

Spirent Communications

Spirent TestCenter Software and Hardware New Features 5.21

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New Products and Features

Hardware Features

New LAG profiles support added to 4x100G XStream mode

The XStream in 4x100G mode now supports 2x4 and 1x8 LAG profiles.

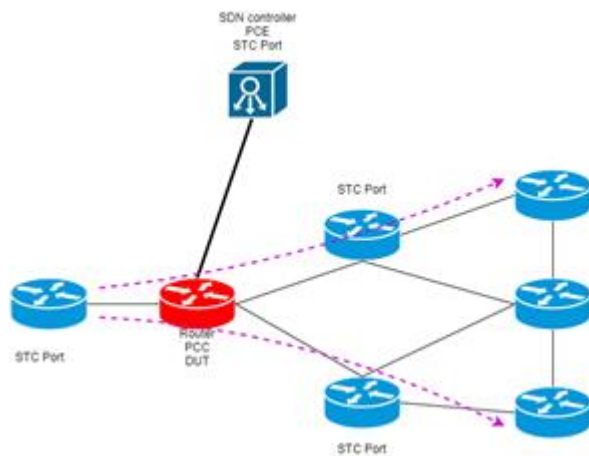
Layer 1 Services support extended to PX3 and DX3 QSFP-DD hardware

Layer 1 Services support is now available on 4x50G mode for PX3(PX3-QSFP-DD-8, PX3-QSFP-DD-4, PX3-QSFP-DD-2), and DX3 (DX3-QSFP-DD-8, DX3-QSFP-DD-4, DX3-QSFP-DD-2) QSFP-DD hardware.

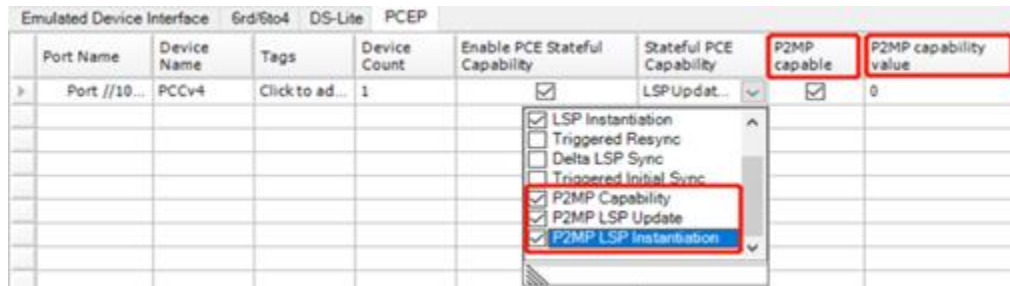
Software Features

PCEP P2MP LSP Extension

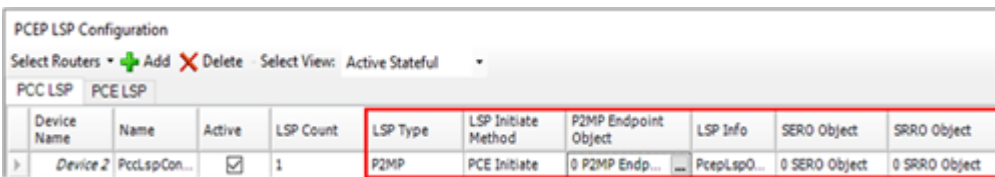
Spirent TestCenter release 5.21 enables Path Computation Element Protocol (PCEP) with Point-to-MultiPoint (P2MP) Traffic Engineering Label Switched Paths (TE LSPs) for use in Multiprotocol Label Switching (MPLS) and Generalized MPLS (GMPLS) networks. Spirent TestCenter can emulate PCE to compute the paths for P2MP TE LSPs and emulate multiple PCC to report or request LSP. In this release, RFC 8623 stateful IPv4 P2MP is supported, IPv6 and PCEP-Error Object will be supported in future releases. License “BPK-1381 PCEP Controller SR P2MP LSP Emulation” must be enabled to activate this feature, wireshark-1.10.3-spirent_180 or later is needed for decoding.



