Spirent TestCenter System and Application Overview

Spirent TestCenter Functions

- PGA: Packet Generation/Analysis
- Emulation Protocol Support (e.g., BGP and PPP)
- ALP: Application Layer Protocols (e.g., TCP and HTTP)
- Avalanche: full TCP and application layer support
- All chassis support all functions; some modules are limited

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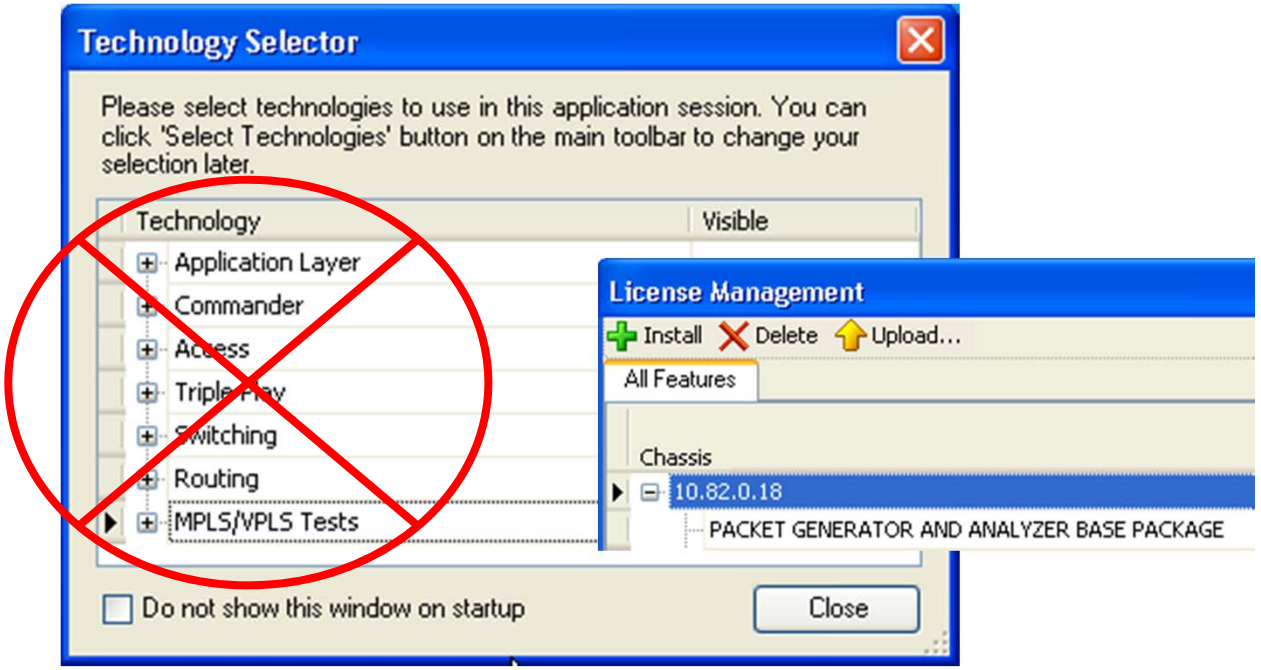
PGA Function

- The Packet Generator/Analyzer "Basic Package" contains all the tools and functionality required to Transmit (Tx), Receive (Rx), and Analyze traffic.
- It does not require any special "Technologies" to be active; and only requires the "PGA Base Package" license.
- The PGA functions can be used with any/all other protocols.

not required for PGA function



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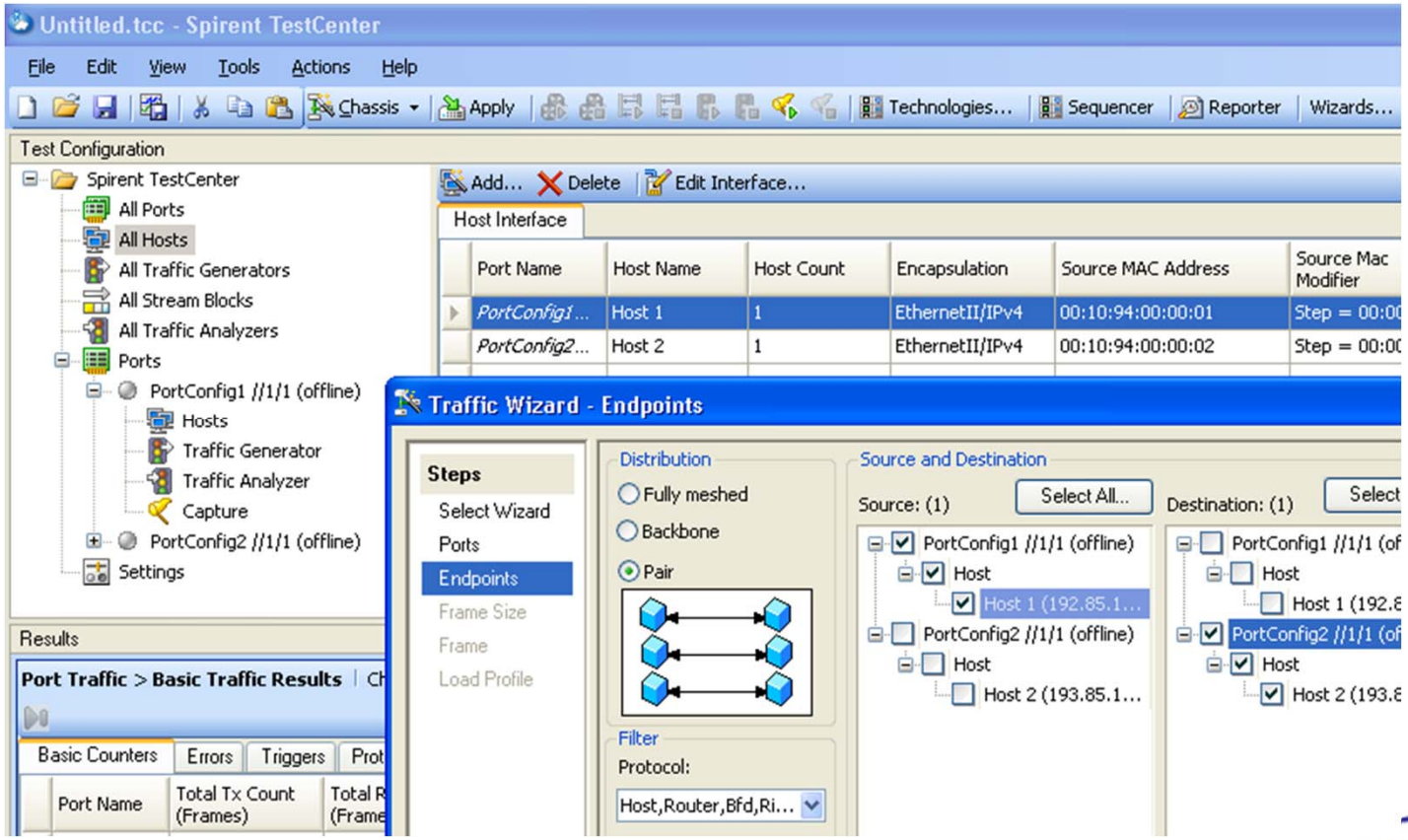
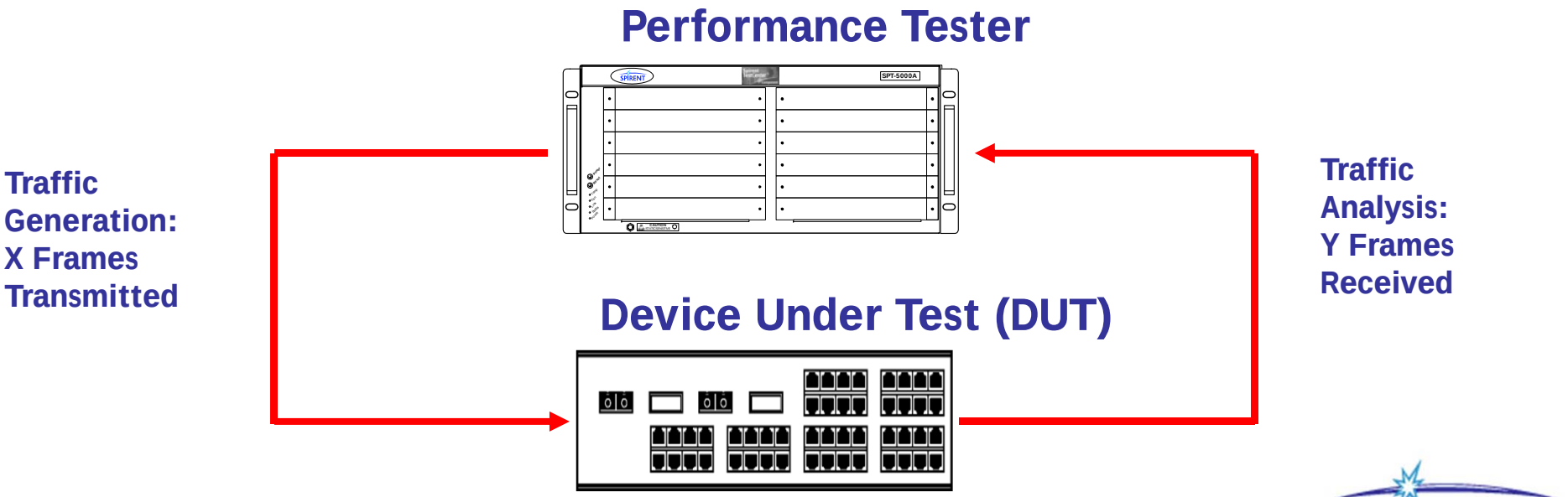
PGA Overview

- The PGA consists for the follow “umbrella” tools which are covered in detail here: Traffic Wizard, Generator, Custom Test Wizard, Analyzer, and Results.
- Also incorporated in the PGA, but not covered in detail here, are the Port Settings, Hosts Blocks, Stream Blocks, Capture and their related functionality.



PGA: Packet Generation/Analysis

- Layer 2, 3, and Layer 4+ headers
- IP layer emulation: ARP/ND, Ping, IGMP
- Performance, Multicast, and QoS Testing
- Capture and Error Generation



Module's PGA Capabilities

- 1000 Series and HM CV generator
  - 16383 streams; billions of flows
  - 4 variable fields of 4-bytes each (6 of 4-bytes with CV)
- 2000 Series and HM CM generator
  - 32767 streams; billions of flows
  - 6 variable fields of 4 bytes
- All generators
  - transmit at up to 104% of wire rate; down to 8 byte IFG
  - 40 bytes to 16383 bytes frames sizes
  - error Generation: Ethernet FCS, IP/UDP/TCP checksums, IP/UDP total length
- All analyzers
  - 64,000 streams, 40 statistics per stream; stream/port/protocol counts and rates
  - Histograms; 10ns latency resolution
  - four 16 bit and one 32 bit Analyzer Filters
  - error counters: CRC, checksums, length, PRBS, header errors
  - Capture Buffer 16M (8M on 10G); supports real-time capture mode

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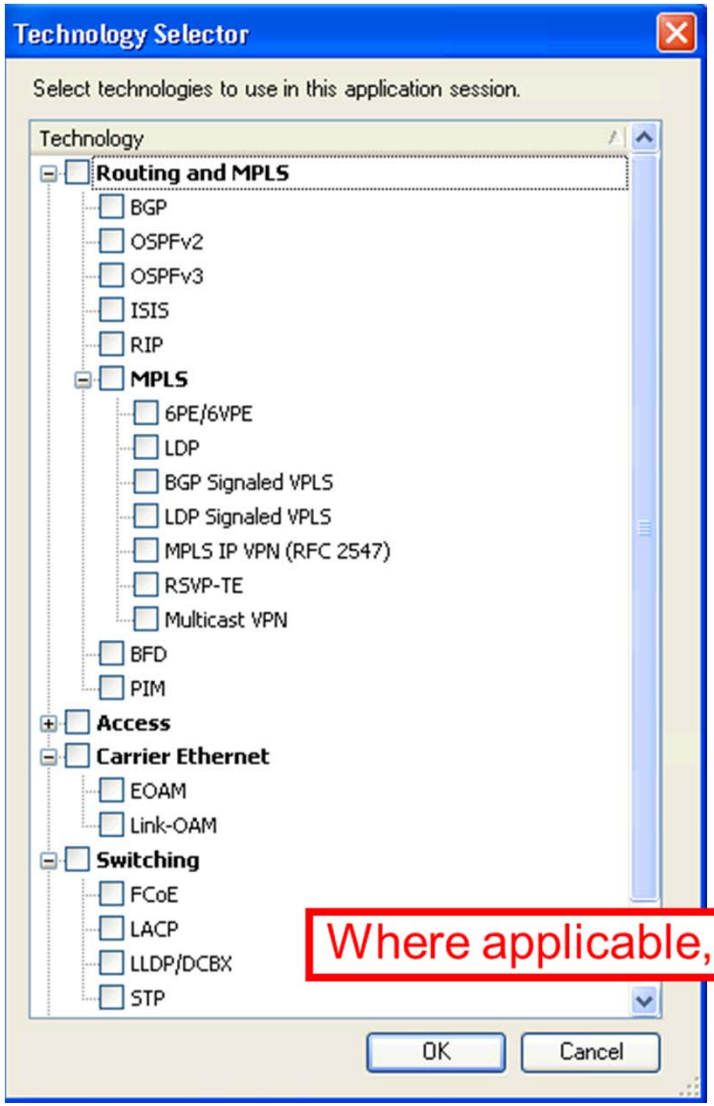
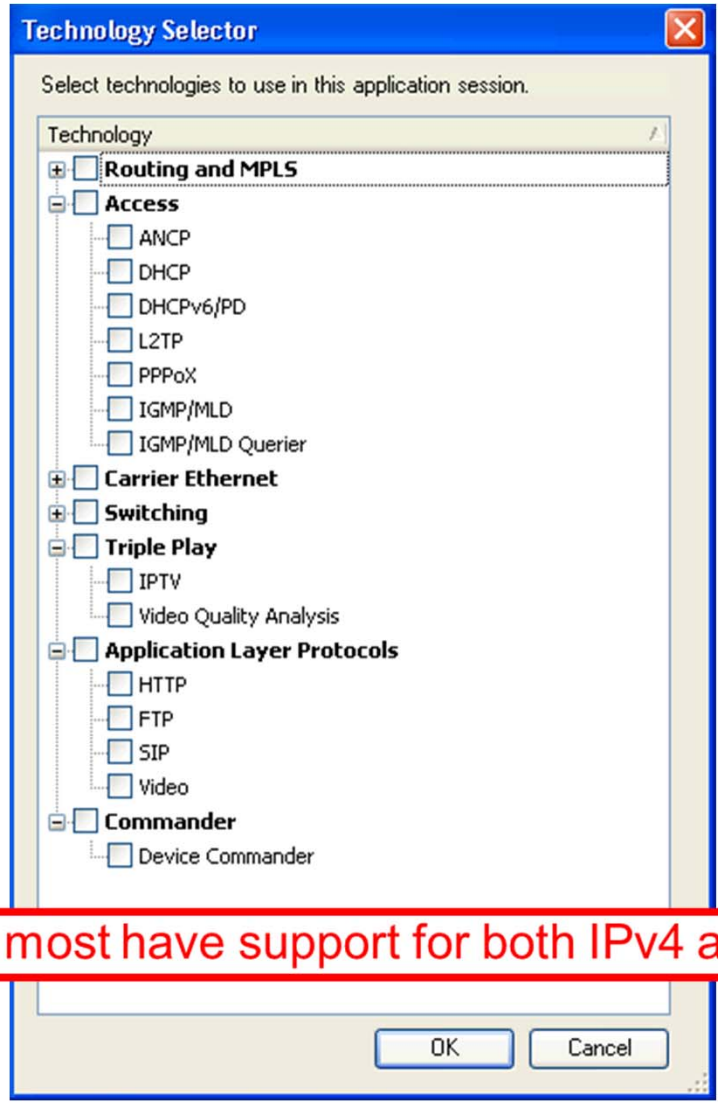
Emulation Protocol Support





Where applicable, most have support for both IPv4 and IPv6!

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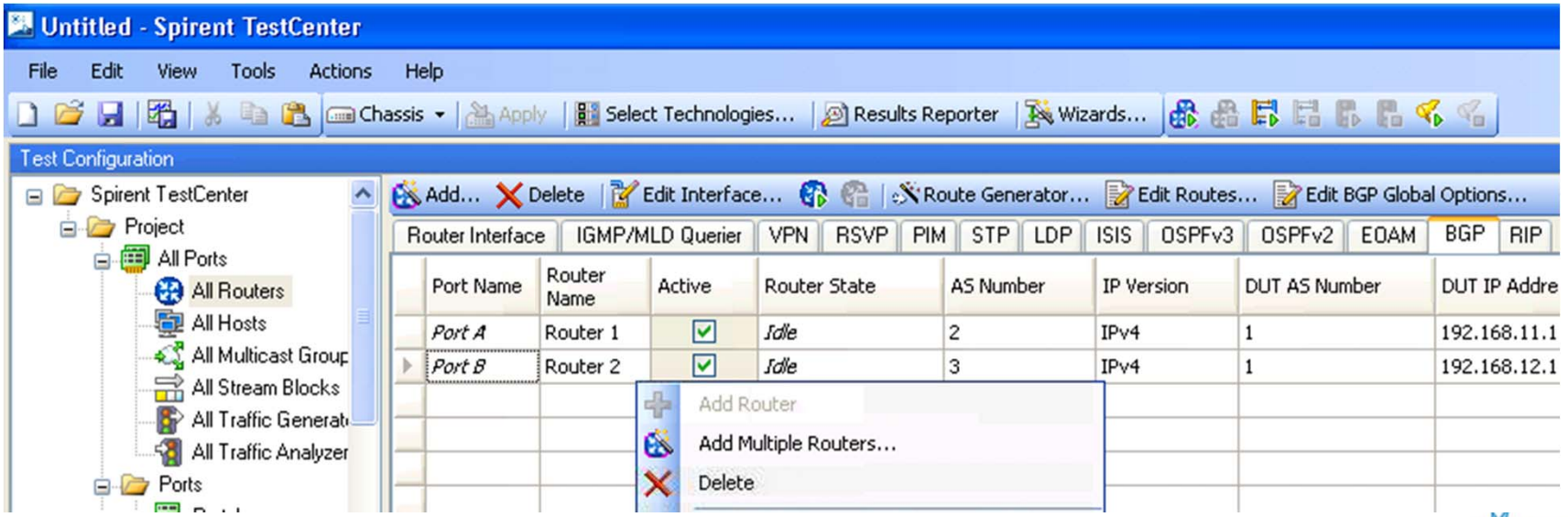
Spirent TestCenter Router Emulation

- Routing Emulation with Spirent TestCenter is router centric.
  - This is more like you would set up a real router.
  - You define a router interface(s) and multiple protocols can be bound to it/them.
- An Emulated Router is a "real" router in that it will form an actual session and participate is all protocol events with the DUT.
  - It can also represent a network, internet, or topology of 100s/1000s of Simulated routers.
  - You have direct control over all the route/router parameters (even negatively).



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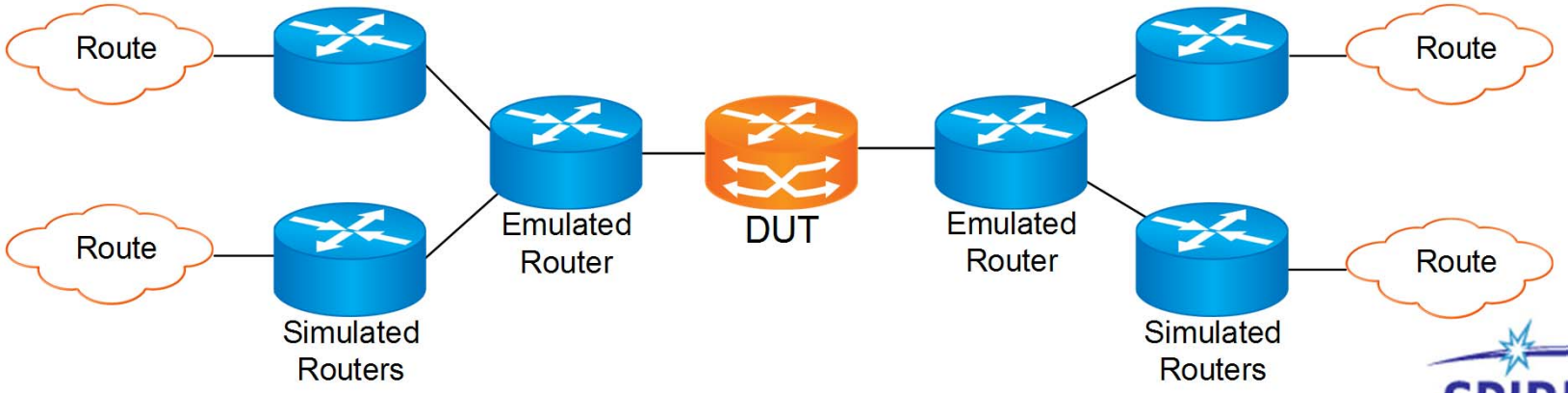
Simple Routing Topology Example

Spirent uses two terms to describe router emulation:

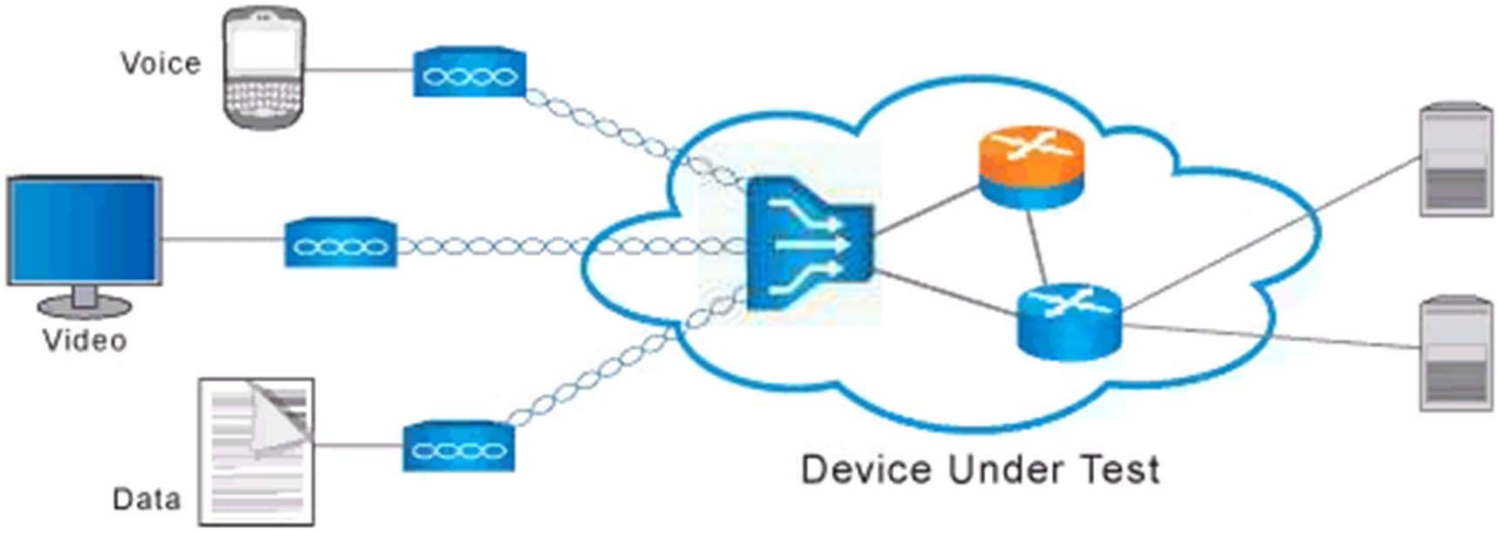
- Emulated Routers – run a routing protocol with the DUT, maintain protocol state, send routes, etc.
- Simulated Routers – exist as link-state routing advertisements from OSPF or IS-IS, or additional AS Paths with BGP

- Use emulated routers to exchange routes or perform interactive testing
- Create simulated routers to build topologies to represent an environment
- Simulated routers are created via Route Generators, configuration grids, and test wizards
- Create topologies that extended tens of routers deep, then simulate traffic from remote access networks across core/provider topologies



ALP: Application Layer Protocols

- Enables integrated Layer 2-7 Testing
- Supports Stateful TCP
- Limited HTTP, FTP, and SIP
- Video Quality Analysis (VQA)



