

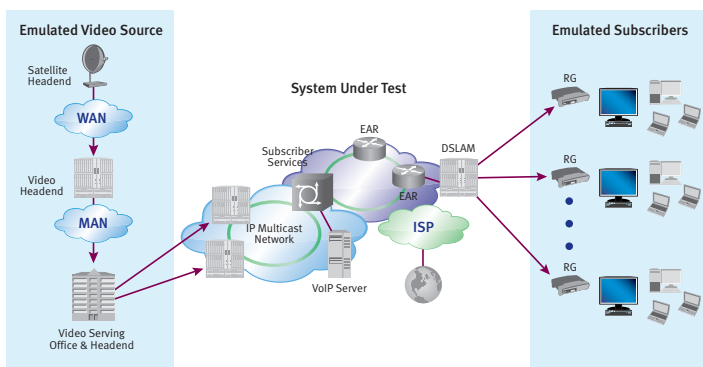
SPIRENT TESTCENTER

IPTV TEST PACKAGE

Convergence is creating a new generation of integrated network devices and services that are much more complex than ever before. The resulting increased complexity, scarcity of testing skills and architectural shortcomings in current test systems are hurting the ability of manufacturers to ship products on time at escalating quality levels and slowing service providers' ability to deploy networks that get Quality of Experience (QoE) right the first time.

INCREASE PRODUCTIVITY: GET THERE FASTER WITH SPIRENT TESTCENTER

- Emulate thousands of subscribers per port who are changing channels
- Scale across hundreds of ports
- Test with emulated traffic or against a real video source
- Create different client profiles for different types of behavior
- Analyze data using detailed statistics showing the min/max/avg values per subscriber
- Identify the min/max/avg of when there is no traffic (gap) and two channels at once (overlap)



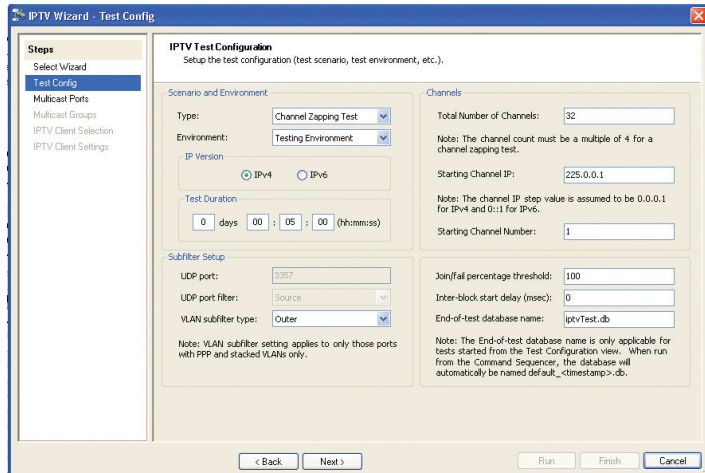
Spirent can help you address this challenge with Spirent TestCenter 2.0 with its innovative Inspire Architecture™. Now you can create and execute more complex test cases in less time with the same resources—and scale tests higher while debugging problems faster. The results: lower CAPEX and OPEX, faster time to market, greater market share and higher profitability.

IPTV is a primary component of Triple Play services (voice, video and data). IPTV provides television content and other services such as Video on Demand (VoD) to broadband subscribers via IP. Using IPTV, a single broadcast can be sent to a worldwide audience enabling new types of service offerings and revenue opportunities.

One of the most important features of any IPTV service is “channel zapping,” the ability for the subscriber device to change channels rapidly. Extremely important during testing, channel zapping helps to determine just how much time users wait for video (channel gap) and/or if there are multiple IPTV streams at the same time (channel overlap). Both of these parameters will affect the users' Quality of Experience (QoE).

The greatest concern in any deployment of an IPTV service is the impact on the network. Since it is IP based, there could be hundreds if not thousands of video channels crossing the network, consuming gigabytes of bandwidth and affecting other services. A single HD IPTV channel could be 8 Mbps, and many providers are planning on at least 4 set top boxes (STB) in a single house, resulting in total potential downstream traffic of up to 32 Mbps per subscriber.

