User's Manual

32

OMX Media Component

User's Manual: H.264 Decoder Part

— Preliminary —

All information contained in these materials, including products and product specifications, represents information on the product at the time of publication and is subject to change by Renesas Electronics Corp. without notice. Please review the latest information published by Renesas Electronics Corp. through various means, including the Renesas Electronics Corp. website (http://www.renesas.com).

Renesas Electronics
www.renesas.com

Rev.1.00 Aug. 29, 2014

Notice

1. Descriptions of circuits, software and other related information in this document are provided only to illustrate the operation of semiconductor products and application examples. You are fully responsible for the incorporation of these circuits, software, and information in the design of your equipment. Renesas Electronics assumes no responsibility for any losses incurred by you or third parties arising from the use of these circuits, software, or information.
2. Renesas Electronics has used reasonable care in preparing the information included in this document, but Renesas Electronics does not warrant that such information is error free. Renesas Electronics assumes no liability whatsoever for any damages incurred by you resulting from errors in or omissions from the information included herein.
3. Renesas Electronics does not assume any liability for infringement of patents, copyrights, or other intellectual property rights of third parties by or arising from the use of Renesas Electronics products or technical information described in this document. No license, express, implied or otherwise, is granted hereby under any patents, copyrights or other intellectual property rights of Renesas Electronics or others.
4. You should not alter, modify, copy, or otherwise misappropriate any Renesas Electronics product, whether in whole or in part. Renesas Electronics assumes no responsibility for any losses incurred by you or third parties arising from such alteration, modification, copy or otherwise misappropriation of Renesas Electronics product.
5. Renesas Electronics products are classified according to the following two quality grades: “Standard” and “High Quality”. The recommended applications for each Renesas Electronics product depends on the product’s quality grade, as indicated below.

   “Standard”: Computers; office equipment; communications equipment; test and measurement equipment; audio and visual equipment; home electronic appliances; machine tools; personal electronic equipment; and industrial robots etc.

   “High Quality”: Transportation equipment (automobiles, trains, ships, etc.); traffic control systems; anti-disaster systems; anti-crime systems; and safety equipment etc.

   Renesas Electronics products are neither intended nor authorized for use in products or systems that may pose a direct threat to human life or bodily injury (artificial life support devices or systems, surgical implantations etc.), or may cause serious property damages (nuclear reactor control systems, military equipment etc.). You must check the quality grade of each Renesas Electronics product before using it in a particular application. You may not use any Renesas Electronics product for any application for which it is not intended. Renesas Electronics shall not be in any way liable for any damages or losses incurred by you or third parties arising from the use of any Renesas Electronics product for which the product is not intended by Renesas Electronics.
6. You should use the Renesas Electronics products described in this document within the range specified by Renesas Electronics, especially with respect to the maximum rating, operating supply voltage range, movement power voltage range, heat radiation characteristics, installation and other product characteristics. Renesas Electronics shall have no liability for malfunctions or damages arising out of the use of Renesas Electronics products beyond such specified ranges.
7. Although Renesas Electronics endeavors to improve the quality and reliability of its products, semiconductor products have specific characteristics such as the occurrence of failure at a certain rate and malfunctions under certain use conditions. Further, Renesas Electronics products are not subject to radiation resistance design. Please be sure to implement safety measures to guard them against the possibility of physical injury, and injury or damage caused by fire in the event of the failure of a Renesas Electronics product, such as safety design for hardware and software including but not limited to redundancy, fire control and malfunction prevention, appropriate treatment for aging degradation or any other appropriate measures. Because the evaluation of microcomputer software alone is very difficult, please evaluate the safety of the final products or systems manufactured by you.
8. Please contact a Renesas Electronics sales office for details as to environmental matters such as the environmental compatibility of each Renesas Electronics product. Please use Renesas Electronics products in compliance with all applicable laws and regulations that regulate the inclusion or use of controlled substances, including without limitation, the EU RoHS Directive. Renesas Electronics assumes no liability for damages or losses occurring as a result of your noncompliance with applicable laws and regulations.
9. Renesas Electronics products and technology may not be used for or incorporated into any products or systems whose manufacture, use, or sale is prohibited under any applicable domestic or foreign laws or regulations. You should not use Renesas Electronics products or technology described in this document for any purpose relating to military applications or use by the military, including but not limited to the development of weapons of mass destruction. When exporting the Renesas Electronics products or technology described in this document, you should comply with the applicable export control laws and regulations and follow the procedures required by such laws and regulations.
10. It is the responsibility of the buyer or distributor of Renesas Electronics products, who distributes, disposes of, or otherwise places the product with a third party, to notify such third party in advance of the contents and conditions set forth in this document, Renesas Electronics assumes no responsibility for any losses incurred by you or third parties as a result of unauthorized use of Renesas Electronics products.
11. This document may not be reproduced or duplicated in any form, in whole or in part, without prior written consent of Renesas Electronics.
12. Please contact a Renesas Electronics sales office if you have any questions regarding the information contained in this document or Renesas Electronics products, or if you have any other inquiries.

(Note 1) “Renesas Electronics” as used in this document means Renesas Electronics Corporation and also includes its majority-owned subsidiaries.

(Note 2) “Renesas Electronics product(s)” means any product developed or manufactured by or for Renesas Electronics.

(2012.4)

Table of Contents

1. OVERVIEW 4
   1.1. About This Document 4
   1.2. H.264 Decoder Media Component Overview and Scope 4
   1.3. Required Header Files 5
   1.4. Role Name and Component Name 5
   1.5. Related Documents 5
   1.6. Terminology 6
2. FUNCTIONS 7
   2.1. Function Details 7
      2.1.1. Decode Functions 7
3. I/O DATA FORMAT 8
   3.1. Buffer Payload 8
      3.1.1. Input Buffer Payload 8
      3.1.2. Output Buffer Payload 14
   3.2. Input Stream Data Format 15
   3.3. Output Picture Data Format 17
4. API REFERENCE 18
5. INDEXES 19
   5.1. Standard Indexes of H.264 Decoder Media Component 19
      5.1.1. OMX_IndexParamVideoAvc 19
   5.2. Extended Indexes of H.264 Decoder Media Component 20
      5.2.1. OMXR_MC_IndexParamVideoStreamStoreUnit 20
   5.3. Valid Indexes for OpenMAX IL Macro Functions 21
6. STRUCTURES 22
   6.1. OMX_VIDEO_PARAM_AVCTYPE 23
   6.2. OMXR_MC_VIDEO_PARAM_STREAM_STORE_UNITTYPE 28
   6.3. Specific Usage on Common Structure Members 29
      6.3.1. OMX_VIDEO_PORTDEFINITIONTYPE (Input Port) 29
      6.3.2. OMX_VIDEO_PARAM_PORTFORMATTYPE (Input Port) 30
      6.3.3. OMX_VIDEO_PARAM_PROFILELEVELTYPE (ProfileLevelQuerySupport) 31
      6.3.4. OMX_VIDEO_PARAM_PROFILELEVELTYPE (ProfileLevelCurrent) 32
      6.3.5. Buffer Flags (*nFlags*) 34
7. MEMORY USAGE 35

