



Spirent TestCenter 4.00 Release Notes for Base and Test Packages

These Release Notes are for all Spirent TestCenter software Base Packages and Test Packages.

Click on any link in the table below to jump directly to a subject section.

Section	Description
<u>New Features</u>	Lists the new features available in Spirent TestCenter's Base and Test Packages
<u>Known Issues</u>	Lists the known issues that are in this release of Spirent TestCenter's Base and Test Packages
<u>System Requirements</u>	Lists the hardware and software requirements for running Spirent TestCenter software applications.
<u>Installation Instructions</u>	Contains the instructions to install the Spirent TestCenter application
<u>Documentation</u>	Introduces Spirent TestCenter documentation and specifies online help file system requirements.
<u>Contacting Spirent Communications</u>	Provides information on how to contact Spirent Communications for technical support.

New Features

Hardware

***NEW* C1 – Small Form Factor appliance with two 10G SFP+ NICs**



The Spirent TestCenter C1 offers the power of Spirent's award-winning Layer 2-7 router, switch, application and security test solutions in a portable form factor. With support for two line-rate 10 Gigabit Ethernet test ports and the complete suite of Spirent test solutions, the C1 offers the power of a professional test tool used by the world's top network equipment manufacturers, service providers and Fortune 100 at an affordable, entry level price point. Users looking for a professional, converged test tool instead of relying on multiple open source utilities or ad-hoc testing methods can now improve their product realization efforts and test smarter by moving up to Spirent TestCenter C1.

***NEW* MX-10G-C2 | MX-10G-C4 | MX-10G-C8**

The new MX-10G-C# is Spirent TestCenter's 10G Base-T HyperMetrics Next module has three variations: support for 2, 4 and 8 port 10G Base-T interfaces.

10G Base-T details include:

- RJ-45 connector
- CAT6A up to 100m (tested to 110m)
- CAT6 up to 55m (tested to 70m)

For more detailed information see the HyperMetrics Next MX 10G module data sheet on spirent.com

Software

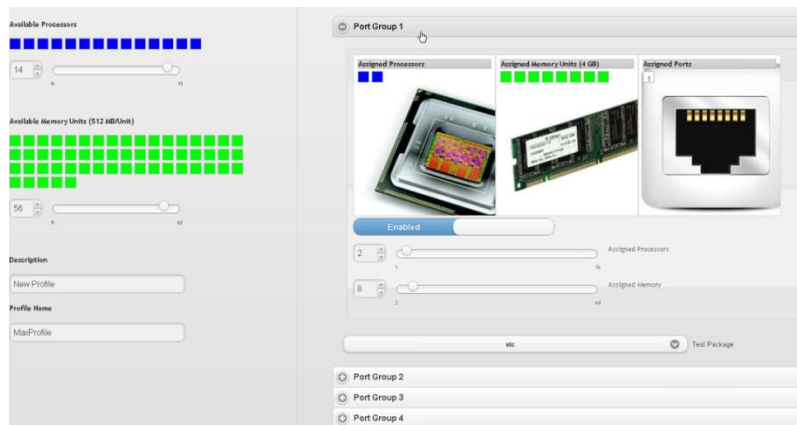
SPIRENT TESTCENTER FRAMEWORK

- New look when launching Spirent TestCenter that includes Transmit and Received aggregated rates represented with a Speedometer for easy visual indicators of test systems running
- New and improved Results view importing/exporting functionality.
 - This allows you to bring in a single result panel from a previously saved perspective or xml file
- Device and Traffic creation wizards now default the answer to “No” when asked if you want to over-write the configuration
- Performance improvements in the Dynamic Result Views that allow speedier results and less processing time to get them
- Added additional default filters to the Stream Threshold tables to allow for quicker validation of the test at a higher level view

AUTOMATION

- TCL is now supported on 64-bit OS when running through a Spirent TestCenter LabServer

NEW Cloud Core Provisioning



- Supported on the following modules
 - MX-10G-S2 | MX-10G-S4 | MX-10G-S8
 - MXP-10G-S4 | MXP-10G-S8
 - MX-10G-C2 | MX-10G-C4 | MX-10G-C8
 - MX-100G-F2 | MX-100G-F1
 - MX-100GO-F2 | MX-100GO-F1
 - MX-40G-F2 | MX-40GO-F1
- HTML5 Web Based Browser GUI
 - One install .EXE
 - Uses Chrome, Firefox, or IE9
 - Easy to use, Drag and Drop
- Allows the user to dynamically allocate CPU Cores, RAM, and test packages to best fit their testing needs
- Move between functionality and performance with the same hardware

- Spirent TestCenter, Spirent Avalanche, and Spirent Landslide supported

BPK-1001A — PACKET GENERATOR AND ANALYZER BASE PACKAGE A

- New continuous rate option
 - Allows the user to quickly switch from step mode to continuous without losing packet sequence
 - Works in all Sequence modes
 - Improves Manual mode to programmatically step from a sequence to continuous mode
- Non-Bursty mode enhancements
 - Allows the user to 'Smooth out' traffic scenarios with a mix of high rate and low rate streams or leave as bursty if the test scenario requires it
 - Allows total control over prioritization and 'smoothness' of traffic
- Histograms columns now have accurate labels if all ports have same histogram configured or if a port is selected in the histogram list, the correct labels will be shown

BPK-1081 — DATA CENTER FCOE DCBX BASE PACKAGE

- Overall enhancements to support stability and usability
- New optional timers on establishment of sessions to allow devices under test to handle the scale at which Spirent TestCenter operates
 - VF/VN Port Keepalive Interval is now exposed and allows settings other than the defined defaults
 - Configurable RATOV Timer that allow users to manipulate the rate at which VN ports can login to the device under test
- A new previewer of the login state that allows viewing the state of VF and VN logins
- Now supporting multiple VLANs for VLAN discovery
- Multiple VF Ports for test scenarios that need to emulated multiple VF Ports on the same FCF
- Enhancements that allow logins based on FIP Priority

BPK-1153A – JAVA API

- Now supported on 64-bit OS when running through a Spirent TestCenter LabServer

BPK-1154A – PYTHON API

- Now supported on 64-bit OS when running through a Spirent TestCenter LabServer

BPK-1158A — IEEE 1588V2 NETWORK-BASED TIMING & SYNCH

- IEE 1588 Subnet Agnostic clock allows communication with clocks across different subnets
- Optional Scale mode when scaling a large number of slave clocks and sending at high frequency 128 pps per clock. With the scale mode enabled there is a 100x improvement in the number of slave clocks able to emulate and generate at 128 pps

BPK-1160A — MPLS-TP BASE PACKAGE A

- Added support for Static LSP/PW with Fault OAM and Status

- Dramatically higher performance and easier to setup MPLS-TP with static tunnels
- Tunnels can now be defined in blocks instead of individually and the number of tunnels can be changed in real-time
- Supported scale of 20,000 tunnels per test with easy Start/Stop AIS, LDI and LKR
- New improved debugging details and counters per tunnel
- New NoCode Automation command sequencer events that allow a mix of MPLS-TP redundancy for a more realistic multi-protocol test
- New MPLS-TP End-to-End Redundancy Wizard
 - The industries first MPLS-TP Wizard that simplifies configuration of MPLS-TP redundant paths
 - Two redundant testing scenarios supported
 - Port to Port Failover: requires 3 ports and is only supported on Spirent TestCenter modules that have multiple ports per port group
 - LSP Failover: requires 2 ports and is supported on all modules
 - Convergence measurement is within 10 nanosecond precision
 - The MPLS-TP Redundancy wizard builds the topology, failover events and the command sequence for quick execution

BPK-1190A GMPLS BASE PACKAGE A

- The upstream label width has been extended from 20-bits to 32-bits
- New capability added to use the upstream PATH label as the egress label
- Additional support for specifying RESV Source IP Address directly