SPIRENT TESTCENTER IPTV TEST PACKAGE



IPTV Wizard Interface

Network designers will also have to account for bandwidth spikes that will occur every half hour as television programs end and subscribers seek a new program. Changing channels requires the stopping of one video channel stream and then joining another. If the user changes channels quickly and traffic continues on the previous channel, a single STB could receive 16 Mbps and affect all services. The actual problem compounds when the user is unhappy with the poor video quality and begins to change channels, adding more load to the network. This will impact other users who may also begin to “surf for quality” and so on.

Service providers and cable providers need to test IPTV quality of experience, STB scalability and network performance. Spirent Communications’ IPTV Test Package fulfills these needs.

KEY FEATURES

- High subscriber emulation and port density
 - 4,094 subscribers per port
 - 48K subscribers per test module
 - 589K subscribers per chassis
- Profile creation for measuring the impact of subscribers channel zapping/surfing
- Identify the min/max/avg of when there is no traffic (gap) or when there are two channels at once (overlap)
- Detailed graphical results of statistics such as min/max/avg channel change
- Configurable IGMP/MLD join/leave latency thresholds to determine failures
- Use simulated IP multicast traffic or test against a real IP multicast source

The Spirent IPTV Test Package supports the measurement of thousands of clients channel zapping across hundreds of ports. This product provides service providers with the tools they need

to test large-scale service configurations and identify issues. The results enable improved equipment selection and cost control, as well as more competitive service level agreements.

APPLICATIONS

- Determine the impact that hundreds or thousands of channels have on the network
- Evaluate key performance parameters such as channel gap and channel overlap of STBs and other multicast devices
- Stress the backplane of edge aggregation devices with thousands of clients changing channels across hundreds of ports
- Benchmark against ideal environments with test equipment generating the traffic on real world servers
- Troubleshoot channel or video quality issues through analysis of extensive reports and channel buffers

BENEFITS

Network Performance: Verifying Bandwidth

Service providers are deploying solutions with hundreds of IPTV channels and hundreds or thousands of videos on demand. Assuming a single neighborhood could have 200 unique multicast streams and the traffic can be up to 8 Mbps per stream, then up to 1.6 Gbps could be supplied to a single neighborhood on a single DSLAM.

Quality of Experience: Avoiding the Death Spiral

Channel surfing is an expected behavior that must be tested. Depending on the type of user, he or she may quickly switch through 10+ channels to see which shows are on. Alternatively, the viewer may switch once every half-hour or once every hour. The frequency of these changes can add stress to the network. If there is too much network load, the video may be delayed or there may be multiple channels sent creating additional load. Understanding how fast users receive traffic will help prevent channel gap (no video) and channel overlap (receiving multiple channels).

IPTV Quality: Checking for Loss

The user has a very high expectation on TV quality. The smallest amount of packet loss will cause video pixilation and impact video quality. Service providers need to test to verify that the network bottlenecks in the last mile can handle hundreds of unique channels at 4 to 8 Mbps per channel with no packet loss.

STB Scalability: Ramping up the Network

Understanding how a single STB behaves is important. Understanding how it behaves when there are thousands of STBs is crucial. As more subscribers request IPTV, they will impact other

subscribers and the overall network. If each network element has not been proven to be scalable, then additional bottlenecks may be introduced and negatively affect other services (VoIP, for example) for all subscribers.

Join/Leave Latency: Measuring STB Channel Changing Behavior

IP multicast routers have been optimized to give you the best join latency. But with 25 Mbps DSL lines, each channel change needs a quick leave and a quick join. Otherwise non-used channels will still flow down each DSL line, consuming valuable bandwidth and causing packet loss. Test the channel gap and overlap while testing your IGMP join and leave latencies.

Channel Impact: Effect on Other Channels

Even if there is enough bandwidth, channel changing can cause delays and packet loss on other channels that are not zapping. Service providers need to test the effect of channel zapping on other non-zapping channels.