Figures

Figure 1-1 Software Stacks and Scope 4
Figure 3-1 Example of Input Buffer Sequence - A Frame Data 10
Figure 3-2 Example of Input Buffer Sequence - An Interlaced Field 10
Figure 3-3 Example of Input Buffer Sequence - A Pair of Interlaced Fields 11
Figure 3-4 Example of Input Buffer Sequence - SPS NAL and PPS NAL is stored in each buffer 11
Figure 3-5 Example of Input Buffer Sequence - SPS NAL and PPS NAL are stored in the same buffer 12
Figure 3-6 Example of Input Buffer Sequence – Timestamp Separated 13
Figure 3-7 Input Stream Data Format - OMXR_MC_VIDEO_StoreUnitEofSeparated mode 15
Figure 3-8 Input Stream Data Format - OMXR_MC_VIDEO_StoreUnitTimestampSeparated mode 16

Tables

Table 1-1 Required Header Files 5
Table 1-2 Role Name and Component Name 5
Table 1-3 List of Related Documents 5
Table 1-4 Terminology 6
Table 2-1 Supported Codec Standard and Functions 7
Table 5-1 Available Standard Indexes for H.264 Decoder Media Component 19
Table 5-2 Available extended indexes for H.264 Decoder Media Component 20
Table 5-3 Valid Indexes and OpenMAX IL Macro Function 21
Table 6-1 H.264 Decoder Media Component Specific Structures 22
Table 6-2 Notation for the access attribute of a structure member 22
Table 6-3 Specific Usage on Buffer Flags 34
Table 7-1 Required Memory Types 35
Table 7-2 Memory Usage for 1920×1080 Stream Decoding 36

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 Decoder Media Component. For the specifications that are common to OMX video decoder, see related documents [1] and [2].

1.2. H.264 Decoder Media Component Overview and Scope

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

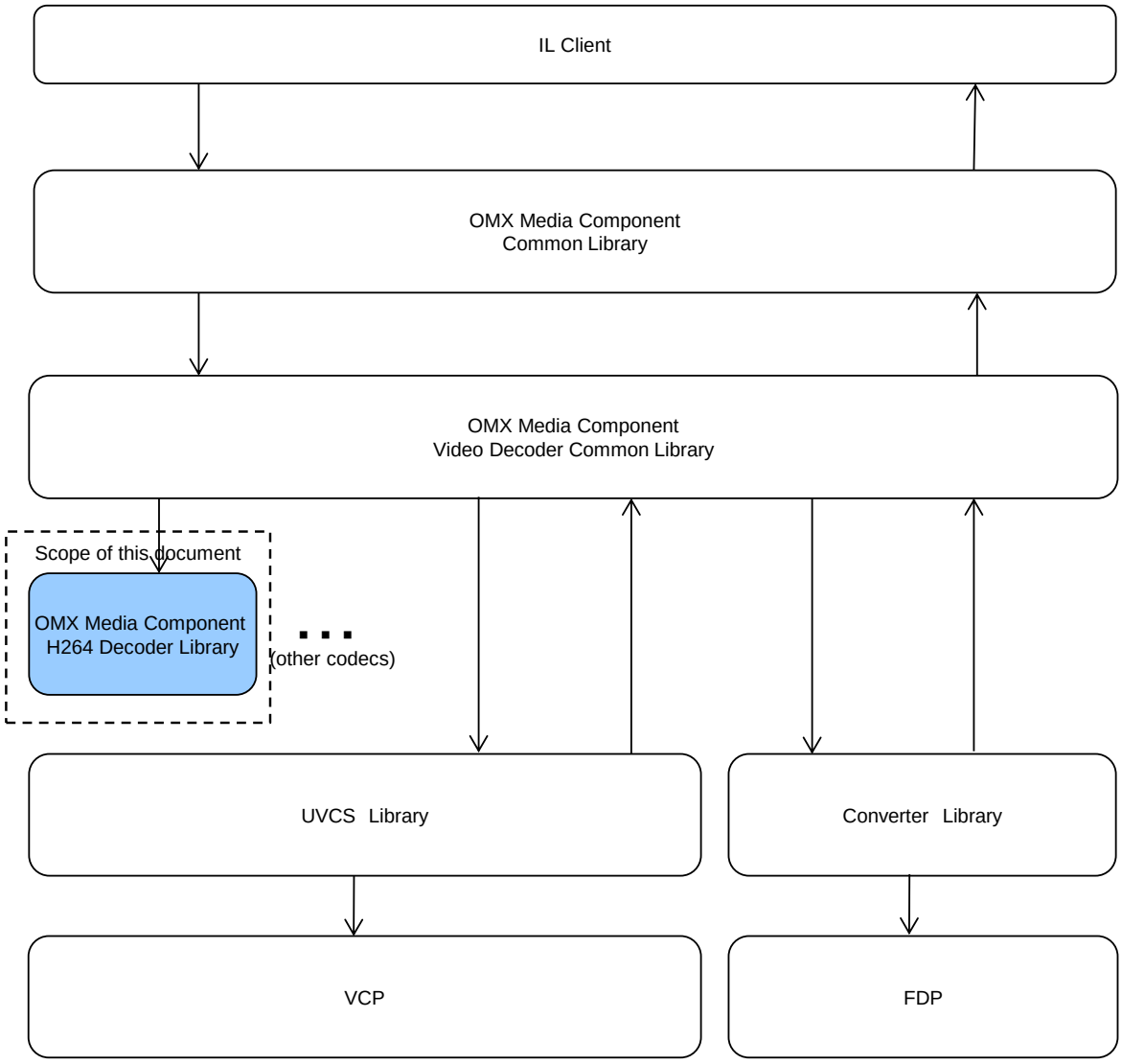

Figure 1-1 Software Stacks and Scope

This document describes the specifications of OMX Media Component H.264 Decoder library part. For the specifications of OMX Media Component Video Decoder 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_h264d.h	-

1.4. Role Name and Component Name

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

Table 1-2 Role Name and Component Name

Role name	Component name
video_decoder.avc	OMX.RENESAS.VIDEO.DECODER.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 Decoder Common Part	The common specifications for OMX Video Decoder 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
[4]	OMX Integration Guide for <OS >	Integration guide for OMX Media Component. Substitute <OS> with your target operating system name.

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.

2. Functions

H.264 Decoder Media Component is a media component which provides functions to decode video stream that is compressed according to the H.264 standard. H.264 Decoder Media Component receives encoded stream data on the input port and emits the decoded video frame data on the output ports.
For the specifications that are common to OMX video decoders, see related document [2].

