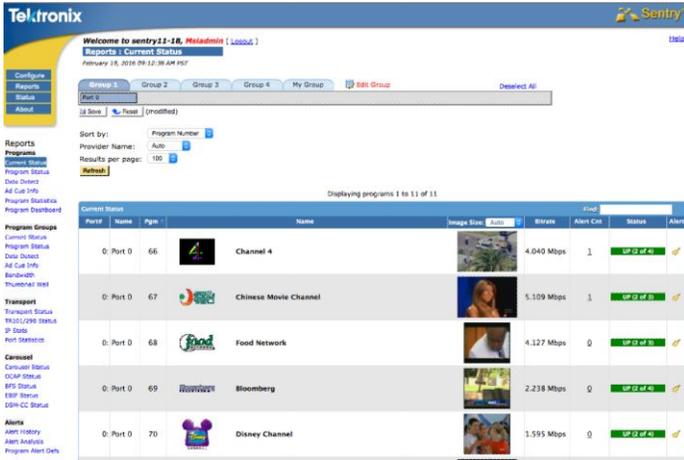


Video Quality Monitors

Sentry® Datasheet: VNM-SEN2



Sentry® is a comprehensive video and audio quality monitoring solution for advanced video networks. It enables video providers to deliver services with optimum quality while reducing operational expenditures.

Key features

- Real-time 24/7 QoS and QoE monitoring and analysis of entire channel lineup
- In-depth monitoring for compliance to closed captioning standards
- Audio silence and audio-level issue detection based on ITU BS.1770 specification
- Tiling and macroblocking detection
- Perceptual video quality (eMOS) for MPEG2, H.264 and H.265 content
- PID-level IDR (Instantaneous Decoding Refresh) and EBP (Encoder Boundary Point) reporting and alerting
- Video thumbnails and Thumbnail Wall
- Comprehensive TR 101 290 measurements
- User-triggered and alert-triggered stream captures
- QoE monitoring for JPEG2000 codec
- Error second and program availability reporting
- Stream to view (video backhauling)
- Historical reporting and graphing
- Transport Stream and Program Group bandwidth graphing
- Analyzer-quality RF measuring capability
- EBIF and Data Carousel monitoring
- Appliance, Virtual Machine (VM) and Cloud options

Key benefits

- Strong correlation to the viewer experience
- Reduce operational costs
- Achieve regulatory compliance and protection from fines
- Ensure the delivery of high quality content
- Verify the delivery of ad inserts
- Ensure compliance and quality from ingress to egress

Video quality monitoring with Sentry®

Monitoring digital video services in today's complex networks requires advanced monitoring in order to be highly confident that the services can be correctly decoded and displayed at any time, on any device. Sentry® is a comprehensive and scalable video and audio quality monitoring solution enabling video providers to deliver both linear and adaptive bitrate services with optimum quality while reducing operational expenditures.

Sentry is an all-purpose monitoring solution incorporating both quality of experience (QoE) and quality of service (QoS) measurements. The variety of inputs with multiple input capability allows video service providers to customize Sentry to easily integrate into any monitoring scheme.

Sentry takes the guess work out of troubleshooting issues. By providing detailed root-cause information, Sentry allows engineers to resolve problems quickly and often before subscribers experience any quality deterioration or outage.

Detection and alerting of a subscriber-impacting issue is only part of the monitoring functions of Sentry. Analysis tools coupled with historical data give service providers the ability to resolve complex and intermittent problems quickly. Advanced reporting capabilities give operators the ability to generate reports that quickly identify the top offending programs or locations.

Software options

Quality of Experience (QoE) monitoring

Quality of experience refers to the quality of the picture itself and not what caused the picture to look poor. It is how the viewer sees or perceives the video quality. Sentry's QoE monitoring stands apart from other solutions by going deep into the content looking at the sequence, GOP, picture, slice, macro-block and block layers of every video and audio service in every transport stream. Sentry's QoE measurements give a strong correlation to the actual viewer experience and Sentry is able to catch encoder specific errors regardless of network status.

