
Read Value	0 – 1
Initial Value	0
Notes	-

nRefIdx11ActiveMinus1

Write Value	-
Read Value	0 – 1
Initial Value	0
Notes	-

bEnableUEP

Write Value	-
Read Value	OMX_FALSE
Initial Value	OMX_FALSE
Notes	This member is not supported.

bEnableFMO

Write Value	-
Read Value	OMX_FALSE
Initial Value	OMX_FALSE
Notes	This member is not supported.

bEnableASO

Write Value	-
Read Value	OMX_FALSE
Initial Value	OMX_FALSE
Notes	This member is not supported.

bEnableRS

Write Value	-
Read Value	OMX_FALSE
Initial Value	OMX_FALSE
Notes	This member is not supported.

eProfile

Write Value	OMX_VIDEO_AVCProfileBaseline OMX_VIDEO_AVCProfileMain OMX_VIDEO_AVCProfileHigh
Read Value	(Current setting)
Initial Value	OMX_VIDEO_AVCProfileBaseline
Notes	– The available setting depends on the other parameters. For the combination of the available settings, see Table 6-3.

eLevel

Write Value	OMX_VIDEO_AVCLevel1 OMX_VIDEO_AVCLevel1b OMX_VIDEO_AVCLevel11 OMX_VIDEO_AVCLevel12 OMX_VIDEO_AVCLevel13 OMX_VIDEO_AVCLevel2 OMX_VIDEO_AVCLevel21 OMX_VIDEO_AVCLevel22 OMX_VIDEO_AVCLevel3 OMX_VIDEO_AVCLevel31 OMX_VIDEO_AVCLevel32 OMX_VIDEO_AVCLevel4 OMX_VIDEO_AVCLevel41 OMX_VIDEO_AVCLevel42
Read Value	(Current setting)
Initial Value	OMX_VIDEO_AVCLevel1
Notes	-

nAllowedPictureTypes

Write Value	-
Read Value	OMX_VIDEO_PictureTypeI OMX_VIDEO_PictureTypeP or OMX_VIDEO_PictureTypeI OMX_VIDEO_PictureTypeP OMX_VIDEO_PictureTypeB
Initial Value	OMX_VIDEO_PictureTypeI OMX_VIDEO_PictureTypeP
Notes	Read value depends on the value of <i>eProfile</i> member.

bFrameMBsOnly

Write Value	-
Read Value	OMX_FALSE OMX_TRUE
Initial Value	OMX_TRUE
Notes	– It is set to OMX_TRUE if the progressive encode mode is selected. Otherwise it is set to OMX_FALSE. For the detail of the encode mode, see related document [2].

bMBAFF

Write Value	-
Read Value	OMX_FALSE
Initial Value	OMX_FALSE
Notes	This member is not supported.

bEntropyCodingCABAC

Write Value	-
Read Value	OMX_FALSE OMX_TRUE
Initial Value	OMX_FALSE
Notes	-

bWeightedPPrediction

Write Value	-
Read Value	OMX_FALSE
Initial Value	OMX_FALSE
Notes	This member is not supported.

nWeightedBipredictionMode

Write Value	-
Read Value	0
Initial Value	0
Notes	This member is not supported.

bconstlpred

Write Value	-
Read Value	OMX_FALSE
Initial Value	OMX_FALSE
Notes	-

bDirect8x8Inference

Write Value	-
Read Value	OMX_TRUE
Initial Value	OMX_TRUE
Notes	-

bDirectSpatialTemporal

Write Value	-
Read Value	OMX_TRUE
Initial Value	OMX_TRUE
Notes	- H.264 Encoder Media Component operates with the spatial direct mode.

nCabacInitIdc

Write Value	-
Read Value	0
Initial Value	0
Notes	-

eLoopFilterMode

Write Value	OMX_VIDEO_AVCLoopFilterEnable OMX_VIDEO_AVCLoopFilterDisable OMX_VIDEO_AVCLoopFilterDisableSliceBoundary
Read Value	(Current setting)
Initial Value	OMX_VIDEO_AVCLoopFilterEnable
Notes	-

Table 6-3 Available Combination of the Encoding Parameters

Frame/Field	<i>nPFrame</i>	<i>nBFrame</i>	<i>nRefFrame</i>	<i>eProfile</i>
Frame Encoding (Progressive)	0	0	0	Baseline / Main / High
	Except 0	0	1 - 2	Baseline / Main / High
		1 – 3	2	Main / High
Field Encoding (Interlace)	0	0	0 - 1	Main / High
	Except 0	0 – 3	2	Main / High

Note:

For the detail of the frame encoding and the field encoding, see related document [2].

If the combination of the specified parameters is not allowed in Table 6-3, the parameters are automatically adjusted within the range of the members when the encoding starts. The following is the order of priority and parameter shall be adjusted in the order of ascending priorities:

eProfile < *nRefFrame* < *nBFrame* < *nPFrame*

6.2. OMX_VIDEO_PARAM_QUANTIZATIONTYPE

[Definition] See related document [3] section 4.3.6.

[Index] OMX_IndexParamVideoQuantization

Member Name	Get	Set
<i>nSize</i>	W	W
<i>nVersion</i>	W	W
<i>nPortIndex</i>	W	W
<i>nQpl</i>	R	W
<i>nQpP</i>	R	W
<i>nQpB</i>	R	W

[Notes] According to OpenMAX IL standard, it is defined that this structure is not applicable to variable bit rate encoding or constant rate encoding. However, Qp value in this implementation is used only on the initial value of quantization. Therefore, unlike OpenMAX standard, it is available by variable bit rate encoding or constant rate encoding.