2.1. Function Details

2.1.1. Decode Functions

Table 2-1 shows the codec standard and functions that H.264 Decoder 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 / Main Profile / High Profile / Progressive High Profile / Constrained High Profile
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	The following tools are not supported for all profiles: - ASO (Arbitrary Slice Order) - FMO (Flexible Macroblock Ordering) - RS (Redundant Slice)
Picture size	<Progressive> Note1 - Width : 80 - 1920 (must be multiple of 2) - Height : 80 - 1088 (must be multiple of 2) <Interlace> Note1 - Width : 80 - 1920 (must be multiple of 2) - Height : 80 - 1088 (must be multiple of 4)
Bit rate	Maximum 40Mbits/s Note2
Frame rate	Maximum 60p / 60i Note2
Input format	H.264 Elementary Stream (Annex B Byte stream format)
Output format	YUV420 Semi-Planar format YUV420 Planar format

Note1: The allowable width and height are 1920 and the maximum number of macroblocks per picture is up to 8160 that is equals to the one of 1920x1088 stream. Therefore, 1088x1920 stream is supported.

Note2: 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 modules except OMX Media Component.

3. I/O Data Format

3.1. Buffer Payload

3.1.1. Input Buffer Payload

H.264 Decoder Media Component supports two modes of input data format: OMXR_MC_VIDEO_StoreUnitEofSeparated and OMXR_MC_VIDEO_StoreUnitTimestampSeparated that this section below describes in details for each mode. The mode can be specified with the *eStoreUnit* member of OMXR_MC_VIDEO_PARAM_STREAM_STORE_UNITTYPE structure via the index OMXR_MC_IndexParamVideoStreamStoreUnit that is described in section 5.2.1.

ATTENTION:
IL client should use the OMXR_MC_VIDEO_StoreUnitEofSeparated mode.
OMXR_MC_VIDEO_StoreUnitTimestampSeparated is defined for backward compatibility with the former version of OMX. The mode has a disadvantage in the decode performance and might be deprecated in the major version update of OMX.

(1) OMXR_MC_VIDEO_StoreUnitEofSeparated mode

- The input data is picture data unit that is defined as either of the following:
  - A frame data of progressive contents (see Figure 3-1)
  - An interlaced field (see Figure 3-2)
  - A pair of interlaced fields (see Figure 3-3)

- Each NAL data must start with StartCodePrefix (see section 3.2).

- When SPS NAL and/or PPS NAL input is separate from a picture data, OMX_BUFFERFLAG_CODECCONFIG must be set in the *nFlags* member of the OMX_BUFFERHEADERTYPE structure of a buffer contains SPS NAL and/or PPS NAL (see Figure 3-4 and Figure 3-5).

- OMX_BUFFERFLAG_ENDOFFRAME must be set in the *nFlags* member of the OMX_BUFFERHEADERTYPE structure only when a buffer payload contains the last data of a picture data.

- When input is the end-of-stream, OMX_BUFFERFLAG_EOS must be set in the *nFlags* member of the OMX_BUFFERHEADERTYPE structure. For the details of OMX_BUFFERFLAG_EOS, see related document [2].

ATTENTION:
There is a performance disadvantage to store a picture data into multiple buffers. Therefore IL client should store a picture data into a single buffer.