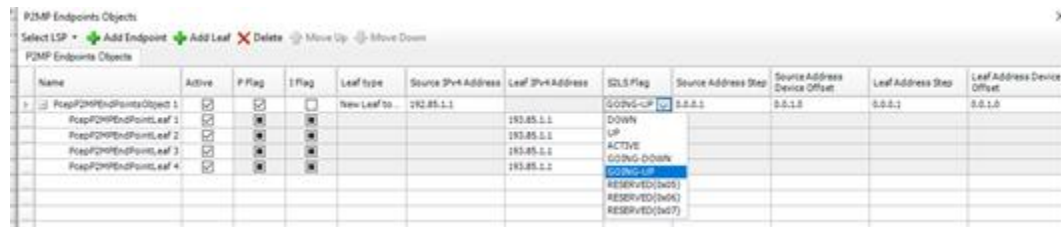
After creating a PCE or PCC emulated device and enabling PCE Stateful Capability, three (3) new items are added under the “Stateful PCE Capability” checkbox. For PCE devices, P2MP capable can be activated and to set P2MP Capability TLV Value.



When editing PCEP LSPs, LSP Type can be set as P2MP and then select LSP Initiate Method.



The “P2MP Endpoint Object” column is added and editable. It includes S2LS Flag, Source Address Step, Source Address Device Offset, Leaf Address Step, and Leaf Address Device Offset. Each P2MP Endpoint object should have one source address, one leaf type, one S2LS operational flag, and at least one leaf. Currently, the S2LS object only supports operational flags, and it is only carried by Report message.



In the LSP Info screen, P2MP ID, Step, and Device Offset are configurable.



SERO and SRRO are used to add Secondary ERO Object and Secondary RRO Object, which are used to represent P2MP intended path and the actual path. SERO is carried by Report, Update, and Initiation message, and it is enabled for PCC and PCE P2MP LSP. SRRO can be carried by Report message only, and it is only enabled for PCC P2MP LSP.

SERO Objects

Select LSP - Add IPv4 SERO Object Add IPv4 SERO SubObject Delete Move Up Move Down

IPv4 SERO Objects

Name	LSP Name	Active	P Flag	I Flag	Route Type	Next Hop IP Address	Next Hop IP Address Step	Next Hop IP Address Device Offset
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BGP LS for IPv6

BGP can be used by PCE to collect link-state and TE information from BGP speaker in NLRI. Spirent TestCenter release 5.21 enables IPv6 for BGP LS. It includes BGP-LS for OSPFv3 w/o SR topology, ISIS w/o SR with MSD, and BGP EPE.



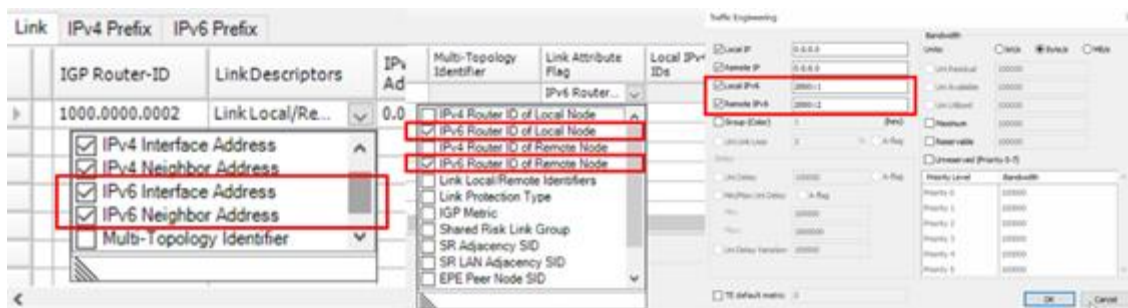
In the BGP Link-State node view, users can select the protocol type and input the router ID in the Local IPv6 Router IDs column.

BGP Routes/VPLS/Link-State

Select Routers - Add Delete

Port Name	Device Name	Community	Extended Community	Protocol ID	Local IPv6 Router IDs	ISIS Area ID	Multi-Topology Identifier	Node Flag Bits (OSPF)	Node Flag Bits (ISIS)
PortConfig1	Device 1			OSPFv3	2000::1, 2000::1				

In the BGP LS view, IPv6 Interface/ Neighbor Address, IPv6 Local/Remote Node, and Traffic Engineering configuration all support IPv6.



In the new added IPv6 Prefix tab, all basic prefix attributes, segment routing attributes, and custom attributes are available.

