Hardware/Software Requirements:

Hardware Requirement

Category : All Devices
1 - CPU

1. The target device MUST use one (1) of the following instruction set architectures:
   a. ARMv7-A or higher
   b. x86
   c. X86-64

2 - System Memory

1. The target device MUST make at least
   a. 170 Mbytes (case where the device has a 32-bit architecture)
   b. 220 MBytes (case where the device has a 64-bit architecture) of system memory available for both the Cobalt runtime and the HTML5 application.
2. Of the aforementioned overall System Memory requirements, up to
   a. 80 MBytes (32-bit architecture)
   b. 100 MBytes (64-bit architecture) MUST be available as memory that the JavaScript engine can allocate.
3. The system memory required above MUST be for per installed and running YouTube application.
4. The System memory requirements in this specification are excluding the buffers needed for both the decoded video frames and graphics frame buffers; the MediaSource buffer requirements are specified in the companion Software requirements specification.

3 - System Storage

1. The target device MUST provide 1 MByte of persistent storage for Cookies, per installed application.
2. The target device MUST provide 16 MBytes of semi-persistent local storage for cache, per installed and running application.
3. The target device MUST provide 64 MBytes of persistent storage for the Cobalt runtime.
4. The target device MUST provide an additional 64 MBytes of persistent storage, for a total of 128 MBytes, while the device's application update process is running.
5. The target device MUST provide 512 bytes of secure (that is, part of Security Hardware or a Trusted Execution Environment) storage for device authentication (see section 9.1 of the Software Requirements)

4 - GPU

1. The target device MUST provide the OpenGL ES 2.0 or higher graphics API.
2. The target device MUST pass the YouTube render benchmark.

5 - Media Decoding

1. The target device MUST support decoding of H.264/MPEG-4 AVC Main Profile Level 3.2 video bitstreams (non-interlaced video) encapsulated in the MP4 container.
2. The target device MUST support decoding of AAC-LC & HE-AAC v1 audio bitstreams encapsulated in the MP4 or the DASH Fragmented MP4 (fMP4) container.
   a. Two (2) channels at 256 kbits/sec (AAC-LC) and 64 kbits/sec (HE-AAC)
   b. The device MUST also support these formats for Media Source playback:
      i. ISO/IEC 14496-12:2012: ISO Base Media File Format (ISO BMFF)
      ii. ISO/IEC 23001-7:2012: Common encryption in ISO BMFF (as specified by 23009-1 section 6.3 - DASH MPD and segment formats)
3. The target device MUST support decoding of Opus audio bitstreams as defined by IETF RFC 6716 bitstreams and encapsulated in the WebM container with the following configurations:
   a. Two (2) channels at up to 128 kbps
4. The target device MAY support decoding of Opus audio bitstreams as defined by IETF RFC 6716 bitstreams and encapsulated in the WebM container with the following configurations:
   a. Six (6) channels at up to 576 kbps
5. The target device MAY support decoding of Opus audio bitstreams encapsulated in the WebM container with the following Immersive Audio configurations:
   a. Decoding support for 6 channels (4 WYZX first order ambisonic components + 1 stereo non-diegetic) at 384 kbps under Channel Mapping Family 2 as defined in the IETF Ambisonics Specification
   b. Decoding support for 18 channels (16 third order ambisonic components + 1 stereo non-diegetic) at 512 kbps under Channel Mapping Family 3 as defined inthe IETF Ambisonics Specification.
6. The target device MUST be able to decode the following image formats:
   a. JPEG
   b. WebP
      i. Devices MUST fully implement the WebP specification, including the support for the following features:
         1. Animation, with a framerate of 10 frames per second
         2. Both lossy and lossless decompression up to 1280x720 resolution
         3. Metadata
         4. Transparency
         5. Color Profile
      ii. The target device MUST be capable of supporting one concurrent WebP decoder without having any impact on the frame rate and/or resolution of an on-going video playback

6 - DRM

1. The target device MUST implement Widevine Level 1 content protection with secure hardware decoding.
2. The target device MUST support key rotation with:
   a. Sixteen (16) or more MediaKeySession objects
   b. Sixteen (16) or more keys per MediaKeySession object
3. The target device MUST support subsample encrypted block format with securehardware decode for any WebM encrypted streams.
4. The target device MUST support secure decoding of all content resolutions, bitrates,codecs, and container formats supported by the device.
5. The target device MUST enforce HDCP revision 1.1 output protection when required by the Widevine license.