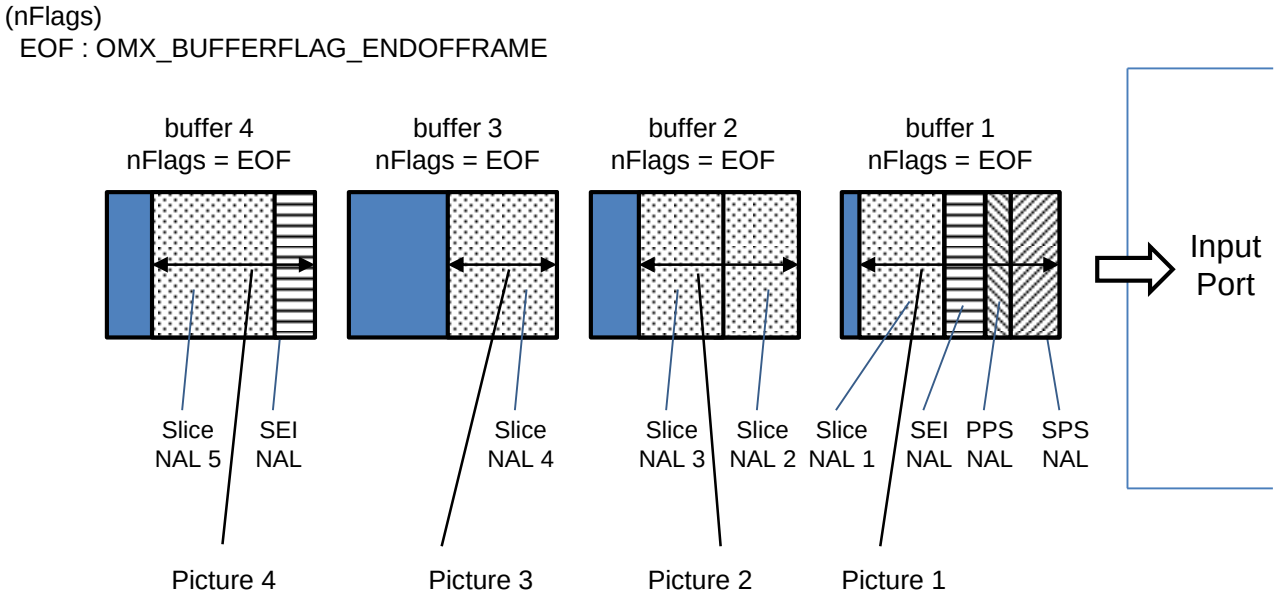

Figure 3-1 Example of Input Buffer Sequence - A Frame Data

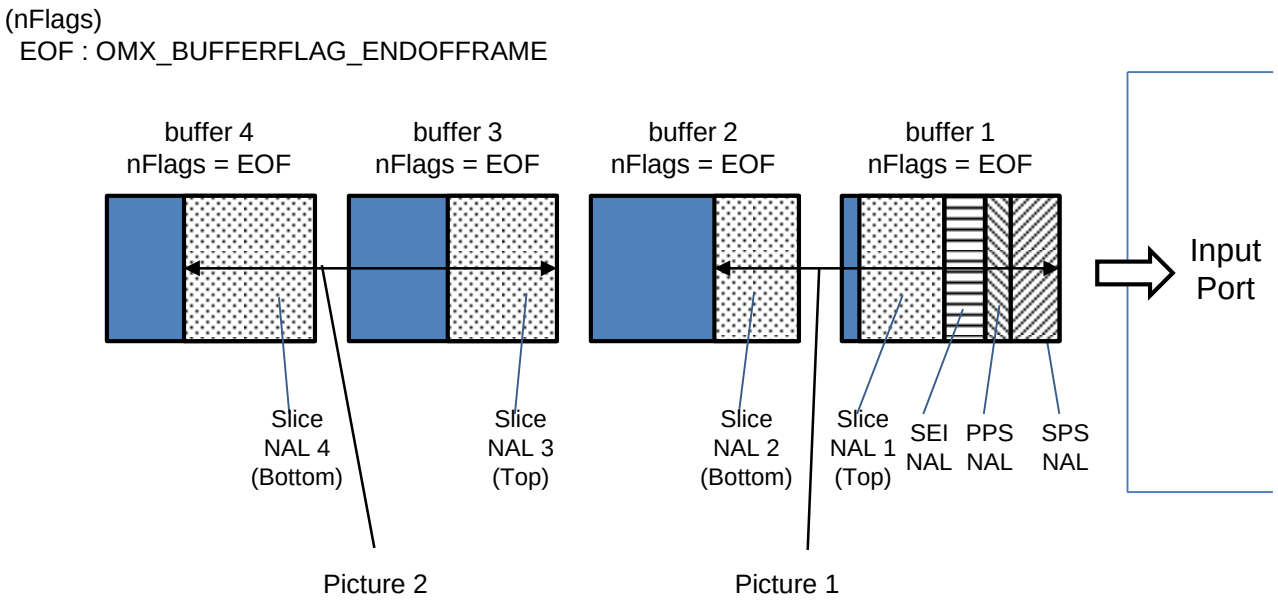

Figure 3-2 Example of Input Buffer Sequence - An Interlaced Field

(nFlags)
EOF : OMX_BUFFERFLAG_ENDOFFRAME

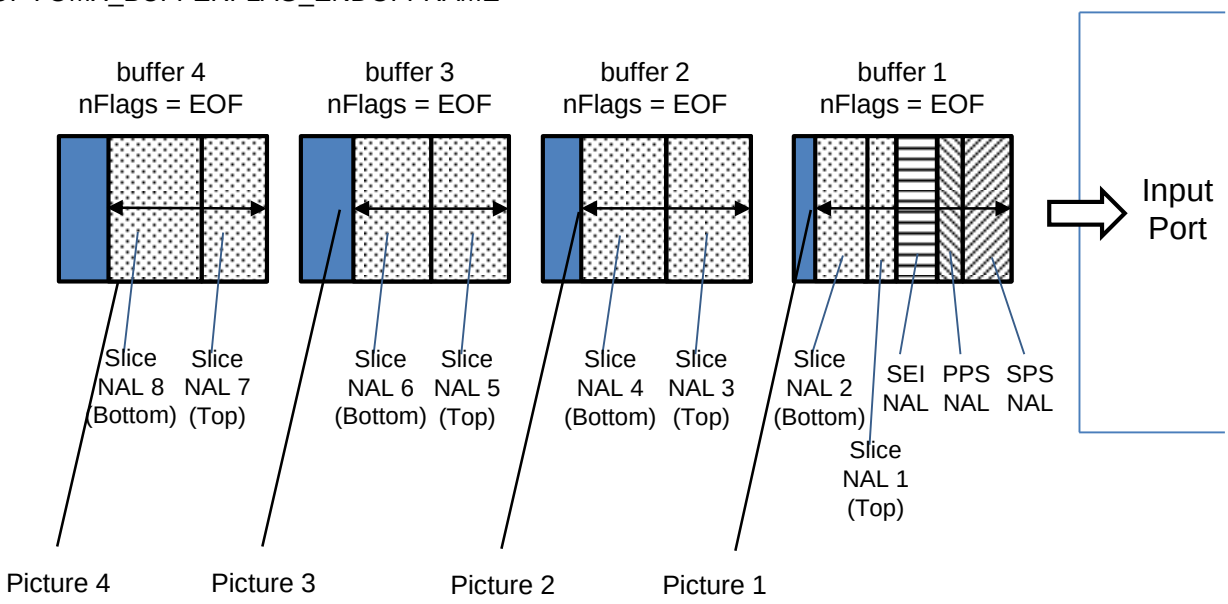

Figure 3-3 Example of Input Buffer Sequence - A Pair of Interlaced Fields

(nFlags)
EOF : OMX_BUFFERFLAG_ENDOFFRAME
CONFIG : OMX_BUFFERFLAG_CODECCONFIG

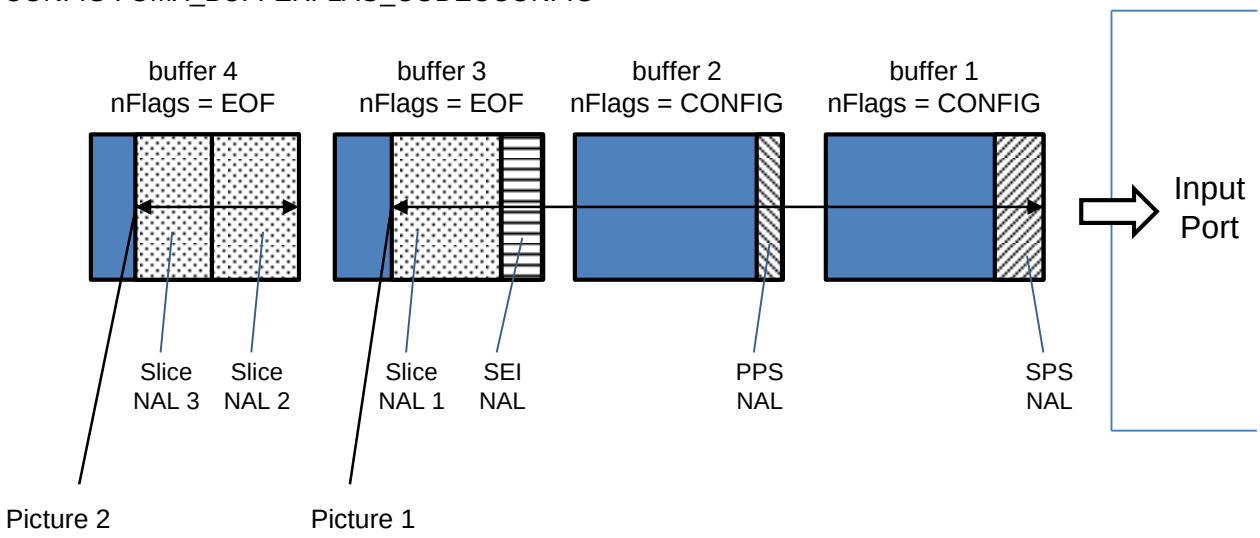

Figure 3-4 Example of Input Buffer Sequence - SPS NAL and PPS NAL is stored in each buffer

