
PacketExpert™ 100G ExpertTCP™

TCP Throughput Testing up to 1 Gbps Rate (per RFC 6349)



818 West Diamond Avenue - Third Floor, Gaithersburg, MD 20878
Phone: (301) 670-4784 Fax: (301) 670-9187 Email: info@gl.com
Website: <https://www.gl.com>

Performance Testing of Packet / Ethernet Connections and Networks

For Predictable
Managed Networks

- RFC 2544
- ITU Y.1564 (SAM)
- RFC 6349 (TCP)

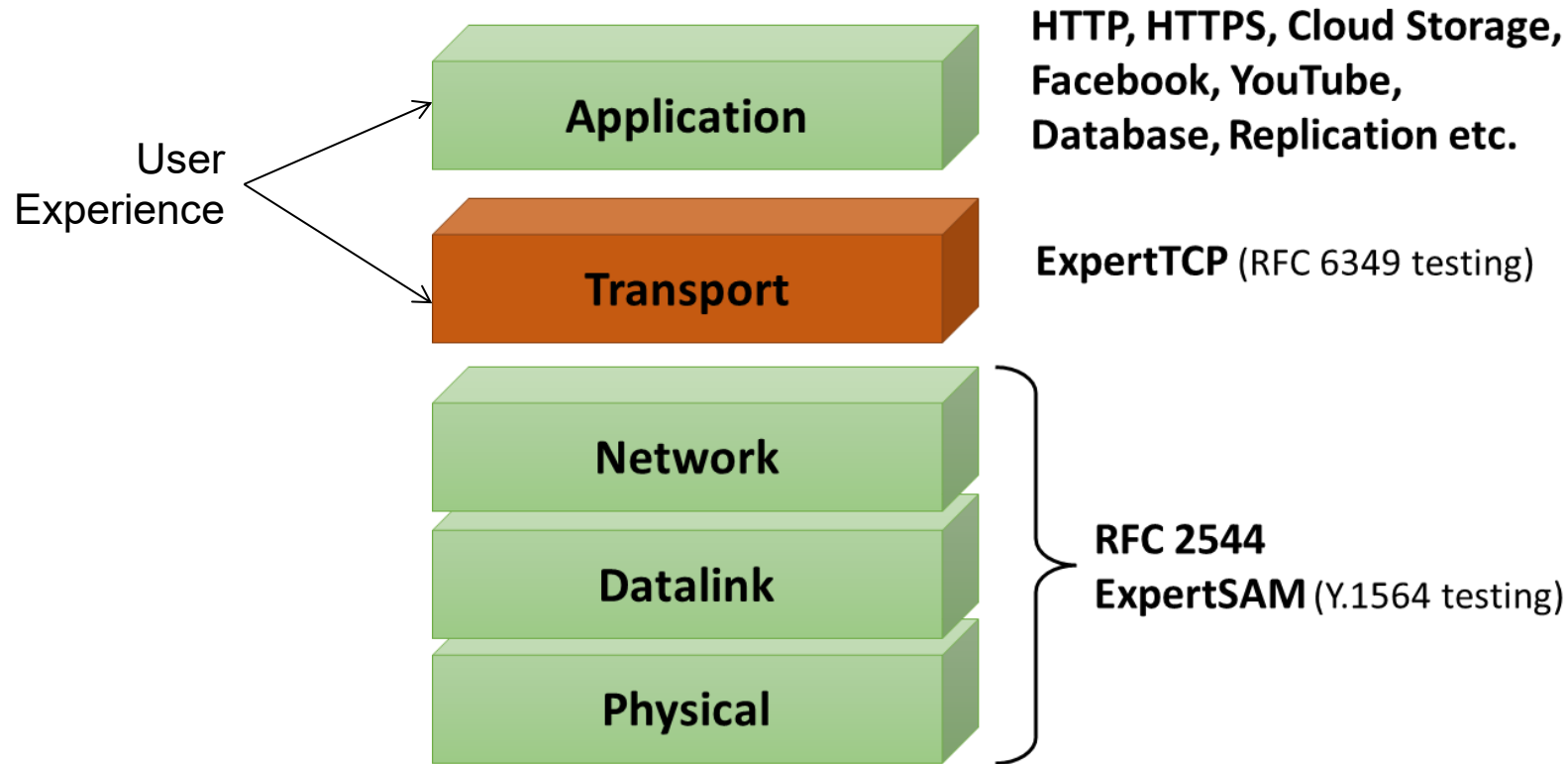
Service Level Agreements
from Network Providers, a must

User Experience,
Application-Network Sensitive,
TCP Tuning

SAM – Service Activation Methodology

TCP – Transmission Control Protocol

Packet / Ethernet Testing



- End-to-End Throughput
- Network Throughput
- Latency
- Packet Loss
- Back-to-Back
- Jitter

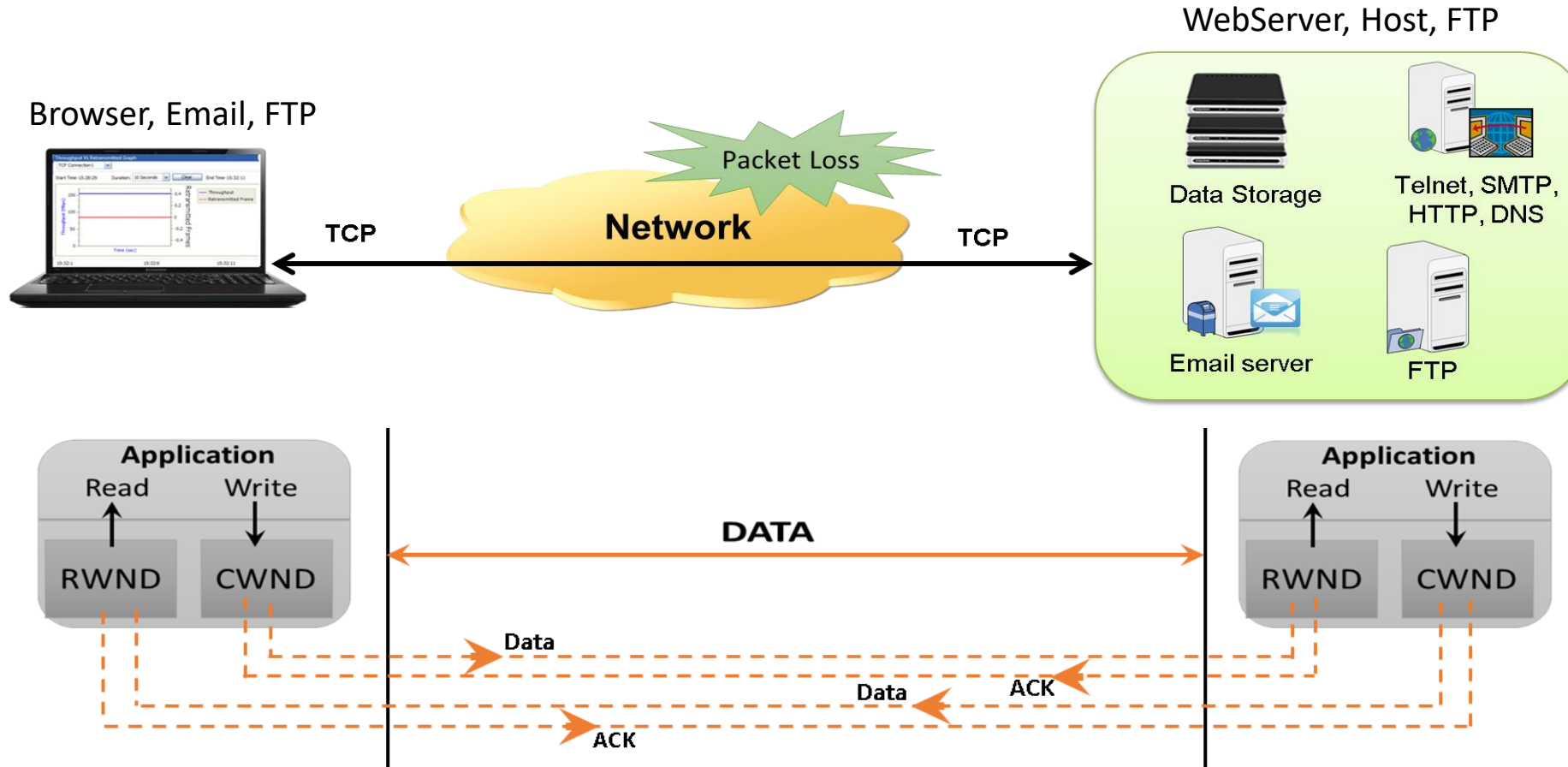
Testing Relevance

Problems	RFC 2544	Y.1564	RFC 6349
Single-service Layer 2/ 3/ 4 SLA Issues like loss, jitter	Yes	Yes	N/A
Multi-service Layer 2/ 3/ 4 SLA Issues like loss, jitter	No	Yes	N/A
TCP window sizes (CPE issues)	No	No	Yes
Excessive retransmissions due to policing	No	No	Yes

