SPIRENT AVALANCHE

HIGH PERFORMANCE IPTV EMULATION, VIDEO QUALITY AND VOICE QUALITY ANALYSIS SYSTEM

VIDEO QUALITY ANALYZER (VQA)

Telephone companies worldwide are supplementing their revenue from legacy voice and data with added services such as IPTV. IPTV is the most critical area since it is the most sensitive to network conditions, requires the most bandwidth, and offers the highest revenue potential.

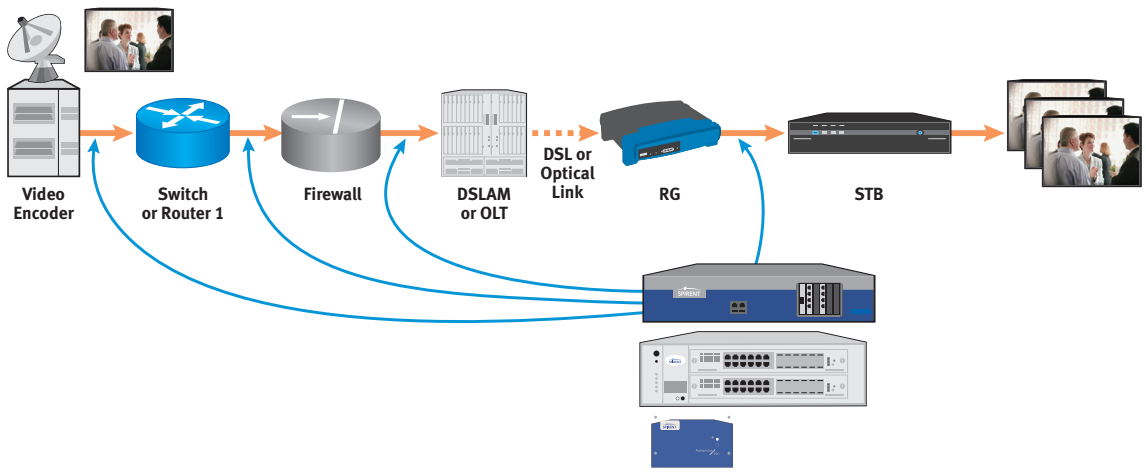
APPLICATIONS

- Assess Video Quality
- Assess Voice Quality
- Monitor, analyze and troubleshoot
- Test and monitor IPTV streams in a lab or on a live network
- Isolate and help resolve network and video content issues
- Multi Play Testing
- Access Network Testing
- Video Quality Metrics while channel changing
- Ad Insertion testing
- Analyzer Quality of MMS Video—QuickTime, Microsoft, Cellular (3GPP)

IPTV must be the same quality, if not higher quality, than existing TV delivery methods; this is particularly true for high definition TV. Network Equipment Manufacturers (NEMs) are being driven to deliver IPTV product with higher performance and reliability so that Service Providers can remain competitive.

Delivering IPTV is technically complex because small amounts of content or network impairments can significantly affect the end-user experience. Even 0.5 percent packet loss will seriously degrade picture quality. Service Providers and NEMs require tools that accurately monitor, analyze and troubleshoot IPTV issues under “real-world” conditions prior to deployment.

Avalanche Video Quality Analyzer (VQA) is a comprehensive Real-Time IPTV Analysis System allowing NEMs and Service Providers to assess more than ninety metrics related to delivering high quality IPTV. These include a wide range of metrics for program information, perceptual quality, network, MDI, content, frame statistics, video scene analysis and ETSI TR101-290 to understand the impact on network performance and end-user perception.



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VIDEO QUALITY ANALYZER (VQA)

FEATURES	BENEFITS
Perceptual Quality Metrics for Video, Audio, and VOIP voice	Characterize the perceptual quality of the Video, Audio and combined Audio/Video MOS (Mean Opinion Scores)
	High correlation with the customer perceptual Quality
	Deep packet inspection for analysis against network impairments, content metrics and ETSI TR101-290 parameters
Real-Time Tables and Charts	Provides a tool to monitor, analyze and troubleshoot IPTV related issues.
	Real-Time charting multiple metrics over a long duration (hours)
	Evaluate trends and metric associations/interactions.
SQL Database of Test Results	Easily filter, graph, colorize and sort results for thousands of IPTV video streams
	See the Perceptual Quality score over time for thousands of IPTV video streams individually
Post Analysis Report Generation	Database of all statistics and charts for post analysis and trend analysis
	Report generation in CSV, PDF, or HTML formats
Multi Play in a stateful L4-L7 environment	Send and analyze stateful traffic at L4-L7 through firewalls, application accelerators, and other L4-L7 network devices
	Measure Video Quality metrics and associate parameters in the presence of voice, stateful data, other video traffic and channel zapping

