

LE590-SG

User's Manual

<2nd>

Table of Contents

Table of Contents	1
1. LE590-SG Overview.....	2
1.1. Starting LE590-SG	2
1.2. Operation Menu	3
1.2.1. Menu Bar	3
1.2.2. Toolbar	5
1.2.3. Configuration and Information Zone	6
1.2.4. Port Configuration	9
1.3. Multi Streams Generation	12
1.4. Capture Criteria	15
1.5. Capture Buffer	18
1.6. Control Panel	19
1.7. Low Rate Packet Generation	22
1.8. ARP Reply Configuration.....	23
1.9. Tx Stream Counter	24
1.10. Universal Stream Counter	25
1.11. Frame Editor	26
1.11.1. Overview	26
1.11.2. Import.....	27
1.11.3. Frame View	27
1.11.4. Data Link layer	28
1.11.5. Tags.....	30
1.11.6. Layer 3 Header	34
1.11.7. Layer 4 Header	37
1.12. BERT.....	43
1.13. Router NAT.....	44
1.14. DUT Clock Measurement	45
2. Operation of LE-590TX with LE590-SG	46
2.1. Hardware connection	46
2.2. Operation of LE590-SG	46
2.2.1. Generate Test Streams to DUT	46
2.2.2. Start to generate test streams	48
2.2.3. Capture Specified Packets.....	49
2.2.4. View counter of captured packet and others	51

1. LE590-SG Overview

LE590-SG provides a powerful and sophisticated virtual front control panel to manage the LE-590TX. Two test ports can be independently configured with parameters to define multiple streams, filters, and capture capabilities. Traffic for various network protocols can be customized, transmitted, and received on each port. Comprehensive statistics provide users an in-depth analysis of the performance of the DUT (Device Under Test).

1.1. Starting LE590-SG

There are two ways to start LE590-SG:

Starting LE590-TAP

- Click **Start** → **Programs** → **LINEEYE** → **LE-590TX** → **LE590-SG Vxxxxx** → **LE590-SG Vxxxxx**.
- Double-click LE590-SG icon located on your PC's desktop.

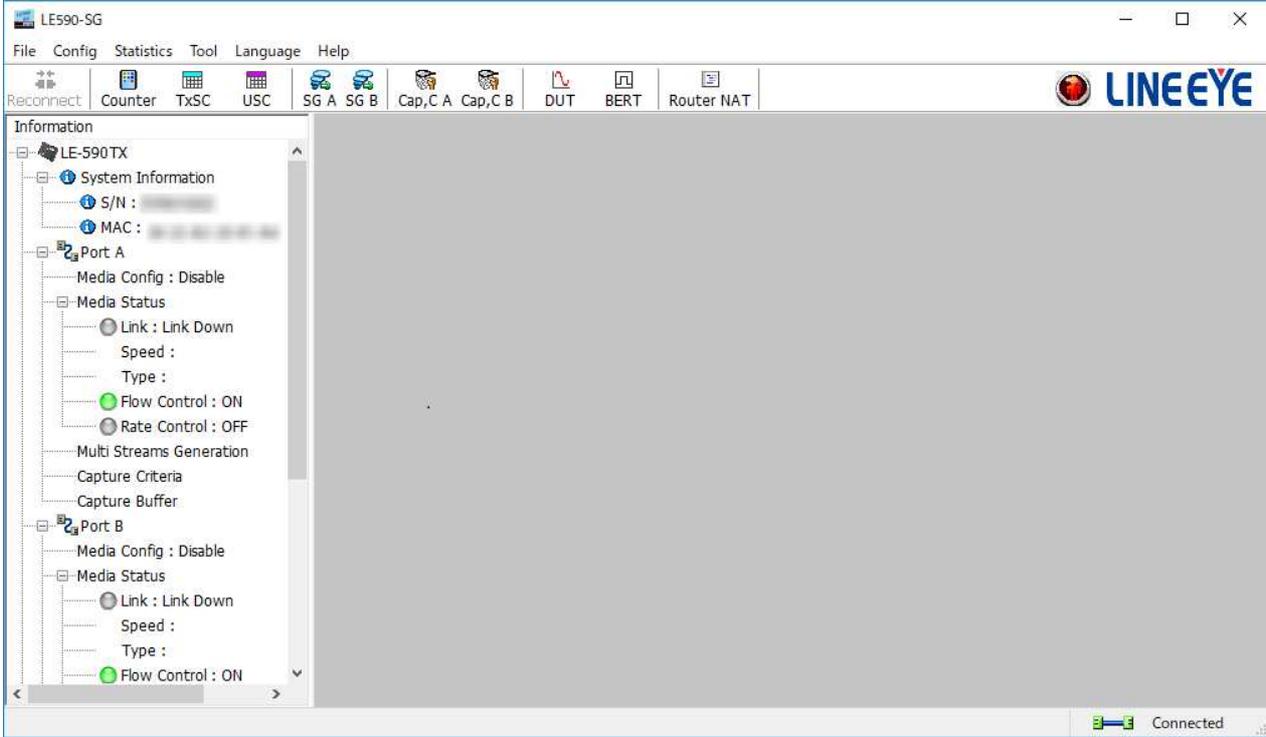


LE590-SG.exe

This manual is for LE590-SG v1.1b028 or later.

1.2. Operation Menu

The operation menu is located at top of this utility



1.2.1. Menu Bar

File Config Statistics Tool Language Help

1.2.1.1. File

Menu Choice	Usage
Load	
Load Port A Config	Load port A setting
Load Port B Config	Load port B setting
Save	
Save Port A Config	Save port A settings.
Save Port B Config	Save port B settings.
Exit	Exit and close this utility

1.2.1.2. Config

Menu Choice	Usage
Port A Stream Generation	Configure the settings and contents of port A for the generation of packet streams
Port B Stream Generation	Configure the settings and contents of port B for the generation of packet streams
Port Configuration	Configure each setting of port A / B
Frame gap for USB transferring	Set capture buffer size to transfer to PC with USB.
Option	In this window, you can set if the future warning window will pop up more often by choosing the Often option, or pop up less warning window by choosing Seldom option.

1.2.1.3. Statistics

Menu Choice	Usage
Control Panel	Real-time frame counters and control panel of Port A and Port B. The counters contain frame counts generated and received that can examine the DUT.

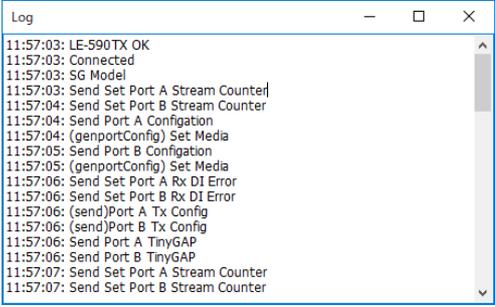
1.2.1.4. Tool

Menu Choice	Usage
DUT OSC Measurement	Performs DUT clock measurement.
BERT Test	Run BERT.

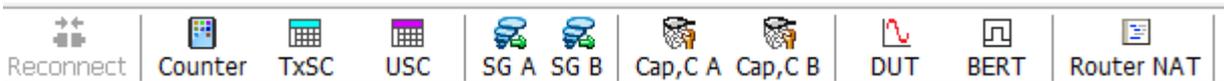
1.2.1.5. Language

Menu Choice	Usage
Languages	LE590-SG has 3 different languages for its UI available. You can set the UI language to English, Simplified Chinese or Japanese.

