INTERDIGITAL®

Perceptual Pre-filtering

A Quantum Leap in Video Technology, Enabling More Consumers to Enjoy High Quality Video

The Video Delivery Problem Today

The explosive growth of online video consumption is choking networks and customer experience. Consumers are increasingly frustrated by frequent re-buffering and reduced resolution—overall a poor viewing experience. Content publishers seeking to meet the skyrocketing consumer demand face increasing challenges.

Existing streaming solutions don't completely solve congestion problems, and ultimately leave content publishers hungry for a solution that delivers more complete results. A new technological approach turns the data threat into an opportunity for content publishers; managed properly, it is an opportunity for reduced costs, increased revenues, and differentiated Quality of Experience (QoE).
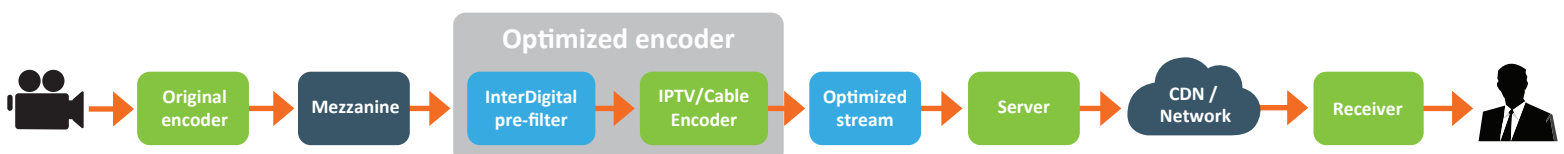
InterDigital's Perceptual Pre-filter Solution
Complements Existing Video Encoding Systems to Improve Encoding Efficiency

Designed based on our keen scientific understanding of the limits of human visual perception, InterDigital's unique **Perceptual Pre-filter Solution** pro-actively filters out parts of visual content that the human eye cannot see under certain viewing conditions. The removal of unnecessary visual information delivers equivalent perceived quality while reducing bit rates.

The Perceptual Pre-Filter Solution works with existing encoding workflows and infrastructures to improve efficiency of video coding, meeting tighter bandwidth constraints and offering more effective delivery to consumers using diverse types of devices—televisions, mobile devices, and personal computers.

The Perceptual Pre-Filter, delivered as a complete application or an SDK, offers seamless integration with existing encoding workflows and solutions.

Optimized encoder

Original encoder → Mezzanine → InterDigital pre-filter → IPTV/Cable Encoder → Optimized stream → Server → CDN / Network → Receiver

FEATURES

- Improves efficiency of video encoding process
- Complements existing bandwidth optimizing solutions
- Seamlessly integrates with existing infrastructures

BENEFITS:

- Increased revenue for OTTs and Pay TV providers
- Improved QoE and capacity for MNOs
- Decreased distribution costs for all content publishers
- Higher quality video streaming on any device type
- Greater QoE for video viewers

For more information, contact Solutions@InterDigital.com.

About InterDigital

InterDigital develops fundamental wireless technologies that are at the core of mobile devices, networks, and services worldwide. We solve many of the industry's most critical and complex technical challenges, inventing solutions for more efficient broadband networks and a richer multimedia experience years ahead of market deployment. InterDigital has licenses and strategic relationships with many of the world's leading wireless companies.

www.Interdigital.com

Pre-Filter in Action

Video coding can be generally understood as a process that removes information that is irrelevant to the viewer and compresses the remaining information to a given target rate with minimum errors added. Most video encoders attempt to do both but lack the appropriate viewing conditions information (e.g. user distance to screen, screen density, brightness, ambient light) to be able to remove what's irrelevant.

InterDigital's User Aware Video encoding process is different: it assumes or obtains information about viewing conditions, and then applies vision science to identify and remove parts of visual content that are invisible. This process is implemented as a pre-filter, followed by the conventional video encoding process.

Pre-Filter Features

Input/output formats:	System features	Filter features	Integration
Input formats: MPEG-2 TS, MP4, AVI, elementary streams, raw video **Codecs:** MPEG-2, H.264, HEVC **Video:** progressive, interlaced **Sampling:** 4:2:0, 4:2:2, 4:4:4 **Color spaces:** BT.601, BT.709, SMPTE 240, RGB (sRGB)	Audio pass-through, SCTE-35 pass-through, CEA 608/708 closed captioning pass-through	Perceptual filtering Resizing Inverse telecine Deinterlacing Color sampling/ format conversion	**Environments:** Linux, Windows **Deployment options:** stand-alone application, software SDK integrated in a 3rd party application

The Benefits

For all content encoded through the Perceptual Pre-Filter, the solution provides a higher quality per bit ratio, which translates into concrete benefits for Pay TV Providers, OTT's, and MNOs.

Pay TV Providers—*More channels on existing bandwidth.* By optimizing existing bandwidth, Pay TV providers (including Cable, Satellite, and IPTV) are able to add more channels, improving customer satisfaction and increasing revenue potential. Costly investments in capacity upgrades may be deferred.

OTTs—*Best quality on any device for increased revenue potential.* Content publishers are losing as much as 20% of potential revenue due to reduced consumer engagement. Using the Perceptual Pre-Filter gives OTTs greater confidence knowing they can deliver a better experience to viewers and leverage this revenue earning potential, even when they don't control the last mile to the viewer. Increased customer QoE is the big win, with reduced delivery costs an added bonus to the bottom line.

MNOs—*More customers enjoying high quality video streaming.* MNOs can provide more subscribers with better viewing experiences without investing in additional costly infrastructure. This results in capacity gains and more satisfied subscribers, even amid heavily fluctuating demand.