# RK3168
# Multimedia Codec Benchmark

Ver. 1.3

June，24, 2013

# Index

Index - 2 -
History - 3 -
Notice - 4 -
1. Image - 5 -
    1.1 Image Decoder - 5 -
    1.2 Image Encoder - 6 -
2. Audio - 7 -
    2.1 Audio Decoder - 7 -
    2.2 Audio Encoder - 9 -
3. Video - 10 -
    3.1 Video Decoder - 10 -
    3.2 Video Encoder - 13 -

# History

| Date | Author | Version | Description |
|---|---|---|---|
| 2012.6.29 | Jian Huan | 1.0 | Add MVC decoder Spec. |
| 2012.6.29 | Jian Huan | 1.1 | Remove DTS audio spec in Audio Decoder chapter; merge it to Video Decoder chapter. |
| 2013.2.28 | Chen Hengming | 1.2 | Add WEBP image support<br>Add AMR Audio, MIDI Audio, Vorbis Audio support<br>Add VP8 decoder support in MKV container |
| 2013.6.24 | Chen Siyong | 1.3 | Add RMVB NO SUPPORT |

# Notice

All the data involved in this paper will be in accordance with the development progress and possible changes.

# 1. Image

## 1.1 Image Decoder

| JPEG | |
|---|---|
| **Image Codec** | JFIF file format 1.02 |
| **Support Image Size** | 48x48pixels to 8176x8176pixles |
| **Container** | JPG, JPEG |
| **Remarks** | (1) Base+progressive<br>(2) Software support SRGB JPEG<br>(3) Software support Adobe RGB JPEG |

| BMP | |
|---|---|
| **Image Codec** | BMP |
| **Support Image Size** | No Restriction[1] |
| **Container** | BMP |
| **Remarks** | n.a. |

| GIF | |
|---|---|
| **Image Codec** | GIF |
| **Support Image Size** | No Restriction |
| **Container** | GIF |
| **Remarks** | n.a. |

| PNG | |
|---|---|
| **Image Codec** | PNG |
| **Support Image Size** | No Restriction |
| **Container** | PNG |
| **Remarks** | n.a. |

| WEBP | |
|---|---|
| **Image Codec** | WEBP |
| **Support Image Size** | No Restriction |
| **Container** | WEBP |
| **Remarks** | n.a. |

---

[1] Limited by actual memory available

## 1.2 Image Encoder

| JPEG | |
|---|---|
| **Image Codec** | JPEG Baseline |
| **Support Image Size** | 96x32pixels to 8176x8176pixles |
| **Maximum Data Rate**[2] | 90Mpixels/Second |
| **File Format** | JFIF file format 1.02 |
| **Remarks** | |

---

[2] Ideal case

# 2. Audio

## 2.1 Audio Decoder

**MPEG Audio**

| | |
|---|---|
| **Audio Codec** | MPEG1/2/2.5 Audio Layer1/2/3 |
| **Channel** | 2 |
| **Bit rate** | 8kbps~320Kbps, CBR and VBR |
| **Sampling rate** | 8KHZ~48KHz |
| **File Format** | MP1, MP2, MP3 |
| **Remarks** | n.a |

**Windows Media Audio**

| | |
|---|---|
| **Audio Codec** | WMA Version 4,4.1, 7, 8, 9, wmapro |
| **Channel** | 2 |
| **Bit rate** | 8kbps~320Kbps |
| **Sampling rate** | 8KHZ~48KHz |
| **File Format** | WMA |
| **Remarks** | Non-support WMA Pro、lossless and MBR |

**WAV Audio**

| | |
|---|---|
| **Audio Codec** | MS-ADPCM, IMA-ADPCM, PCM |
| **Channel** | 2 |
| **Bit rate** | n.a |
| **Sampling rate** | 8KHZ~48KHz |
| **File Format** | WAV |
| **Remarks** | Support 4bit MS-ADPCM,IMA-ADPCM |

**APE Audio**

| | |
|---|---|
| **Audio Codec** | APE Ver. 3.95, 3.97, 3.98, 3.99 normal and fast |
| **Channel** | 2 |
| **Bit rate** | n.a |
| **Sampling rate** | 8KHZ~48KHz |
| **File Format** | APE |
| **Remarks** | n.a |

