ISO/IEC 23002-4:2018-03 (E)

Information technology - MPEG video technologies - Part 4: Video tool library

Contents

Page

Foreword viii

Introduction x

1 Scope 1

2 Normative references 1

3 Terms and definitions 2

4 FU description convention 2
4.1 FU interface 2
4.2 FU IDs 3
4.3 Token pool 7
4.4 Array data order 10
4.5 Input ports (reset_i, init_i, start_i) 10
4.6 FU block diagram notations 10
4.7 Conventions 11
4.8 Granular FU 11

5 General-purpose FUs 11
5.1 Syntax parsing 11
5.1.1 Generic syntax parser 11
5.1.2 Algo_Byte2bit 11
5.1.3 Mgnt_Select_MB_4 12
5.1.4 Mgnt_Merger420 12
5.1.5 Mgnt_Select_MB_8 12
5.1.6 Mgnt_SynP_DEMUX 13
5.1.7 Mgnt_SynP_BytePreprocessor 13
5.2 General processing FUs 14
5.2.1 Algo_InverseQuantization1D 14
5.2.2 Algo_InverseQuantizationND 15
5.2.3 Algo_InversePrediction1D 18
5.2.4 Algo_InversePredictionND 20
5.2.5 Algo_ED_AD_StaticBit 24
5.2.6 Algo_ED_VLD 26
5.2.7 Alog_ED_AD_AdaptiveBit 27
5.2.8 Algo_ED_BitPrecision 28
5.2.9 Algo_ED_AD 31
5.2.10 Algo_ED_AD_EG 36
5.2.11 Algo_ED_4bitsD 42
5.2.12 Algo_ED_FixedLength 44
5.2.13 Algo_LookUpTable1D 45
5.2.14 Algo_ContextModeling 46
5.2.15 Algo_simpleMath_2op 48
5.2.16 Mgnt_Replicate_1_2 50
5.2.17 Mgnt_Replicate_1_4 50
5.2.18 Mgnt_Replicate_1_8 51
5.2.19 Mgnt_MUX_2_1 52
5.2.20 Mgnt_MUX_4_1 53
5.2.21 Mgnt_MUX_8_1 55
5.2.22 Mgnt_DEMUX_1_2 56

5.2.23 Mgnt_DEMUX_1_4 57
5.2.24 Mgnt_DEMUX_1_8 59
5.2.25 Mgnt_ExtractSegment 60
5.2.26 Mgnt_ProviderValue 61
5.2.27 Mgnt_RepeatSegment 62
5.2.28 Mgnt_ExtractBytes 64
5.2.29 Mgnt_ExtractBits 65
5.2.30 Mgnt_Provider1D 66
5.2.31 Mgnt_Provider2D 67

6 FUs for MPEG-4 Simple Profile 69
6.1 General 69
6.2 Syntax parsing 69
6.2.1 Algo_SynP 69
6.2.2 Mgnt_BlockExpand 69
6.2.3 Mgnt_Splitter420B 70
6.2.4 Mgnt_Splitter420MV 70
6.2.5 Algo_MVR_MedianOfThreeLeftAndTopAndTopRight 71
6.2.6 Mgnt_Splitter_420_TYPE 71
6.2.7 Algo_VLDtableB6_MPEG4Part2 72
6.2.8 Algo_VLDtableB7_MPEG4Part2 72
6.2.9 Algo_VLDtableB8_MPEG4Part2 73
6.2.10 Algo_VLDtableB12_MPEG4Part2 73
6.2.11 Algo_VLDtableB13_MPEG4Part2 73
6.2.12 Algo_VLDtableB14_MPEG4Part2 74
6.2.13 Algo_VLDtableB15_MPEG4Part2 74
6.2.14 Algo_VLDtableB16_MPEG4Part2 75
6.2.15 Algo_VLDtableB17_MPEG4Part2 75
6.3 Texture decoding 76
6.3.1 Algo_IQ_QSAndQmatrixMp4vOrH263Scaler 76
6.3.2 Algo_DCRAddr_ThreeLeftTop_8x8 76
6.3.3 Algo_DCRAddr_ThreeLeftTop_16x16 77
6.3.4 Algo_DCRInvPred_CHROMA_8x8 77
6.3.5 Algo_DCRInvPred_LUMA_16x16 78
6.3.6 Algo_IS_ZigzagOrAlternateHorizontalVertical_8x8 79
6.3.7 Algo_IAP_AdaptiveHorizontalOrVerticalPred_8x8 79
6.3.8 Algo_IAP_AdaptiveHorizontalOrVerticalPred_16x16 80
6.3.9 Algo_IDCT2D_ISOIEC_23002_1 80
6.3.10 Mgnt_DCSplit 81
6.4 Motion compensation 81
6.4.1 Mgnt_FB_w_Addess_8x8 81
6.4.2 Mgnt_FB_w_Addess_16x16 82
6.4.3 Algo_PictureReconstruction_Saturation 82
6.4.4 Algo_Interp_HalfpelBilinearRoundingControl 83