1.2.1.6. Help

Menu Choice	Usage
About ...	An “About” window will pop up and show detailed system information. Click the OK button to exit the “About” pop-up window.
System Requirements	A “System Requirements” window will pop up and show the requirements for your PC and the FPGA/Firmware of the module. Click the OK button to exit the “System Requirements” pop-up window.
LINEEYE Web	Open your default web browser and access LINEEYE Website (www.lineeye.com)
Log	See instant log of current running command and result 

1.2.2. Toolbar

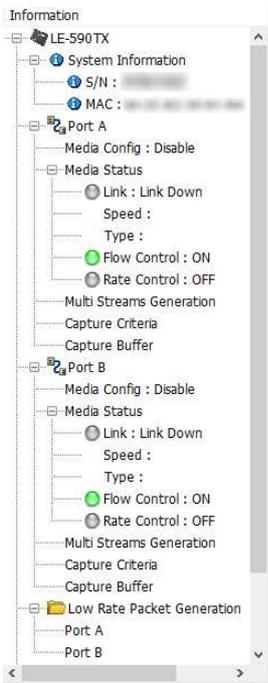


Keys	Usage
Reconnect	If the USB connection between your PC and LE-590TX is down, a “ Disconnected ” icon  will be shown in “ System Connection Status ”. Press Reconnect button  to re-establish the connection between your PC and LE-590TX. If the connection has been established successfully, a message window will pop up, and the “ System Connection Status ” will be shown as “ Connected ”  .
Counter	Real-time frame counters and control panel of Port A and Port B. The counters contain frame counts generated and received that can examine the DUT.

Tx SC	Shown the Tx Streams Counter window.
USC	Shown on the Port Universal Streams Counter window.
SG A	Configure the settings and contents of port A for the generation of packet streams
SG B	Configure the settings and contents of port B for the generation of packet streams
Cap, C A	Configure the criteria to capture the packets from port A.
Cap, C B	Configure the criteria to capture the packets from port B.
DUT	Performs DUT clock measurement.
BERT	Run BERT.
Router NAT	Run router NAT test.

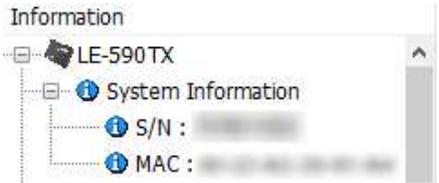
1.2.3. Configuration and Information Zone

For different selections, there are System Information, Configuration and Status of Port A, Port B, Report and Function Configuration in this block.



1.2.3.1. System Information

Click the item below to show the system information

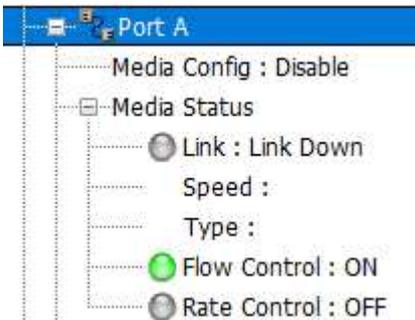


On the right side of the main window, it shows

Model	LE-590TX
S/N	[redacted]
MAC	[redacted]
PCB Version	MP03
FPGA Version	v2.2b001 2019/01/04
Firmware Version	v0.9b023
API Version	v1.0b035 2019/01/08

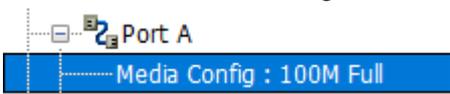
1.2.3.2. Port Status and Configuration

Click the item of ports to show the status or configuration



1.2.3.3. Media Config

Click item below to configure the link mode. Port A and port B has the same configuration items



User can view the media link status or force to run specified media link

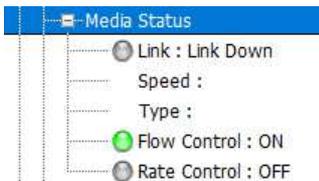
Port A : Media Configuration

<input checked="" type="checkbox"/> Auto	<input type="checkbox"/> Force
<input checked="" type="checkbox"/> 10M Half	<input type="radio"/> Force 10M Full
<input checked="" type="checkbox"/> 10M Full	<input type="radio"/> Force 100M Full
<input checked="" type="checkbox"/> 100M Half	<input type="radio"/> Disable
<input checked="" type="checkbox"/> 100M Full	
MDIX	
<input checked="" type="radio"/> Auto MDIX	<input type="button" value="Apply"/>
<input type="radio"/> Force MDI-II	
<input type="radio"/> Force MDI-X	
<input type="button" value="Set"/>	

Click to take effect the configuration on this page.

1.2.3.4. Media Status

Click items below to view the media status at its sub-tree.



This window shows current link and media status

Port A : Media Status

Link	Link Up
Speed	100M
Mode	Full
Type	Copper
Flow Control	ON
Rate Control	OFF

1.2.4. Port Configuration

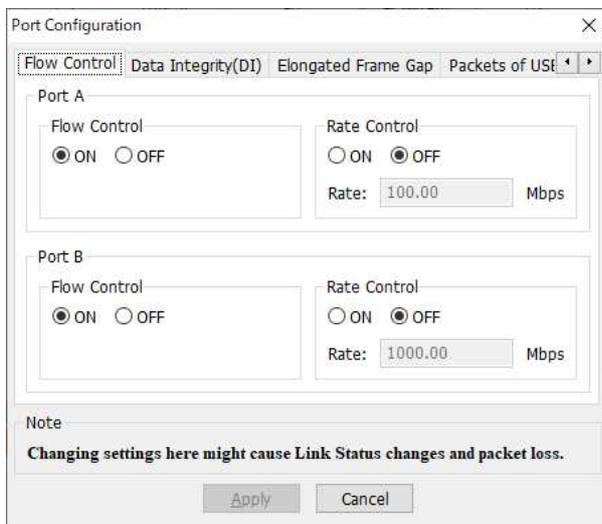
Other settings related to each A / B port are displayed by selecting “Port Configuration” from “Config” in the menu.

1.2.4.1. Flow Control

Sets ON/OFF of flow control.

Flow control is a mechanism which keeps the transmission rate of the sender within the receiving range of the receiver, and is used to manage the flow of data / packets between two nodes, especially when the sender can send more than the receiver acceptance capacity.

When flow control is enabled, rate control setting turns to be available and when rate control is enabled you can set the rate.



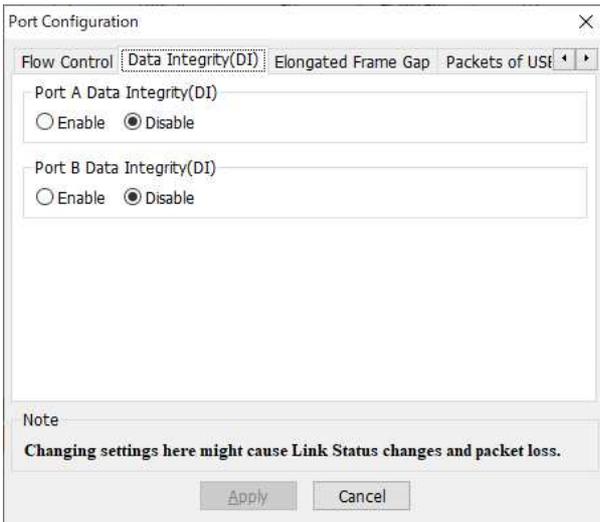
1.2.4.2. Data Integrity(DI)

Sets ON/OFF of the check function by second level CRC (advanced data integrity).