Link	IPv4 Prefix	IPv6 Prefix	LS IPv6 Prefix Block Name	Active	LS Prefix Descriptor Flag	OSPF Route Type	Prefix Count	IPv6 Prefix	End IPv6 Prefix	IPv6 Prefix Step	IPv6 Prefix Step	Multi-Topology Identifier	LS Prefix Attribute Flag	IGP
			BgpLsIPv6Prefix...	<input checked="" type="checkbox"/>	IP Reachability Info		1	2000::1	2000::2	64	::1		IGP Flags, Prefix Me...	IS-B

All new added information can be decoded by wireshark-1.10.3-spirent_180 or later.

SR Flex Algo for OSPFv3

This feature is used to configure Segment Routing (SR) related information in OSPFv3 protocol, including SR Flexible Algorithm Definition (FAD) TLV and SR Flexible Algorithm Prefix Metric (FAPM) Sub-TLV.

SR FAD TLV can be added in the Opaque/Router-Info LSA tab, and it has five (5) sub-TLVs as shown in the screen capture.

Name	Port Name	Device Name	Active	Flex Algorithm	Metric Type	Calculation Type	Priority	Flex Algorithm Sub TLVs	Exclude Admin Groups	Include-Any Admin Groups	Include-All Admin Groups
Ospf3RfAdTlv 1		Device 1	<input checked="" type="checkbox"/>	128	IGP Metric	1	2	Exclude Admin...	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

- Exclude Admin Group
- Include-Any Admin Group
- Include-All Admin Group
- Definition Flags
- Exclude SRLG

SR FAPM Sub-TLV can be added in Intra-Area Prefix TLV (tab Intra-Area Prefix LSAs and Link LSAs), Inter-Area Prefix TLV (tab Inter-Area Prefix LSAs), and External Prefix TLV (tab AS External LSAs and NSSA LSAs).

Name	Port Name	Device Name	Active	LSA Type	Advertising Router ID	Link State ID	Extended LSA TLVs	Number Prefixes
Ospf3SrFapmSubTlv 1	Port //1/1 (a...	Device 1	<input checked="" type="checkbox"/>	Extended LSA	192.0.0.1	0	IPv6 Inter A...	1

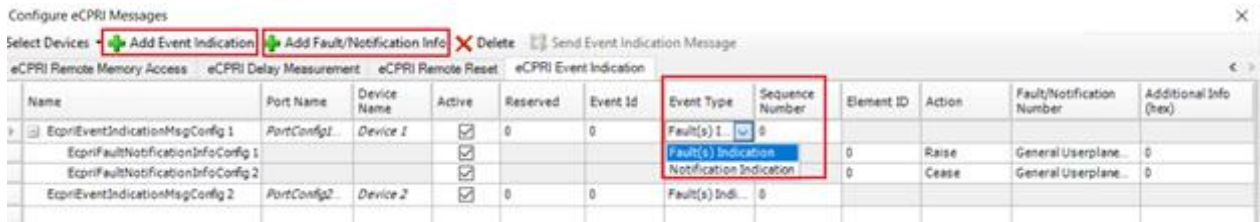
All new added information can be decoded by wireshark-1.10.3-spirent_180 or later.

eCPRI Event Indication Message Phase 1

Event Indication eCPRI message is used when either side of the protocol indicates to the other end that an event has occurred. An Event is generally a raised fault/notification. Fault needs ack, notification does not require ack. In Spirent TestCenter release 5.21, both fault and notification indications are supported and can emulate sending and receiving of event indication messages.

In the eCRPI Event Indication tab, events can be added:

- One Event Indication can either contain one or more faults, or one or more notifications.
- Users can add event indication messages and multiple faults/notifications in a single message as in the example shown below:



Spirent TestCenter IQ will display the number of Event Indication Messages sent and received by category.

