

 무료 전자 책

# 배우기

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## video

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---

# 1:

- ,
- ( : )
- , ,
- , HTTP
- DRM

• , ,

-

## Examples

Blender Foundation Tears of Steel. , "HD 720p (~ 365MB, mov, 2.0)" . "mov" .

SRT . . .

/ [MediaInfo](#) . GUI MediaInfo API .

MediaInfo GUI , . . .

---

```
▼ C:\Tmp\tears_of_steel_720p.mov
  ▼ General
    Complete name: C:\Tmp\tears_of_steel_720p.mov
    Format: MPEG-4
    Format profile: QuickTime
    Codec ID: qt_0000.02 (qt_)
    File size: 355 MiB
    Duration: 12 min
    Overall bit rate: 4 056 kb/s
    Writing application: Lavf53.32.100
```

. MPEG-4 . MPEG-4 ISO MP4 . Apple MediaInfo "QuickTime" .

: MP4 MPEG-4 . MPEG-4 . MPEG-4 .

MPEG-4 ISO Base Media File Format . . .

```
Video
  ID: 1
  Format: AVC
  Format/Info: Advanced Video Codec
  Format profile: Main@L3.1
  Format settings, CABAC: No
  Format settings, ReFrames: 2 frames
  Format settings, GOP: M=4, N=18
  Codec ID: avc1
  Codec ID/Info: Advanced Video Coding
  Duration: 12 min
  Bit rate: 4 000 kb/s
  Width: 1 280 pixels
  Height: 534 pixels
  Display aspect ratio: 2.40:1
  Frame rate mode: Constant
  Frame rate: 24.000 FPS
  Color space: YUV
  Chroma subsampling: 4:2:0
  Bit depth: 8 bits
  Scan type: Progressive
  Bits/(Pixel*Frame): 0.244
  Stream size: 338 MiB (95%)
  Writing library: x264 core 122
  Encoding settings: cabac=0 / ref=2 / deblock=1:0:0 / ar
  Language: English
```

. *Format* .

AVC H.264 . . AVC .

. . . . .

. *Bit rate* , *Width* *Height* . 720p , HD . 1280x720 720p .

. . . . .

. . . . .

\_\_\_\_\_

```
Audio
  ID: 2
  Format: MPEG Audio
  Format version: Version 1
  Format profile: Layer 3
  Mode: Joint stereo
  Codec ID: .mp3
  Duration: 12 min
  Bit rate mode: Constant
  Bit rate: 192 kb/s
  Channel(s): 2 channels
  Channel positions: Front: L R
  Sampling rate: 44.1 kHz
  Compression mode: Lossy
  Stream size: 16.8 MiB (5%)
  Language: English
  Default: Yes
  Alternate group: 1
```

, . "MPEG Audio Layer 3" MP3 .

.  
\_\_\_\_\_

MPEG-4 . . - .

MP3 . AAC ( ) .

H.264 . High H.264 . .

.  
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[FFprobe](#) ffmpeg , [Bento4](#) MP4 . . MediaInfo .

: [https://riptutorial.com/ko/video/topic/5690/-](https://riptutorial.com/ko/video/topic/5690/)

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## 2:

- , .
- ( : ) .
- , , .
- , HTTP .
- DRM .

• , , .

, . .

## Examples

Blender Foundation [Tears of Steel](#) . , "HD 720p (~ 365MB, mov, 2.0)" . "mov" .

SRT . . .

/ [MediaInfo](#) . GUI MediaInfo API .

MediaInfo GUI , . . .

---

```
▼ C:\Tmp\tears_of_steel_720p.mov
  ▼ General
    ..... Complete name: C:\Tmp\tears_of_steel_720p.mov
    ..... Format: MPEG-4
    ..... Format profile: QuickTime
    ..... Codec ID: qt_0000.02 (qt_)
    ..... File size: 355 MiB
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    ..... Overall bit rate: 4 056 kb/s
    ..... Writing application: Lavf53.32.100
```

. MPEG-4 . MPEG-4 ISO MP4 . Apple MediaInfo "QuickTime" .

: MP4 MPEG-4 . MPEG-4 . MPEG-4 .