The second level CRC is a checksum calculated based on the contents of the frame contents from the offset to the end of the data field.

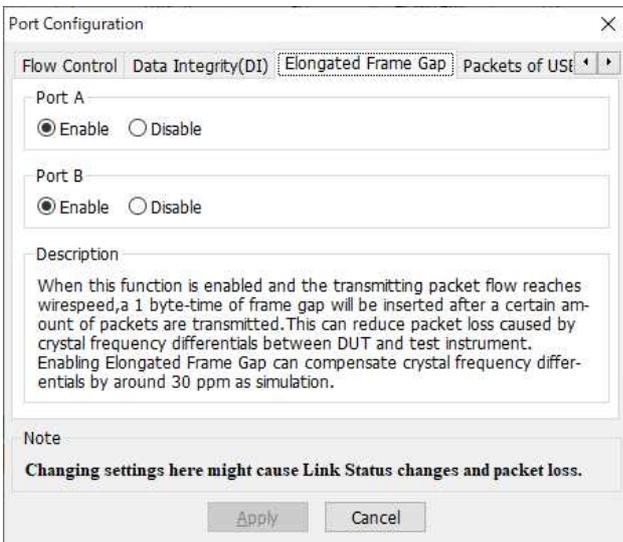


If the data is corrupted by the DUT and the FCS is affected by the error data, the second level CRC check serves as a checksum. The mismatch between sent and received packets is recorded as a second level CRC check error (DI Error).



1.2.4.3. Elongated Frame Gap

When this function is enabled and packet transmission reaches wire speed, a frame gap of the time for 1 byte is inserted after a certain number of packets are transmitted. As a result, in the simulation of crystal oscillation between the DUT and the test equipment, the difference of crystal oscillation can be corrected by about 30 ppm by enabling the elongated frame gap. Enable this function if the DUT clock is slower than the LE-590TX.

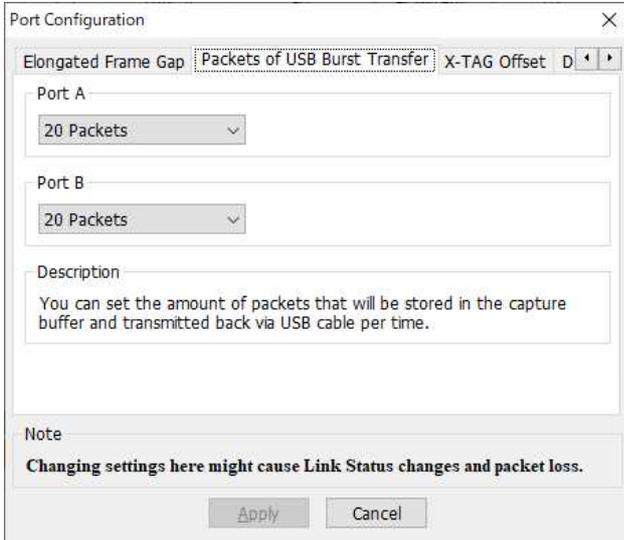


1.2.4.4. Packets of Burst Transfer

Transmits to the PC via USB for each specified number of packets.

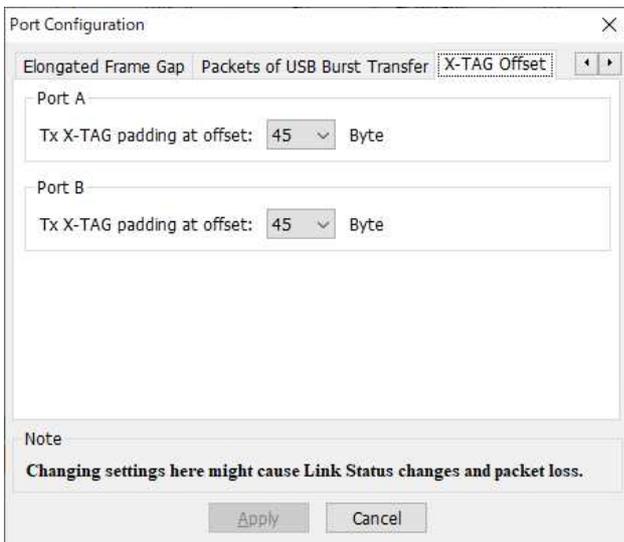
Usually select the default value of 20 Packets.

Lower the value when using older PCs and laptops with lower performance.



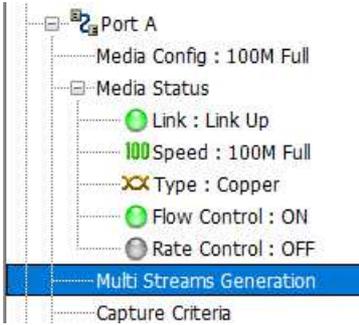
1.2.4.5. X-TAG Offset

Set the insertion position of an X-TAG when using it.

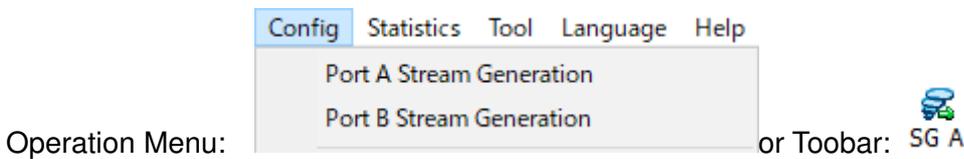


1.3. Multi Streams Generation

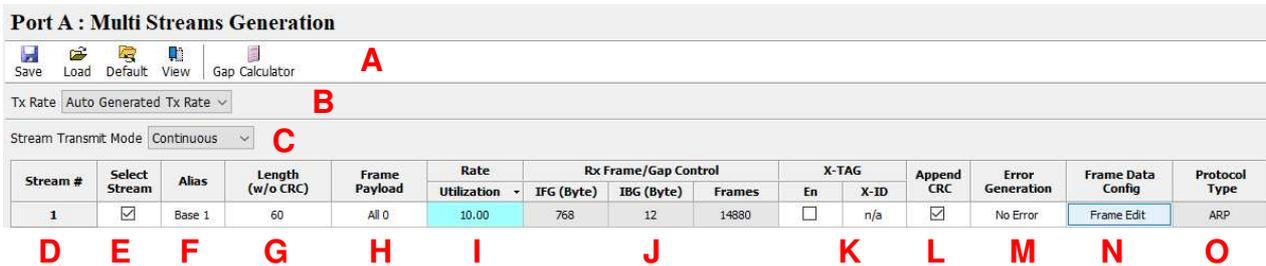
Click item below to view the Multi Streams Generation configuration window.



The configuration is the same as selection in operation menu or toolbar as below



System shows the configuration window. User can configure the streams patterns for streams generation. Maximum 64 entries are allowed for this configuration.

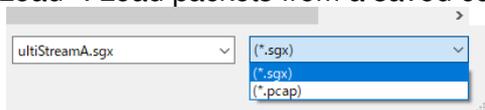


Continued

MAC		VLAN		IP		HV-DA		HV-SA		HV-VID	
DA	SA	En	VID	DIP	SIP	Mode	Range	Mode	Range	Mode	Range
00-00-00-00-00-00	FF-FF-FF-FF-FF-FF	<input checked="" type="checkbox"/>	0	n/a	n/a	Fixed	---	Fixed	---	Fixed	---

A: "Save" : Save the configuration of current settings

"Load" : Load packets from a saved configuration (.sgx) or Pcap format (.pcap) file.



"Default" : Restore to the default settings.

"View" : Select the item to be displayed.

"Gap Calculator" : The gap calculation can be done.

B: Tx Rate : Select the send rate.

"Auto Generated Tx Rate" : Transmit at the rate of the value set for **I**.

"Manual Input Rate" : Transmit at the rate of the value set for **J**.

"Capped Balance Tx Rate" : Transmit evenly with the value entered for "Max Rate (Mbps)".

C: "Continuous" : Continuously transmit.

"Packets Limit" : Transmits the number of packets entered in "Packets".

"Time Mode" : Transmission is performed for the period entered in "second(s)".

D: Select # : Show the number of streams.

To add a new stream, right click on the lower number of the stream volume (Stream #) and select "New".

Stream #	Select Stream	Alias
1	<ul style="list-style-type: none"> New Save as.. Import Copy Paste Delete Move to.. 	

New ✕

Number of Streams ▲ ▼

MAC

DA Fixed Step + - ▲ ▼

Select Exchange Byte ▼

SA Fixed Step + - ▲ ▼

Select Exchange Byte ▼

IPv4

Internet

DIP Fixed Step + - ▲ ▼

Select Exchange Byte ▼

SIP Fixed Step + - ▲ ▼

Select Exchange Byte ▼

E: Select Stream : User can tick the to active the stream generation of this stream.

F: Alias : Enter the name of the created frame.

G: Length (no CRC): Frame length in bytes without CRC

I: Rate: Select the unit and input the value of the parameter that the packets will be generated.

Packet per Second: PPS

Utilization: %

Line Rate: Mbps

PPS: Packet per second. Volume of packets that will be generated per second.

Utilization: Percentage of Wirespeed transmission

Line Rate: Mbytes per second in transmission

J: CRC TxFrame/GAP Control : Enter IFG, IBG, Frames when Tx Rate is set to "Manual Input Rate".

Ethernet devices must allow a minimum idle period between transmissions of Ethernet frames. It is called interframe gap (IFG) as the illustration below

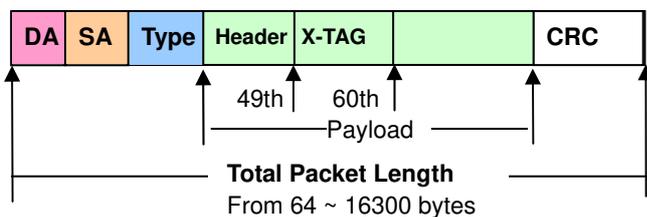


The minimum interframe gap is 96 bits time or 12 byte time. It is the time taken for transmission of 96 bits raw data on the media.

K: X-TAG En : User can tick the to active tag generation of X-TAG. When it is ticked, user can select X-ID. Each X-TAG has a unique ID. If there are more than one product of Xtramus is generating the data stream on the same network, their X-ID should be different

X-TAG that is used as stream tags for providing fundamental information for collecting statistics of multi-stream traffic. Advanced tests like latency, packet loss, and packet sequence miss can be realized by X-TAG.

X-TAG is an Xtramus proprietary 12 bytes embedded tag that is located at 49th~60th bytes of each testing frames that are generated by Rapid-Matrix for multi-stream tests.



L: Append CRC: Add CRC checksum to the end of each frame. CRC checksum is the way to verify the correctness after data transmission. 4 bytes will be added at the end of the frame when CRC checksum is added.

M: Error Generation : Generates an error frame.

N: Frame Data Config: Configure the payload contents in frame. Click the **Frame Editor**

 to edit the detailed contents in frame. For the detail of how to use Frame Editor, please refer to 1.11 Frame Editor

O: Protocol Type: System shows the Protocol Type when frame content is configured in



P: DA: Mode: Show or configure current Destination Address Mode. It can be Fixed, Increase, Decrease or Random. If increase or decrease mode is selected, configure range (0~255) is required. The DA will increase or decrease according to the range and repeat again. For the

detail of this function, please refer to 1.11 Frame Editor

Q: SA: Mode: Show or configure Source Address Mode. It can be Fixed, Increase, Decrease or Random. If increase or decrease mode is selected, configure range (0~255) is required. The SA will increase or decrease according to the range and repeat again. For the detail of this function, please refer to 1.11 Frame Editor

R: VID: Mode: Show or configure VID Mode. It can be Fixed, Increase, Decrease or Random. If increase or decrease mode is selected, configure range (0~4095) is required. The SA will increase or decrease according to the range and repeat again. For the detail of this function, please refer to 1.11 Frame Editor

S: DIP: Show or configure current Destination IPAddress.

T: SIP: Show or configure Source IPAddress.

U: HV-DA : Change the end value (XX) of the Destination MAC address.

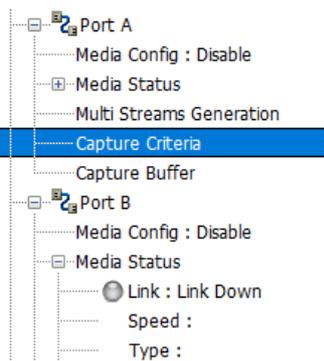
V: HV-SA : Change the end value (XX) of the Source MAC address.

W: HV-VID : When VID is checked, VID is changed.

Click  to take effect the configuration.

1.4. Capture Criteria

Click item below to view the Capture Criteria configuration window.



The configuration is the same as selection in operation menu or toolbar as below

Toolbar:  
Cap,C A Cap,C B

System shows the configuration window. Users can configure the criteria that they want to capture, from protocol or SDFR aspects

◆ Protocol

Different protocols can be combined as unique criteria

Protocol SDFR Result

Capture all packets **A**

MAC **B**

- Broadcast
- Multicast
- Unicast
- VLAN
- CRC error
- Over Size
- Under 64 bytes
- Pause packet

Network **C**

- Ethernet-II
- ARP
- IPv4
- IPv6
- IPX
- ICMP
- IGMP
- SNAP
- BPDU
- None IPv4
- IPv4 with extension header
- IPv4 checksum error

Protocol **D**

- TCP
- UDP
- FTP
- RTP
- OSPF
- RSVP

X-Tag **E**

Packet length filter(with CRC)

Filter length (Bytes) = 52 **F**

A: Capture all packets: All packets are captured and sent to PC by USB port. Be attention that packet loss is possible if the captured traffic is higher than traffic allowed for USB port.

B: MAC: MAC based criteria. Packets with MAC events in the list is captured and sent to PC by USB port

C: Network: Network events criteria. Packets with network events in the list is captured and sent to PC by USB port.

D: Protocol: Protocol Type criteria. Packets with protocol type in the list is captured and sent to PC by USB port.

E: X-TAG: X-TAG is an Xtramus proprietary 12 bytes embedded tag. User can capture this kind of packets from product of Xtramus

F: Packet length filter: Capture packet (frame) length in specified range of length

◆ SDFR:

- SDFR (Self-Discover Filtering Rules) is a technique that make capture of Ethernet easy and convenient
- User-friendly interface that the value such as source IP, destination IP and other criteria for capture and filter can be input directly without calculating mask.

- SDFR value for capture or filter includes several network event (such as DA, SA, DIP...), varied length of frame (oversized, undersized) and varied of frame/packet type (CRC error, IP checksum error...).
- Value of SDFR can be a unique value or a range of values between specified values. All packets that fit the value are captured
- Multiple filter condition can be activated easily by just clicking different options
- Displays captured packet in real-time while network is still running.
- Value of SDFR and filter criteria can be changed dynamically during capture procedure.

Port A : Capture Criteria

Protocol	SDFR	Result
<input type="checkbox"/>	DA A	B
<input type="checkbox"/>	SA	C
<input type="checkbox"/>	VID	D
<input type="checkbox"/>	SIP	
<input type="checkbox"/>	DIP	
<input type="checkbox"/>	SPort	
<input type="checkbox"/>	DPort	
<input type="checkbox"/>	DA & SA	
<input type="checkbox"/>	DA & SA & VID	
<input type="checkbox"/>	DA & SIP	
<input type="checkbox"/>	DA & DIP	
<input type="checkbox"/>	SA & SIP	
<input type="checkbox"/>	SA & DIP	
<input type="checkbox"/>	SIP & DIP	
<input type="checkbox"/>	SIP & SPort	
<input type="checkbox"/>	SIP & DPort	
<input type="checkbox"/>	DIP & SPort	
<input type="checkbox"/>	DIP & DPort	
<input type="checkbox"/>	SIP & DIP & SPort	
<input type="checkbox"/>	SIP & DIP & DPort	

DA	Single	00-22-A2-00-00-08
SA	Single	00-22-A2-00-00-00
VID	Single	1111
DIP	Single	192.168.0.1
SIP	Single	192.168.0.0
DPort	Single	80
SPort	Single	80

Glossary

DA: Destination MAC Address
 SA: Source MAC Address
 VID: VLAN ID
 DIP: Destination IP Address
 SIP: Source IP Address
 DPort: Destination port

A: SDFR items: User can tick the items that act as criteria. When user ticks one option, some other options will be gray. It means the option what user tick has covered the range of those options in gray.

B: Pattern

- DA: Destination MAC address
- SA: Source MAC address
- VID: VLAN ID that follows 802.11Q standard
- DIP: Destination IP address
- SIP: Source IP address
- DPort: Destination port of IP address
- SPort: Source port of IP address

C: Pattern Mode: Select a pattern (Single, Pair, Range) to cover the value of criteria items.

D: Patterns: The unique value or range of values specified as the capture criteria of criteria items.

For example, user wants to capture packets with VLAN ID 1 to 10.

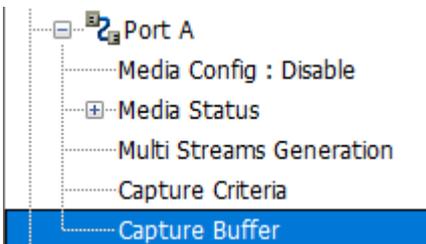
Protocol	SDFR	Result
<input type="checkbox"/>	DA	▲
<input type="checkbox"/>	SA	
<input checked="" type="checkbox"/>	VID	
<input type="checkbox"/>	SIP	

Plus

VID Range ≤ VID ≤

1.5. Capture Buffer

Click item below to view the Capture Buffer configuration window.



To view the contents of captured packets, user can select the captured packets from Capture Buffer window

- A:** Save: Save the captured packets to file
- B:** Tick this option to capture Bert Error packets
- C:** Start Capture: Starts the capture process.

D: Stop Capture: Stop the capture process

This block lists all captured packets

E: Summary: Summary of network items

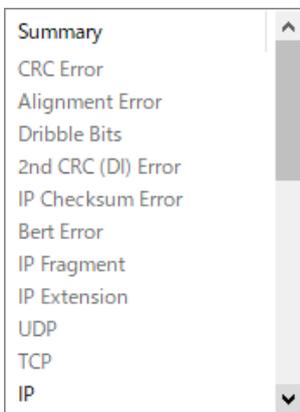
F: Length (add CRC): Packet length that includes CRC

G: DA: Destination MAC Address

H: SA: Source MAC Address

I: Frame Data: Contents of captured frame (packet).

J: Summary: List all summary items of network. When user select a packet, the summary items that fit the packet is labels as black word, otherwise, labels as gray word that it does not fit the packet. For the example below, the selected packet is **IP** packet and it does not has the other property such as CRC Error, Alignment Error.



K: Item Name: Frame view of capture packets, such as Ethernet II

1.6. Control Panel



Click the **Counter** button to pop up the Counter window.

Control button of this window can control packet generation and receiving, and also view the result counter

The Counter Window interface includes a Counter Panel with the following controls:

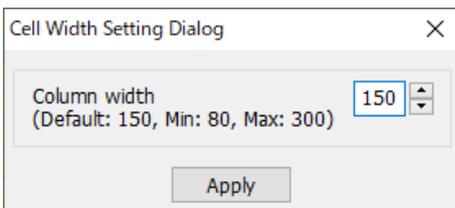
- A:** Save (Save icon)
- B:** Clear (000)
- C:** Hide (Hide icon)
- D:** Show (Show icon)
- E:** Resize (Resize icon)
- F:** Export to Excel (Excel icon)
- G:** Tx Learning Pkts A (Tx Learning Pkts A icon)
- H:** Tx Learning Pkts B (Tx Learning Pkts B icon)

	Port A	Port B	Total
Link Status	Link Up	Link Up	
Speed mode	100M Full	100M Full	
Tx Packet	6,476	71,876	
Tx Byte	414,464	4,887,568	
Tx Packets Rate	0	0	
Tx Line Rate(Mbps)	0.00	0.00	
Tx Utilization(%)	0.00	0.00	
Rx Packet	0	6,476	
Rx Byte	0	414,464	
Rx Packets Rate	0	0	
Rx Line Rate(Mbps)	0.00	0.00	
Rx Utilization(%)	0.00	0.00	
⊕ Collision	-	-	
⊕ Error & Loss Packet	-	-	
⊕ Packet Size Statistics	-	-	
⊕ Layer2 Packet Counts	-	-	
⊕ Network Layer	-	-	
⊕ SDFR	-	-	
X-TAG Packet	0	0	
Tx Start Time	2019/02/06 11:55:13	2019/02/06 11:58:55	
Tx End Time	2019/02/06 11:55:17	2019/02/06 11:58:57	
First Error Time	-	-	
Last Error Time	-	-	

The right side of the window features an Operation panel with controls for All Ports, Port A, and Port B, including Transmit and Capture buttons with status indicators and a numeric display.

◆ Control buttons

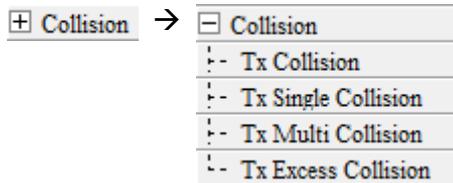
- A:** Save: Save current result of counters to Excel file
- B:** Clear: Clear all counters to zero and it is ready for next packet generation
- C:** Hide: Hide all the data that is zero.
- D:** Show: Show all the data of this window.
- E:** Resize: Adjust the width of the cell.



- F:** Export to Excel:
- G:** Tx Learning PKts A: Transmit Learning packets from port A.
- H:** Tx Learning PKts B: Transmit Learning packets from port B.

I: Counter: Counters for streams generation

Counter with  mark is expansible. Please click the  mark



J: Operation: This option can activate Transmit or Capture of port A, port B or port A + B individually.

Button	Description
	Stop complete procedure of transmitting or capturing.
	Start to transmit or capture procedure
	Pause transmitting or capturing procedure. System still measure the statistics counter, however, the counter value is static for user to watch the status when user click the  button. When user click  again, the counter status resume to real status instantly. Click this button does not affect the real counters values

1.7. Low Rate Packet Generation

Port A : Low Rate Packet Generation

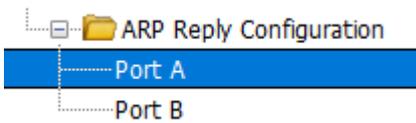
A  Save
B  Load
C  000 Clear
D  Default

E Stream #	F Active Stream	G Alias	H Length (w/o CRC)	I Frame Data Config	J Protocol Type	K Interval (Sec)	L Packet Count
1	<input type="checkbox"/>	LRPG 1	60	Frame Edit	LLC	1	0
2	<input type="checkbox"/>	LRPG 2	60	Frame Edit	LLC	1	0
3	<input type="checkbox"/>	LRPG 3	60	Frame Edit	LLC	1	0
4	<input type="checkbox"/>	LRPG 4	60	Frame Edit	LLC	1	0

	00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F		0123456789ABCDEF
0000	00 22 A2 A1 A0 00	00 22 A2 A1 B0 00	00 00
0010	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00		.. "e; .." e; "
0020	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	
0030	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	

- A:** Save: Save the current settings.
- B:** load: Load the settings.
- C:** Clear: Clear the current value to zero
- D:** Default: Restore to the default settings.
- E:** Stream #: Show the number of streams.
- F:** Active Stream: User can tick the to active the stream generation of this stream.
- G:** Length (w/o CRC): Frame length in bytes without CRC
- H:** Frame Data Config: Configure the payload contents in frame.
- I:** Protocol Type: System shows the Protocol Type when frame content is configured in Frame Editor
- J:** Interval(Sec): Sets the transmission interval.
- K:** Packet Count: Sets the number of packets to transmission.

1.8. ARP Reply Configuration



Port A : ARP Reply Configuration

Save Load Default

D Stream #	E Enable	F SIP	G Netmask	H Gateway	I SIPv6	J My MAC	K Status
1	<input type="checkbox"/>	0.0.0.0	0.0.0.0	0.0.0.0	0000:0000:0000:0000:0000:0000:0000:0000	00-00-00-00-00-00	Off
2	<input type="checkbox"/>	0.0.0.0	0.0.0.0	0.0.0.0	0000:0000:0000:0000:0000:0000:0000:0000	00-00-00-00-00-00	Off
3	<input type="checkbox"/>	0.0.0.0	0.0.0.0	0.0.0.0	0000:0000:0000:0000:0000:0000:0000:0000	00-00-00-00-00-00	Off
4	<input type="checkbox"/>	0.0.0.0	0.0.0.0	0.0.0.0	0000:0000:0000:0000:0000:0000:0000:0000	00-00-00-00-00-00	Off
5	<input type="checkbox"/>	0.0.0.0	0.0.0.0	0.0.0.0	0000:0000:0000:0000:0000:0000:0000:0000	00-00-00-00-00-00	Off
6	<input type="checkbox"/>	0.0.0.0	0.0.0.0	0.0.0.0	0000:0000:0000:0000:0000:0000:0000:0000	00-00-00-00-00-00	Off
7	<input type="checkbox"/>	0.0.0.0	0.0.0.0	0.0.0.0	0000:0000:0000:0000:0000:0000:0000:0000	00-00-00-00-00-00	Off
8	<input type="checkbox"/>	0.0.0.0	0.0.0.0	0.0.0.0	0000:0000:0000:0000:0000:0000:0000:0000	00-00-00-00-00-00	Off
9	<input type="checkbox"/>	0.0.0.0	0.0.0.0	0.0.0.0	0000:0000:0000:0000:0000:0000:0000:0000	00-00-00-00-00-00	Off
10	<input type="checkbox"/>	0.0.0.0	0.0.0.0	0.0.0.0	0000:0000:0000:0000:0000:0000:0000:0000	00-00-00-00-00-00	Off
11	<input type="checkbox"/>	0.0.0.0	0.0.0.0	0.0.0.0	0000:0000:0000:0000:0000:0000:0000:0000	00-00-00-00-00-00	Off
12	<input type="checkbox"/>	0.0.0.0	0.0.0.0	0.0.0.0	0000:0000:0000:0000:0000:0000:0000:0000	00-00-00-00-00-00	Off

Apply

- A:** Save: Save the current settings.
- B:** load: Load the settings.
- C:** Default: Restore to the default settings.
- D:** Stream#: Show the number of streams.
- E:** Enable: User can tick the to active the stream generation of this stream.
- F:** SIP: Show or configure Source IPAddress.
- G:** Netmask: Show or configure Netmask.
- H:** Gateway: Show or configure Default Gateway.
- I:** SIPv6: Show or configure Source IPAddress V6.
- J:** My MAC: Show or configure MAC Address.
- K:** Status: Show the transmission status.

1.9. Tx Stream Counter

000
Clear Hide Show Port AB Port A Port B On Top

Port A

Stream #	Packets	Bytes	XID
1	6,476	414,464	n/a
2	n/a	n/a	n/a
3	n/a	n/a	n/a
4	n/a	n/a	n/a
5	n/a	n/a	n/a
6	n/a	n/a	n/a
7	n/a	n/a	n/a
8	n/a	n/a	n/a

Port B

Stream #	Packets	Bytes	XID
1	71,876	4,887,568	n/a
2	n/a	n/a	n/a
3	n/a	n/a	n/a
4	n/a	n/a	n/a
5	n/a	n/a	n/a
6	n/a	n/a	n/a
7	n/a	n/a	n/a
8	n/a	n/a	n/a

- A:** Clear: Clear the current counters value to zero.
- B:** Hide Zero: Hide counter items that its counter value is zero.
- C:** Show: Show all the data of this window.
- D:** Port AB: Lists counters value of port A and port B simultaneously.
- E:** Port A: Lists counters value of port A only.
- F:** Port B: Lists counters value of port B only.
- G:** On Top: Display the window in front.
- H:** Packets: Show the number of packets.
- I:** Bytes: Show the number of bytes in the packets.
- J:** XID: Show the XID of the packets.

1.10. Universal Stream Counter

Universal Stream Counter Window

Port A

XID #	Line Rate (Mbps)	Packets	Bytes	Loss Event	S/N Miss	IPCS Error	Latency (us)		
							Current	Max	Min
Total	0.00	0	0	0	0	0	n/a	n/a	n/a
0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
3	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
4	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Port B

XID #	Line Rate (Mbps)	Packets	Bytes	Loss Event	S/N Miss	IPCS Error	Latency (us)		
							Current	Max	Min
Total	0.00	0	0	0	0	0	n/a	n/a	n/a
0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
3	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
4	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

A: Update: The Update button allows you to pause or start the counter operation.

B: Save: Save current result of counters to Excel file.

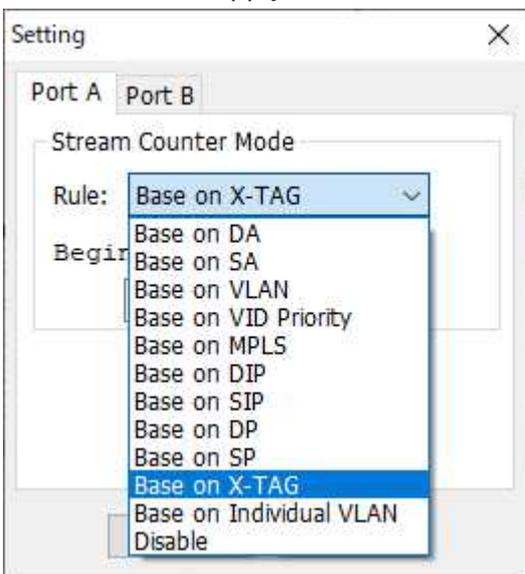
C: Clear: Clear all counters to zero.

D: Clear: Clear Max and Min counters to zero..

E: Hide: Hide all the data that is zero.

F: Show: Lists counters value of port B only.

G: Set: Click the button to pop up the Setting window. In this window, you may modify the Rule (Stream Counter Mode) of USC. The chosen mode will be shown in the side pointed by the red arrow. Click the Apply button to save this setting or Cancel to close this window without saving.



After applying your settings made on the Setting window, the changes will be shown on the Port Universal Streams Counter window.

XID #	Line Rate(Mbps)	Packets	Bytes	Loss Event	S/N Miss	IPCS Error	Latency (us)		
							Current	Max	Min
Total	0.00	368,331	23,573,184	0	0	0	n/a	n/a	n/a
6	0.00	368,331	23,573,184	0	0	0	n/a	0.00	0.00

H: Port AB: Show the PortA & B counter of this window.

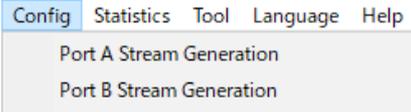
I: Port A: Show the PortA counter of this window.

J: Port B: Show the PortB counter of this window.

K: On Top: Display the window in front.

1.11. Frame Editor

To create the pattern and contents of the streams what user want to generate, the utility has Frame Editor function to create what user want.

Click  button on toolbar or  on operation menu, system shows

Port A : Multi Streams Generation

Save Load Default View Gap Calculator

Tx Rate: Auto Generated Tx Rate

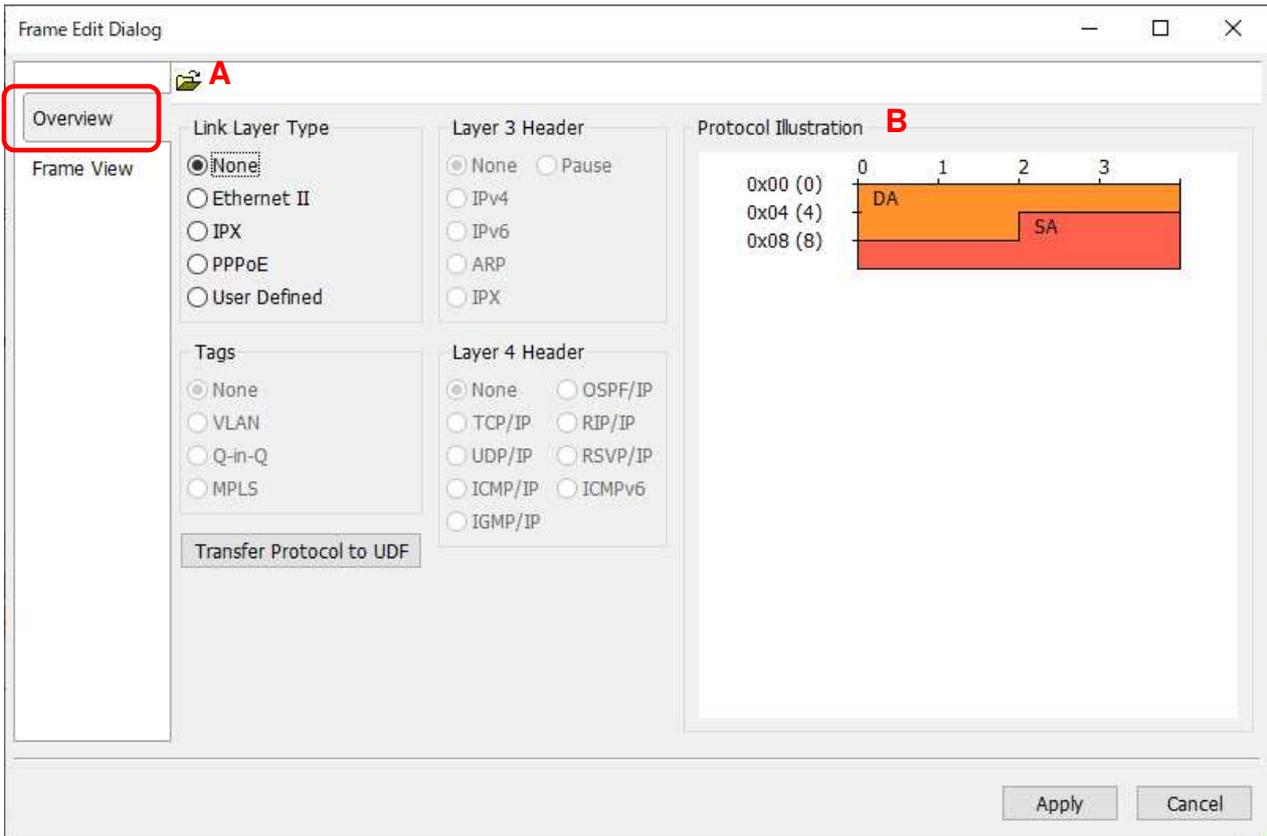
Stream Transmit Mode: Continuous

Stream #	Select Stream	Alias	Length (w/o CRC)	Frame Payload	Rate	Rx Frame/Gap Control			Append CRC	Error Generation	Frame Data Config	Protocol Type
					Utilization	IFG (Byte)	IBG (Byte)	Frames				
1	<input checked="" type="checkbox"/>	Base 1	60	All 0	10.00	768	12	14880	<input checked="" type="checkbox"/>	No Error	Frame Edit	ARP

Configure related parameters, then user can click  to edit the detailed contents in frame.

1.11.1. Overview

This window shows all frame type that is configurable. User can also import user-defined file (*.pcap of Ethereal or Wireshark) for test directly.



1.11.2. Import

Click the **A**:  button and import the file from PC

B: Protocol Illustration: The figure shows the structure of packet/frame that will be generated. The figure is changeable, depending on the configuration of the packet/frame.

1.11.3. Frame View

This Frame View window shows the frame structure of the frame that user want to edit.

Item Name A	Value B
[-] Ethernet 802.3	
Destination	FF:FF:FF:FF:FF:FF
Source	00:00:00:00:00:00
C [-] Length	0x0000
[+] LLC (Logical Link Control Protocol)	

```

00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F | 0123456789ABCDEF
00000000 FF FF FF FF FF FF 00 00 00 00 00 00 00 00 00 .....
00000010 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
00000020 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
00000030 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
    
```

D

- A:** Item Name: Network protocol type
- B:** Value: the value in the protocol type
- C:** Click [-] can expand the items in protocol type
- D:** Contents of the edited frame/packet.