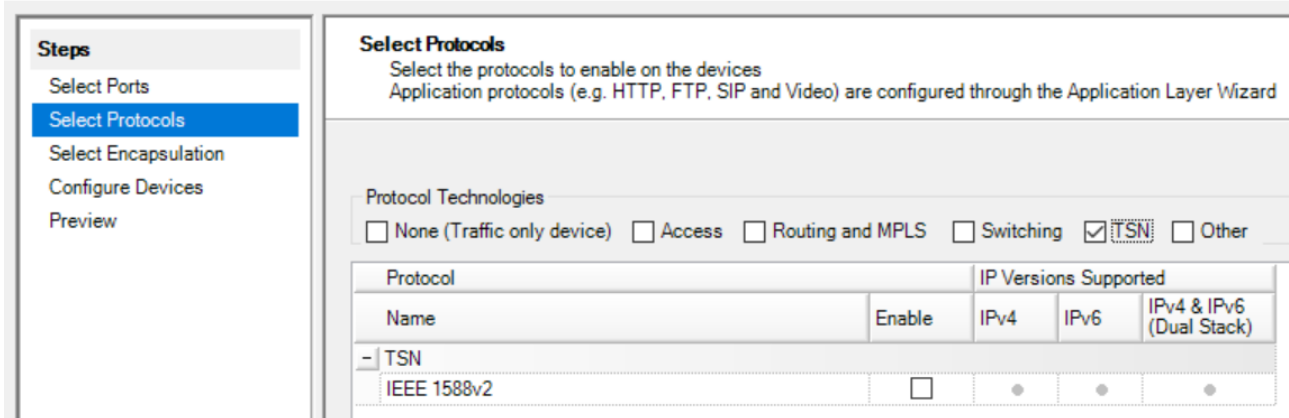
Port Name	Device Name	State	Tx Fault Indication C...	Rx Fault Indication C...	Tx Fault Indication Acknow...	Rx Fault Indication Acknow...	Tx Notification Indication Cou...	Rx Notification Indication Cou...
PortConfig1, 170.108.115.150/1/1	Device 1	Started	1	0	0	1	0	1
PortConfig2, 170.108.115.153/1/1	Device 2	Started	0	1	1	0	1	0

PTP Device Wizard Support

This feature improves usability in high-scale scenarios involving PTP protocol. Users can create a scale PTP configuration using the wizard with ease, without worrying about the parameter distribution across devices and the ports. The PTP device wizard allows users to select protocol, configure upper layer and lower protocols, configure the number of devices, VLANs, and MAC and IP addresses, all in single flow. The PTP Configuration page allows users to configure protocol specific parameters such as encapsulation, delay mechanism, messaging mode, intervals, clock ID, priority values, domain number, etc. It supports incrementing parameters across the devices and across the ports from the given start and step value.