APPLICATIONS

Avalanche VQA is used to assess the perceived quality of IPTV video for thousands of simulated clients and VoIP Voice Calls. Avalanche VQA can analyze video from any compatible Multicast or Unicast IPTV video source, or alternatively, Avalanche can also emulate thousands of video servers “streaming” both Multicast and Unicast video. This provides for a complete end-to-end solution for testing IPTV.

- Test Ad-Insertion Equipment, Video Encoders, Routers, Firewalls, Deep Packet Inspection Devices, Switches, and all other network equipment in the IPTV delivery network
- Assess the perceived quality of IPTV and streaming video for thousands of simulated clients
- Assess the perceived quality of thousands of VoIP Voice Calls
- Verify system ability to handle IPTV requests from thousands of simulated clients changing channels (both Multicast and Unicast)
- Measure the impact of Ad-Insertion on video quality
- Simulate thousands of Multicast and Unicast IPTV Video servers
- Isolate and help resolve network and video content issues
- Test the network infrastructure ability to transport CBR and VBR video from thousands of simulated video servers to thousands of simulated video clients

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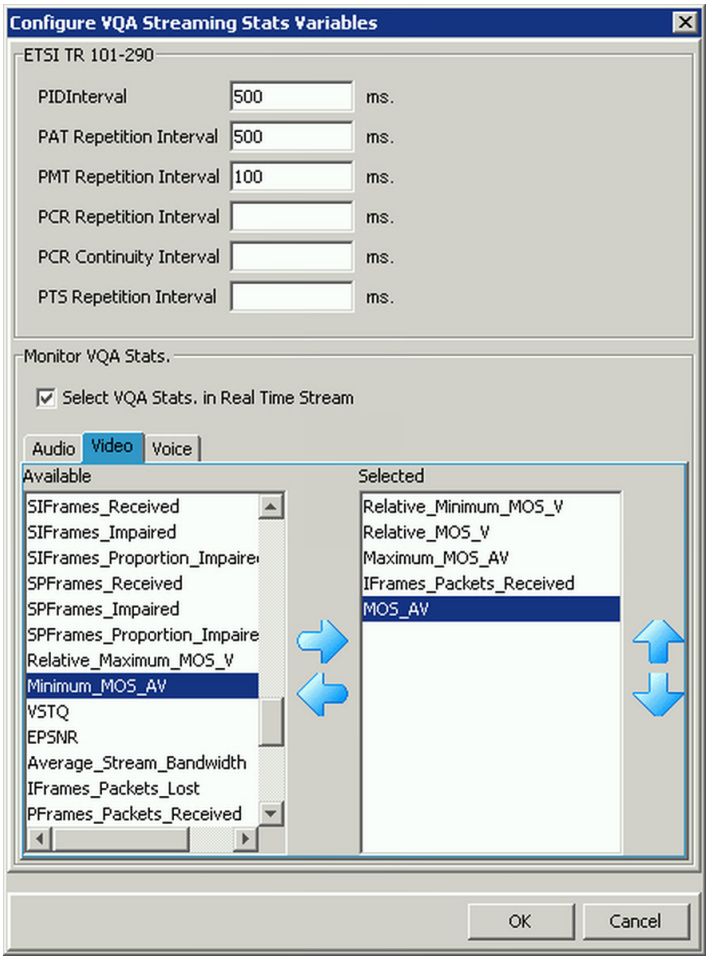
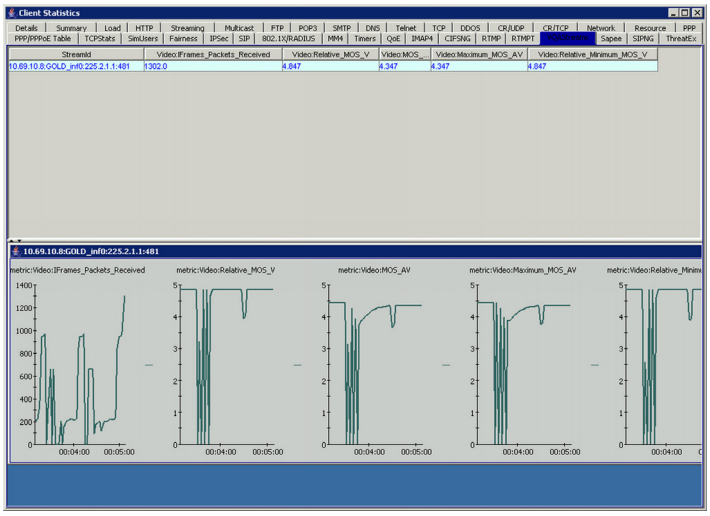