MPEG-4 ISO Base Media File Format . . .

```

Video
  ID: 1
  Format: AVC
  Format/Info: Advanced Video Codec
  Format profile: Main@L3.1
  Format settings, CABAC: No
  Format settings, ReFrames: 2 frames
  Format settings, GOP: M=4, N=18
  Codec ID: avc1
  Codec ID/Info: Advanced Video Coding
  Duration: 12 min
  Bit rate: 4 000 kb/s
  Width: 1 280 pixels
  Height: 534 pixels
  Display aspect ratio: 2.40:1
  Frame rate mode: Constant
  Frame rate: 24.000 FPS
  Color space: YUV
  Chroma subsampling: 4:2:0
  Bit depth: 8 bits
  Scan type: Progressive
  Bits/(Pixel*Frame): 0.244
  Stream size: 338 MiB (95%)
  Writing library: x264 core 122
  Encoding settings: cabac=0 / ref=2 / deblock=1:0:0 / ar
  Language: English

```

. *Format* .

AVC H.264 . . AVC .

. . . .

. *Bit rate* , *Width* *Height* . 720p , HD . 1280x720 720p .

. .

. . . .

\_\_\_\_\_



```

v Audio
  ID: 2
  Format: MPEG Audio
  Format version: Version 1
  Format profile: Layer 3
  Mode: Joint stereo
  Codec ID: .mp3
  Duration: 12 min
  Bit rate mode: Constant
  Bit rate: 192 kb/s
  Channel(s): 2 channels
  Channel positions: Front: L R
  Sampling rate: 44.1 kHz
  Compression mode: Lossy
  Stream size: 16.8 MiB (5%)
  Language: English
  Default: Yes
  Alternate group: 1

```

, . "MPEG Audio Layer 3" MP3 .

MPEG-4 . . - .

MP3 . AAC ( ) .

H.264 . High H.264 . .

[FFprobe](#) `ffmpeg` , [Bento4](#) MP4 . . [MediaInfo](#) .

Blender Foundation [Tears of Steel](#) . , "HD 720p (~ 365MB, mov, 2.0)" . "mov" .

[Bento4](#) `mp4info` `mp4dump` [FFmpeg](#) .

MP4 ISO "QuickTime"(MOV) . .

.ISO . . `mp4dump` .

```
mp4dump tears_of_steel_720p.mov
```

```
[ftyp] size=8+12
major_brand = qt
minor_version = 200
```

```

compatible_brand = qt
[wide] size=8+0
[mdat] size=8+371579623
[moov] size=8+598972
  [mvhd] size=12+96
    timescale = 1000
    duration = 734167
    duration(ms) = 734167
  [trak] size=8+244250
    [tkhd] size=12+80, flags=f
      enabled = 1
      id = 1
      duration = 734167
      width = 1280.000000
      height = 534.000000
...

```

. 8 598972 moov . . ISO / IEC 14496-12 .

mdat , mp4dump .

. . .

```
ffmpeg -i tears_of_steel_720p.mov -an -vcodec copy video_track.mov
```

. !

. H.264 .

- I- - .
- P- - (: " 5 ").
- B- - P- - "5 10 % " .

2 I- .

.

```
mp4info --show-layout video_track.mov
```

.

```

...
00000959 [V] (1) size= 7615, offset=15483377, dts=491008 (39958 ms)
00000960 [V] (1)* size=104133, offset=15490992, dts=491520 (40000 ms)
00000961 [V] (1) size= 16168, offset=15595125, dts=492032 (40042 ms)
00000962 [V] (1) size= 4029, offset=15611293, dts=492544 (40083 ms)
00000963 [V] (1) size= 24615, offset=15615322, dts=493056 (40125 ms)
00000964 [V] (1) size= 4674, offset=15639937, dts=493568 (40167 ms)
00000965 [V] (1) size= 18451, offset=15644611, dts=494080 (40208 ms)
00000966 [V] (1) size= 95800, offset=15663062, dts=494592 (40250 ms)
00000967 [V] (1) size= 30271, offset=15758862, dts=495104 (40292 ms)
00000968 [V] (1) size= 10997, offset=15789133, dts=495616 (40333 ms)
00000969 [V] (1) size= 28458, offset=15800130, dts=496128 (40375 ms)
00000970 [V] (1) size= 9593, offset=15828588, dts=496640 (40417 ms)
00000971 [V] (1) size= 24548, offset=15838181, dts=497152 (40458 ms)

```

```

00000972 [V] (1) size= 6853, offset=15862729, dts=497664 (40500 ms)
00000973 [V] (1) size= 27698, offset=15869582, dts=498176 (40542 ms)
00000974 [V] (1) size= 7565, offset=15897280, dts=498688 (40583 ms)
00000975 [V] (1) size= 24682, offset=15904845, dts=499200 (40625 ms)
00000976 [V] (1) size= 5535, offset=15929527, dts=499712 (40667 ms)
00000977 [V] (1) size= 38360, offset=15935062, dts=500224 (40708 ms)
00000978 [V] (1)* size= 82466, offset=15973422, dts=500736 (40750 ms)
00000979 [V] (1) size= 13388, offset=16055888, dts=501248 (40792 ms)
00000980 [V] (1) size= 2315, offset=16069276, dts=501760 (40833 ms)
00000981 [V] (1) size= 21983, offset=16071591, dts=502272 (40875 ms)
00000982 [V] (1) size= 3384, offset=16093574, dts=502784 (40917 ms)
00000983 [V] (1) size= 22225, offset=16096958, dts=503296 (40958 ms)
...

```

```

. (1)* I- .
. / / !B- , , !

```

40 30 PNG .

```

ffmpeg -i video_track.mov -ss 00:00:40 -vframes 30 picture%04d.png

```

.P B .

7 . mp4info .40 (00000966) 7 . . (, ), I- "" . () .

## DASH

DASH . DASH .

. [dash.js](#) .

[Axinom DASH](#) , "Clear" 1080p .

Sample Streams ▾

[http://media.axprod.net/TestVectors/v7-Clear/Manifest\\_1080p.mpd](http://media.axprod.net/TestVectors/v7-Clear/Manifest_1080p.mpd)

00:02:37.583  
Frame 3782 @ 24.00 fps  
H.264 High Profile 1920x1080 @ 3000 kbps



[dash.js](#) URL [http://media.axprod.net/TestVectors/v6-Clear/Manifest\\_1080p.mpd](http://media.axprod.net/TestVectors/v6-Clear/Manifest_1080p.mpd) . . .

```
http://media.axprod.net/TestVectors/v7-Clear/Manifest_1080p.mpd
http://media.axprod.net/TestVectors/v7-Clear/2/init.mp4
http://media.axprod.net/TestVectors/v7-Clear/15/init.mp4
http://media.axprod.net/TestVectors/v7-Clear/18/init.mp4
http://media.axprod.net/TestVectors/v7-Clear/18/0001.m4s
http://media.axprod.net/TestVectors/v7-Clear/2/0001.m4s
http://media.axprod.net/TestVectors/v7-Clear/15/0001.m4s
http://media.axprod.net/TestVectors/v7-Clear/15/0002.m4s
http://media.axprod.net/TestVectors/v7-Clear/5/init.mp4
http://media.axprod.net/TestVectors/v7-Clear/5/0002.m4s
http://media.axprod.net/TestVectors/v7-Clear/18/0002.m4s
http://media.axprod.net/TestVectors/v7-Clear/5/0003.m4s
...
```

( [ISO / IEC 23009-1](#) XML ). DASH .

AdaptationSet . , , 3 3 5 5 .

Representation .

```

AdaptationSet [ segmentAlignment=true group=1 maxWidth=1920 maxHeight=1080 maxFrameRate=24 par=16:9 ]
  <Role schemeIdUri="urn:mpeg:dash:role:2011" value="main" xmlns="urn:mpeg:dash:schema:mpd:2011" />
  <SegmentTemplate timescale="1200000" media="$RepresentationID/$Number%04d$.m4s" startNumber="1" duration="1" />
  <Representation id="8" mimeType="video/mp4" codecs="hev 1.2.4.L63.90" width="512" height="288" frameRate="24" />
  <Representation id="9" mimeType="video/mp4" codecs="hev 1.2.4.L63.90" width="640" height="360" frameRate="24" />
  <Representation id="10" mimeType="video/mp4" codecs="hev 1.2.4.L90.90" width="852" height="480" frameRate="24" />
  <Representation id="11" mimeType="video/mp4" codecs="hev 1.2.4.L93.90" width="1280" height="720" frameRate="24" />
  <Representation id="12" mimeType="video/mp4" codecs="hev 1.2.4.L120.90" width="1920" height="1080" frameRate="24" />
AdaptationSet [ segmentAlignment=true group=2 lang=en ]
  <Role schemeIdUri="urn:mpeg:dash:role:2011" value="main" xmlns="urn:mpeg:dash:schema:mpd:2011" />
  <SegmentTemplate timescale="24000" media="$RepresentationID/$Number%04d$.m4s" startNumber="1" duration="1" />
  <Representation id="15" mimeType="audio/mp4" codecs="mp4a.40.29 audioSamplingRate=48000 startWithSAP=1" />
    <AudioChannelConfiguration schemeIdUri="urn:mpeg:dash:23003:3:audio_channel_configuration:2011" value="2" />
AdaptationSet [ segmentAlignment=true group=2 lang=en-AU ]
  <SegmentTemplate timescale="24000" media="$RepresentationID/$Number%04d$.m4s" startNumber="1" duration="1" />
  <Representation id="16" mimeType="audio/mp4" codecs="mp4a.40.29 audioSamplingRate=48000 startWithSAP=1" />
    <AudioChannelConfiguration schemeIdUri="urn:mpeg:dash:23003:3:audio_channel_configuration:2011" value="2" />
AdaptationSet [ segmentAlignment=true group=2 lang=et-ET ]
  <SegmentTemplate timescale="24000" media="$RepresentationID/$Number%04d$.m4s" startNumber="1" duration="1" />
  <Representation id="17" mimeType="audio/mp4" codecs="mp4a.40.29 audioSamplingRate=48000 startWithSAP=1" />
    <AudioChannelConfiguration schemeIdUri="urn:mpeg:dash:23003:3:audio_channel_configuration:2011" value="2" />
AdaptationSet [ segmentAlignment=true group=3 lang=en ]
  <Role schemeIdUri="urn:mpeg:dash:role:2011" value="main" xmlns="urn:mpeg:dash:schema:mpd:2011" />
  <Role schemeIdUri="urn:mpeg:dash:role:2011" value="subtitle" xmlns="urn:mpeg:dash:schema:mpd:2011" />
  <SegmentTemplate timescale="1000" media="$RepresentationID/$Number%04d$.m4s" startNumber="1" duration="1" />
  <Representation id="18" mimeType="application/mp4" codecs="wvtt" startWithSAP="1" bandwidth="428" xmlns="urn:mpeg:dash:schema:mpd:2011" />

```

(: ) . 1 "" Role .

, ( ).

( ) ( ) / .

SegmentTemplate URL . DASH ( 4 ) . "init.mp4" .

DASH DASH Live . . . DASH ""!

URL .

1. 2 (360p) , 15 ( ) 18 ( ) .
2. (0001.m4) .
3. .
4. 1080p ! 5 (1080p) .
5. .

DASH . . .

Axinom DASH . . . , DASH HTTP .

DASH . . . Windows .

```
copy init.mp4 /b + 0001.mp4 /b + 0002.mp4 /b + 0003.mp4 /b track.mp4
```

track.mp4 . MP4 (: mp4info FFmpeg) .

: <https://riptutorial.com/ko/video/topic/5879/-->



# 3:

- 1280 : 720
- 16 : 9
- 1.77777777777777777777777777777778

## Examples

(DAR)



720

1280

Display Aspect Ratio (DAR) 16:9

. 16 : 9 . DAR.

, DAR = 1280 : 720 = 16 : 9 = 1.77777777777777777777777777777778 .

(PAR)

. .



1280

720 Picture Aspect Ratio (PAR) 9:16

.. DAR . ( : 16 ). PAR.

(16 : 9) PAR 9:16. .

, PAR = 720 : 1280 = 9:16 = 0.5625

**(SAR)**

.

? ! . SAR.



1280

720 Picture Aspect Ratio (PAR) 9:16

Sample Aspect Ratio (SAR) 81:256



1280

. SAR = PAR / DAR .



$$\text{SAR} = 9:16 / 16 : 9 = (9/16) / (16/9) = 81/256 = 3.1604938271604938271604938271605$$

(PAR) .

: <https://riptutorial.com/ko/video/topic/5713/-->

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