

---

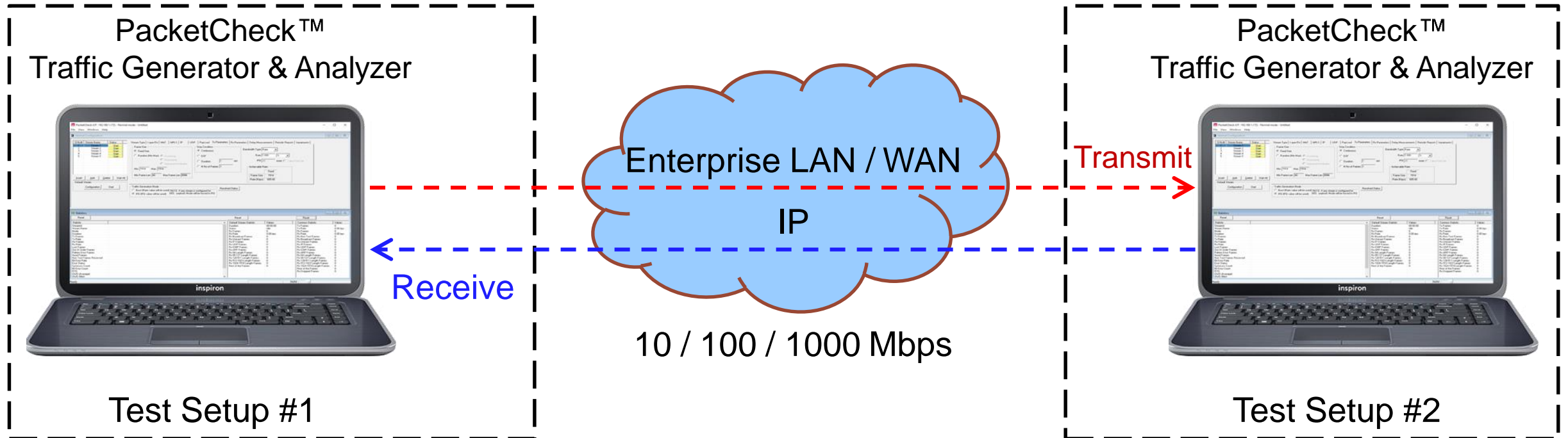
# PacketCheck™ – Software Ethernet Tester

---



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

# PacketCheck™- Ethernet / IP Test Tool

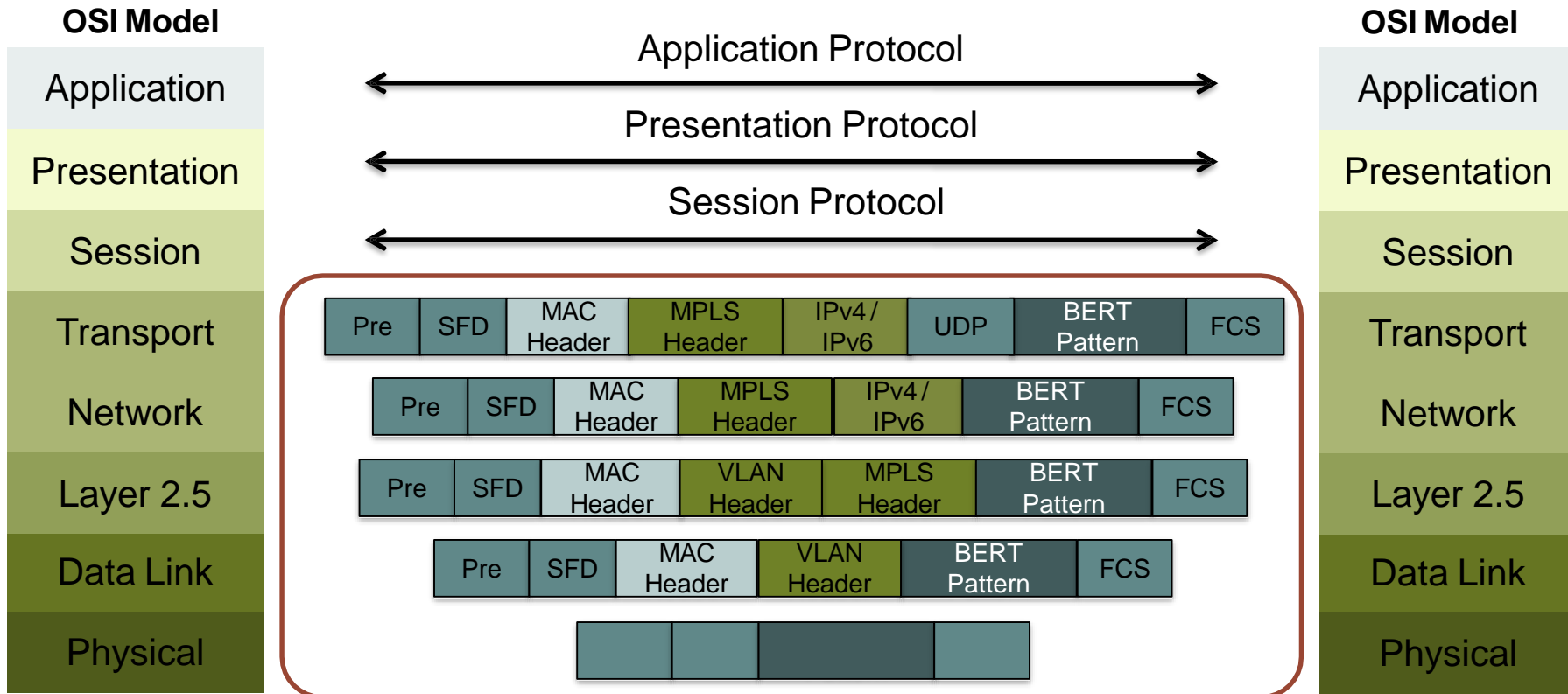


- PacketCheck™ uses the PC's network interface card to transmit and receive Ethernet or IP packets
- Bit Error Rates (BER) and throughputs and Delay, Impairment (up to 500 Mbps) can be easily tested
- Generates multi-stream Ethernet / IP / UDP traffic as well single-stream physical layer traffic
- Measures 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.)