Real-Time Tables Graph



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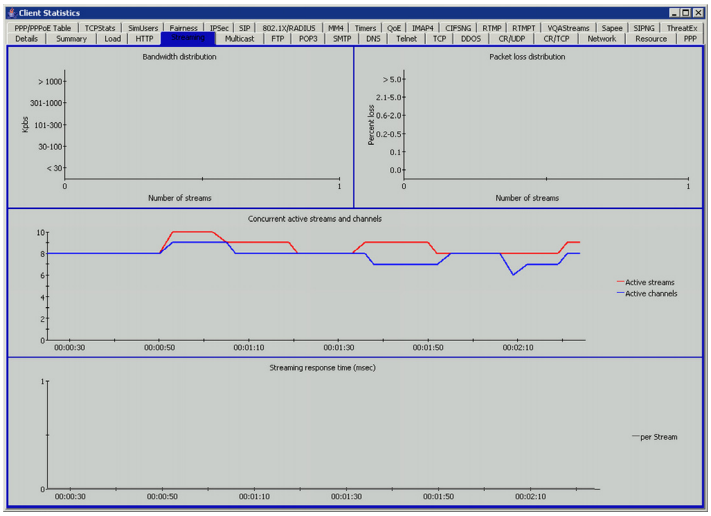

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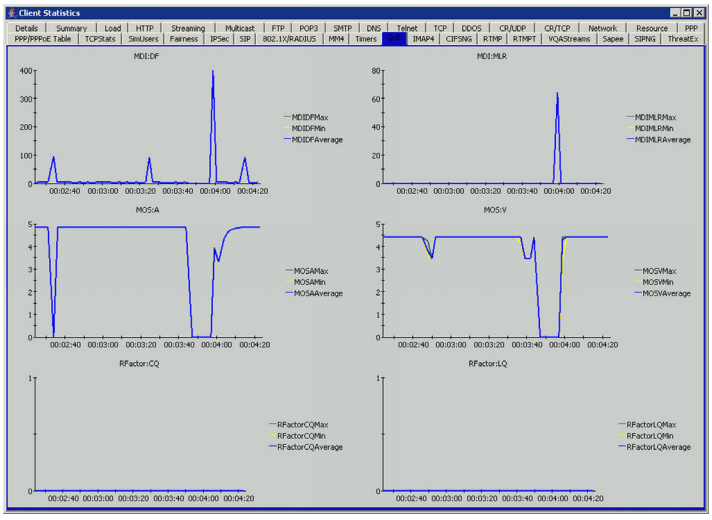

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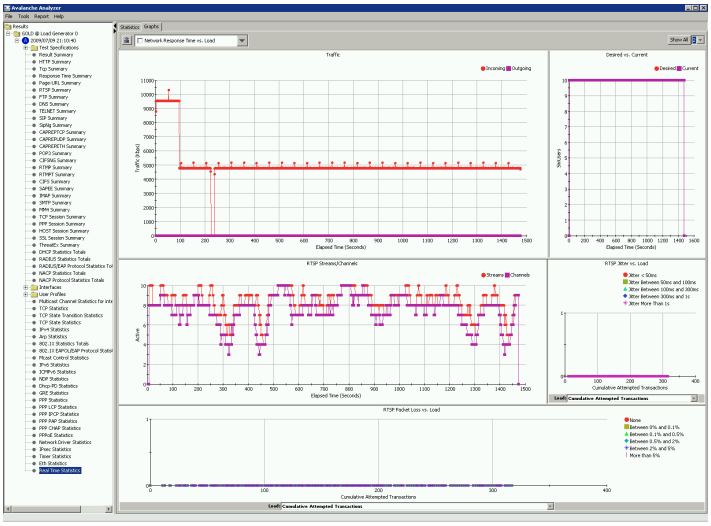