7 FUs for MPEG-4 AVC Constrained Baseline Profile 84
7.1 General 84
7.2 Syntax parsing 84
7.2.1 Algo_NALU 84
7.2.2 Algo_SynP 84
7.2.3 Algo_BlockExpand 85
7.2.4 Algo_BlockSplit 85
7.2.5 Algo_IntraPred_Split 86
7.2.6 Algo_Parser_I_PCM 86
7.2.7 Algo_DemuxParserInfoForBlocks_Chroma 87
7.2.8 Algo_DemuxParserInfoForBlocks_Luma 87
7.3 Texture decoding 88
7.3.1 Algo_IS_Zigzag_4x4 88
7.3.2 Algo_DCR_Hadamard_LUMA_IHT1d 88
7.3.3 Algo_Transpose4x4 89
7.3.4 Algo_DCR_Hadamard_LUMA_Reordering 89
7.3.5 Algo_DCR_Hadamard_LUMA_Scaling 90

7.3.6 Algo_DCR_Hadamard_CHROMA 90
7.3.7 Algo_IT4x4_1d 90
7.3.8 Algo_IT4x4_Addshift 91
7.3.9 Algo_IntraPred_LUMA_16x16 91
7.3.10 Algo_IntraPred_LUMA_4x4 92
7.3.11 Algo_Merge_4x4_to_16x16 92
7.3.12 Algo_IQ_QSAndSLAndIDCTScaler_4x4 92
7.3.13 Mgnt_IQ_INTRA16x16 93
7.3.14 Algo_IntraPred_4x4_to_8x8 93
7.3.15 Algo_IntraPred_CHROMA 94
7.3.16 Mgnt_Intra16x16 94
7.3.17 Mgnt_Intra4x4 95
7.3.18 Mgnt_IQ_Chroma 95
7.3.19 Mgnt_Buffer_Neighbour_FullMb 95
7.3.20 Mgnt_Buffer_Neighbour_YxY 96
7.3.21 Algo_Merge_4x4_to_16x16_norasterscan 96
7.3.22 Algo_Split_16x16_to_4x4_norasterscan 97
7.4 Motion compensation 97
7.4.1 Algo_Interp_EighthPelBilinear 97
7.4.2 Algo_Interp_SeparableSixTapQuarterPel 98
7.4.3 Algo_Interp_Reord 98
7.4.4 Algo_MvLXReconstr 99
7.4.5 Mgnt_DPB 99
7.4.6 Algo_MMCO 100
7.4.7 AlgoRefList 100
7.4.8 Mgnt_InterPred 101
7.4.9 Algo_RefIdxtoFrameNum 101
7.5 Filtering 102
7.5.1 Mgnt_DBF_AdaptiveFilter 102
7.5.2 Algo_DBF_AdaptiveFilter 102
7.5.3 Algo_MvComponentReorder 103
7.6 Renderer 103
7.6.1 Mgnt_POC 103
7.6.2 Mgnt_BufferRender 103
7.6.3 Mgnt_Merger420_AVC 104