[Details]

nSize

Write Value	The size of the structure in bytes.
Read Value	-
Initial Value	-
Notes	-

nVersion

Write Value	The version number of OpenMAX IL specifications 1.1.2
Read Value	-
Initial Value	-
Notes	-

nPortIndex

Write Value	VPB + 1
Read Value	-
Initial Value	-
Notes	-

nQpl

Write Value	0 - 51, 255
Read Value	(Current setting)
Initial Value	255
Notes	<ul style="list-style-type: none"> The <i>nQpl</i> is the initial value of the quantization parameter for I frame. The value 255 denotes the 'Auto Setting' that the initial value is automatically determined. Auto setting is recommended. If the specified value is out of range value, Auto setting is selected.

nQpP

Write Value	0 - 51, 255
Read Value	(Current setting)
Initial Value	255
Notes	- The <i>nQpP</i> is the initial value of the quantization parameter for P

	<p>frame.</p> <ul style="list-style-type: none"> – The value 255 denotes the 'Auto Setting' that the initial value is automatically determined. Auto setting is recommended. – If the specified value is out of range value, Auto setting is selected.
--	--

nQpB

Write Value	0 - 51, 255
Read Value	(Current setting)
Initial Value	255
Notes	<ul style="list-style-type: none"> – The <i>nQpB</i> is the initial value of the quantization parameter for B frame. – The value 255 denotes the 'Auto Setting' that the initial value is automatically determined. Auto setting is recommended. – If the specified value is out of range value, Auto setting is selected.

6.3. OMX_VIDEO_CONFIG_AVCINTRAPERIOD

[Definition] See related document [3] section 4.3.27.

[Index] OMX_IndexConfigAvcIntraPeriod

Member Name	Get	Set
<i>nSize</i>	W	W
<i>nVersion</i>	W	W
<i>nPortIndex</i>	W	W
<i>nIDRPeriod</i>	R	W
<i>nPFrames</i>	R	W

[Notes] If the OMX_CONFIG_AVCINTRAPERIOD structure is updated during OMX_StateExecuting state or OMX_StatePause state via OMX_SetConfig function, the updated setting is not applied until the H.264 Encoder Media Component transits to OMX_StateIdle state.

[Details]

nSize

Write Value	The size of the structure in bytes.
Read Value	-
Initial Value	-
Notes	-

nVersion

Write Value	The version number of OpenMAX IL specifications 1.1.2
Read Value	-
Initial Value	-
Notes	-

nPortIndex

Write Value	VPB + 1
Read Value	-
Initial Value	-
Notes	-

nIDRPeriod

Write Value	0 – 120
Read Value	(Current setting)
Initial Value	1
Notes	<ul style="list-style-type: none"> - If the member is set to 0, only the top frame of the stream is encoded with IDR frame. - The value larger than the maximum is rounded down to the maximum. - If the <i>nPFrames</i> member is set to 0, this member is updated to 1 when the encoding starts.

nPFrames

Write Value	0 – 119
Read Value	(Current setting)
Initial Value	29
Notes	<ul style="list-style-type: none"> - This parameter is the same as the <i>nPFrames</i> member of the OMX_VIDEO_PARAM_AVCTYPE structure. See 6.1.

```
[Definition] typedef struct tagOMXR_MC_VIDEO_PARAM_SEQUENCE_HEADER_WITH_IDRTYPE
{
    OMX_U32                nSize;
    OMX_VERSIONTYPE        nVersion;
    OMX_U32                nPortIndex;
    OMX_BOOL                bSequenceHeaderWithIDR;
} OMXR_MC_VIDEO_PARAM_SEQUENCE_HEADER_WITH_IDRTYPE;
```

[Member]	Member Name	Get	Set
	<i>nSize</i>	W	W
	<i>nVersion</i>	W	W
	<i>nPortIndex</i>	W	W
	<i>bSequenceHeaderWithIDR</i>	R	W

[Details]

Write Value	The size of the structure in bytes.
Read Value	-
Initial Value	-
Notes	-

Write Value	The version number of OpenMAX IL specifications 1.1.2
Read Value	-
Initial Value	-
Notes	-

Write Value	VPB + 1
Read Value	-
Initial Value	-
Notes	-

Write Value	OMX_TRUE OMX_FALSE
Read Value	(Current setting)
Initial Value	OMX_FALSE
Notes	<ul style="list-style-type: none"> – If set to OMX_TRUE, SPS and PPS are prepended to IDR frames. For the details of the output buffer sequence, see Figure 3-2.

6.5. OMXR_MC_VIDEO_PARAM_AVC_SYNTAX_OPTION

[Definition] typedef struct tagOMXR_MC_VIDEO_PARAM_AVC_SYNTAX_OPTION {
 OMX_U32 *nSize*;
 OMX_VERSIONTYPE *nVersion*;
 OMX_U32 *nPortIndex*;
 OMX_BOOL *bAUDEnable*;
 OMX_BOOL *bVUIEnable*;
 OMX_U32 *u32PPSNum*;
 } OMXR_MC_VIDEO_PARAM_AVC_SYNTAX_OPTION;

[Index] OMXR_MC_IndexParamVideoAVCSyntaxOption

Member Name	Get	Set
<i>nSize</i>	W	W
<i>nVersion</i>	W	W
<i>nPortIndex</i>	W	W
<i>bAUDEnable</i>	R	W
<i>bVUIEnable</i>	R	W
<i>u32PPSNum</i>	R	W

[Notes] The index to enable H.264 Encoder Media Component to prepend option syntax.