- PTP protocol can be selected under the TSN Category

Create Devices - Select Protocols

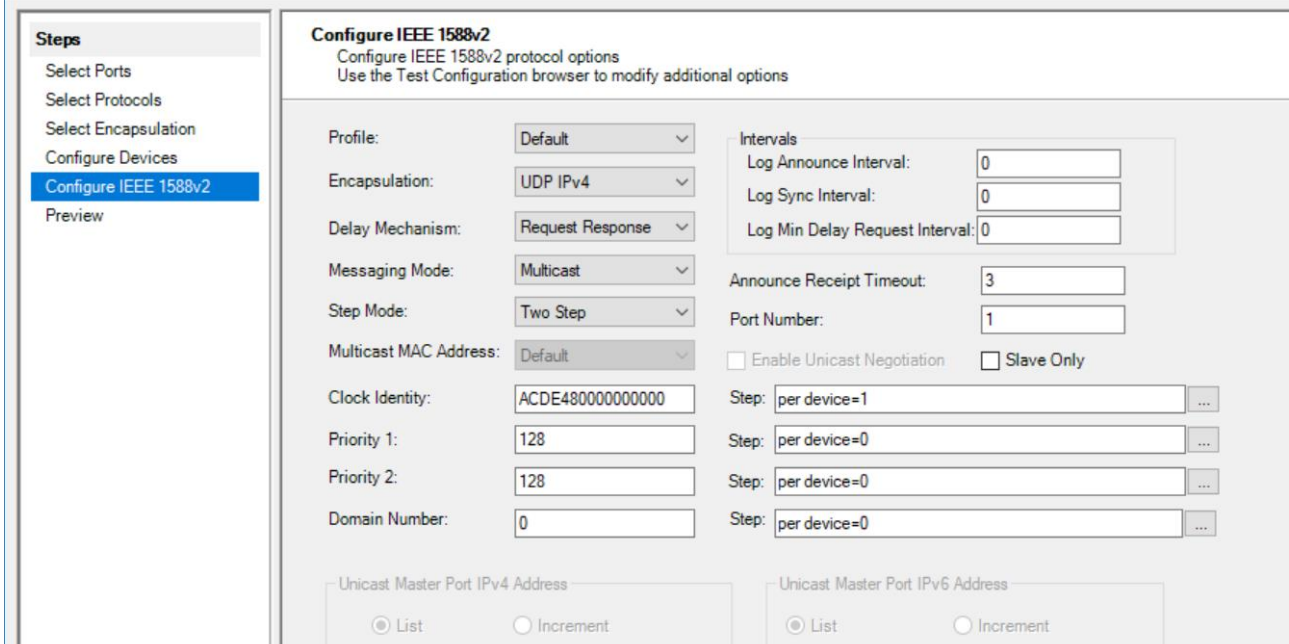


The screenshot shows the 'Select Protocols' step of the wizard. On the left, a 'Steps' sidebar lists: Select Ports, **Select Protocols**, Select Encapsulation, Configure Devices, and Preview. The main area is titled 'Select Protocols' with the instruction 'Select the protocols to enable on the devices'. Below this, 'Protocol Technologies' are listed with checkboxes: None (Traffic only device), Access, Routing and MPLS, Switching, TSN, and Other. A table below shows the configuration for TSN:

Protocol Name	Enable	IP Versions Supported		
		IPv4	IPv6	IPv4 & IPv6 (Dual Stack)
- TSN				
IEEE 1588v2	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

- All of the PTP parameters are available for users to configure.

Create Devices - Configure IEEE 1588v2



The screenshot shows the 'Configure IEEE 1588v2' step of the wizard. On the left, the 'Steps' sidebar lists: Select Ports, Select Protocols, Select Encapsulation, **Configure Devices**, and Preview. The main area is titled 'Configure IEEE 1588v2' with the instruction 'Configure IEEE 1588v2 protocol options'. The configuration fields are as follows:

- Profile: Default
- Encapsulation: UDP IPv4
- Delay Mechanism: Request Response
- Messaging Mode: Multicast
- Step Mode: Two Step
- Multicast MAC Address: Default
- Clock Identity: ACDE480000000000
- Priority 1: 128
- Priority 2: 128
- Domain Number: 0
- Intervals:
 - Log Announce Interval: 0
 - Log Sync Interval: 0
 - Log Min Delay Request Interval: 0
 - Announce Receipt Timeout: 3
 - Port Number: 1
- Enable Unicast Negotiation: (Slave Only:)
- Step configuration:
 - Step: per device=1
 - Step: per device=0
 - Step: per device=0
 - Step: per device=0
- Unicast Master Port IPv4 Address: List Increment
- Unicast Master Port IPv6 Address: List Increment

QBv TX Support Added

- Qbv Tx support for 2.5G & 5G speeds on Spirent FX2/MX2 1G/10G load modules and NIC-47.
- Qbv Tx support for 100M speed on Spirent FX2 1G load modules and NIC-65.

The QBv Tx feature provides a way to schedule the transmissions of frames based on the timing derived from 802.1AS. The frames are assigned to queues based on Quality-of-Service (QoS) priority.

This feature enables creating Traffic Profiles.

- Traffic queues/flows for up to 8 priorities
- Schedule the traffic based on specified time intervals
- Insert gPTP timestamp at time of transmission

QBv Parameters configuration:

<input checked="" type="checkbox"/> Configure Qbv Params	
Base time Tx (secs.nsecs):	<input type="text" value="0.0"/>
Base time Rx (secs.nsecs):	<input type="text" value="0.0"/>
Cycle Time Tx (us):	<input type="text" value="1000000"/>
Cycle Time Rx (us):	<input type="text" value="1000000"/>
Start Time(offset within cycle) (us):	<input type="text" value="0"/>
Tick granularity of DUT (ns):	<input type="text" value="2.5"/>
Stream Start Wait Time (us):	<input type="text" value="0"/>

IPv4 Next Hop for IPv6 Route on BGP

Spirent TestCenter Release 5.21 enables users to configure BGP IPv6 unicast routes with IPv4 Next Hop value. Previously, only IPv6 Next Hop Values were supported for BGP IPv6 unicast routes.

Next Hop Addr Type	Next Hop	IPv4 Next Hop	Next Hop Increment Per Router
IPv4		192.0.0.1	0.0.0.1
IPv6	::ffff:192.85.1.3		

Support for Communities in BGP Route Import

In Spirent TestCenter Release 5.21, users can import the community values from the route file using the BGP Route Table Import wizard. The Route file should be imported in Juniper® route file format to use the benefits of this feature.

