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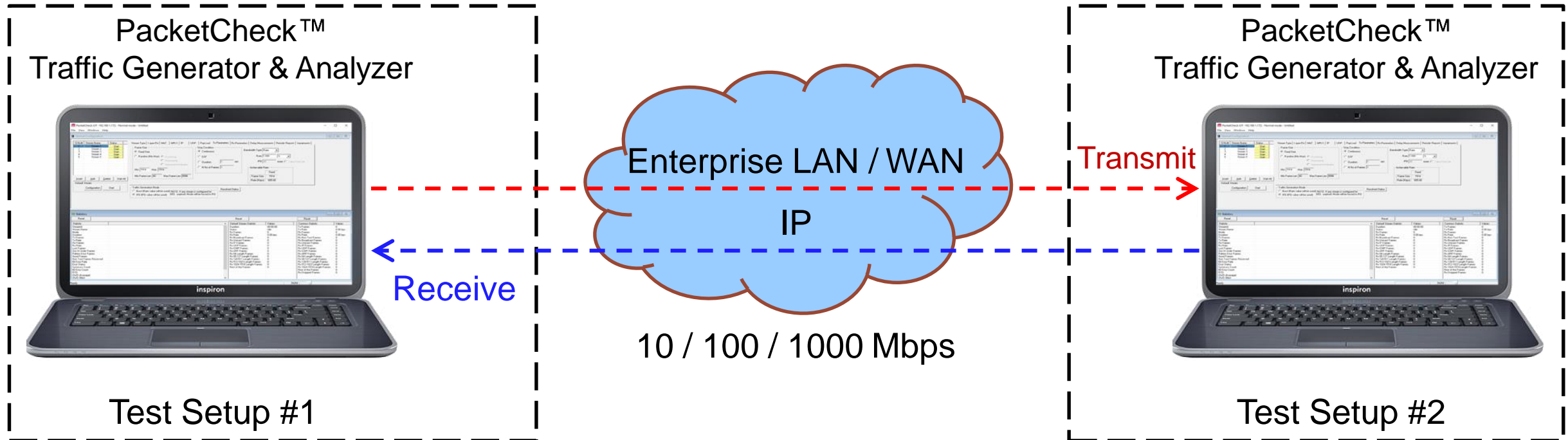
# PacketCheck™ – Software Ethernet Tester

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# PacketCheck™- Ethernet / IP Test Tool

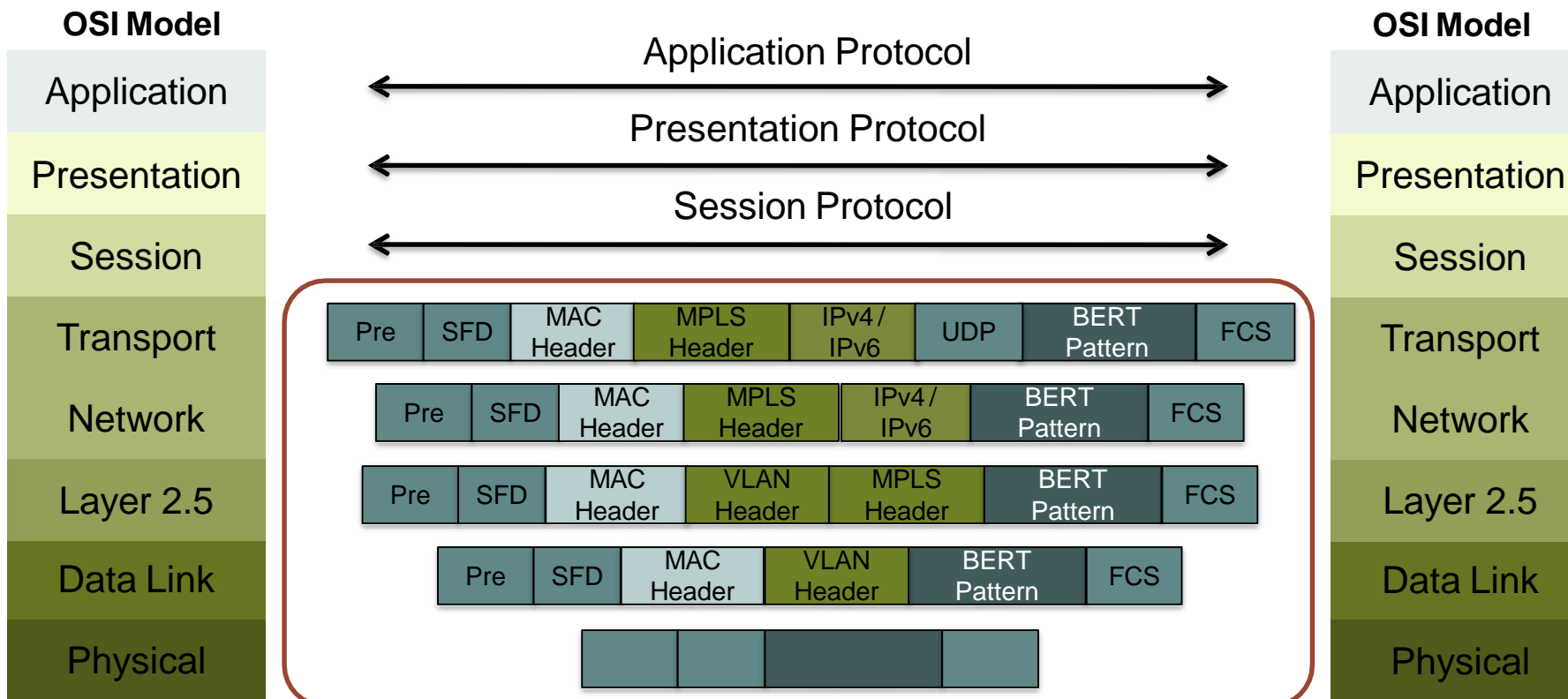


- PacketCheck™ uses the PC's network interface card to transmit and receive Ethernet or IP packets
- Bit Error Rates (BER) and throughputs and Delay, Impairment (up to 500 Mbps) can be easily tested
- Generates multi-stream Ethernet / IP / UDP traffic as well single-stream physical layer traffic
- Measures end to end performance such as bit error rate, total packets, packet loss, out of sequence packets, errored packets, Round Trip Delay, and One Way Delay (within the same PC)

# Applications

- What is the maximum IP bandwidth between your branch offices?
- What is the round-trip delay between two IP addresses with microsecond accuracy?  
Between two Ethernet MAC addresses?
- Is your LAN switch dropping packets? Introducing errors? Blocking traffic because it's overloaded?
- Is your CAT 5 or CAT 6 wiring deteriorating? Introducing errors?
- Need to find out your bandwidth between enterprise locations? Traffic overload?  
Throughput? Error rates? Delay?

# Testing at Layer 1, 2, 3, & 4 of OSI Model



## Host A

Preamble – 7 Bytes  
 Start Frame Delimiter – (SFD)- 1 Byte  
 MAC Header –  
 • Dest/Src MAC Address – 6 Bytes  
 • EtherType field – 2 Bytes  
 (0x0800) IP  
 VLAN Header - 4 bytes each

## Framing Representation

MPLS Header - 4 bytes each  
 IP Header – 20 Bytes  
 UDP Header – 8 Bytes  
 Payload – BER Test Pattern  
 Frame Check Sum – (FCS) – 4 Bytes

Ethernet  
 Payload

## Host B

# Main Features

- Capability to test Ethernet traffic of up to 500 Mbps bandwidth. Supports minimum line rate of 64 Bps
- Generate full duplex traffic at any of the four layers (Layer1, Layer2 (Ethernet) with stacked VLAN/ MPLS, Layer3 (IPv4), Layer4 (UDP)) with on-demand bandwidth
- Create multiple streams of traffic for network testing from layer 2, 3, or 4
- Bit Error Rate Testing for checking networks for dropped packets, out-of-order, non-test frames, and so on. Write packet errors to an error log
- Determine Round Trip Delay (RTD) between two IP addresses or two Ethernet MAC addresses with microsecond accuracy
- Determine One Way Delay (OWD) between two NIC cards on the test PC with microseconds accuracy
- Record test traffic in binary and/or PCAPNG or NTAR file format
- Playback PCAPNG files for test traffic generation. Either recorded from test BERT traffic or recorded traffic of interest
- Record non-test packets to a PCAPNG file. i.e. Non-BERT traffic related packets
- Provides options to record unidentified network traffic which does not belongs to any user defined stream into a PCAP or HDL file format and analyze the recorded traffic in Wireshark® or PacketScan™ application
- Generate and verify PRBS patterns such as QRSS,  $2^6-1$ ,  $2^9-1$ ,  $2^{11}-1$ ,  $2^{15}-1$ ,  $2^{20}-1$ , &  $2^{23}-1$
- Measures bit error rate, synchronization status, throughput, packet loss, out of order packets, round trip delay, etc.
- Impair traffic such as inserting, deleting or changing bytes
- Supports jumbo frames in addition to all normal frame sizes from 64 bytes to 1518 bytes