[Details]

nSize

Write Value	The size of the structure in bytes.
Read Value	-
Initial Value	-
Notes	-

nVersion

Write Value	The version number of OpenMAX IL specifications 1.1.2
Read Value	-
Initial Value	-
Notes	-

nPortIndex

Write Value	VPB + 1
Read Value	-
Initial Value	-
Notes	-

bAUDEnable

Write Value	OMX_TRUE OMX_FALSE
Read Value	(Current setting)
Initial Value	OMX_FALSE
Notes	- If set to OMX_TRUE, Access unit delimiter is prepended to frame.

bVUIEnable

Write Value	-
Read Value	OMX_FALSE
Initial Value	OMX_FALSE
Notes	- This member is not supported.

u32PPSNum

Write Value	-
Read Value	1
Initial Value	1
Notes	- This member is not supported.

6.6. Specific Usage on Common Structure Members

This section describes H.264 Encoder Media Component specific usage of the structures that are described in related document [2].

6.6.1. OMX_VIDEO_PORTDEFINITIONTYPE (Input Port)

[Index] OMX_IndexParamPortDefinition

[Details]

xFramerate

Write Value	See Table 6-4
Read Value	(Current setting)
Initial Value	0x000F0000
Notes	-

6.6.2. OMX_VIDEO_PORTDEFINITIONTYPE (Output Port)

[Index] OMX_IndexParamPortDefinition

[Details]

xBitrate

Write Value	See Table 6-5
Read Value	(Current setting)
Initial Value	64000
Notes	-

nFramerate

Write Value	-
Read Value	See Table 6-4
Initial Value	0x000F0000
Notes	-

eCompressionFormat

Write Value	OMX_VIDEO_CodingAVC
Read Value	(Current setting)
Initial Value	OMX_VIDEO_CodingAVC
Notes	-

6.6.3. OMX_VIDEO_PARAM_PORTFORMATTYPE (Input Port)

[Index] OMX_IndexParamVideoPortFormat

[Details]

xFramerate

Write Value	See Table 6-4
Read Value	0x003C0000 (nIndex = any value)
Initial Value	
Notes	-

6.6.4. OMX_VIDEO_PARAM_PORTFORMATTYPE (Output Port)

[Index] OMX_IndexParamVideoPortFormat

[Details]

nIndex

Write Value	0
Read Value	-
Initial Value	-
Notes	-

eCompressionFormat

Write Value	OMX_VIDEO_CodingAVC
Read Value	OMX_VIDEO_CodingAVC (nIndex = 0)
Initial Value	-
Notes	-

xFramerate

Write Value	-
Read Value	0x003C0000 (nIndex = 0)
Initial Value	-
Notes	-

6.6.5. OMX_VIDEO_PARAM_BITRATETYPE

[Index] OMX_IndexParamVideoBitrate

[Details]

eControlRate

Write Value	OMX_Video_ControlRateConstant OMX_Video_ControlRateVariable OMX_Video_ControlRateConstantSkipFrames
Read Value	(Current setting)
Initial Value	OMX_Video_ControlRateConstant
Notes	-

nTargetBitrate

Write Value	See Table 6-5
Read Value	(Current setting)
Initial Value	64000
Notes	-

6.6.6. OMX_VIDEO_PARAM_PROFILELEVELTYPE (ProfileLevelQuerySupport)

[Index] OMX_IndexParamVideoProfileLevelQuerySupported

[Details]

eProfile

Write Value	-
Read Value	OMX_VIDEO_AVCProfileBaseline (nProfileIndex=0) OMX_VIDEO_AVCProfileMain (nProfileIndex=1) OMX_VIDEO_AVCProfileHigh (nProfileIndex=2)
Initial Value	OMX_VIDEO_AVCProfileBaseline
Notes	-

eLevel

Write Value	-
Read Value	OMX_VIDEO_AVCLevel42
Initial Value	OMX_VIDEO_AVCLevel42
Notes	-

nProfileIndex

Write Value	0, 1, 2
Read Value	-
Initial Value	-
Notes	-

6.6.7. OMX_VIDEO_PARAM_PROFILELEVELTYPE (ProfileLevelCurrent)

[Index] OMX_IndexParamVideoProfileLevelCurrent

[Details]

eProfile

Write Value	OMX_VIDEO_AVCPProfileBaseline, OMX_VIDEO_AVCPProfileMain, OMX_VIDEO_AVCPProfileHigh
Read Value	(Current setting)
Initial Value	OMX_VIDEO_AVCPProfileBaseline
Notes	– This member is the same as the <i>eProfile</i> member of OMX_VIDEO_PARAM_AVCTYPE structure. For details, see 6.1.

