



VQA - Spirent Video Quality Analyzer

DETAILED REAL-TIME IPTV ANALYSIS SYSTEM

Telephone companies worldwide are transitioning from legacy voice and data to value added Triple Play services (VoIP, IPTV and Data). Of the three services, IPTV is the most critical since it is the most sensitive to network conditions and the most demanding of resources.

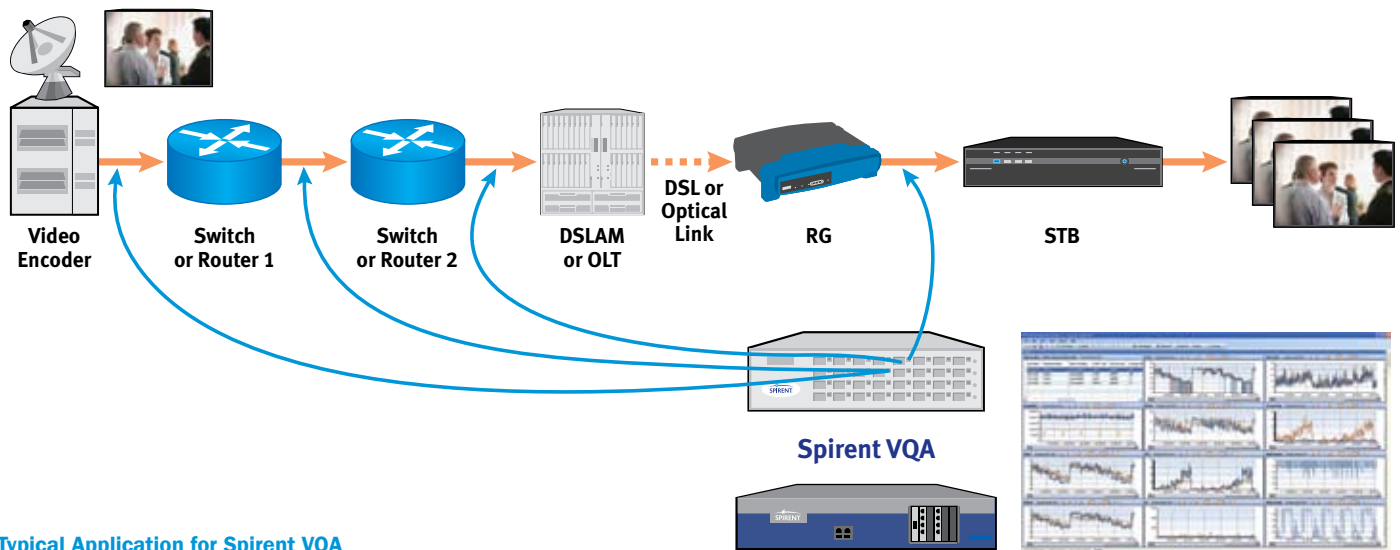
APPLICATIONS

- Assess Video 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
- Triple Play Testing
- Access Network Testing
- Video Quality Metrics while channel changing
- Ad Insertion testing

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.

The Spirent VQA is a comprehensive Real-Time IPTV Analysis System allowing NEMs and Service Providers to assess hundreds of 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, Spirent offers Video Quality Analysis (VQA) solutions on two renown platforms – Avalanche and Spirent TestCenter.



Typical Application for Spirent VQA

BENEFITS

Avalanche VQA

- Scalable video test application combined with detailed Layer 4-7 performance analysis
- Post analysis using SQL data base
 - Brief Metrics (6 Metrics) – high channel density per port
 - Full Metrics (55 Metrics) – select number of channels per port

Spirent TestCenter VQA

- High port density video test application combined with Layer 2/3 FPGA and Routing analysis
- Real-Time Tables/Charts and Post Analysis/ Report Generation using SQL data base
 - Detailed Metrics (175 Metrics) – low channel density per port

FEATURES & BENEFITS

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 association/ interactions

Post Analysis and Report Generation

- Database of all statistics and charts for post analysis and trend analysis
- Report generation

Program Information

- Provides information about video and audio stream

Perceptual Quality Metrics

- 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

Network Metrics for Video, Audio and Transport Streams

- Monitor, analyze and troubleshoot network related issues
- Correlate perceptual quality to network characteristics