(nFlags)
EOF : OMX_BUFFERFLAG_ENDOFFRAME
CONFIG : OMX_BUFFERFLAG_CODECCONFIG

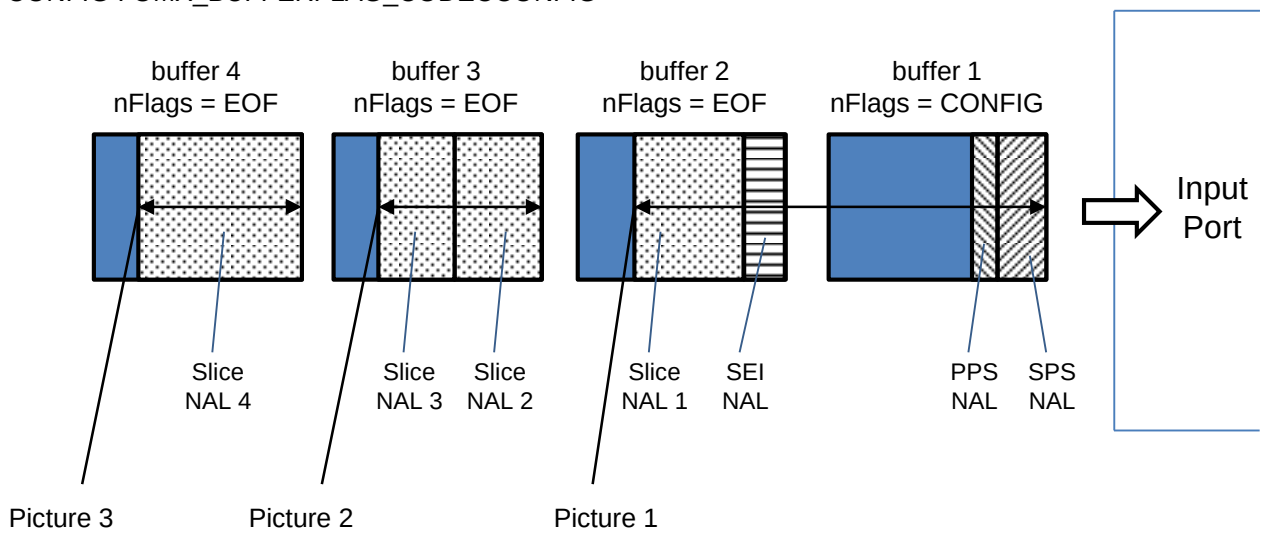

Figure 3-5 Example of Input Buffer Sequence - SPS NAL and PPS NAL are stored in the same buffer

(2) OMXR_MC_VIDEO_StoreUnitTimestampSeparated mode

- The input data is NAL data unit.
- Each NAL data must not start with StartCodePrefix (see section 3.2).
- When SPS NAL and/or PPS NAL are input, OMX_BUFFERFLAG_CODECCONFIG must be set in the *nFlags* member of the OMX_BUFFERHEADERTYPE structure of a buffer contains SPS NAL and/or PPS NAL.
- Picture data unit is defined as either of the following:
  - A frame data of progressive contents
  - An interlaced field

  A picture data must consist of single buffer or multiple buffers that have same timestamp value in the *nTimeStamp* member of the OMX_BUFFERHEADERTYPE structure (see Figure 3-6).
- When input is the end-of-stream, OMX_BUFFERFLAG_EOS must be set in the *nFlags* member of the OMX_BUFFERHEADERTYPE structure. For the details of OMX_BUFFERFLAG_EOS, see [2].

ATTENTION: As described in section 3.1, IL clients should not use the OMXR_MC_VIDEO_StoreUnitTimestampSeparated mode.

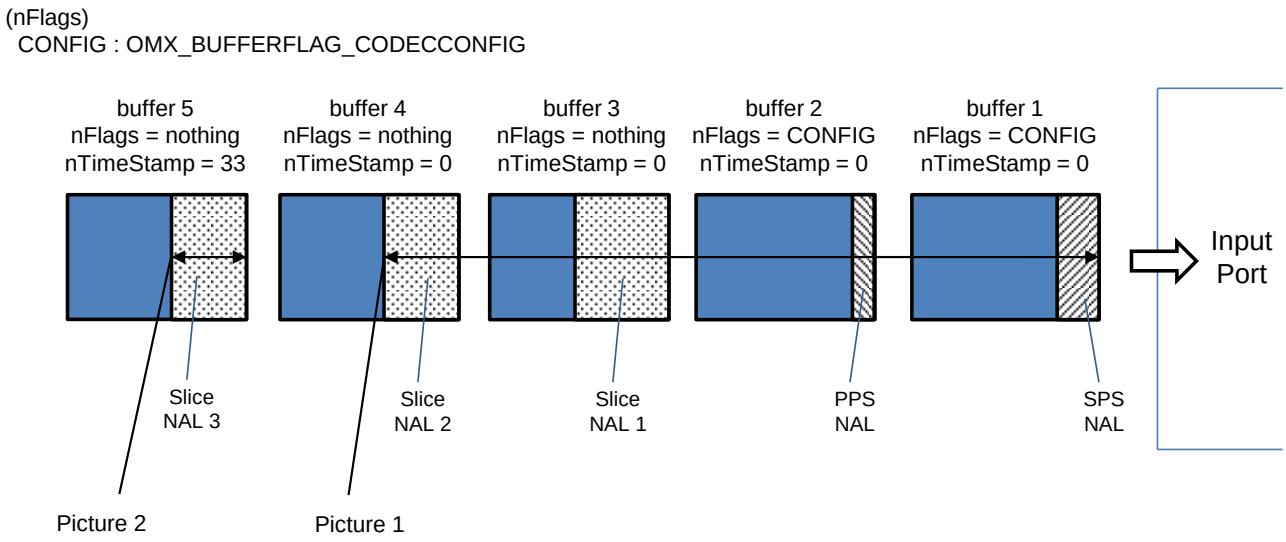

Figure 3-6 Example of Input Buffer Sequence – Timestamp Separated

3.1.2. Output Buffer Payload

See related document [2].

3.2. Input Stream Data Format

Figure 3-7 and Figure 3-8 illustrate the input stream format for the OMXR_MC_VIDEO_StoreUnitEofSeparated mode and the OMXR_MC_VIDEO_StoreUnitTimestampSeparated mode, respectively. While the input format of the former mode is H.264 Annex B Byte stream format itself, the one of latter mode is no StartCodePrefix format.