- Running RFC 2544, Y.1564 or another L2/L3 layer test is always first step
- However, even after these performance tests are passed with good results, end-customers can still complain that the “network is slow” and the cause of poor application performance (i.e., FTP, web browsing, etc.)
- Lack of TCP testing is a turn-up gap because end-customer applications are transported using TCP
- Save operating expense costs by eliminating or quickly resolving painful end-customer finger pointing scenarios

TCP Principle

(Packet Loss and Waiting for ACK Reduces Throughput)

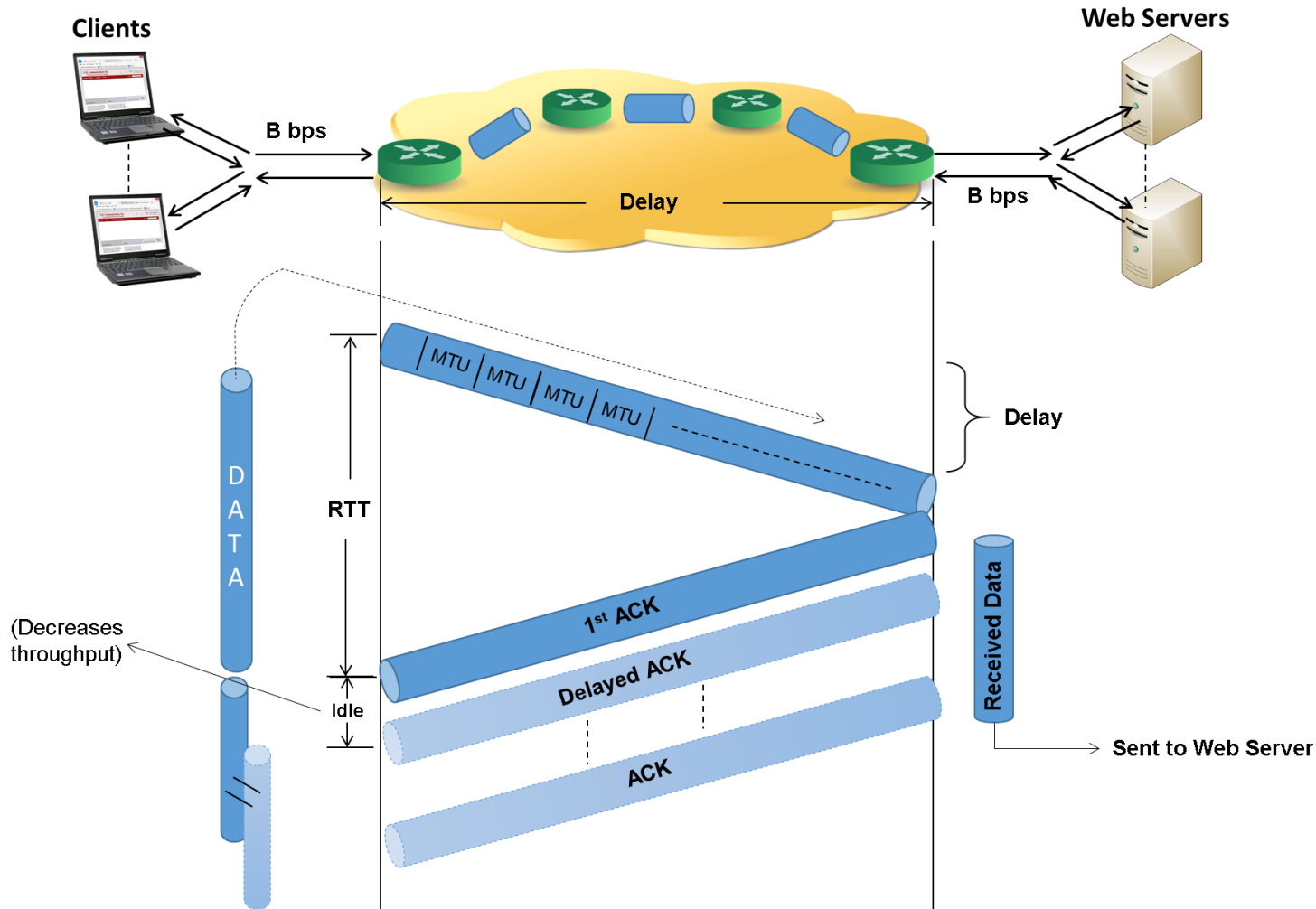


Major TCP Throughput Inter-Relationships

- Bandwidth of Applications
- Latency/Delay of Networks
- Packet Loss Networks
- TCP Retransmission Scheme
- Maximum Transmit Unit of Network
- Transmit/Receive Windows of TCP
- Number of TCP Simultaneous Connections

Bandwidth Delay Product (Bits or Bytes)

Application and Network are Matched, TCP is Tuned



$B = 10 \text{ Mbps}$
 $RTT = 50 \text{ ms}$

$B * 50 = 500,000 \text{ bits}$
or $62,500 \text{ Bytes}$

$65,535 \text{ Bytes}$ is max
window

Achieving max
throughput

(Decreases
throughput)

Bandwidth (B) - Bandwidth (bps), Mbps, the maximum rate at which an application can transmit or receive data (the smaller of the two). Line rate may be shared among applications

Bandwidth Delay Product (BDP) - measured in bits or bytes (divided by 8), the number of bits (or bytes) in the network that are unacknowledged (in transit), $B \text{ (bps)} * RTT \text{ (secs)} = \text{BDP bits}$

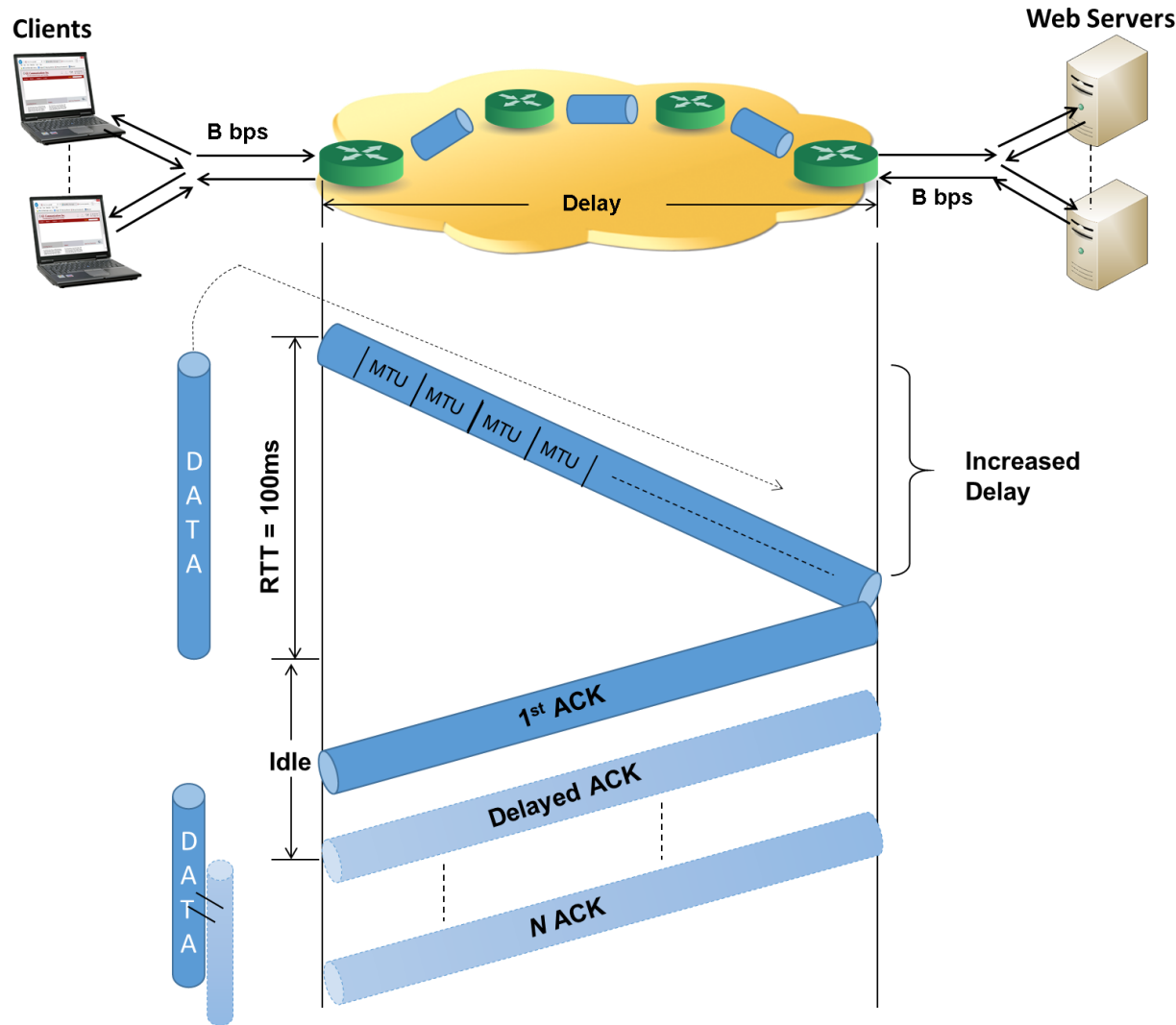
Effect of Increased Network Delay or Smaller Tx or Rx Buffers