Media Delivery Index (MDI) – RFC 4445

- Network quality indicator for monitoring, comparing and adjusting network elements to minimize network loss and jitter

ETSI TR101-290 – P1 & P2 Metrics

- “Fast Health Check” of MPEG2-TS transport
- De-codability metrics – basic, continuous and periodic monitoring
- Monitor, analyze and troubleshoot DBV transport stream related issues

Frame Statistics

- Information on I, B and P frames
- Monitor, analyze and troubleshoot frame related issues
- Correlate frame impairment and network characteristics

Content and Video Scene Analysis Metrics

- Monitor, analyze and troubleshoot issues related content and scenes
- Correlate content and scene characteristics to network characteristics and perceptual quality

Triple Play

- Measure Video Quality metrics and associate parameters in the presence of voice, data, other video traffic and channel zapping

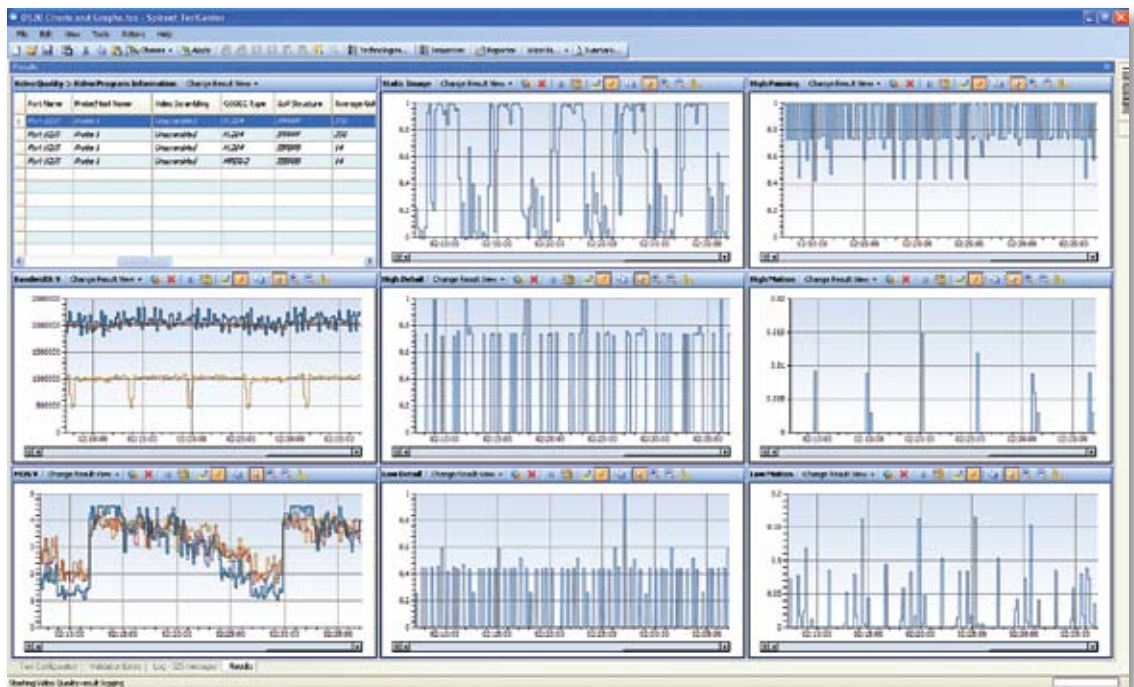
TECHNICAL SPECIFICATIONS

Category	Metrics
Video Metrics	
Video Program Information	<ul style="list-style-type: none"> ■ PID ■ RTP SSRC ■ Video Scrambling (DRM) ■ CODEC (H.264, MPEG2/4, VC1) ■ GoP (Length (Average, Maximum, Current), Structure – I, IP, IBBP, P, IBP) ■ Inter-I-Frame Gap ■ Frame (Width, Height, Rate, Interlacing, Slices Per I-Frame) ■ Video Reference Clock Rate
Video Interval Metrics	<ul style="list-style-type: none"> ■ Bandwidth Information (Interval Stream Bandwidth) ■ Perceptual Quality (Absolute MOS-V, Relative MOS-V, VSTQ, EPSNR, Absolute MOS-AV) ■ Packet (Transport Pocket Received, Transport Packets Lost, Transport Packet Effective Loss Rate, Transport Packet Discarded) ■ MDI – DF (Min, Ave, Max), MLR (Min, Ave, Max) – RFC 4445 ■ 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	<ul style="list-style-type: none"> ■ 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) ■ 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 Metrics	
