Umetrix Video

Assuring the Quality of Experience (QoE) for Streaming Video and Video Calling for Devices and Services

Video Experience Evaluation System

How can you know that complex video services and supporting mobile devices will deliver a great user experience? There's only one way to know for sure: by measuring the video experience in the live network using actual, unmodified smartphones and tablets.

Umetrix Video enables service providers and device manufacturers to quantify and compare the video experience of services and devices in the live network for launch, optimization, and benchmarking.

KEYSIGHT

Use Cases for Devices and Services

- **Mobile (LTE and 5G)** — Assure new devices, chipsets, and video services deliver acceptable QoE before launch. As content and networks evolve, compare performance to competitors or for different devices and networks.
- **Home (Fixed 5G, Cable and Fiber)** — Assure media players, smart devices, and set tops deliver acceptable QoE before launch; assure home video services deliver acceptable QoE before launch and benchmark performance to competitors.

Depending on the desired use case for video quality assessment, Umetrix Video can be configured to use one or more solution methodologies: Gross Error Detection (GED) or non-reference (NR) analysis.

Highlights

- Assure the video quality of new devices and services at launch
- Assess the launch readiness of video calling, HD streaming, and over-the-top (OTT) video services
- Evaluate video experience in the live network using real, unmodified devices
- Compare devices and end-to-end video delivery using Keysight's patented video frame and audio/video synchronization analysis
- Perform video quality assessments and identify freezing and buffering events without the need for a reference (source) video

More than half of Americans prefer to use their mobile devices to stream video content.

Video conferencing and chat is fast becoming the normal way to communicate, as everyone in the home ages 5-95 now knows how to use it.

In a post-COVID economy, expect to see continued high demand for OTT streaming video services and significant increases in telehealth and tele-learning services.

Gross Error Detection

Umetrix Video Gross Error Detection (GED) is a vision-based measurement tool that uses test videos imprinted with patented visual and audio markers to assess the performance of video calling/chat services.

In a video call, the transmit device's camera is pointed at a "donor" screen that plays a test video. On the receive side, the Umetrix software application uses a camera to capture the moving image on the receiving device's screen, and then processes the captured media files to derive all of the key performance indicators (KPIs). Audio tones are also injected and received to measure AV sync. The diagram below (Figure 1) shows an illustration of the Umetrix video calling test case.

Umetrix Video Gross Error Detection (GED) capabilities:

- Supports both camera capture and direct video (DV) capture
- Provides practical KPIs that measure playback smoothness and audio-video sync
- End-to-end experience of streaming video or video chat (e.g., IR.94 ViLTE, FaceTime, Skype)

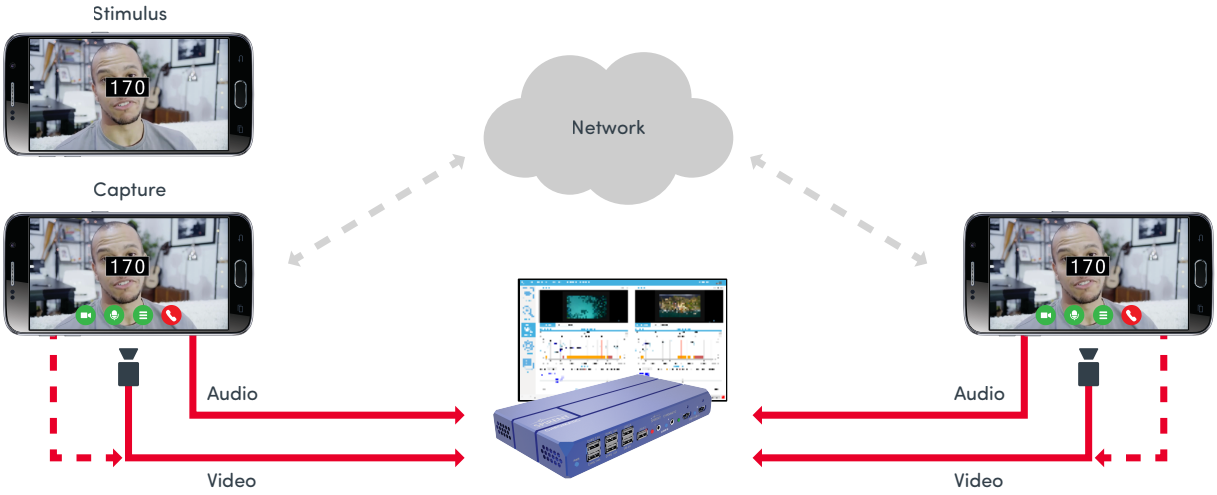

Figure 1. Gross Error Detection (GED) solution overview flow diagram

Video KPIs

- Frame rate
- Video freeze
- Video impairment
- Session score
- Weighted session score

AV Sync KPIs

- AV sync
- Segment count
- Segments within limits

Video Chat KPIs

- Frame rate
- Video freeze
- Video impairment
- Session score
- Weighted session score

Non-Reference

Umetrix Video supports any video streaming service (e.g., mobile, home, 5G applications), analyzes the video content to detect artifacts, and performs scoring without prior knowledge of the source video. This analysis is powered by Keysight's content-trained non-reference (NR) algorithm, which uses machine learning on thousands of sample videos to understand the variations in different types of content (drama, animation, etc.). Content training is based on de facto industry standards that correlate to human perceptual scoring. The result: faster and less expensive repeatable design validation, regression testing, and competitive benchmarking.