eLevel

Write Value	OMX_VIDEO_AVCLLevel1, OMX_VIDEO_AVCLLevel1b, OMX_VIDEO_AVCLLevel11, OMX_VIDEO_AVCLLevel12, OMX_VIDEO_AVCLLevel13, OMX_VIDEO_AVCLLevel2, OMX_VIDEO_AVCLLevel21, OMX_VIDEO_AVCLLevel22, OMX_VIDEO_AVCLLevel3, OMX_VIDEO_AVCLLevel31, OMX_VIDEO_AVCLLevel32, OMX_VIDEO_AVCLLevel4, OMX_VIDEO_AVCLLevel41, OMX_VIDEO_AVCLLevel42
Read Value	(Current setting)
Initial Value	OMX_VIDEO_AVCLLevel1
Notes	– This member is the same as the <i>eLevel</i> member of OMX_VIDEO_PARAM_AVCTYPE structure. For details, see 6.1.

nProfileIndex

Write Value	-
Read Value	0
Initial Value	0
Notes	-

6.6.8. OMX_VIDEO_CONFIG_BITRATETYPE

[Index] OMX_IndexConfigVideoBitrate

[Details]

eEncodeBitrate

Write Value	See Table 6-5.
Read Value	(Current setting)
Initial Value	64000
Notes	-

6.6.9. OMX_VIDEO_CONFIG_FRAMERATETYPE (Input Port)

[Index] OMX_IndexConfigVideoFramerate

[Details]

xEncodeFramerate

Write Value	See Table 6-4.
Read Value	(Current setting)
Initial Value	0x000F0000
Notes	-

6.6.10. OMX_VIDEO_CONFIG_FRAMERATETYPE (Output Port)

[Index] OMX_IndexConfigVideoFramerate

[Details]

xEncodeFramerate

Write Value	-
Read Value	See Table 6-4.
Initial Value	0x000F0000
Notes	-

6.6.11. Frame Rate

Table 6-4 shows the relation between the parameter setting and the frame rate. The frame rate setting is represented in Q16 format. When a setting value that is not described in Table 6-4 is specified, the frame rate is calculated with some loss of precision.

Table 6-4 Frame Rate Settings

Setting	Frame Rate [fps]
0x00010000 - 0x00090000	1 - 9 (not supported)
0x000A0000	10
0x000B0000	11
0x000C8000	12.5
0x000D0000	13
0x000EFC28	14.985
0x000F0000	15
0x00100000	16
0x00110000	17
0x00120000	18
0x00130000	19
0x00140000	20
0x00150000	21
0x00160000	22
0x00170000	23
0x00180000	24
0x00190000	25
0x001A0000	26
0x001B0000	27
0x001C0000	28
0x001DF851	29.97
0x001E0000	30
0x003BF0A3	59.94
0x003C0000 - 0xFFFFFFFF	60

6.6.12. Bit Rate

Table 6-5 shows the valid settings of the bit rate for the encoding. The bits per a frame (bit rate / frame rate) should be less than or equal to 4 Mbits. When the bits per a frame exceeds 4 Mbits, the bit rate is automatically calculated so that it falls within 4 Mbits.

Table 6-5 Bit Rate Settings

Setting (in decimal)	Encoded Bit Rate [bps]
0 - 12,000	12,000
12,001 - 39,999,999	12,001 - 39,999,999
40,000,000 - 4,294,967,295	40,000,000

7. Memory Requirement

Table 7-1 describes the types of the memory that H.264 Encoder Media Component requires.

Table 7-1 Required Memory Types

Memory Type	Accessible from	Description
input buffer	Hardware and CPU	Buffers for the input port. The required memory size is $(nStride \times nSliceHeight \times 3 / 2) \times nBufferCountActual$. For details of the <i>nBufferCountActual</i> member, see related document [2].
output buffer	Hardware and CPU	Buffers for the output port. The required memory size is $3,110,400 \times nBufferCountActual$. For details of the <i>nBufferCountActual</i> member, see related document [2].
stream_work_0	Hardware	Work buffers for encoding.
stream_work_1	Hardware and CPU	
stream_work_2	Hardware	
stream_work_3	CPU	
stream_work_4	Hardware	
stream_work_5	Hardware and CPU	
lib_work_mem	CPU	A work buffer for storing information used for encoding control.
tmp_work_mem	CPU	A temporary work buffer

Table 7-2 shows the memory requirement in the case of 1920x1080 stream encoding.

Table 7-2 Memory Requirement for 1920x1080 Stream Encoding

Memory Type	Size	Notes
input buffer	15 [Mbyte]	In the case where the <i>nBufferCountActual</i> for the input port is set to 5.
output buffer	6 [Mbyte]	In the case where the <i>nBufferCountActual</i> for the output port is set to 2.
stream_work_0	20 [Mbyte]	-
stream_work_1	18 [Kbyte]	Fixed size
stream_work_2	277 [Kbyte]	-
stream_work_3	23 [Kbyte]	Fixed size
stream_work_4	10 [Mbyte]	-
stream_work_5	9 [Kbyte]	-
lib_work_mem	21 [Kbyte]	-
tmp_work_mem	37 [Kbyte]	-