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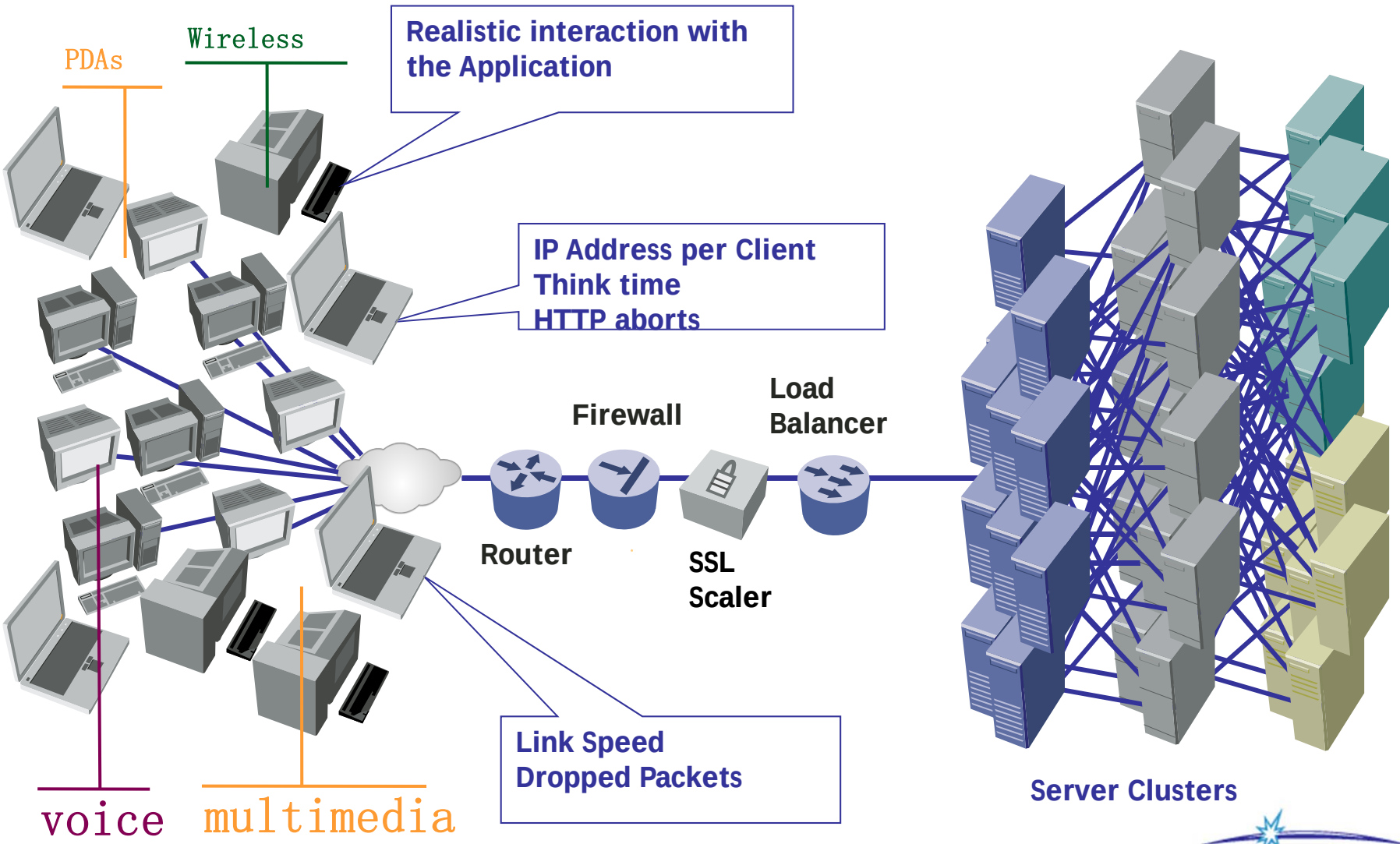
Avalanche: Emulated Clients and Servers



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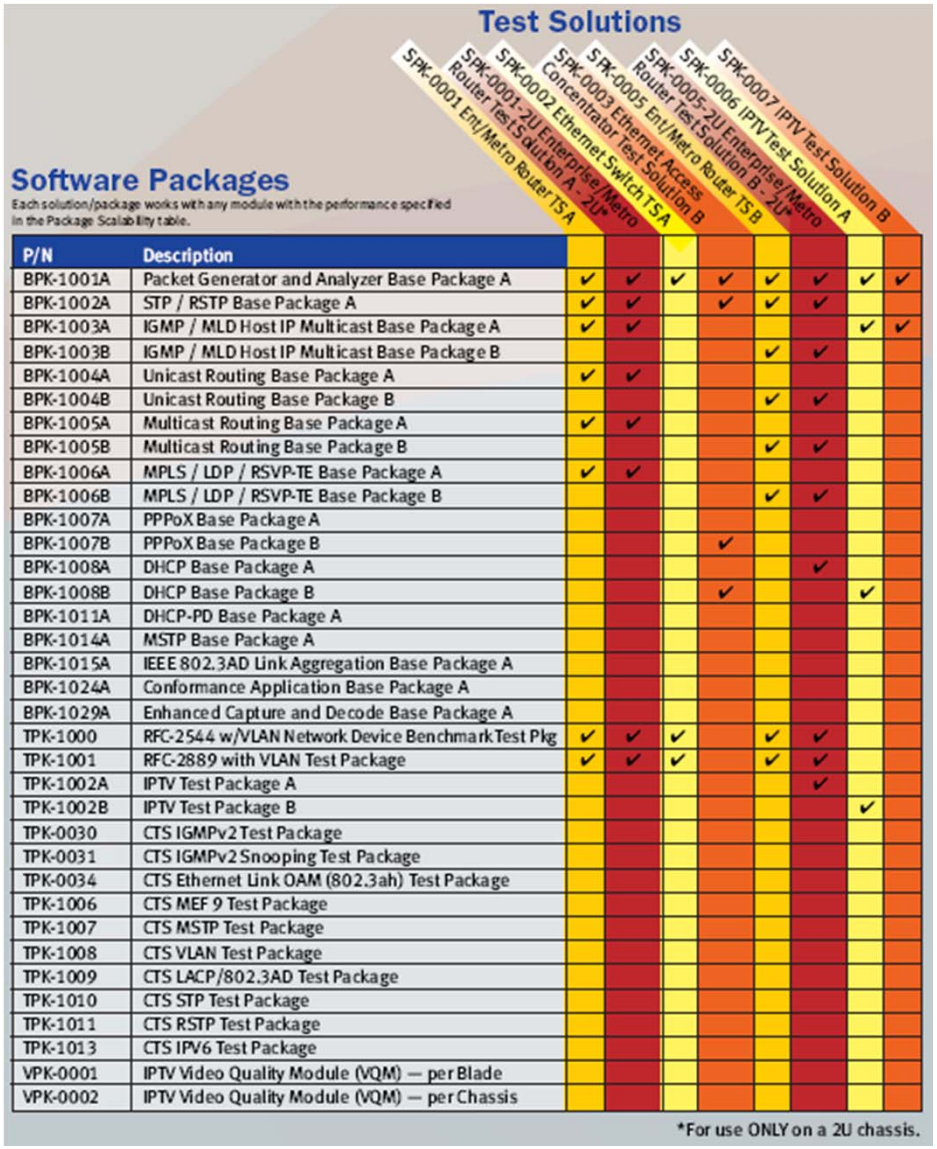
Layer 2/3 Test Solutions Example

This is not a complete list!



Test Solutions

Software Packages

Each solution/package works with any module with the performance specified in the Package Scalability table.

P/N	Description	SPK-0001 Ent/Metro Router TSA	SPK-0001-2U Enterprise/Metro Router Test Solution A - 2U*	SPK-0002 Ethernet Switch Concentrator Test Solution B	SPK-0003 Ethernet Access TSA	SPK-0005 Ent/Metro Router TSB	SPK-0005-2U Enterprise/Metro Router Test Solution B - 2U*	SPK-0006 IPTV Test Solution A	SPK-0007 IPTV Test Solution B
BPK-1001A	Packet Generator and Analyzer Base Package A	✔	✔	✔	✔	✔	✔	✔	✔
BPK-1002A	STP / RSTP Base Package A	✔	✔		✔	✔	✔		
BPK-1003A	IGMP / MLD Host IP Multicast Base Package A	✔	✔					✔	✔
BPK-1003B	IGMP / MLD Host IP Multicast Base Package B					✔	✔		
BPK-1004A	Unicast Routing Base Package A	✔	✔						
BPK-1004B	Unicast Routing Base Package B					✔	✔		
BPK-1005A	Multicast Routing Base Package A	✔	✔						
BPK-1005B	Multicast Routing Base Package B					✔	✔		
BPK-1006A	MPLS / LDP / RSVP-TE Base Package A	✔	✔						
BPK-1006B	MPLS / LDP / RSVP-TE Base Package B					✔	✔		
BPK-1007A	PPPoX Base Package A								
BPK-1007B	PPPoX Base Package B				✔				
BPK-1008A	DHCP Base Package A						✔		
BPK-1008B	DHCP Base Package B				✔			✔	
BPK-1011A	DHCP-PD Base Package A								
BPK-1014A	MSTP Base Package A								
BPK-1015A	IEEE 802.3AD Link Aggregation Base Package A								
BPK-1024A	Conformance Application Base Package A								
BPK-1029A	Enhanced Capture and Decode Base Package A								
TPK-1000	RFC-2544 w/VLAN Network Device Benchmark Test Pkg	✔	✔	✔		✔	✔		
TPK-1001	RFC-2889 with VLAN Test Package	✔	✔	✔		✔	✔		
TPK-1002A	IPTV Test Package A						✔		
TPK-1002B	IPTV Test Package B							✔	
TPK-0030	CTS IGMPv2 Test Package								
TPK-0031	CTS IGMPv2 Snooping Test Package								
TPK-0034	CTS Ethernet Link OAM (802.3ah) Test Package								
TPK-1006	CTS MEF 9 Test Package								
TPK-1007	CTS MSTP Test Package								
TPK-1008	CTS VLAN Test Package								
TPK-1009	CTS LACP/802.3AD Test Package								
TPK-1010	CTS STP Test Package								
TPK-1011	CTS RSTP Test Package								
TPK-1013	CTS IPV6 Test Package								
VPK-0001	IPTV Video Quality Module (VQM) — per Blade								
VPK-0002	IPTV Video Quality Module (VQM) — per Chassis								

*For use ONLY on a 2U chassis.

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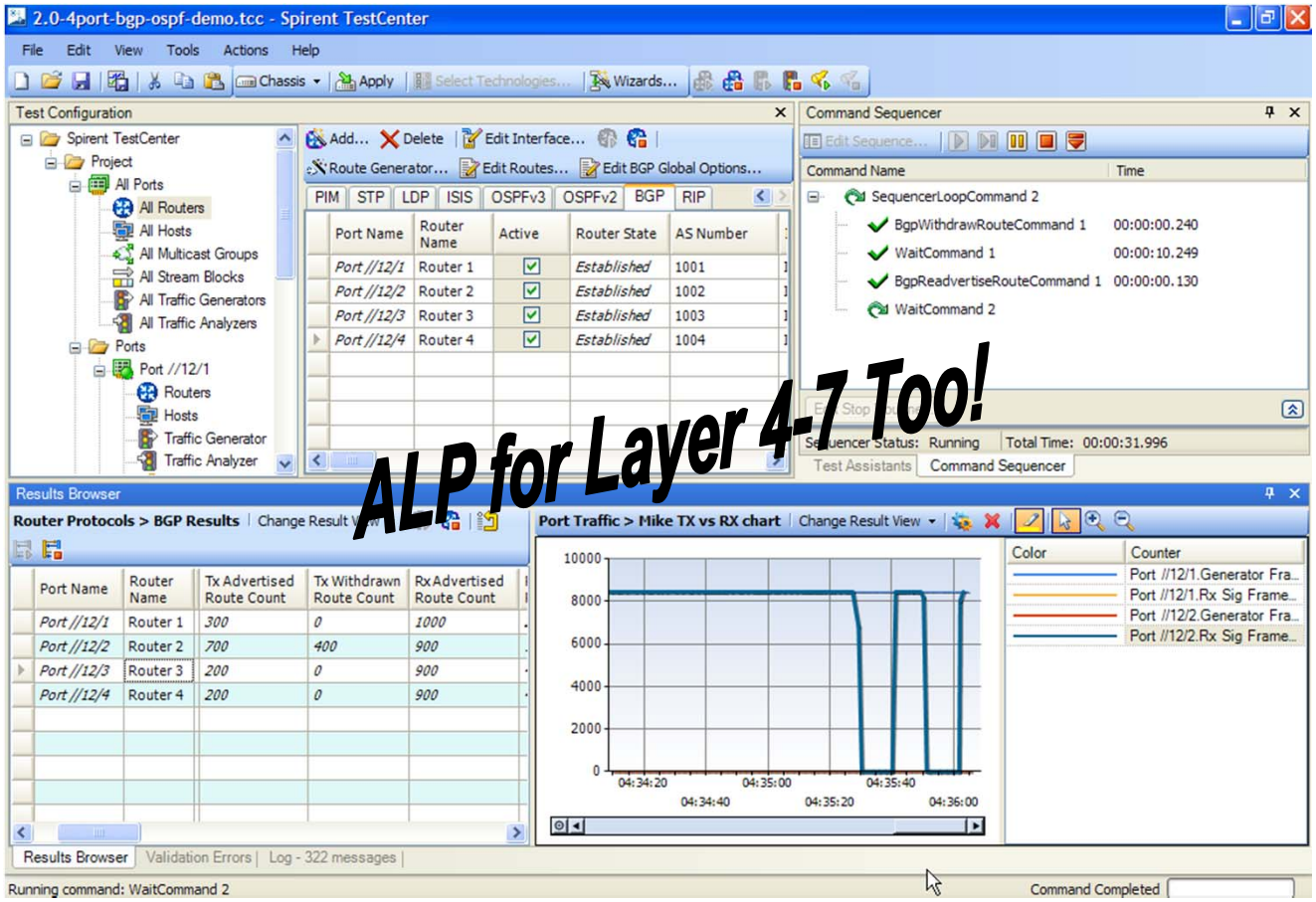
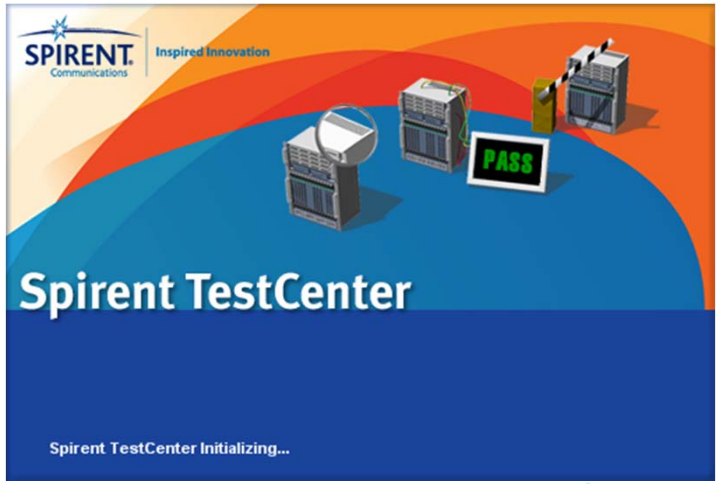
Graphical User Interface for Layer 2/3

- The Spirent TestCenter “Application”
- Common GUI Framework for all Layer 2/3 Test Solutions



The Spirent TestCenter Application

- Supports Performance and Functional Testing for Layers 2-7
  - Layers 4-7 supported with ALP
- Integrated control and data plane testing
  - For example, sending traffic to BGP advertised routes
- Provides deterministic and repeatable test environment
- Test results are available in real-time and at the end of a test
- The setup and results can be saved in different formats
- Includes many easy-to-use wizards:
  - Simplifies test set up and execution
  - Used for Device and Traffic creation
  - Used for Large Scale testing
  - For creating Access and Routing Topologies
  - For creating MPLS Layer 2/3 VPNs
  - Plus RFC 2544/2889 Test Packages



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Basic GUI Features

- Multi-pane window to see and compare everything at a single glance
- Includes equipment, firmware. and license management features
- Spreadsheet configuration windows with copy down and fill functions
- Multiple Wizards for setting up and running tests
- Allows you save the setup and results in standard formats: XML&SQL
- Unique analysis capabilities aid in the interpretation of test results
- Troubleshooting tools reduce time to identify and correct problems
- GUI-to-script improves the time and effort required to automate tests
- Allows you to simultaneously view both Setup and Results
- Customizable setup and results windows
- Reporting tools quickly produce summarized and detailed test reports

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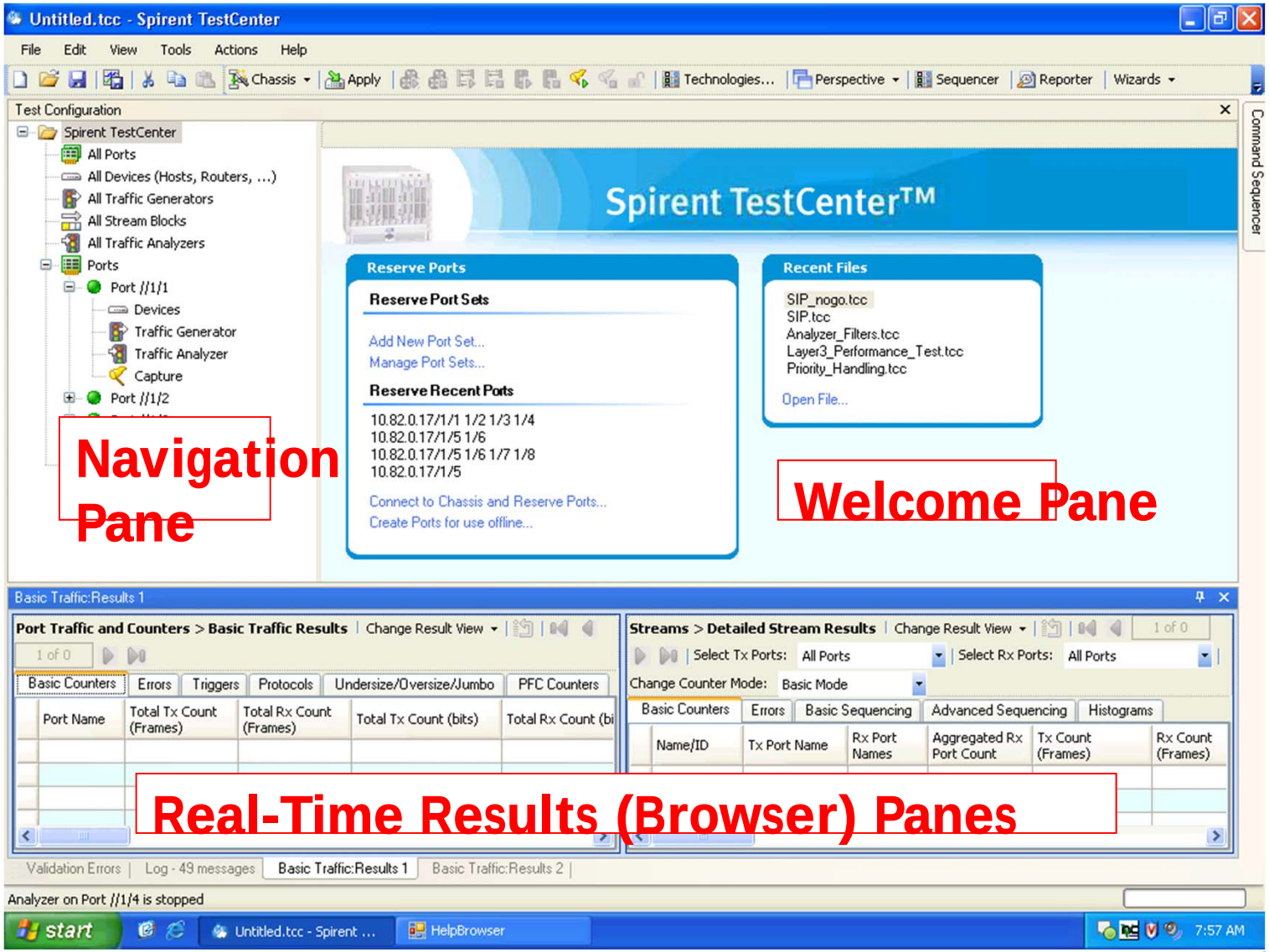
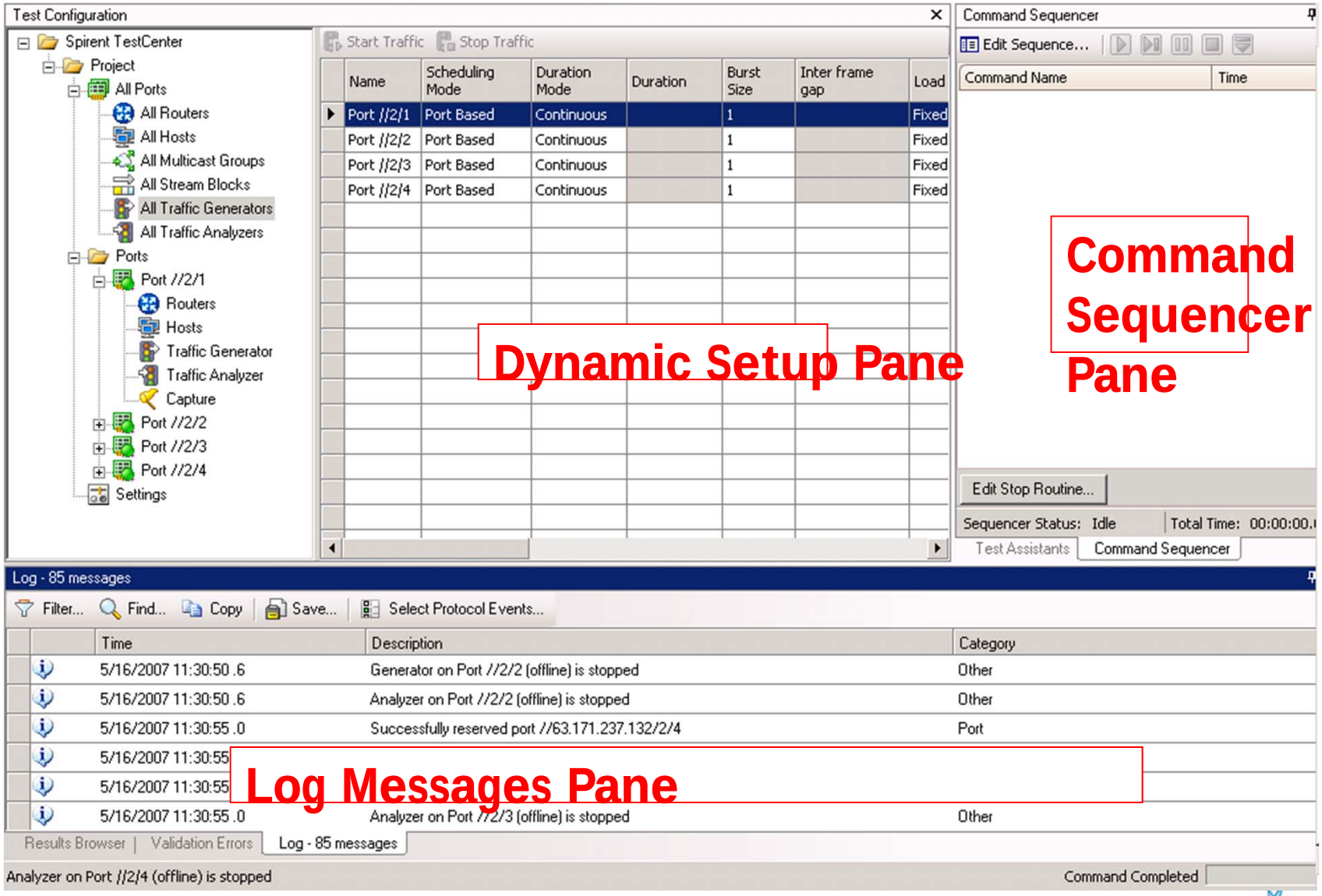
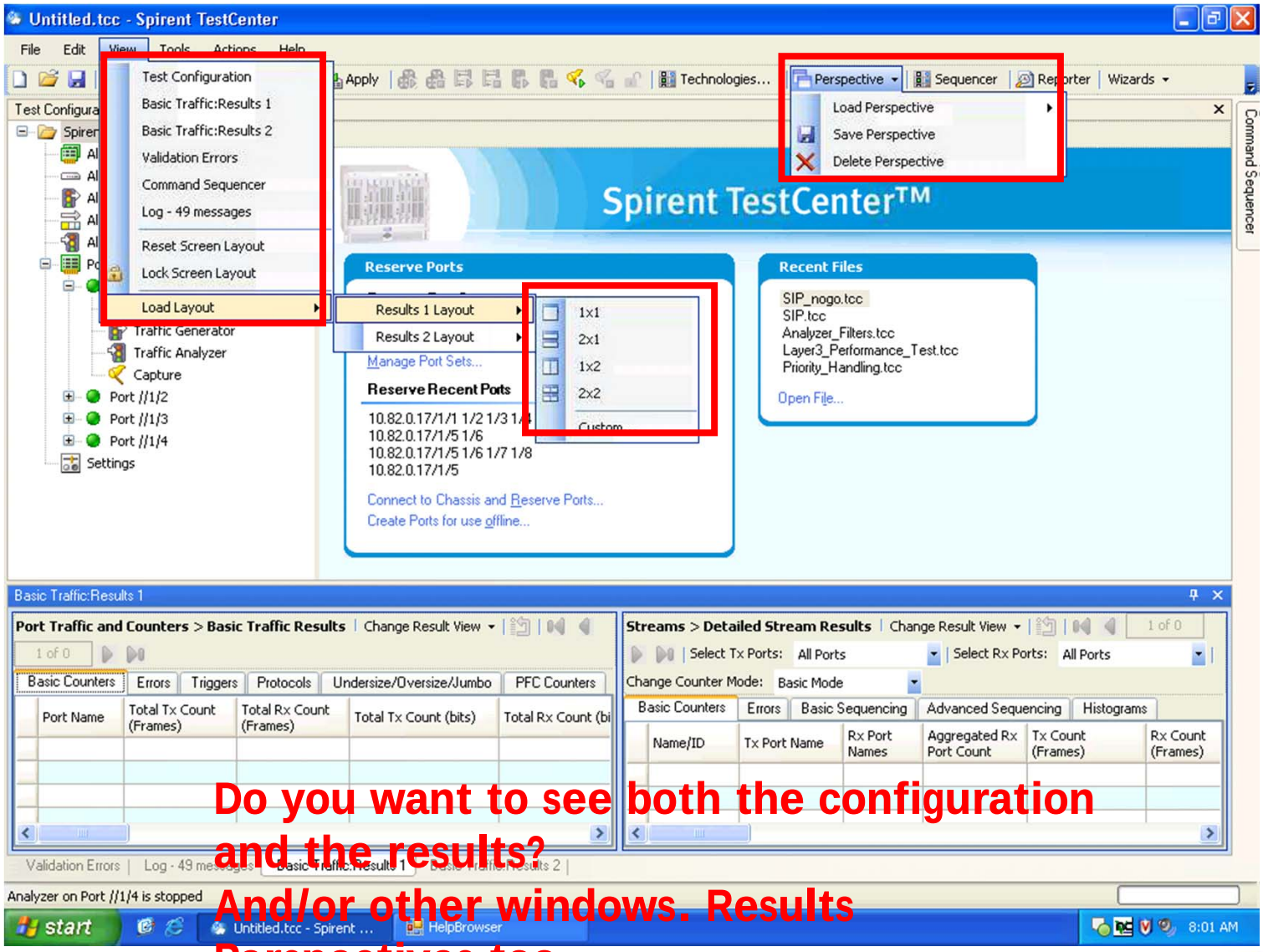
Main Window


Untitled.tcc - Spirent TestCenter
File Edit View Tools Actions Help
Chassis Apply Technologies... Perspective Sequencer Reporter Wizards
Test Configuration
Spirent TestCenter
All Ports
All Devices (Hosts, Routers, ...)
All Traffic Generators
All Stream Blocks
All Traffic Analyzers
Ports
Port //1/1
Devices
Traffic Generator
Traffic Analyzer
Capture
Port //1/2
Spirent TestCenter™
Reserve Ports
Reserve Port Sets
Add New Port Set...
Manage Port Sets...
Reserve Recent Ports
10.82.0.17/1/1 1/2 1/3 1/4
10.82.0.17/1/5 1/6
10.82.0.17/1/5 1/6 1/7 1/8
10.82.0.17/1/5
Connect to Chassis and Reserve Ports...
Create Ports for use offline...
Recent Files
SIP_nogo.tcc
SIP.tcc
Analyzer_Filters.tcc
Layer3_Performance_Test.tcc
Priority_Handling.tcc
Open File...
Command Sequencer
Navigation Pane
Welcome Pane
Basic Traffic:Results 1
Port Traffic and Counters > Basic Traffic Results
Change Result View
Basic Counters Errors Triggers Protocols Undersize/Oversize/Jumbo PFC Counters
Port Name
Total Tx Count (Frames)
Total Rx Count (Frames)
Total Tx Count (bits)
Total Rx Count (bi
Streams > Detailed Stream Results
Select Tx Ports: All Ports
Select Rx Ports: All Ports
Change Counter Mode: Basic Mode
Basic Counters Errors Basic Sequencing Advanced Sequencing Histograms
Name/ID
Tx Port Name
Rx Port Names
Aggregated Rx Port Count
Tx Count (Frames)
Rx Count (Frames)
Real-Time Results (Browser) Panes
Validation Errors Log - 49 messages Basic Traffic:Results 1 Basic Traffic:Results 2
Analyzer on Port //1/4 is stopped
start
Untitled.tcc - Spirent ...
HelpBrowser
7:57 AM

Main Window – Cont.



Change Window View by Menu

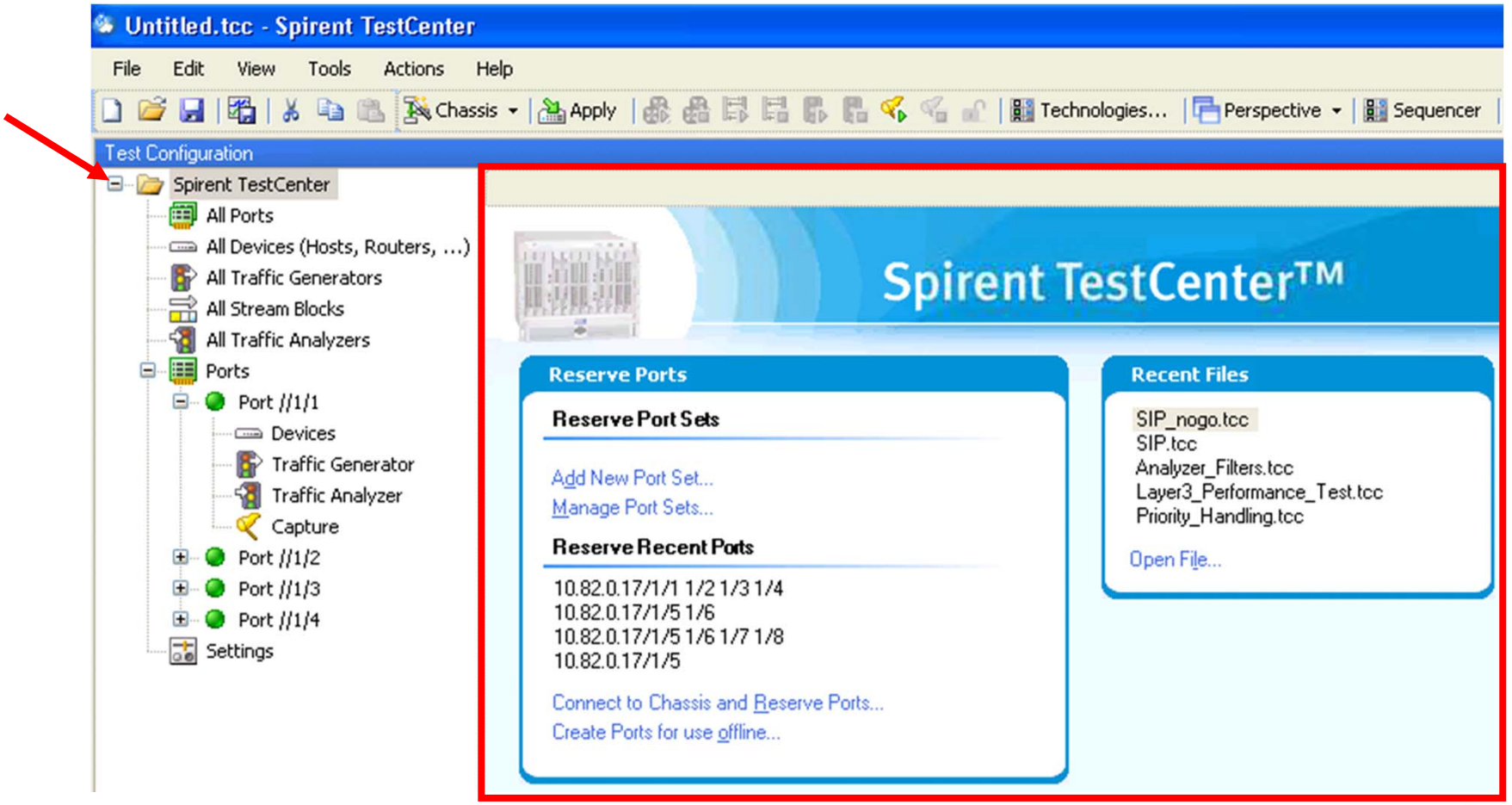


Do you want to see both the configuration and the results?

And/or other windows. Results Perspectives too.

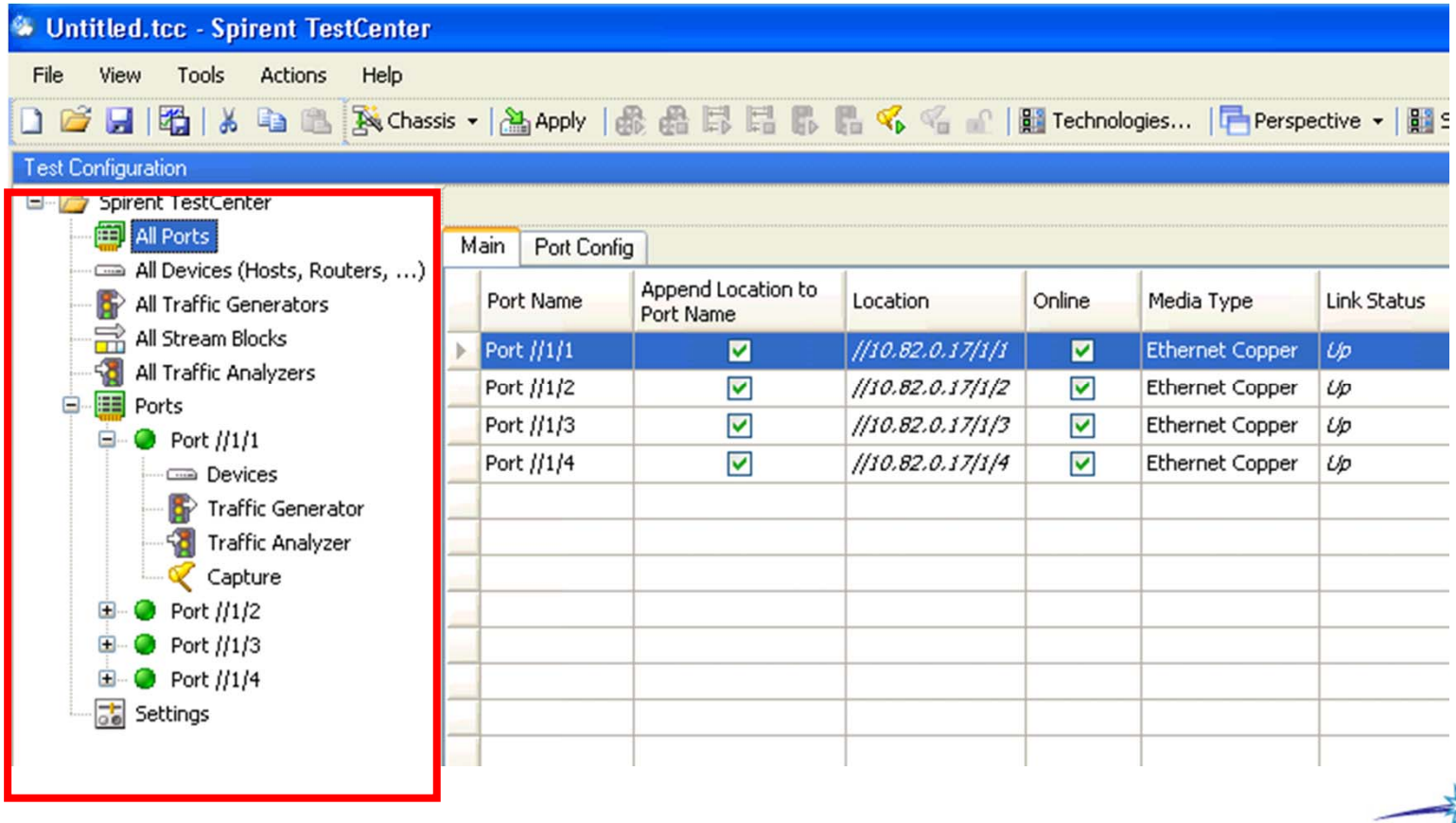
Welcome Pane

- Port Reservation, add Offline Ports, Load Files



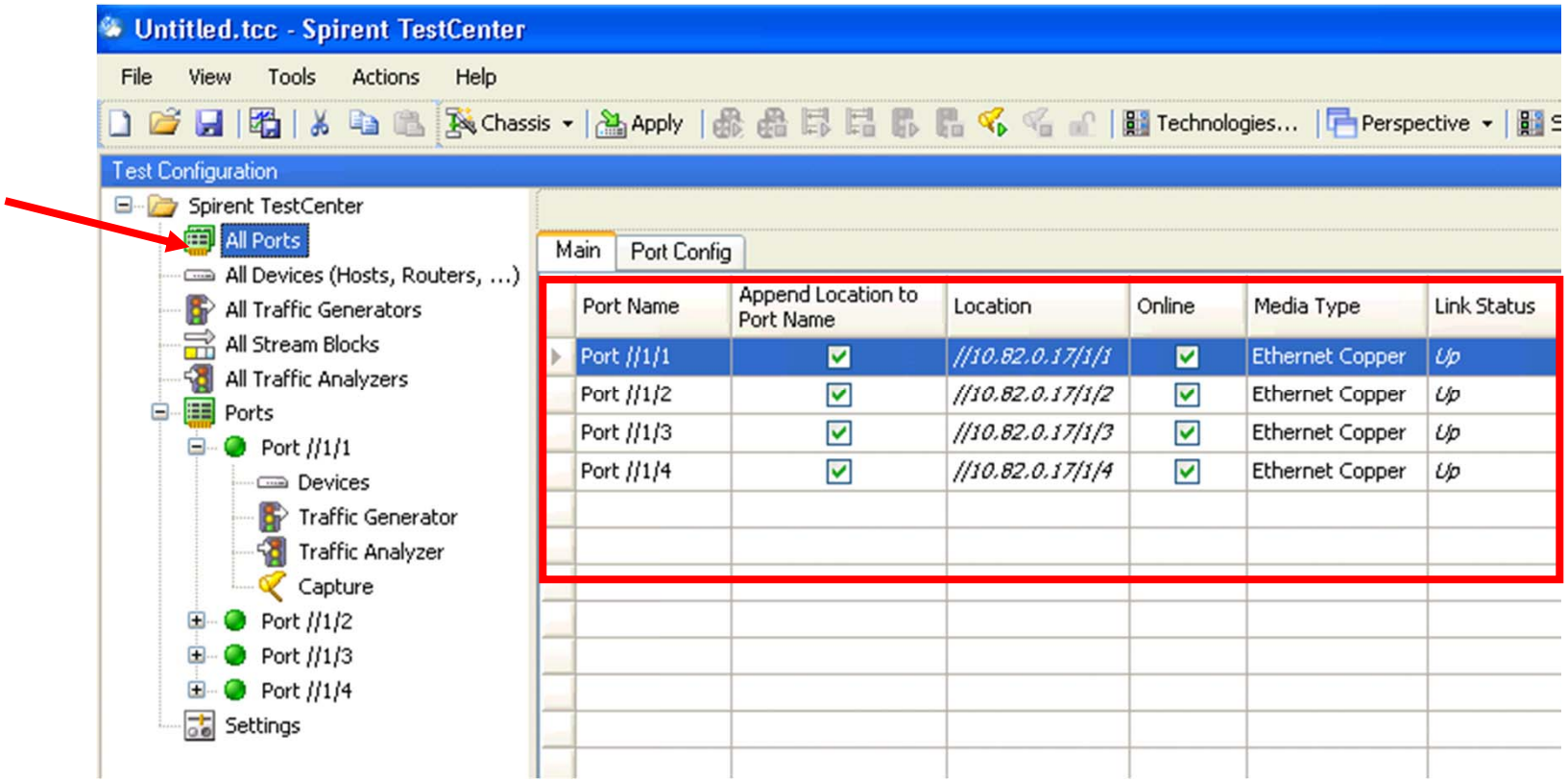
Test Configuration Pane – Navigation Tree

- The navigation test configuration pane is always displayed on the left side of the Test Setup pane.
- When you open the application, the navigation tree is collapsed with only the top-level icons displayed.



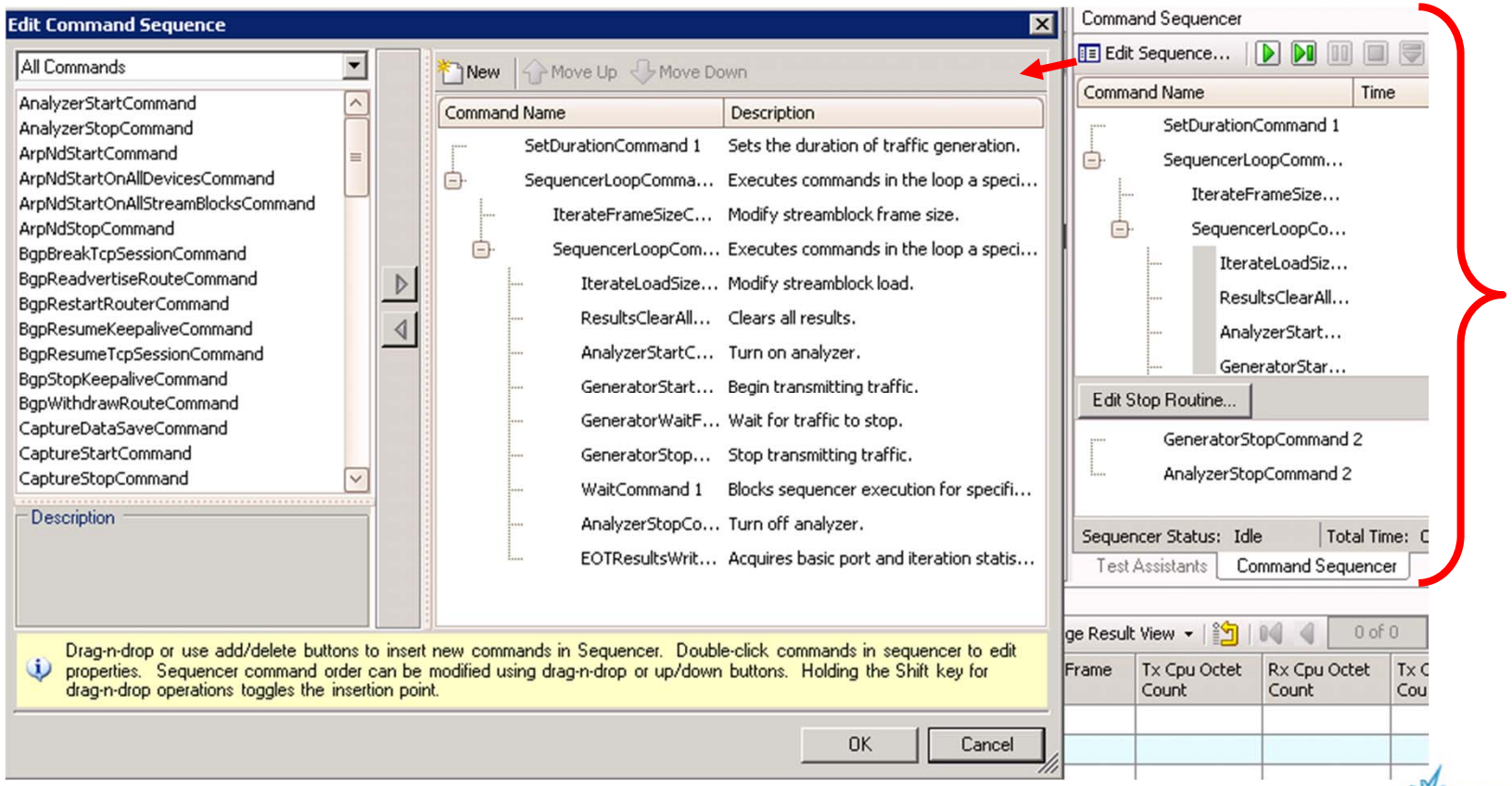
Test Configuration Pane – Setup Pane

- Allows user to configure detail testing parameters.
- The Setup pane, located on the right side of the Navigation pane, displays the active test setup grid (spreadsheet) or form.
- Change the grid or form displayed in the Setup pane by clicking another icon in the Navigation pane.



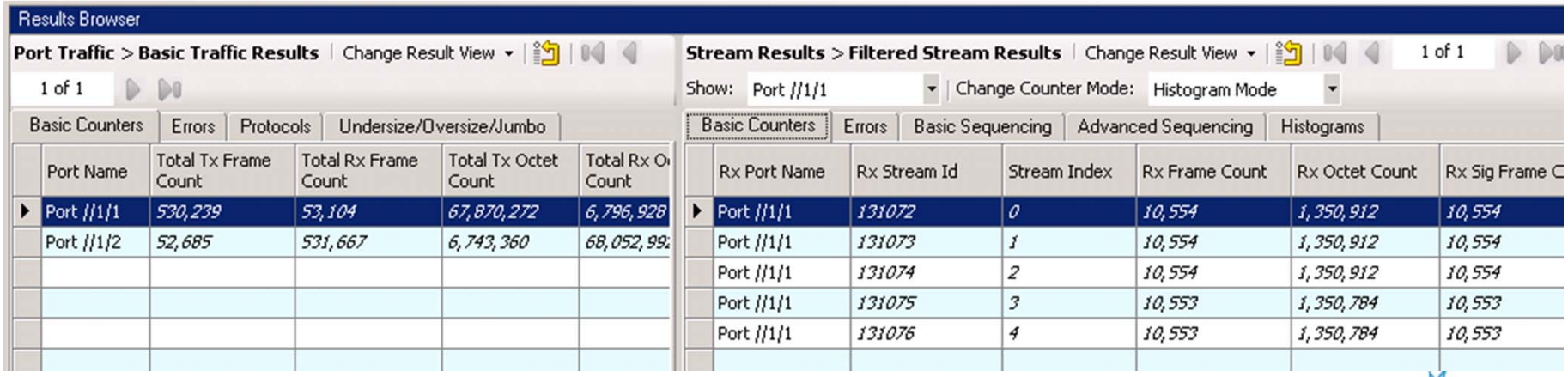
Command Sequencer

- User customizable; used to run batch mode tests
- Sequence steps can also be created using the Wizards



Results Browser Pane

- All real-time results data is displayed in the Results Browser
- There are two Results Browser windows by default
- There are ports-based and stream-based counters
- There are events and rates
- There are dataplane and control plane (CPU) counters
- There are many, many more!



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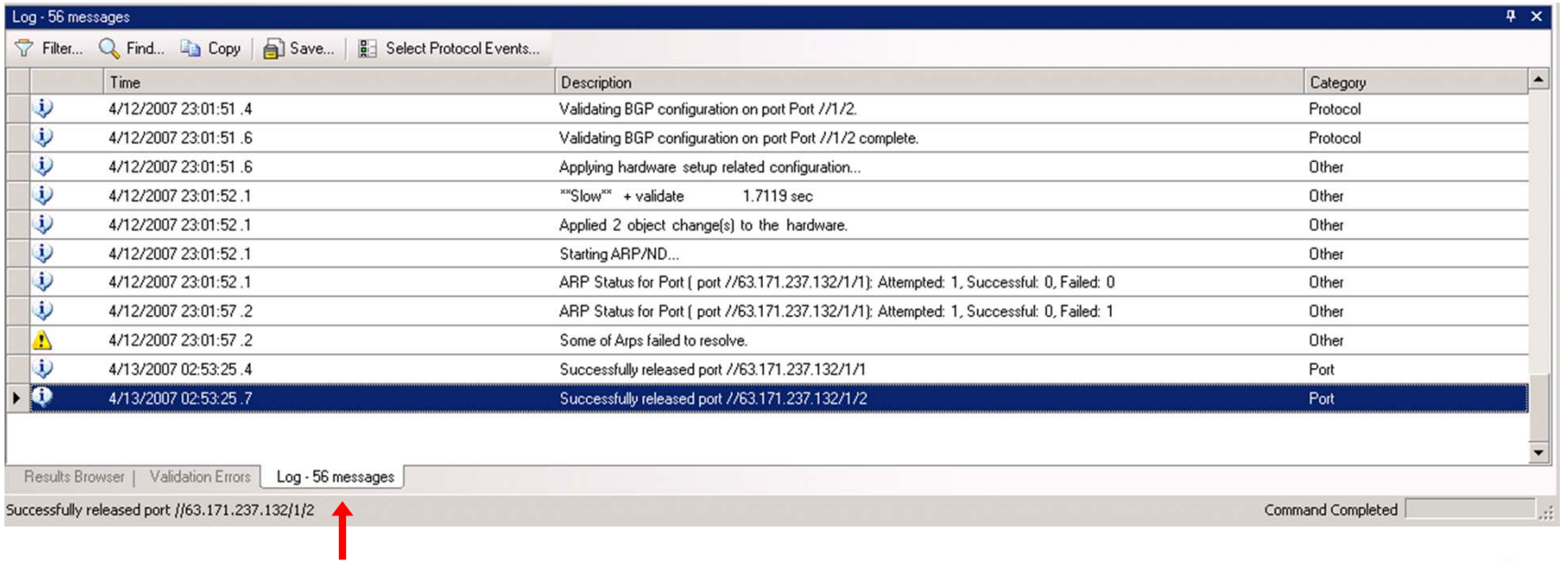
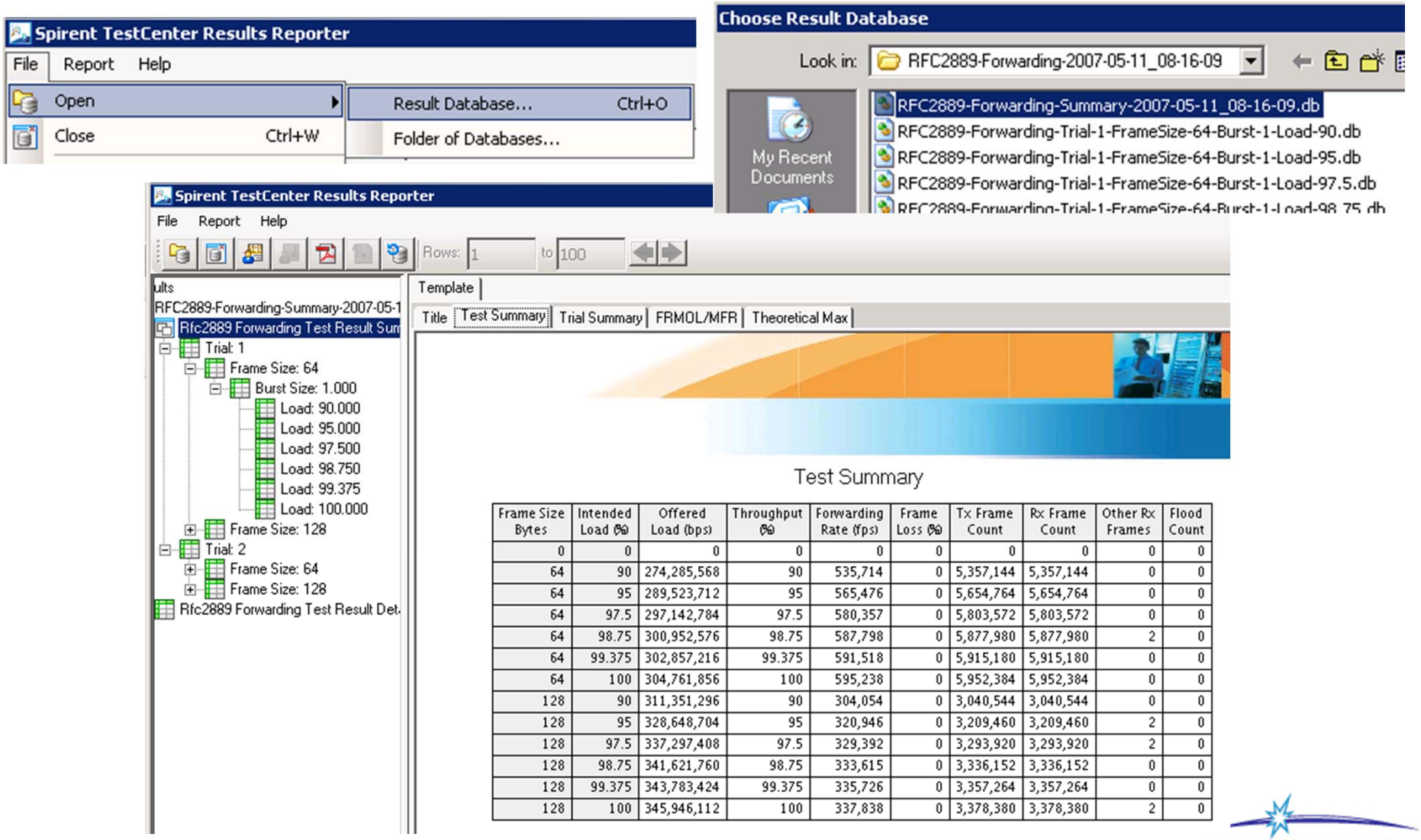
Test Log Pane

- The Event Log is displayed on demand.
- It records both informational and warning messages.
- A row is appended to the Event Log each time it receives a new event.



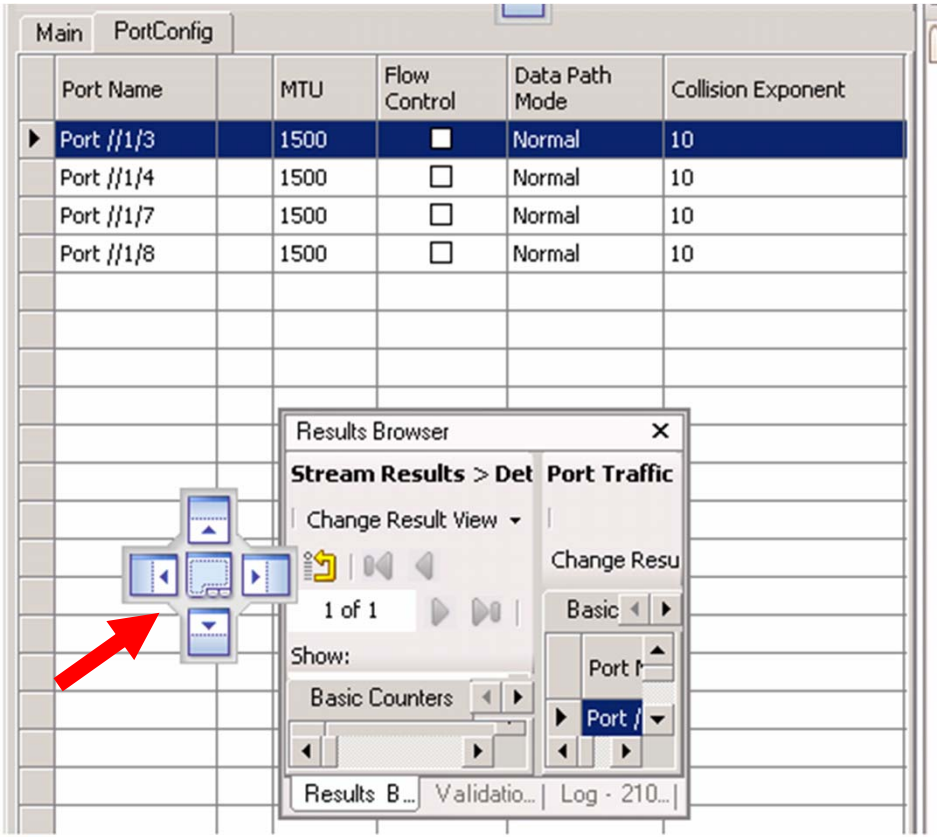
Results Reporter Application

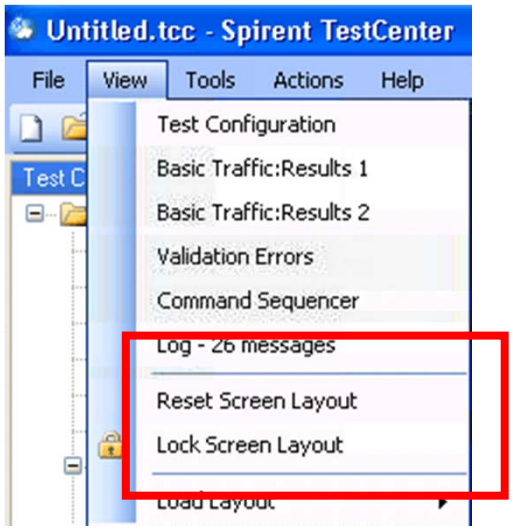


Frame Size Bytes	Intended Load (%)	Offered Load (bps)	Throughput (%)	Forwarding Rate (fps)	Frame Loss (%)	Tx Frame Count	Rx Frame Count	Other Rx Frames	Flood Count
0	0	0	0	0	0	0	0	0	0
64	90	274,285,568	90	535,714	0	5,357,144	5,357,144	0	0
64	95	289,523,712	95	565,476	0	5,654,764	5,654,764	0	0
64	97.5	297,142,784	97.5	580,357	0	5,803,572	5,803,572	0	0
64	98.75	300,952,576	98.75	587,798	0	5,877,980	5,877,980	2	0
64	99.375	302,857,216	99.375	591,518	0	5,915,180	5,915,180	0	0
64	100	304,761,856	100	595,238	0	5,952,384	5,952,384	0	0
128	90	311,351,296	90	304,054	0	3,040,544	3,040,544	0	0
128	95	328,648,704	95	320,946	0	3,209,460	3,209,460	2	0
128	97.5	337,297,408	97.5	329,392	0	3,293,920	3,293,920	2	0
128	98.75	341,621,760	98.75	333,615	0	3,336,152	3,336,152	0	0
128	99.375	343,783,424	99.375	335,726	0	3,357,264	3,357,264	0	0
128	100	345,946,112	100	337,838	0	3,378,380	3,378,380	2	0

Docking Framework

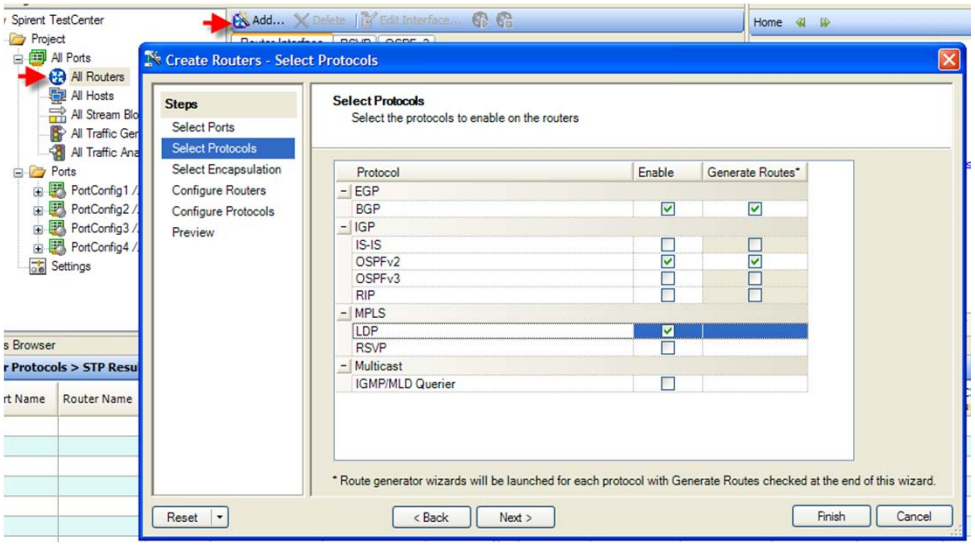
- Flexible layout
  - Window panes or tabs
- Allows docked or floating views
  - Example: you can have a floating results window on a 2nd monitor
- Auto-hide pin
- Can bring back the windows using the View menu



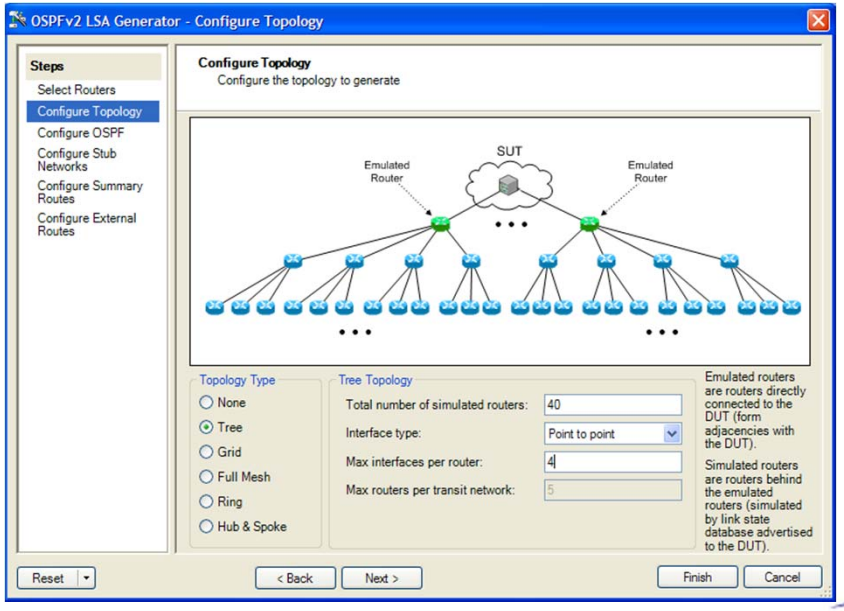


GUI Configuration Tools

Quickly build tens, hundreds or thousands of emulated routers and enable multiple protocols as well as routes to advertise:



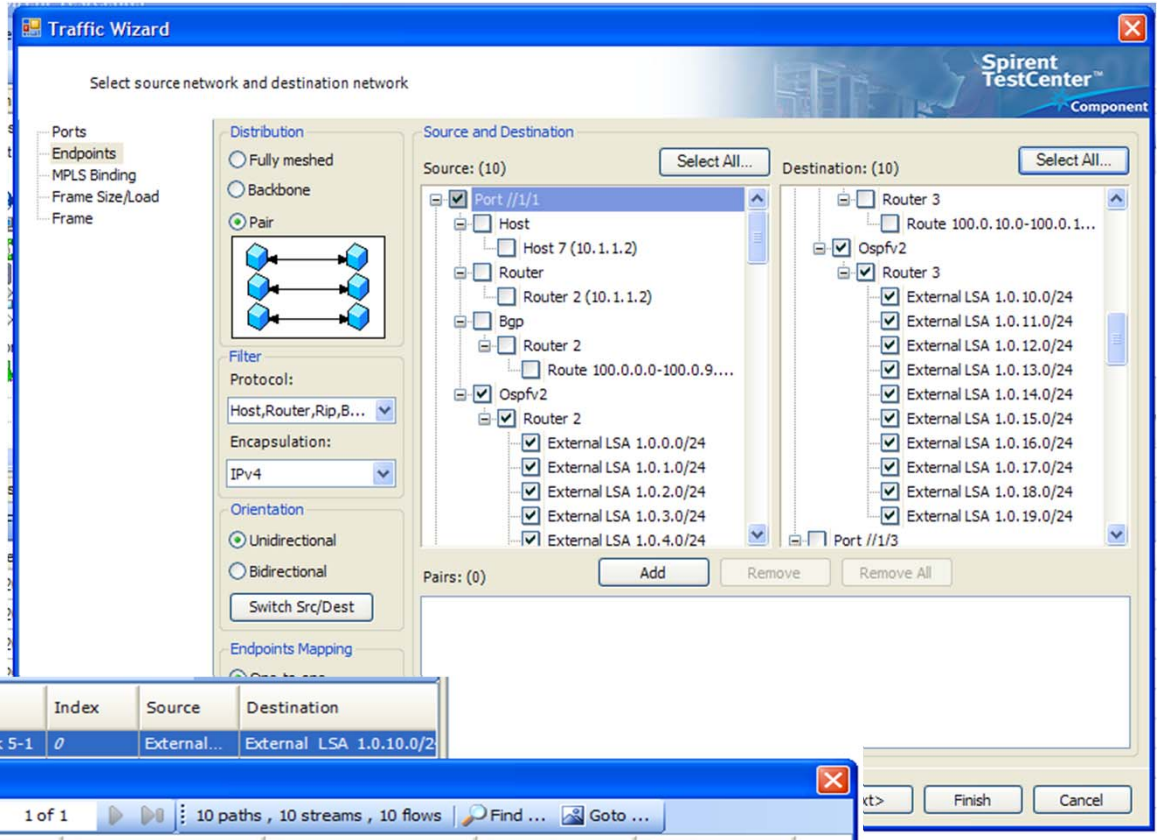
The Route/LSA generators provide ease creation of large, realistic network topologies:



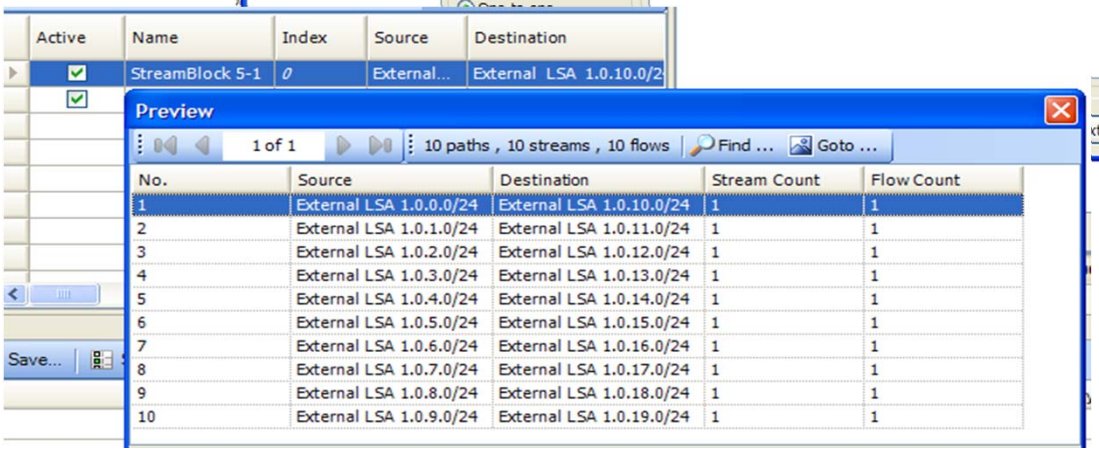
Traffic Wizard

Quickly and easily build traffic to and from routes.

Use the Select All tool to select specific protocols.

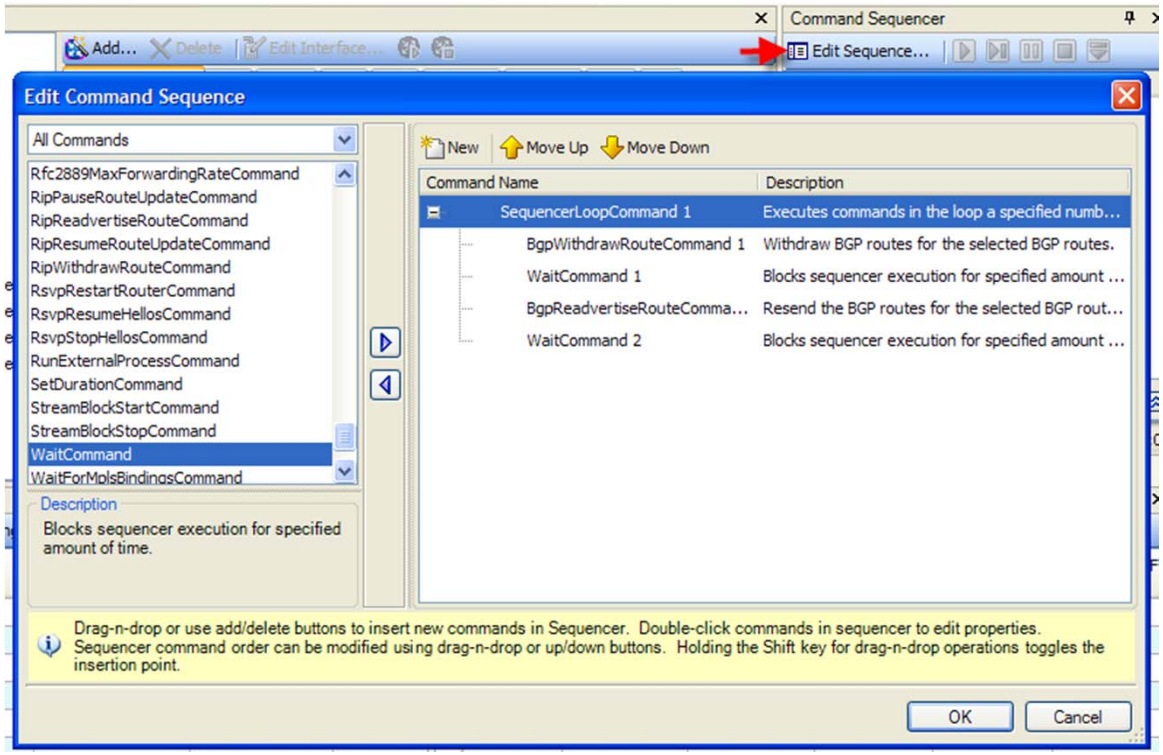


Right-click on the stream blocks created and select Preview to see all streams/flows created:

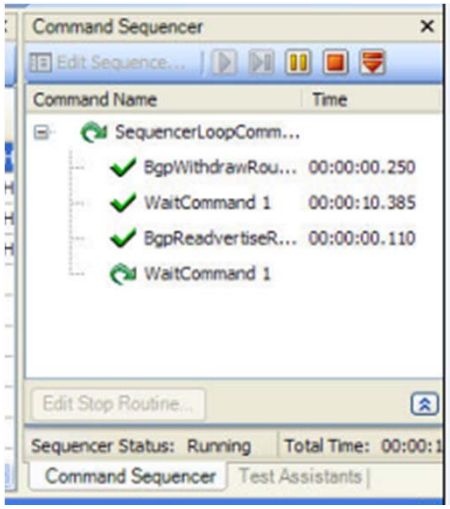


Command Sequencer

The Command Sequencer includes over 130 commands including all protocol, stream, capture and more :



It can be run at any time and shows status and time stamp for each event:



Command Sequencer also includes “Run External Event” command which enables White Box testing to interact with the DUT/SUT during the test.

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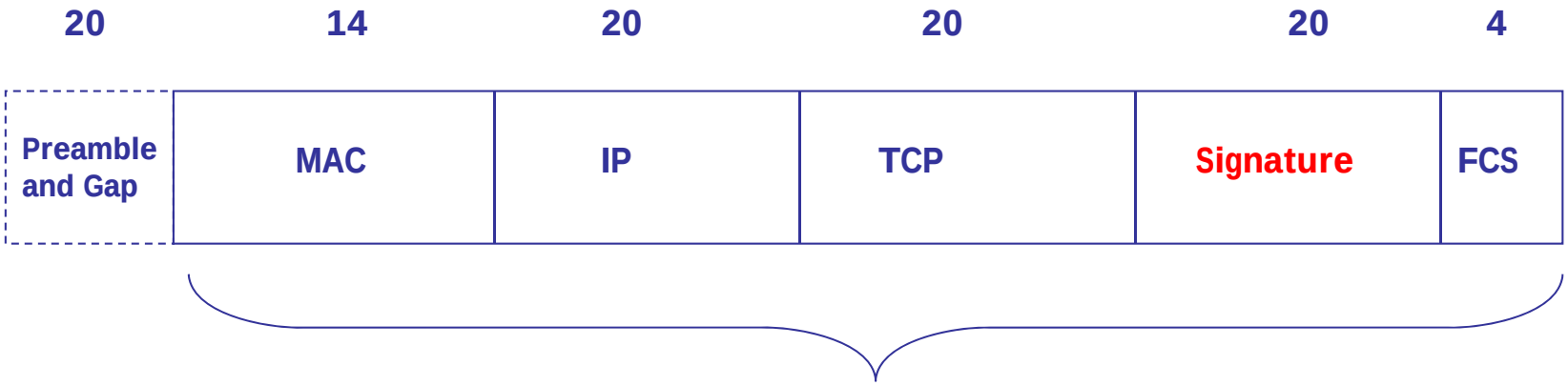
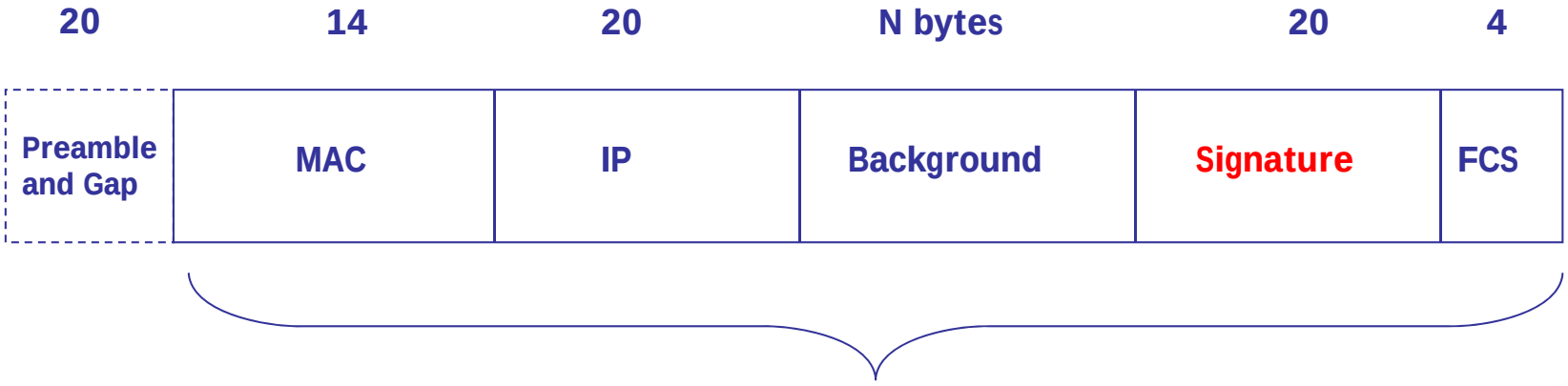
Spirent TestCenter Test Frame

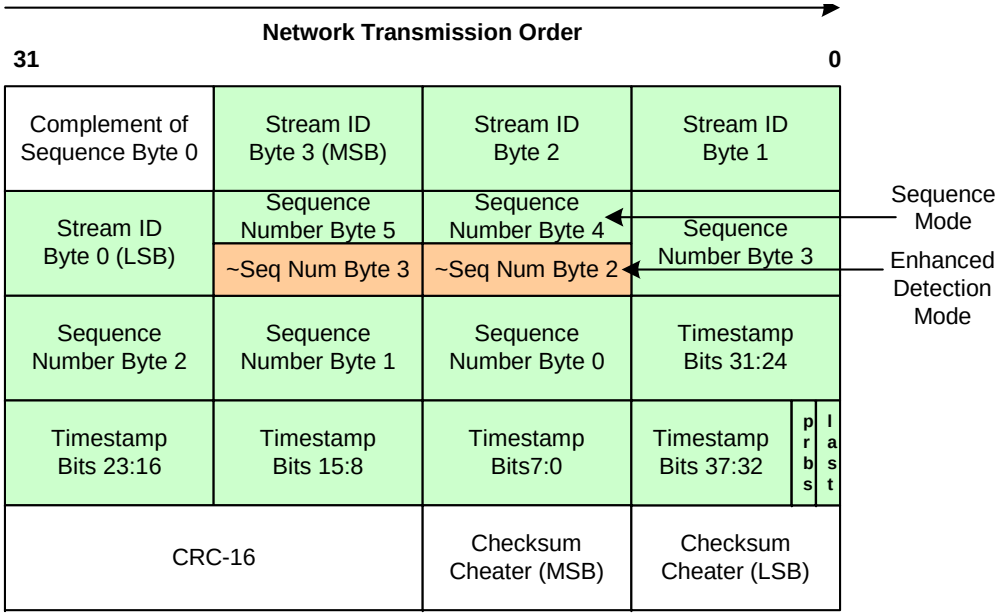


Frame Length = 78 byte minimum with TCP and no PRBS



Frame Length = MAC+IP+N+Signature

The Spirent TestCenter Signature Field



- the Signature is **Scrambled** so not to influence repetitive patterns
- it is **20 bytes** and oriented at the end of the IP Datagram
- it contains 32 bits of **Stream ID** (up to 4 billion test streams possible)
- it has a 10 nanosecond **Timestamp** resolution
- the **PRBS bit** is set when Spirent TestCenter inserts a PRBS 23 pattern in the payload
- the **Last bit** will tell the receiver which byte was time stamped
- it has a built in **UDP/TCP Checksum Cheater** field (for use when modifiers are placed in the payload)

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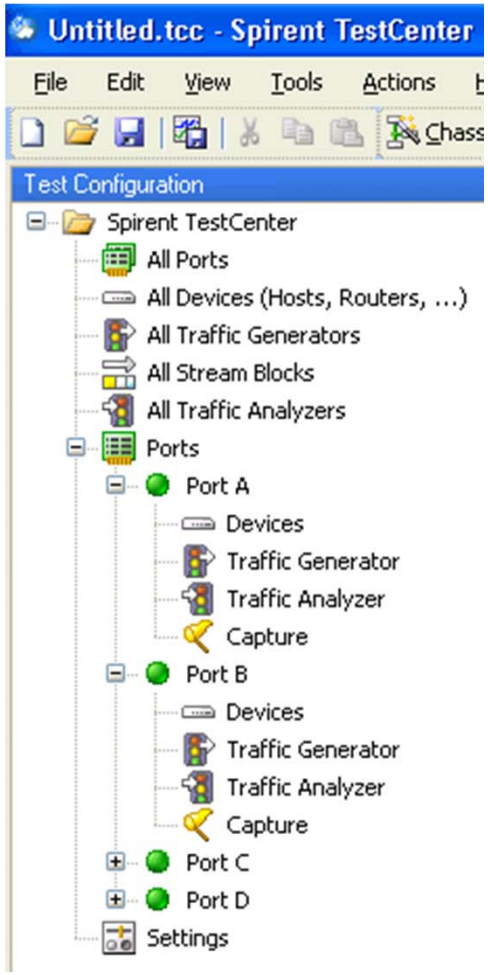
12 Steps to Setup and Run a Test