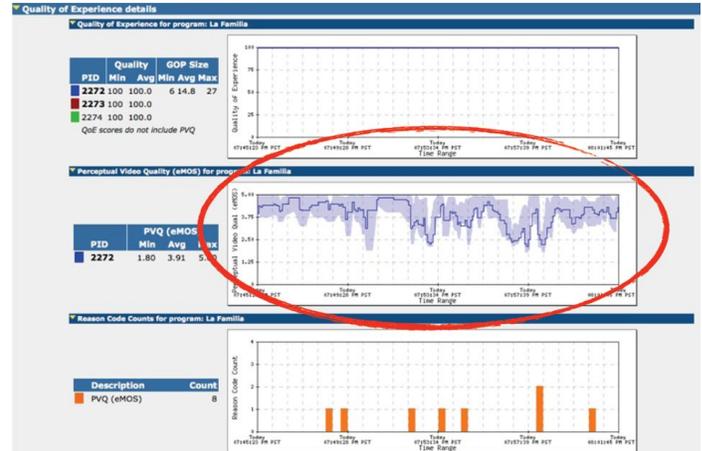
Quality of Service (QoS) monitoring

Quality of service measurements look at the transmission and health of the MPEG/IP transport network. Sentry monitors the most critical TR 101 290 Priority 1, 2 and 3 tests to offer comprehensive QoS checks and alarming. Real-time monitoring and alerting notify service providers right away if there are errors related to the priority checks they are most concerned about. This saves on operational costs related to mean time to detect (MTTD) and mean time to repair (MTTR) an issue. Sentry also offers PCR measurements including PCR Interval and PCR Accuracy.

Perceptual Video Quality (PVQ monitoring)

Sentry ranks picture quality in real time on SD, HD, and UHD programs (MPEG2, H.264 and H.265), so service providers can understand how video compression artifacts such as blocking video are affecting the viewer's experience with the picture. These problems are extremely difficult to detect and are becoming a critical issue to monitor as video content continues to grow while bandwidth is becoming more limited than ever. Sentry's eMOS is the industry's first and only highly scalable "non-reference" perceptual quality score that correlates closely with the Tektronix PQA - the industry standard for picture quality test and measurement, used by leading encoder manufacturers worldwide.

Sentry accurately detects video artifacts and scores them as PVQ (or eMOS), which ranks video quality in a similar way as a Mean Opinion Score (MOS). eMOS can be used, in the case when there are no technical "errors" in the transport stream, to measure perceptual video quality in the compressed domain. Sentry's PVQ scoring is sensitive to certain artifacts caused by over-compression that specifically affect chroma detail.



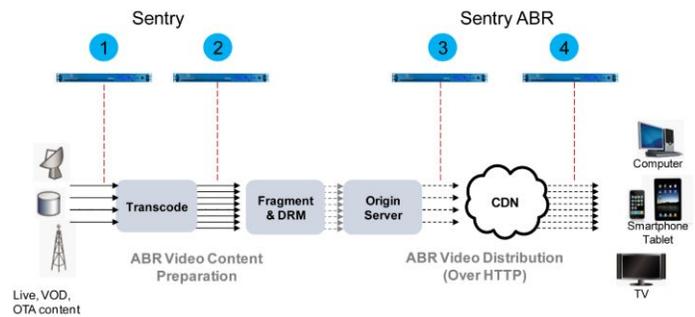
Perceptual Video Quality (eMOS) Measurement.

Adaptive bitrate monitoring for TV Everywhere/OTT

The underlying technology used with TV Everywhere/OTT content is adaptive bitrate streaming (ABR). This involves the segmentation of video into small fragments of compressed content for transmission to viewing devices such as TVs, smart phones and tablets.