# Main Features (Contd.)

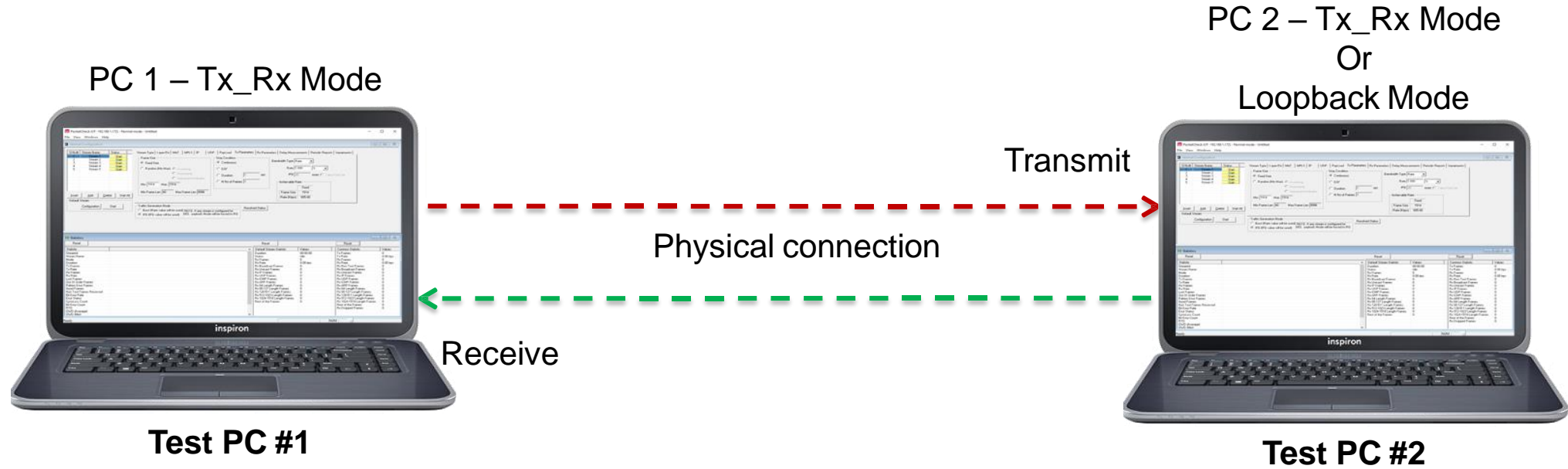
- Ability to append Zero-Padding bytes to outgoing frames to test router interoperability with packet sizes less than 60 bytes, ensuring that routers handle small packets correctly.
- Customizable protocol headers like MAC source / destination address, EtherType field, IP source / destination address, and UDP source / destination port
- Create multiple full-duplex streams per PacketCheck™ easily
- Each stream can be configured as Transmit Only, Receive Only, or Transmit and Receive
- Ability to copy from one stream to another (both one-to-one copy and one-to-many copy) to quickly configure multiple streams
- Ability to resolve IP Address to MAC address (based on Address Resolution Protocol (ARP)) for all streams with a single click, so that all streams are configured properly before starting the test
- Populate switch/router MAC tables and routing tables using the Resolve all streams feature before the starting the test to avoid unnecessary flooding
- Independently define each stream to operate as Layer2 (Ethernet) or Layer3 (IP) or Layer4 (UDP)
- For Layer3 or Layer4 streams, analyzes the received payload based on the IP or UDP length and ignore any MAC padded bytes added in transit
- Define the frame size/rate to be generated for each stream Independently
- Jumbo frames also supported (depending on the NIC card support for Jumbo frames)

# Main Features (Contd.)

- Up to 500 Mbps total combined rate (all streams combined) is possible
- The transmission rate can be configured to operate in 2 modes – Burst mode or Inter Frame Gap (IFG) mode
- In Burst mode, each stream's rate can be set in Mbps, Kbps, etc.
- In IFG mode, the Inter Frame gap in milliseconds can be configured. The estimated rate achievable based on the IFG and the frame size is displayed for user convenience
- Burst mode tries to generate traffic with the configured rate, but also as smoothly and evenly distributed so that the Device Under Test (DUT) node buffers do not overflow due to a temporary spike in the peak traffic
- Frame sizes from 22 bytes up to 1518 supported
- Use a full-featured version or a loopback only version (with address swapping) at node endpoints
- Capability to generate/respond to ARP requests, making it easy to work with Routers
- Provides user configurable Packet Length for OWD and RTD
- Generate reports in XML or PDF formats
- Support to configure IP Protocol Type from 0 to 255
- Multiple Instances – run multiple instances on a single PC to utilize all available NIC cards

# BER Test Setup at Layer 1

**Scenario 1: Source & destination PCs connected using Ethernet cable**

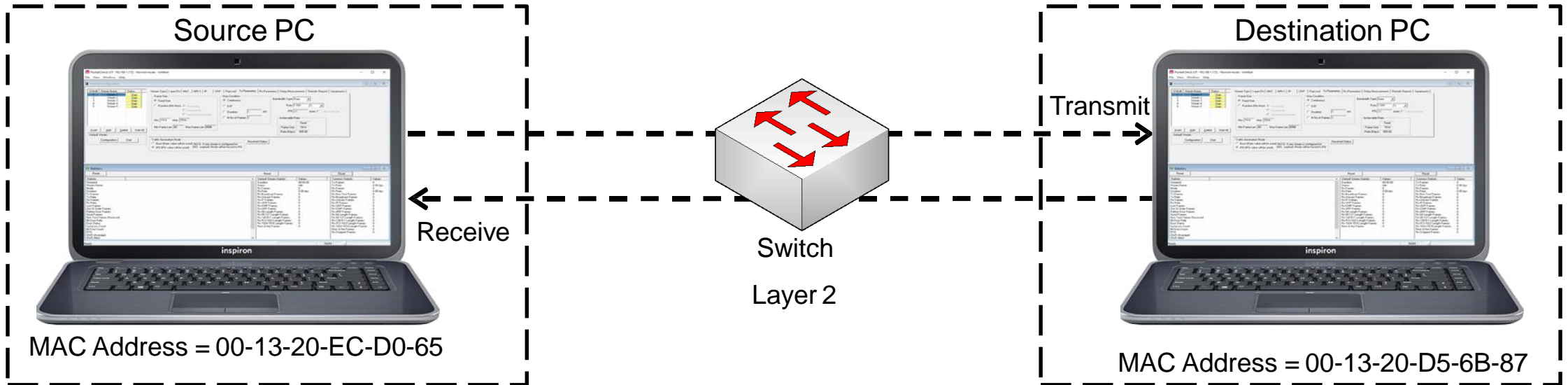


- The PCs are connected using an Ethernet cable. The payload includes PRBS and fixed patterns



# BER Test Setup at Layer 2

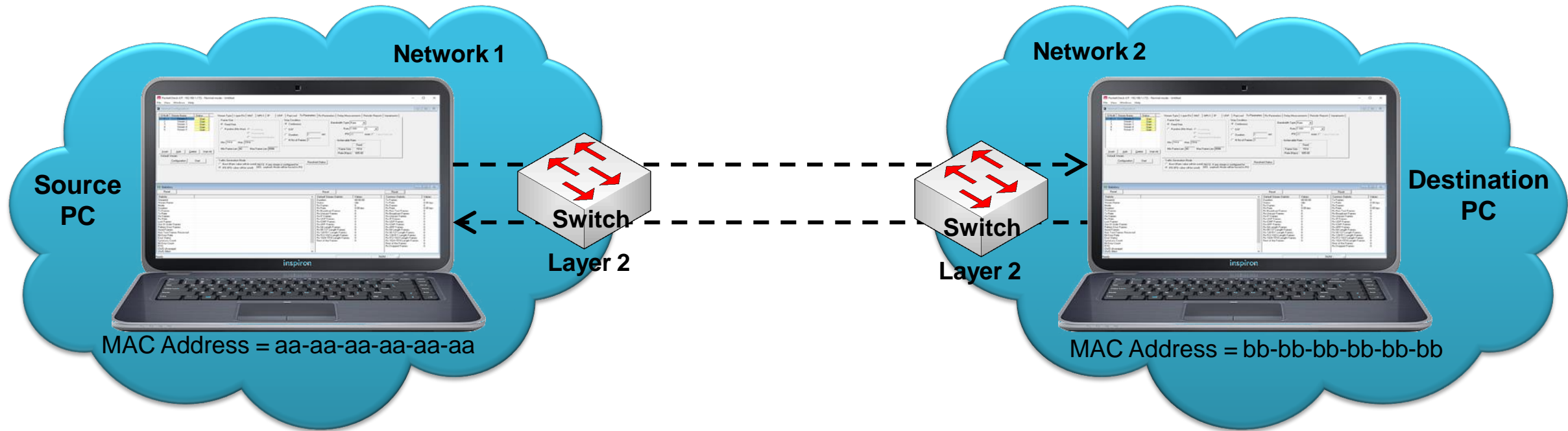
**Scenario 2: Source & destination PCs on the same LAN, connected by a switch**



- The PCs are connected through a switch, which routes the packets based on the MAC address

