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## Content Specs

### Introduction

The following guide details the current best practices for creating content for Samsung XR.

A Samsung XR account is required to publish content.

For details about publishing created content, please see our Content Publishing Guidelines ([/portal/content/content\\_uploading\\_guide](/portal/content/content_uploading_guide)).

### Assets and Information Needed

The following items and information are required to publish created content to the Samsung XR Service.

- A 360 Spherical Video
  - Native resolution (not upscaled)
  - Progressive (not interlaced)
  - See the Video Track section below for information about the resolutions, frame rates, and codecs supported.
  - See the Audio Track section below for information about the audio formats supported.
- The Type of the Video
  - Standard Monoscopic 360 (Default)
  - Steroscopic 360 Top (Left Eye) / Bottom (Right Eye)
  - Steroscopic 360 Left / Right
- A Video Title
  - Each video needs to have an appropriate video name/title for example "Sunset Drive". Video titles are visible to the consumer and hence all titles need to be consumer friendly. In case there are multiple videos that belong to the same shoot, it may be helpful to name them in sequence. A video title is limited to 100 characters.
- A Video Description
  - The video description should accurately describe the content of the video. Additional information that can be added to the description is Author, Date the video was shot, Location (if appropriate) etc. The video description is limited to 1000 characters.

The following items are recommended to publish content to the Samsung XR Service.

- A Channel Profile Photo or Company Logo and Background Image
  - The account publishing content should have a profile photo (or logo) and custom background image.
  - At least a 256x256 JPG or PNG image is needed for the profile photo, and a 1440x420 JPG or PNG image is needed to customize the background image. Tip: Profile photos/logos should be submitted with a background color in place. (No transparencies.)
  - The profile image will be cropped to a circle so the content should be centered within the published image.
- A Video Thumbnail
  - We will automatically generate a sample thumbnail for each video published.

- You may publish your own thumbnail via the video edit feature after the publish completes.
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- A published thumbnail should be non-distorted when viewed on a 2d plane (i.e. not spherical.)
  - A minimum resolution of 1280x720 JPG or PNG is recommended.



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## Media Container

Samsung XR service accepts videos in a `.mp4` or `.mov` video container.

This container must contain one video track and audio track(s) as detailed by the relevant sections of this document. One or more subtitle tracks may also be added.

There may also be a variety of metadata on the video; however, the majority of the metadata must be entered into the server upon publish.

## File Size

When publishing video clips, there is a limit of 25GB.

This is intended to reduce abuse of the system, and should provide ample space for short (~5 minute) video clips, even at the maximum quality.

## Video Track

In order to create a quality experience, there are several requirements for distributing your video on Samsung XR.

For monoscopic videos a minimum resolution width of 3840 is recommended. The aspect ratio can be either 2:1 or 16:9. Videos with a resolution width as low as 1920 can be published, but only videos with a minimum width of 3840 can be viewed with a Gear VR. The lower resolution videos can still be viewed using Samsung XR mobile or via the Samsung XR website.

For stereoscopic videos a minimum resolution width of 3840 is required. The aspect ratio can be either 1:1 or 16:9. Between the two stereoscopic video types, Top/Bottom Stereoscopic is recommended.

The frame rate should be in the range of 23.976 to 60.00 frames per second. Drop frame is supported.

The recommended minimum bit rate is 40,000Kbps (40Mbit). For videos with a lot of motion, you can publish a higher bit rate, provided that you do not exceed the 25 GB file size limit.

The supported codecs are h.264, h.265, and ProRes.

Due to the nature of spherical video, higher resolution should be favored over other factors. Reducing the resolution will not help bit rates or the perceived quality of your video.

Use the native FPS of your source camera, but ensure that it is exported progressive, as the spherical wrapping will introduce unwanted artifacts.

Our transcoder will convert your video to use a codec and frame rate that best supports all the devices that are compatible with Samsung XR.

## Audio Track

Samsung XR supports mono, stereo, and multiple formats of spacial audio for playback. With spacial audio, as you turn your head in Gear VR, the audio will stay in the correct position. Depending on the spatial audio type, the mixing will differ. NOTE: spatial audio formats only work on Android Lollipop and above...not KitKat!

### Input Details

- Format: AAC
- Profile: AAC-LC
- Input/Output Buffers Interleaved
- 16 bit PCM audio buffers
- Sampling Rate 32, 44.1, or 48 kHz

### Input Channel Configurations

The following audio configurations are automatically recognized by the Samsung XR Service.

- 1 Channel, Mono

- 2 Channel, Stereo (Left, Right)

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- 4 Channel, Ambisonic (1st Order, ACN channel ordering, SN3D normalization)
- 6 Channel, 5.1 Surround (Left, Right, Center, LFE, Left Surround, Right Surround)



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Here is an example (<https://samsungvr.com/ui/CMS/CarBee.mp4>) (31MB) of a 360 video file with 5.1 spatial audio. In the example, a bee flies around your head while a Ferrari starts its engine.

## Additional Spatial Audio Formats

The audio formats discussed below may also be used. These formats must be specified during the video publish process. See our [Content Publishing Guidelines \(/portal/content/content\\_uploading\\_guide\)](/portal/content/content_uploading_guide) for more information.