8. Appendix

8.1. Examples of typical configuration

Table 8-1 Examples of setting 720x480 without Bframe

PortIndex	Index Structure	Structure member	Value
VPB+0	OMX_VIDEO_PORTDEFINITIONTYPE	nFrameWidth	720
		nFrameHeight	480
		nStride	736
		nSliceHeight	480
		xFrameRate	0x001E0000
		eColorFormat	OMX_COLOR_FormatYUV420SemiPlanar
	OMX_VIDEO_PARAM_PORTFORMATTYPE	eColorFormat	OMX_COLOR_FormatYUV420SemiPlanar
		xFrameRate	0x001E0000
	OMXR_MC_VIDEO_PARAM_PICTURE_MEMORY_ALLOCTYPE	eMemoryAlloc	OMXR_MC_VIDEO_MemAllocFrame
VPB+1	OMX_VIDEO_PORTDEFINITIONTYPE	nBitRate	10000000
		eCompressionFormat	OMX_VIDEO_CodingAVC
	OMX_VIDEO_PARAM_BITRATETYPE	eControlRate	OMX_Video_ControlRateConstant
		nTargetBitrate	10000000
	OMX_VIDEO_PARAM_AVCTYPE	nSliceHeaderSpacing	0
		nPFrames	29
		nBFrames	0
		nRefFrames	1
		eProfile	OMX_VIDEO_AVCPProfileBaseline
		eLevel	OMX_VIDEO_AVCLLevel32
		eLoopFilterMode	OMX_VIDEO_AVCLoopFilterEnable
	OMX_VIDEO_PARAM_PROFILELEVELTYPE	eProfile	OMX_VIDEO_AVCPProfileBaseline
		eLevel	OMX_VIDEO_AVCLLevel32
	OMX_VIDEO_PARAM_QUANTIZATIONTYPE	nQpI	255
		nQpP	255
		nQpB	255

Table 8-2 Examples of setting 1920x1080 with Bframe

PortIndex	Index Structure	Structure member	Value
VPB+0	OMX_PARAM_PORTDEFINITION TYPE	nBufferCoutActual	5
		nFrameWidth	1920
	OMX_VIDEO_PORTDEFINITION TYPE	nFrameHeight	1080
		nStride	1920
		nSliceHeight	1080
		xFrameRate	0x001E0000
		eColorFormat	OMX_COLOR_FormatYUV420SemiPlan ar
	OMX_VIDEO_PARAM_PORTFO RMATTYPE	eColorFormat	OMX_COLOR_FormatYUV420SemiPlan ar
		xFrameRate	0x001E0000
VPB+1	OMXR_MC_VIDEO_PARAM_PIC TURE_MEMORY_ALLOCTYPE	eMemoryAlloc	OMXR_MC_VIDEO_MemAllocFrame
	OMX_VIDEO_PORTDEFINITION TYPE	nBitRate	20000000
		eCompressionFormat	OMX_VIDEO_CodingAVC
	OMX_VIDEO_PARAM_BITRATET YPE	eControlRate	OMX_Video_ControlRateConstant
		nTargetBitrate	20000000
	OMX_VIDEO_PARAM_AVCTYPE	nSliceHeaderSpacing	0
		nPFrames	10
		nBFrames	2
		nRefFrames	2
		eProfile	OMX_VIDEO_AVCPProfileMain
		eLevel	OMX_VIDEO_AVCLLevel41
		eLoopFilterMode	OMX_VIDEO_AVCLoopFilterEnable
	OMX_VIDEO_PARAM_PROFILE LEVELTYPE	eProfile	OMX_VIDEO_AVCPProfileMain
		eLevel	OMX_VIDEO_AVCLLevel41
	OMX_VIDEO_PARAM_QUANTIZ ATIONTYPE	nQpI	255
		nQpP	255
		nQpB	255

8.2. Examples of the GOP structure by setting

The following figures describe an example of GOP structure encoded by setting nPFrames, nBFrames and nIDRPeriod.

Frame encoding

nPFrames = 0 (nBFrames = 0, nIDRPeriod = 1)



Figure 8-1 Example 1 of GOP structure (frame encoding, nPFrames=0, nBFrames=0)