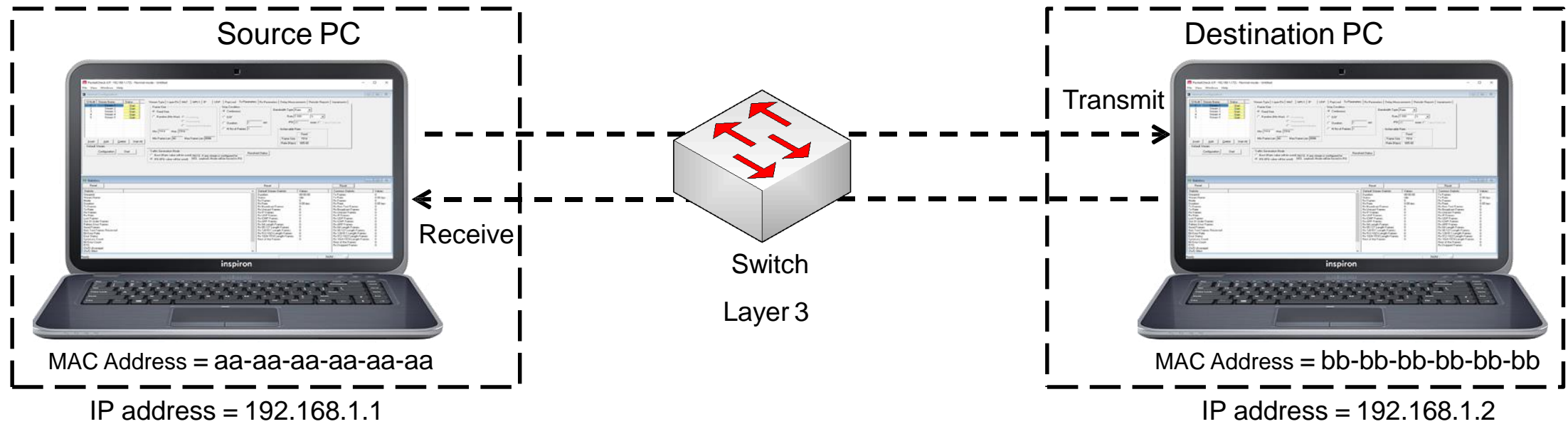
# BER Test Setup at Layer 2

**Scenario 3: Source & destination PCs located in different LANs connected through multiple switches**



# BER Test Setup at Layer 3 / 4

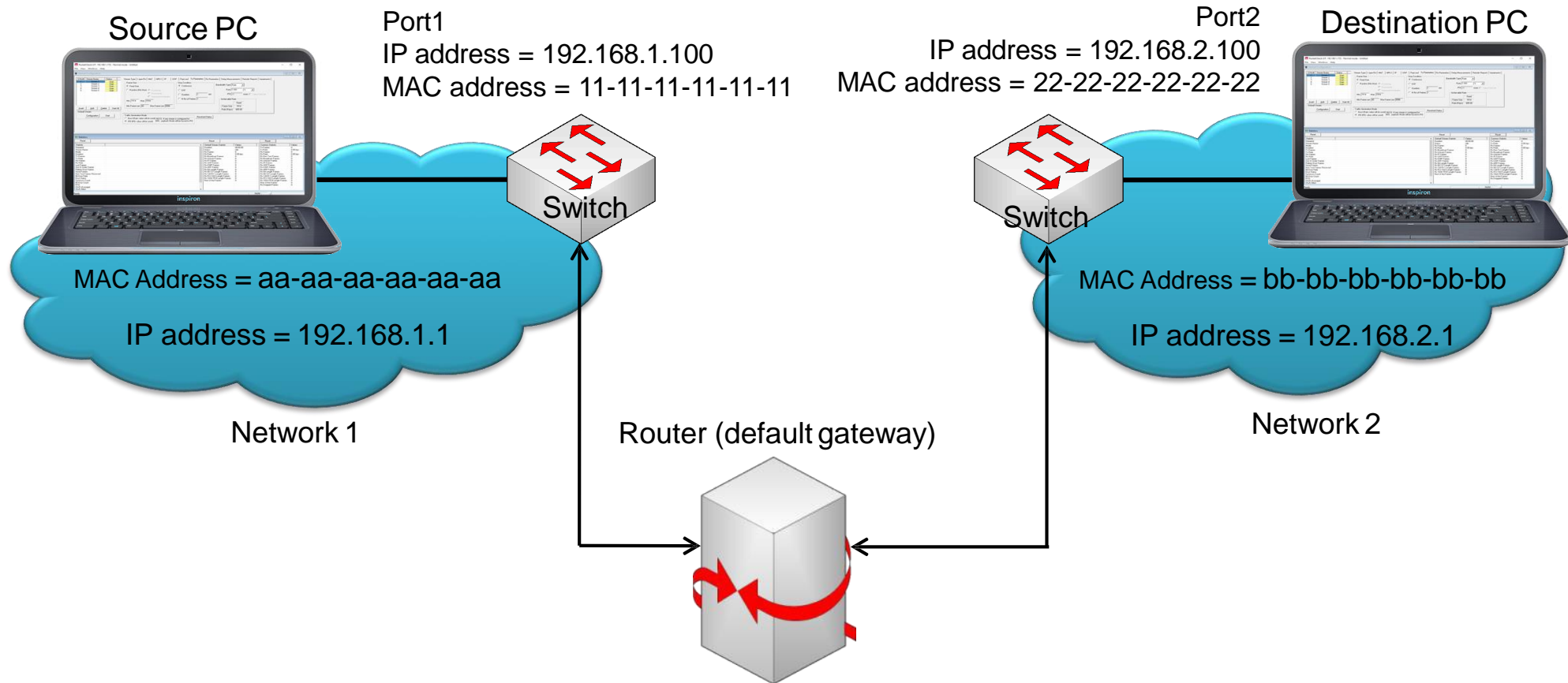
**Scenario 4: Source & destination PCs are located within the same IP Network**



- Packets route between the source and destination PCs based on both the IP address and MAC address

# BER Test Setup at Layer 3 / 4

## Scenario 5 : Source & destination PCs located on different IP Networks



- Source and destination PCs are located in different IP networks connected via routers

# Initialization Configuration

PacketCheck - Initial config

Mode Selection

☒ Normal ☐ Loopback

I/F Selection

Intel(R) Ethernet Connection I217-V [192.168.1.23]

Start Packet Check

Name: \\Device\\NPF\_{C0469574-F48E-4698-97DF-B237037F1F9A}

Description: Intel(R) Ethernet Connection I217-V

MAC Address: fc-aa-14-9c-fa-b9

IP Address: 192.168.1.23

Link Type: Ethernet (802.3)

Current Link Speed: 1000 Mbps

Max Payload Size: 1500 bytes

Media State: Connected

- PacketCheck™ operates in normal and loopback mode
- Verify interface, IP and MAC address
- PacketCheck™ PC configuration file is automatically generated containing initial configuration parameters displayed in the GUI

# Stream Types Selection

Normal Configuration

Sl No#	Stream Name	Status
1	Stream1	Start

Insert Add Delete Start/Stop

Default Stream

Configuration Start

Stream Type

Layer/Dir MAC MPLS IP UDP PayLoad Tx Parameters Rx Parameters Delay Measurements Periodic Reports Impairments

Stream Type

Type User Defined

User Defined

File Based File Based

FileType HDL

File Name

Traffic Generation Mode

☒ Burst (Rate value will be used)

☐ IFG (IFG value will be used)

Resolved Status Apply Stream Parameters

# File Based Stream Type

- Allows to specify a source file for the stream, this source file can be PCAP or HDL file format
- In File Based option the default mode is set to Tx and all the other configurations will be disabled as it is not required in File Based option

The screenshot shows the 'Normal Configuration' window. On the left, there is a table with columns 'SI No#', 'Stream Name', and 'Status'. The first row contains '1', 'Stream1', and 'Start'. Below the table are buttons for 'Insert', 'Add', 'Delete', and 'Start/Stop'. Underneath these is a 'Default Stream' section with 'Configuration' and 'Start' buttons. On the right, there is a tabbed interface with tabs for 'Stream Type', 'Layer/Dir', 'MAC', 'MPLS', 'IP', 'UDP', 'PayLoad', 'Tx Parameters', 'Rx Parameters', 'Delay Measurements', 'Periodic Reports', and 'Impairments'. The 'Stream Type' tab is active and highlighted with a red box. Inside this tab, the 'Type' dropdown is set to 'File Based'. Below it, the 'File Based' section contains a 'FileType' dropdown set to 'HDL' and a 'File Name' text field with the path 'C:\Program Files (x86)\GL Communication' and a browse button. At the bottom right, there is a 'Traffic Generation Mode' section with two radio buttons: 'Burst (Rate value will be used)' (which is selected) and 'IFG (IFG value will be used)'. To the right of this are 'Resolved Status' and 'Apply Stream Parameters' buttons.

SI No#	Stream Name	Status
1	Stream1	Start

Stream Type | Layer/Dir | MAC | MPLS | IP | UDP | PayLoad | Tx Parameters | Rx Parameters | Delay Measurements | Periodic Reports | Impairments

Stream Type

Type: File Based

File Based

FileType: HDL

File Name: C:\Program Files (x86)\GL Communication

Insert | Add | Delete | Start/Stop

Default Stream

Configuration | Start

Traffic Generation Mode

☒ Burst (Rate value will be used)

☐ IFG (IFG value will be used)

Resolved Status | Apply Stream Parameters

# User Defined Stream Type

- Allows to define the stream parameters such as Layer, Ethernet/IP/UDP Headers, Frame Size, Rate, Payload etc. and the PacketCheck™ generates/analyzes the stream traffic as per these parameters.

The screenshot shows the 'Normal Configuration' window. On the left is a table with columns 'SI No#', 'Stream Name', and 'Status'. The first row contains '1', 'Stream1', and 'Start'. Below the table are buttons for 'Insert', 'Add', 'Delete', and 'Start/Stop'. Under 'Default Stream' are 'Configuration' and 'Start' buttons. The main area has tabs for 'Stream Type', 'Layer/Dir', 'MAC', 'MPLS', 'IP', 'UDP', 'PayLoad', 'Tx Parameters', 'Rx Parameters', 'Delay Measurements', 'Periodic Reports', and 'Impairments'. The 'Stream Type' tab is active, showing a 'Type' dropdown menu with 'User Defined' selected (highlighted with a red box). Below it is a 'File Based' section with a 'FileType' dropdown set to 'HDL' and a 'File Name' text field with a browse button. At the bottom, the 'Traffic Generation Mode' section has two radio buttons: 'Burst (Rate value will be used)' (selected) and 'IFG (IFG value will be used)'. To the right of these are 'Resolved Status' and 'Apply Stream Parameters' buttons.

SI No#	Stream Name	Status
1	Stream1	Start

Stream Type | Layer/Dir | MAC | MPLS | IP | UDP | PayLoad | Tx Parameters | Rx Parameters | Delay Measurements | Periodic Reports | Impairments

Stream Type

Type: User Defined

File Based

FileType: HDL

File Name:

Insert | Add | Delete | Start/Stop

Default Stream

Configuration | Start

Traffic Generation Mode

☒ Burst (Rate value will be used)

☐ IFG (IFG value will be used)

Resolved Status | Apply Stream Parameters



# Layer 1 Single-stream Generation

PacketCheck (I/F -192.168.1.112) - Normal mode - Config2

File View Windows Help

### Normal Configuration

SI No#	Stream Name	Status
1	Stream1	Stop

Single Stream Selection

Stream Type: Layer/Dir | MAC | MPLS | IP | UDP | PayLoad | Tx Parameters | Rx Parameters | Delay Measurements | Periodic Reports | Impairment:

Layer: Dir [Tx\_Rx] | Layer 2 [Ethernet] | Layer 2.5 [None] | Layer 3 [None] | Layer 4 [None]

Layer 2.5, 3, 4 are set to None

Default Stream Configuration: Configuration | Start

Traffic Generation Mode: ☒ Burst (Rate value will be used) | ☐ IFG (IFG value will be used)

Resolved Status | Apply Stream Parameters

### Statistics

Reset | ☒ Show Default Stream

Statistics	StreamId
Stream Name	Stream1
Mode	Tx_Rx
Duration	00:00:15
Tx Total Frames	622
Tx BERT Frames	622
Tx Rate	493.32 Kbps
Tx RTD Frames	0
Tx DWD Frames	0
Rx Total Frames	615
Rx BERT Frames	615
Rx Rate	490.20 Kbps
Rx RTD Frames	0
Rx DWD Frames	0
Lost Frames	0
Out Of Order Frames	0
Pattern Error Frames	0
Good Frames	0
Non Test Frames Received	0
Bit Error Rate	0.00E+00
Error Status	SYNC
SyncLoss Count	0
Bit Error Count	0
RTD	-NA-
DWD (Average)	-NA-
DWD (Min)	-NA-
DWD (Max)	-NA-
UDP Checksum Error Frames	0
Zero UDP Checksum Packet	0
HDL/PCAP File Recording ...	Idle
Binary File Recording Status	Idle

Test Statistics

PacketCheck Reset	NIC Reset	Other Reset
Default Stream Statistics	PacketCheck Tx	PacketCheck Rx
Total Frames	0	741175
Rate	0.00 bps	0.00 bps
Non Test Frames	-NA-	-NA-
IP Frames	0	741175
UDP Frames	0	0
TCP Frames	0	0
ICMP Frames	0	0
IGMP Frames	0	0
Other L4 Protocol Frames	0	0
ARP Request Frames	0	0
ARP Response Frames	0	0
Other Frames	0	0
Broadcast Frames	0	0
Unicast Frames	0	0
Multicast Frames	0	0
64 Length Frames	0	0
65_127 Length Frames	0	0
128_255 Length Frames	0	0
256_511 Length Frames	0	0
512_1023 Length Frames	0	0
1024_1518 Length Frames	0	0
> 1518 Length Frames	0	0
Status	Stopped	Stopped
Duration	00:54:15	00:54:15
File Recording Status	Idle	Idle

Default Stream Statistics

Cumulative Statistics	Tx	Rx
Total Frames	37429	986927
Rate	494.95 Kbps	488.89 Kbps
Non Test Frames	0	0
IP Frames	37179	876767
UDP Frames	7065	83651
TCP Frames	29490	43814
ICMP Frames	2	2
IGMP Frames	0	5600
Other L4 Protocol Frames	622	743700
ARP Request Frames	68	102927
ARP Response Frames	182	331
Other Frames	0	6902
Broadcast Frames	36	111683
Unicast Frames	37285	798340
Multicast Frames	108	76304
64 Length Frames	10457	116274
65_127 Length Frames	6657	48174
128_255 Length Frames	2599	23055
256_511 Length Frames	3976	25972
512_1023 Length Frames	2608	3897
1024_1518 Length Frames	11132	769555
> 1518 Length Frames	0	0

Cumulative Statistics

# Layer 2 / 3 / 4 Multi-stream Generation

PacketCheck (I/F - 192.168.1.112) - Normal mode - Config2

File View Windows Help

### Normal Configuration

SI No#	Stream Name	Status
1	Stream1	Stoo
2	Stream2	Stoo
3	Stream3	Stoo

Single Stream Selection

Insert Add Delete Start/Stop

Default Stream Configuration Start

Stream Type Layer/Di MAC MPLS IP UDP PayLoad Tx Parameters Rx Parameters Delay Measurements Periodic Reports Impairments

Stream Type Type User Defined

File Based File Type HDL File Name

Traffic Generation Mode ☒ Burst (Rate value will be used) ☐ IFG (IFG value will be used)

Resolved Status Apply Stream Parameters

### Statistics

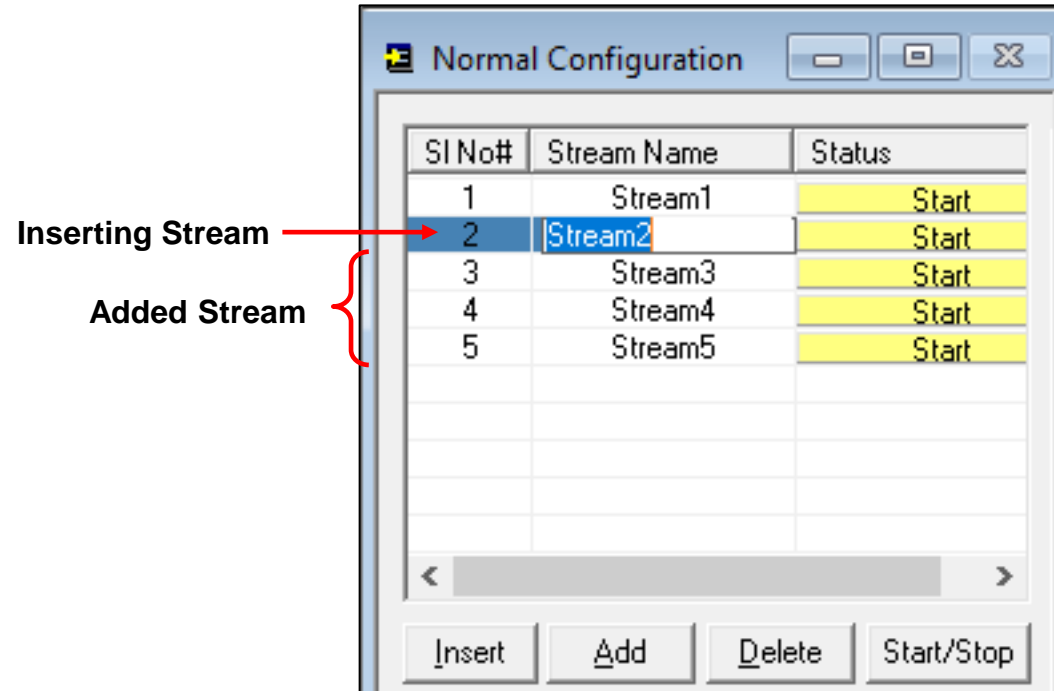
Reset ☒ Show Default Stream

Statistics	Stream1	Stream2	Stream3
StreamId	1	2	3
Stream Name	Stream1	Stream2	Stream3
Mode	Tx_Rx	Tx_Rx	Tx_Rx
Duration	00:00:18	00:00:18	00:00:18
Tx Total Frames	749	14915	14912
Tx BERT Frames	749	14915	14912
Tx Rate	494.93 Kbps	9.81 Mbps	9.81 Mbps
Tx RTD Frames	0	0	0
Tx OWD Frames	0	0	0
Rx Total Frames	743	0	0
Rx BERT Frames	743	0	0
Rx Rate	491.93 Kbps	0.00 bps	0.00 bps
Rx RTD Frames	0	0	0
Rx OWD Frames	0	0	0
Lost Frames	0	0	0
Out Of Order Frames	0	0	0
Pattern Error Frames	0	0	0
Good Frames	0	0	0
Non Test Frames Received	0	0	0
Bit Error Rate	0.00E+00	0.00E+00	0.00E+00
Error Status	SYNC	NO RX DATA	NO RX DATA
SyncLoss Count	0	0	0
Bit Error Count	0	0	0
RTD	-NA-	-NA-	-NA-
OWD (Average)	-NA-	-NA-	-NA-
OWD (Min)	-NA-	-NA-	-NA-
OWD (Max)	-NA-	-NA-	-NA-
UDP Checksum Error Frames	0	0	0
Zero UDP Checksum Packet	0	0	0
HDL/PCAP File Recording ...	Idle	Idle	Idle
Binary File Recording Status	Idle	Idle	Idle