Audio Program Information	<ul style="list-style-type: none"> ■ PID ■ RTP SSRC ■ Number of Audio Channels ■ Reference Clock Rate ■ CODEC (MPEG-1 Layer 1/ 2/3 audio, MPEG-2 Advanced Audio Coding, AC-3 audio, MPEG-4 Advanced Audio Coding/ Low Delay Advanced Audio Coding/High Efficiency Advanced, Audio Coding)
Audio Interval Metrics	<ul style="list-style-type: none"> ■ Bandwidth (Stream Audio Bandwidth) ■ Perceptual Quality Information (Interval Absolute MOS-A) ■ Packet Information (Interval Transport (Loss, Effective Loss, Discarded))
Audio Continuous Metrics	<ul style="list-style-type: none"> ■ 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)
ETSI TR101-290	
<ul style="list-style-type: none"> ■ MP2TS TR101-290 P1 Information (Sync Loss, Sync Byte Error, PAT Error, PAT Error 2, Continuity Error, PMT Error, PMT2 Error) ■ MP2TS TR101-290 P2 Information (Transport Error, CRC Error, PCR – Error, Repetition, Discontinuity, Accuracy, PTS Error) 	
Tunable Parameters	
<ul style="list-style-type: none"> ■ Loss Concealment (Frame Loss Concealment Robustness, Slices per I-Frame) ■ Video Buffer (Nominal Delay, Maximum Packet Count) ■ MOS Thresholds (MOS V Threshold, MOS V Normalized Threshold, MOS AV Threshold, MOS A Threshold) 	
Other	
Interfaces	<ul style="list-style-type: none"> ■ Copper – 1G, 10G ■ Fiber
Transport	IP, RTP, MPEG2-TS
Transport Method	RTP/UDP, Raw UDP

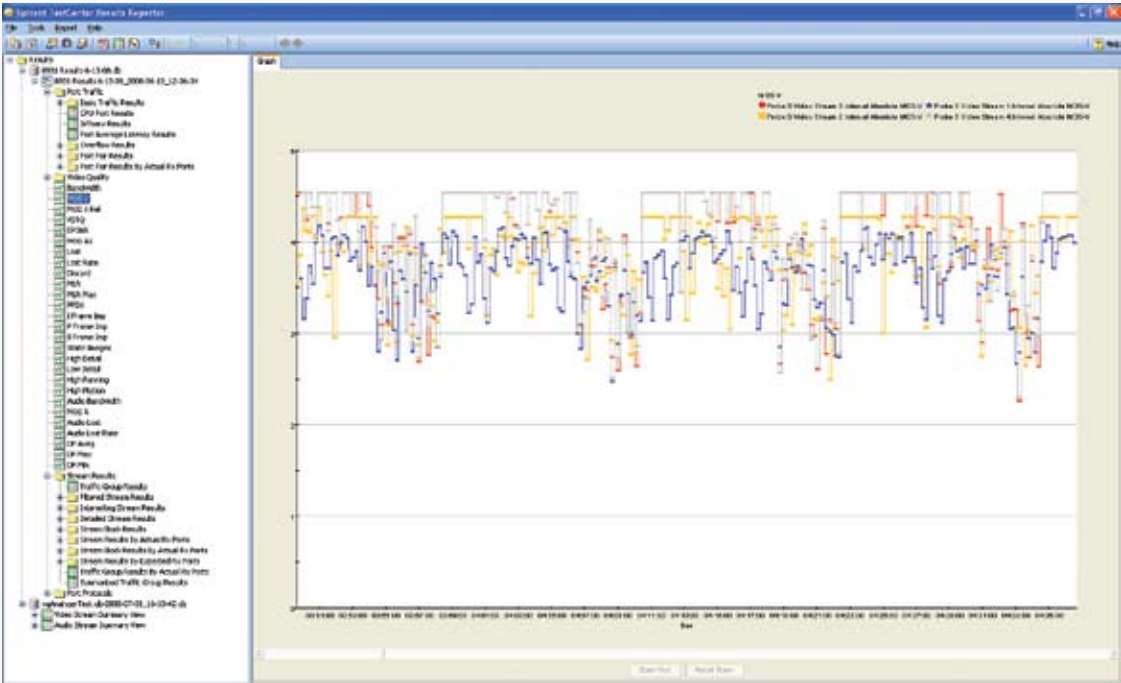
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Real-Time Results Comparing Characteristics of Single Stream or Multiple Streams