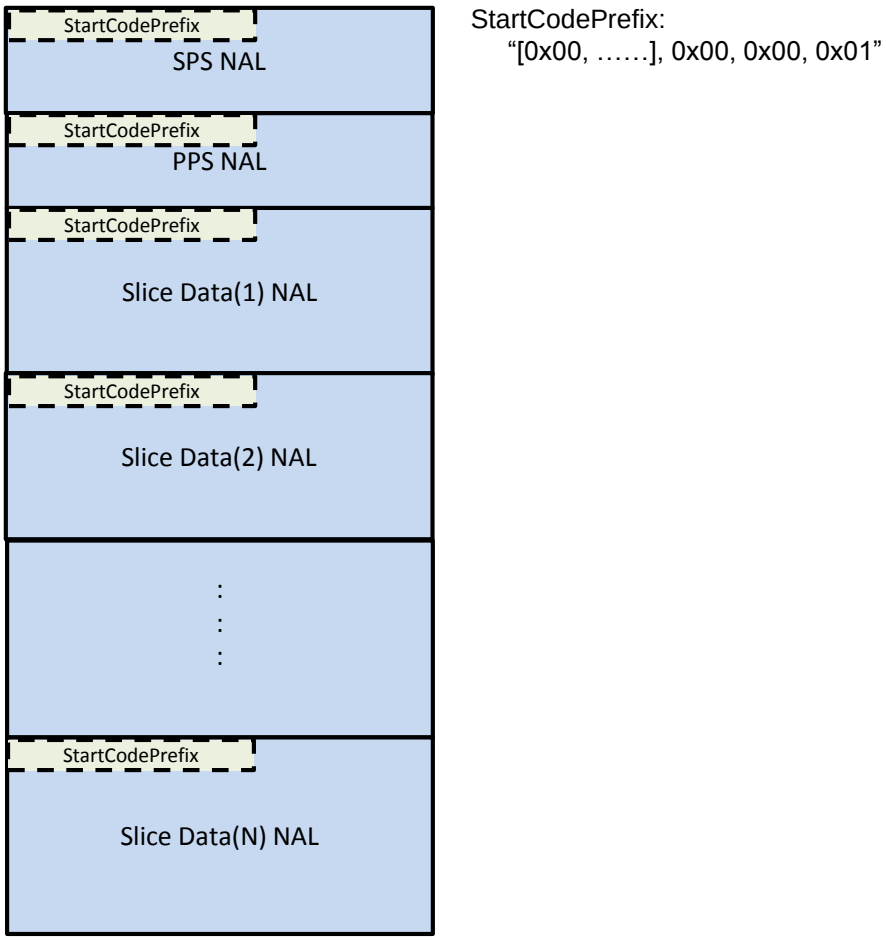

Figure 3-7 Input Stream Data Format - OMXR_MC_VIDEO_StoreUnitEofSeparated mode

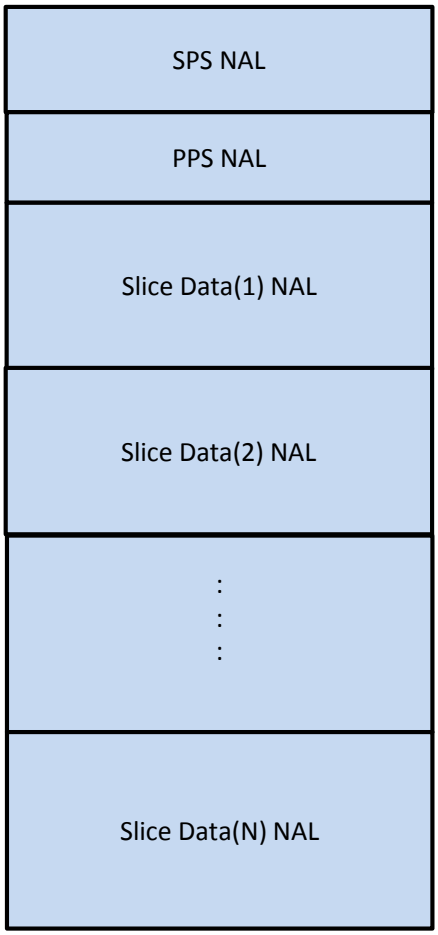

Figure 3-8 Input Stream Data Format - OMXR_MC_VIDEO_StoreUnitTimestampSeparated mode

3.3. Output Picture Data Format

See related document [2].

4. API Reference

See related document [2].

5. Indexes

5.1. Standard Indexes of H.264 Decoder Media Component

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

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

Index	Description
OMX_IndexParamPortDefinition	See related document [2]
OMX_IndexParamVideoPortFormat	
OMX_IndexConfigCommonOutputCrop	
OMX_IndexConfigCommonScale	
OMX_IndexParamVideoProfileLevelQuerySupported	
OMX_IndexParamVideoProfileLevelCurrent	
OMX_IndexParamVideoAvc	See section 5.1.1

5.1.1. OMX_IndexParamVideoAvc

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

[Corresponding Structure] OMX_VIDEO_PARAM_AVCTYPE structure

[Notes] None

5.2. Extended Indexes of H.264 Decoder Media Component

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

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

Index	Description
OMXR_MC_IndexParamVideoReorder	See related document [2]
OMXR_MC_IndexParamVideoDeinterlaceMode	
OMXR_MC_IndexParamVideoStreamStoreUnit	See section 5.2.1

5.2.1. OMXR_MC_IndexParamVideoStreamStoreUnit

[Description] An index to set the mode for the input buffer format that is described in section 3.1.1.

[String] “OMX.RENESAS.INDEX.PARAM.VIDEO.STREAM.STORE.UNIT”

[Corresponding Structure] OMXR_MC_VIDEO_PARAM_STREAM_STORE_UNITTYPE 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/SetParameter		Get/SetConfig	
		Get	Set	Get	Set
VPB+0	OMX_IndexParamPortDefinition	See related document [2]			
	OMX_IndexParamVideoPortFormat				
	OMX_IndexParamVideoProfileLevelQuerySupported				
	OMX_IndexParamVideoProfileLevelCurrent				
	OMX_IndexParamVideoAvc	X	X	-	-
	OMXR_MC_IndexParamVideoStreamStoreUnit	X	X	-	-
VPB+1	OMX_IndexParamPortDefinition	See related document [2]			
	OMX_IndexParamVideoPortFormat				
	OMX_IndexConfigCommonOutputCrop				
	OMX_IndexConfigCommonScale				
	OMXR_MC_IndexParamVideoReorder				
	OMXR_MC_IndexParamVideoDeinterlaceMode				

X : Valid
- : Invalid

6. Structures

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

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

Structure Name	Description
OMX_VIDEO_PARAM_AVCTYPE	See section 6.1
OMXR_MC_VIDEO_PARAM_STREAM_STORE_UNITTYPE	See section 6.2

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

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

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

[Index] OMX_IndexParamVideoAvc

[Member]

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

[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 + 0
Read Value	-
Initial Value	-
Notes	-

nSliceHeaderSpacing

Write Value	-
Read Value	0
Initial Value	0
Notes	-

nPFrames

Write Value	-
Read Value	0
Initial Value	0
Notes	-

nBFrames

Write Value	-
Read Value	0
Initial Value	0
Notes	-

bUseHadamard

Write Value	-
Read Value	OMX_FALSE
Initial Value	OMX_FALSE
Notes	-

nRefFrames

Write Value	-
Read Value	0
Initial Value	0
Notes	-

nRefIdx10ActiveMinus1

Write Value	-
Read Value	0
Initial Value	0
Notes	-

nRefIdx11ActiveMinus1

Write Value	-
Read Value	0
Initial Value	0
Notes	-

bEnableUEP

Write Value	-
Read Value	OMX_FALSE
Initial Value	OMX_FALSE
Notes	-

bEnableFMO

Write Value	-
Read Value	OMX_FALSE
Initial Value	OMX_FALSE
Notes	-

bEnableASO

Write Value	-
Read Value	OMX_FALSE
Initial Value	OMX_FALSE
Notes	-

bEnableRS

Write Value	-
Read Value	OMX_FALSE
Initial Value	OMX_FALSE
Notes	-

eProfile

Write Value	-
Read Value	OMX_VIDEO_AVCProfileBaseline OMX_VIDEO_AVCProfileMain OMX_VIDEO_AVCProfileHigh OMXR_MC_VIDEO_AVCProfileUnknown
Initial Value	OMX_VIDEO_AVCProfileBaseline
Notes	- This member is the profile of the video stream that is currently being processed. - When the input stream is Constrained Baseline Profile, this member is set to OMX_VIDEO_AVCProfileBaseline. - When the input stream is Progressive High Profile or Constrained High Profile, this member is set to OMX_VIDEO_AVCProfileHigh.