$B = 10 \text{ Mbps}$
 $\text{RTT} = 100 \text{ ms}$

$B * 100 = 1,000,000 \text{ bits}$
or $125,000 \text{ Bytes}$

But $65,535 \text{ Bytes}$ is max window

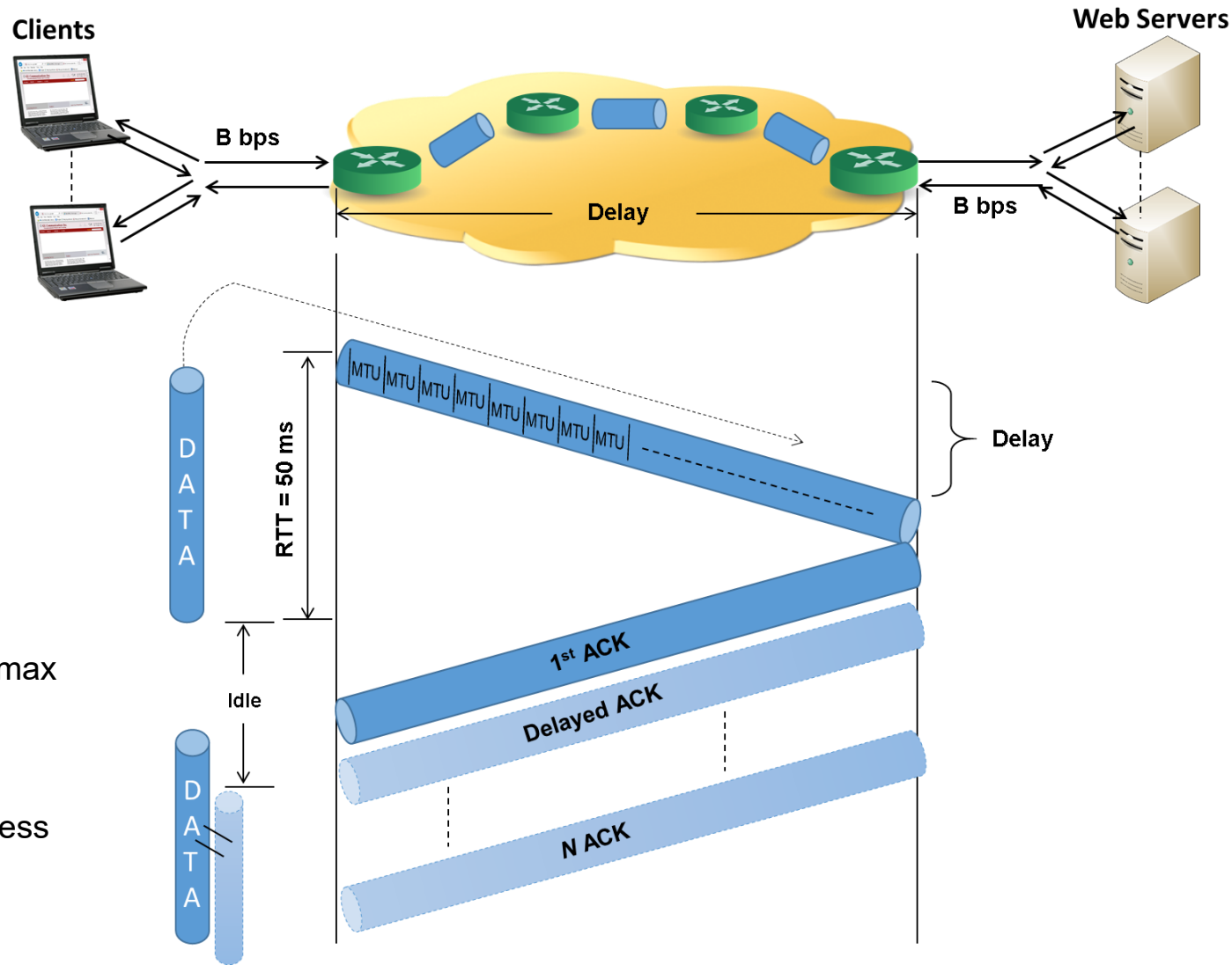
NOT Achieving max throughput, 50% or less



Latency, Delay, Round Trip Time (RTT) - in seconds (secs), or milliseconds (ms), round trip time includes acknowledgement delay

TCP Throughput - bits/second (bps), million bits/second (Mbps), One way throughput (RFC 2544, Y.1564), Round-trip throughput (RFC 6349) is a different story since retransmissions and acknowledgements are involved.

Effect of Increased Application Bandwidth



$B = 20 \text{ Mbps}$
 $\text{RTT} = 50 \text{ ms}$

$B * 50 = 100,000 \text{ bits}$
or $125,000 \text{ Bytes}$

But $65,536 \text{ Bytes}$ is max window

NOT Achieving max throughput, 50% or less

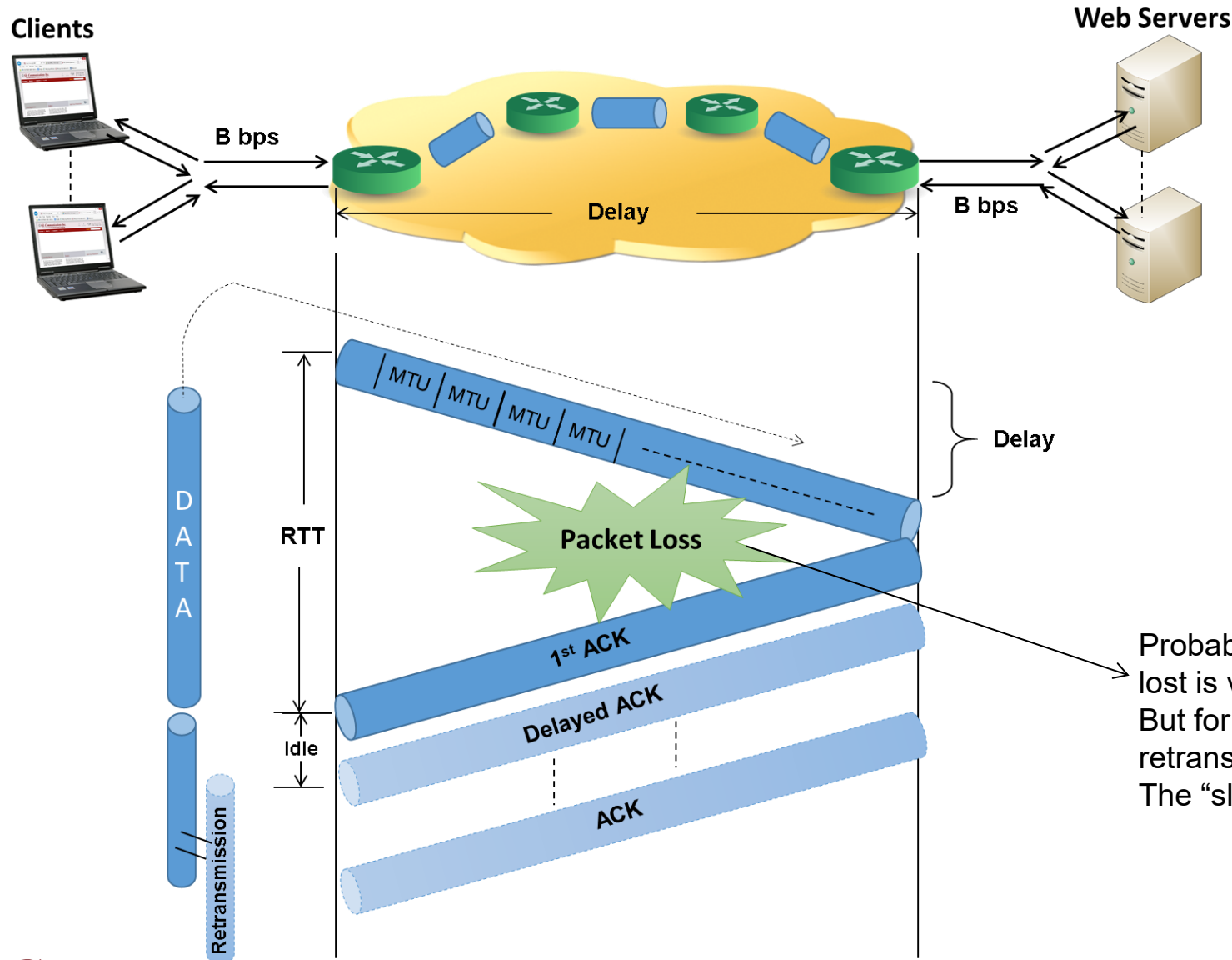
Maximum Transmission Unit (MTU) - Approx. 1500 bytes, max packet size

Jitter - Instantaneous variation in RTT, e.g. if RTT is nominally 100 ms, but varies from 80 ms to 120 ms, then jitter is +/- 20ms, or 40 ms. Since jitter affects ACK time, TCP throughput is affected

Packet Loss Rate - Very important factor affecting TCP throughput, could be as high as 2%

Excess Bandwidth may be used for additional TCP Connections

Effect of Packet Loss Rate and Retransmission Scheme

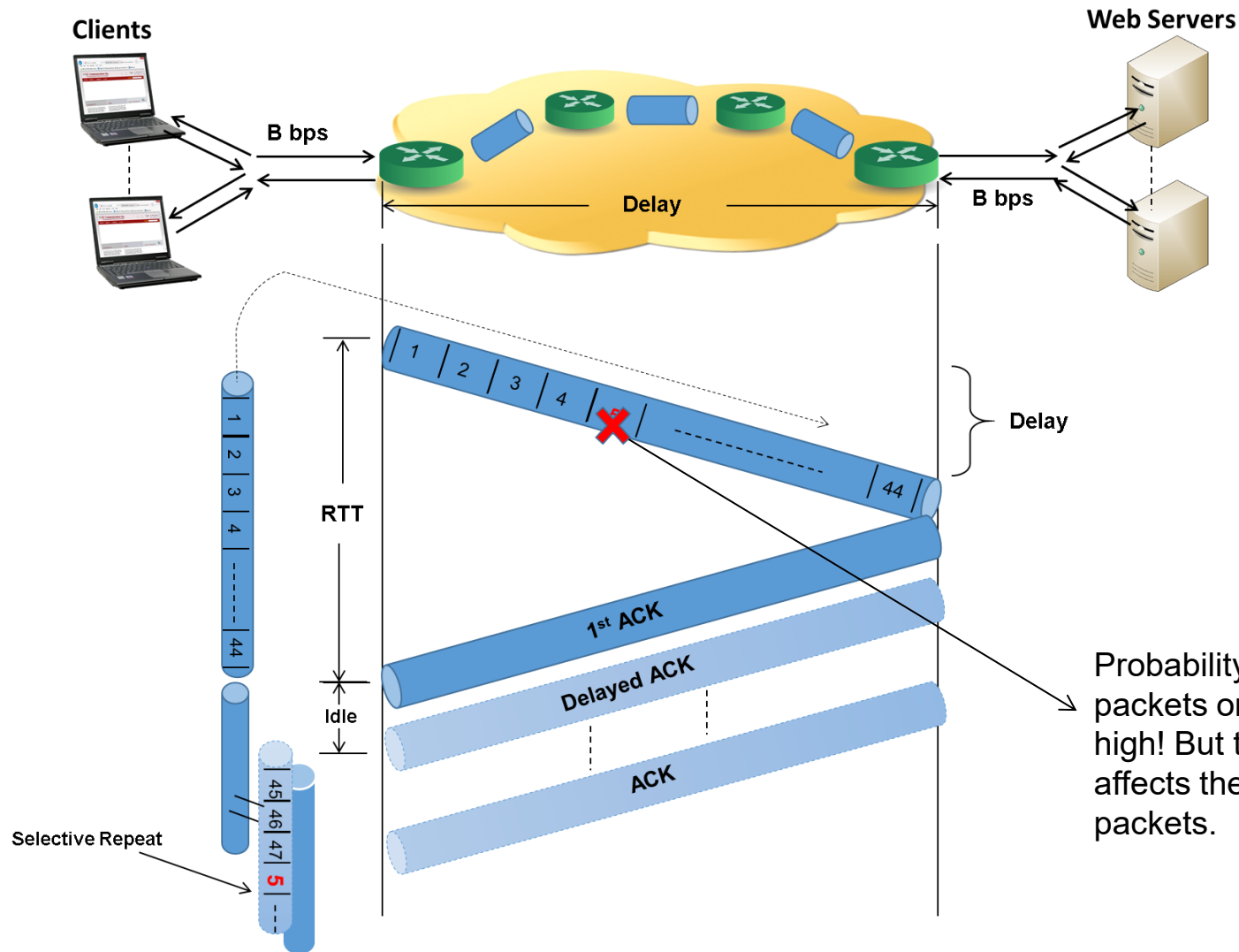


For **Go Back N** retransmission scheme, and if unpacked packets are maximum ~ 43 or 44 , then Packet Loss effects are very serious!

Packet Loss	TCP Throughput
0 %	100%
0.1 %	< 50%
1 %	< 10%
2 %	0 %

Probability that one or more MTU packets or ACK packets is lost is very high!! Can be 1 !!!
 But for every lost MTU packet or ACK packet, 43 retransmissions occur. This results in near zero throughput. The "slow start phase" results in very few "in flight" packets.

Effect of Packet Loss Rate and Retransmission Scheme (Contd.)



For **Selective Repeat** retransmission scheme, and if unacked packets is maximum ~ 43 or 44, then Packet Loss affects TCP Throughput linearly for “low” Packet Loss rates

Packet Loss	TCP Throughput
0 %	100%
0.1 %	> 99 %
1 %	> 95 %
2 %	? %

Probability that one or more MTU packets or ACK packets lost is very high! But the retransmission only affects the lost packets, not other packets.

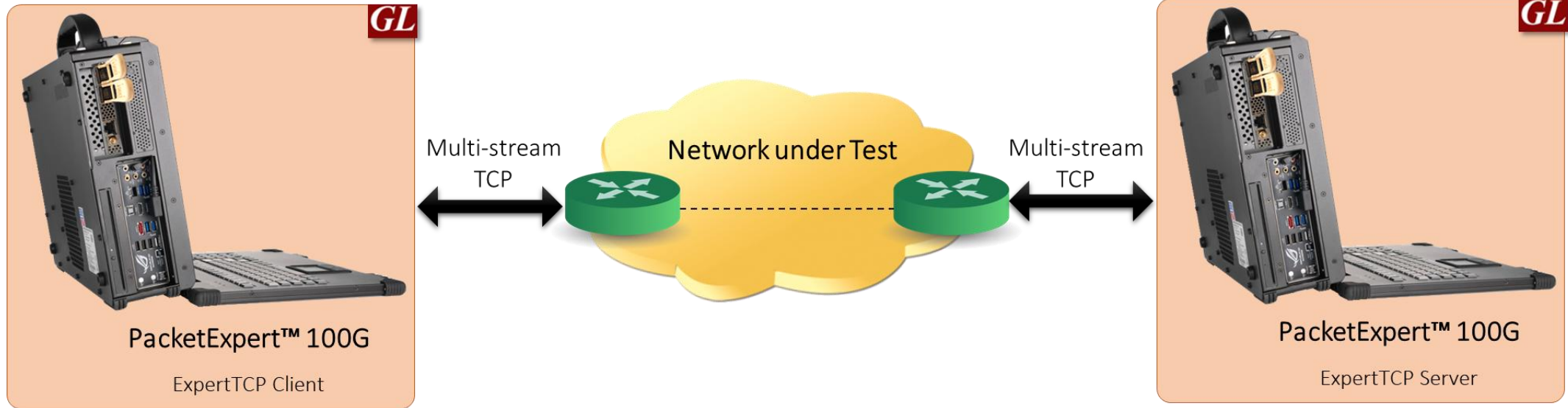
ExpertTCP™ (RFC 6349 Testing)

The TCP Throughput Testing is conducted in 3 steps simultaneously on up to 16 application streams:

- Path MTU Discovery - What is the maximum packet size that can successfully traverse the network?
- Round Trip Time (RTT) Measurement - Timestamp based RTT discovery of transmitted packet until acknowledgement packet arrives from far end
- Measure TCP Throughput - Complete measurements per RFC 6349 definitions to provide TCP Throughput results

GL ExpertTCP™ Hardware/Software

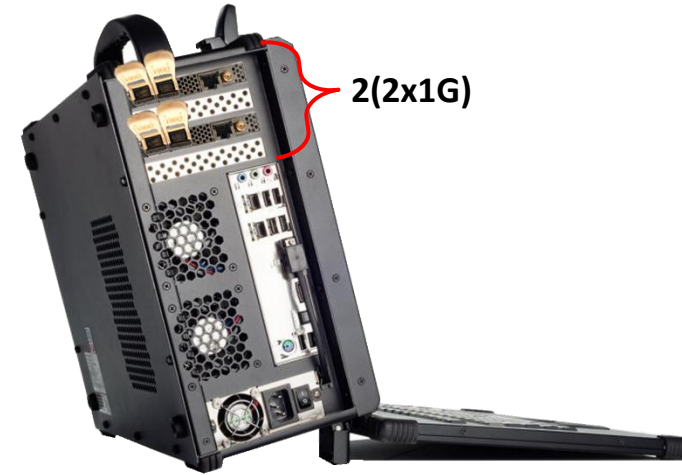
ExpertTCP™ Architecture



Hardware Specifications – Portable Platforms



Portable PacketExpert™ 100G

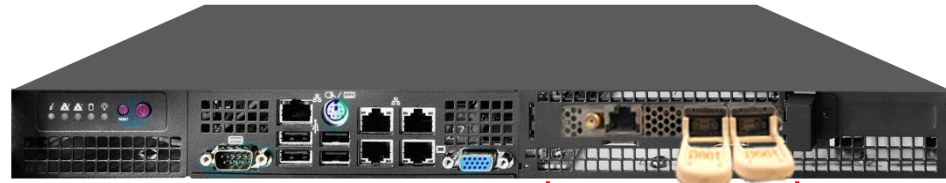


Portable PacketExpert™ 100G



Portable PacketExpert™ 100G

Hardware Specifications: Rack-mount Platforms



2x1G

PacketExpert™ 100G – 1U Rack-mount PC



7x(2x1G)

PacketExpert™ 100G – 4U Rack-mount PC

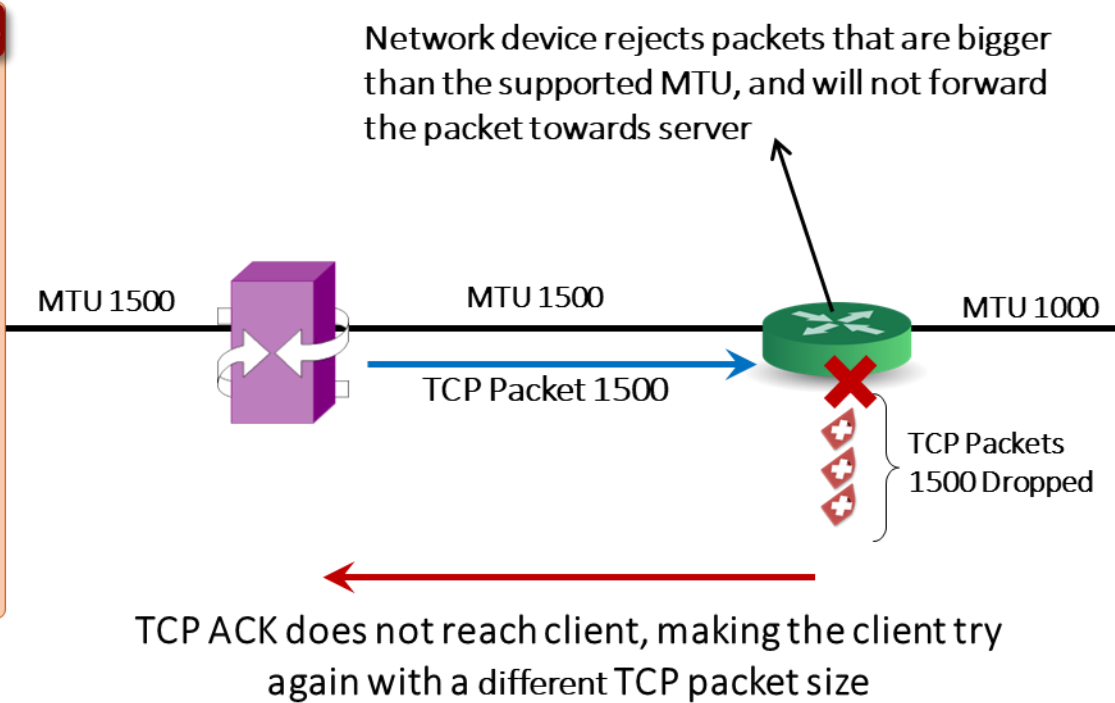


2x(2x1G)

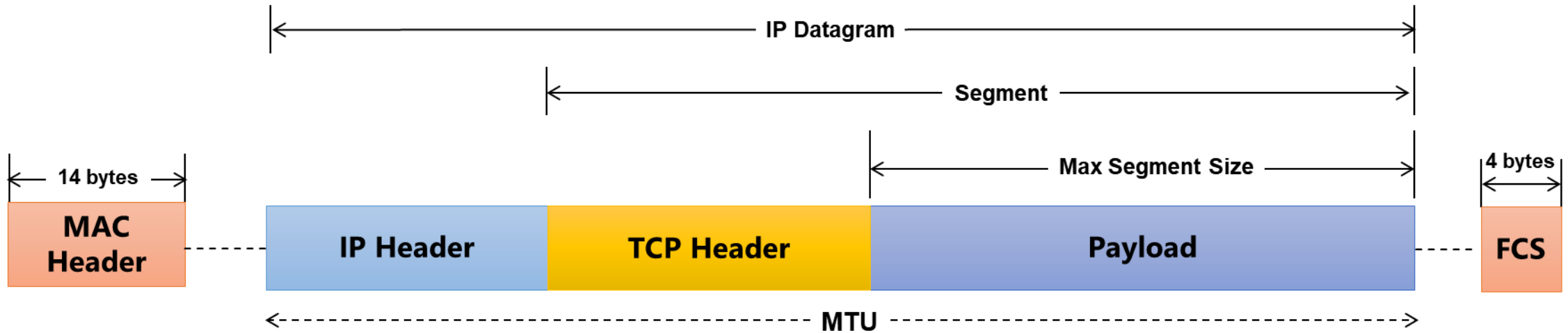
PacketExpert™ 100G – 2U Rack-mount PC

Step 1. Path MTU Discovery

Client sends packet with Don't Fragment (DF) bit set

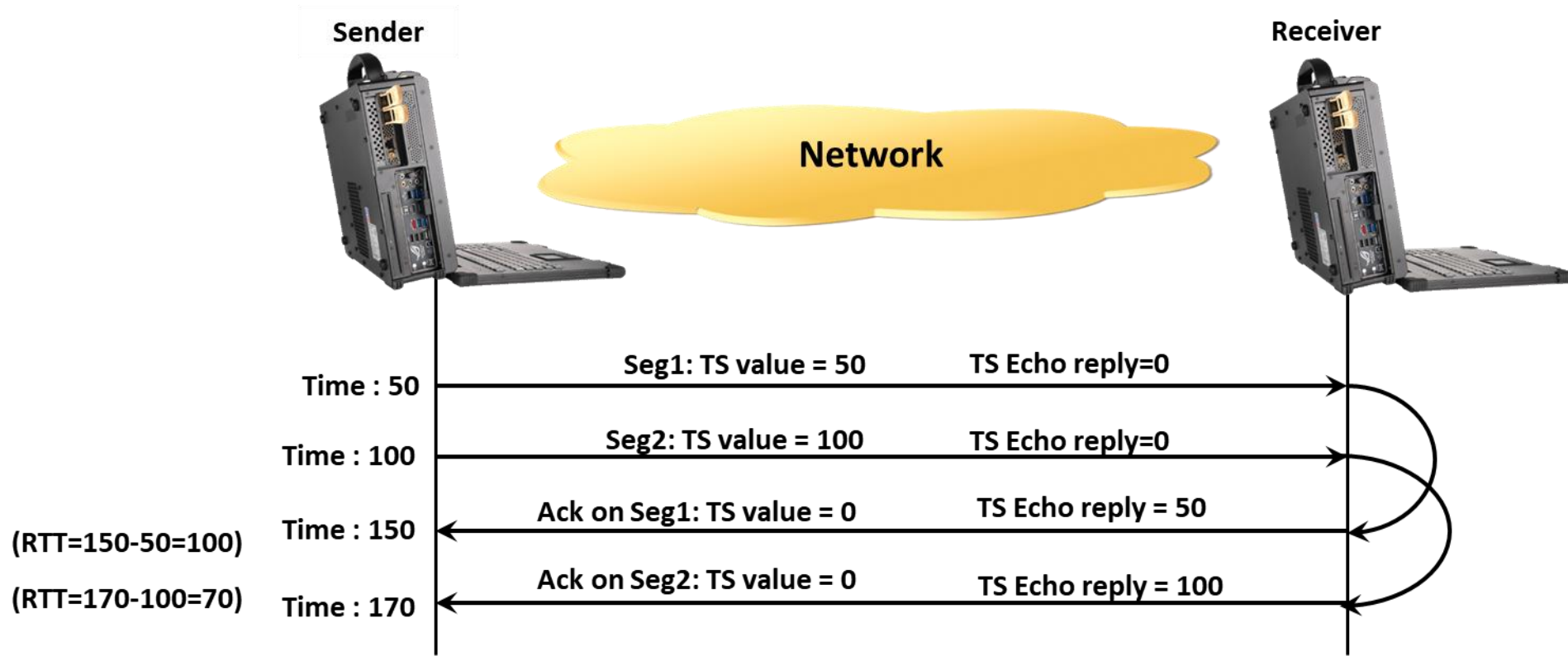


Step 1. Path MTU Discovery (Contd.)



- Path MTU discovery as per RFC 4821 - PLPMTUD - Packetization Layer Path MTU Discovery
- DF (Do Not Fragment) bit is set to avoid fragmentation when traversing through network
- The algorithm uses TCP retransmit conditions to search for the MTU
- Each conclusive probe narrows the MTU search range, either by raising the lower limit on a successful probe or lowering the upper limit on a failed probe
- Path MTU is discovered for both directions in case of bi-directional test

Step 2. Timestamp based RTT Measurement

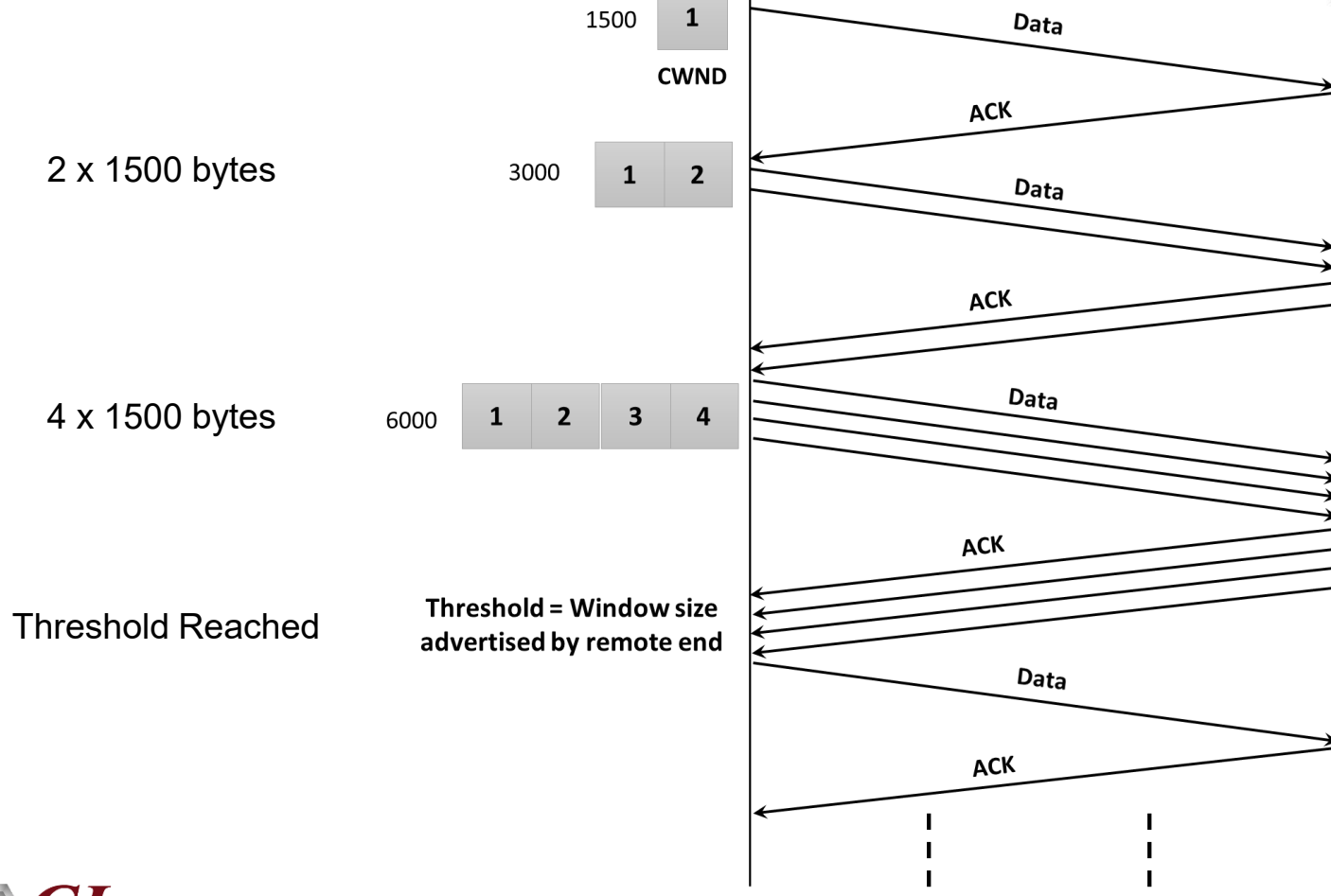


- Timestamp based RTT Measurement (RFC 1323)
- The Tx segment includes current time in option field, Receiver echoes timestamp in ACK

Step 3. Now Ready to Measure TCP Throughput



Step 3. Slow Start TCP Throughput Measurement



In Slow start, the congestion window increases exponentially until it reaches threshold

Slow Start - Initially send two TCP Segments
If Acks received, then send double the number of TCP Segments

Continue doubling until the Receiver "ssthreshold" # is reached, or Acks are not received and Timeout is reached,

Then halve the send TCP segments
If Acks are received send TCP segments are incremented by one, until again Timeout is reached,

Then number of send TCP segments is halved and the process continues

Software Operation

Loading ExpertTCP™ Server and Client Devices

PacketExpert™ Dashboard Servers Admin

[Devices](#) [Ports](#) [Expert TCP](#) Load Save Export

Devices

Quick Config

Ports Settings and Configuration

PacketExpert™ Dashboard Servers Admin

Devices **Ports** Expert TCP Load Save Export

Settings SFP Info SFP Monitor Alarms/Errors Graphs SyncE

Port Information Quick Config

Device	Port	SFP Description	Link Speed	FEC	Laser	Equalization Mode	Remote Loopback	SyncE	MAC Address ✓ HW MAC Address	IP Address	Subnet Mask	Default Gateway	IPv6 Address	Edit
Server1 / Device1	Port1	SFP/SFP+/SFP28+1000BASE-LX 3	1 G	✗	ON	✗	✗	OFF	✓ 00-0D-E9-09-9F-53	192.168.1.11	255.255.255.0	192.168.1.1	1111:1111:1111:1111:1111:1111:0011	
	Port2	SFP/SFP+/SFP28+1000BASE-LX 3	1 G	✗	ON	✗	✗	OFF	✓ 00-0D-E9-09-9F-54	192.168.1.12	255.255.255.0	192.168.1.1	2222:2222:2222:2222:2222:2222:0012	
Server2 / Device1	Port1	SFP/SFP+/SFP28+1000BASE-LX 3	1 G	✗	ON	✗	✗	OFF	✓ 00-0D-E9-09-9F-5C	192.168.1.21	255.255.255.0	192.168.1.1	1111:1111:1111:1111:1111:1111:0011	
	Port2	SFP/SFP+/SFP28+1000BASE-LX 3	1 G	✗	ON	✗	✗	OFF	✓ 00-0D-E9-09-9F-5D	192.168.1.22	255.255.255.0	192.168.1.1	2222:2222:2222:2222:2222:2222:0012	

Ports Configuration X

Select Port: Server1 / Device1 / Port1 ▼

Interface Settings

Interface Type: Optical Link Speed: 1 G

Laser ON/OFF:

SyncE

Selection: OFF ▼ QL-TLV: QL-STU/UNK ▼

Interval: 10 packets per second

MAC/IP Address

IPv4 Address: 192.168.1.11 Subnet Mask: 255.255.255.0

Default Gateway: 192.168.1.1

MAC Address: 00-0D-E9-09-9F-53
✓ HW MAC Address

IPv6 Address: 1111:1111:1111:1111:1111:1111:0011

Remote Loopback

Enable:

- Drop IP Checksum error frames
- Drop UDP Checksum error frames
- Drop FCS error frames

Secondary Address

0.0.0.0 + 0000:0000:0000:0000:0000:0000:0000 +

Sl.No	IPv4 Address	Sl.No	IPv6 Address

Apply Cancel

Adding Test Setup

- Allows multiple test setups to add

The screenshot displays the PacketExpert™ web interface. The main content area is titled 'Expert TCP' and includes a 'Summary' tab and 'All Port Statistics'. A table with columns for '#', 'Setup', and 'Connection' is visible. A red box highlights a '+' icon in the first row of the table, with a red arrow pointing to the 'Add Test Setup' dialog box. The dialog box has a teal header and contains the following fields:

- Name:** A text input field containing 'SETUP1'.
- Client Port:** A dropdown menu showing 'Server1 / Device1 / Port1'.
- Server Port:** A dropdown menu showing 'Server2 / Device1 / Port1'.
- Ready to connect:** A radio button that is currently selected.
- Buttons:** 'Add' (green) and 'Cancel' (grey) buttons at the bottom right.

The background interface also shows navigation links for 'Dashboard', 'Servers', and 'Admin', along with 'Load', 'Save', and 'Export' buttons. A 'Start Selected' button and a 'Stop Selected' button are also visible.






ExpertTCP™ Summary

PacketExpert™ Dashboard Servers Admin

Devices Ports **Expert TCP** Load Save Export

Summary Configuration Results All Port Statistics Event Log

ExpertTCP Summary Start Selected Stop Selected Report

#	Setup	Connection	Actions	Test Progress	Metrics						Status
					Path MTU (Bytes)	Baseline RTT (msec)	Throughput (Gbps)	Transfer Time (secs)	TCP Efficiency (%)	Buffer Delay (%)	
<input checked="" type="checkbox"/>	SETUP1 Server1 / Device1 / Port1 → Server2 / Device1 / Port1 192.168.30.81 → 192.168.30.10	Connected	   	 Elapsed 00:00:00	↑	↑	↑	↑	↑	↑	IDLE
					↓	↓	↓	↓	↓	↓	

Configurations

- All settings configured locally on the client side

The screenshot displays the PacketExpert™ ExpertTCP Configuration interface. The main configuration area is titled "ExpertTCP Configuration" and includes the following sections:

- Link Type:** Radio buttons for "Symmetrical" (selected) and "Asymmetrical".
- ExpertTCP Test Parameters:**
 - Test Selection: Checkboxes for "Path MTU", "Baseline RTT", and "Throughput" (all checked).
 - Test Direction: Radio buttons for "Upstream", "Downstream", and "Both" (selected).
 - Transfer Size: Radio buttons for "Size" (selected) and "Time", with a value of "125000" and a unit of "MBytes".
- TCP Port Configuration:** A grid of 16 ports, divided into "Upstream Ports" (5001-5016) and "Downstream Ports" (6001-6016). The "Connections" dropdown is set to "16".

On the left, the "Source" configuration for "Server1 / Device1 / Port1" is shown with MAC: 00-0D-E9-09-9F-53, IP: 192.168.1.11, Mask: 255.255.255.0, and Gateway: 192.168.1.1. A speed control shows "1000 Mbps". On the right, the "Destination" configuration for "Server2 / Device1 / Port1" is shown with MAC: 00-0D-E9-09-9F-5C, IP: 192.168.1.21, Mask: 255.255.255.0, and Gateway: 192.168.1.1. A speed control shows "1000 Mbps".

Configurations (Contd.)

- Separate Upstream and Downstream bandwidths configurable for asymmetrical path

The screenshot displays the PacketExpert™ ExpertTCP Configuration interface. The 'Link Type' is set to 'Asymmetrical'. The configuration is divided into three main sections: Source, Test Parameters, and Destination.

Source (Server1 / Device1 / Port2): MAC: 00-0D-E9-09-D5-17, IP: 192.168.1.32, Mask: 255.255.255.0, Gateway: 192.168.1.1. A red box highlights the bandwidth settings: ↑↑ 1000 Mbps.

ExpertTCP Test Parameters: Test Selection includes Path MTU, Baseline RTT, and Throughput. Test Direction is set to Both. Transfer Size is 125000 MBytes. TCP Port Configuration shows 16 connections with upstream ports (5001-5016) and downstream ports (6001-6016).

Destination (Server2 / Device1 / Port2): MAC: 00-0D-E9-09-D5-05, IP: 192.168.1.42, Mask: 255.255.255.0, Gateway: 192.168.1.1. A red box highlights the bandwidth settings: ↓↓ 1000 Mbps.

Arrows indicate the flow of traffic: a blue arrow from Source to Destination and an orange arrow from Destination to Source.

Overall Test Results

PacketExpert™ Dashboard Servers Admin

Devices Ports **Expert TCP** Load Save Export

Summary Configuration **Results** All Port Statistics Event Log

ExpertTCP Test Results Results Details SETUP1

Test Date: Apr 17, 2026, 17:29:32 Direction: **Both** TCP Connections: 16 Transfer Size: 1000.00 MBytes Link Type: Symmetrical Overall Status: **PASS**

Key Performance Metrics

↑ Throughput 686.96 Mbps Ideal: 941.48	↓ Throughput 686.96 Mbps Ideal: 941.48	↑ Transfer Time 11.65 sec Ideal: 8.00	↓ Transfer Time 11.65 sec Ideal: 8.00	↑ Buffer Delay 86.8%	↓ Buffer Delay 85.3%	↑ TCP Metrics TCP Efficiency: 100.0% Time Ratio: 1.46	↓ TCP Metrics TCP Efficiency: 100.0% Time Ratio: 1.46
--	--	---	---	--------------------------------	--------------------------------	--	--

Path MTU Discovery **PASS**

Direction	Discovered MTU (bytes)	Status
↑ Upstream	1500	Pass
↓ Downstream	1500	Pass

Baseline RTT Measurement **PASS**

Direction	Trial Duration (sec)	Avg RTT (msec)	Min RTT (msec)	Max RTT (msec)	Selected RTT (msec)	Status
↑ Upstream	2.0	0.068	0.068	0.068	0.068	Pass
↓ Downstream	2.0	0.068	0.068	0.068	0.068	Pass

Test Summary

Parameter	↑ Upstream	↓ Downstream
Baseline RTT (msec)	0.068	0.068
Calculated BDP (KBytes)	8,474	8,473
TCP cwnd (Bytes)	65,535	65,535
TCP rwnd (Bytes)	65,535	65,535
Path MTU (Bytes)	1,500	1,500
MSS Used (Bytes)	1,448	1,448
No of TCP Connection	16	16

TCP Setup

Single TCP connection

Link Type: Symmetrical Asymmetrical

ExpertTCP Test Parameters

✓ Enabled = Auto-discover | X Disabled = Manual config

Test Selection: Path MTU Baseline RTT Throughput

Test Direction: ↑ Upstream ↓ Downstream ↕ Both

Transfer Size: Size Time ▾

TCP Port Configuration

Connections: ▾

↑ Upstream Ports	↓ Downstream Ports
#1 <input type="text" value="5001"/>	#1 <input type="text" value="6001"/>

Multiple TCP connections

Link Type: Symmetrical Asymmetrical

ExpertTCP Test Parameters

✓ Enabled = Auto-discover | X Disabled = Manual config

Test Selection: Path MTU Baseline RTT Throughput

Test Direction: ↑ Upstream ↓ Downstream ↕ Both

Transfer Size: Size Time ▾

TCP Port Configuration

Connections: ▾

↑ Upstream Ports				↓ Downstream Ports			
#1 <input type="text" value="5001"/>	#2 <input type="text" value="5002"/>	#3 <input type="text" value="5003"/>	#4 <input type="text" value="5004"/>	#1 <input type="text" value="6001"/>	#2 <input type="text" value="6002"/>	#3 <input type="text" value="6003"/>	#4 <input type="text" value="6004"/>
#5 <input type="text" value="5005"/>	#6 <input type="text" value="5006"/>	#7 <input type="text" value="5007"/>	#8 <input type="text" value="5008"/>	#5 <input type="text" value="6005"/>	#6 <input type="text" value="6006"/>	#7 <input type="text" value="6007"/>	#8 <input type="text" value="6008"/>
#9 <input type="text" value="5009"/>	#10 <input type="text" value="5010"/>	#11 <input type="text" value="5011"/>	#12 <input type="text" value="5012"/>	#9 <input type="text" value="6009"/>	#10 <input type="text" value="6010"/>	#11 <input type="text" value="6011"/>	#12 <input type="text" value="6012"/>
#13 <input type="text" value="5013"/>	#14 <input type="text" value="5014"/>	#15 <input type="text" value="5015"/>	#16 <input type="text" value="5016"/>	#13 <input type="text" value="6013"/>	#14 <input type="text" value="6014"/>	#15 <input type="text" value="6015"/>	#16 <input type="text" value="6016"/>

TCP Test Parameters

- Upstream/Downstream/Bidirectional
- Path MTU - run test and discover or user can enter manually
- Baseline RTT - run test and find out or user can enter manually
- Separate Path MTU/Baseline RTT configuration for Upstream/Downstream directions for asymmetrical paths

Link Type: Symmetrical Asymmetrical

ExpertTCP Test Parameters

✓ Enabled = Auto-discover | X Disabled = Manual config

Test Selection

Path MTU Baseline RTT Throughput

Test Direction

↑ Upstream ↓ Downstream ↓ Both

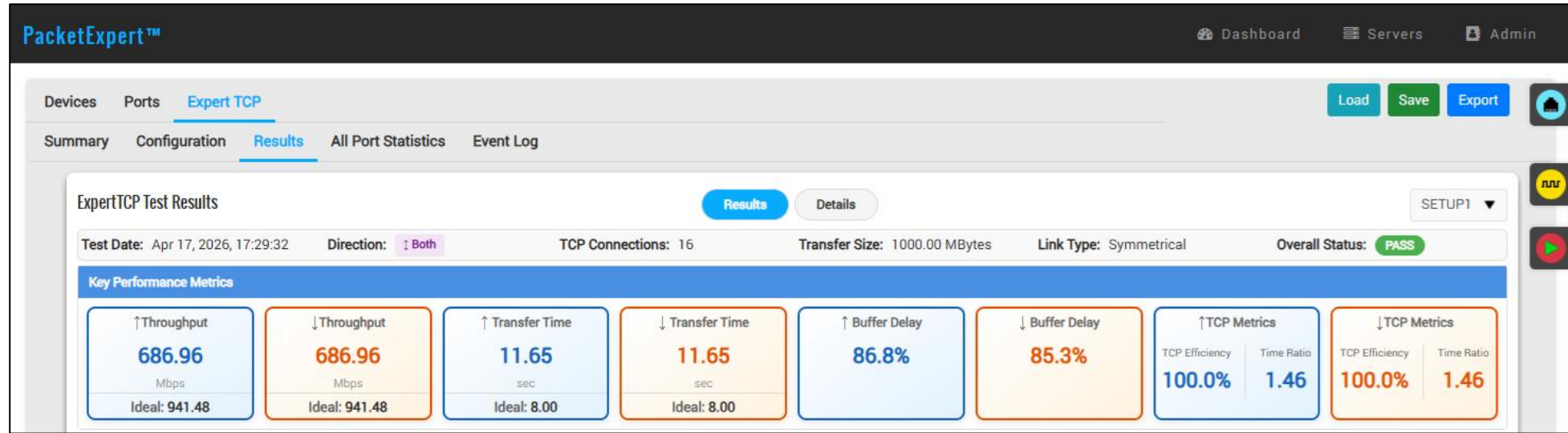
Transfer Size: Size Time

TCP Port Configuration

Connections: 16

↑ Upstream Ports				↓ Downstream Ports			
#1	#2	#3	#4	#1	#2	#3	#4
5001	5002	5003	5004	6001	6002	6003	6004
#5	#6	#7	#8	#5	#6	#7	#8
5005	5006	5007	5008	6005	6006	6007	6008
#9	#10	#11	#12	#9	#10	#11	#12
5009	5010	5011	5012	6009	6010	6011	6012
#13	#14	#15	#16	#13	#14	#15	#16
5013	5014	5015	5016	6013	6014	6015	6016