### Binaural Audio

4 mono or stereo audio tracks need to be present in the mp4. Samsung XR will constantly mix exactly two of them for head tracked spatial audio. The order of the tracks must be as follows: 0 degrees (front), 90 degrees (right), 180 degrees (back), 270 degrees (left). For example, when the user is looking at 45 degrees, approximately 50% of the first audio track and 50% of the second audio track are mixed. At 90 degrees, 100% of the second audio track is played.

### Quadraphonic Audio

4 mono or stereo audio tracks need to be present in the mp4. Samsung XR will play a different audio track for each of the four 90 degree cardinal directions a user looks in the video. The engine will fade between two of the tracks when the user is close to crossing into the next quadrant. The order of the tracks must be as follows: 0 degrees (front), 90 degrees (right), 180 degrees (back), 270 degrees (left). A good example of this audio format is the **MansLaughter - An Experiment in Theatrical VR** video, which can be found on the Samsung XR service by searching for **MansLaughter**.

*Note: The main difference between binaural audio and quadraphonic audio is that binaural will constantly mix two tracks at any given time while quadraphonic will only play one track at any given time (with the exception of the corners). Binaural audio is generally the preferred choice for most 360 videos. We envision quadraphonic audio most applicable to a 360 video with each quadrant having a different scene with a distinctly different audio track.*

### Mach1 Spatial Audio

- Mach1 Multi-channel isotropic spatial: 8x1 audio - 8 x 1 @48k/44.1k 16bit

All 8 channels are to be placed in a single audio track. The audio track will be transcoded to 4 audio tracks with 2 channels each to support the Android platform.

### Audio Tip

FFmpeg (<https://ffmpeg.org/>) is a free open source audio and video conversion tool. The following ffmpeg commands can be used to build mp4 files with binaural or quadraphonic audio.

If the audio files are in WAV format, then this command will convert them to AAC:

```
ffmpeg -i video.mp4 -i 0.wav -i 90.wav -i 180.wav -i 270.wav -map 0:v -map 1:a -map 2:a -map 3:a -map 4:a -vcodec copy -acodec libfdk_aac output.mp4
```

If the audio files are already AAC, then this is the command you need:

```
ffmpeg -i video.mp4 -i 0.aac -i 90.aac -i 180.aac -i 270.aac -map 0:v -map 1:a -map 2:a -map 3:a -map 4:a -vcodec copy -acodec copy output.mp4
```

If there is an error, it may be because the AAC files are in ADTS format, and you need to add the option “-bsf:a aac\_adtstoasc”:

```
ffmpeg -i video.mp4 -i 0.aac -i 90.aac -i 180.aac -i 270.aac -map 0:v -map 1:a -map 2:a -map 3:a -map 4:a -vcodec copy -acodec copy -bsf:a aac_adtstoasc output.mp4
```

## Content Production Tips

The following are some suggestions and best practices to ensure that your content will yield the best possible user experience.

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- Steady, stationary 360 cameras work best so people's heads don't feel like they are moving when they are not, avoiding motion sickness.
- Keep the horizon of the video as stable as possible.
- Full spherical 360 is the best format for immersion. Cylindrical content is not nearly as immersive.
- Have interesting things going on all around the camera, but keep those things at least 5 feet away since stitching at close range in 360 is usually difficult.
- Stitch the content so there are no stitch lines visible to the user.
- Putting a 360 camera into a kayak or smooth running vehicle can work for some people. A bouncy car ride will likely cause motion sickness.
- Make sure the lighting and exposure on all of your cameras is the same or as similar as possible, and try to correct for the remaining delta with post production.
- Use stereoscopic 3D cautiously when using 360 because it will halve your resolution and is difficult to have work in all viewing directions (really requires a large number of cameras and a lot of post-production to make it nice.)
- 360 CGI video can be even more compelling than real world film when done correctly, especially since you can have many more virtual cameras that are smaller to avoid all stitching issues and create stereoscopic 3D 360 better.
- Avoid mixing in any 2D content with the 360 content since the 2D content will not be displayed properly in the 360 player.

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- (<https://www.microsoft.com/store/apps/9N7J19GTLQDG>)
- (<https://www.oculus.com/experiences/gear-vr/837075486363>)
- (<https://www.oculus.com/experiences/rift/1885027758194398/>)
- (<https://www.oculus.com/experiences/go/837075486363650/>)
- (<https://www.oculus.com/experiences/s.com/experiences/quest/2346574095401736/>)

ALSO ON MOBILE

- (<http://apps.samsung.com/appquery/appDetail.as?appId=com.samsung.android.video360>)
- (<https://play.google.com/store/apps/details?id=com.samsung.android.video360>)

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FAQ (HTTPS://HELP.CONTENT.SAMSUNG.COM/CSWEB/AUTH/GOSUPPORT.DO?SERVICECD=SAMSUNGVR&CHNLCD=WEB&TARGETURL=/FAQ/SEARCHFAQ.DO&\_COMMON\_LANG=EN)

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