Frame encoding

nPFrames = 3 , nBFrames = 0, nIDRPeriod = n

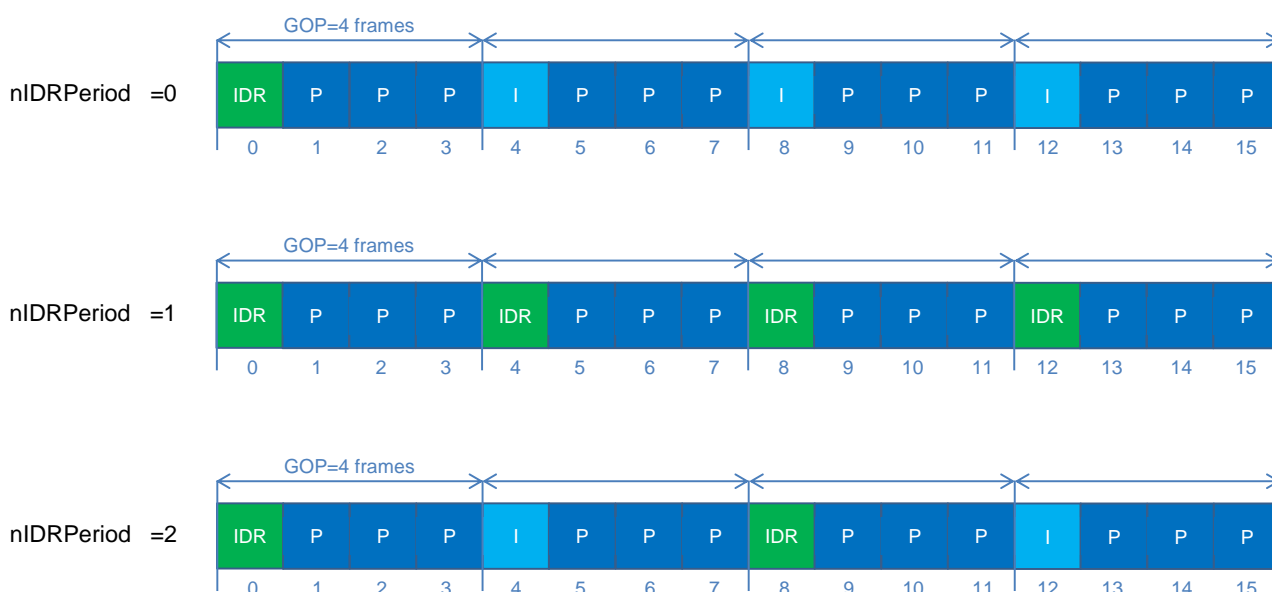


Figure 8-2 Example 2 of GOP structure (frame encoding, nPFrames=3, nBFrames=0)

Frame encoding

$nPFrames = 2$, $nBFrames = 1$, $nIDRPeriod = n$

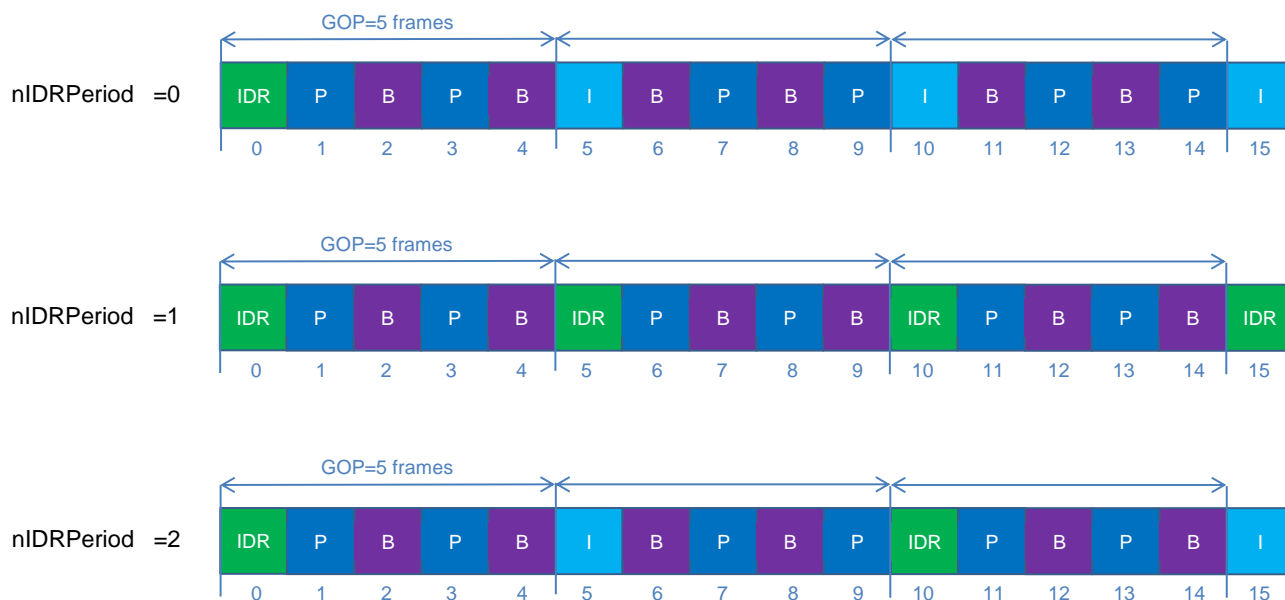


Figure 8-3 Example 3 of GOP structure (frame encoding, $nPFrames=2$, $nBFrames=1$)

Frame encoding

$nPFrames = 2$, $nBFrames = 2$, $nIDRPeriod = n$

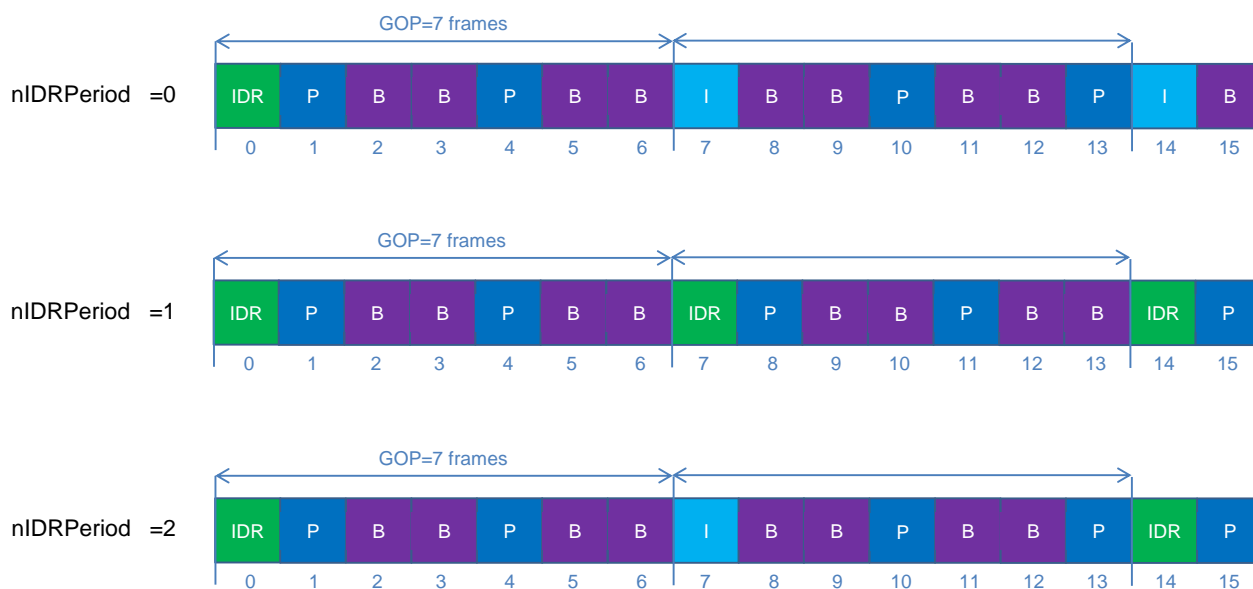


Figure 8-4 Example 4 of GOP structure (frame encoding, $nPFrames=2$, $nBFrames=2$)

Field encoding

$nPFrames = 0$ ($nBFrames = 0$, $nIDRPeriod = 1$) $nRefFrames = n$

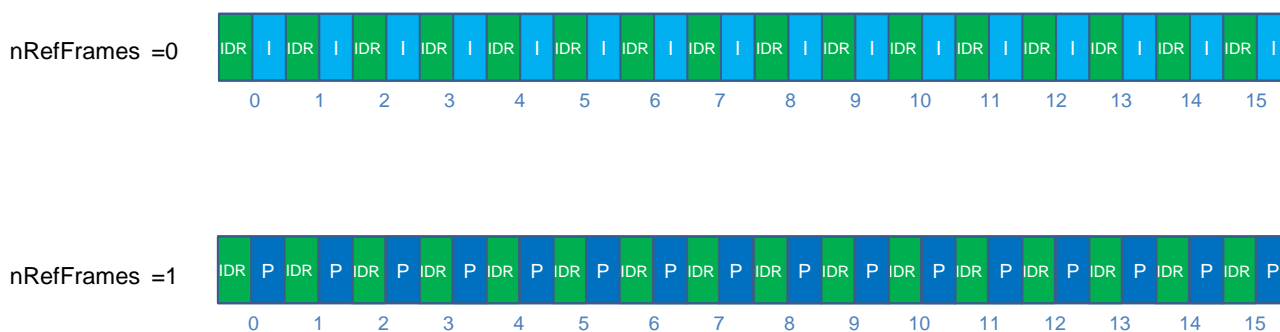


Figure 8-5 Example 5 of GOP structure (field encoding, $nPFrames=0$, $nBFrames=0$)

Field encoding

$nPFrames = 3$, $nBFrames = 0$, $nIDRPeriod = n$



Figure 8-6 Example 6 of GOP structure (field encoding, $nPFrames=3$, $nBFrames=0$)

Field encoding

$nPFrames = 2$, $nBFrames = 1$, $nIDRPeriod = n$

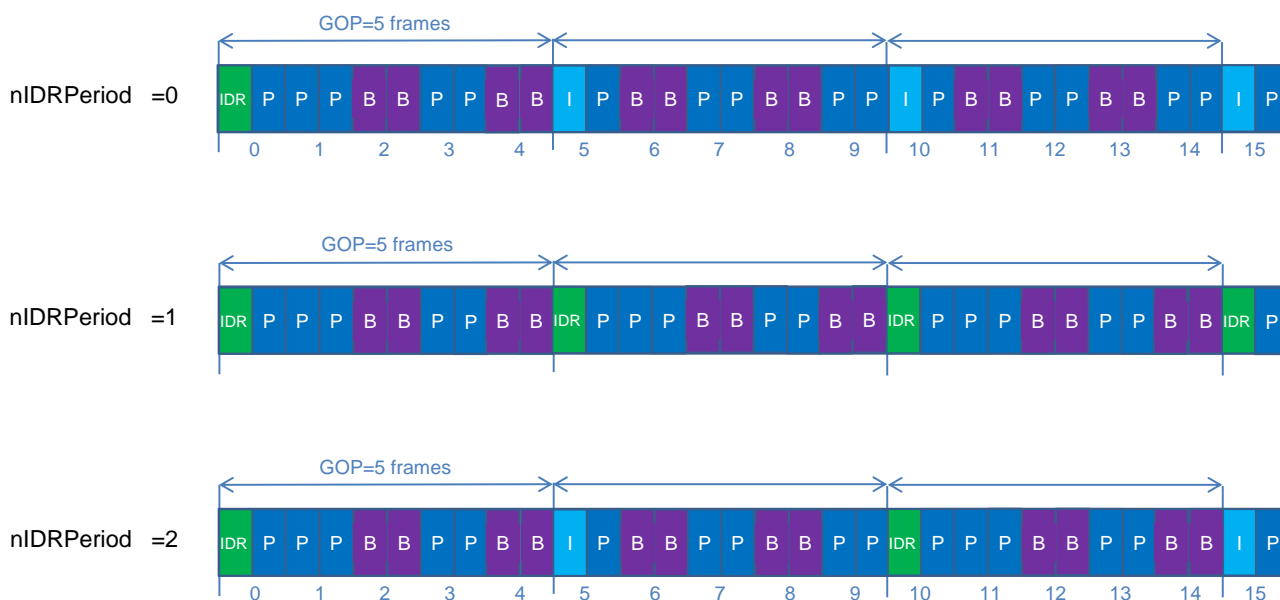


Figure 8-7 Example 7 of GOP structure (field encoding, $nPFrames=2$, $nBFrames=1$)