End-of-Test Graph

TECHNICAL SPECIFICATIONS

Supported Standards and RFC's

- ETSI TR.101-290 "Fast Health Check" of the MPEG2-TS Stream
- P.564 Class 1 Voice Measurements
- G.107 E-Model Voice Measurements
- RFC-4445 Media Delivery Index
- RFC-3550 Packet-to-Packet Delay Variation

Client Emulation

- IGMP Joins, Leaves, Duration, Linger for thousands of IGMPv2 of IGMPv3 Clients
- RTSP Play, Stop, FF, RW from thousands of streaming clients
- Emulation of all popular Client Browser and Media Player Types
- Ability to analyze MPEG-2 and MPEG-4/H.264

Server Emulation

- Emulation of thousands of RTP Servers, Multicast Servers, MMS Server
- Ability to upload multiple custom video files to be streamed
- Streaming over Unicast or Broadcasting over multicast of MPEG-2, MPEG-4/H.264, VC-1, or 3GPP video files in MPEG2-TS format
- Both RTP/UDP or UDP transport types supported

Client Emulation Metrics

- IGMP (Joins, Leaves, User Zaps, Dropped, Bad Queries, Downgrade Reports)

TECHNICAL SPECIFICATIONS	
	Video Quality
Video Program Information	• PID • RTP SSRC • Video Scrambling • CODEC • GoP (Length, Structure) • Inter-I-Frame Gap • Frame (Width, Height, Rate, Interlacing, Slices Per I-Frame) • Video Reference Clock Rate

Video Interval Metrics	• Bandwidth Information: Interval Stream Bandwidth
	• Perceptual Quality: Absolute MOS-V, Relative MOS-V , VSTQ, EPSNR, Absolute MOS-AV
	• Packet: Transport Packet Received, Transport Packets Lost, Transport Packet Effective Loss Rate, Transport Packet Discarded
	• MDI (RFC 4445)
	• DF (Min, Ave, Max)
	• MLR (Min, Ave, Max)
	• Jitter: Average PPDV (RFC 3550)
	• Frame
	  • Received: I, P, B, SI, SP
	  • Impaired: I, P, B, SI, SP
	• Error Extension Impaired: P, B, SP
	• Scene: Static, High Detail Images, Low Detail, High Panning, High Motion, Low Motion

Video Continuous Metrics	• Bandwidth: Average Stream Bandwidth, Frame Bandwidth—I, P, B, SI, SP (Average, Maximum) • Perceptual Quality: MOS-V—Absolute, Relative (Average, Minimum, Maximum), VSTQ, EPSNR • Degradation Factors: Packet Loss, CODEC, Frame Resolution, Gop Length • Packet: Transport Pocket Received, Transport Packets Lost, Uncorrected Proportion, Burst Loss—Count, Rate, Length, Gap—Count, Rate, Length • Jitter: I Frame Inter-arrival Jitter, PPDV—RFC.3550)

TECHNICAL SPECIFICATIONS (CONTINUED)

	Video Quality

Video Continuous Metrics (cont'd.)	• Frame
	  • Frames Received: I, P, B
	  • Proportion Frames Impaired: I, P, B
	  • Frames Packets Received: I, P, B, SI, SP
	  • Frames Packets Lost: I, P, B, SI, SP
	  • Frames Packets Discarded: I, P, B, SI, SP
	  • Frame Proportion Impaired: I, P, B, SI, SP
	• Proportion Error Extension Impaired: P, B, SP
	• Scene: Proportion Static, Proportion High Detail Images, Proportion Low Detail, Proportion High Panning, Proportion High Motion, Proportion Low Motion

	Audio Quality
Audio Program Information	• PID • RTP SSRC • Audio CODECs • Audio Coding • Number of Audio Channels • Reference Clock Rate
Audio Interval Metrics	• Bandwidth (Stream Audio Bandwidth) • Perceptual Quality Information (Interval Absolute MOS-A) • Packet Information (Interval Transport (Loss, Effective Loss, Discarded)
Audio Continuous Metrics	• Bandwidth (Ave Stream Audio Bandwidth) • Perceptual Quality (MOS-A—Absolute, (Average, Minimum, Maximum), Proportion Below Absolute MOS-A Threshold) • Degradation Factors (Packet Loss, CODEC) • Packet (Transport Pocket Received, Transport Packets Lost, Uncorrected Lost Proportion, Burst Loss—Count, Rate, Length, Gap—Count, Rate, Length, PPDV—RFC.3550)
Supported Technologies	Video Codecs • MPEG-1, MPEG-2, MPEG-4 • H.261, H.263, H.263+, H.264 • MPEG-4 part 2 • Microsoft VC1 • JPEG video • Telepresence
	Audio Codecs • MPEG-1 Layer 1, 2, 3 audio • MPEG-2 Advanced Audio Coding • AC-3 audio • MPEG-4 Advanced Audio Coding • MPEG-4 Low Delay Advanced Audio Coding • MPEG-4 High Efficiency Advanced