7 - Connectivity

1. Devices MUST be capable of Wake-On-LAN functionality and enabling such functionality by default.
2. Devices with HDMI interconnects MUST implement HDMI Consumer Electronics Control (CEC) with support for the "One Touch Play" feature, including the <Active Source> and <Image View On> messages.

8 - Display

Requirements are specific to each device category. See sections below

9 - Voice Capture (optional)

YouTube plans to introduce quality requirements for any far-field microphone or array of microphones that is integrated in a Device. The following requirements are currently in consideration for the 2021 Hardware Technical Requirements.

For each microphone:

- The acoustics overload point (AOP) MUST be greater than 120dB
- The Signal-to-Noise ratio (SNR) MUST be equal to 60 dB or higher at 94 dB(A) SPL @1kHz input level
- Variations in the frequency response MUST remain within a +- 3 dB limit over the 100 Hz to 8000 Hz range
- Total harmonic distortion (THD) MUST be less than 1% at 94 dB SPL @ 1kHz input level

Category: FHD Devices

1 - CPU

1. The target device MUST have two (2) or more physical CPU cores.
2. Each physical CPU core MUST be rated at 2,500 DMIPS or greater.

2 - System Memory
  No additional requirements.
3 - System Storage
  No additional requirements.
4 - GPU

1. The target device's GPU MUST have a pixel fill rate of 500 Million pixels per second or greater.
2. The target device's GPU MUST have a texture fill rate of 500 Million texels per second or greater.
3. The target device MUST have the ability to apply a 360/3D video transformation to a decoded video frame.

5 - Media Decoding

1. The target device MUST support 60fps decoding and playbacks of rectangular videos up to the maximum resolution. For spherical or 3D videos, the target device MUST support 30fps decoding and playback up to the maximum resolution.
2. The target device MUST support the decoding of VP9 Profile 0 (8-bits) and VP9 Profile 2 (10-bits) Level 4.1 video bitstreams encapsulated in the WebM container and up the following resolutions:

Spatial Resolution	Display Frame Rate	Bitrate (kbits/sec)
1920x1080	30 or 60 frames/sec (rectangular video)	20,000
1920x1080	30 frames/sec (rectangular video resulting from a 360/3D video transformation)	20,000

3. The target device MUST support decoding of VP9 video bitstreams at the decoding frequency specified in the table below:

Spatial Resolution	Display Frame Rate	Minimum number of display frames between two consecutive ALT-REF frames	Bitrate (kbits /sec)
All resolutions up to 1080P included	Up to 30 frames/sec included	4	37.5 frames/sec
	Up to 60 frames/sec included	4	75 frames/sec

4. The target device MAY support decoding of AV1 video Main Profile Level 4.1 video for Standard Dynamic Range (8-bits) or High Dynamic Range (10-bits) video bitstreams encapsulated in an MP4 container.
5. The target device MUST be able to sustain the maximum decoding video bitrates specified for one (1) second.
6. The target device MAY support decoding of AC3 and EAC3 audio bitstreams encapsulated in the DASH Fragmented MP4 (fMP4) container with the following configurations
   a. Two (2) channels at up to 192 kbits/sec
   b. Six (6) channels at up to 512 kbits/sec

7. The target device MAY support decoding of Multi-channel AAC-LC audio bitstreams encapsulated in the MP4 or the DASH Fragmented MP4 (fMP4) container
    a. Six (6) channels at 384 kbits/sec
8. The decoding performance requirements set forth in this section MUST be met for both encrypted content and content in the clear

6 - DRM

The target MUST be able to operate under the Widevine Resource Rating Tier 2, as specified in the Widevine OEMCrypto 15 (or later) documentation.