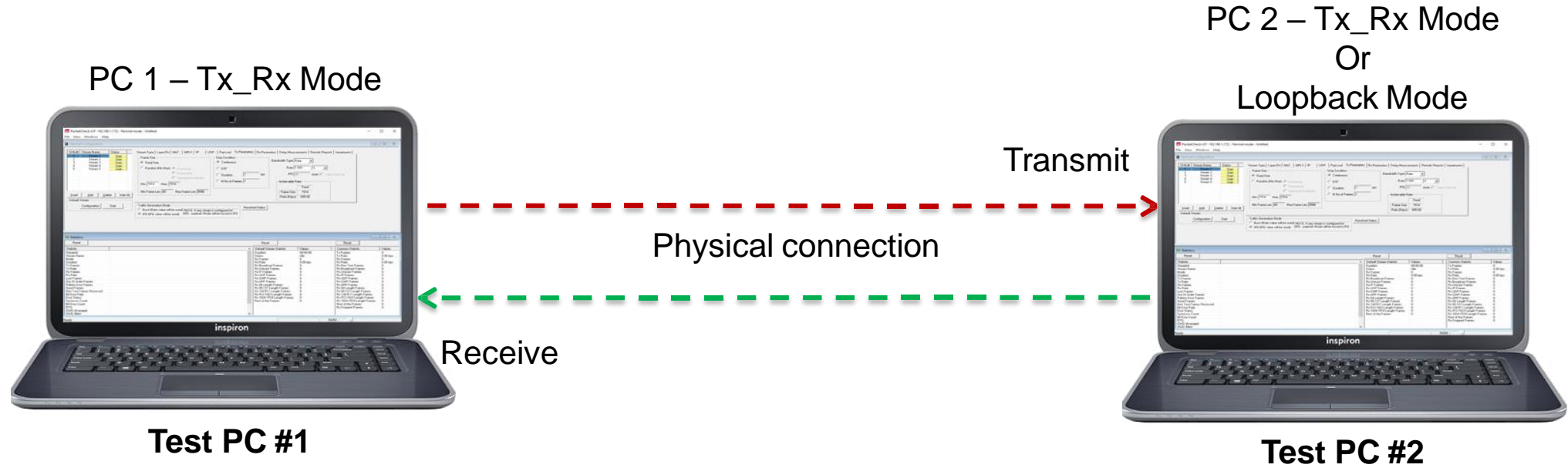
- Customizable protocol headers like MAC source / destination address, EtherType field, IP source / destination address, and UDP source / destination port
- Create multiple full-duplex streams per PacketCheck™ easily
- Each stream can be configured as Transmit Only, Receive Only, or Transmit and Receive
- 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)
- 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

# Main Features (Contd.)

- 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**

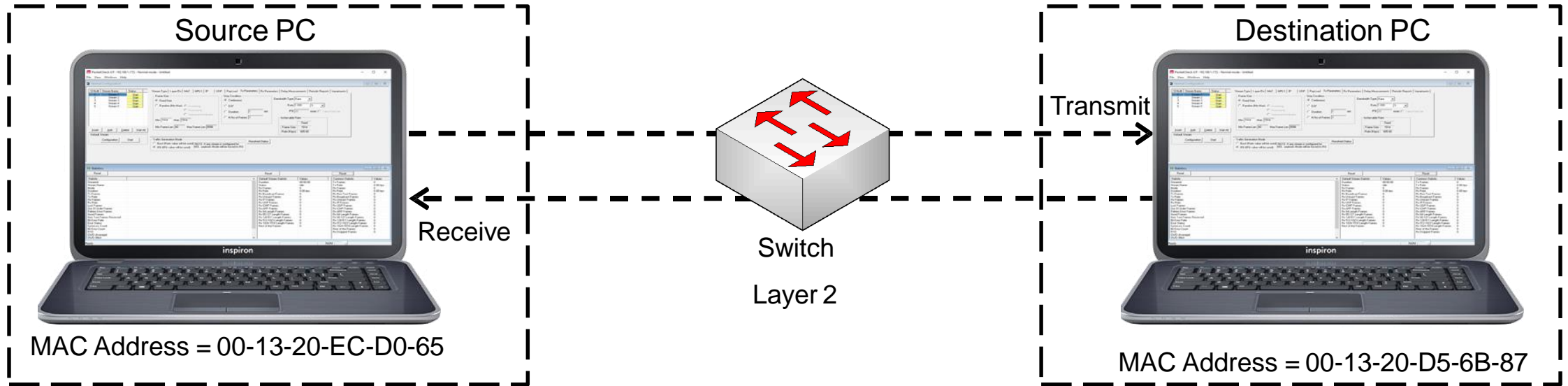


- The PCs are connected using an Ethernet cable. The payload includes PRBS and fixed patterns



# BER Test Setup at Layer 2

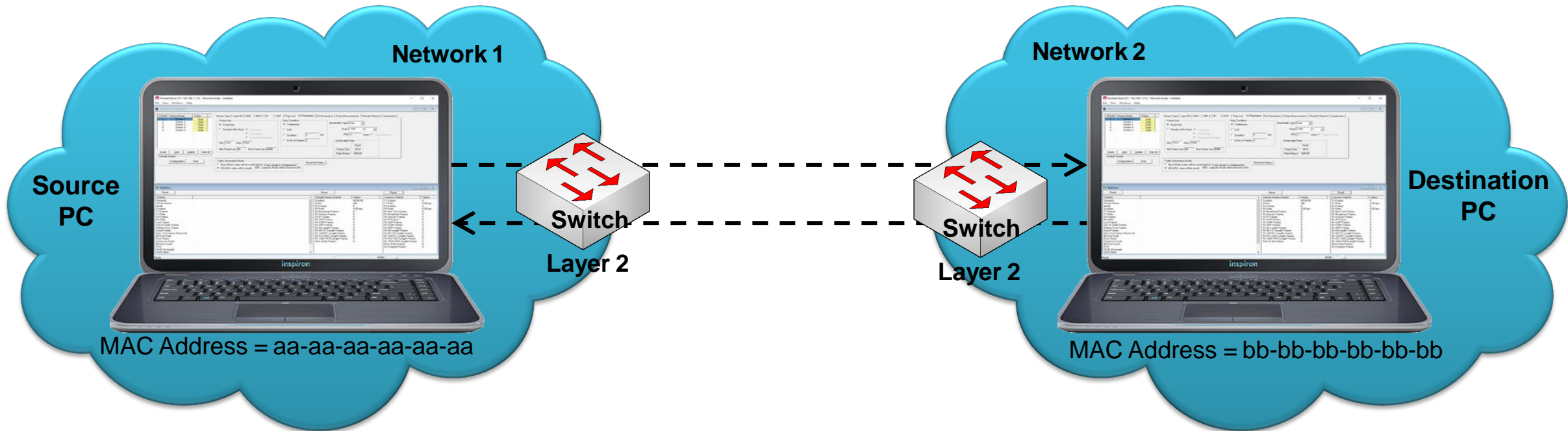
**Scenario 2: Source & destination PCs on the same LAN, connected by a switch**



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

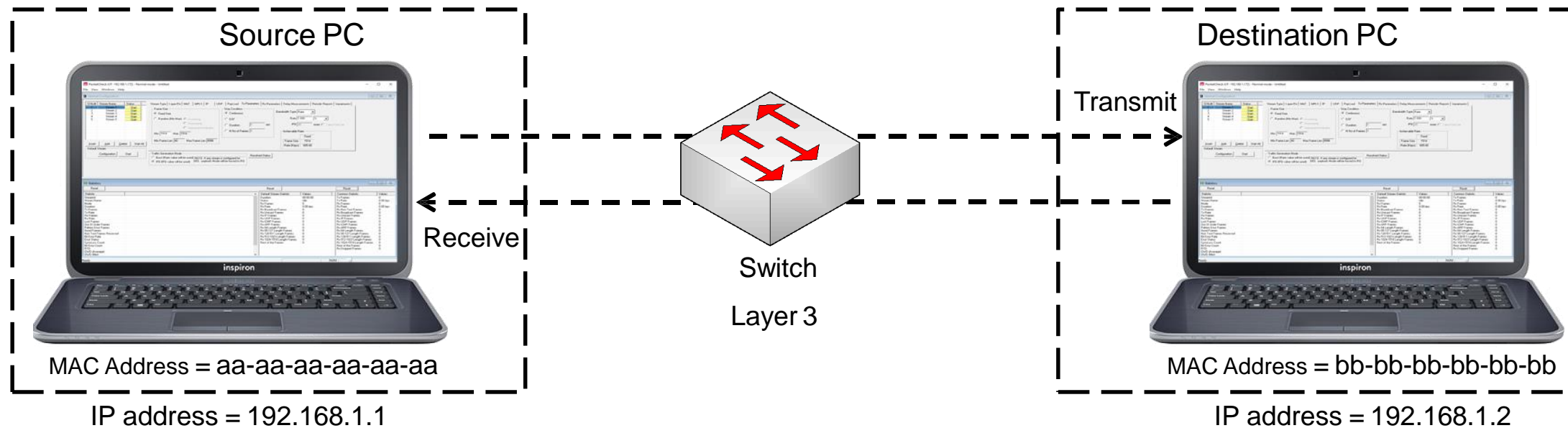
# BER Test Setup at Layer 2

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



# BER Test Setup at Layer 3 / 4

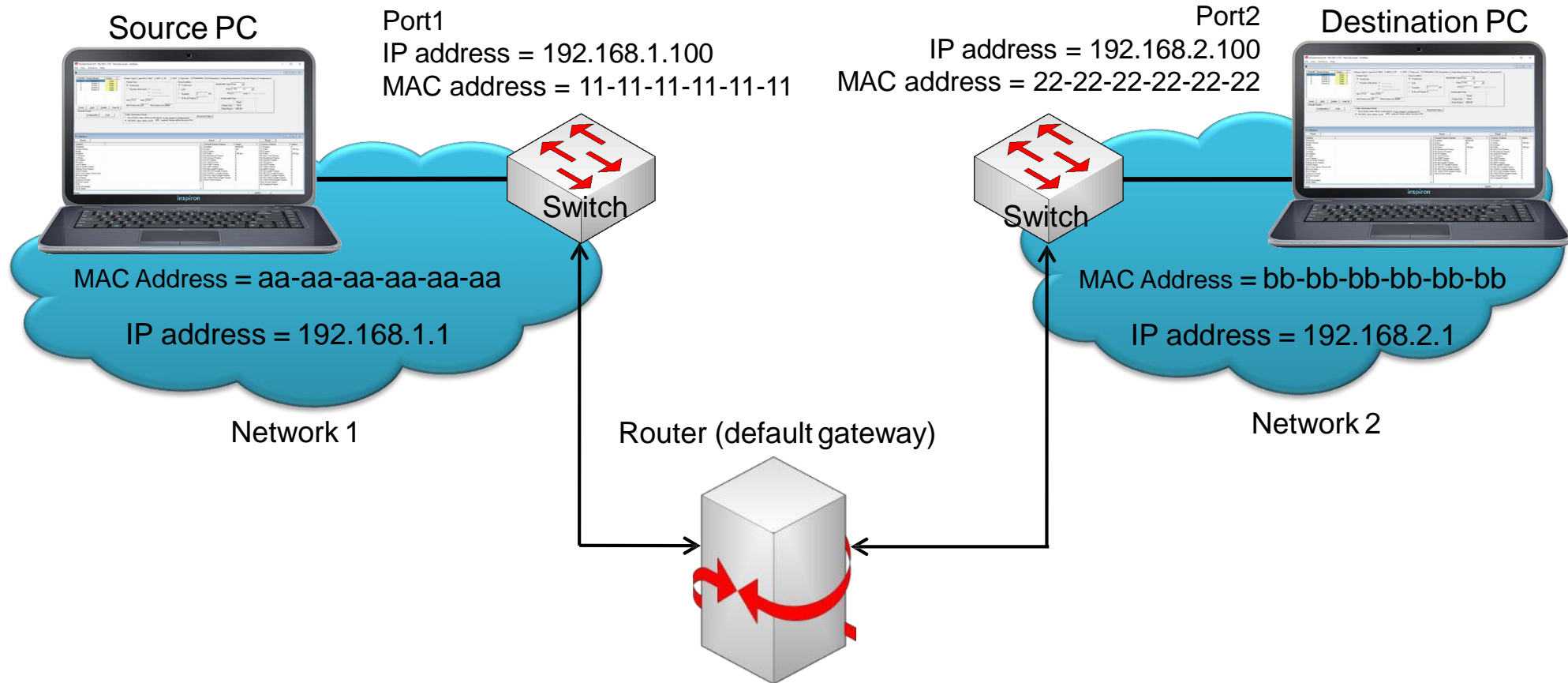
## Scenario 4: Source & destination PCs are located within the same IP Network



- 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

The screenshot shows a window titled "PacketCheck - Initial config" with the following configuration options:

- Mode Selection:** Radio buttons for "Normal" (selected) and "Loopback".
- I/F Selection:** A dropdown menu showing "Intel(R) Ethernet Connection I217-V [192.168.1.23]".
- Start Packet Check:** A button to initiate the configuration process.
- 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

The screenshot shows the 'Normal Configuration' window with the following components:

- Stream List Table:**

SI No#	Stream Name	Status
1	Stream1	Start
- Stream Type Selection:** A red box highlights the 'Stream Type' tab and the 'Type' dropdown menu, which is currently set to 'User Defined'. The 'File Based' option is also visible in the dropdown.
- File Based Configuration:** A red box highlights the 'File Based' section, which includes a 'FileType' dropdown set to 'PCAP' and a 'File Name' text box containing 'C:\Program Files (x86)\GL Communication...'. A file selection button is also present.
- Buttons:** 'Insert', 'Add', 'Delete', 'Start All', 'Configuration', 'Start', 'Resolved Status', and 'Apply'.
- Traffic Generation Mode:** Radio buttons for 'Burst (Rate value will be used)' (selected) and 'IFG (IFG value will be used)'.