Within the ABR workflow, Sentry is used from ingest all the way through the critical transcode process to perform comprehensive QoE analysis, artifact detection and compliance checks on each stream at each bitrate in real time. Sentry quantifies and compares video quality across profiles and also provides IDR/EBP alignment verification and IDR/EBP presence/cadence.

Multi-Screen Multi-Point Video Monitoring



Ad verification

Sentry provides the most complete digital ad insertion monitoring solution by combining real-time monitoring and alerting with historical auditing across the entire channel lineup in all advertising zones. Sentry delivers extensive data that improves digital ad insertion on any platform, allowing engineering teams to ensure proper function of insertion technology by identifying and correcting system errors when they occur.

In addition, the ad insertion verification capability allows ad sales groups to provide higher levels of customer service, resulting in greater revenue potential. Using the web-based interface you can monitor digital ad insertion across your entire network. By strategically placing Sentry in each of your ad zones, you can monitor and be alerted on all insertion opportunities network-wide, as well as issues that arise from problems.



Monitoring Ad Insertion.

Data carousel and EBIF monitoring

Sentry monitors tru2way™ and DSM-CC carousels. Detailed reports of carousel performance and activity are based on their real-time behavior and data output. Service providers are able to identify the root cause of errors and make necessary changes to eliminate issues and guarantee rapid application deployment.

The reports show detailed source and file structures and carousel changes in real time while observing streaming metrics such as cycle time, bandwidth utilization, and stream packet continuity. Real-time alerting notifies users of critical situations, enabling them to resolve issues such as outages, cycle-time fluctuations, and unauthorized changes.

eTV applications and metadata are prone to errors introduced during transport, ad splicing and multiplexing. Sentry's EBIF module decodes the application data and signaling information enabling proactive eTV monitoring and fast troubleshooting.

Compliance monitoring

For Closed Caption compliance monitoring, Sentry has the ability to monitor, alert and report on the availability and quality of closed captions across all channels in real time. Sentry will verify that the captions are present and not in error. When errors do occur, Sentry will let you know how long they were in error and the reason for the error. Data and syntax anomalies within the closed captioning data stream are detected to allow for an accurate closed captioning quality of experience (QoE) measurement. This applies to SCTE20 and ATSC transported caption data.

For Audio Loudness monitoring, Sentry helps video service providers ensure compliance with its advanced audio level detection and analysis based on the ITU-R BS 1770 specification. Sentry monitors the loudness of every audio element on every program in every transport stream in real time. The thumbnail timeline feature captures thumbnail images to help visually confirm the relative location of audio issues in programming or commercials. Sentry offers 90-day historical reporting to help service providers with documents needed to prove compliance or to show when violations have occurred.



Monitoring Audio Loudness compliance.

Platform specifications

All specifications apply to all models unless noted otherwise.

Available platforms

Virtual machine	Virtual Machine (VM) options available for software deployments
Cloud	AWS and Google cloud options available (call for other options)
Appliance	Standard chassis (ability to monitor up to 500 programs or up to 4 Gbps) Premium chassis (ability to monitor up to 1500 programs or up to 8 Gbps)

Supported protocols (all platforms)

Video	MPEG-2, H.264 (AVC), H.265 (HEVC), VC-1, JPEG2000 UHD/HD/SD programs, SPTS or MPTS, multicast (IGMP v3) and unicast Scales up to 1500 SPTS programs or up to 4000 programs w/MPTS IDR and EBP reporting and alerts Closed Caption compliance Perceptual Video Quality (PVQ) for MPEG2, H.264 and H.265 Tiling, macroblocking, compression issue detection Video thumbnails and thumbnail timeline Program availability reporting and Freeze detection MPEG-PSI, DVB-SI, ATSC-PSIP program information
Audio	Dolby AC-3 (5.1 Surround), E-AC-3 MPEG-1 Layer II (Mono, Stereo) AAC, HE-AAC, and HE-AAC v2 Audio Loudness and CALM Act compliance (ITU BS. 1770)
Digital Program Insertion (DPI)	SCTE-35 type 5 and 6 with full API access Advanced DPI reporting and thumbnails
Misc. support	SNMP trap, email, JSON API, and CSV support Real-time QoS and QoE monitoring and analysis of entire lineup Comprehensive TR 101 290 measurements Advanced video, audio, closed caption, and ad-insertion analysis On demand or triggered stream to view (video backhauling) Historical reporting up to 3 months (92 days) Flexible reporting and alerts