Real-Time Results – Table and Scene Metrics



Results Reporter – Chart of Video MOS for Multiple Channels

The screenshot displays the 'Spirent VQA Results Reporter' interface with a detailed data table. The table lists results every 10 seconds. The columns include: 'Time', 'Video', 'Destination Address', 'Continuation of Port', 'Stream', 'Video of Movie MOS', 'Frame Rate', 'Video of Movie MOS of Frame', 'Video of Movie MOS of Frame', and 'Video of Movie MOS of Frame'. The data shows a high volume of entries for various video streams, with MOS values fluctuating between approximately 0.5 and 5.0.

Time	Video	Destination Address	Continuation of Port	Stream	Video of Movie MOS	Frame Rate	Video of Movie MOS of Frame	Video of Movie MOS of Frame	Video of Movie MOS of Frame
00:00:00	Video 1	192.168.1.1	1234	192.168.1.1	0	30	0	0	0
00:00:10	Video 1	192.168.1.1	1234	192.168.1.1	0	30	0	0	0
00:00:20	Video 1	192.168.1.1	1234	192.168.1.1	0	30	0	0	0
00:00:30	Video 1	192.168.1.1	1234	192.168.1.1	0	30	0	0	0
00:00:40	Video 1	192.168.1.1	1234	192.168.1.1	0	30	0	0	0
00:00:50	Video 1	192.168.1.1	1234	192.168.1.1	0	30	0	0	0
00:01:00	Video 1	192.168.1.1	1234	192.168.1.1	0	30	0	0	0
00:01:10	Video 1	192.168.1.1	1234	192.168.1.1	0	30	0	0	0
00:01:20	Video 1	192.168.1.1	1234	192.168.1.1	0	30	0	0	0
00:01:30	Video 1	192.168.1.1	1234	192.168.1.1	0	30	0	0	0
00:01:40	Video 1	192.168.1.1	1234	192.168.1.1	0	30	0	0	0
00:01:50	Video 1	192.168.1.1	1234	192.168.1.1	0	30	0	0	0
00:02:00	Video 1	192.168.1.1	1234	192.168.1.1	0	30	0	0	0
00:02:10	Video 1	192.168.1.1	1234	192.168.1.1	0	30	0	0	0
00:02:20	Video 1	192.168.1.1	1234	192.168.1.1	0	30	0	0	0
00:02:30	Video 1	192.168.1.1	1234	192.168.1.1	0	30	0	0	0
00:02:40	Video 1	192.168.1.1	1234	192.168.1.1	0	30	0	0	0
00:02:50	Video 1	192.168.1.1	1234	192.168.1.1	0	30	0	0	0
00:03:00	Video 1	192.168.1.1	1234	192.168.1.1	0	30	0	0	0
00:03:10	Video 1	192.168.1.1	1234	192.168.1.1	0	30	0	0	0
00:03:20	Video 1	192.168.1.1	1234	192.168.1.1	0	30	0	0	0
00:03:30	Video 1	192.168.1.1	1234	192.168.1.1	0	30	0	0	0
00:03:40	Video 1	192.168.1.1	1234	192.168.1.1	0	30	0	0	0