RFC 6349 - Benchmarking Methodology for TCP Throughput Testing

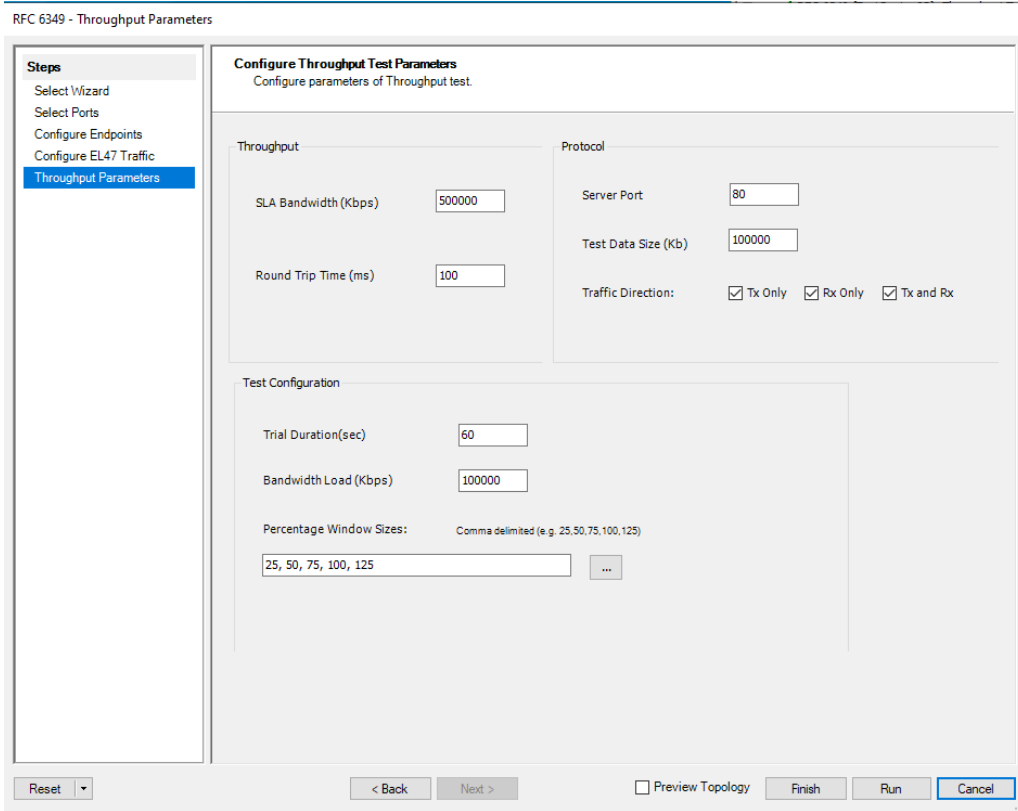
RFC 6349 is a methodology used to measure end-to-end TCP throughput in a managed IP network. It provides accurate TCP throughput measurement and a practical test approach that specifies tunable parameters such as link speed, RTT (Round-Trip Time), MTU (Maximum Transmission Unit), and Socket Buffer sizes. It can be used to determine how these factors affect TCP performance over an IP network.

RFC 6349 is provided under a new license and is dependent on the Spirent TestCenter Enhanced Layer 4-7 license (BPK-2001) which must be purchased separately.

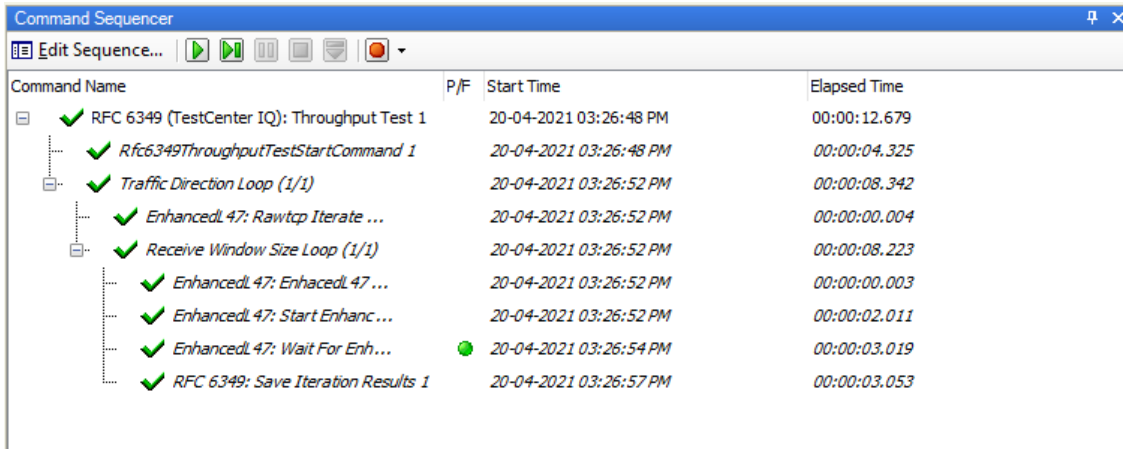
The wizard builds a sequence of test loops that utilize the Enhanced L47 Raw TCP protocol for traffic generation. The wizard configures an outer loop with multiple iterations: client-to-server traffic (Tx only), server-to-client traffic (Rx only) and bidirectional traffic (Tx+Rx). In each of these outer loop iterations, there is an inner loop which exercises different TCP receive window size configurations based on a percentage of the Minimum (Ideal) TCP receive window size (called Minimum RWIND). The calculation is explained in RFC 6349 section 3.3.1. The inner loop iterates over these different Minimum RWIND sizes, executes the tests, and gathers statistics to present in the result.

