



## Spirent TestCenter™

# UNICAST ROUTING BASE PACKAGE - BGP PROTOCOL

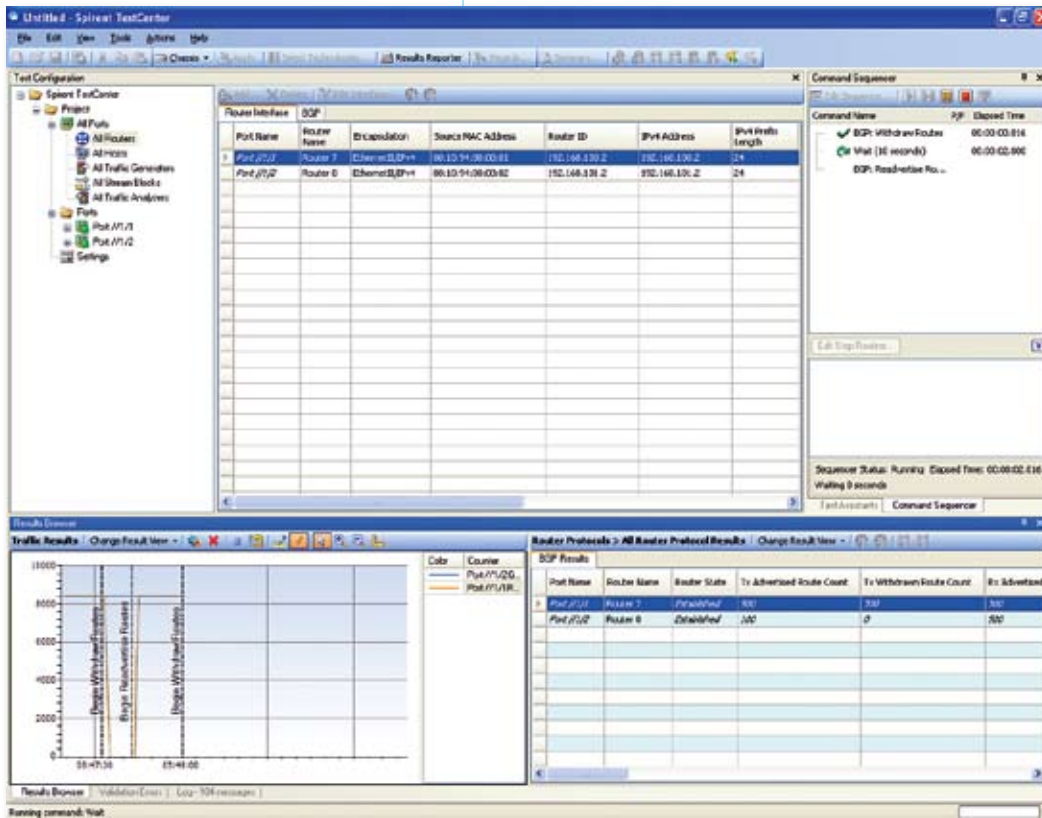
The Unicast Routing Base Package is a Spirent TestCenter component that enables network equipment manufacturers, service providers and large enterprises to quickly evaluate and troubleshoot routing functionality, performance and scalability of any routing device or network.

### APPLICATIONS

- Defining BGP scale testing with the most BGP routers and routes per port
- Configure Internet-scale BGP network emulations on multiple ports with integrated data plane traffic
- Evaluate router performance under typical or extreme traffic load conditions for minutes, hours, days or weeks of testing
- Simulate realistic network stress
- Test high availability routing features

Spirent TestCenter's Unicast Routing Base Package integrates BGP with OSPF, IS-IS and RIP protocols to emulate real-world network topologies. Combine the Unicast Routing Base Package with the MPLS or Multicast base packages to test an infinite variety of realistic network topologies.

This package is an integrated component of Spirent TestCenter and works with other Spirent TestCenter components providing concurrent support for all key network protocols including MPLS, BFD, DHCP, QoS, Multicast and wire-rate data-plane traffic.



### FEATURES & BENEFITS

- Test the migration of routed networks from IPv4 to IPv6 under realistic deployment scenarios
- Test scalability and protocol functionality in the same test by running multiple protocols concurrently on each port
- Quickly build hundreds or thousands of emulated routers and different router configurations with the router wizard
- Simulate realistic configurations found on service provider networks with large numbers of BGP peer routers
- Simulate real network conditions and see results on demand at any time during a test without starting and stopping the protocols or traffic

### TECHNICAL SPECIFICATIONS FOR BGP

- BGP-4, BGP+ and MP-BGP support
- Router wizard enables the building of single or multi-hop Internal and External BGP router configurations that support custom IP addressing, configuration of Local and Remote 2 or 4-byte AS numbering, BGP Router IDs, MD-5 Authentication, Graceful Restart and BFD
- BGP route generator allows for millions of unique or duplicate IPv4 and/or IPv6 routes, with custom prefix distributions and AS Path configurations
- Interactive commands to flap (withdraw or age-out, and readvertise) individual routes or route blocks or by route type. Group events to create long term stress tests.
- Log the real-time exchange of control-plane messages and view BGP events in real time, seeing messages sent from the Spirent TestCenter port, or as received from the DUT
- Integrated with traffic wizard to quickly build traffic between traffic endpoints behind emulated routers
- View Routes command allows users to see routes advertised by the neighbor router per emulated router and optionally save the routes to a file (txt or csv) for later analysis
- Support for bi-directional capture and real-time decoder (BPK-1029A) with BGP protocol ladder diagrams to view protocol events as they occur
- Configurable timers and BGP key protocol attributes enable functional testing
- Support for Ethernet, ATM and SONET media types and all associated encapsulations to test over any supported media and encapsulation
- Support for L2TP and GRE tunneling on a per router basis test over any supported tunnel mode
- BGP Route Table Import Wizard imports and advertises any real-world Internet routing tables complete with multiple peers and millions of routes and associated route attributes
- BGP Route generator wizard quickly builds complex, large-scale routing topologies with custom prefix length distributions
- External or Internal BGP support for IPv4 and IPv6 routing or dual-stack with independent IPv4 and IPv6 routes
- Confederations and route reflectors and associated route attributes
- Send or receive Route Refresh messages
- Configure and send IANA specified or custom user-defined AFI/SAFI values
- BGP BTSH/GTSM support for per-interface TTL settings, and Traffic Analyzer support to view TTL values received from peers
- Configure standard and/or 4-byte AS numbers on a per-peer basis
- TCP MD-5 keyed authentication per peer for IPv4 BGP-4 and IPv6 BGP+ sessions
- BGP Graceful Restart with configurable timers
- Pack BGP routes with common attribute into update messages to send real Internet routing tables quickly
- All common BGP attributes are configurable on a per route block level
- Activate, deactivate and reactivate BGP routers and routes to build scalability tests that add objects over time
- BGP Router configuration options: IP version (IPv4, IPv6 or both), local and remote router ID, local and remote AS number, local and remote 4-byte AS number, enable BFD, enable MD-5 authentication, minimum label, enable confederations, Hold Time Interval, Keepalive Interval timers, act as BGP initiator, enable Graceful Restart and Restart Time, custom AFI/SAFI values, enable view routes, enable route packing and enable Route Refresh
- Global BGP options to configure maximum routes per update, inter-update delay, connection retry count, connection retry interval, session open delay and session close delay

- Emulate thousands of peers and millions of routes from a single port
- BGP attribute configuration options per route block: Origin, AS Path (both types supported concurrently), AS Path Segment Type (Set, Sequence, Confed\_Set, Confed\_Sequence), Next Hop, Link-Local Next Hop, Multi Exit Discriminator (MED), Local Preference, Atomic Aggregate, Aggregator AS, Aggregator IP, Community, Originator ID, Cluster ID, Route Distinguisher (RD), Route Target (RT) and Site of Origin (SOO)
- Import large community lists from saved lists or configure custom up to 128 custom communities including the well-known (NO\_EXPORT, LOCAL\_AS and NO\_ADVERTISE values)
- View BGP tables received from DUT and store in text or comma separate formats
- Create large BGP tables with millions of unique or duplicate routes to simulate realistic configurations found on service provider networks with large numbers of BGP peer routers
- Interactive and Command Sequencer BGP events: Start or Stop BGP, Establish BGP, Advertise BGP, Break or Resume TCP Session, Stop or Resume Keepalive, Refresh Routes, Withdraw or Readvertise Routes, Restart Router and View Routes
- Integrated with both versions of BGP and BFD for convergence and scalability testing include interactive BFD commands: Admin Up or Down, Stop and Resume PDUs, Enable or Disable Demand Mode, Initiate Poll, and Set Diagnostic State and per router BFD results
- Detailed per-router BGP protocol and state counters including: router state (Idle, Connect, Active, OpenSent, OpenConfirm, Established), TX/RX Advertised Route Count, TX/RX Withdrawn Route Count, TX/RX Notification Count, TXRX Advertised Update Count, TX/RX Withdrawn Update Count, TX/RX Keepalive Count, TX/RX Route Refresh Count, TX/RX Open Count, Last Received Update Route Count, Outstanding Route Count, TX/RX Notify Code, TX/RX Notify SubCode, and configured IPv4 Routes and IPv6 Routes
- Per test, port, and router BGP protocol and route summaries for each BGP route type include: number of BGP ports per test,

number of BGP routers per test, number of active BGP routers per port and test, number of IPv4 and IPv6 routes configured

- Summary statistics for the number of BGP routers in the following states Up, Down, Idle, Connect, Active, OpenSent, OpenConfirm and Established
- Integrated support for BGP IPv4 and IPv6 protocol conformance testing with the BPK-1024A Conformance Application Base Package and the TPK-0017 for IPv6 and TPK-0018 for IPv4 BGP testing

### SUPPORTED MODULES & PLATFORMS

- Supports all Spirent TestCenter test modules and personality cards
- Series 2000 modules provide higher performance than Series 1000 modules; contact your Spirent representative for details
- BPK-1004A/B supports all Spirent TestCenter test modules and personality cards; BPK-1004B should be used with Series 2000 test modules

### SYSTEM REQUIREMENTS

#### Minimum PC, UNIX, or Linux Requirements by System Size

- For Small Port System (2-25 ports)
  - Minimum Requirement – 2.4 GHz Intel Pentium 4 processor (or equivalent), 512 MB RAM and 10 GB of free disk space
  - Recommended System – Intel Core™ 2 Duo E6300 processor (or equivalent), 2 GB of free RAM, and 10 GB of free disk space
- For Medium Port System (26-75 ports)
  - Minimum Requirement – 3 GHz Intel Pentium 4 processor (or equivalent), 2 GB of free RAM, 15 GB of free disk space
  - Recommended System – Intel Core 2 Duo E6400 processor (or equivalent), 4 GB free RAM, 100 GB of free disk space
- For Large System (76 ports and above)
  - Minimum Requirement – Intel Core 2 Duo E6400 processor (or equivalent), 3 GB free RAM, 100 GB free space on hard drive
  - Recommended System – Intel Core 2 Duo E6600 processor (or equivalent), 4 GB of RAM, 100 GB of free disk space

### 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 10/100/1000Mbps 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
- WAN-2003A and SFP-4002A personality module required for ATM testing
- Operating system languages supported: English, French, German, Italian, Japanese, Korean and Chinese (traditional and simplified)
- Operating systems supported: Windows XP SP2, Windows 2003 Server (32 bit), RedHat EL3 and EL5, Solaris 8.0 and 10.0
- BPK-1066A required for BFD protocol testing
- BPK-1006A/B required for MPLS testing
- BPK-1001A/B required for packet generator/analyzer features
- BPK-1029A required for real-time capture/decode feature
- BPK-1024A required for Conformance Test Suites
- TPK-0017 required for BGP IPv4 protocol conformance testing
- TPK-0018 required for BGP IPv4 protocol conformance testing

### ORDERING INFORMATION

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

**Unicast Routing Base Package A –**  
Supports up to 10 emulated routers per port: BPK-1004A

**Unicast Routing Base Package B –**  
Supports up to the maximum supported emulated routers per port: BPK-1004B

### RELATED STANDARDS

- RFC 1771 – Describes BGP-4
- Draft-ietf-idr-bgp-identifier-08.txt – Describes BGP 4-byte AS
- RFC 1997 – Describes BGP-4 communities
- RFC 2545 – BGP+ (for IPv6)
- RFC 2796 – Describes BGP-4 route reflection
- RFC 2842 – Describes MP-BGP capabilities negotiation and AFI/SAFI use
- RFC 2858 – Describes MP-BGP
- RFC 2918 – Describes BGP-4 route refresh capability
- RFC 3065 – Describes BGP-4 AS confederations
- Draft-ietf-l2vpn-vpls-bgp-00 and 02 – Virtual Private LAN Service (VPLS-BGP)
- RFC 4724 – Describes Graceful Restart for BGP
- Draft-gill-btsh-02.txt – Describes BGP TTL Security Hack (BTSH)
- RFC 3682 – The Generalized TTL Security Mechanism (GTSM)
- Draft-ietf-bfd-v4v6-1hop-06.txt – Describes BFD operation for single hop protocols
- Draft-ietf-bfd-multihop-05.txt – Describes BFD operation for multihop protocols



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