Field encoding

$nPFrames = 2$, $nBFrames = 2$, $nIDRPeriod = n$

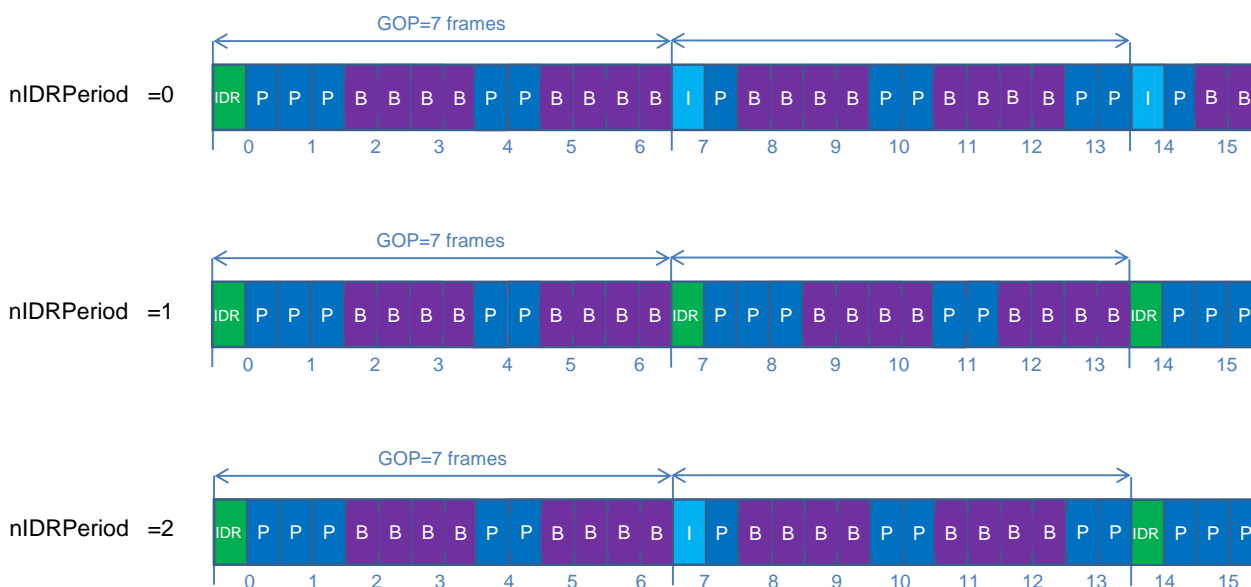


Figure 8-8 Example 8 of GOP structure (field encoding, $nPFrames=2$, $nBFrames=2$)

REVISION HISTORY	OMX Media Component User's Manual : H.264 Encoder Part
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Rev.	Date	Description	
		Page	Summary
0.02	Jan. 31, 2014	—	Draft revision based on Japanese User's Manual Rev.0.02.
0.03	Mar. 26, 2014	—	<p>Fixed typos</p> <ul style="list-style-type: none"> - The <i>xBitrate</i> member of 6.5.2.OMX_VIDEO_PORTDEFINITIONTYPE (Output Port) <p>Add description about the combination of the parameters and the range of the value:</p> <ul style="list-style-type: none"> - 6.1. OMX_VIDEO_PARAM_AVCTYPE - Table 6 - 3 Available Combination of the Encoding Parameters - 6.2.OMX_VIDEO_PARAM_QUANTIZATIONTYPE - 6.3.OMX_VIDEO_CONFIG_AVCINTRAPERIOD <p>Add section:</p> <ul style="list-style-type: none"> - 6.5.OMXR_MC_VIDEO_PARAM_AVC_SYNTAX_OPTION. <p>Add detail description about the common member of the different structures:</p> <ul style="list-style-type: none"> - 6.6.7.OMX_VIDEO_PARAM_PROFILELEVELTYPE (ProfileLevelCurrent) <p>Add memory requirement information in 7. Memory Requirement</p> <p>Add examples of typical configuration in 8. Appendix</p>
0.0.4	May. 22.2014	—	<ul style="list-style-type: none"> - Correct the description about the minimum value of the Encoded Bit Rate. - Correct the description about the default value of the bUseHadamard member.
	May. 30, 2014	—	- Correct the description for stream_work_x and lib_work_mem in Table 7-1
	June. 4, 2014	—	- Correct the value for stream_work_2 size in Table 7-2
	Jul. 4, 2014	38	Updated Notes and size in Table7-2
1.00	Aug. 20 2014	38	Fixed Table 7-1
	Aug. 26, 2014	18	Updated parameter of Set in OMX_VIDEO_PARAM_AVCTYPE.
		19	Change "IDR frame or I frame" to "IDR frame".
	Sep. 9, 2014	6	Fixed Table 0-1 Role Name and Component Name.
1.0.1	Oct. 14, 2014	38	Updated Size in Table7-2
	Oct. 23, 2014	41	Add examples of the GOP structure.
	Nov. 06, 2014	24	Add a note about OMX_VIDEO_PARAM_QUANTIZATIONTYPE

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