Default Stream Statistics	PacketCheck Tx	PacketCheck Rx	NIC Tx	NIC Rx	Other Rx
Total Frames	741175	36807	140059	105078	
Rate	0.00 bps	0.00 bps	0.00 bps	0.00 bps	0.00 bps
Non Test Frames	-NA-	-NA-	-NA-	-NA-	-NA-
IP Frames	0	741175	36557	133015	1962
UDP Frames	0	7065	83632	19	
TCP Frames	0	0	29490	43781	33
ICMP Frames	0	0	2	2	0
IGMP Frames	0	0	0	5600	0
Other L4 Protocol Frames	0	741175	0	0	1910
ARP Request Frames	0	0	68	182	102745
ARP Response Frames	0	0	182	38	293
Other Frames	0	0	0	6824	78
Broadcast Frames	0	0	36	8655	103028
Unicast Frames	0	741175	36663	55100	2050
Multicast Frames	0	0	108	76304	0
64 Length Frames	0	0	10457	13235	103039
65_127 Length Frames	0	0	6657	48092	82
128_255 LengthFrames	0	0	2593	23047	8
256_511 Length Frames	0	0	3976	25956	16
512_1023 Length Frames	0	0	2608	3886	11
1024_1518 Length Frames	0	741175	10510	25843	1922
> 1518 Length Frames	0	0	0	0	0
Status	Stopped	-	Stopped	-	Stopped
Duration	00:54:15	-	00:54:15	-	00:54:15
File Recording Status	Idle	-	Idle	-	Idle

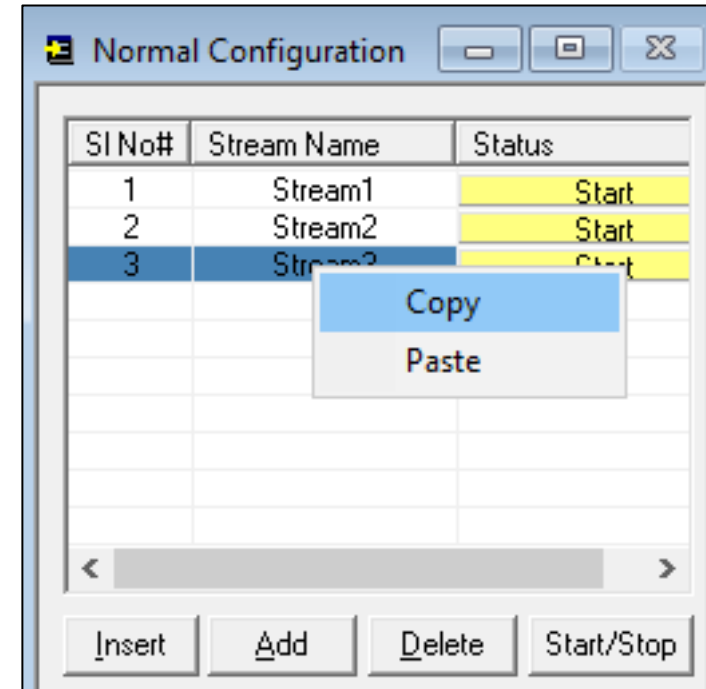
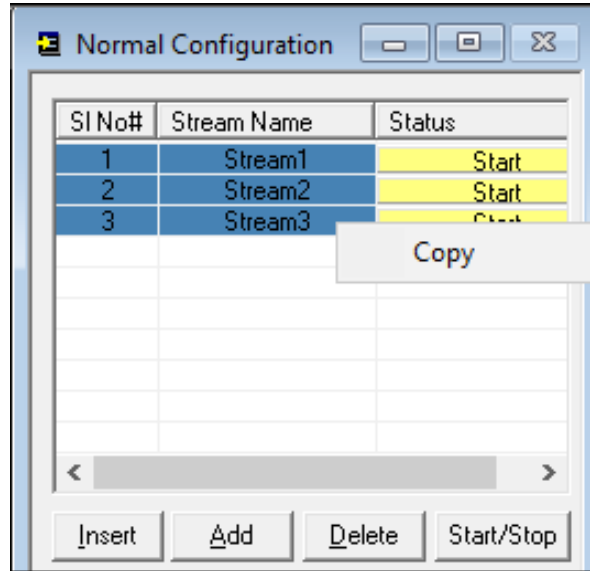
Cumulative Statistics	Tx	Rx
Total Frames	67383	987055
Rate	20.15 Mbps	489.31 Kbps
Non Test Frames	0	0
IP Frames	37306	876895
UDP Frames	7065	83651
TCP Frames	29490	43814
ICMP Frames	2	2
IGMP Frames	0	5600
Other L4 Protocol Frames	749	743828
ARP Request Frames	68	102927
ARP Response Frames	182	331
Other Frames	29827	6902
Broadcast Frames	36	111683
Unicast Frames	67239	795068
Multicast Frames	108	76304
64 Length Frames	10457	116274
65_127 Length Frames	6657	48174
128_255 LengthFrames	2593	23055
256_511 Length Frames	3976	25972
512_1023 Length Frames	2608	3897
1024_1518 Length Frames	41086	763683
> 1518 Length Frames	0	0

# Add / Insert / Delete Streams



- PacketCheck™ allows for multi-stream generation
- Each stream can be configured to Tx, Rx or both Tx\_Rx in layer 2, layer 3, and layer 4

# Copy and Paste Streams



- Provides options to copy from one stream to another (both one-to-one copy and one-to-many copy) to quickly configure multiple streams

# MAC / IP / UDP Configurations

Layer Dir: Tx Rx

Layer 2: Ethernet

Layer 2.5: MPLS

Layer 3: IP

Layer 4: UDP

Stream Type | Layer/Dir | **MAC** | MPLS | IP | UDP | PayLoad

Layer 2

Source MAC Addr: fc-aa-14-9c-bf-99 Use I/F Addr

Destination MAC Addr: FC-AA-14-9C-BF-99 Resolve

EtherType: 00-00 User defined

Stream Type | Layer/Dir | MAC | **MPLS** | IP | UDP | PayLoad | Tx Parameters | Rx Parameters | Delay Measurements | Periodic Reports | Impairments

MPLS Stack: 3

MPLS #1

Label: 564564 CoS: 1 TTL: 128

MPLS #2

Label: 765765 CoS: 5 TTL: 128

MPLS #3

Label: 234234 CoS: 7 TTL: 128

Stream Type | Layer/Dir | MAC | MPLS | **IP** | UDP | PayLoad | Tx Parameters | Rx Parameters | Delay Measurements | Periodic Reports | Impairments

Source

Source IP Address: 192 . 168 . 1 . 88 Use I/F Address

Subnet Mask: 225 . 225 . 225 . 0

IP Spoofing

☐ Enable Start: 0 End: 0

Destination

Destination IP address: 192 . 168 . 1 . 176 Ping

Default Gateway: 0 . 0 . 0 . 0 ☐ Enable

TOS/DS: 00 TTL: 128 Protocol: 17

☐ Build MAC Header Automatically

☐ Increment Identification Initial Value: 0

Stream Type | Layer/Dir | MAC | MPLS | IP | **UDP** | PayLoad

Source Port: 4000

Destination Port: 5000

☐ Configure Checksum: 00 00

# Payload

The screenshot shows the 'Payload' tab in a software interface. The 'Source' section is highlighted with a red box. It contains a 'Source Type' dropdown menu set to 'Fixed Pattern', a 'PRBS Pattern' dropdown menu set to 'QRSS', and an 'Invert Pattern' checkbox. To the right of these is a 'Fixed Pattern' text field containing 'AB CD EF'. Below the 'Source' section, there are three checked options: 'Enable Sequence Number' (with 'Up Count' selected), 'Enable Magic Pattern' (with a default hexadecimal value), and 'Enable Payload Length'.

## Payload Source Types –

- Fixed Patterns – pattern repeats throughout the packet's payload. Configure test pattern of 2 bytes. Eg: AB-CD, BD-EF, and so on to achieve pattern sync
- PBRs Patterns - generates PRBS patterns e.g. QRSS,  $2^6-1$ ,  $2^9-1$ ,  $2^{11}-1$ ,  $2^{15}-1$ ,  $2^{20}-1$ , and  $2^{23}-1$

The screenshot shows the 'Payload' tab in a software interface. The 'Source' section is highlighted with a red box. It contains a 'Source Type' dropdown menu set to 'PRBS Pattern', a 'PRBS Pattern' dropdown menu set to 'QRSS', and an 'Invert Pattern' checkbox. To the right of these is a 'Fixed Pattern' text field containing 'ab cd ef'. Below the 'Source' section, there are three checked options: 'Enable Sequence Number' (with 'Up Count' selected), 'Enable Magic Pattern' (with a default hexadecimal value), and 'Enable Payload Length'.

# Tx and Rx Parameters

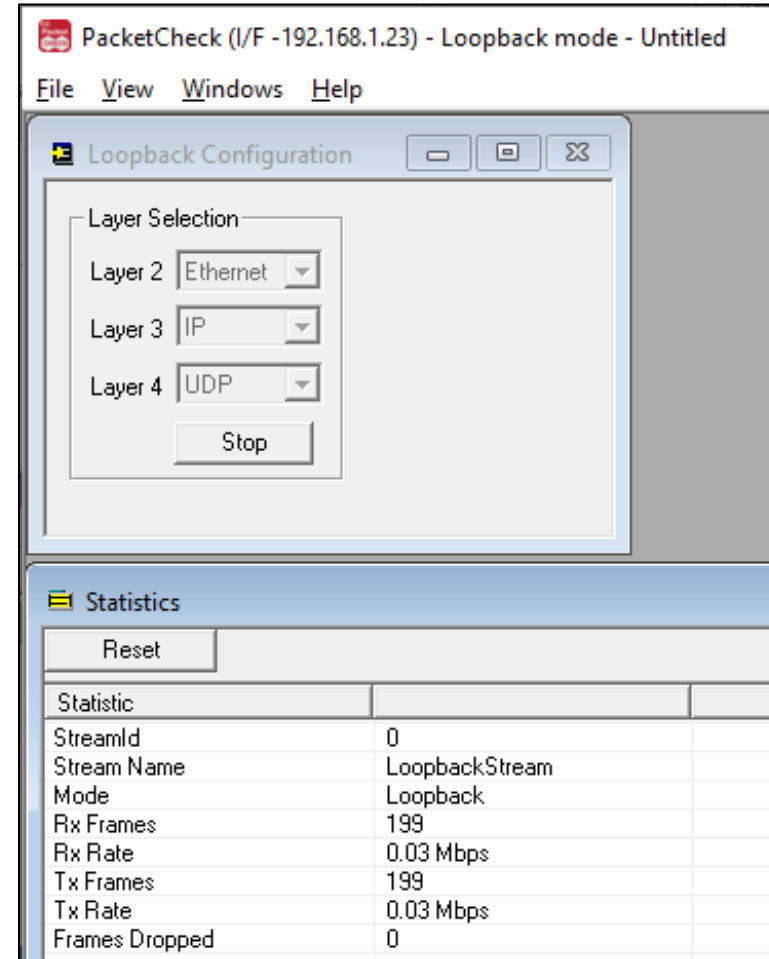
- Tx streams can be set to transmit frame with fixed / random sizes, specific duration, count, IFG, and rate
- Rx streams can be set to generate Binary, HDL (GL proprietary), PCAP (Wireshark®) file formats, and BERT log files
- Stop conditions to limit the fixed / PBRs pattern file transmission and logging of the received patterns to a defined file
- Zero-Padding bytes can be appended to outgoing frames to test router interoperability with packet sizes less than 60 bytes, ensuring that routers handle small packets correctly

The screenshot shows the 'Tx Parameters' tab in a software interface. The 'Frame Size' section has 'Fixed Size' selected. The 'Zero Padding' section is checked, with 'Frame Size Range' set to 'Range(68 - 8996)', 'Min' at 68, 'Max' at 1514, and 'Post Padding Frame Size' at 120. The 'Stop Condition' section has 'Continuous' selected. The 'Bandwidth Type' is set to 'Rate' with a value of 10.00. The 'Traffic Generation Mode' section has 'Burst (Rate value will be used)' selected. Buttons for 'Resolved Status' and 'Apply Stream Parameters' are visible.

The screenshot shows the 'Rx Parameters' tab in a software interface. The 'Record To Binary File' and 'Generate Bert Log' options are checked, both pointing to 'C:\Program Files (x86)\GL Communica...'. The 'Record To File' section has 'HDL' selected, pointing to 'C:\Program Files (x86)\GL Communications Inc\t...'. The 'Stop Condition' section has 'Duration' selected with a value of 360000 sec. The 'Traffic Generation Mode' section has 'Burst (Rate value will be used)' selected. Buttons for 'Resolved Status' and 'Apply Stream Parameters' are visible.

# Loopback Mode

- PacketCheck™ can operate in Loopback mode.  
PacketCheck™ can perform loopback at the Ethernet, IP and UDP levels





# Statistics

## Normal Mode

Statistics					
Reset		<input checked="" type="checkbox"/> Show Default Stream			
Statistics					
StreamId	1	2	3	4	
Stream Name	Stream1	Stream2	Stream3	Stream4	
Mode	TX_RX	TX_RX	TX_RX	TX_RX	
Duration	00:01:16	00:01:16	00:01:16	00:01:16	
Tx Total Frames	3077	55647	59683	60010	
Tx BERT Frames	3077	55647	59683	60010	
Tx Rate	488.24 Kbps	8.84 Mbps	9.52 Mbps	9.53 Mbps	
Tx RTD Frames	0	0	0	0	
Tx QWD Frames	0	0	0	0	
Rx Total Frames	3091	6132	6132	6132	
Rx BERT Frames	3091	6132	6132	6132	
Rx Rate	491.17 Kbps	976.27 Kbps	976.27 Kbps	976.27 Kbps	
Rx RTD Frames	0	0	0	0	
Rx QWD Frames	0	0	0	0	
Lost Frames	0	0	0	0	
Out Of Order Frames	0	0	0	0	
Pattern Error Frames	0	0	0	0	
Good Frames	0	0	0	0	
Non Test Frames Received	0	0	0	0	
Bit Error Rate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
Error Status	SYNC	SYNC	SYNC	SYNC	
SyncLoss Count	0	0	0	0	
Bit Error Count	0	0	0	0	
RTD	-NA-	-NA-	-NA-	-NA-	
QWD (Average)	-NA-	-NA-	-NA-	-NA-	
QWD (Min)	-NA-	-NA-	-NA-	-NA-	
QWD (Max)	-NA-	-NA-	-NA-	-NA-	
UDP Checksum Error Frames	0	0	0	0	
Zero UDP Checksum Packet	0	0	0	0	
HDL/PCAP File Recording ...	Idle	Idle	Idle	Idle	
Binary File Recording Status	Idle	Idle	Idle	Idle	

## Loopback Mode

Statistics		
Reset		
Stream Name		
StreamId	0	
Stream Name	LoopbackStream	
Mode	Loopback	
Rx Frames	7756	
Rx Rate	0.03 Mbps	
Tx Frames	7756	
Tx Rate	0.03 Mbps	
Frames Dropped	0	
Ready		

- Receive (Rx) and Transmit (Tx) statistics in normal and loopback modes
- Options: Tx & Rx frames, bit error rates, sent frames, lost frames, out of order frames, pattern error, good frames, non-test frames received, error status, error count, sync loss count, frames dropped, impairments introduced into the outgoing traffic, UDP checksum error frames, and zero UDP checksum packets

# Delay Measurements

- PacketCheck™ can measure One-Way Delay (OWD), calculating the delay at the receiving end in  $\mu\text{sec}$
- Also, PacketCheck™ can be configured to measure the average Round Trip Delay [RTD] value of each packet in  $\mu\text{sec}$
- OWD and RTD provides user configurable frame length, minimum frame length, maximum frame length or can define any value within the range between 68

The screenshot shows the 'Normal Configuration' window of PacketCheck. The 'Delay Measurements' tab is selected and highlighted with a red box. The window contains a table for stream configuration and various measurement settings.

SI No#	Stream Name	Status
1	Stream1	Start
2	Stream2	Start
3	Stream3	Start

Below the table are buttons for 'Insert', 'Add', 'Delete', and 'Start/Stop'. There is also a 'Default Stream' section with 'Configuration' and 'Start' buttons.

The 'Delay Measurements' section includes a 'Measurement Type' dropdown menu with options: 'None', 'Round Trip Delay', 'One Way Delay' (selected), and 'Enable Rx'. The 'WD FrameLength' is set to '63' with a 'Minimum' button and a range of 'Range from 63 to 8996'.

At the bottom, there is a 'Traffic Generation Mode' section with radio buttons for 'Burst (Rate value will be used)' (selected) and 'IFG (IFG value will be used)'. There are also buttons for 'Resolved Status' and 'Apply Stream Parameters'.

# One Way Delay (OWD)

Normal Configuration

SI No#	Stream Name	Status
1	Stream1	Start
2	Stream2	Start
3	Stream3	Start

Stream Type | Layer/Dir | MAC | MPLS | IP | UDP | PayLoad | Tx Parameters | Rx Parameters | **Delay Measurements** | Periodic Reports | Impairments

Measurement Type: One Way Delay

☒ Enable Tx  
☐ Enable Rx

Tx OWD FrameLength: 21 Minimum  
Range from 21 to 8996

Minimum Length  
Maximum Length  
User Defined

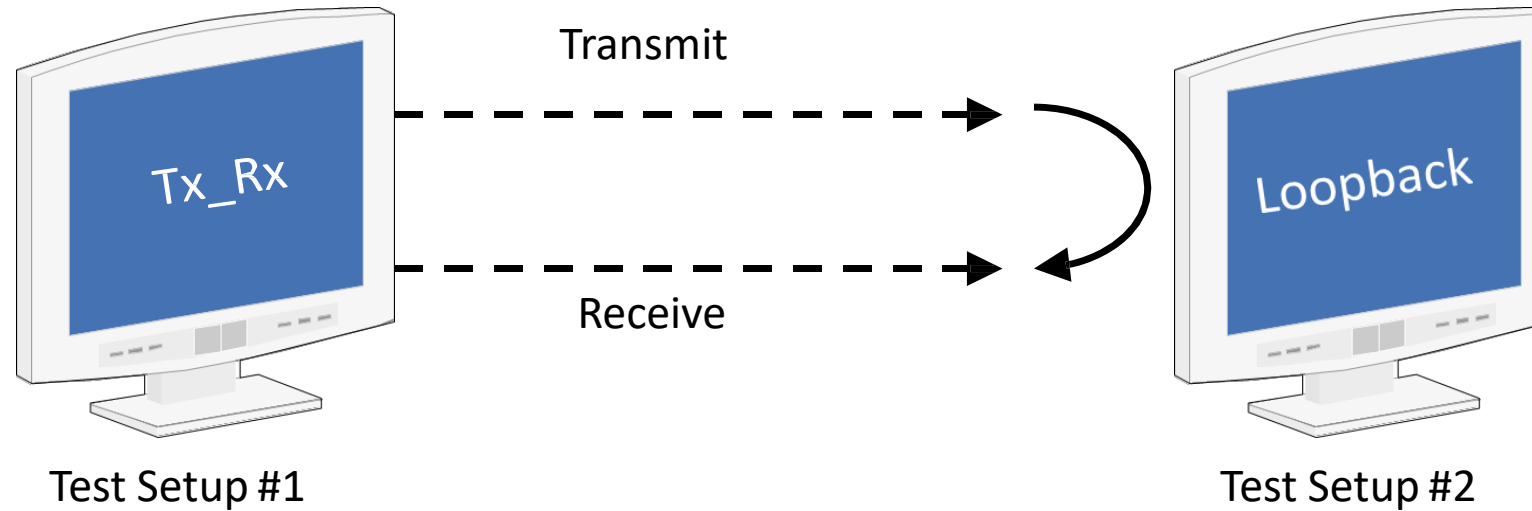
Insert Add Delete Start/Stop

Default Stream  
Configuration Start

Traffic Generation Mode  
☒ Burst (Rate value will be used)  
☐ IFG (IFG value will be used)

Resolved Status Apply Stream Parameters

# Round Trip Delay (RTD)



- Calculates the average Round Trip Delay with microsecond resolution
- RTD is the time taken for a packet to travel to the remote end and back to the source
- RTD calculated using 2 PacketCheck™ applications - one at the local end running in Tx\_Rx (Transmit and Receive) mode and another at the remote end running in loopback mode

## Round Trip Delay (RTD)

**Normal Configuration**

SI No#	Stream Name	Status
1	Stream1	Start
2	Stream2	Start
3	Stream3	Start

Insert Add Delete Start/Stop

Default Stream  
Configuration Start

Stream Type Layer/Dir MAC MPLS IP UDP PayLoad Tx Parameters Rx Parameters Delay Measurements Periodic Reports Impairments

Measurement Type Round Trip Delay

☐ Enable Tx Tx RTD FrameLength 56 Minimum  
Range from 56 to 8996

☐ Enable Rx

Traffic Generation Mode  
☒ Burst (Rate value will be used)  
☐ IFG (IFG value will be used)

Resolved Status Apply Stream Parameters

# Run-time Impairment Generation

The screenshot displays a software interface for configuring network impairments. At the top, a series of tabs are visible: Stream Type, Layer/Dir, MAC, MPLS, IP, UDP, PayLoad, Tx Parameters, Rx Parameters, Delay Measurements, Periodic Reports, and Impairments (which is highlighted with a red border). Below the tabs, the 'Impairment Type' dropdown menu is set to 'INSERT BYTES'. A red arrow points from this dropdown to a list box on the right that contains the following options: DELETE BYTES, INSERT BYTES, AND, OR, and XOR. Under the 'Impairment Type' dropdown, there are two main sections: 'Options' and 'Impairment Duration'. The 'Options' section includes three input fields: 'Bytes to insert' with the value 4, 'Byte Offset' with the value 0, and 'Skip Before Impair' with the value 1. The 'Impairment Duration' section includes two radio buttons: 'Repeat' (unselected) and 'Continuous' (selected), with a '1' in a box next to the 'Repeat' option. An 'Activate' button is located at the bottom of the 'Impairment Duration' section.

- Impairments can be introduced in outgoing traffic using various impairment types and duration. Supports various types of impairments - DELETE BYTES, INSERT BYTES, AND, OR, & XOR. Impairments can be introduced at specific intervals or can be set to continuous insertion on each stream

# Impairments (Contd.)

The following Impairment Types are supported in PacketCheck™:

## Delete bytes:

Deletes 'X' number of bytes at specified offset for every 'Y' packets sent out for the stream. Repeat this for limited number of times or repeat continuously.

**E.g. :** 20 bytes being deleted from every 11th frame sent at an offset of 18 bytes which will be repeated 500 times

The screenshot shows the 'DELETE BYTES' configuration window. The 'Impairment Type' dropdown is set to 'DELETE BYTES'. Under the 'Options' section, 'Byte count' is 20, 'Byte Offset' is 18, and 'Skip Before Impair' is 10. Under the 'Impairment Duration' section, the 'Repeat' radio button is selected with a value of 500, and the 'Continuous' radio button is unselected. An 'Activate' button is at the bottom right.

## Insert bytes

Insert 'X' number of bytes at specified offset for every 'Y' packets sent out for the stream. Repeat this for limited number of times or repeat continuously.

**E.g.:** "ABCD" being inserted within the frame at an offset of 14 bytes in every alternate frame, which will be repeated 500 times.

The screenshot shows the 'INSERT BYTES' configuration window. The 'Impairment Type' dropdown is set to 'INSERT BYTES'. Under the 'Options' section, 'Bytes to insert' is 'ABCD', 'Byte Offset' is 14, and 'Skip Before Impair' is 1. Under the 'Impairment Duration' section, the 'Repeat' radio button is selected with a value of 500, and the 'Continuous' radio button is unselected. An 'Activate' button is at the bottom right.

# Impairments (Contd.)

## Logical AND

Modify a byte at specified offset for every 'Y' packets sent out for the stream. Modification is done by doing logical AND with the user specified Hex byte. Repeat this for limited number of times or repeat continuously.

**E.g.:** 56th byte of every 17th frame being ANDed with 00 which will be repeated 20 times.

The screenshot shows a configuration window for a Logical AND impairment. At the top, a dropdown menu is set to 'AND'. Below this, there are two main sections: 'Options' and 'Impairment Duration'. In the 'Options' section, there are three input fields: 'AND with' containing '00', 'Byte Offset' containing '56', and 'Skip Before Impair' containing '16'. In the 'Impairment Duration' section, the 'Repeat' radio button is selected with a value of '20' in the adjacent text box, and the 'Continuous' radio button is unselected. An 'Activate' button is located at the bottom right of the window.

## Logical OR

Modify a byte at specified offset for every 'Y' packets sent out for the stream. Modification is done by doing logical OR with the user specified Hex byte. Repeat this for limited number of times or repeat continuously.

**E.g.:** 21st byte of every 6th frame being ORed with FF which will be repeated continuously.

The screenshot shows a configuration window for a Logical OR impairment. At the top, a dropdown menu is set to 'OR'. Below this, there are two main sections: 'Options' and 'Impairment Duration'. In the 'Options' section, there are three input fields: 'OR with' containing 'FF', 'Byte Offset' containing '21', and 'Skip Before Impair' containing '5'. In the 'Impairment Duration' section, the 'Continuous' radio button is selected and highlighted with a dashed border, while the 'Repeat' radio button is unselected. An 'Activate' button is located at the bottom right of the window.

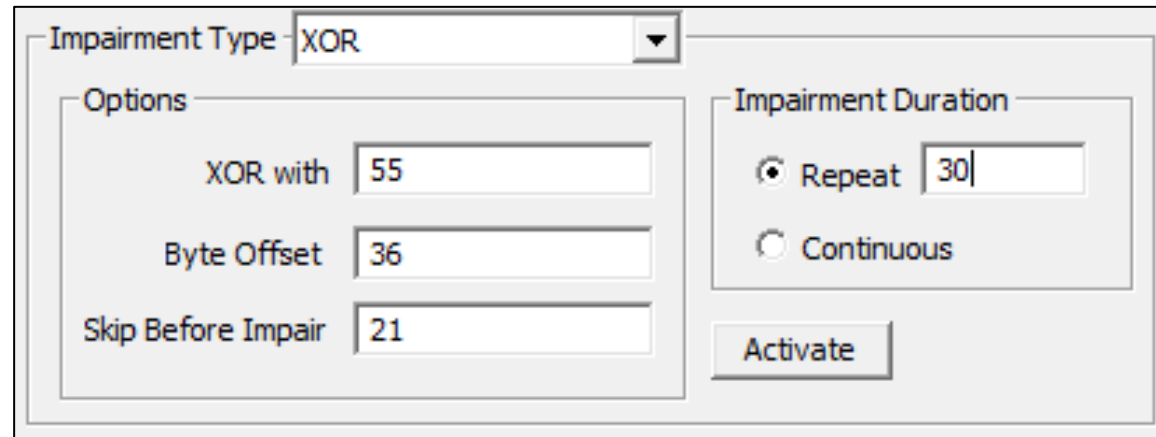


# Impairments (Contd.)

## Logical XOR

Modify a byte at specified offset for every 'Y' packets sent out for the stream. Modification is done by doing logical XOR with the user specified Hex byte. Repeat this for limited number of times or repeat continuously.

**E.g.:** 36th byte of every 22nd frame being XORed with 55 which will be repeated 30 times.



The screenshot shows a configuration window for the 'Logical XOR' impairment. At the top, 'Impairment Type' is set to 'XOR'. Below this, there are two main sections: 'Options' and 'Impairment Duration'. In the 'Options' section, 'XOR with' is set to '55', 'Byte Offset' is set to '36', and 'Skip Before Impair' is set to '21'. In the 'Impairment Duration' section, the 'Repeat' radio button is selected with a value of '30', and the 'Continuous' radio button is unselected. An 'Activate' button is located at the bottom right of the window.