8 FUs for MPEG-4 AVC Progressive High Profile 104
8.1 General 104
8.1.1 Overview 104
8.1.2 Algo_SynP 104
8.1.3 Algo_BlockExpand 106
8.1.4 Algo_DemuxParserInfoForBlocks_Luma 106
8.2 Texture decoding 107
8.2.1 Algo_IS_Zigzag_8x8 107
8.2.2 Algo_IQ_QSAndSLAndIDCTScaler_8x8 107
8.2.3 Algo_IIT_8x8 107
8.2.4 Algo_IntraPred_LUMA_8x8 108
8.2.5 Mgnt_Intra_8x8 108
8.2.6 Algo_Merge_8x8_to_16x16 109
8.2.7 Algo_DCR_Hadamard_CHROMA 109
8.2.8 Algo_DCR_Hadamard_LUMA_Scaling 110
8.2.9 Algo_IQ_QSAndSLAndIDCTScaler_4x4 110
8.2.10 Algo_Merge_8x8_to_16x16_norasterscan 111
8.2.11 Algo_Split_16x16_to_8x8_norasterscan 111
8.2.12 Mgnt_I4x4_I8x8_demux 111
8.2.13 Mgnt_I4x4_I8x8_mux 112
8.3 Motion compensation 112
8.3.1 Algo_GeneratePredWeight 112
8.3.2 Mgnt_SelectMvpLX 113
8.3.3 Algo_MvLXReconstr 113
8.3.4 Algo_MvBuffer 114
8.3.5 Mgnt_SelectMvpLX 115

8.3.6 Algo_FrameNumToPocList 115
8.4 Filtering 115
8.4.1 Algo_DBF_AdaptiveFilter 115
8.4.2 Algo_MvComponentReorder 116

9 MPEG-4 Part 16 SC3DMC decoder specific FUs 117
9.1 General 117
9.2 Algo_ExtractMask_SC3DMC 117
9.3 MPEG-4 SC3DMC TFAN Specific FUs 118
9.3.1 Algo_DecodeConnectivity_TFAN 118
9.4 MPEG-4 SC3DMC SVA Specific FUs 123
9.4.1 Algo_ContextModeling_SVA_nType 123
9.4.2 Algo_ContextModeling_SVA_Indexes 125
9.4.3 Algo_ContextModeling_SVA_Vertex_Attribute 127
9.4.4 Algo_DecodeConnectivity_SVA 130
9.4.5 Algo_ExtractFaceDirection_SVA 134
9.4.6 Algo_Connectivity_InversePrediction_SVA 135

10 FUs for HEVC Main Profile 137
10.1 General 137
10.2 Syntax parsing 137
10.2.1 Algo_SynP 137
10.3 Texture decoding 138
10.3.1 Algo_IntraPrediction 138
10.3.2 selectCU 138
10.4 Motion compensation 139
10.4.1 Algo_InterPrediction 139
10.4.2 Mgnt_DecodedPictureBuffer 139
10.4.3 Algo_GenerateRefList 140
10.4.4 Algo_MvComponentPred 140
10.5 Filtering 141
10.5.1 Algo_SaoFilter 141
10.5.2 Algo_GenerateBs 141
10.5.3 Algo_DeblockingFilter 142
10.5.4 Algo_QpGen 142
10.6 MD5 check 142
10.6.1 Mgnt_MD5SplitInfo 142
10.6.2 Mgnt_padding 143
10.6.3 Mgnt_MD5Shifter 143
10.6.4 Mgnt_MD5Compute 143
10.7 Inverse transforms 144
10.7.1 Mgnt_IT_Splitter 144
10.7.2 Mgnt_IT_Merger 144
10.7.3 Mgnt_Block_Merger 145
10.7.4 Mgnt_Transpose_4x4 145
10.7.5 Mgnt_Transpose_8x8 145
10.7.6 Mgnt_Transpose_16x16 146
10.7.7 Mgnt_Transpose_32x32 146
10.7.8 Mgnt_Transpose_32x32 146
10.7.9 Algo_IT4x4_1d 146
10.7.10 Algo_IT8x8_1d 147
10.7.11 Algo_IT16x16_1d 147
10.7.12 Algo_IT32x32_1d 147
10.7.13 Algo_invDST4x4_1st 148
10.7.14 Algo_invDST4x4_2nd 148

Annex A (normative) Naming convention of FU 149

Annex B (informative) FU network examples 151

Annex C (informative) FNL of MPEG-4 AVC Progressive High Profile decoder 186

Annex D (normative) Granular FUs concept 218

Annex E (informative) Granular FUs 219

Annex F (normative) Parallelogram prediction 236

Annex G (informative) Network specifications 240

Annex H (informative) Patent statement 241

Annex I (informative) Instantiation of generic syntax parser FU from BSD 242

Bibliography 261