7 - Connectivity

Devices with output HDMI interface(s) MUST support HDMI Version 1.4b or above

8 - Display

If the device features a video display, such display MUST be capable of reproducing luminance and chrominance values for 75% or more of the BT.709 color space

Category: >FHD Devices
1 - CPU

1. The target device MUST have two (2) or more physical CPU cores for a total of 7k DMIPS.
2. Each physical CPU core MUST be rated at 2,500 DMIPS or greater.

2 - System Memory

No additional requirements.

3 - System Storage

No additional requirements.

4 - GPU

1. The target device's GPU MUST have a pixel fill rate of 1.1 billion pixels per second or greater.
2. The target device's GPU MUST have a texture fill rate of 1.1 billion texels per second or greater.
3. The target device MUST have the ability to apply a 360/3D transformation to a decoded video frame.

5 - Media Decoding

1. The target device MUST support 60fps decoding and playbacks of rectangular videos up to the maximum resolution. For spherical or 3D videos, the target device MUST support 30fps decoding and playback up to the maximum resolution.
2. The target device MUST support the decoding of VP9 Profile 0 and Profile 2, Level 5.1video bitstreams encapsulated in the WebM container and up the following resolutions:

Spatial Resolution	Display Frame Rate	Bitrate (kbits/sec)
3840x2160	30 or 60 frames/sec (rectangular video)	40,000
3840x2160	30 frames/sec (rectangular video resulting from a 360/3D transformation)	40,000

3. The target device MUST support decoding of VP9 video bitstreams at the decoding frequency specified in the table below:

Spatial Resolution	Display Frame Rate	Minimum number of display frames between two consecutive ALT-REF frames	Bitrate (kbits/sec)
All resolutions up to 1080P included	Up to 30 frames/sec included	4	37.5 frames/sec
	Up to 60 frames/sec included	4	75 frames/sec
2K - 2560x1440	Up to 30 frames/sec included	4	37.5 frames/sec
	Above 30 and up 60 frames/sec included	5	72 frames/sec

4. The target device MUST support decoding of H.264/MPEG-4 AVC High Profile Level 4.2 video bitstreams encapsulated in the MP4 container and up to the following video resolutions:

Spatial Resolution	Display Frame Rate	Bitrate (kbits/sec)
1920x1080	30 or 60 frames/sec (rectangular video)	20,000

1920x1080	30 frames/sec (rectangular video resulting from a 360/3D transformation)	20,000

5. A target device supporting High Dynamic Range (HDR) MUST support decoding of AV1 Main Profile, Level 5.1 video bitstreams for 10-bit HDR video bitstreams encapsulated in an MP4 container.
6. The target device MAY support decoding of AV1 Main Profile Level 5.1 video bitstreams for Standard Dynamic Range (8-bits) video bitstreams encapsulated in an MP4 container.
7. The target device MUST be able to sustain the maximum decoding video bitrates specified for at least one (1) second.
8. The target device MUST support the decoding of Multi-channel AAC-LC audio bitstreams encapsulated in the MP4 or the DASH Fragmented MP4 (fMP4) container
    a. Six (6) channels at up to 384 kbits/sec
9. The target device MAY support decoding of AC3 and EAC3 audio bitstreams encapsulated in the DASH Fragmented MP4 (fMP4) container with the following configurations
    a. Two (2) channels at up to 192 kbits/sec
    b. Six (6) channels at up to 512 kbits/sec

6 - DRM

1. The target device MUST enforce HDCP revision 2.2 output protection when required by the Widevine license.
2. The target MUST be able to operate under the Widevine Resource Rating Tier 3, as specified in the Widevine OEMCrypto 15 (or later) documentation.

7 - Connectivity

Devices with output HDMI interface(s) MUST support HDMI Version 2.0b or above

Software Requirement

Please refer below document: