ENCODING FOR QUALITY

How to Deliver the Best Online Video Experience Every Time
There’s no excuse for poor-quality online and mobile video. With the rapid evolution of online video technology and standards in recent years, every video played on any desktop, mobile, or connected TV platform should look and sound great every time. With expectations raised by HDTV, Blu-Ray, and premium online content, that’s exactly what consumers have come to demand. If your online video experiences can’t meet their standards, you’ll stand out in all the wrong ways.

To succeed with online video, you need to make sure your videos look just as good to viewers as the best available offline video. The following recommendations can help you provide the best possible experience no matter how or where consumers view your video content.

1. Encode video to the highest quality for each device.

Consumers use a wide variety of devices to play your video, from iPhones, iPads, and Android-based mobile devices to Roku, Xbox 360, and connected TVs—each supporting different types of video. A one-size-fits-all approach to encoding will inevitably compromise the experience you deliver to many viewers. Instead, make sure you deliver video to each device in the highest quality it can handle. For example, while most devices can handle the H.264 Baseline profile, consumers who’ve invested in more powerful devices like the latest iPad, PlayStation, and Xbox models can expect even better experiences delivered through the H.264 Main and High profiles.

Similarly, avoid upscaling or downscaling video unnecessarily. You should deliver the top resolution for each device type (1024 x 768 for first- and second-generation iPads, 1920 x 1080 or third-generation iPads, and so on) within the parameters of your source content, along with lower resolutions for users with lower bandwidth. We don’t recommend using your encoder to upscale video, as this generally increases its size without really improving quality—properly scaling video is something that can be handled by the end device.

Brightcove’s Zencoder video encoding service defaults to the H.264 Baseline profile at level 3.0 for the broadest possible device compatibility, but allows you to choose other profiles and levels via the API to ensure that you deliver the best experience each device is capable of presenting. Most devices today support Main and High Profile, for example, and these profiles provide significant improvements to encoding quality.
2. Use an adequate bitrate

The bitrate at which you deliver video can be even more important than the codec you use. After all, any codec can look good if you use enough bits. The right bitrate for each viewer depends on their bandwidth; the same bitrate can be too low for viewers with ample bandwidth, resulting in sub-optimal quality, but too high for viewers with lower bandwidth, leading to excessive buffering. The only way to ensure the right bitrate for each viewer is through adaptive bitrate streaming: video is encoded at multiple bitrates, then delivered in the right bitrate for each viewer according to their local bandwidth and device capabilities.

Zencoder provides complete cloud-based encoding for adaptive bitrate protocols including Apple’s HTTP Live Streaming (HLS) and Microsoft Smooth Streaming to dynamically adjust video quality based on available bandwidth speeds.

3. Use the best available encoding technology

Video quality isn’t entirely determined by the codec used; the same codec can look very different depending on how it’s encoded. When H.264 was introduced back in 2003, it didn’t look much better than what had come before, and it took time for encoders to implement all the features and optimize the efficiencies that would unlock its full potential. H.264 has come a long way since then, becoming as much as two times more efficient in some implementations. The same will be true for H.265 when it arrives; it offers the possibility of doubling the efficiency of H.264, but it’ll take time to get there. Whatever codec you use, make sure you also take the time to choose the best encoder.

While the relative merits of H.264 encoders are a constant topic of debate, x264, a free software library for encoding video into H.264/MPEG-4 AVC format, has emerged as the best encoder in terms of quality, as shown in various comparisons over the years from its introduction to the present. The ongoing introduction of new features in x264 continue to enhance the quality and efficiency available through H.264, while competing video formats fall short.

Zencoder’s massive speed and scalability complements the efficiency of x264 to provide the world’s most powerful encoding platform. Zencoder also provides the best available encoding technology at the format level; for example, Zencoder HLS packaging is 10 – 12 percent more efficient than other encoders, resulting in smaller file sizes leading to lower CDN and storage costs.

4. Don’t overlook audio

Audio quality is at least as important as video. A study by Ralf Steinmetz shows that it is “more important to maintain a continuous (minimum jitter) audio stream than a video stream” when watching video online (see also this article). Similar studies have shown just how sensitive users are to audio/video desynchronization, finding that viewers are sensitive to audio/video sync errors of just a few milliseconds. In another study, viewers who watched television with high fidelity stereo audio “liked the program content significantly more” and found it significantly more involving” than viewers watching the same video with low fidelity, mono audio.
The differences between good and bad audio encoders are even more pronounced than those among video encoders. The AAC audio codec, offering higher efficiency than MP3, has become the dominant choice of video publishers—but many fail to ensure that it actually delivers the quality of experience that it should. Publishers often opt for open source encoders for audio and video, but the only production-ready open source AAC encoder, FAAC, hasn’t been updated in two years, and its quality is generally recognized to be poor.

Zencoder uses the best commercial AAC encoder on the market, and supports advanced profiles like HE-AAC and HE-AACv2, which deliver high quality sound at low bitrates. Advanced audio processing techniques and algorithms further enhance quality, so that even when comparing different implementations of the same encoder, Zencoder audio often sounds better.

5. Encode from high-quality content

Remember the old saying: garbage in, garbage out. The best codecs and software in the world can’t help bad input. In fact, encoding bad video makes it look even worse, as the encoder tries to preserve artifacts and blockiness. Encoding good video is also a lossy process, but you can minimize generational loss and ensure the best results by starting with the best possible source content. Input your video at the highest available rendition and high enough bitrate to make the most of each viewer’s playback device capabilities.

Zencoder helps publishers start from high-quality source content by charging for transcoding by the minute of output video transcoded, not by the gigabyte. Charging by GB can penalize publishers for uploading a high-quality input, while charging by the minute allows publishers to upload a high quality input, and eliminates having to choose between cost and quality.

ENSURING A QUALITY VIEWER EXPERIENCE

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- Use an adequate bitrate
- Use the best available encoding technology
- Don’t overlook audio
- Encode from high-quality content

AVOIDING COMMON MISTAKES

- Change your frame rate only by even multiples — or, preferably, not at all.
- When necessary, deinterlace source content before encoding video, not after.
- Auto-rotate mis-oriented content.
- Perform operations in the correct order.
6. Avoid common mistakes

Zencoder helps publishers avoid common encoding errors by performing operations in the right way, in the right order.

FOR EXAMPLE:

► Changing the frame rate of your video results in dropped or duplicated frames, with noticeable and distracting results for the viewer. When changing the frame rate is necessary for bandwidth purposes, Zencoder can do so only by even multiples—such as going from 60 fps to 30 fps, or 30 fps to 15 fps—to avoid these problems.

► When source content in formats such as analog or 1080i HDTV needs to be deinterlaced, Zencoder uses the best available deinterlace algorithm, and completes this task before encoding video for best results.

► Content that is sideways or upside-down is automatically rotated.

► Operations are always performed in the correct order for best results, such as deinterlacing video prior to resizing, not the other way around.

For viewers and publishers alike, this will be a golden age for online video. More viewers than ever are embracing the convenience, flexibility, and mobility of watching content via the web rather than traditional broadcast or Blu-Ray platforms. It’s also never been easier to ensure a high-quality experience on any device people use. But outstanding online video doesn’t happen automatically; you have to make sure you’re going about it the right way. The recommendations above can help you deliver the quality your audience demands every time.