# 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 a software interface titled "Normal Configuration". 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 All".

The main configuration area is divided into several sections:

- Stream Type:** A dropdown menu is set to "File Based", which is highlighted with a red box.
- File Based:** A sub-section containing:
  - FileType:** A dropdown menu set to "PCAP".
  - File Name:** A text field containing "C:\Program Files (x86)\GL Communication ...".
- Traffic Generation Mode:** Two radio buttons are present: "Burst (Rate value will be used)" (which is selected) and "IFG (IFG value will be used)".

At the bottom right, there are buttons for "Resolved Status" and "Apply".

# 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 displays the 'Normal Configuration' window. On the left, a table lists three streams: Stream1, Stream2, and Stream3, all with a 'Start' status. Below the table are buttons for 'Insert', 'Add', 'Delete', and 'Start All'. A 'Default Stream' section contains 'Configuration' and 'Start' buttons. The main configuration area on the right 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. Below it, the 'File Based' section includes a 'FileType' dropdown set to 'PCAP' and a 'File Name' text box 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)'. 'Resolved Status' and 'Apply' buttons are also present.

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

FileType: PCAP

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

Default Stream

Configuration | Start

Traffic Generation Mode

Burst (Rate value will be used)

IFG (IFG value will be used)

Resolved Status | Apply



# Layer 1 Single-stream Generation

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

File View Windows Help

Normal Configuration

SI No#	Stream Name	Status
1	Stream1	Stop

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

Layer Configuration:

- 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

Traffic Generation Mode:

- Burst (Rate value will be used)
- IFG (IFG value will be used)

Buttons: Insert Add Delete Stop All Configuration Start Resolved Status Apply

---

Statistics

Reset  Show Default Stream

Statistics	Stream1	Default Stream Statistics	PacketCheck Tx	PacketCheck Rx	NIC card Tx	NIC card Rx	Cumulative Statistics	Tx	Rx
StreamId	1	Total Frames	0	0	0	0	Total Frames	221031	0
Stream Name	Stream1	Rate	0.00 bps	0.00 bps	0.00 bps	0.00 bps	Rate	101.06 Mbps	0.00 bps
Mode	TX_RX	Non Test Frames	0	-NA-	-NA-	-NA-	Non Test Frames	0	0
Duration	00:00:26	IP Frames	0	0	0	0	IP Frames	0	0
Tx Total Frames	221025	UDP Frames	0	0	0	0	UDP Frames	0	0
Tx BERT Frames	221025	TCP Frames	0	0	0	0	TCP Frames	0	0
Tx Rate	101.07 Mbps	ICMP Frames	0	0	0	0	ICMP Frames	0	0
Tx RTD Frames	0	IGMP Frames	0	0	0	0	IGMP Frames	0	0
Tx DWD Frames	0	Other L4 Protocol Frames	0	0	0	0	Other L4 Protocol Frames	0	0
Rx Total Frames	0	ARP Request Frames	0	0	0	0	ARP Request Frames	0	0
Rx BERT Frames	0	ARP Response Frames	0	0	0	0	ARP Response Frames	0	0
Rx Rate	0.00 bps	Other Frames	0	0	0	0	Other Frames	221031	0
Rx RTD Frames	0	Broadcast Frames	0	0	0	0	Broadcast Frames	0	0
Rx DWD Frames	0	Unicast Frames	0	0	0	0	Unicast Frames	221032	0
Lost Frames	0	Multicast Frames	0	0	0	0	Multicast Frames	0	0
Out Of Order Frames	0	64 Length Frames	0	0	0	0	64 Length Frames	0	0
Pattern Error Frames	0	65_127 Length Frames	0	0	0	0	65_127 Length Frames	0	0
Good Frames	0	128_255 Length Frames	0	0	0	0	128_255 Length Frames	0	0
Non Test Frames Received	0	256_511 Length Frames	0	0	0	0	256_511 Length Frames	0	0
Bit Error Rate	0.00E+00	512_1023 Length Frames	0	0	0	0	512_1023 Length Frames	0	0
Error Status	NO RX DATA	1024_1518 Length Frames	0	0	0	0	1024_1518 Length Frames	221032	0
SyncLoss Count	0	> 1518 Length Frames	0	0	0	0	> 1518 Length Frames	0	0
Bit Error Count	0	Status	Idle	-	Idle	-			
RTD	-NA-	Duration	00:00:00	-	00:00:00	-			
OWD (Average)	-NA-	File Recording Status	Idle	-	Idle	-			
OWD (Min)	-NA-								
OWD (Max)	-NA-								
UDP Checksum Error Frames	0								
Zero UDP Checksum Packet	0								

Test Statistics

Ready NUM

# Layer 2 / 3 / 4 Multi-stream Generation

PacketCheck (/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

Multi Stream BERT Testing

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 Type: PCAP | File Name: C:\Program Files (x86)\GL Communication...

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

Buttons: Insert, Add, Delete, Start All, Configuration, Start, Resolved Status, Apply