***NEW* BPK-1191A PROTECTION SWITCHING BASE PKG A**

- MPLS-TP Linear Protection has been added to Spirent TestCenter to further extend the testing capabilities of MPLS-TP in addition to the protection switching associated with it
- Easy to use Setup Wizard to configure paths and failover scenarios.....
- Allows configuration of both normal and protected MPLS-TP Paths
- NoCode Automation support via the Command Sequencer to cause failover scenarios
- Spirent TestCenter provides the results to report the Arrival Time Difference as well as the Switchover time between paths
- Precision of results is 10 nanoseconds

BPK-1302A – DYNAMIC PROTOCOL GENERATOR BASE PKG

- Custom metadata editing capabilities that as the protocol list grows it allows easier documentation and searching capabilities when trying to find the right protocol for the test all within Spirent TestCenter
- Packet payloads of the real applications being replayed are now editable to further extend the test scenarios when testing real applications on top of Spirent TestCenter's Topology Emulation
- Avoid packet name collisions and potential mis-configurations with packet name validation
- Increased the Attack Database that now includes over 100 attacks
- Enhanced statistics that now allow you to see per playlist name and the associated statistics

BPK-1303 SIP ENCODED RTP & SPEECH VQA BASE PKG

- Now supporting H.264 Video on Encoded RTP
- Enhanced SIP Video metrics includes the following:
 - Video Interval Metrics
 - Perceptual Quality: Absolute MOS-V, Relative MOS-V
 - Packet: Transport Packet Received, Transport Packet Lost, Transport Packet Effective Loss Rate, Transport Packet Discarded
 - Video Continuous Metrics
 - Bandwidth: Average Stream Bandwidth
 - Perceptual Quality: MOS-V - Absolute, Relative(Minimum, Average, Maximum)
 - Degradation Factors: Packet Loss
 - Packet: Transport Packet Received, Transport Packet Loss, Uncorrected Proportion, Burst Loss – Count, Rate, Length, Gap – Count, Rate, Length
 - Jitter: I Frame Inter-arrival Jitter, PPDV

TPK-0017 CTS BGP4 IPv4 TEST PACKAGE

- Added compliance for RFC 1745
- Section 12.x.x OSPF-BGP Interaction tests have now been enabled and can be used

TPK-1011 CTS RSTP TEST PACKAGE

- Enhancement to add support for 802.1D 2004, optimization for sync (17.19.39)

TPK-1078 CTS MPLS-TP OAM TEST PACKAGE

- Additional support for the following specifications
 - RFC 6428: Proactive CC, CV and RDI (BFD based OAM)
 - RFC 6426: On Demand CV (LSP Ping)

***NEW* TPK-1079 CTS IPSEC IKEV2 TEST PACKAGE**

- New CTS Package for security testing of IPSEC using IKEv2
- Over 200 test cases added
- Supported specifications include:
 - RFC 5996: Internet Key Exchange Protocol Version 2 (IKEv2)
 - RFC 3748: Extensible Authentication Protocol (EAP)
 - RFC 3947: Negotiation of NAT-Traversal in the IKE

Known Issues

C1

- Administration link is only supported on an IPv4 network.
- Capture can capture 96 bytes of each incoming frame
- Partial Reset mode is not supported on the C1
- GUI download feature from the C1 is not supported as it is on the 2U, 3U, 9U and 11U
- SIP protocol is not officially supported in the initial 4.00 release on the C1

MX-10G-C2, MX-10G-C4 and MX-10G-C8

- Please download the Product Alert for Spirent TestCenter Power and Cooling 4.00 for important information about known power and cooling limitations.
- Only 8 MX-10G-C8 modules are supported in SPT-11U
- Do not place a MX-10G-C8 module in slot 6 or in slot 10 of an SPT-11U chassis
- MX-10G-C8, MX-10G-C4 and MX-10G-C2 are not supported in the SPT-3U chassis

MX-100G, MX-40G, FX-100G and FX-40G

- MX-40G and FX-40G occasionally unable to establish link. CR # 320335471
 - *Workaround:* Release the port and Re-reserve. If this does not resolve the problem, reboot the test module.