An example of the resulting test iterations is shown in the table.

Iteration	Traffic Direction	%Min RWIND Size
Iteration 1	Tx Only	25%
Iteration 2	Tx Only	50%
Iteration 3	Tx Only	75%
Iteration 4	Tx Only	100%
Iteration 5	Tx Only	125%
Iteration 6	Rx Only	25%
Iteration 7	Rx Only	50%
Iteration 8	Rx Only	75%
Iteration 9	Rx Only	100%
Iteration 10	Rx Only	125%
Iteration 11	Tx+Rx	25%
Iteration 12	Tx+Rx	50%
Iteration 13	Tx+Rx	75%
Iteration 14	Tx+Rx	100%
Iteration 15	Tx+Rx	125%



The wizard configures the Spirent TestCenter Command Sequencer to run the traffic direction and receive window loops as described above. The screen capture below shows how the command sequencer window can be used to display test progress.



Results are displayed using Spirent TestCenter IQ by selecting the RFC 6349 Results profile.

The screenshot displays the Spirent TestCenter IQ interface. At the top, the navigation menu includes 'Results Library', 'Results Dashboard', and 'Profile Library'. The 'Profile Library' is expanded to show a search for '634', with 'RFC 6349 Results' selected under the 'all, rfc6349' category.

The main results area shows a table titled 'RFC6349 Metric Iteration Summary Results' with the following data:

Snapshot Name	Applied Window S... (Bytes)	Line Rate (Mbps)	Ideal TCP Throug... (Mbps)	Actual TCP Throug... (Mbps)	Ideal TCP Transm... (Bytes)	Actual TCP Trans... (Bytes)	Total Retransmit... (Bytes)	Ideal TCP Transf... (sec)	Actual TCP Transf... (sec)	TCP Transfer Tim... (sec)	Base Line Round ... (ms)	Average Round Tr... (ms)	Buffer Delay (%)	TCP Efficiency (%)
T1-T1-Tx-25	1,562,500	100.000	94,193.55	303	706,491,612,903.23	251,000,000	0	0.02	60	2.814.55	1	0	0	
T1-T2-Tx-90	3,125,000	100.000	94,193.55	303	706,491,612,903.23	252,000,000	0	0.02	60	2.803.38	1	0	0	

Below the table, three charts are displayed for the snapshot 'T1-T1-Tx-25' with a window size of 1562500 bytes:

- TCP Buffer Delay Chart:** Shows a single data point for Buffer Delay at approximately 0%.
- TCP Transfer Time Ratio Chart:** Shows a single data point for TCP Transfer Time Ratio at approximately 3200.
- TCP Efficiency Chart:** Shows a single data point for TCP Efficiency at approximately 100%.

At the bottom, a 'Throughput Chart' displays 'Client Throughput' and 'Server Throughput' over time, showing a peak in throughput around 03:39:00. Below the chart is the 'RFC 6349 Config' section with the following settings:

- Port Count: 2
- SLA Bandwidth: 500,000
- Base Line Rtt (ms): 100
- Iteration Duration (seconds): 60
- Test Data Size (KB): 100,000
- Line Rate (Gbps): 100

Spirent Support

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

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E-mail: support@spirent.com

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The latest versions of user manuals, application notes, and software and firmware updates are available on the Spirent Communications Customer Service Center website at

<https://support.spirent.com>.

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

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