---

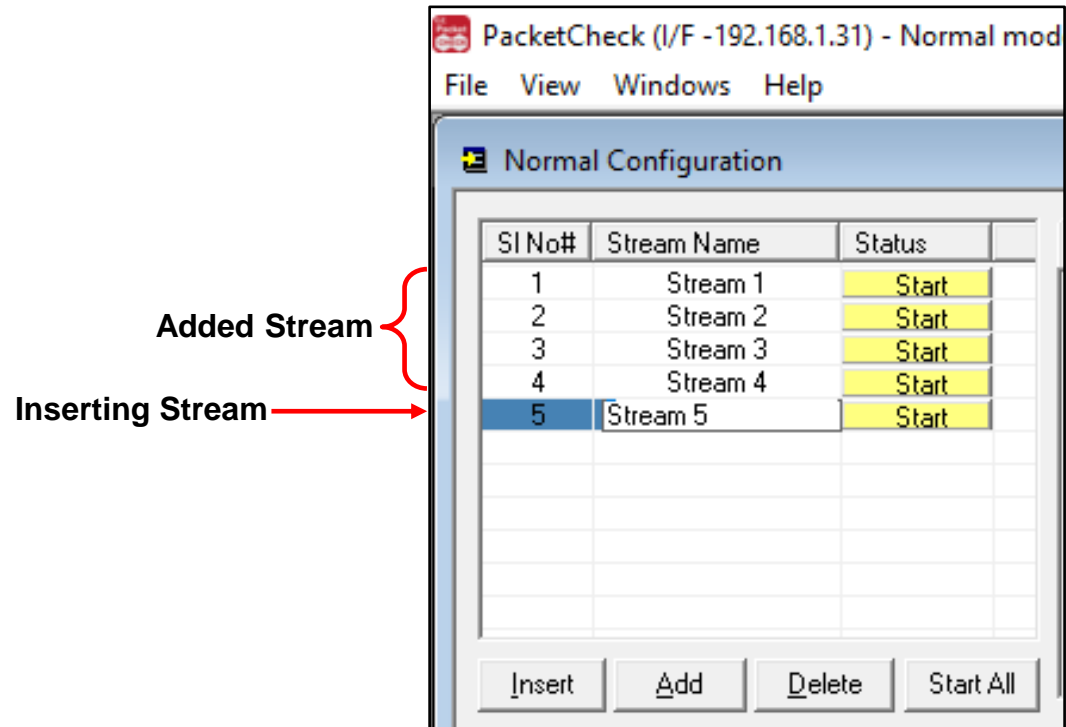
### Statistics

Reset |  Show Default Stream

Statistics	Stream1	Default Stream Statistics	PacketCheck Tx	PacketCheck Rx	NIC card Tx	NIC card	Cumulative Statistics	Tx	Rx
StreamId	1	Total Frames	0	0	0	0	Total Frames	5566872	0
Stream Name	Stream1	Rate	0.00 bps	0.00 bps	0.00 bps	0.00 bps	Rate	0.00 bps	0.00 bps
Mode	Tx_Rx	Non Test Frames	0	-NA-	-NA-	-NA-	Non Test Frames	0	0
Duration	00:11:19	IP Frames	0	0	0	0	IP Frames	0	0
Tx Total Frames	5566872	UDP Frames	0	0	0	0	UDP Frames	0	0
Tx BERT Frames	5566872	TCP Frames	0	0	0	0	TCP Frames	0	0
Tx Rate	0.00 bps	ICMP Frames	0	0	0	0	ICMP Frames	0	0
Tx RTD Frames	0	IGMP Frames	0	0	0	0	IGMP Frames	0	0
Tx DWD Frames	0	Other L4 Protocol Frames	0	0	0	0	Other L4 Protocol Frames	0	0
Rx Total Frames	0	ARP Request Frames	0	0	0	0	ARP Request Frames	0	0
Rx BERT Frames	0	ARP Response Frames	0	0	0	0	ARP Response Frames	0	0
Rx Rate	0.00 bps	Other Frames	0	0	0	0	Other Frames	5566872	0
Rx RTD Frames	0	Broadcast Frames	0	0	0	0	Broadcast Frames	0	0
Rx DWD Frames	0	Unicast Frames	0	0	0	0	Unicast Frames	5566872	0
Lost Frames	0	Multicast Frames	0	0	0	0	Multicast Frames	0	0
Out Of Order Frames	0	64 Length Frames	0	0	0	0	64 Length Frames	0	0
Pattern Error Frames	0	65_127 Length Frames	0	0	0	0	65_127 Length Frames	0	0
Good Frames	0	128_255 Length Frames	0	0	0	0	128_255 Length Frames	0	0
Non Test Frames Received	0	256_511 Length Frames	0	0	0	0	256_511 Length Frames	0	0
Bit Error Rate	0.00E+00	512_1023 Length Frames	0	0	0	0	512_1023 Length Frames	0	0
Error Status	NO RX DATA	1024_1518 Length Frames	0	0	0	0	1024_1518 Length Frames	5566872	0
SyncLoss Count	0	> 1518 Length Frames	0	0	0	0	> 1518 Length Frames	0	0
Bit Error Count	0	Status	Idle	-	Idle	-			
RTD	-NA-	Duration	00:00:00	-	00:00:00	-			
DWD (Average)	-NA-	File Recording Status	Idle	-	Idle	-			
DWD (Min)	-NA-								
DWD (Max)	-NA-								
UDP Checksum Error Frames	0								
Zero UDP Checksum Packet	0								

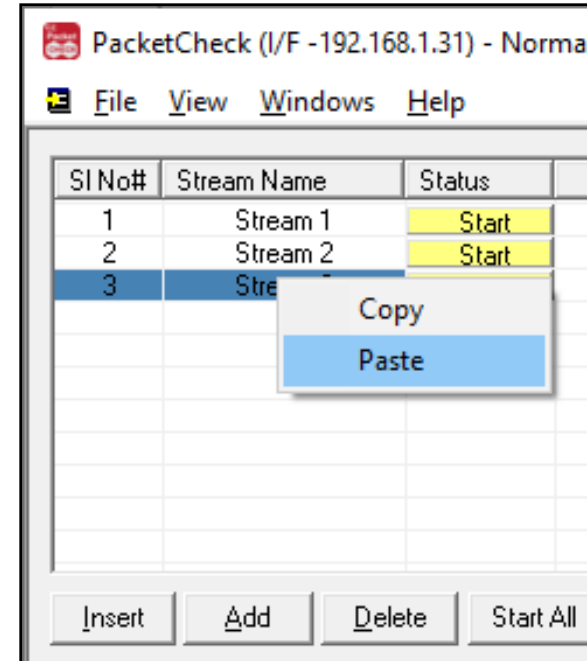
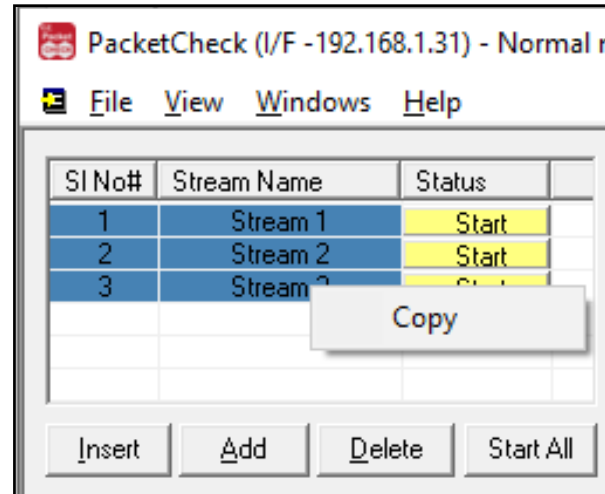
Ready | NUM

# 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

The diagram illustrates the configuration process for network protocols. On the left, a 'Layer' configuration panel shows a 'Dir' dropdown set to 'Tx/Rx' and four layer options: Layer 2 (Ethernet), Layer 2.5 (MPLS), Layer 3 (IP), and Layer 4 (UDP). Red arrows point from these options to three detailed configuration panels:

- MAC Configuration Panel:** Shows 'Stream Type' | Layer/Dir | **MAC** | MPLS | IP | UDP | PayLoad. Fields include: Layer 2, Source MAC Addr (fc-aa-14-9c-bf-99), Destination MAC Addr (FC-AA-14-9C-BF-99), EtherType (00-00), and buttons for 'Use I/F Addr', 'Resolve', and 'User defined'.
- MPLS Configuration Panel:** Shows 'Stream Type' | Layer/Dir | MAC | **MPLS** | IP | UDP | PayLoad | Tx Parameters | Rx Parameters | Delay Measurements | Periodic Reports | Impairments. Fields include: MPLS Stack (3), MPLS #1 (Label: 564564, CoS: 1, TTL: 128), MPLS #2 (Label: 765765, CoS: 5, TTL: 128), and MPLS #3 (Label: 234234, CoS: 7, TTL: 128).
- IP Configuration Panel:** Shows 'Stream Type' | Layer/Dir | MAC | MPLS | **IP** | UDP | PayLoad | Tx Parameters | Rx Parameters | Delay Measurements | Periodic Reports | Impairments. Fields include: Source IP Address (192 . 168 . 1 . 88), Subnet Mask (225 . 225 . 225 . 0), Destination IP address (192 . 168 . 1 . 176), Default Gateway (0 . 0 . 0 . 0), TOS/DS (00), TTL (128), Protocol (17), and checkboxes for 'IP Spoofing' and 'Build MAC Header Automatically'.
- UDP Configuration Panel:** Shows 'Stream Type' | Layer/Dir | MAC | MPLS | IP | **UDP** | PayLoad. Fields include: Source Port (4000), Destination Port (5000), and a checkbox for 'Configure Checksum' with a value of 00 00.

# Payload

The screenshot shows the 'Payload' tab in a configuration tool. The 'Source' section is highlighted with a red box. It contains a 'Source Type' dropdown set to 'Fixed Pattern', a 'PRBS Pattern' dropdown set to 'QRSS', and an 'Invert Pattern' checkbox. To the right, there is a 'Fixed Pattern' text field containing 'AB CD EF'. Below this, 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 configuration tool. The 'Source' section is highlighted with a red box. It contains a 'Source Type' dropdown set to 'PRBS Pattern', a 'PRBS Pattern' dropdown set to 'QRSS', and an 'Invert Pattern' checkbox. To the right, there is a 'Fixed Pattern' text field containing 'ab cd ef'. Below this, 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

The screenshot shows the 'Tx Parameters' tab selected in a software interface. The 'Frame Size' section has 'Fixed Size' selected with a value of 1514. The 'Stop Condition' section has 'Continuous' selected. The 'Bandwidth Type' is set to 'Rate' with a value of 10.000. The 'IFG' is set to 5 msec. The 'Traffic Generation Mode' has 'IFG (IFG value will be used)' selected. Buttons for 'Resolved Status' and 'Apply' are visible.

The screenshot shows the 'Rx Parameters' tab selected in a software interface. The 'Record To Binary File' and 'Generate Bert Log' options are checked. The 'Record To File' section has 'HDL' selected with a file path. The 'Stop Condition' section has 'Duration' selected with a value of 360000 sec. The 'Traffic Generation Mode' has 'IFG (IFG value will be used)' selected. Buttons for 'Resolved Status' and 'Apply' are visible.

# Loopback Mode

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

The screenshot shows the PacketCheck software interface. The title bar reads "PacketCheck (I/F - 192.168.1.23) - Loopback mode - Untitled". The menu bar includes "File", "View", "Windows", and "Help".

The "Loopback Configuration" panel is active, showing the following settings:

- Layer Selection
- Layer 2: Ethernet
- Layer 3: IP
- Layer 4: UDP
- Stop button

The "Statistics" panel is also visible, featuring a "Reset" button and a table of statistics:

Statistic	
StreamId	0
Stream Name	LoopbackStream
Mode	Loopback
Rx Frames	199
Rx Rate	0.03 Mbps
Tx Frames	199
Tx Rate	0.03 Mbps
Frames Dropped	0



# Statistics

## Normal Mode

Statistics	Stream1	Stream2	Stream3	Stream4	Stream5
StreamId	1	2	3	4	5
Stream Name	Stream1	Stream2	Stream3	Stream4	Stream5
Mode	RX	RX	RX	RX	RX
Duration	00:00:25	00:00:25	00:00:25	00:00:25	00:00:25
Tx Total Frames	0	0	0	0	0
Tx BERT Frames	0	0	0	0	0
Tx Rate	0.00 bps	0.00 bps	0.00 bps	0.00 bps	0.00 bps
Tx RTD Frames	0	0	0	0	0
Tx OWD Frames	0	0	0	0	0
Rx Total Frames	2072	2072	2072	2072	2072
Rx BERT Frames	2072	2072	2072	2072	2072
Rx Rate	978.73 Kbps	978.73 Kbps	978.73 Kbps	978.73 Kbps	978.73 Kbps
Rx RTD Frames	0	0	0	0	0
Rx OWD Frames	0	0	0	0	0
Lost Frames	0	0	0	0	0
Out Of Order Frames	0	0	0	0	0
Pattern Error Frames	0	0	0	0	0
Good Frames	0	0	0	0	0
Non Test Frames Received	0	0	0	0	0
Bit Error Rate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Error Status	SYNC	SYNC	SYNC	SYNC	SYNC
SyncLoss Count	0	0	0	0	0
Bit Error Count	0	0	0	0	0
RTD	-NA-	-NA-	-NA-	-NA-	-NA-
OWD (Average)	-NA-	-NA-	-NA-	-NA-	-NA-
OWD (Min)	-NA-	-NA-	-NA-	-NA-	-NA-
OWD (Max)	-NA-	-NA-	-NA-	-NA-	-NA-
UDP Checksum Error Frames	0	0	0	0	0
Zero UDP Checksum Packet	0	0	0	0	0
HDL/PCAP File Recording ...	Idle	Idle	Idle	Idle	Idle
Binary File Recording Status	Idle	Idle	Idle	Idle	Idle

## Loopback Mode

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

- 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 displays the 'Normal Configuration' window for PacketCheck. The 'Delay Measurements' tab is selected and highlighted with a red box. The interface includes a table for stream configuration and various control panels.

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:  (Dropdown menu options: None, Round Trip Delay, One Way Delay, Enable Rx)

WD FrameLength:  (User defined) Range from 35 to 8996

Buttons: Insert, Add, Delete, Start All

Default Stream: Configuration, Start

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

Buttons: Resolved Status, Apply

# 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: 68 (User defined)  
Range from 35 to 8996

- Minimum Length
- Maximum Length
- User Defined

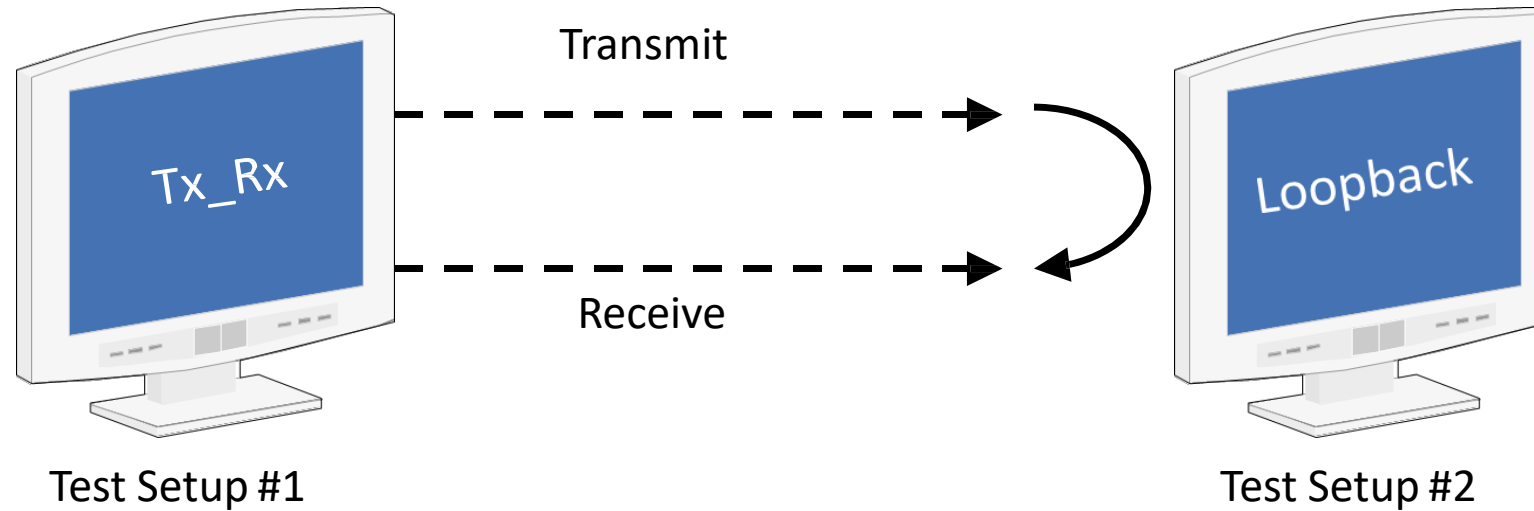
Insert | Add | Delete | Start All

Default Stream  
Configuration | Start

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

Resolved Status | Apply

# 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

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: 68    User defined  
Range from 28 to 8996

Enable Rx

Insert   Add   Delete   Start All

Default Stream  
Configuration   Start

Traffic Generation Mode  
 Burst (Rate value will be used)    Resolved Status    Apply  
 IFG (IFG value will be used)

# Run-time Impairment Generation

The screenshot shows a software interface for configuring network impairments. At the top, there is a horizontal menu with tabs for 'Stream Type', 'Layer/Dir', 'MAC', 'MPLS', 'IP', 'UDP', 'PayLoad', 'Tx Parameters', 'Rx Parameters', 'Delay Measurements', 'Periodic Reports', and 'Impairments'. The 'Impairments' tab is highlighted with a red border. Below the menu, the 'Impairment Type' dropdown is currently set to 'INSERT BYTES'. A red arrow points from this dropdown to a list of options: 'DELETE BYTES', 'INSERT BYTES', 'AND', 'OR', and 'XOR'. The 'Options' section contains three input fields: 'Bytes to insert' (value: 4), 'Byte Offset' (value: 0), and 'Skip Before Impair' (value: 1). The 'Impairment Duration' section has two radio buttons: 'Repeat' (value: 1) and 'Continuous' (selected). An 'Activate' button is located at the bottom of the configuration area.

- 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 configuration window for the 'DELETE BYTES' impairment. The 'Impairment Type' dropdown is set to 'DELETE BYTES'. Under the 'Options' section, 'Byte count' is set to 20, 'Byte Offset' is set to 18, and 'Skip Before Impair' is set to 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 located at the bottom right of the configuration area.

## 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 configuration window for the 'INSERT BYTES' impairment. The 'Impairment Type' dropdown is set to 'INSERT BYTES'. Under the 'Options' section, 'Bytes to insert' is set to 'ABCD', 'Byte Offset' is set to 14, and 'Skip Before Impair' is set to 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 located at the bottom right of the configuration area.

# 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, there are two radio buttons: 'Repeat' (which is selected) and 'Continuous'. The 'Repeat' radio button has a text input field next to it containing '20'. At the bottom right of the window is an 'Activate' button.

## 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, there are two radio buttons: 'Repeat' and 'Continuous' (which is selected). The 'Repeat' radio button has a text input field next to it containing '20'. At the bottom right of the window is an 'Activate' button.



# 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 a network impairment. At the top, a dropdown menu is set to 'XOR'. Below this, there are two main sections: 'Options' and 'Impairment Duration'. In the 'Options' section, there are three input fields: 'XOR with' containing '55', 'Byte Offset' containing '36', and 'Skip Before Impair' containing '21'. In the 'Impairment Duration' section, there are two radio buttons: 'Repeat' (which is selected) and 'Continuous'. The 'Repeat' radio button has a text input field next to it containing '30'. At the bottom right of the window is an 'Activate' button.

# Default Stream Configuration

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

The screenshot shows the PacketCheck software interface. The main window is titled 'Normal Configuration' and contains a table of streams:

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

A 'Default Stream Configuration' dialog box is overlaid on the main window. It contains two sections for recording statistics:

- PacketCheck statistics (Record To File):**
  - None
  - HDL [ ]
  - PCAP [C:\Program Files (x86)\GL Communica ...]
- NIC card statistics (Record To File):**
  - None
  - HDL [ ]
  - PCAP [C:\Program Files (x86)\GL Communica ...]

The background window also shows a 'Statistics' section with a table of metrics for Stream1:

Statistics	Stream1
StreamId	1
Stream Name	Stream1
Mode	TX_RX
Duration	00:11:19
Tx Total Frames	5566872
Tx BERT Frames	5566872
Tx Rate	0.00 bps
Tx RTD Frames	0
Tx DWD Frames	0
Rx Total Frames	0
Rx BERT Frames	0
Rx Rate	0.00 bps
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	NO RX DATA
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

# Default Stream Statistics

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: FileType: PCAP, File Name: C:\Program Files (x86)\GL Communication ...