CV-10G-S8

- The CV module will default the PFC settings on. This default will consume more memory on the port itself and could impact some of the advertised scalability numbers for the control-plane emulation protocols.
 - *Workaround: When creating a new configuration, on the Port Setup's "PFC Measurement" tab, disable all the "Priority Enabled" Queues. Take the port offline and then bring it back online. This will clear the PFC information running on the port and free up memory to run non PFC tests.*

BPK-1001A — PACKET GENERATOR AND ANALYZER BASE PACKAGE A

- Analyzer identified the VPLS traffic as IPv4 checksum error packets. CR# 183222270
- Capture Pattern Definition Filter is not working when used with Spirent TestCenter Virtual – CR# 288812597

BPK-1003A/B — IGMP / MLD Host IP Multicast Base Package A/B

- When running a test after loading a pre-3.00 configuration file, IGMP/MLD Device-Group results will not appear in the results database created via the File->Save Results operation. CR # 179699974
 - *Workaround: Use the IGMP/MLD-specific latency results database to view the Device-Group results, or save and reload the configuration from the 3.00 application before running the test..*
- Due to the introduction of paged IGMP/MLD results, IGMP/MLD TCL scripts that use the ResultDataSetSubscribe command will only retrieve one page's worth of IGMP/MLD results (i.e., 100 results).
 - *Workaround: Replace the ResultDataSetSubscribe command with the ResultsSubscribe command.*
- When running a large port-count test with any IGMP based multicast traffic, users are strongly discouraged from using Detailed Streams Statistics result views. This feature puts extreme load on the STC API that may result in unresponsiveness of the GUI and the API itself.
 - *Workaround: View stream statistics using EOT after the test is completed. Use Interesting stream results to see the RX stats on a per-port basis.*

BPK-1006A — MPLS / LDP / RSVP-TE Base Package A/B

- More than one prefix resolving protocols (RSVP/LDP) on the same device is not support. CR # 181123886
 - *Workaround: Use two devices. One runs LDP and another one runs RSVP.*

BPK-1055A — IEEE 1588v2 NETWORK-BASED TIMING & SYNCH

- IEEE1588 - 300 slave clocks Tx/Rx messages at 128pps stop responding in both Normal & Scale mode. CR # 326097121

BPK-1060A — SIP/RTP/RTCP Base Package A

- SIP configurations (older than 2.30) not forward compatible with 4.00

- Unable to run both IPv4 and IPv6 on a same host for SIP Signaling Only as well as AudioCodec and Video. CR # 16332815
- Real time MOS score is not displayed for the first call CR # 207092123
- MOS score sometimes displayed “1” CR # 197206895 & 215297879
 - *Workaround:* Open corresponding “Stream>Detailed Stream Results” page to make MOS score refreshed. Sometimes, may also require to click “Clear Results in the view” button in “SIP UA Results “ page to update the MOS score to show actual measurement.

BPK-1090A — VQA & MDI BASE PACKAGE A

- Stopping and restarting VQA caused the RTP timestamp error metric to go up by 1. CR # 182493211

TPK-1001 — RFC-2889 WITH VLAN SWITCHING BENCHMARK TEST PACKAGE

- Implement correct round robin behavior when using multiple hosts per port. CR# 182166438

TPK-1002A/B — IPTV Test Package A/B

- IPTV test with around 4000 IPTV device blocks will take longer than expected to complete and may not report results for all the device blocks. CR # 182555601 & 185640911
 - *Workaround:* Consolidate the individual IPTV devices into a small number (<10) of device blocks.
- IPTV multicast video server is unstable at 450Mbps of streaming video for Hypermetrics mX card CR # 296623081
 - *Workaround:* The following are the benchmarked bandwidth limit for the various Hypermetrics mX cards;
 - 2-port – 320Mbps
 - 4-port – 320Mbps
 - 8-port – 220Mbps

Conformance Test Package Limitations

The conformance test suites listed below have following limitations due to lack of supporting implementations to test against, and hence does not claim to be fully support

TPK-1068 — CTS FCSW Test Package

- IUT’s implementation of B-port
- Virtual Fabrics.
- Principal ISL Recovery.
- FCoE mode operation.