TECHNICAL SPECIFICATIONS (CONTINUED)	
ESTI TR101-290 P1	• Sync Loss • Sync Byte Error • PAT Error • PAT Error 2 • Continuity Error • PMT Error • PMT2 Error
Test Packages	• Transport Error • CRC Error • PCR Error • PCR Repetition / Discontinuity Error • PCR Accuracy Error • PTS Error
TS Format	• Standard Definitions (SD), High Definition (HD) • SPTS: Single Program Transport Stream • MPTS: Multi-Program Transport Stream • Dynamic Payload
L2 Encapsulation	• Eth2/IP/UDP • Eth2/IP/UDP/RTP • Eth2/VLAN/IP/UDP • Eth2/VLAN/IP/UDP/RTP • Eth2/PPPoE/IP/UDP • Eth2/PPPoE/IP/UDP/RTP • Eth2/PPPoE/VLAN/IP/UDP/RTP
VoIP Voice Quality	
Interval	• MOS Listening Quality • MOS Conversational Quality • R-Factor Listening Quality • R-Factor Conversational Quality • Packets Received • Packets Lost • Average Packet Loss Rate
Continuous	• MOS Listening Quality • MOS Conversational Quality • R-Factor Listening Quality • R-Factor Conversational Quality
Technologies VoIP CODECS	• G.711 µ-law (64k, 56k) • G.711 µ-law PLC (64k, 56k) • G.711 64k A-law (64k, 56k) • G.711 64k A-law PLC (64k, 56k) • G.723.1 5.3K, 6.3K, Annex C • G.728 • G.729, G.729A • GSM 6.10 (full-rate) • GSM 6.10 (half-rate) • GSM 6.10 (enhanced full-rate) • Lucent/elemedia SX7300/8300 • Lucent/elemedia SX9600 • G.726 ADPCM (16 kbit, 24 kbit, 32 kbit, 40 kbit) • GIPS Enhanced G.711 µ-law, A-law • GIPS iLBC, iSAC, iPCM • G.729E (8.0 kbit, 11.8 kbit)

TECHNICAL SPECIFICATIONS (CONTINUED)	
Technologies VoIP CODECS (cont'd.)	• Wideband Linear PCM • Wideband Linear PCM with PLC • G.722 (56kbit, 48kbit, 32kbit, 24kbit, 23.85kbit, 23.05kbit, 19.85kbit) • QCELP (8kbit, 13kbit) • EVRC (Full Rate, Half Rate, Eighth Rate) • SMV (Modes 0, 1, 2, 3) • AMR Narrowband (12.2kbit, 10.2kbit, 7.95kbit, 7.4kbit, 6.7kbit, 5.9kbit,, 5.15kbit, 4.75kbit) • iLBC (13.3kbit, 15.2kbit) • Speex Narrowband (2.15kbit, 5.95kbit, 8kbit, 11kbit, 15kbit, 18.2kbit, 24.6kbit, 3.95kbit, 12.8kbit, 16.8kbit, 20.6kbit, 23.8kbit, 27.8kbit, 34.2kbit 42.2kbit) • Broadcom 16kbit, 32kbit) • IS-54 (7.95kbit) • Japanese PDC (6.7kbit) • AMBE2Plus (2.4kbit, 3.2kbit, 4kbit, 4.8kbit