**OGG Audio**

| | |
|---|---|
| **Audio Codec** | Q1~ Q10 |
| **Channel** | 2 |
| **Bit rate** | n.a |

| | |
|---|---|
| **Sampling rate** | 8KHZ~48KHz |
| **File Format** | OGG, OGA |
| **Remarks** | n.a |

| FLAC Audio | |
|---|---|
| **Audio Codec** | Compress Level 0~8 |
| **Channel** | 2 |
| **Bit rate** | n.a |
| **Sampling rate** | 8KHZ~48KHz |
| **File Format** | FLAC |
| **Remarks** | n.a |

| AAC Audio | |
|---|---|
| **Audio Codec** | MAIN, ADIF, ATDS Header AAC-LC and AAC-HE, AAC-ELD |
| **Channel** | 5.1 |
| **Bit rate** | n.a |
| **Sampling rate** | 8KHZ~48KHz |
| **File Format** | AAC, M4A |
| **Remarks** | n.a |

| AMR Audio | |
|---|---|
| **Audio Codec** | AMR-NB, AMR-WB |
| **Channel** | 1 |
| **Bit rate** | AMR-NB 4.75~12.2kbps@8kHz<br>AMR-WB 6.60~23.85kbps@16kHz |
| **Sampling rate** | 8KHZ, 16KHz |
| **File Format** | 3GP |
| **Remarks** | n.a |

| MIDI Audio | |
|---|---|
| **Audio Codec** | MIDI Type 0 and 1, DLS version 1 and 2, XMF and Mobile XMF, RTTTL/RTX, OTA, iMelody |
| **Channel** | 2 |
| **Bit rate** | n.a |
| **Sampling rate** | n.a |
| **File Format** | XMF, MXMF, RTTTL, RTX, OTA, IMY |
| **Remarks** | n.a |

## 2.2 Audio Encoder

| AMR Audio | |
|---|---|
| **Audio Codec** | AMR-NB, AMR-WB |
| **Channel** | 2 |
| **Bit rate** | 4.75kbps~12.2Kbps, CBR |
| **Sampling rate** | 8KHZ, 16KHZ |
| **Container** | 3GPP |
| **Remarks** | n.a |

| AAC Audio | |
|---|---|
| **Audio Codec** | AAC-ADTS-LC |
| **Channel** | 2 |
| **Bit rate** | 4.75kbps~60Kbps, CBR |
| **Sampling rate** | 8KHZ~44.1KHZ |
| **Container** | AAC, 3GPP |
| **Remarks** | n.a |

# 3. Video

## 3.1 Video Decoder

**MPEG-1/2**

| | |
|---|---|
| **Video Codec** | MPEG-1/2 |
| **Supported Image Size** | 48x48pixels to 1920x1088pixels |
| **Maximum Frame Rate** | 30fps |
| **Maximum Bit Rate[1]** | 80Mbps |
| **Audio Codec[2]** | MP2, MP3 |
| **File Format** | DAT, MPG, VOB, TS |
| **Remarks** | |

**MPEG-4**

| | |
|---|---|
| **Video Codec** | MPEG4 |
| **Supported Image Size** | 48x48pixels to 1920x1088pixels |
| **Maximum Frame Rate** | 30fps |
| **Maximum Bit Rate** | 38.4Mbps |
| **Audio Codec** | MP2, MP3, AC-3[3], AAC[4], DTS[5], PCM[6], ADPCM[7] |
| **File Format** | AVI, MKV, MP4, MOV, 3GP |
| **Remarks** | (1) Not support MS MPEG4 v1/v2/v3<br>(2) Not support GMC |

**DIVX**

| | |
|---|---|
| **Video Codec** | DivX 4/5/6 |
| **Supported Image Size** | 48x48pixels to 1920x1088pixels |
| **Maximum Frame Rate** | 30fps |
| **Maximum Bit Rate** | 38.4Mbps |
| **Audio Codec** | MP2, MP3, AC-3[8], AAC[9], DTS[10], PCM[11], ADPCM[12] |
| **File Format** | AVI, MKV, MP4, MOV, 3GP |
| **Remarks** | (1) Not support Data Partitioning<br>(2) Not support GMC |