Appliance platform – General characteristics

Browser support	Firefox, Safari, Google Chrome and Internet Explorer
Video inputs	Up to 2 Ethernet port inputs: 1G (1000Base-T) or 10G/1G SFP+ (10GBASE SR or LR) ASI 4-port interface QAM A/B/C 4 or 8-port interface (ITU-T J.83 annex A, B or C) 8VSB Annex B interface (ITU-T J.83) DVB S/S2 interface
Management port	1000BASE-T Ethernet interface

Appliance platform – Physical characteristics

Dimensions	
Standard chassis	44 mm (1.7 in) H × 437 mm (17.2 in) W × 600 mm (29.5 in) D
Premium chassis	45 mm (1.8 in.) H × 439 mm (17.3 in.) W × 750 mm (29.5 in.) D
Weight (net)	
Standard chassis	12.4 kg (27 lb.)
Premium chassis	14.1 kg (31 lb.)

Appliance platform – Environmental characteristics

Temperature (operating)	5 °C to +40 °C (+41 °F to +104 °F)
Humidity (operating)	Between 0% and 80% relative humidity for temperatures up to 31° C, decreasing linearly to 50% relative humidity at 40° C
Altitude (operating)	0 m to 2000 m (6562 ft.)
Power source	
	Dual redundant supplies
Standard chassis	100-127 / 200-240 VAC (±10% max), 50/60 Hz
Premium chassis with AC supplies	100-127 / 200-240 VAC (±10% max), 50/60 Hz
Premium chassis with DC supplies	–48 VDC to –60 VDC
Power consumption	
	Dual redundant supplies
Standard chassis	Maximum: 4 / 2 A (x2) Typical: 60 to 100 W
Premium chassis with AC supplies	Maximum: 7.0 / 3.5 A (x2) Typical: 160 to 200 W
Premium chassis with DC supplies	Maximum: 19 A to 15 A (x2) Typical: 140 to 180 VA

Ordering information

Contact Tektronix for more information about ordering a Sentry system.

VNM-SEN2 systems

Virtual Machine (VM)	Software deployment options
AWS cloud	AWS cloud software options
Google cloud	Google cloud software options
Standard chassis appliance	Ability to monitor up to 500 programs; optional interfaces available
Premium chassis appliance	Ability to monitor up to 500 or 1500 programs

Interfaces

Ethernet	1 or 2 ports
ASI ²	4 ports
QAM A/B/C ²	4 or 8 tuners
DVB-S2 ²	Dual receiver

Software options

Sentry base system	Real time video/audio QoS and QoE monitoring solution up to 500 programs
Video throughput	Select the amount of video throughput to be monitored
Digital Program Insertion (DPI)	Adds advanced DPI monitoring and analysis
IDR/EBP alignment monitoring	Adds IDR and EBP monitoring and program group alignment
Perceptual Video Quality (PVQ) monitoring	Adds picture quality analysis and scoring, including additional detection of encoder issues
Premium audio	Adds Dolby Digital Plus audio detection and monitoring
1500 programs	Adds the ability to monitor 1500 simultaneous programs (Premium chassis only)



Tektronix is registered to ISO 9001 and ISO 14001 by SRI Quality System Registrar.

² The ASI, QAM A/B/C and DVB-S2 interfaces are available only on the standard chassis.

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For Further Information. Tektronix maintains a comprehensive, constantly expanding collection of application notes, technical briefs and other resources to help engineers working on the cutting edge of technology. Please visit www.tek.com.

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