AVALANCHE VQA ORDERING INFORMATION

Part Number	Avalanche VQA Description	Voice, Video, or Voice and Video License
	HYPERMETRICS CM and AP Only	
BPK-1088A	AVALANCHE VoIP VQA METRICS FOR HYPERMETRICS CM - 9U	Voice
BPK-1088A-2XMOD	AVALANCHE VoIP VQA METRICS FOR HYPERMETRICS CM - 2XMOD	Voice
BPK-1088A-MOD	AVALANCHE VoIP VQA METRICS FOR HYPERMETRICS CM – MODULE	Voice
BPK-1088B	AVALANCHE VQA & MDI BASE FULL FOR HYPERMETRICS CM - 9U	Voice and Video
BPK-1088B-2XMOD	AVALANCHE VQA & MDI BASE FULL FOR HYPERMETRICS CM - 2XMOD	Voice and Video
BPK-1088B-MOD	AVALANCHE VQA & MDI BASE FULL METRICS FOR HYPERMETRICS CM - MODULE	Voice and Video
BPK-1088-UPG-AB	UPG TO AVALANCHE VQA & MDI FULL FOR HYPERMETRICS CM - 9U	Voice and Video
BPK-1088-UPG-AB-2XMOD	UPG TO AVALANCHE VQA & MDI FULL FOR HYPERMETRICS CM - 2XMOD	Voice and Video
BPK-1088-UPG-AB-MOD	UPG TO AVALANCHE VQA & MDI FULL FOR HYPERMETRICS CM - MODULE	Voice and Video
SPK-1043	AVALANCHE VQA MULTIMEDIA SRVR/CLIENT FOR HYPERMETRICS CM - 9U	Voice and Video
SPK-1043-2XMOD	AVALANCHE VQA MULTIMEDIA SRVR/CLIENT FOR HYPERMETRICS CM - 2XMOD	Voice and Video
SPK-1044	AVALANCHE EXTREME VER-3 FOR HYPERMETRICS CM -9U	Voice and Video
SPK-1044-2XMOD	AVALANCHE EXTREME VER-3 FOR HYPERMETRICS CM - 2XMOD	Voice and Video
	Appliance 2900, 2700	
CEE-SW-VQA-BRF	AVALANCHE VoIP VQA METRICS CLIENT	Voice
CEE-SW-VQA	AVALANCHE VIDEO QUALITY ANALYSIS FULL METRICS CLIENT	Voice and Video
CEE-SWB-009	AVALANCHE EXTREME VER 3 SW BUNDLE	Voice and Video
CEE-SWB-011	AVALANCHE VQA MULTIMEDIA SW BUNDLE	Voice and Video
	Appliance 290	
CEE-SW-VQA-BRF-PT	AVALANCHE PT VoIP VQA METRICS CLIENT	Voice
CEE-SW-VQA-PT	AVALANCHE PORTABLE VIDEO QUALITY ANALYSIS FULL METRICS CLIENT	Voice and Video
CEE-SWB-009-PT	AVALANCHE PORTABLE EXTREME VER 3 SW BUNDLE	Voice and Video
CEE-SWB-011-PT	AVALANCHE PORTABLE VQA MULTIMEDIA SW BUNDLE	Voice and Video

VIDEO QUALITY ANALYZER (VQA)

SUPPORTED INTERFACES MODULES/PLATFORMS

Compatible Physical Cabling Interfaces

- 10/100 Copper
- 1-Gigabit Ethernet Copper
- 1-Gigabit Ethernet Fiber
- 10-Gigabit Ethernet Fiber

Spirent TestCenter Chassis

- SPT-2000A—Rack-Mountable or Portable 2U Chassis
- SPT-2000A-HS—Rack-Mountable or Portable 2U Chassis with High-Speed Fan
- SPT-9000A—Rack-Mountable 9U Chassis

Spirent TestCenter Modules

- HyperMetrics CM: CM-1G-D4—4-Port 10/100/1000 Dual Media Ethernet Module
- HyperMetrics CM: CM-1G-D12—12-Port 10/100/1000 Dual Media Ethernet Module
- CPU-5001A: 8-Port 1-Gigabit Ethernet CPU Module
- HyperMetrics AP: CPU-5002A—8-Port 1-Gigabit Ethernet HyperMetrics CPU Module
- HyperMetrics AP: CPU-5003A—2-Port 10-Gigabit Ethernet HyperMetrics CPU Module

Avalanche Appliances

- Avalanche 2700
- Avalanche 2900
- Avalanche 290

REQUIREMENTS

PC or Workstation

- Windows®, Linux®, or Solaris®
- 1 x RJ45 Ethernet cable and 1 x RJ45 Ethernet port installed in the PC
- Operating system languages supported: English, French, German, Italian, Japanese, Korean and Chinese (traditional and simplified)

PC or Workstation Requirements

- Minimum Configuration
  - 2.4GHz Pentium 4 or equivalent with 2GB RAM and 10GB of free disk space
- Recommended Configuration
  - Intel® Core 2 Duo E5200 or better with 4GB RAM and 100GB free disk space
  - For test automation system requirements refer to the Spirent TestCenter Automation data sheet (P/N 79-000037)

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