TPK-1066 — CTS FCLS Test Package

- Class 1, Class 2 traffic test cases.

- Virtual Fabrics.
- Test cases for link/port status query related messages

TPK-1071 — CTS LDP Test Package

- Downstream on demand advertise mode is not enabled

TPK-0032 — CTS DHCPv6 Test Package

- Three Unsupported messages: Decline, Confirm, Reconfigure
- Also config5 and config10 when the DUT is configured as server allocating ipv6 address are not enabled.

TPK-1064 — CTS Y.1731 Test Package

- 3-port MIP
- Ethernet Test
- Multicast Loopback
- Dual Ended Frame Loss
- One Way Delay Measurement

TPK-1070 — CTS RSVP Test Package

- IPv6 not supported

TPK-0025 — CTS PWE3 Ethernet Encap Test Package

- FEC 129
- PW Status TLV

TPK-1043, 1044 and 1045 — CTS IPSEC Test Package

- Extended Sequence number
- Multicast SA
- Dummy Packet Tx
- Unicast SA for ANY destination IP

TPK-1072 — CTS BGP-VPLS Test Package

- TCs which require Control word configured are not supported

TPK-1073 — CTS E-LMI Test Package

- Configuration-4 for Single EVC Asynchronous Status message is not supported

TPK-1048 — CTS P2MP RSVP-TE Test Package

- Use of multiple subLSPs in single message has been untested.
- P2MP Reremerge tests with behavior supporting correcting the reremerge or allowing it to persist.
- RSVP Hello is not supported
- Routing protocol to be used for tunnel setup lacks support for ISIS
- Some test-cases on P2MP State management, error handling, Notify messages and LSP integrity flag have been disabled.

TPK-1012 — CTS MEF 14 Test Package

- MEF 14 when run simultaneously with other Conformance Test suite that needs routing emulation support gives inconsistencies in results. CTS works fine when run in isolation.
- MEF14 does not support capture while executing.

TPK-1006 — CTS MEF 9 Test Package

- MEF9 does not support capture while executing.

TPK-1008— CTS VLAN TEST PACKAGE

- FCS field will not check wrong IP checksum packets

TPK-1076— SYNCHRONOUS ETHERNET TEST PACKAGE

- DUT must be triggered by changing the QL value firstly, or else it will not accept the new coming QL value, so Add one test step for this operation in most test cases. This will influence most test cases.
- Opt2 and Opt3 SSM code are not supported

Limitations: The current release of the test suite has the following known limitations.

TPK-1028 — CTS VRRP Test Package	VR IP Address count cannot be more than 1
TPK-1036 — CTS MMRP (802.1AK) Test Package	Some tests not supported due to STC limitations
TPK-0028 — CTS VPLS Test Package	Config-2 is not supported
TPK-1049 — CTS MEF21 Test Package	TCs sending Error Symbol Period Event TLV are not supported
TPK-0017 — CTS BGP-4 Test Package	BGP OSPF Interaction is not supported

Results Reporter

- Using the Result Reporter from the command line to export files to csv formats. The batch file that runs can hang. CR # 324090313
 - *Workaround:* user must kill the process using “CTRL-C”.
- Results Reporter does not sort all data when clicking on the column headers. It only sorts what is on the page. CR #184631206
 - *Workaround:* user must create a query to sort all the data.
- The number of characters for a file name (full path) which Spirent TestCenter can handle is limited to 222 bytes. CR # 184454263
 - *Workaround:* user must create a query to sort all the data.