TECHNICAL SPECIFICATIONS

Scalability

- Maximum number of STBs per port: 4,094
- Maximum number of channels per port: 32K

Supported Technologies and Protocols

- IPv4/IPv6
- VLAN/non-VLAN
- IGMPv1, v2, v3
- MLDv1, v2
- UDP
- IGMPoPPPoEoQnQ
- IGMPoPPPoEoVLAN
- IGMPoPPPoE
- IGMPoDHCPoQnQ
- IGMPoDHCPoVLAN
- IGMPoDHCP
- IGMP/MLDoQnQ
- IGMP/MLDoVLAN

Key Parameters

- Test duration
- Join/failure threshold
- Zap behavior: zap, zap and view
- View duration
- Zap direction (up, down, random)



Real Time Charting of Results

- Inter-client start delay
- Zap interval: leave-to-leave
- Set top box leave to join delay
- Join/leave latency thresholds

Key Results

- Available by STB or by STB group
- Available by channel and by channel group
- Graphical and tabular display of min, max and avg for:
 - Join/Leave latency
 - Channel change latency
 - Channel gap
 - Channel overlap
- Join/Leave failures
- Duplicate Joins and Leaves
- Packets: Rate/Lost/Reordered/Duplicate/ Late
- Detailed client profile statistics

RFCS SUPPORTED

- RFC 2236 - IGMPv2
- RFC 3376 - IGMPv3
- RFC 2710 - MLDv1
- RFC 2810 - MLDv2

SUPPORTED MODULES

Series 2000 modules provide higher performance than Series 1000 modules; contact your Spirent representative for details.

TPK-1002A/B supports all Spirent TestCenter test modules and personality cards.

SPIRENT TESTCENTER IPTV TEST PACKAGE

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
- A SPT-2000A Spirent 2U Chassis and Controller, SPT-5000A Spirent 5U Chassis and Controller or SPT-9000A Spirent 9U Chassis and Controller
- Operating system languages supported: English, French, German, Italian, Japanese, Korean, and Chinese (traditional and simplified)

MINIMUM PC REQUIREMENTS

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

ORDERING INFORMATION

Part numbers ending in “A” indicate the standard performance version; those ending in “B” indicate the high performance version.

SPIRENT GLOBAL 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-scalability validation testing

AMERICAS 1-800-SPIRENT • +1-818-676-2683 • sales@spirent.com

EUROPE AND THE MIDDLE EAST +44 (0) 1293 767979 • emeainfo@spirent.com

ASIA AND THE PACIFIC +86-10-8518-2539 • salesasia@spirent.com

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

Visit www.spirent.com/gs or contact your Spirent sales representative.

| PRODUCT | PART NUMBER |
|--|--------------------------|
| Product | Part Number |
| IPTV Test Package A | TPK-1002A |
| IPTV Test Package B | TPK-1002B |
| IPTV Test Solution A consists of these products: | SPK-0006 |
| IPTV Test Package A | TPK-1002A |
| IGMP Base Package A | BPK-1003A |
| DHCP Base Package A | BPK-1008A |
| Packet Generator and Analyzer | BPK-1001A Base Package A |
| IPTV Test Solution B consists of these products: | SPK-0007 |
| IPTV Test Package B | TPK-1002B |
| IGMP Base Package A | BPK-1003A |
| DHCP Base Package A | BPK-1008A |
| Packet Generator and Analyzer | BPK-1001A Base Package A |
| Related Spirent TestCenter Software | |
| PPPoX Base Package A | BPK-1007A |
| PPPoX Base Package B | BPK-1007B |
| IGMP/MLD Host IP Multicast | BPK-1003A Base Package |
| DHCP-PD Base Package A | BPK-1011A |
| L2TPv3 DEPI Base Package A | BPK-1013B |
| Ethernet Access Concentrator Test Solution B consists of these products: | SPK-0003 |
| Packet Generator and Analyzer | BPK-1001A Base Package A |
| PPPoX Base Package B | BPK-1007B |
| DHCP Base Package B | BPK-1008B |
| IGMP/MLD Host IP Multicast | BPK-1003A Base Package A |