00:03:50	Video 1	192.168.1.1	1234	192.168.1.1	0	30	0	0	0
00:04:00	Video 1	192.168.1.1	1234	192.168.1.1	0	30	0	0	0
00:04:10	Video 1	192.168.1.1	1234	192.168.1.1	0	30	0	0	0
00:04:20	Video 1	192.168.1.1	1234	192.168.1.1	0	30	0	0	0
00:04:30	Video 1	192.168.1.1	1234	192.168.1.1	0	30	0	0	0
00:04:40	Video 1	192.168.1.1	1234	192.168.1.1	0	30	0	0	0
00:04:50	Video 1	192.168.1.1	1234	192.168.1.1	0	30	0	0	0
00:05:00	Video 1	192.168.1.1	1234	192.168.1.1	0	30	0	0	0
00:05:10	Video 1	192.168.1.1	1234	192.168.1.1	0	30	0	0	0
00:05:20	Video 1	192.168.1.1	1234	192.168.1.1	0	30	0	0	0
00:05:30	Video 1	192.168.1.1	1234	192.168.1.1	0	30	0	0	0
00:05:40	Video 1	192.168.1.1	1234	192.168.1.1	0	30	0	0	0
00:05:50	Video 1	192.168.1.1	1234	192.168.1.1	0	30	0	0	0
00:06:00	Video 1	192.168.1.1	1234	192.168.1.1	0	30	0	0	0
00:06:10	Video 1	192.168.1.1	1234	192.168.1.1	0	30	0	0	0
00:06:20	Video 1	192.168.1.1	1234	192.168.1.1	0	30	0	0	0
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00:06:50	Video 1	192.168.1.1	1234	192.168.1.1	0	30	0	0	0
00:07:00	Video 1	192.168.1.1	1234	192.168.1.1	0	30	0	0	0
00:07:10	Video 1	192.168.1.1	1234	192.168.1.1	0	30	0	0	0
00:07:20	Video 1	192.168.1.1	1234	192.168.1.1	0	30	0	0	0
00:07:30	Video 1	192.168.1.1	1234	192.168.1.1	0	30	0	0	0
00:07:40	Video 1	192.168.1.1	1234	192.168.1.1	0	30	0	0	0
00:07:50	Video 1	192.168.1.1	1234	192.168.1.1	0	30	0	0	0
00:08:00	Video 1	192.168.1.1	1234	192.168.1.1	0	30	0	0	0
00:08:10	Video 1	192.168.1.1	1234	192.168.1.1	0	30	0	0	0
00:08:20	Video 1	192.168.1.1	1234	192.168.1.1	0	30	0	0	0
00:08:30	Video 1	192.168.1.1	1234	192.168.1.1	0	30	0	0	0
00:08:40	Video 1	192.168.1.1	1234	192.168.1.1	0	30	0	0	0
00:08:50	Video 1	192.168.1.1	1234	192.168.1.1	0	30	0	0	0
00:09:00	Video 1	192.168.1.1	1234	192.168.1.1	0	30	0	0	0
00:09:10	Video 1	192.168.1.1	1234	192.168.1.1	0	30	0	0	0
00:09:20	Video 1	192.168.1.1	1234	192.168.1.1	0	30	0	0	0
00:09:30	Video 1	192.168.1.1	1234	192.168.1.1	0	30	0	0	0
00:09:40	Video 1	192.168.1.1	1234	192.168.1.1	0	30	0	0	0
00:09:50	Video 1	192.168.1.1	1234	192.168.1.1	0	30	0	0	0
00:10:00	Video 1	192.168.1.1	1234	192.168.1.1	0	30	0	0	0