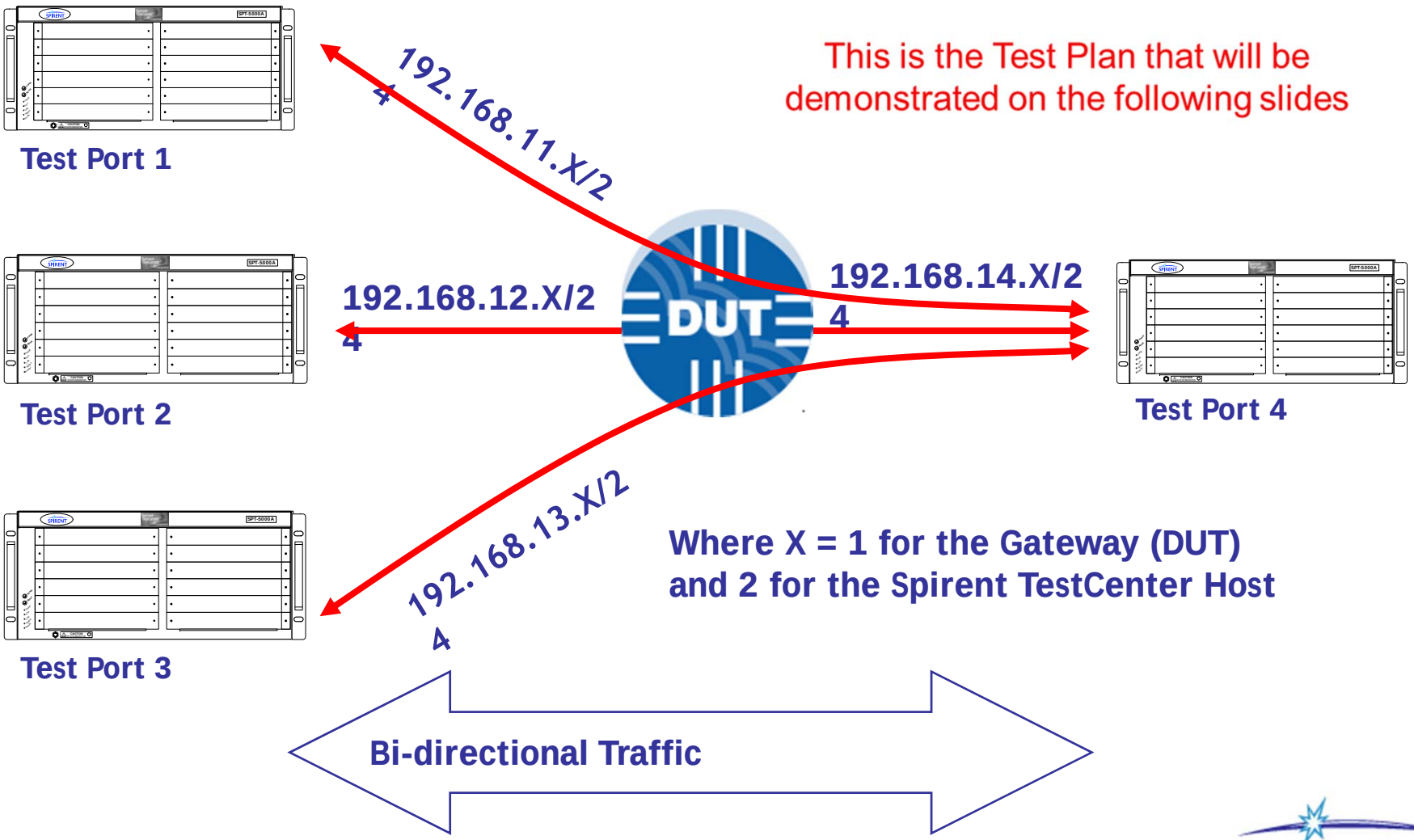
Work your way from the top down on the Test Configuration Tree

1. Configure and connect to the Device/System Under Test (DUT/SUT)
2. Verify that you have IP connectivity to the chassis (your PC)
3. Connect and reserve the test ports (Port Reservation)
4. Configure the physical layer parameters (Ports)
5. Possibly enable network emulation (Devices: Routers)
6. Possibly define the traffic endpoints (Devices: Hosts/Routes/LSPs)
7. Create the traffic and traffic attributes (Stream Blocks: Raw or Bound)
8. Possibly modify transmit properties (Traffic Generator)
9. Possibly modify receive properties (Traffic Analyzer)
10. Possibly setup the test schedule (Command Sequencer)
11. Possibly modify other test parameters (Settings and Tools > Options)
12. Run your test; view and interpret the results (Results Browser)

Only Items 1-4, 7 & 12 are required
Underlined items are related

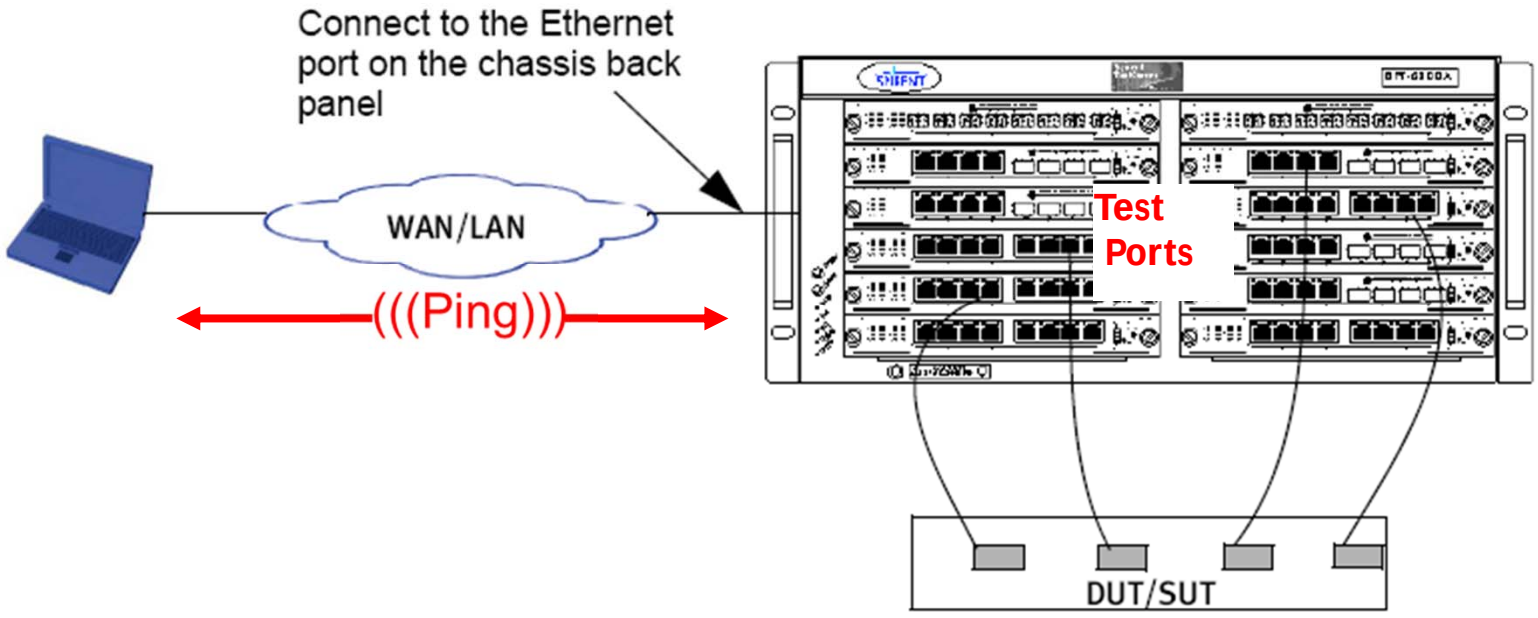


1. Configure and connect to the DUT/SUT



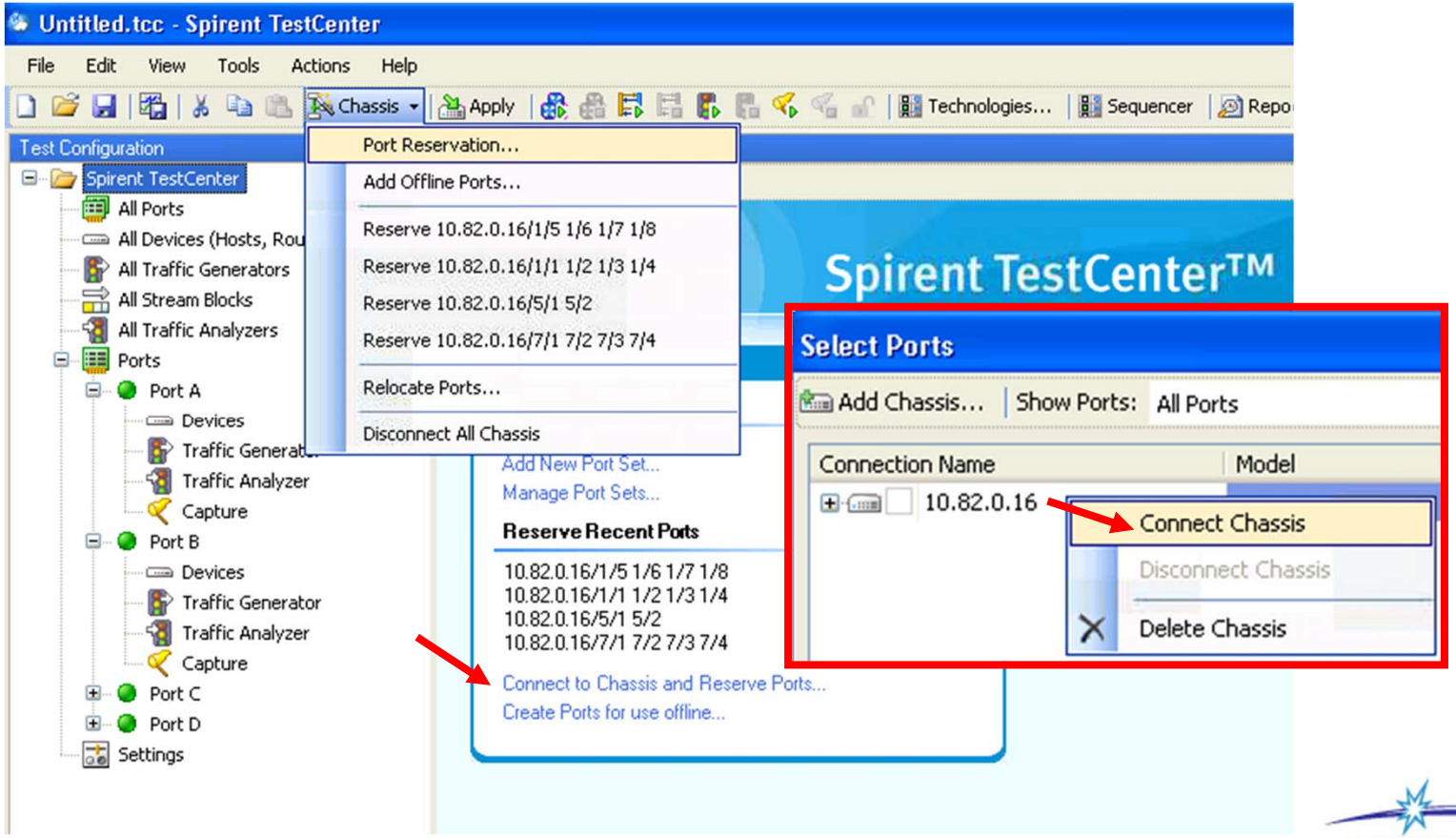
2. Verify IP Connectivity

- Your PC runs the "Spirent TestCenter Application" and connects out-of-band to the chassis' management port.

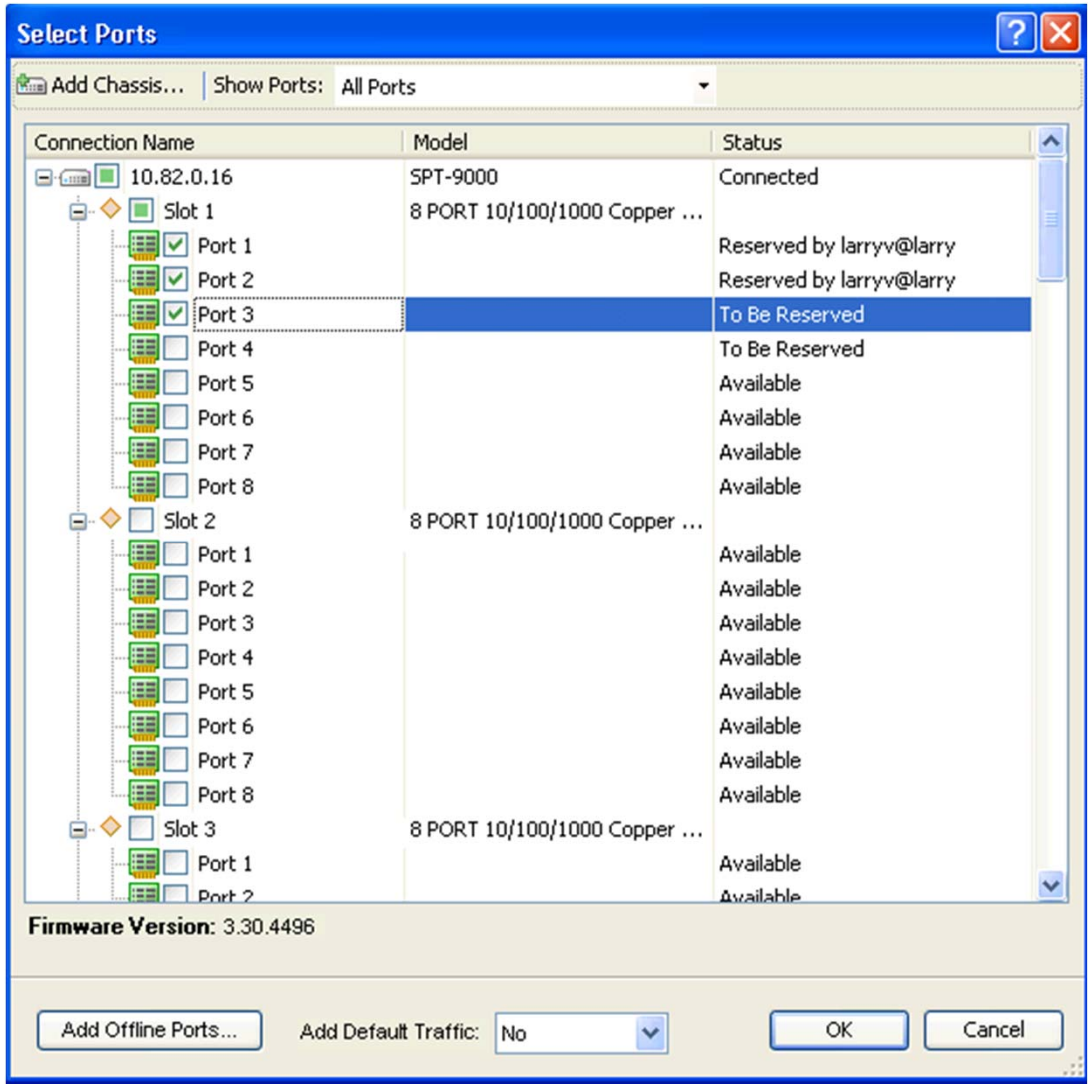


3a. Connect to the Chassis

- In the Select Ports window, right-click and select Connect Chassis
- This can also be done by expanding the + sign under Connection Name column for the corresponding IP address



3b. Reserve the Ports



- After connecting to Chassis, select the ports which are to be used.
- Ports are reserved in multiples of two unless it is a 10GigE port or a HM CM module*

*Optional with 3.40

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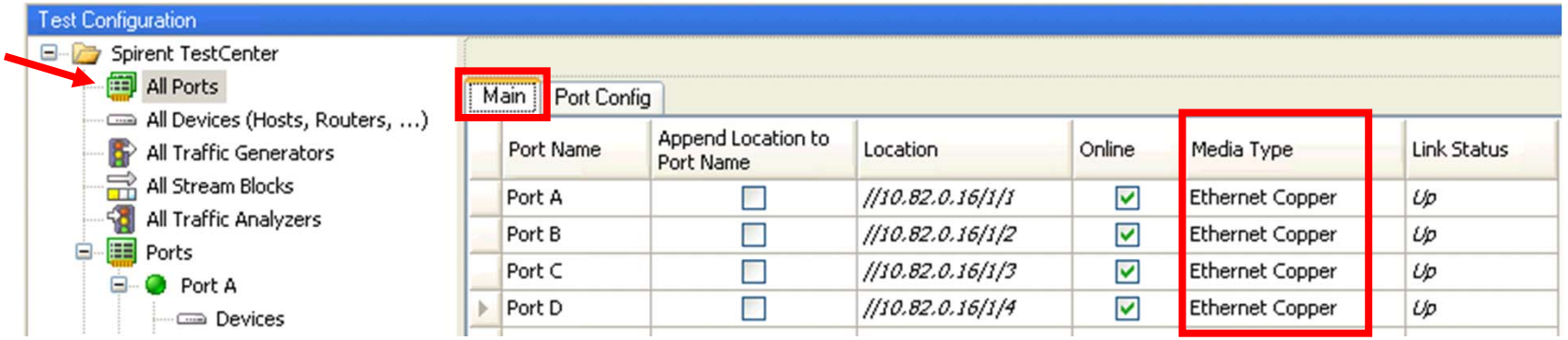
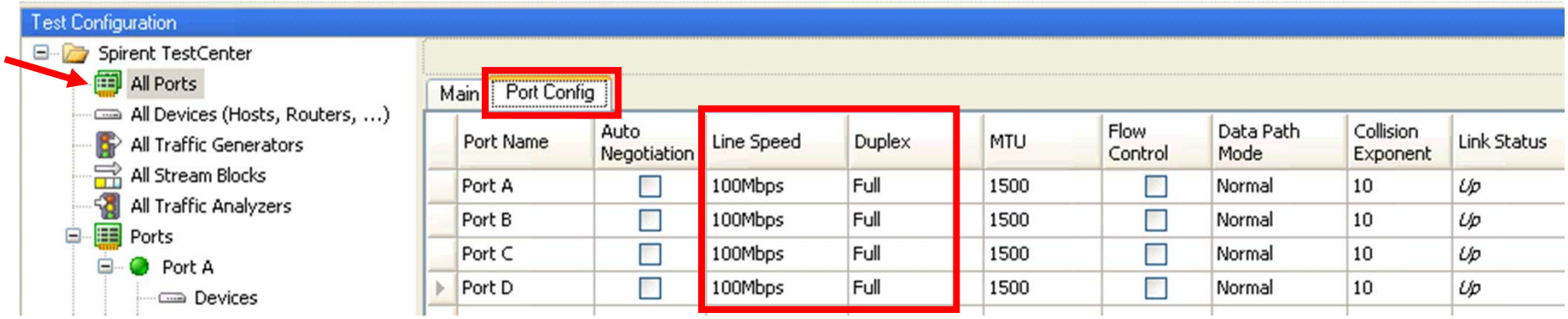
4. Configure the Physical Layer Properties

- Example shows setting 4 ports to copper and 100M full duplex.

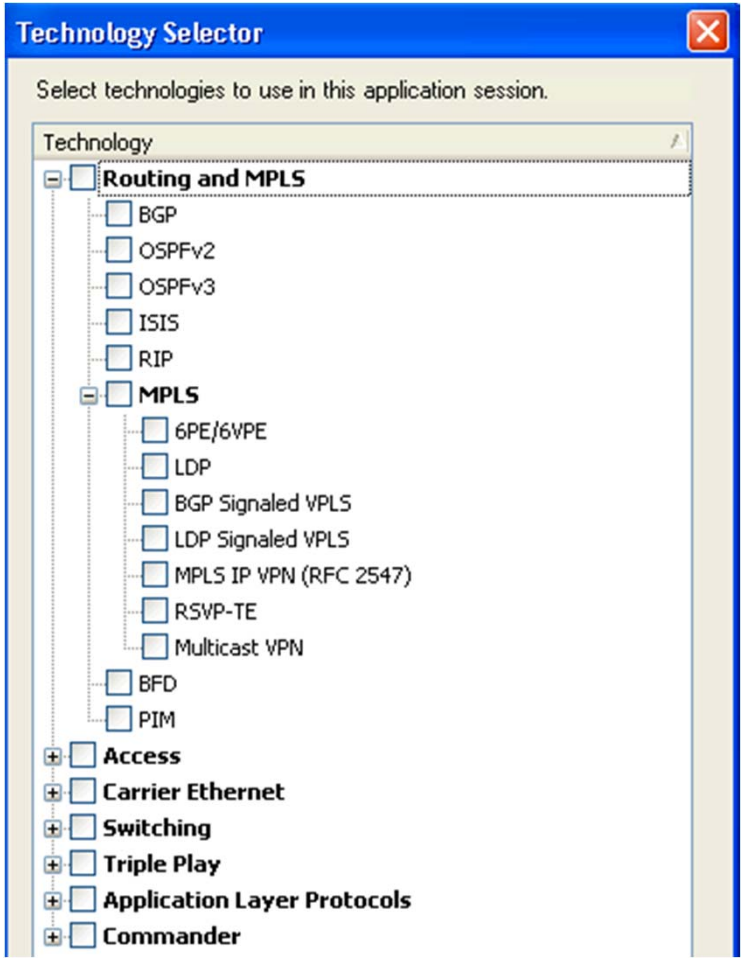




5. Enable Network Emulation if Required

- Since we are using static addresses and directly connected interfaces for this example, no other emulation is required.

ARP/ND and Ping will still be enabled by default



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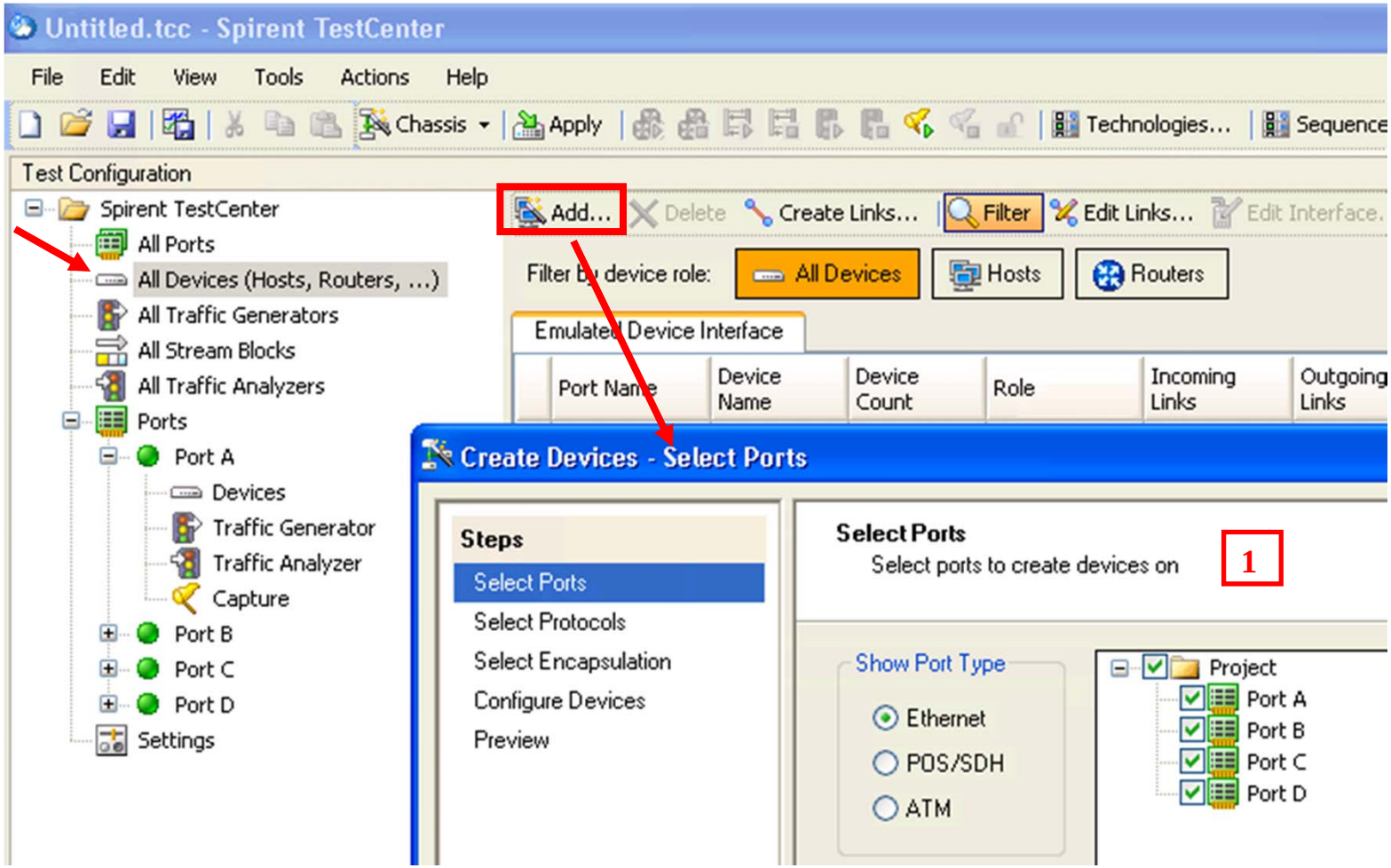
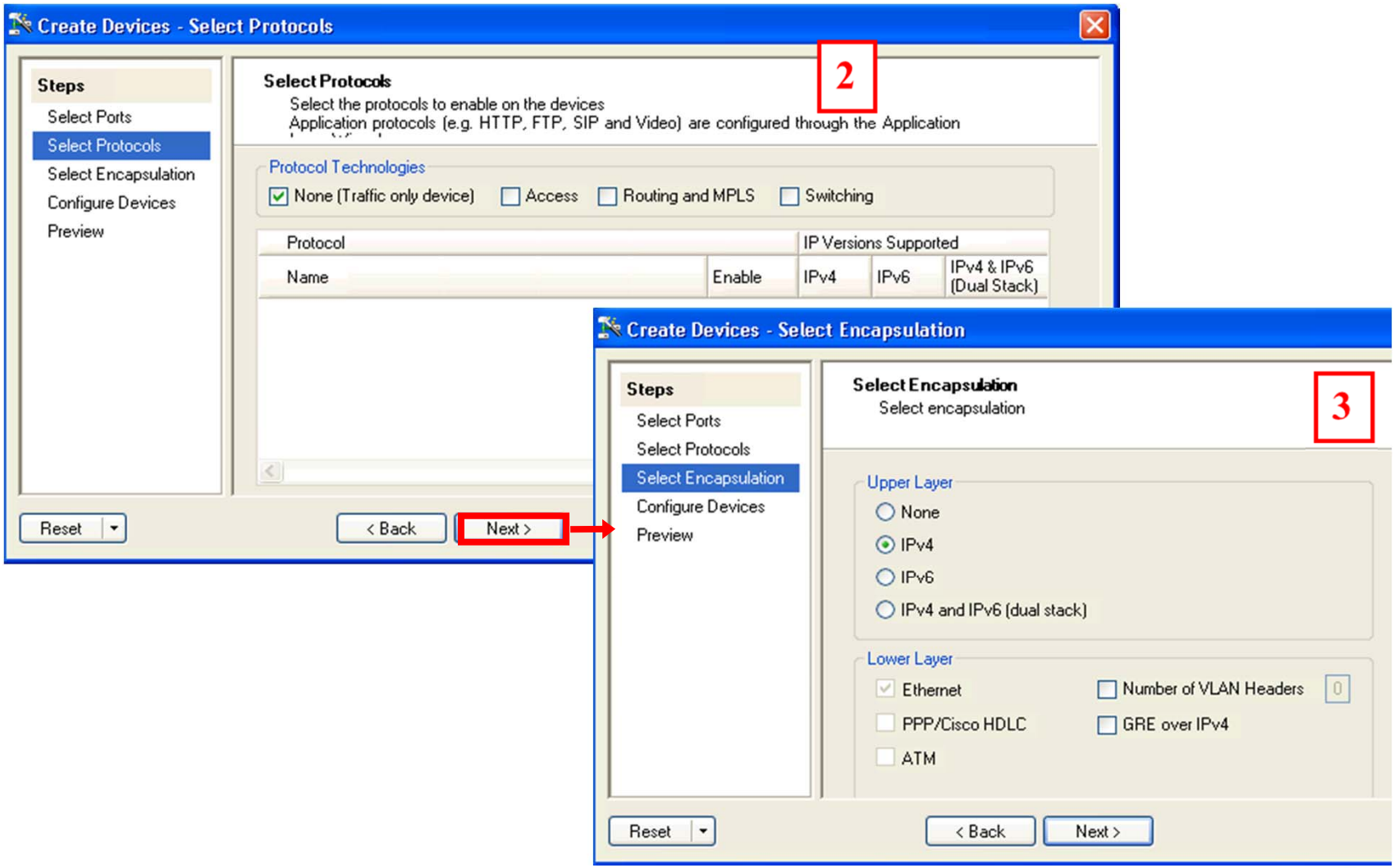
6a. Define the Traffic End Points