eLevel

Write Value	-
Read 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 OMXR_MC_VIDEO_AVCLevelUnknown
Initial Value	OMX_VIDEO_AVCLevel1
Notes	- This member is the level of the video stream that is currently being processed.

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 *eProfile* member.

bFrameMBsOnly

Write Value	-
Read Value	OMX_FALSE
Initial Value	OMX_FALSE
Notes	-

bMBAFF

Write Value	-
Read Value	OMX_FALSE
Initial Value	OMX_FALSE
Notes	-

bEntropyCodingCABAC

Write Value	-
Read Value	OMX_FALSE
Initial Value	OMX_FALSE
Notes	-

bWeightedPPrediction

Write Value	-
Read Value	OMX_FALSE
Initial Value	OMX_FALSE
Notes	-

nWeightedBipredicitonMode

Write Value	-
Read Value	0
Initial Value	0
Notes	-

bconstIpred

Write Value	-
Read Value	OMX_FALSE
Initial Value	OMX_FALSE
Notes	-

bDirect8x8Inference

Write Value	-
Read Value	OMX_FALSE
Initial Value	OMX_FALSE
Notes	-

bDirectSpatialTemporal

Write Value	-
Read Value	OMX_FALSE
Initial Value	OMX_FALSE
Notes	-

nCabacInitIdc

Write Value	-
Read Value	0
Initial Value	0
Notes	-

eLoopFilterMode

Write Value	-
Read Value	OMX_VIDEO_AVCLoopFilterEnable
Initial Value	OMX_VIDEO_AVCLoopFilterEnable
Notes	-

6.2. OMXR_MC_VIDEO_PARAM_STREAM_STORE_UNITTYPE

[Description] A structure to set the mode for the input buffer format that is described in section 3.1.1.

[Definition]
```
typedef struct tagOMXR_MC_VIDEO_PARAM_STREAM_STORE_UNITTYPE {
        OMX_U32                                 nSize;
        OMX_VERSIONTYPE                         nVersion;
        OMX_U32                                 nPortIndex;
        OMXR_MC_VIDEO_STOREUNITTYPE             eStoreUnit;
} OMXR_MC_VIDEO_PARAM_STREAM_STORE_UNITTYPE;
```

[Index] OMXR_MC_IndexParamVideoStreamStoreUnit

[Member]

Member Name	Get	Set
nSize	W	W
nVersion	W	W
nPortIndex	W	W
eStoreUnit	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 + 0
Read Value	-
Initial Value	-
Notes	-

eStoreUnit

Write Value	OMXR_MC_VIDEO_StoreUnitEofSeparated OMXR_MC_VIDEO_StoreUnitTimestampSeparated
Read Value	(Current setting)
Initial Value	OMXR_MC_VIDEO_StoreUnitEofSeparated
Notes	For details of this member, see section 3.1.1.

6.3. Specific Usage on Common Structure Members

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

6.3.1. OMX_VIDEO_PORTDEFINITIONTYPE (Input Port)

[Index] OMX_IndexParamPortDefinition

[Details]

nFrameWidth

Write Value	80 - 1920
Read Value	(Current setting)
Initial Value	176
Notes	− An odd value is rounded down to the closest even value. − No effects on the decode processing.

nFrameHeight

Write Value	80 - 1920
Read Value	(Current setting)
Initial Value	144
Notes	− An odd value is rounded down to the closest even value. − No effects on the decode processing.

eCompressionFormat

Write Value	-
Read Value	OMX_VIDEO_CodingAVC
Initial Value	OMX_VIDEO_CodingAVC
Notes	-

6.3.2. OMX_VIDEO_PARAM_PORTFORMATTYPE (Input Port)

[Index] OMX_IndexParamVideoPortFormat

[Details]

eCompressionFormat

Write Value	-
Read Value	OMX_VIDEO_CodingAVC
Initial Value	OMX_VIDEO_CodingAVC
Notes	-

6.3.3. 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 (*nProfileIndex*=0, 1, 2)
Initial Value	OMX_VIDEO_AVCLevel42
Notes	-

nProfileIndex

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

6.3.4. OMX_VIDEO_PARAM_PROFILELEVELTYPE (ProfileLevelCurrent)

[Index] OMX_IndexParamVideoProfileLevelCurrent

[Details]

eProfile

Write Value	-
Read Value	OMX_VIDEO_AVCProfileBaseline OMX_VIDEO_AVCProfileMain OMX_VIDEO_AVCProfileHigh
Initial Value	OMX_VIDEO_AVCProfileBaseline
Notes	-

eLevel

Write Value	-
Read Value	OMX_VIDEO_AVCLevel1 OMX_VIDEO_AVCLevel1b OMX_VIDEO_AVCLevel11 OMX_VIDEO_AVCLevel12 OMX_VIDEO_AVCLevel13 OMX_VIDEO_AVCLeve2 OMX_VIDEO_AVCLevel21 OMX_VIDEO_AVCLevel22 OMX_VIDEO_AVCLevel3 OMX_VIDEO_AVCLevel31 OMX_VIDEO_AVCLevel32 OMX_VIDEO_AVCLevel4 OMX_VIDEO_AVCLevel41 OMX_VIDEO_AVCLevel42
Initial Value	OMX_VIDEO_AVCLevel1
Notes	-

nProfileIndex

Write Value	-
Read Value	0
Initial Value	0
Notes	-

6.3.5. OMXR_MC_VIDEO_DECODERESULTTYPE

[Index] N/A

[Details]

u32PictWidth

Write Value	-
Read Value	The width of the decoded picture data in pixels
Initial Value	-
Notes	None.

u32PictHeight

Write Value	-
Read Value	The height of the decoded picture data in pixels
Initial Value	-
Notes	None.

6.3.6. Buffer Flags (*nFlags*)

H.264 Decoder Media Component has specific usage for the buffer flags listed in Table 6-3. For the other flags, see related document [2].

Table 6-3 Specific Usage on Buffer Flags

Flag	Description
OMX_BUFFERFLAG_CODECCONFIG	See section 3.1.1.