Key Performance Metrics



- Throughput - the maximum possible TCP throughput for the given CIR
- Transfer Time - the time taken to transfer the test data size at the ideal throughput
- Buffer Delay - measure of how much the RTT increases during the actual TCP Throughput test compared to the Baseline RTT
- TCP Efficiency - measure of the number of Transmitted bytes compared to the retransmitted bytes
- TCP Metrics Time Ratio - Measure of how much Actual transfer time is greater than the Ideal transfer time

Test Summary

Test Summary		
Parameter	↑ Upstream	↓ Downstream
Baseline RTT (msec)	0.068	0.068
Calculated BDP (KBytes)	8,474	8,472
TCP cwnd (Bytes)	65,535	65,535
TCP rwnd (Bytes)	65,535	65,535
Path MTU (Bytes)	1,500	1,500
MSS Used (Bytes)	1,460	1,460
No of TCP Connection	16	16

Throughput Results

- Displays per-connection TCP throughput statistics for both **upstream** and **downstream** directions, including **average**, **minimum**, and **maximum throughput**, along with RTT measurements and retransmission metrics for performance validation
- Provides detailed transmission statistics such as Tx/Rx frames and bytes, enabling users to analyze connection-level efficiency, packet behavior, and overall TCP test performance across multiple configured sessions

PacketExpert™ Dashboard Servers Admin

Devices Ports **Expert TCP** Load Save Export

Summary Configuration **Results** All Port Statistics Event Log

ExpertTCP Connection Details Results **Details** SETUP1

Connection	Time (sec)	Direction	Retransmitted Frames	Retransmitted Bytes	Retransmission %	RTT (msec)			Throughput (Mbps)			Tx Frames	Rx Frames	Tx Bytes
						Avg	Min	Max	Avg	Min	Max			
#1	00:00:10	↑	0	0	0	0.125	0.049	0.14	42.845	42.845	107.946	37,036	37,036	53,621,140
		↓	0	0	0	0.129	0.075	0.139	43.043	43.043	108.573	37,292	37,292	53,868,748
#2	00:00:10	↑	0	0	0	0.125	0.046	0.14	42.845	42.845	107.978	37,090	37,090	53,621,140
		↓	0	0	0	0.129	0.073	0.139	43.043	43.043	122.933	37,900	37,900	53,868,748
#3	00:00:10	↑	0	0	0	0.125	0.087	0.14	42.845	42.845	108.01	37,086	37,086	53,620,064
		↓	0	0	0	0.129	0.064	0.139	43.043	43.043	122.944	37,915	37,915	53,868,748
#4	00:00:10	↑	0	0	0	0.125	0.071	0.14	42.844	42.844	108.042	37,084	37,084	53,619,692
		↓	0	0	0	0.129	0.062	0.139	43.043	43.043	122.954	37,912	37,912	53,868,748
#5	00:00:10	↑	0	0	0	0.125	0.072	0.14	42.844	42.844	108.074	37,077	37,077	53,619,692
		↓	0	0	0	0.129	0.06	0.139	43.043	43.043	122.954	37,882	37,882	53,868,748
#6	00:00:10	↑	0	0	0	0.125	0.069	0.14	42.845	42.845	108.106	37,076	37,076	53,619,692
		↓	0	0	0	0.129	0.058	0.139	43.044	43.044	122.965	37,892	37,892	53,868,748
#7	00:00:10	↑	0	0	0	0.125	0.115	0.14	42.845	42.845	108.138	37,084	37,084	53,619,692
		↓	0	0	0	0.129	0.056	0.139	43.044	43.044	122.975	37,929	37,929	53,868,748
#8	00:00:10	↑	0	0	0	0.125	0.115	0.14	42.845	42.845	108.17	37,079	37,079	53,619,692
		↓	0	0	0	0.129	0.054	0.14	43.044	43.044	122.986	37,896	37,896	53,868,748
#9	00:00:10	↑	0	0	0	0.125	0.115	0.14	42.845	42.845	108.191	37,078	37,078	53,619,692
		↓	0	0	0	0.129	0.051	0.139	43.044	43.044	122.986	37,898	37,898	53,868,748
#10	00:00:10	↑	0	0	0	0.125	0.063	0.14	42.845	42.845	108.223	37,076	37,076	53,619,692
		↓	0	0	0	0.129	0.045	0.139	43.044	43.044	122.996	37,900	37,900	53,868,748
#11	00:00:10	↑	0	0	0	0.125	0.063	0.14	42.845	42.845	108.255	37,082	37,082	53,619,692
		↓	0	0	0	0.129	0.042	0.139	43.044	43.044	123.007	37,920	37,920	53,868,748
#12	00:00:10	↑	0	0	0	0.125	0.063	0.14	42.845	42.845	108.287	37,090	37,090	53,619,692
		↓	0	0	0	0.129	0.04	0.139	43.044	43.044	123.007	37,901	37,901	53,868,748
#13	00:00:10	↑	0	0	0	0.125	0.057	0.14	42.845	42.845	108.319	37,092	37,092	53,619,692
		↓	0	0	0	0.129	0.031	0.139	43.044	43.044	123.017	37,895	37,895	53,868,748
#14	00:00:10	↑	0	0	0	0.125	0.055	0.14	42.845	42.845	108.35	37,085	37,085	53,619,692
		↓	0	0	0	0.129	0.031	0.139	43.044	43.044	123.028	37,900	37,900	53,868,748
#15	00:00:10	↑	0	0	0	0.125	0.053	0.14	42.845	42.845	122.483	37,085	37,085	53,619,692
		↓	0	0	0	0.129	0.031	0.139	43.044	43.044	123.028	37,923	37,923	53,868,748
#16	00:00:10	↑	0	0	0	0.125	0.051	0.14	42.845	42.845	122.494	37,118	37,118	53,619,692
		↓	0	0	0	0.129	0.091	0.139	43.044	43.044	123.038	38,503	38,503	53,867,776

Port Statistics

PacketExpert™ Dashboard Servers Admin

Devices Ports **Expert TCP** Load Save Export

Summary Configuration Results **All Port Statistics** Event Log

Description	Device1 / Port1	Reset	Device1 / Port2	Reset	Device1 / Port2	Reset	Device1 / Port1	Reset
	Tx		Rx		Tx		Rx	
Link Utilization (%)	0.000		0.000		0.000		0.000	
Data Rate (Gbps)	0.000		0.000		0.000		0.000	
Bad Frames	0		0		0		0	
Non Test Frames	-		0		-		0	
FCS Error Frames	-		0		-		0	
IP Checksum Errors	-		0		-		0	
UDP Checksum Errors	-		0		-		0	
Total Frames	1,187,810		172,652,010		172,652,025			
Valid Frames	1,187,810		172,652,010		172,652,025			
Number Of Bytes	941,065,098		137,085,640,752		137,085,641,810			
Frame Rate (frames/sec)	0		0		0			
Broadcast Frames	1		0		1			
Multicast Frames	0		0		0			
Control Frames	0		0		0			
VLAN Frames	0		0		0			
Pause Frames	0		0		0			
Undersized Frames	0		0		0			
64 Bytes Length	1		2		1			
65-127 Byte Length	595,311		86,326,028		86,326,044			

Continued

128-255 Byte Length	0	0	0	0
256-511 Bytes Length	15	16	16	15
512-1023 Bytes Length	1	0	0	1
1024-1518 Byte Length	592,482	86,325,964	86,325,964	595,231
Oversized Frames	0	0	0	0
1 Level Stacked VLAN Frames	-	0	-	0
2 Level Stacked VLAN Frames	-	0	-	0
3 Level Stacked VLAN Frames	-	0	-	0
1 Level Stacked MPLS Frames	-	0	-	0
2 Level Stacked MPLS Frames	-	0	-	0
3 Level Stacked MPLS Frames	-	0	-	0
IPv4 Packets	-	172,652,008	-	1,187,793
IPv6 Packets	-	0	-	0
TCP Packets	-	172,652,008	-	1,187,793
ICMP Packets	-	0	-	0
IGMP Packets	-	0	-	0
IGRP Packets	-	0	-	0
Other Protocol IP Packets	-	0	-	0
UDP Packets	-	0	-	0

Thank You