- Add Devices using the Create Devices Wizard: Step 1

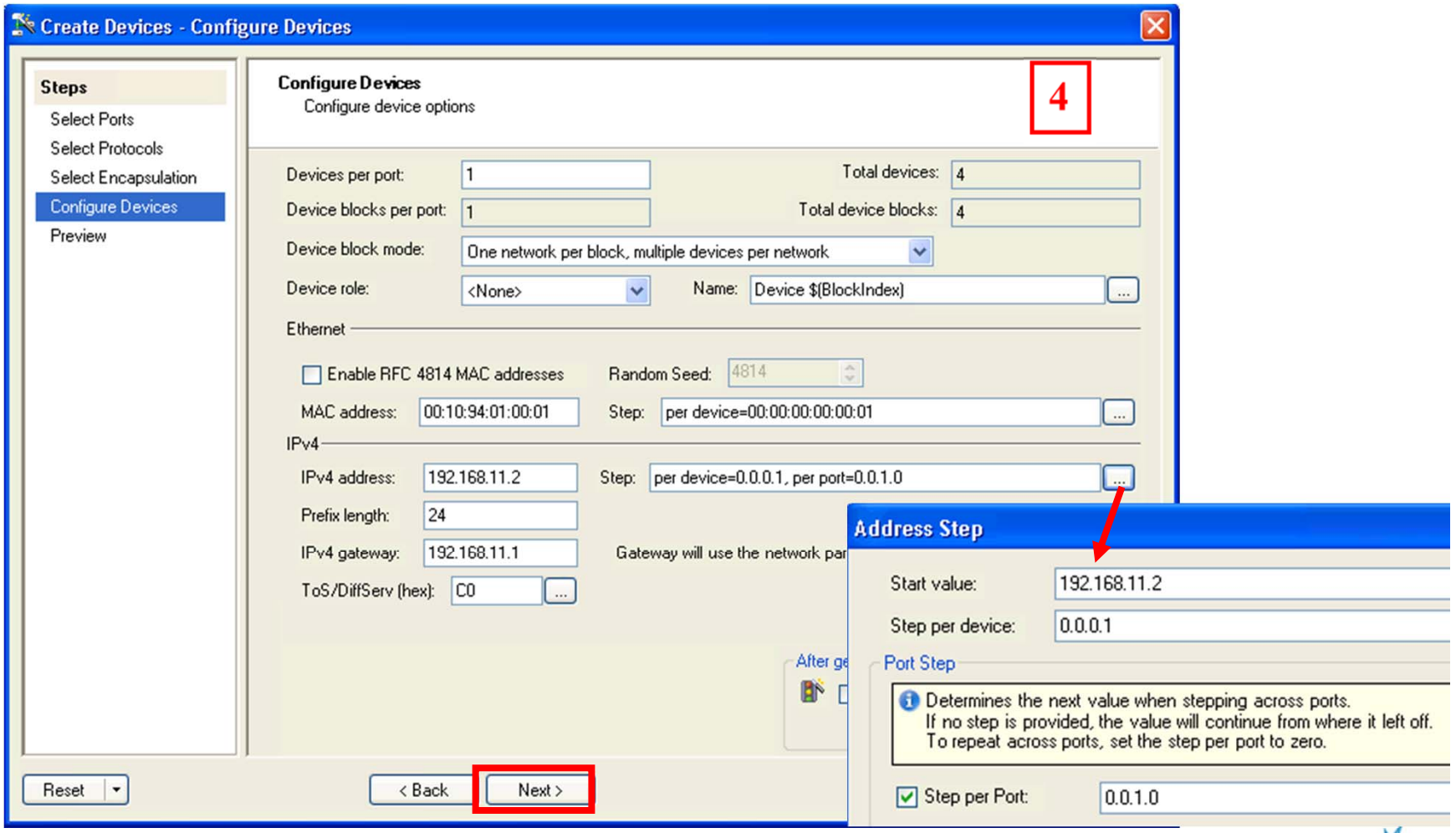


6b. Creating the Devices - Wizard Step 2 & 3



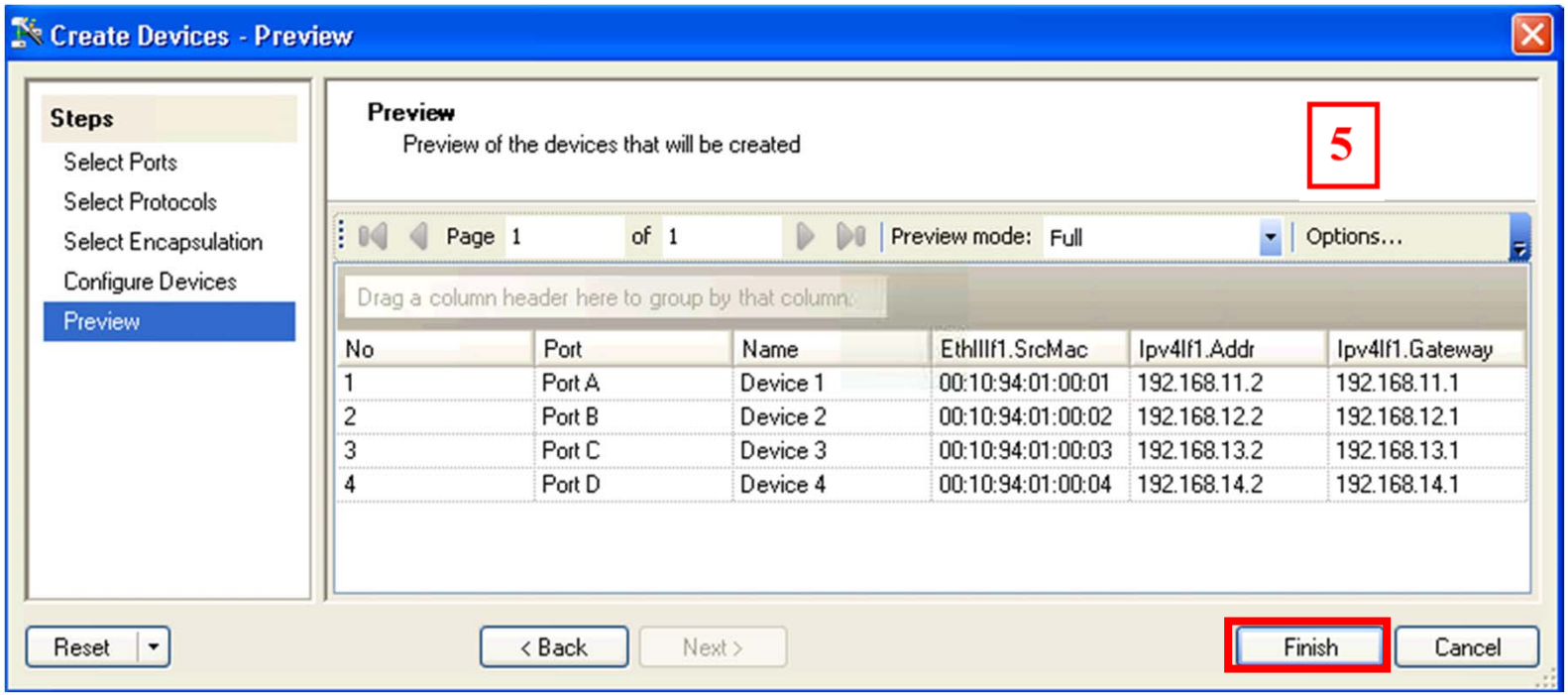
6c. Creating the Devices - Wizard Step 4

- Configure MAC and IP/Gateway addresses for the Devices.



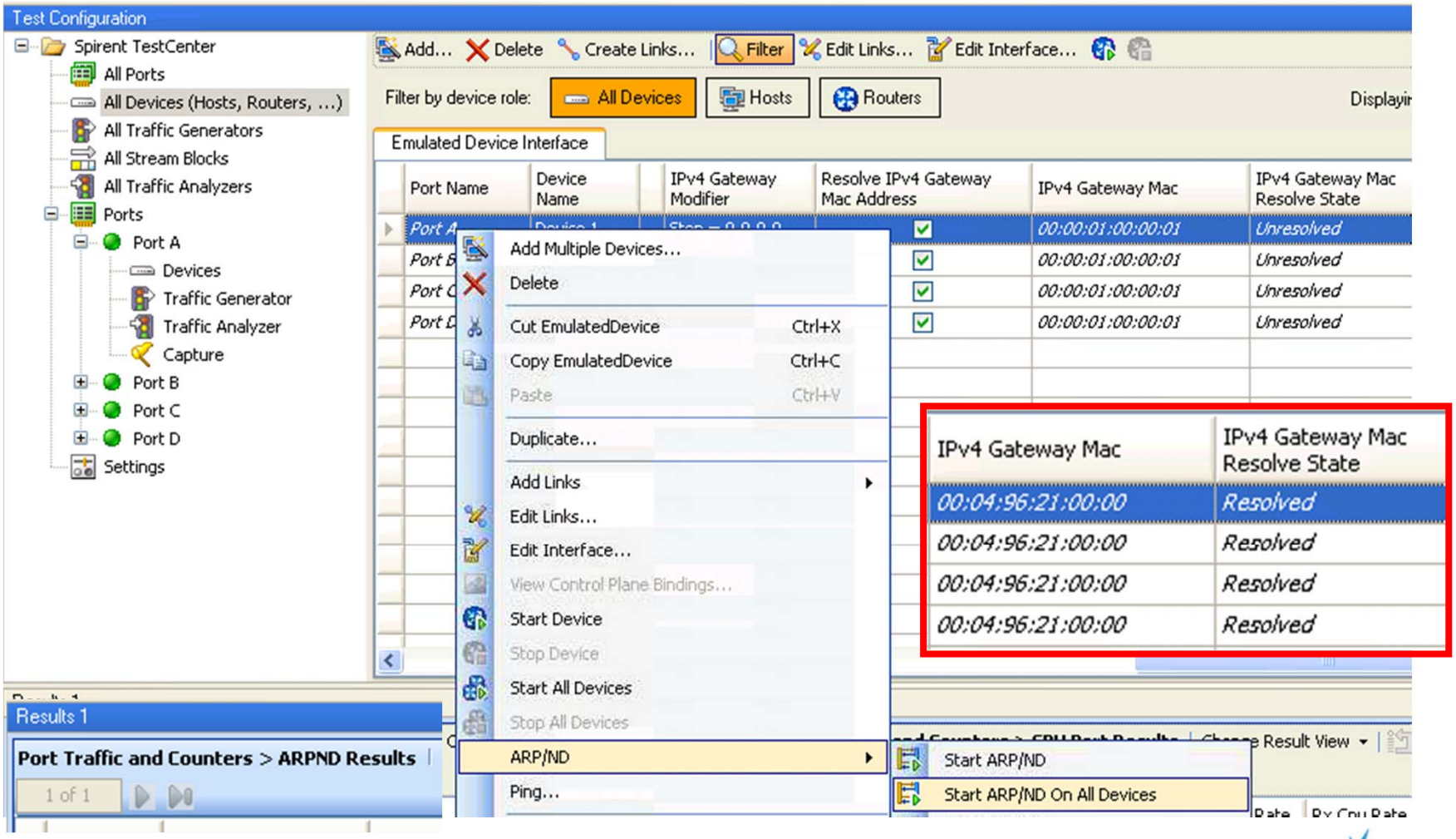
6d. Creating the Devices - Wizard Step 5

- Preview of the Devices that will be created.



6e. Resolve the Gateway's MAC Address

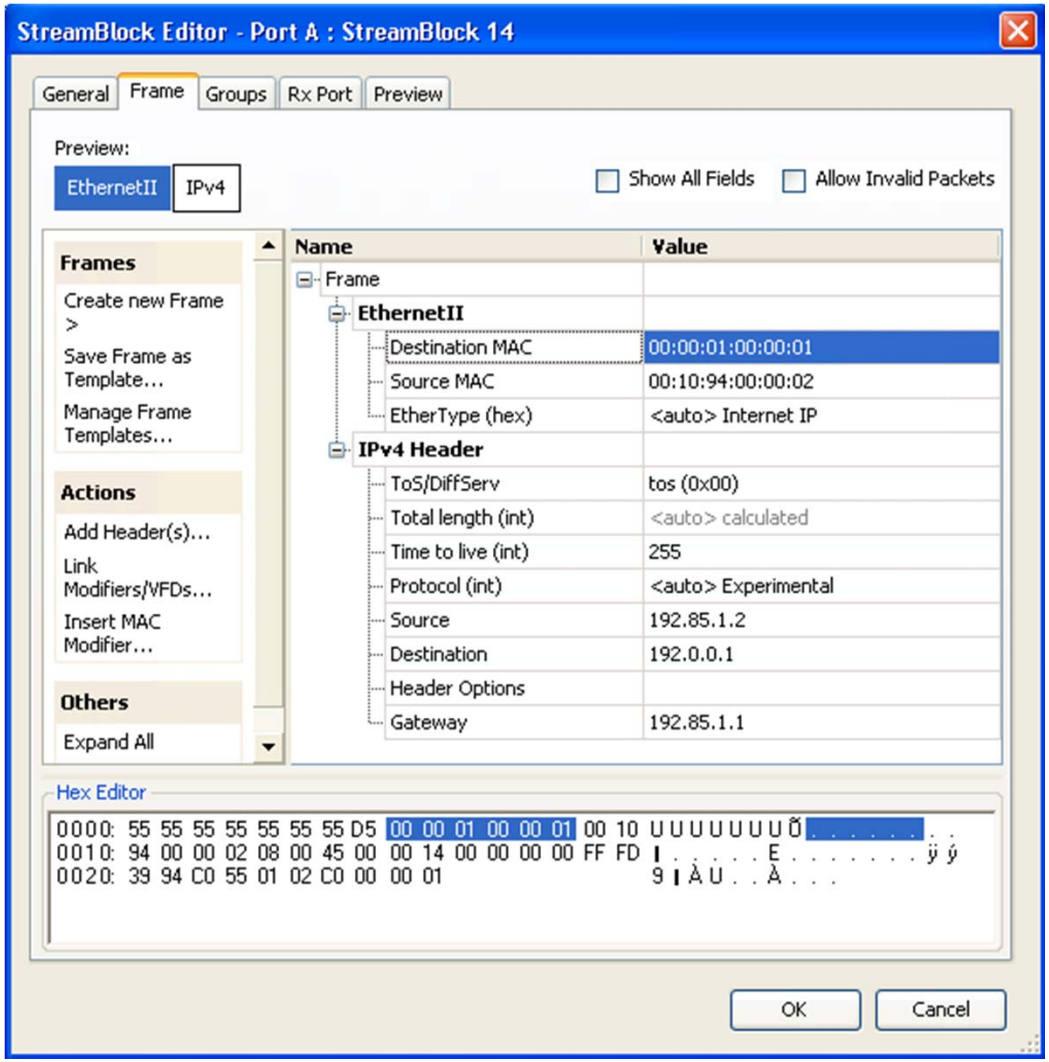
- Right-click on a Device(s) and select ARP/ND



7. Traffic using Raw Stream Blocks

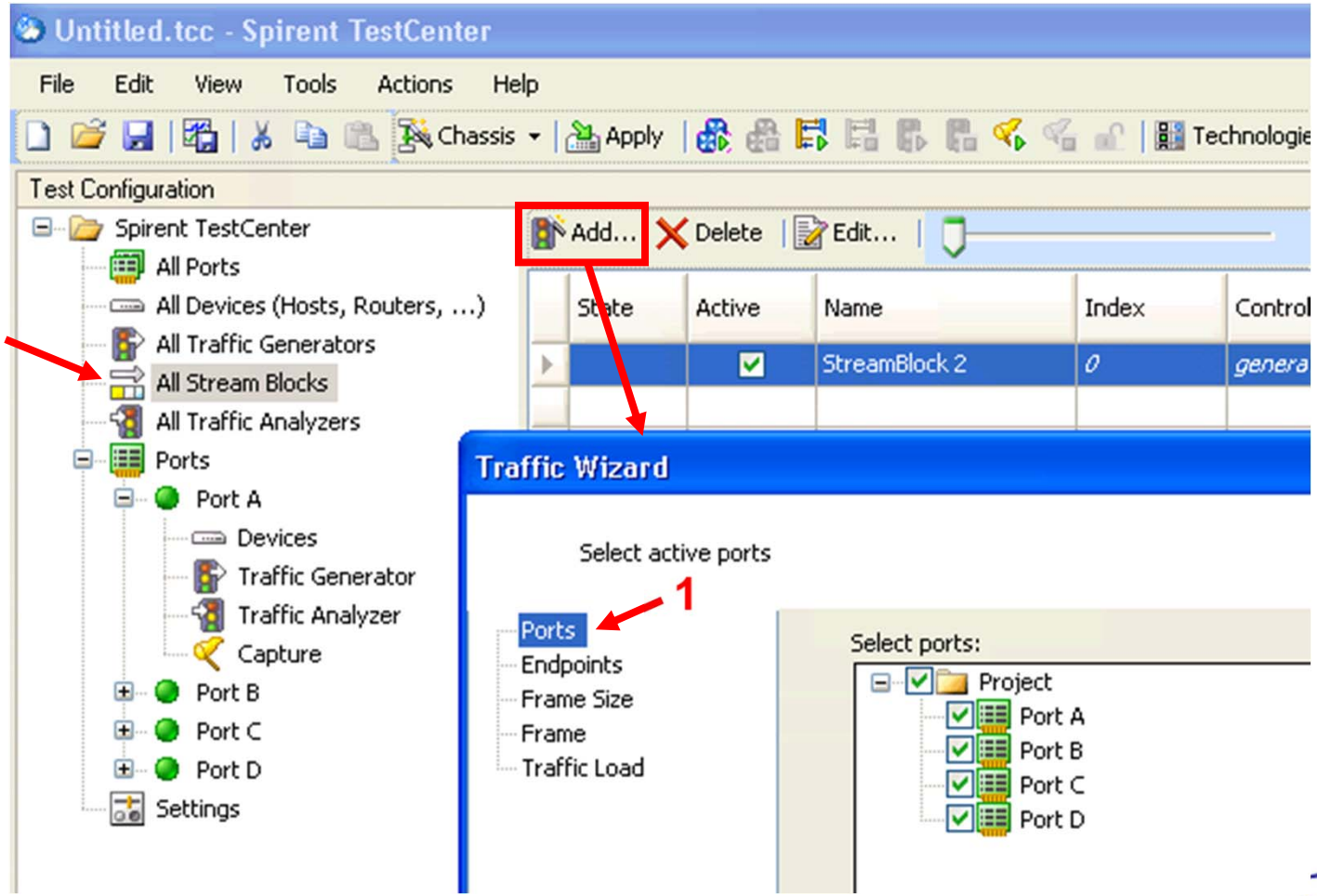
- A way to build custom traffic
- No direct concept of endpoints
- Still supports ARP
- Has other Stream Block concepts:
  - Frames Sizes*
  - Payload Definition*
  - Traffic Mode and Load*
  - Specific Receive (Rx) Port(s)