7. Memory Requirement

Table 7-1 describes the types of the memory that H.264 Decoder 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 1,572,864 x *nBufferCountActual*. For details of the *nBufferCountActual* member, see related document [2].
output buffer	Hardware and CPU	Buffers for the output port. The required memory size is (*nStride* x *nSliceHeight* x 3 / 2) x *nBufferCountActual.* For details of the *nBufferCountActual* member, see related document [2]. In the case IL client uses OMX_UseBuffer() for the output port, the allocated buffers must be accessible from hardware and need not be accessible from CPU.
work buffer	Hardware and CPU	Work buffers for decoding.
stream_work_0	Hardware	Work buffers for decoding.
stream_work_1	Hardware and CPU	
stream_work_2	Hardware	Work buffers for decoding. stream_work_2 is mv information work area.
stream_work_3	CPU	Work buffers for decoding.
stream_work_4	Hardware and CPU	
stream_work_5	Hardware and CPU	
frame_mem	Hardware	Frame buffers used for reference decoding and output.
lib_work_mem	CPU	A work buffer for storing information used for decoding control.
tmp_work_mem	CPU	A temporary work buffer required for the initial stream header decoding.

Note: For hardware restrictions of memory, see related document [4].

Table 7-2 shows the memory requirement in the case of 1920x1080 Level 4.2 stream decoding per component instance. Multiple component instances require their own work memory, respectively.

Table 7-2 Memory Requirement for 1920x1080 Stream Decoding

Memory Type	Size	Notes
input buffer	3 [Mbyte]	In the case where the *nBufferCountActual* for the input port is set to 2.
output buffer	9 [Mbyte]	In the case where the *nBufferCountActual* for the output port is set to 3.
work buffer	3 [Mbyte]	-
stream_work_0	20 [Mbyte]	-
stream_work_1	139 [Kbyte]	Fixed size
stream_work_2	2,664 [Kbyte]	Worst case 10[Mbyte]
stream_work_3	226 [Kbyte]	Fixed size
stream_work_4	2 [Kbyte]	-
stream_work_5	1 [Kbyte]	Fixed size
frame_mem	27 [Mbyte]	Worst case 40[Mbyte]
lib_work_mem	128 [Kbyte]	Fixed size
tmp_work_mem	840 [Kbyte]	Fixed size

Since the reference frame memory size depends on DPB size, picture size and horizontal memory alignment, the worst case in Level 4.2 decoding is 1040 x 1040 sized stream that requests 40 [Mbyte] for frame_mem.

REVISION HISTORY	OMX Media Component User's Manual : H.264 Decoder Part

Rev.	Date	Description	
		Page	Summary
0.06	Dec. 20, 2013	–	Draft revision based on Japanese User's Manual Rev.0.06.
0.07	Jan. 31, 2014	–	Fixed typos.
0.08	Mar. 25, 2014	34	Add the detailed information of Memory Requirement.
0.09	May. 29, 2014	4	Fixed Figure1-1: "Video Common Library" to "Video Decoder Common Library"
	May. 30, 2014	34	Correct the descriptions for stream_work_x and lib_work_mem in Table 7-1
	Jun. 4, 2014	34	Correct the value for stream_work_2 size in Table 7-2
	Jul. 23, 2014	34	Updated Description of stream_work_* in Table7-1 Updated Notes and Size in Table7-2
0.10	Jul. 29, 2014	34	Fixed Table 7-1: Highlight reference to the related document.
1.00	Aug. 20 2014	33	Add section 6.3.5.OMXR_MC_VIDEO_DECODERESULTTYPE.
	Aug. 20 2014	34	Fixed Table 7-1
	Aug. 26,2014	23	Updated parameter of Set in OMX_VIDEO_PARAM_AVCTYPE.
	Aug. 27,2014	26	Updated Read Value of *eLevel* in OMX_VIDEO_PARAM_AVCTYPE.
1.0.1	Oct.14 2014	35-36	Added the "work buffer" in Table7-1/Table7-2. Updated Size in Table7-2

SALES OFFICES Renesas Electronics Corporation http://www.renesas.com

Refer to "http://www.renesas.com/" for the latest and detailed information.

Renesas Electronics America Inc.
2880 Scott Boulevard Santa Clara, CA 95050-2554, U.S.A.
Tel: +1-408-588-6000, Fax: +1-408-588-6130

Renesas Electronics Canada Limited
1101 Nicholson Road, Newmarket, Ontario L3Y 9C3, Canada
Tel: +1-905-898-5441, Fax: +1-905-898-3220

Renesas Electronics Europe Limited
Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, U.K
Tel: +44-1628-651-700, Fax: +44-1628-651-804

Renesas Electronics Europe GmbH
Arcadiastrasse 10, 40472 Düsseldorf, Germany
Tel: +49-211-65030, Fax: +49-211-6503-1327

Renesas Electronics (China) Co., Ltd.
7th Floor, Quantum Plaza, No.27 ZhiChunLu Haidian District, Beijing 100083, P.R.China
Tel: +86-10-8235-1155, Fax: +86-10-8235-7679

Renesas Electronics (Shanghai) Co., Ltd.
Unit 204, 205, AZIA Center, No.1233 Lujiazui Ring Rd., Pudong District, Shanghai 200120, China
Tel: +86-21-5877-1818, Fax: +86-21-6887-7858 / -7898

Renesas Electronics Hong Kong Limited
Unit 1601-1613, 16/F., Tower 2, Grand Century Place, 193 Prince Edward Road West, Mongkok, Kowloon, Hong Kong
Tel: +852-2886-9318, Fax: +852 2886-9022/9044

Renesas Electronics Taiwan Co., Ltd.
13F, No. 363, Fu Shing North Road, Taipei, Taiwan
Tel: +886-2-8175-9600, Fax: +886 2-8175-9670

Renesas Electronics Singapore Pte. Ltd.
80 Bendemeer Road, Unit #06-02 Hyflux Innovation Centre Singapore 339949
Tel: +65-6213-0200, Fax: +65-6213-0300

Renesas Electronics Malaysia Sdn.Bhd.
Unit 906, Block B, Menara Amcorp, Amcorp Trade Centre, No. 18, Jln Persiaran Barat, 46050 Petaling Jaya, Selangor Darul Ehsan, Malaysia
Tel: +60-3-7955-9390, Fax: +60-3-7955-9510

Renesas Electronics Korea Co., Ltd.
11F., Samik Lavied' or Bldg., 720-2 Yeoksam-Dong, Kangnam-Ku, Seoul 135-080, Korea
Tel: +82-2-558-3737, Fax: +82-2-558-5141

© 2013 Renesas Electronics Corporation. All rights reserved.

Colophon 1.3

OMX Media Component
User's Manual: H.264 Decoder Part

Publication Date: Rev. 1.00 Aug. 29, 2014

Published by: Renesas Electronics Corporation
© 2013 Renesas Electronics Corporation. All rights reserved.

OMX Media Component

User's Manual: H.264 Decoder Part

Renesas Electronics Corporation