Default Stream: Configuration, Stop

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

Resolved Status, Apply

---

### Statistics

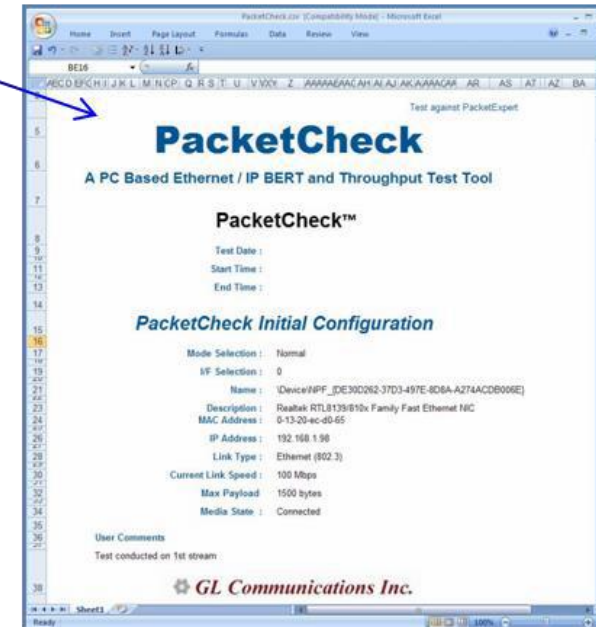
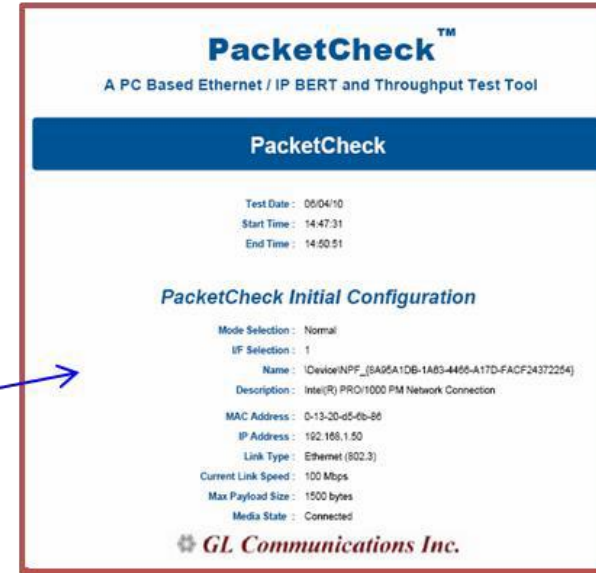
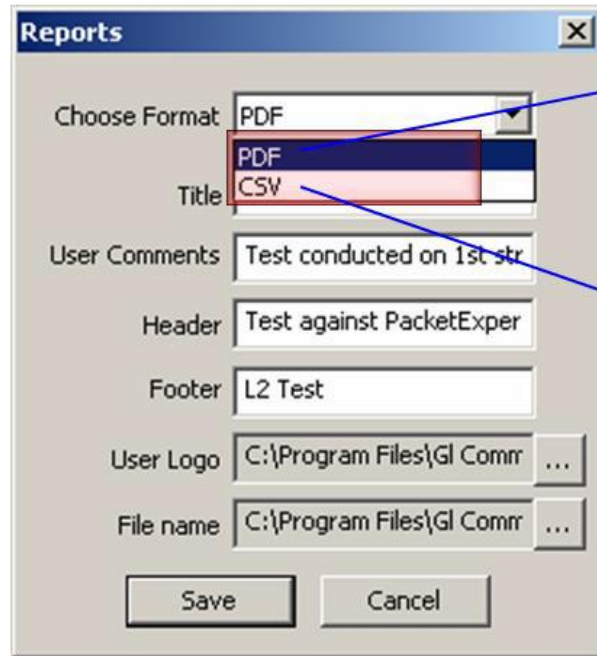
Reset,  Show Default Stream

Statistics	Stream1	PacketCheck Tx	PacketCheck Rx	NIC card Tx	NIC card Rx	Cumulative Statistics	Tx	Rx
StreamId	1	0	125591	34	224511	Total Frames	5566872	0
Stream Name	Stream1	0.00 bps	3.92 Mbps	0.00 bps	5.89 Mbps	Rate	30.95 Kbps	0.00 bps
Mode	TX_RX	0	-NA-	-NA-	-NA-	Non Test Frames	0	0
Duration	00:11:19	0	0	33	33	IP Frames	0	0
Tx Total Frames	5566872	0	0	33	33	UDP Frames	0	0
Tx BERT Frames	5566872	0	0	0	0	TCP Frames	0	0
Tx Rate	0.00 bps	0	0	0	0	ICMP Frames	0	0
Tx RTD Frames	0	0	0	0	0	IGMP Frames	0	0
Tx OWD Frames	0	0	0	0	0	Other L4 Protocol Frames	0	0
Rx Total Frames	0	0	0	0	0	ARP Request Frames	0	0
Rx BERT Frames	0	0	0	0	0	ARP Response Frames	0	0
Rx Rate	0.00 bps	0	125592	1	224478	Other Frames	5566872	0
Rx RTD Frames	0	0	0	1	1	Broadcast Frames	0	0
Rx OWD Frames	0	0	125592	1	224477	Unicast Frames	5566872	0
Lost Frames	0	0	0	32	33	Multicast Frames	0	0
Out Of Order Frames	0	0	0	1	1	64 Length Frames	0	0
Pattern Error Frames	0	0	0	0	0	65_127 Length Frames	0	0
Good Frames	0	0	0	33	38	128_255 Length Frames	0	0
Non Test Frames Received	0	0	0	0	0	256_511 Length Frames	0	0
Bit Error Rate	0.00E+00	0	0	0	0	512_1023 Length Frames	0	0
Error Status	NO RX DATA	0	125592	0	224472	1024_1518 Length Frames	5566872	0
SyncLoss Count	0	0	0	0	0	> 1518 Length Frames	0	0
Bit Error Count	0	0	0	0	0	Status	Running	Running
RTD	-NA-	0	0	0	0	Duration	00:06:15	00:07:51
OWD (Average)	-NA-	0	0	0	0	File Recording Status	Idle	Idle
OWD (Min)	-NA-	0	0	0	0			
OWD (Max)	-NA-	0	0	0	0			
UDP Checksum Error Frames	0							
Zero UDP Checksum Packet	0							

Ready NUM

# Report Generation

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



**Thank you!**