*General tab

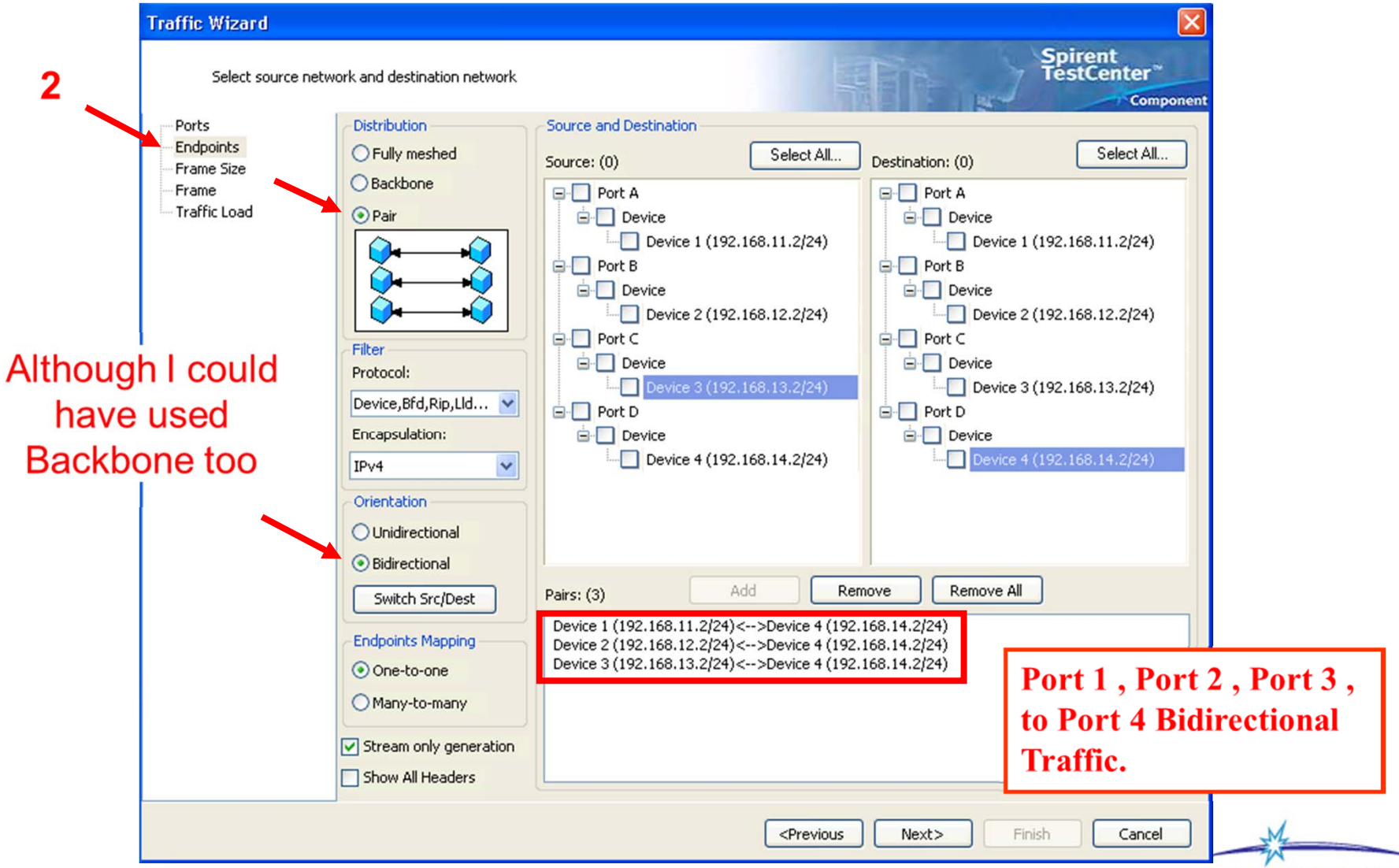


7a. Traffic Wizard Step 1

- Or access the Traffic Wizard to create Bound Stream Blocks

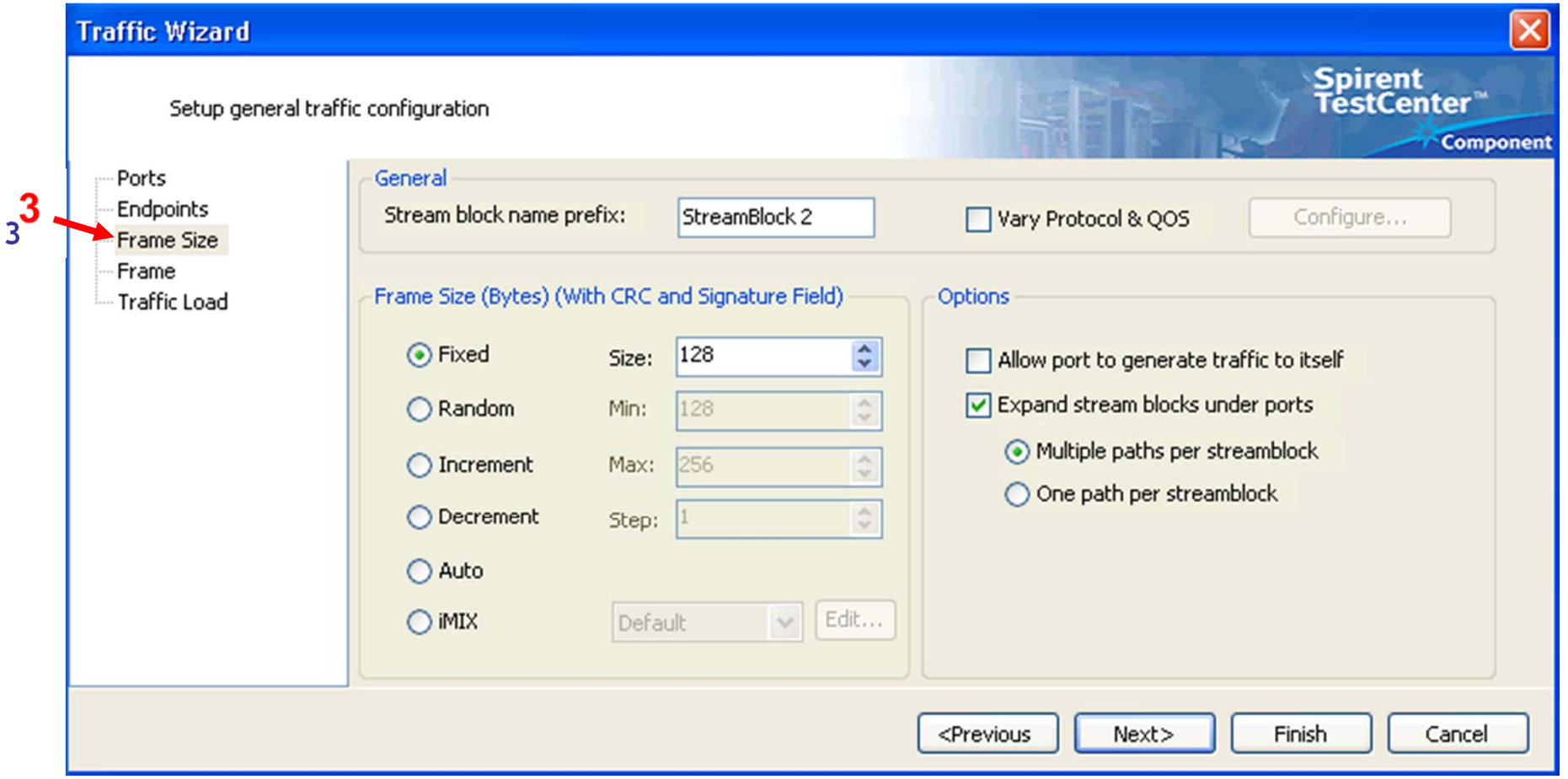


7b. Traffic Wizard Step 2



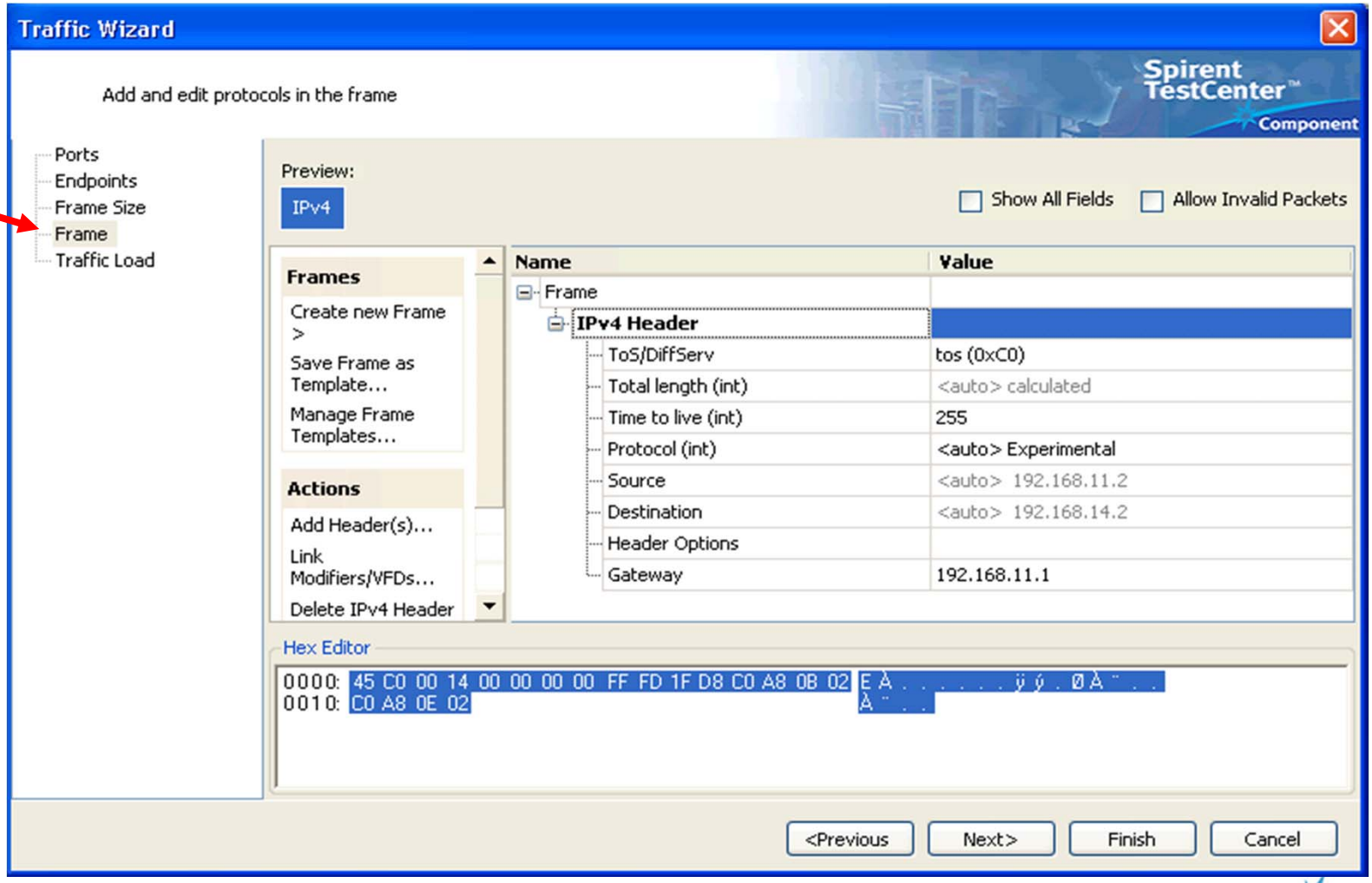
7c. Traffic Wizard Step 3

- Configure the Stream Block name, Options, and Frame Size



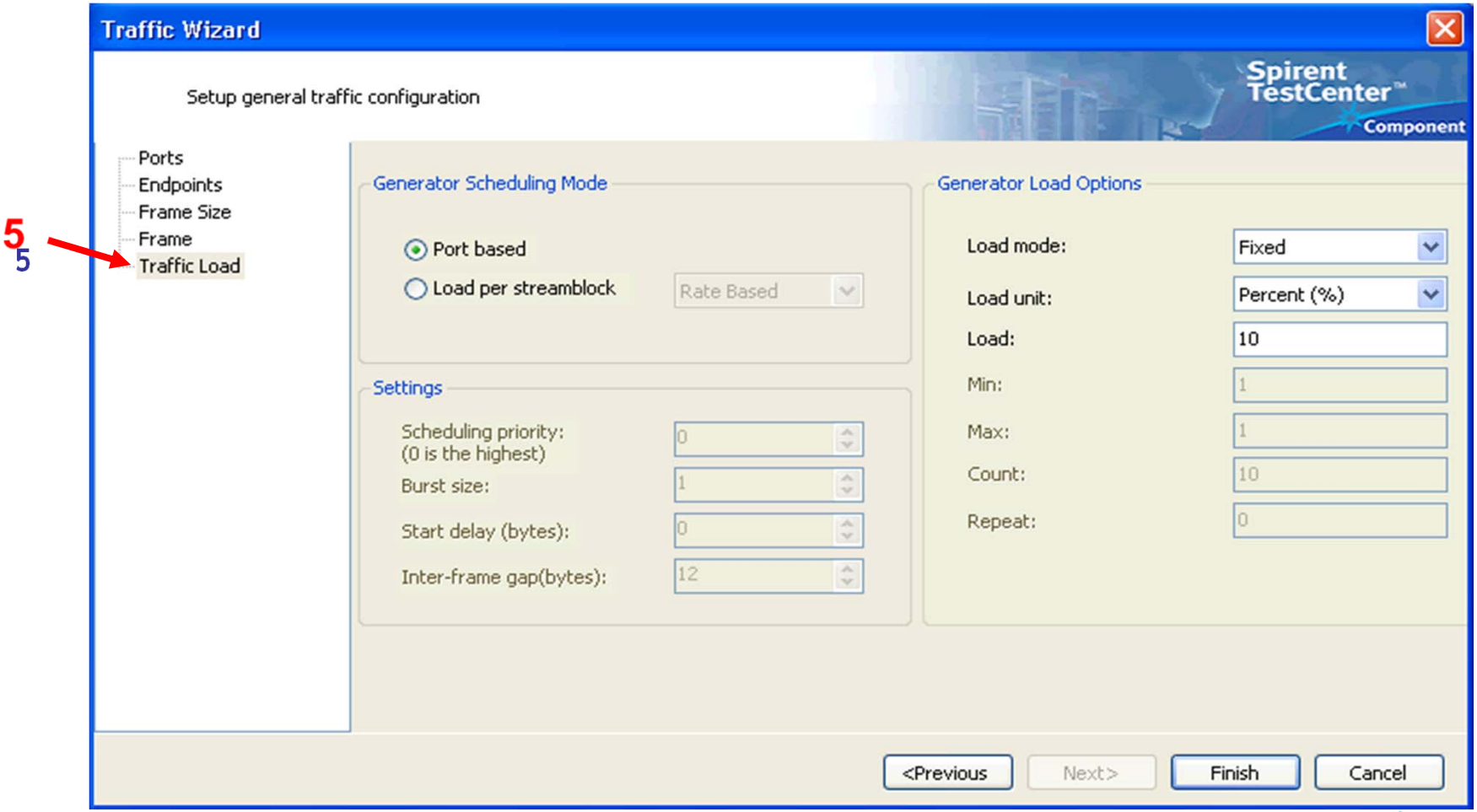
7d. Traffic Wizard Step 4

- Configure the Frame template; optional



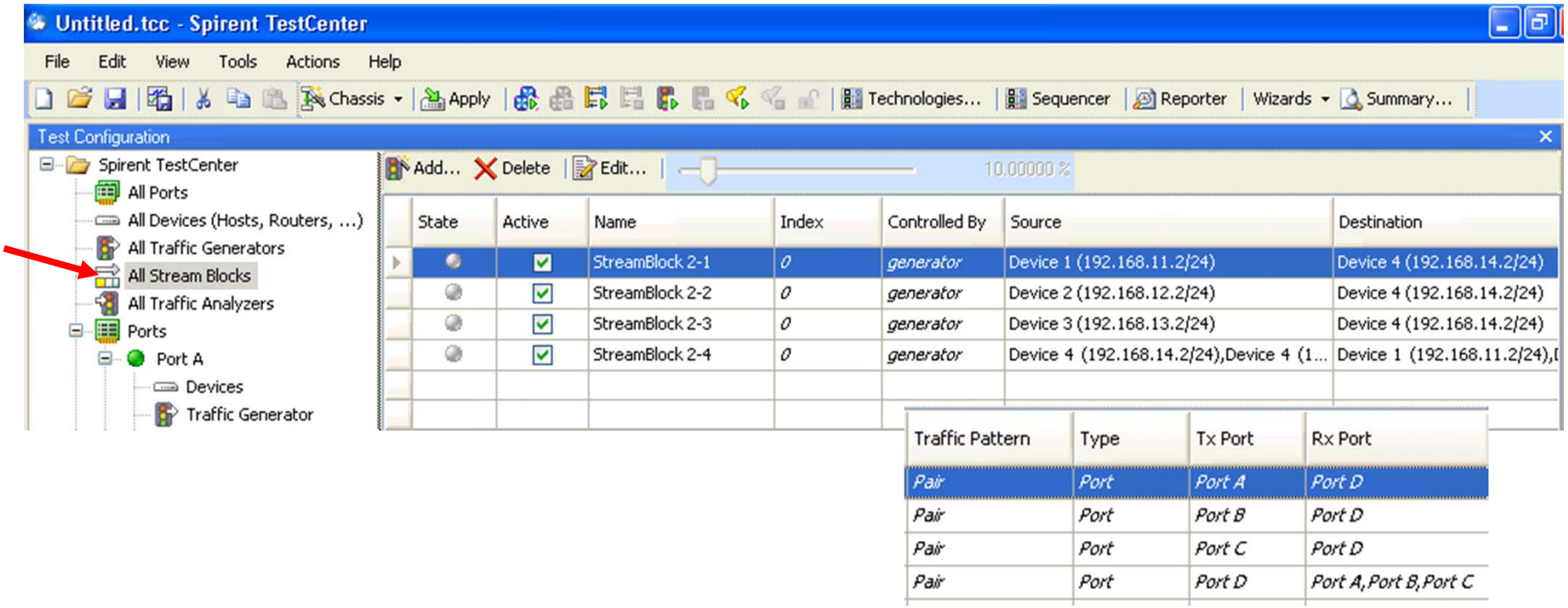
7e. Traffic Wizard Step 5

- Configure the Traffic Load options



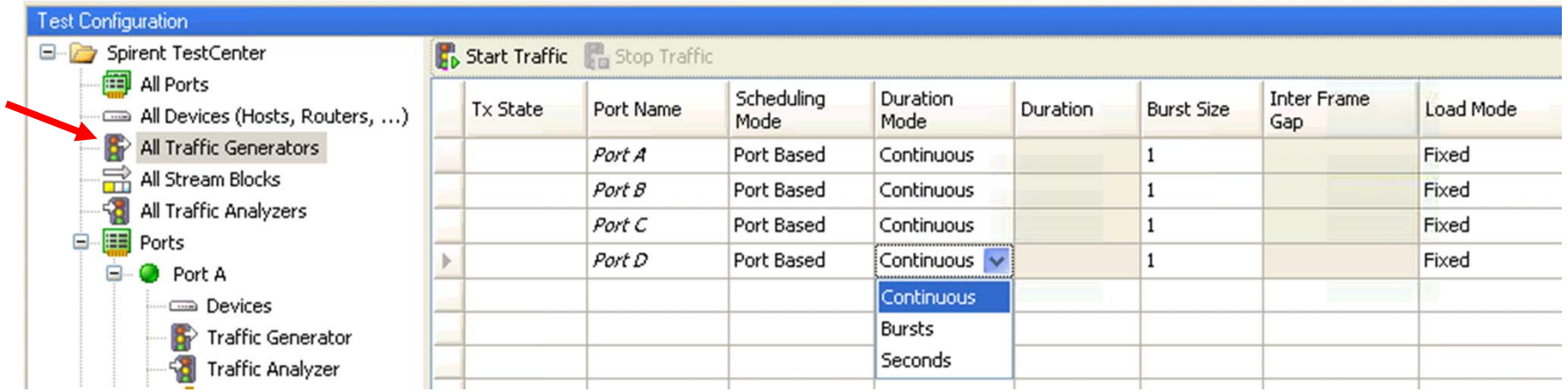
7f. Traffic Wizard Result

- Bound Stream Blocks from the All Stream Blocks view
- See Source and Destination endpoints; and specific Tx/Rx Ports



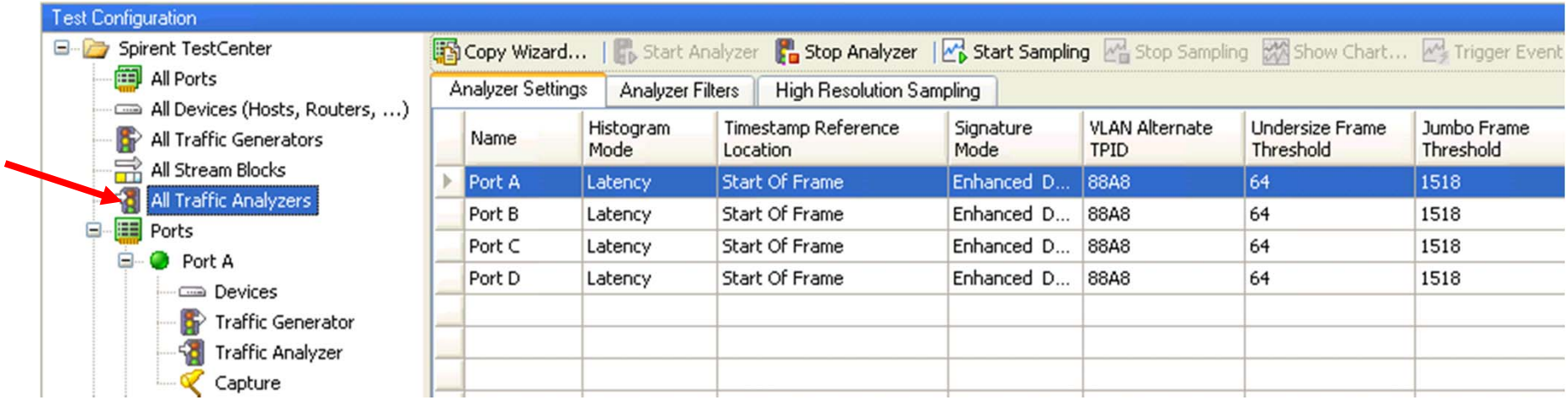
8. Possibly Modify Transmit Properties

- Not necessary for this example



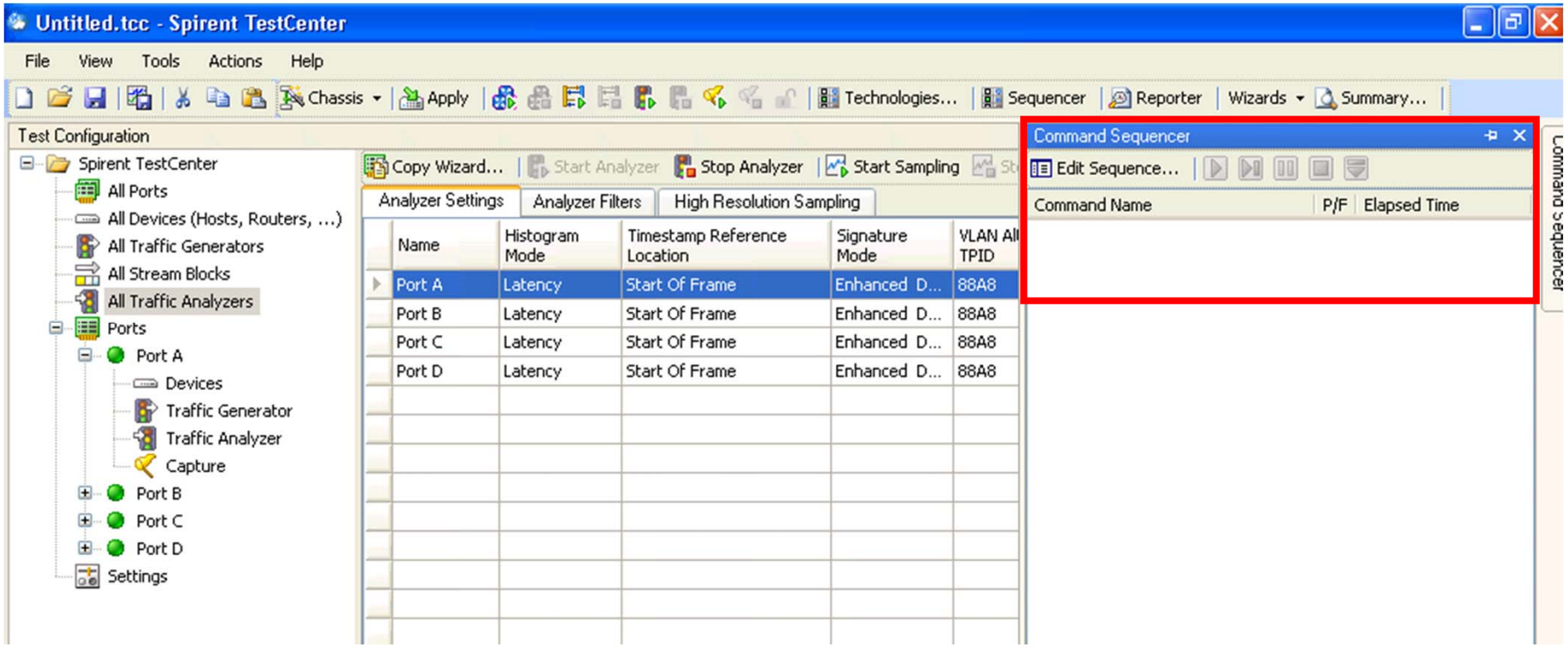
9. Possibly Modify Receive Properties

- Not necessary for this example



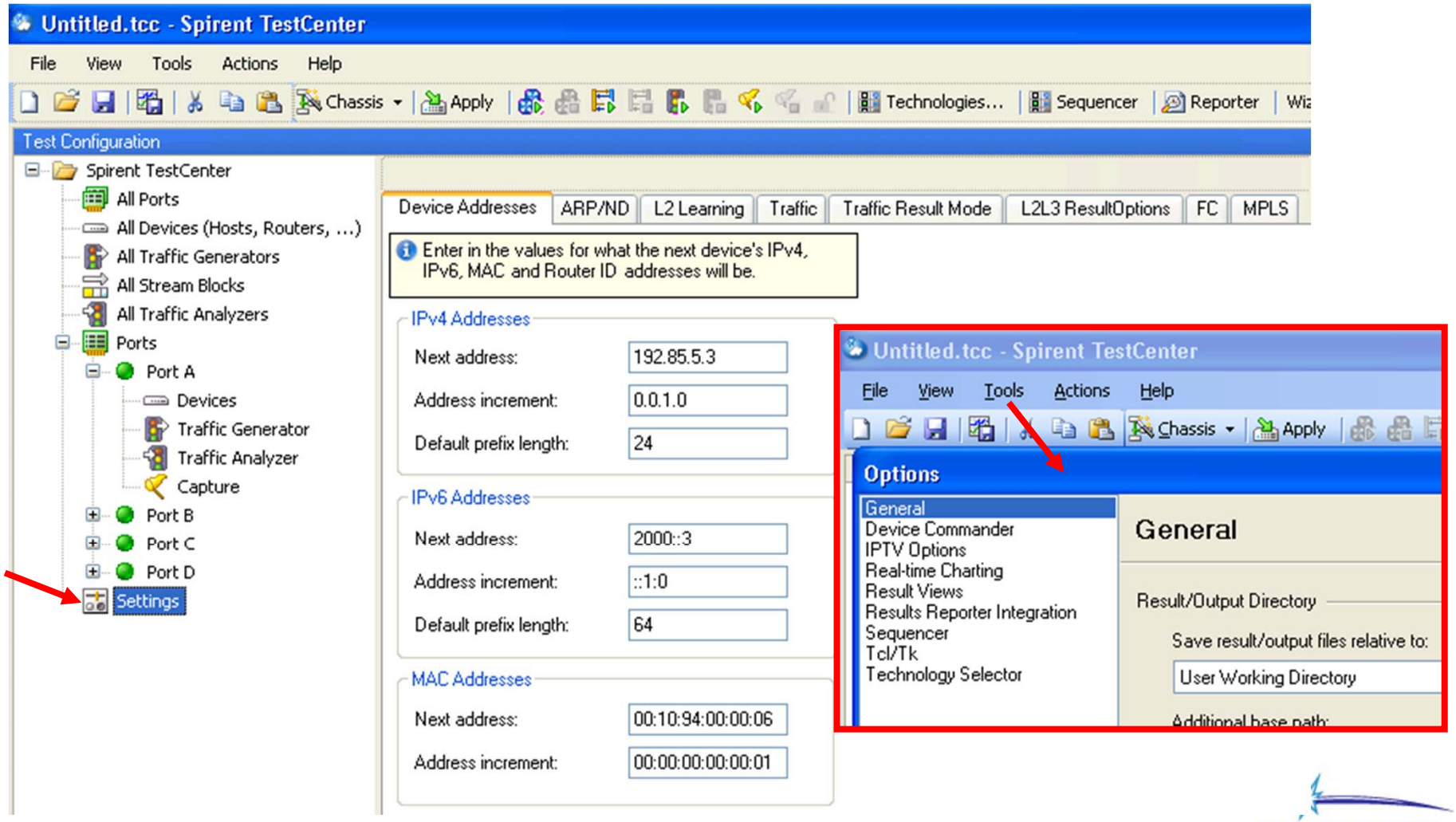
10. Possibly Setup the Test Schedule

- Not necessary for this example since we will run the test interactively.