Field	Value
Impairment Type	XOR
XOR with	55
Byte Offset	36
Skip Before Impair	21
Impairment Duration (Repeat)	30
Impairment Duration (Continuous)	Unselected

# Default Stream Configuration

- All incoming Ethernet frames not belonging to any of the user defined streams are treated as default stream

PacketCheck (I/F - 192.168.1.28) - Normal mode - Untitled

File View Windows Help

Normal Configuration

SI No#	Stream Name	Status
1	Stream1	Start
2	Stream2	Start
3	Stream3	Start

Stream Type Layer/Dir MAC MPLS IP UDP PayLoad Tx Parameters Rx Parameters Delay Measurements Periodic Reports Impairments

Stream Type

Type User Defined

File Based

File

Default Stream Configuration

☒ PacketCheck Statistics (Record To File)

☐ None

☐ HDL

☒ PCAP C:\Program Files (x86)\GL Communications...

☒ NIC Statistics (Record To File)

☐ None

☐ HDL

☒ PCAP C:\Program Files (x86)\GL Communications...

☒ Other Statistics (Record To File)

☐ None

☐ HDL

☒ PCAP C:\Program Files (x86)\GL Communications...

Default Stream

Configuration Start

Statistics

Reset ☒ Show Default Stream

Statistics	PacketCheck Reset	NIC Reset	Other Reset
StreamId	Total Frames	0	0
Stream Name	Rate	0.00 bps	0.00 bps
Mode	Non Test Frames	-NA-	-NA-
Duration	IP Frames	0	0
Tx Total Frames	UDP Frames	0	0
Tx BERT Frames	TCP Frames	0	0
Tx Rate	ICMP Frames	0	0
Tx RTD Frames	IGMP Frames	0	0
Tx OWD Frames	Other L4 Protocol Frames	0	0
Rx Total Frames	ARP Request Frames	0	0
Rx BERT Frames	ARP Response Frames	0	0
Rx Rate	Other Frames	0	0
Rx RTD Frames	Broadcast Frames	0	0
Rx OWD Frames	Unicast Frames	0	0
Lost Frames	Multicast Frames	0	0
Out Of Order Frames	64 Length Frames	0	0
Pattern Error Frames	65_127 Length Frames	0	0
Good Frames	128_255 Length Frames	0	0
Non Test Frames Received	256_511 Length Frames	0	0
Bit Error Rate	512_1023 Length Frames	0	0
Error Status	1024_1518 Length Frames	0	0
SynLoss Count	> 1518 Length Frames	0	0
Bit Error Count	Status	Idle	Idle
RTD	Duration	00:00:00	00:00:00
OWD (Average)	File Recording Status	Idle	Idle
OWD (Min)			
OWD (Max)			
UDP Checksum Error Frames			
Zero UDP Checksum Packet			
HDL/PCAP File Recording ...			
Binary File Recording Status			

Cumulative Statistics	Tx	Rx
Total Frames	0	0
Rate	0.00 bps	0.00 bps
Non Test Frames	0	0
IP Frames	0	0
UDP Frames	0	0
TCP Frames	0	0
ICMP Frames	0	0
IGMP Frames	0	0
Other L4 Protocol Frames	0	0
ARP Request Frames	0	0
ARP Response Frames	0	0
Other Frames	0	0
Broadcast Frames	0	0
Unicast Frames	0	0
Multicast Frames	0	0
64 Length Frames	0	0
65_127 Length Frames	0	0
128_255 Length Frames	0	0
256_511 Length Frames	0	0
512_1023 Length Frames	0	0
1024_1518 Length Frames	0	0
> 1518 Length Frames	0	0

# Default Stream Statistics

PacketCheck (I/F - 192.168.5.10) - Normal mode - Tx\_Rx\_10Streams2

File View Windows Help

### Normal Configuration

SI No#	Stream Name	Status
1		Stop
2		Stop
3		Start

Stream Type Layer/Dir MAC MPLS IP UDP Payload Tx Parameters Rx Parameters Delay Measurements Periodic Reports Impairments

Stream Type  
Type: User Defined

File Based  
FileType: HDL  
File Name:

Insert Add Delete Start/Stop

Default Stream  
Configuration Stop

Traffic Generation Mode  
☒ Burst (Rate value will be used)  
☐ IFG (IFG value will be used)

Resolved Status Apply Stream Parameters

### Statistics

Reset ☒ Show Default Stream

Statistics	1	2	3
StreamId	1	2	3
Stream Name			
Mode	TX_RX	TX_RX	TX_RX
Duration	00:00:21	00:00:21	00:00:00
Tx Total Frames	96143	72903	0
Tx BERT Frames	96143	72903	0
Tx Rate	55.13 Mbps	41.99 Mbps	0.00 bps
Tx RTD Frames	0	0	0
Tx DWD Frames	0	0	0
Rx Total Frames	4329	4319	0
Rx BERT Frames	4329	4319	0
Rx Rate	2.56 Mbps	2.57 Mbps	0.00 bps
Rx RTD Frames	0	0	0
Rx DWD Frames	0	0	0
Lost Frames	0	0	0
Out Of Order Frames	0	0	0
Pattern Error Frames	0	0	0
Good Frames	0	0	0
Non Test Frames Received	0	0	0
Bit Error Rate	0.00E+00	0.00E+00	0.00E+00
Error Status	SYNC	NO RX DATA	NO RX DATA
SyncLoss Count	0	0	0
Bit Error Count	0	0	0
RTD	-NA-	-NA-	-NA-
DWD (Average)	-NA-	-NA-	-NA-
DWD (Min)	-NA-	-NA-	-NA-
DWD (Max)	-NA-	-NA-	-NA-
UDP Checksum Error Frames	0	0	0
Zero UDP Checksum Packet	0	0	0
HDL/PCAP File Recording ...	Idle	Idle	Idle
Binary File Recording Status	Idle	Idle	Idle

Default Stream Statistics	PacketCheck Tx	PacketCheck Rx	NIC Tx	NIC Rx	Other Rx
Total Frames	0	41366	8	8	273159
Rate	0.00 bps	27.84 Mbps	0.00 bps	0.00 bps	192.28 Mbps
Non Test Frames	-NA-	-NA-	-NA-	-NA-	-NA-
IP Frames	0	0	8	8	0
UDP Frames	0	0	8	8	0
TCP Frames	0	0	0	0	0
ICMP Frames	0	0	0	0	0
IGMP Frames	0	0	0	0	0
Other L4 Protocol Frames	0	0	0	0	0
ARP Request Frames	0	0	0	0	0
ARP Response Frames	0	0	0	0	0
Other Frames	0	41366	0	0	273162
Broadcast Frames	0	0	0	0	0
Unicast Frames	0	41366	0	0	273162
Multicast Frames	0	0	8	8	0
64 Length Frames	0	0	0	0	0
65_127 Length Frames	0	0	0	0	0
128_255 Length Frames	0	0	8	8	0
256_511 Length Frames	0	0	0	0	0
512_1023 Length Frames	0	0	0	0	0
1024_1518 Length Frames	0	41366	0	0	273162
> 1518 Length Frames	0	0	0	0	0
Status	Running	-	Running	-	Running
Duration	00:00:18	-	00:02:02	-	00:00:17
File Recording Status	Idle	-	Idle	-	Idle

Cumulative Statistics	Tx	Rx
Total Frames	169058	323156
Rate	97.01 Mbps	223.80 Mbps
Non Test Frames	0	0
IP Frames	8	8
UDP Frames	8	8
TCP Frames	0	0
ICMP Frames	0	0
IGMP Frames	0	0
Other L4 Protocol Frames	0	0
ARP Request Frames	0	0
ARP Response Frames	0	0
Other Frames	169050	323148
Broadcast Frames	0	0
Unicast Frames	169050	323148
Multicast Frames	8	8
64 Length Frames	0	0
65_127 Length Frames	0	0
128_255 Length Frames	8	8
256_511 Length Frames	0	0
512_1023 Length Frames	0	0
1024_1518 Length Frames	169050	323156
> 1518 Length Frames	0	0

PacketCheck Reset NIC Reset Other Reset

Ready

CAP NUM

# Report Generation

(\* .pdf, \* . csv file formats)

Reports

Choose Format: PDF

Title: CSV

User Comments: Test conducted on 1st str

Header: Test against PacketExper

Footer: L2 Test

User Logo: C:\Program Files\Gl Commr ...

File name: C:\Program Files\Gl Commr ...

Save Cancel

PacketCheck™

A PC Based Ethernet / IP BERT and Throughput Test Tool

PacketCheck

Test Date : 06/04/10  
Start Time : 14:47:31  
End Time : 14:50:51

PacketCheck Initial Configuration

Mode Selection : Normal  
IP Selection : 1  
Name : \Device\NPF\_{8A95A1DB-1A83-4465-A17D-FACF24372254}  
Description : Intel(R) PRO/1000 PM Network Connection  
MAC Address : 0-13-20-d5-4b-86  
IP Address : 192.168.1.50  
Link Type : Ethernet (802.3)  
Current Link Speed : 100 Mbps  
Max Payload Size : 1500 bytes  
Media State : Connected

GL Communications Inc.

PacketCheck™

A PC Based Ethernet / IP BERT and Throughput Test Tool

PacketCheck™

Test Date :  
Start Time :  
End Time :

PacketCheck Initial Configuration

Mode Selection : Normal  
IP Selection : 0  
Name : \Device\NPF\_{D0E30D62-37D3-497E-8D5A-A27AACD8068E}  
Description : Realtek RTL8139/810x Family Fast Ethernet NIC  
MAC Address : 0-13-20-ec-d0-65  
IP Address : 192.168.1.98  
Link Type : Ethernet (802.3)  
Current Link Speed : 100 Mbps  
Max Payload Size : 1500 bytes  
Media State : Connected

User Comments  
Test conducted on 1st stream

GL Communications Inc.

**Thank you!**