**REAL MEDIA (license issue now no support)**

| | |
|---|---|
| **Video Codec** | Real Video 8/9/10 |
| **Supported Image Size** | 48x48pixels to 1920x1088pixels |
| **Maximum Frame Rate** | 30fps |
| **Maximum Bit Rate** | 38.4Mbps |

| | |
|---|---|
| **Audio Codec** | Cook, AAC |
| **File Format** | RM, RMVB |
| **Remarks** | (1) Not support Real G2. |

| H.264 | |
|---|---|
| **Video Codec** | H.264 |
| **Supported Image Size** | 48x48pixels to 1920x1088pixels |
| **Maximum Frame Rate** | 30fps |
| **Maximum Bit Rate** | 57.2Mbps |
| **Audio Codec** | MP2, MP3, AC-3, AAC, DTS, PCM[14],ADPCM[15] |
| **File Format** | AVI, MKV, MP4, MOV, 3GP, TS, FLV |
| **Remarks** | (1) Not support MBAFF |

| GOOGLE VP8 | |
|---|---|
| **Video Codec** | VP8 |
| **Supported Image Size** | 48x48pixels to 1920x1088pixels |
| **Maximum Frame Rate** | 60fps |
| **Maximum Bit Rate** | 38.4Mbps |
| **Audio Codec** | Ogg Vorbis |
| **File Format** | WEBM,MKV |
| **Remarks** | |

| H.263 | |
|---|---|
| **Video Codec** | H.263 |
| **Supported Image Size** | SQCIF(128x96), QCIF(176x144), CIF(352x288),4CIF(704x576) |
| **Maximum Frame Rate** | 30fps |
| **Maximum Bit Rate** | 38.4Mbps |
| **Audio Codec** | MP3 |
| **File Format** | 3GP, MOV, MP4 |
| **Remarks** | (1) Not support H.263+ |

| SORENSON SPARK | |
|---|---|
| **Video Codec** | Sorenson Spark |
| **Supported Image Size** | 48x48pixels to 1920x1088pixels |
| **Maximum Frame Rate** | 30fps |
| **Maximum Bit Rate** | 38.4Mbps |
| **Audio Codec** | MP3 |
| **File Format** | FLV |
| **Remarks** | |

| ON2 VP6 | |
|---|---|

| **Video Codec** | VP6 |
|---|---|
| **Supported Image Size** | 48x48pixels to 1920x1088pixels |
| **Maximum Frame Rate** | 30fps |
| **Maximum Bit Rate** | 38.4Mbps |
| **Audio Codec** | MP2, MP3, AC-3[15], AAC[16], DTS[17], PCM[18], ADPCM[19] |
| **File Format** | AVI, FLV |
| **Remarks** | |

| MOTION JPEG | |
|---|---|
| **Video Codec** | MJPEG |
| **Supported Image Size** | 48x48pixels to 1920x1088pixels |
| **Maximum Frame Rate** | 30fps |
| **Maximum Bit Rate** | 38.4Mbps |
| **Audio Codec** | MP2, MP3, AC-3[20], AAC[21], DTS[22], PCM[23], ADPCM[24] |
| **File Format** | AVI, MOV |
| **Remarks** | |

## 3.2 Video Encoder

| H.264/AVC | |
|---|---|
| **Video Codec** | H.264 |
| **Supported Image Size** | 96x96pixels to 1920x1088pixels |
| **Maximum Frame Rate** | 30fps |
| **Maximum Bit Rate** | 20Mbps |
| **Audio Codec** | AMR-NB |
| **File Format** | MOV, 3GP |
| **Remarks** | (1) Not support MBAFF |

---

[1] Ideal case.

[2] Related codec parameter is in accordance with the description in Chapter 2.1 Audio.

[3] Maximum 6-channel decoding is supported in AAC.

[4] Maximum 6-channel decoding is supported in AC-3.

[5] Maximum 6-channel decoding is supported in DTS.

[6] Support in AVI only.

[7] Support in AVI only.

[8] Maximum 6-channel decoding is supported in AAC

[9] Maximum 6-channel decoding is supported in AC-3.

[10] Maximum 6-channel decoding is supported in DTS.

[11] Support in AVI only.

[12] Support in AVI only.

[14] Support in AVI only.

[15] Support in AVI only.

[15] Maximum 6-channel decoding is supported in AAC

[16] Maximum 6-channel decoding is supported in AC-3.

[17] Maximum 6-channel decoding is supported in DTS.

[18] Support in AVI only.

[19] Support in AVI only.

[20] Maximum 6-channel decoding is supported in AAC

[21] Maximum 6-channel decoding is supported in AC-3.

[22] Maximum 6-channel decoding is supported in DTS.

[23] Support in AVI only.

[24] Support in AVI only.