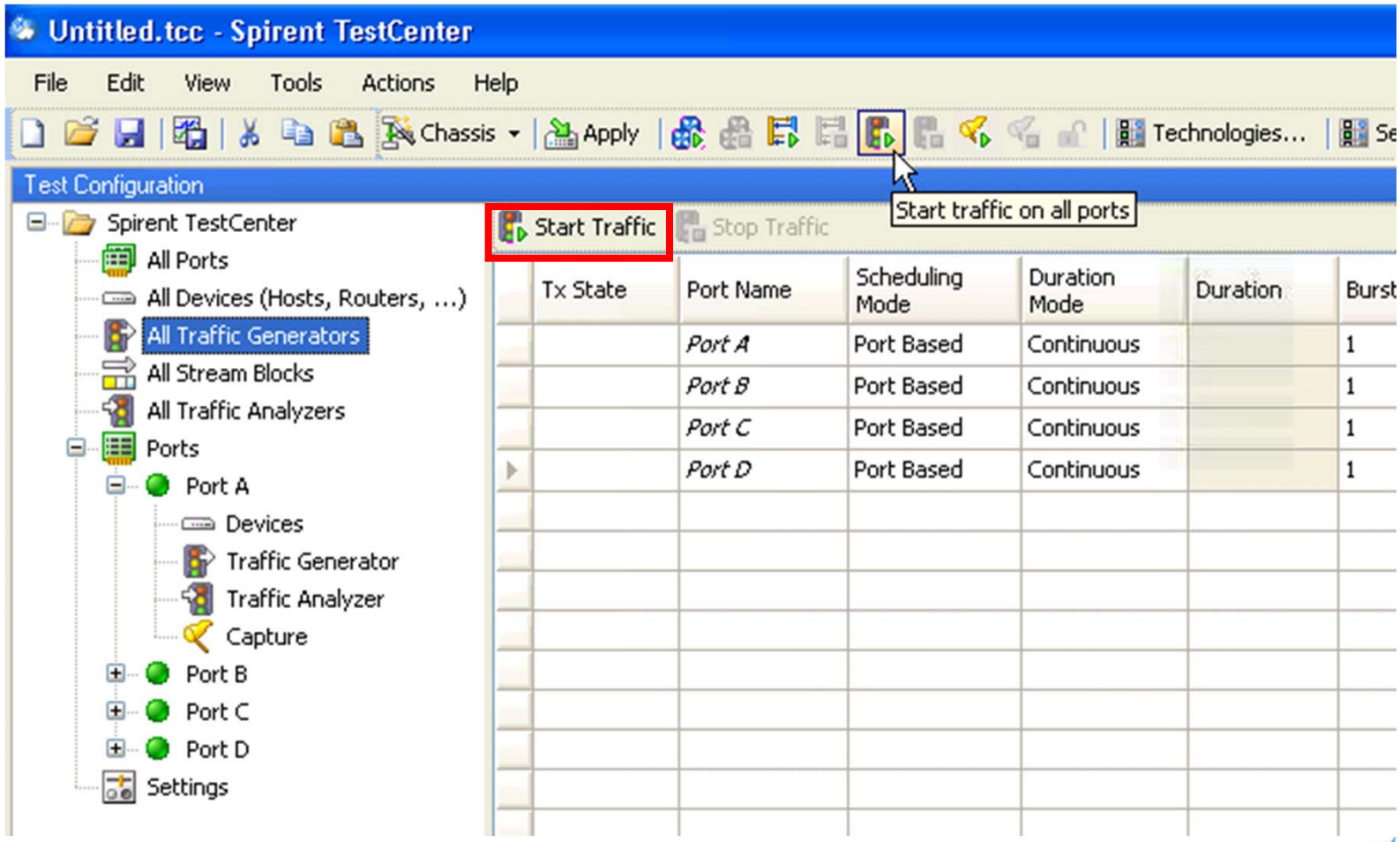
11. Possibly Modify other Test Settings

- Not necessary for this example



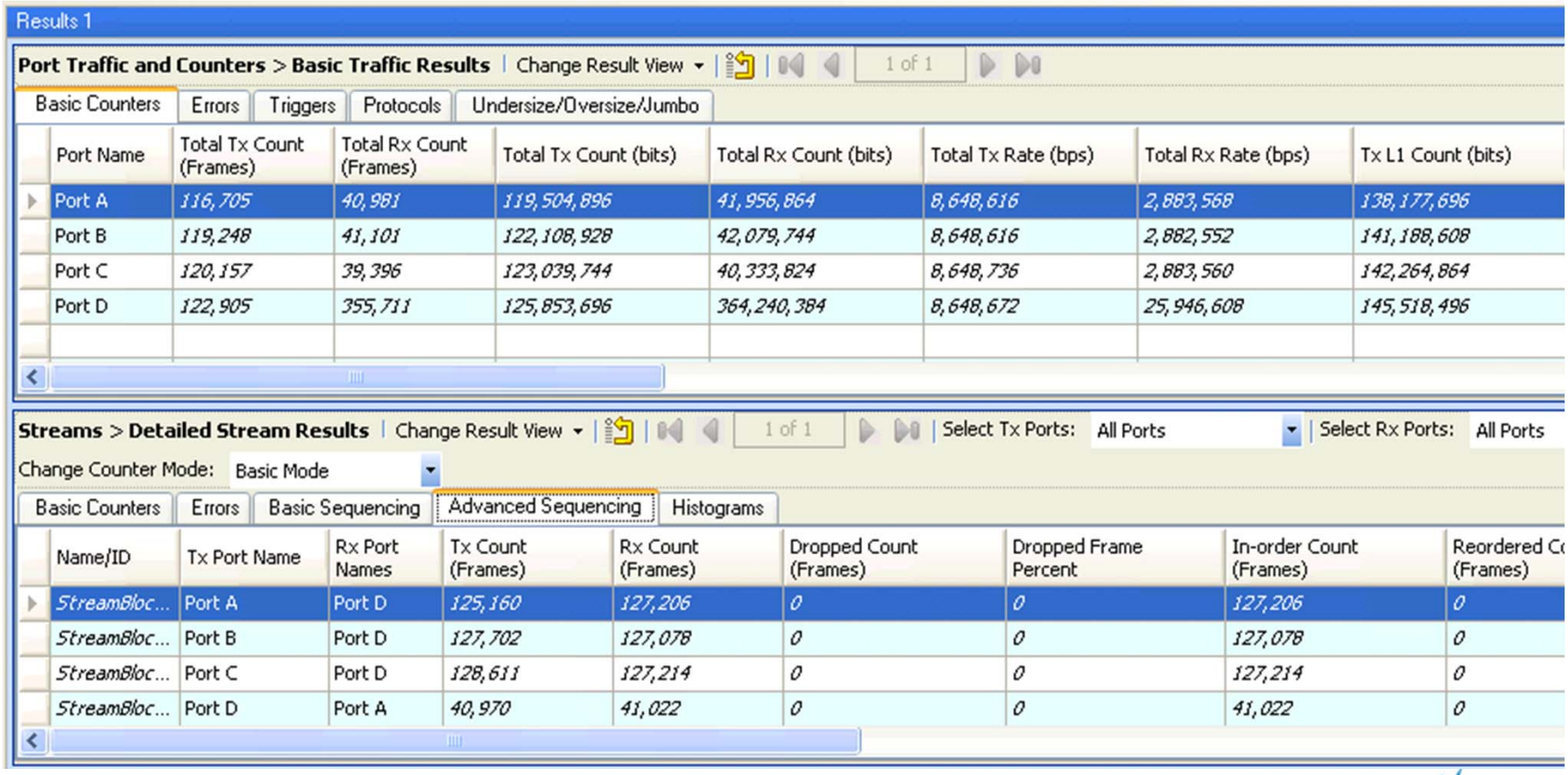
12a. Run the Test

- Send traffic by clicking Start Traffic button.



12b. View and Interpret the Results

- You can view the Port-based aggregate or Stream-based individual statistics; Stream-based also supports Histograms



Analyzer Capabilities

- Flexible classification of results
  - Stream ID is the default; track only "Test" traffic
  - Customize Analyzer Filters; track anything
    - by QoS, Protocols, Addressing, VLANs, More!
- Up to 2 Million user-selectable real-time statistics per port
- Advanced measurements, concurrently, in real time
  - Jitter
  - Loss
  - Sequencing
  - Latency
  - Data Integrity

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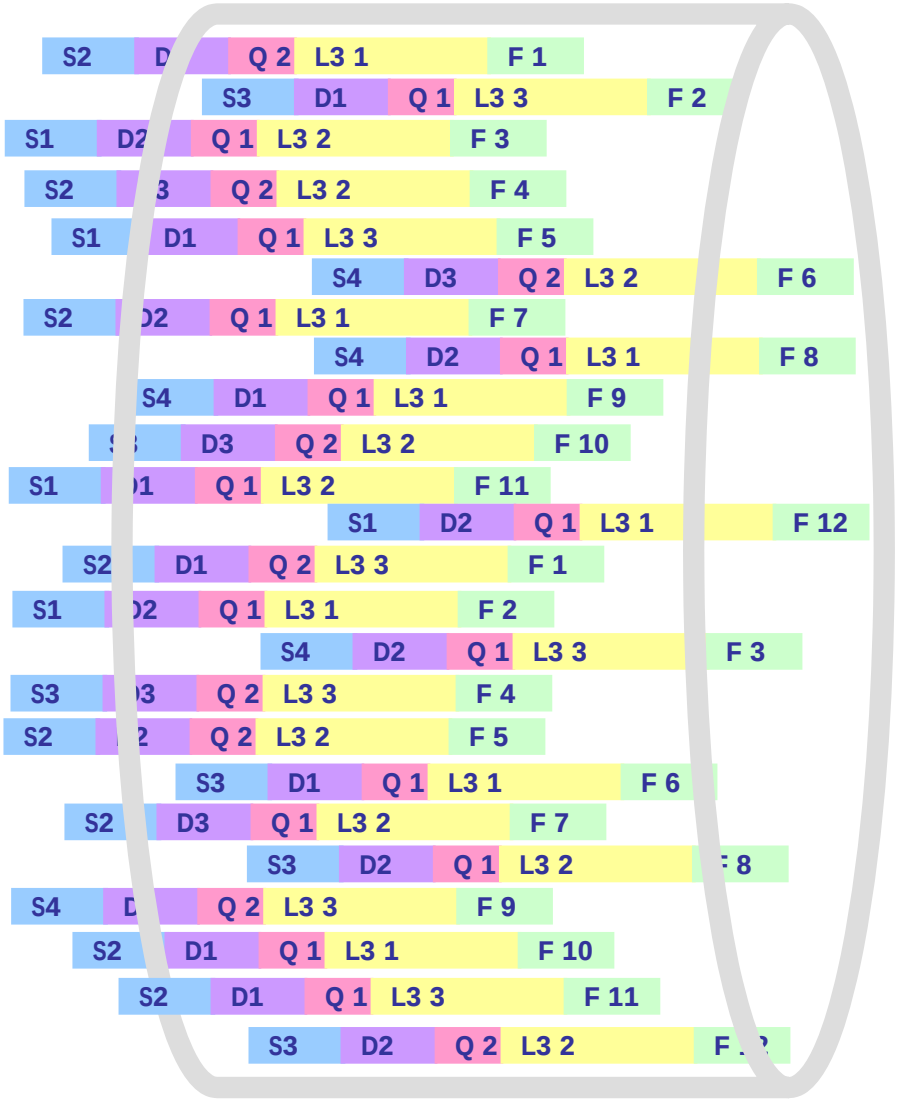
Spirent TestCenter Analyzer Filters



There are 100s of Analyzer Filter Options!

Source

S1	
S2	
S3	
S4	

Destination

D1	
D2	
D3	

QoS Level

Q1	
Q2	

L3 Protocol

L3 1	
L3 2	
L3 3	

Source/Destination Pairs

S1	D1	
S1	D2	
S1	D3	
S2	D1	
S2	D2	
S2	D3	
S3	D1	
S3	D2	
S3	D3	
S4	D1	
S4	D2	
S4	D3	

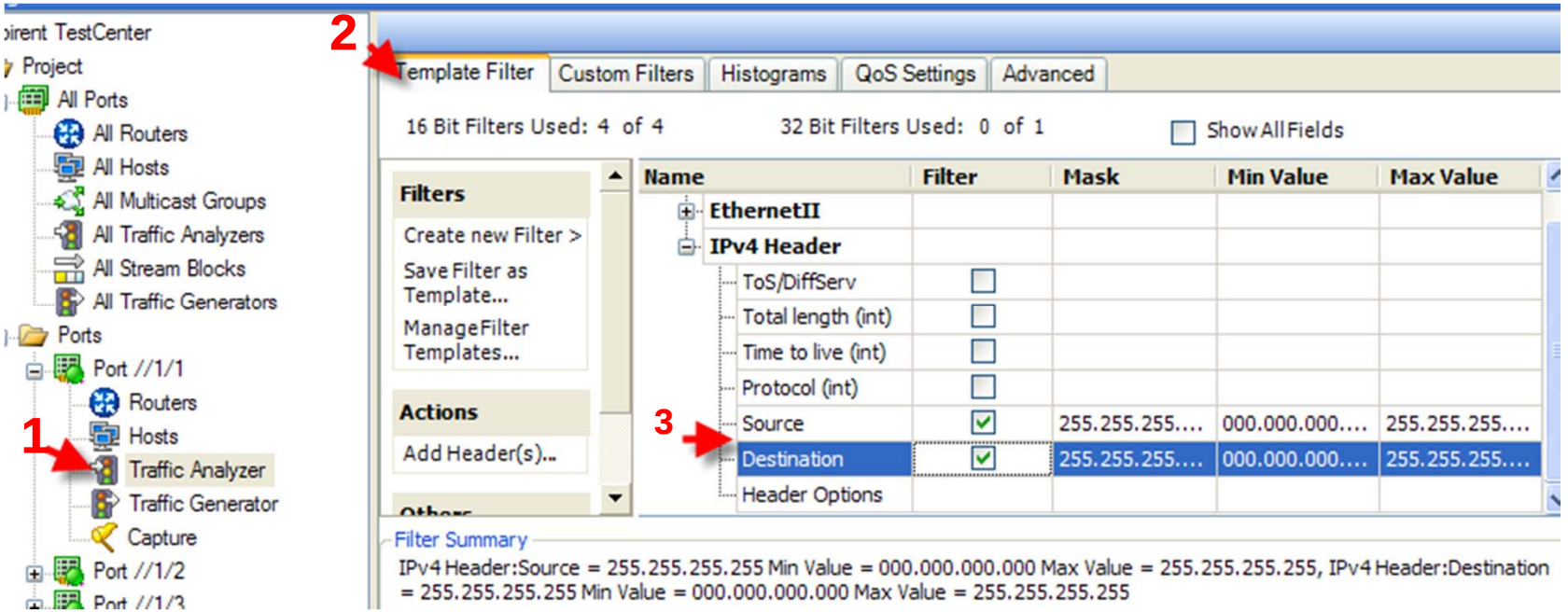
Source & QoS

S1	Q1	
S1	Q2	
S2	Q1	
S2	Q2	
S3	Q1	
S3	Q2	
S4	Q1	
S4	Q2	

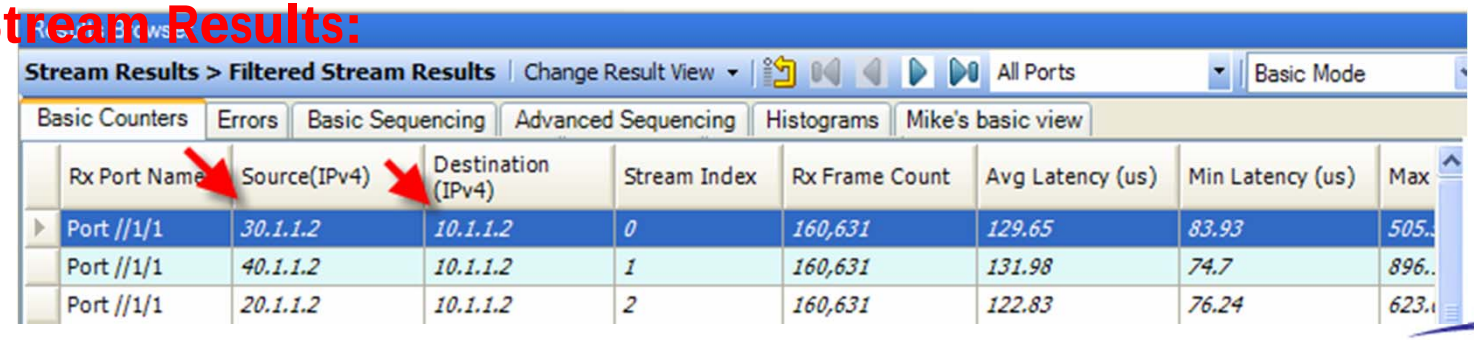
L3 Protocol & QoS

L3 1	Q1	
L3 1	Q2	
L3 2	Q1	
L3 2	Q2	
L3 3	Q1	
L3 3	Q2	

Customizing Analyzer Filters



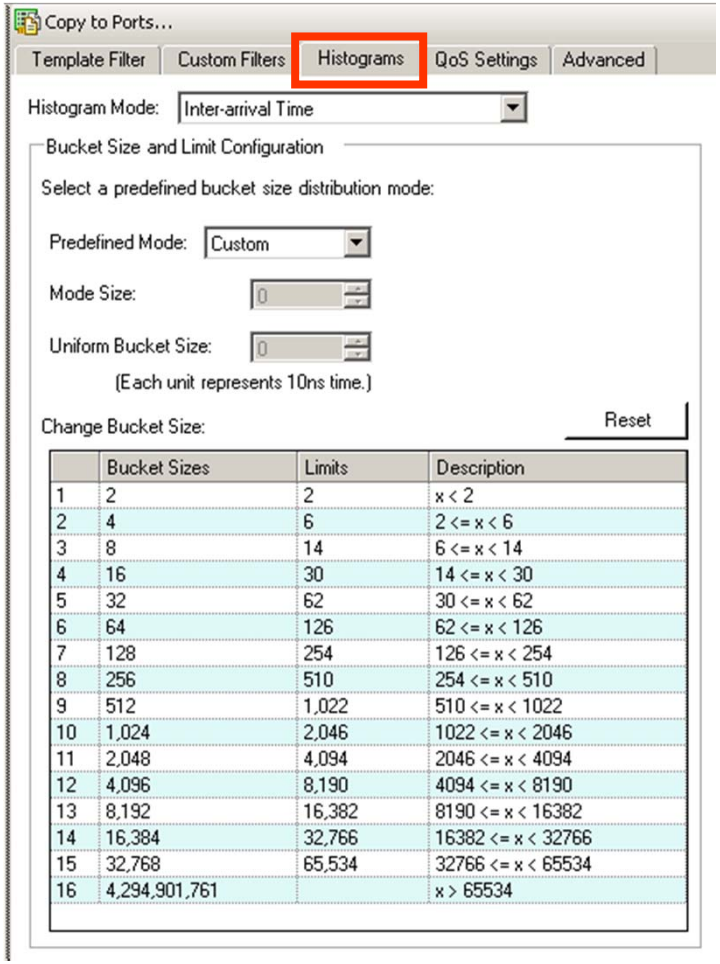
The results of customized filters are viewable in the Filtered Stream Results:



Traffic Analyzer Histograms

- There are a several customizable choices that display in real-time
- The following types of histograms are available:
  - Inter-arrival time*
  - Frame length distribution*

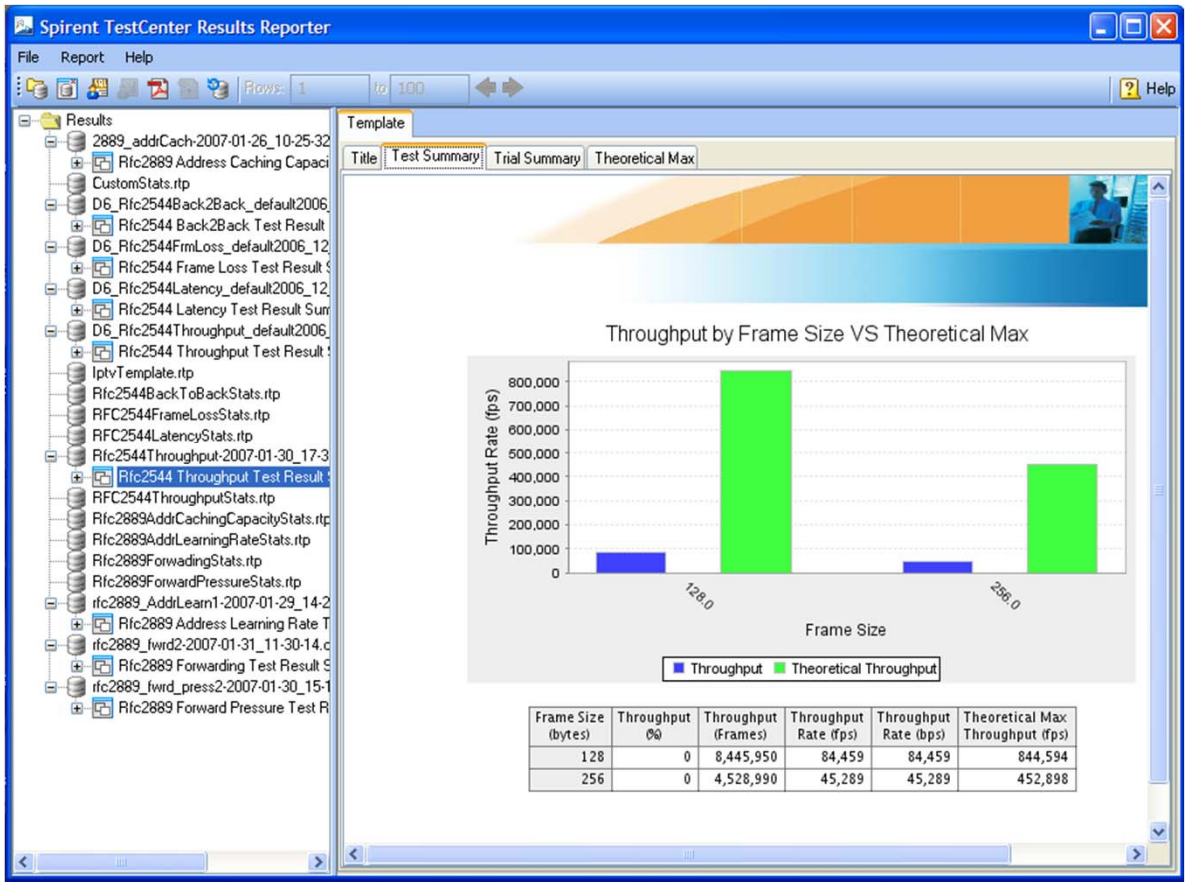
    *available for non-test traffic too
  - Latency distribution
  - Sequence run length
  - Sequence difference check
  - Jitter as per the MEF specs
- User-defined buckets and distribution modes
- Real-time results displayed in the Results Browser
- Post-test results saved in the database and displayed via the Results Reporter



	Bucket Sizes	Limits	Description
1	2	2	x < 2
2	4	6	2 <= x < 6
3	8	14	6 <= x < 14
4	16	30	14 <= x < 30
5	32	62	30 <= x < 62
6	64	126	62 <= x < 126
7	128	254	126 <= x < 254
8	256	510	254 <= x < 510
9	512	1,022	510 <= x < 1022
10	1,024	2,046	1022 <= x < 2046
11	2,048	4,094	2046 <= x < 4094
12	4,096	8,190	4094 <= x < 8190
13	8,192	16,382	8190 <= x < 16382
14	16,384	32,766	16382 <= x < 32766
15	32,768	65,534	32766 <= x < 65534
16	4,294,901,761		x > 65534

Post-test Results and the Results Reporter

- Results are saved to a standard .db database format
- Then they can be viewed with Results Reporter:
  - Templates format results into test reports
  - Results reports can be exported to PDF, XLS, CSV or HTML
  - SQL queries can be used to examine specific result fields
- Alternatively they can be manipulated with SQLite



Generator Aggregate Statistics

The following statistics are available for the generator on each port (rates are available for each statistic)

- Generator Frames
- Generator Octets
- Generator Signature Frames
- Generator Signature Octets
- Generator CRC Error Frames
- Generator L3 Checksum Errors
- Generator L4 Checksum Errors
- Generator IPv4 Frames
- Generator IPv6 Frames
- Generator VLAN Frames
- Generator MPLS Frames
- Generator Undersized Frames
- Generator Oversized Frames
- Generator Jumbo Frames

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Port Aggregate Statistics

The following statistics are available for each port (rates are available for each statistic)

- Tx and Rx Frames
- Tx and Rx Octets
- Rx FCS Error Frames
- Rx IPv4 Checksum Errors
- Rx TCP Checksum Errors
- Rx UDP Checksum Errors
- Rx PRBS Filled Octets
- Rx PRBS Bit Errors
- Total IPv4 Frames
- Total IPv6 Frames
- Total Tx MPLS Frames
- Rx IPv4 Frames
- Rx TCP Frames
- Rx UDP Frames
- Rx MPLS Frames
- Rx ICMP Frames
- Rx VLAN Frames
- Rx Oversized Frames
- Rx Jumbo Frames
- 8 user-defined counters/triggers

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Control Plane Statistics

The following statistics are available for the CPU (“control plane” or “stack”) on each port (rates are available for each statistic)

- Tx and Rx CPU Frames
- Tx and Rx CPU Octets
- Tx and Rx CPU IPv4 Frames
- Tx and Rx CPU IPv6 Frames
- Tx and Rx CPU ARP Requests
- Tx and Rx CPU ARP Reply
- Tx and Rx CPU ICMP Echo Requests
- Tx and Rx CPU ICMP Echo Replies

Stream Analysis

The following statistics are available for each stream; it depends on the Analyzer "mode" though.

- Tx/Rx Frames (rate)
- Tx/Rx Bytes (rate)
- Packet Loss (rate)
- In Order Packets (rate)
- Reordered Packets (rate)
- Duplicate Packets (rate)
- Late Packets (rate)
- Dropped Packets (rate)
- In Sequence Packets (rate)
- Out of Sequence Packets (rate)
- First and Last Arrival Time
- Min/Max/Ave Inter-arrival Time
- Min/Max/Ave Latency
- Min/Max/Ave Jitter
- Histograms (inter-arrival time, latency, jitter, frame length, sequence run length, sequence difference check)
- Invalid FCS (rate)
- IPv4 Errors (rate)
- TCP/UDP Errors (rate)
- PRBS Errored Bits and Fill Bytes (rate)

RED = always trackable, even without the signature field; think custom analyzer filters!

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Thank You

www.spirentcampus.com