Results Reporter – SQL Data Base with all results every 10s

SUPPORTED MODULES/PLATFORMS

- Spirent TestCenter VQA supports 2000 Series Modules
- Avalanche VQA supports 2000 Series Modules, CPU Module 5000 series, 2900 Appliance

SPIRENT TESTCENTER HARDWARE REQUIREMENTS

- Pentium® or greater PC running Windows® XP Professional SP2 with mouse/color monitor required for GUI operation. See Minimum PC Requirements section.
- One Ethernet cable and one 10/100/1000 Mbps Ethernet card installed in the PC
- SPT-2000A Spirent 2U Chassis and Controller, SPT-2000A-HS Spirent 2U Chassis and Controller or SPT-9000A Spirent TestCenter 9U Chassis and Controller
- Operating system languages supported: English, French, German, Italian, Japanese, Korean and Chinese (traditional and simplified)
- For test automation system requirements refer to the Spirent TestCenter Automation data sheet (P/N 79-000037)

PC, UNIX, or Linux Requirements by System Size

- Small Port System: 1-25 ports*
 - Minimum: 2.4GHz Pentium 4 or equivalent with 512 MB of free RAM and 10 GB of free disk space
 - Recommended: Intel Core™ 2 Duo E6300 processor (or equivalent) 1, 2 GB of free RAM, and 10 GB of free disk space
- Medium Port System: 26-75 ports*
 - Minimum: 3 Ghz Pentium 4 or equivalent with 2 GB of RAM and 15 GB of free disk space
 - Recommended: Intel Core 2 Duo E6400 processor (or equivalent), 4 GB free RAM, and 100 GB of free disk space
- Large Port System: 75+ ports*
 - Minimum: E6400 Intel® Core™ 2 Duo or equivalent with 3 GB of RAM and 100 GB of free disk space
 - Recommended: Intel Core 2 Duo E6600 processor (or equivalent), 4 GB of RAM, and 100 GB of free disk space.

* Large System is recommended for VQA for Real-Time Graphing and storing of SQL database.

Spirent TestCenter Ordering Information

Part Number	Description
Spirent TestCenter VQA	
BPK-1074-MOD	VQA BASE PACKAGE A – 2000 Series Module
BPK-1074A-2U	VQA BASE PACKAGE A – 2U Chassis
BPK-1074A	VQA BASE PACKAGE A – 9U Chassis
Spirent TestCenter MDI	
BPK-1073-MOD	MDI BASE PACKAGE A – 2000 Series Module
BPK-1073A-2U	MDI – BASE PACKAGE A – 2U Chassis
BPK-1073A	MDI – BASE PACKAGE A – 9U Chassis
Spirent TestCenter VQA & MDI	
SPK-1034-MOD	VQA & MDI BASE PACKAGE A – 2000 Series Module
SPK-1034A-2U	VQA & MDI – BASE PACKAGE A – 2U Chassis
SPK-1034A	VQA & MDI – BASE PACKAGE A – 9U Chassis
Other Associated Part Numbers	
BPK-1001A	PACKET GENERATOR AND ANALYZER BASE PACKAGE A – Required for VQA on 2000 series
BPK-1003A	IGMP/MLD HOST IP MULTICAST BASE PACKAGE A – Optional for testing Video Quality during channel changes

Avalanche Ordering Information

Part Number	Description
BPK-1079A-MOD	AVALANCHE VIDEO QUALITY ANALYSIS CLIENT BASE PKG A – MODULE, VQA & MDI – CPU Module 5000 Series
BPK-1079A-2U	AVALANCHE VIDEO QUALITY ANALYSIS CLIENT BASE PACKAGE A, VQA & MDI – 2U Chassis 2000 series
BPK-1079A	AVALANCHE VIDEO QUALITY ANALYSIS CLIENT BASE PACKAGE A, VQA & MDI – 9U Chassis 2000 series
CEE-SW-VQA	AVALANCHE VIDEO QUALITY ANALYSIS CLIENT BASE PACKAGE Appliance, VQA & MDI – 2900 Appliance
Other Associated Part Numbers	
BPK-1001A	PACKET GENERATOR AND ANALYZER BASE PACKAGE A – Required for VQA on 2000 series cards
CEE-SW-VOD	AVALANCHE VIDEO ON DEMAND MULTICAST CLIENT/SERVER. AVALANCHE VIDEO ON DEMAND MULTICAST CLIENT/SERVER. Streaming Multicast Raw UDP and MPEG-TS, IGMPv2 and IGMPv3, Support of MPEG-2 Video and MPEG-4 Video – Optional Video Server on 2900 Appliance
BPK-1045A	LAYER 4-7 VIDEO STREAMING MULTICAST BASE PACKAGE A – Optional Video Server on 2000 series modules
BPK-1033A	LAYER 4-7 SYSTEM SOFTWARE BASE PACKAGE A Required for optional Video Server on 2000 series modules

SPIRENT SERVICES

Spirent Global Services optimizes your productivity with Spirent TestCenter over a broad range of technologies:

Professional Services

- Test lab optimization: Test automation engineering services
- Service deployment and service-level optimization: Vendor acceptance testing, SLA benchmarking, infrastructure and security validation
- Device scalability optimization: POC high capability validation testing

Education Services

- Web-based training: 24 x 7 hardware and software training
- Instructor-led training: Hands-on methodology and product training
- Certifications: SCPA and SCPE certifications Implementation Services
- Optimized new customer productivity with up to three days of on-site assistance

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