System Requirements

System Test	Recommended System
General Functional Testing at low port (< 20) and stream density and/or low protocol scale (100's of emulated endpoints)	<ul style="list-style-type: none">• Intel i3 CPU (or equivalent)<ul style="list-style-type: none">• 2.9 GHz or better• 3GB RAM• 50GB of free disk space
Scaling Testing with higher ports and/or single or multi-dimensional protocols scale	<ul style="list-style-type: none">• Intel i7 CPU (or equivalent)<ul style="list-style-type: none">• 2.9 GHz or better• 8 GB RAM• 100GB of free disk space

Spirent TestCenter Hardware/Software Requirements

- A Spirent TestCenter SPT-11U, SPT-2U, SPT-2000A, or SPT-2000A-HS, or SPT-5000A or SPT-9000A chassis with one or more ordered test modules and personality boards (if required) and with blank panels and firmware installed Chassis firmware version 3.55 or higher
- Spirent TestCenter Application
- License for BPK-1001A (Packet Generator and Analyzer Base Package A) software is a minimum requirement
- A single instance of Spirent TestCenter is supported per PC when using the graphical user interface.

Operating System Support

Windows XP Professional, Service Pack 3

Windows 7 Professional 32-bit / 64-bit (running as a 32-bit application)

Windows Vista Enterprise Service Pack 1 32-bit / 64-bit

Windows Vista Business Service Pack 1 32-bit / 64-bit

Windows Server 2008 R2 Enterprise

Windows Server 2008 R2 Standard

Windows Server 2003 64-bit R2

Windows operating system languages supported: English, French, German, Japanese, Korean, Chinese (traditional and simplified), and Italian

Unix Sun Solaris SPARC 8.0, 10.0 (supported by Automation only)

Red Hat Enterprise Linux 3.0 WS, EL5 (supported by Automation only)

FreeBSD 5.5/6.3/7.1 (supported by Automation only, with Perl)

CentOS Linux 5.0 (supported by Automation only)

Ubuntu Linux 10.10 (supported by Automation only)

Third-party Software Support	Version	Purpose
Tcl/Tk	8.4.13	For use of the Spirent TestCenter Test Automation API.
PERL	5.8.8	For use of the Spirent TestCenter Test Automation API. Supports single threaded PERL only.
Ruby	1.8.6	For use of the Spirent TestCenter Test Automation API. Supported on Windows only.
Java	1.6	For use of the Spirent TestCenter Test Automation API.
Python	2.x/3.x	For use of the Spirent TestCenter Test Automation API.
C/C++	Windows: Microsoft Visual Studio 6 or later. Linux/Solaris : g++ 4.02 or later	For use of the Spirent TestCenter Test Automation API.

Software Dependencies

It is important to work with a combination of operating system and scripting language that is supported by Spirent. The table below shows the combinations of operating systems and scripting language that are tested and supported by Spirent.

		Language/Version					
		C/C++ VS6/g++ 4.02 or later	Java 1.6	Perl 5.88	Ruby 1.86	Tcl 8.4.13	Python 2.6
Windows	Windows XP Professional Service Pack 3	Yes	Yes	Yes	Yes	Yes	Yes
	Windows 7 Professional 32-bit / 64-bit	Yes	Yes	Yes	Yes	Yes	Yes
	Windows Vista Business Service Pack 1 32-bit / 64 bit	Yes	Yes	Yes	Yes	Yes	Yes
	Windows Vista Enterprise Service Pack 1 32-bit / 64-bit	Yes	Yes	Yes	Yes	Yes	Yes
	Windows Server 2008 R2 Enterprise	Yes	Yes	Yes	Yes	Yes	Yes
	Windows Server 2008 R2 Standard	Yes	Yes	Yes	Yes	Yes	Yes
	Windows Server 2003 32-bit Enterprise R2	Yes	Yes	Yes	Yes	Yes	Yes
	Windows Server 2003 64-bit R2	Yes	Yes	Yes	Yes	Yes	Yes
Linux/ Unix	Red Hat Enterprise Linux EL3 WS	Yes	Yes	No	Yes	Yes	Yes
	Red Hat Enterprise Linux EL5 WS	Yes	Yes	No	Yes	Yes	Yes
	CentOS Linux 5.0	Yes	Yes	No	Yes	Yes	Yes
	Ubuntu Linux 10.10	Yes	Yes	No	Yes	Yes	Yes
	FreeBSD 5.5	No	No	Yes	No	Yes	No
	FreeBSD 6.3	No	No	Yes	No	Yes	No
	FreeBSD 7.1	No	No	Yes	No	Yes	No
Solaris	Solaris SPARC 8.0	Yes	No	No	No	Yes	No
	Solaris SPARC 10	Yes	No	No	No	Yes	No

Note: If you are using Avalanche on Spirent TestCenter Windows 2008 server is not officially supported at this time.