Non-reference (NR) algorithm capabilities:

- Assesses live streaming or chat services without specific reference test content
- Enables streaming video assessment of wireless service providers TV services in Keysight's Fit4Launch program
- Provides a foundation for the ability to tune the algorithm for specific use cases and conditions
- Currently supports capture resolutions of 480p, 720p, and 1080p at 24, 30, and 60 FPS
- Complies with ITU-T P.1204

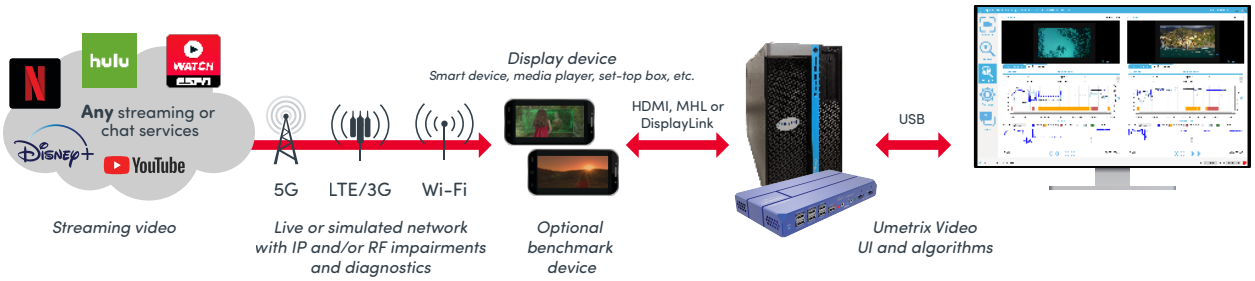

Figure 2. Non-Reference solution overview flow diagram

Video KPIs

- NR video MOS
- Video freeze
- Video buffering
- Weighted buffering and freezing (WMBF)
- Temporal information
- Spatial information
- Time to first frame

Very Good or Excellent Streaming Quality[1]

Comparison of video quality during identical live TV streaming on two high-end devices:

Figure 3. 98.7% of the time, Device B delivered great video.

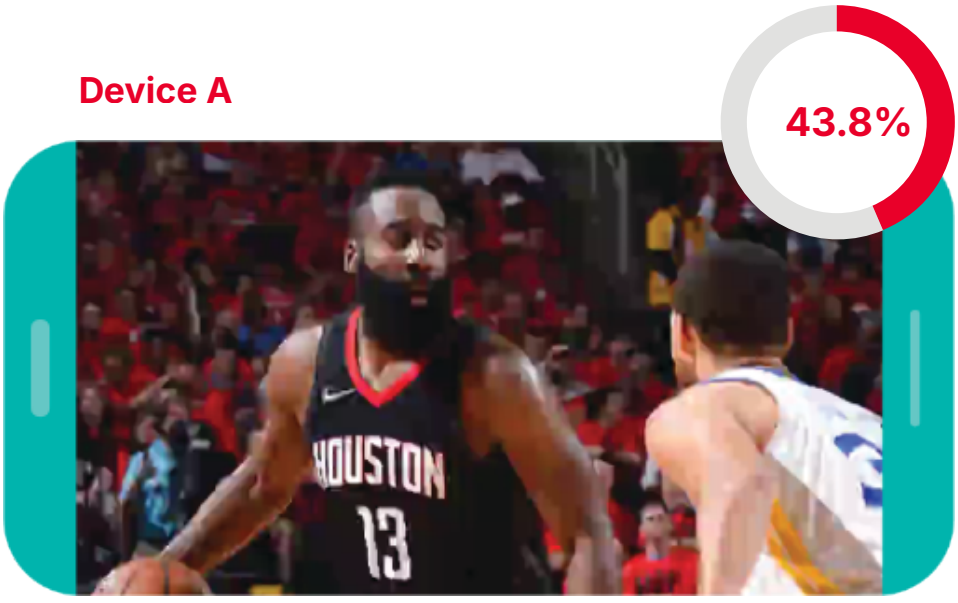

Figure 4. Device A didn't do as well, streaming great video only 43.8% of the time.

[1] In a study that combined data across three carriers, four services, and two markets.

Keysight Expertise

Others may know mobile or video individually, but Keysight is unique in our understanding of the reciprocal impact of mobile and video on each other.

Keysight is a trusted provider for decades, spanning multiple generations of mobile technologies. Our validated test solutions have been used throughout the world for certifying mobile devices on global carrier networks; over 90% of all mobile user equipment (UEs) has touched our solutions.

Keysight knows video. We have a strong history of delivering QoE assessments and years of experience with video quality assessment methodologies, algorithms, impairments, and root cause diagnostics. Keysight's overall video approach is algorithm-agnostic, allowing us to offer a variety of methodologies and algorithms to provide the right KPIs for each individual customer.

Rethink Testing with Keysight

When our customers don't have the expertise, time, or resources to perform automated testing and assurance, Keysight offers a suite of managed solutions to perform these functions as a service. Keysight's Test Automation managed solution combines our test expertise, products, and our lab and test automation software in a bundled service to seamlessly deliver testing capabilities integrated with other operator functions.

Keysight's Fit4Launch pre-launch Certification as a Service (CaaS) combines lab and field testing for comprehensive device performance evaluation across video, data, voice, location, and E911 services. Identify issues prior to release in a reliable manner to ensure a positive user experience.