LabServer

Without LabServer, customers may connect to Spirent TestCenter using any of the above supported operating systems as clients. However, customers using FreeBSD 5.5/6.3/7.1 clients are required connect to Spirent TestCenter using LabServer.

Installation Instructions for 4.00

Refer to *Spirent TestCenter Software Installation Instructions* for application and firmware installation instructions. This document is included with Spirent TestCenter firmware files on the installation DVD and it is available as a Related Resource with the firmware downloads on the Spirent Communications support website (<http://support.spirent.com>).

Getting Started with Spirent TestCenter provides hardware set up, software installation, and licensing instructions for Spirent customers who are receiving and installing a new Spirent TestCenter system. This document is included in the Documentation folder on the installation DVD, and is available in the current Documentation download file on the Spirent Communications support website (<http://support.spirent.com>).

Documentation

Spirent TestCenter user documentation is available in PDF and WebHelp formats.

Documents delivered in PDF format support product installation, Spirent TestCenter Virtual, Spirent TestCenter automation, and provide testing methodology information. These documents are available on the Spirent Communications support website (<http://support.spirent.com>) with the software downloads.

Help files, included within Spirent TestCenter applications, provide reference information and context sensitive user support. Launch a Help file by pressing **F1** in an open application or by clicking the **Help** button displayed in the menu bar or on a dialog box.

Two documents are available through the Spirent Knowledge Base, only.

- The *Spirent TestCenter Hardware Reference* provides information about Spirent TestCenter chassis, modules, module LEDs, multiple chassis connections, cables, and chassis commands. It includes basic information about system administration functions and diagnostics.

Navigate to the Spirent Communications support website (<http://support.spirent.com>). Click the **Knowledge Base** tab and then click **Documentation** in the menu bar. Enter **hardware reference** in the search box on the right and click **Search**. Click the **Spirent TestCenter Hardware Reference** link in the results list.

- The *Spirent TestCenter Automation Programmer's Reference* supports the use of the Spirent TestCenter Automation API for testing. It provides current information about the Spirent TestCenter Automation API syntax and functions. Topics describe how to use the API, and how to create and run test configurations.

Navigate to the Spirent Communications support website (<http://support.spirent.com>). Click the **Knowledge Base** tab and then click **Documentation** in the menu bar. Enter **programmers reference** in the search box on the right and click **Search**. Click the **Spirent TestCenter Automation Programmer's Reference** link in the results list.

Contacting Spirent Communications

To obtain technical support for any Spirent Communications product, please contact our Support Services department using any of the following methods:

Americas

E-mail: support@spirent.com

Web: <http://support.spirent.com>

Toll Free: +1 800-SPIRENT (+1 800-774-7368) (North America)

Phone: +1 818-676-2616

Hours: Monday through Friday, 06:30 to 18:00 Pacific Time

Europe, Africa, Middle East

E-mail: support@spirent.com

Web: <http://support.spirent.com>

Phone: +33 (1) 6137 2270 (France)

Phone: +44 1803 546333 (UK)

Hours: Monday through Thursday, 09:00 to 18:00, 9:00 to 17:00 Friday, Paris Time

Asia Pacific

E-mail: support@spirent.com

Web: <http://support.spirent.com>

Phone: +86 (800) 810-9529 (toll-free mainland China only)

Phone: +86 (10) 8233 0033 (China)

Operating Hours: Monday through Friday, 09:00 to 18:00 Beijing Time

The latest versions of user manuals, application notes, and software and firmware updates are available on the Spirent Communications Customer Service Center website at <http://support.spirent.com>.

Information about Spirent Communications and its products and services can be found on the main company website at <http://www.spirent.com>.

Company Address

Spirent Communications, Inc.
26750 Agoura Road
Calabasas, CA 91302
USA

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