1.11.4. Data Link layer

Data Link Layer type of streams generation

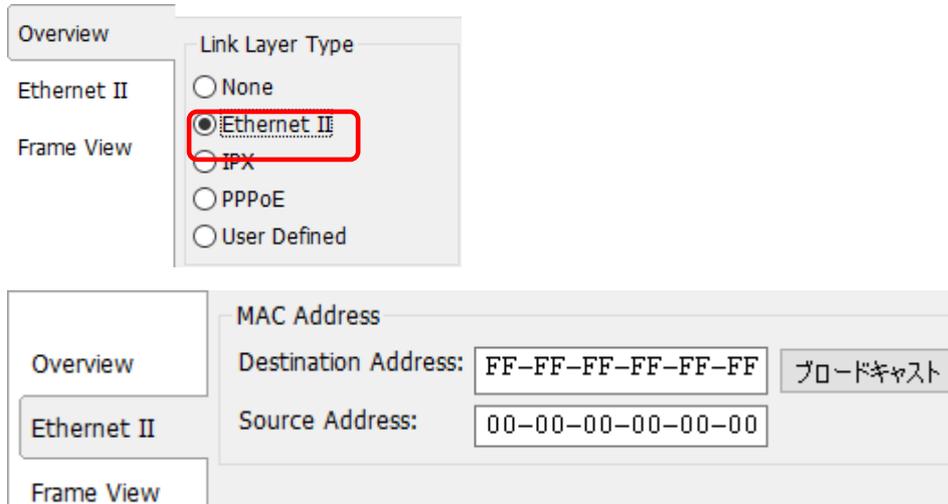
Link Layer Type

- None
- Ethernet II
- IPX
- PPPoE
- User Defined

Data Link layer: The Data Link Layer is Layer 2 of the seven-layer OSI model of computer networking. The Data Link Layer protocols respond to service requests from the Network Layer and they perform their function by issuing service requests to the Physical Layer. Several protocols options can be chosen for the test.

1.11.4.1. Ethernet II

Ethernet II: The most common Ethernet protocol currently used on LAN



User can configure the MAC address of DUT.

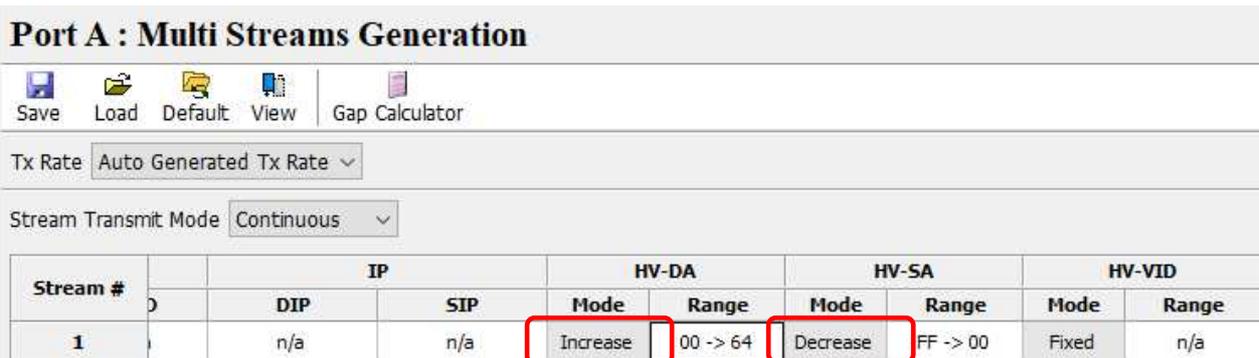
Destination Address (DA): Default: FF:FF:FF:FF:FF:FF, means broadcast frame. To use variation of DA function, this MAC address is the start MAC address

Source Address (SA): Default: 00:00:00:00:00:00, means the MAC address of this device itself. To use variation of SA function, this MAC address is the start MAC address

1.11.4.2. Variation of DA, SA and VID

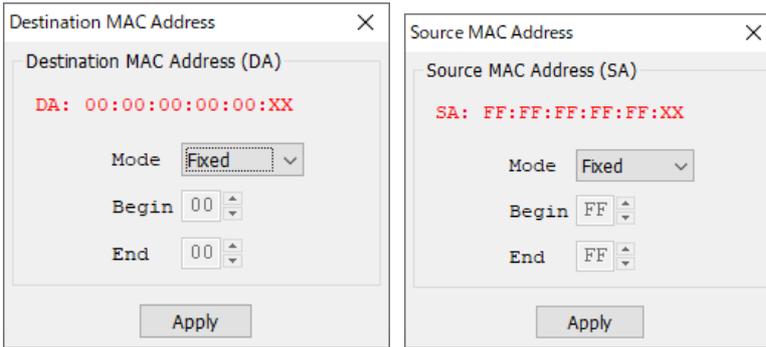
The DA and SA is variable if increase or decrease selection is selected

DA, SA of Default Multi Streams generation is fixed



User can click the selection and change it to increase or decrease and also specify a range of variation as the example below

HV-DA		HV-SA	
Mode	Range	Mode	Range
Increase	00 -> 64	Decrease	FF -> 00

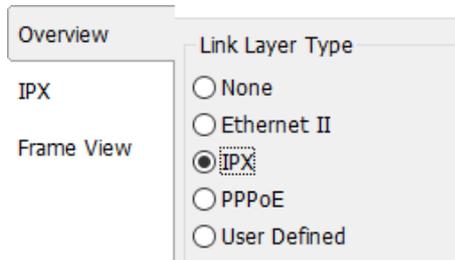


Assume that the DA is 00-00-21-5C-0A-22, Assume that the DA is 00-00-21-5C-0B-22

- When increase mode is selected, the last 2 hexadecimal digits will be 22, 23, 24...till the counts of the range, for example, 100.
- When decrease mode is selected, the last 2 hexadecimal digits will be 22, 21, 20...till the counts of the range, for example, 150.

1.11.4.3. IPX

IPX: Internetwork Packet Exchange (IPX) is the OSI-model Network layer protocol in the IPX/SPX protocol stack. The IPX/SPX protocol stack is supported by Novell's NetWare network operating system.

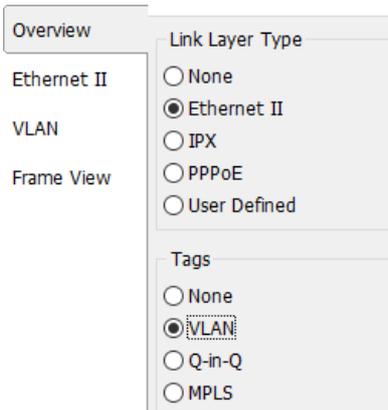


This editor of IPX will added if required.

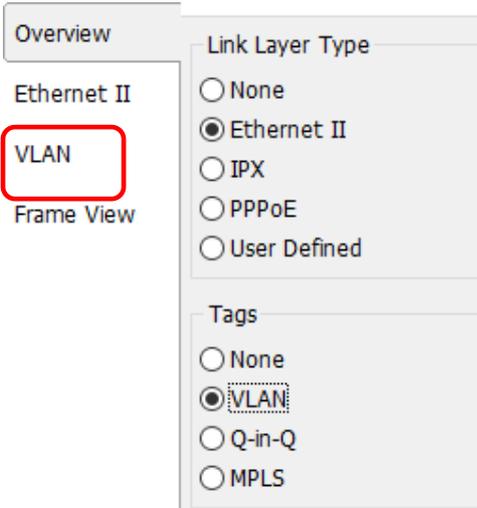
1.11.5. Tags

When Ethernet II of Data Link Layer is selected, extra tag options is available.

When Ethernet II is selected. Tags option is opened

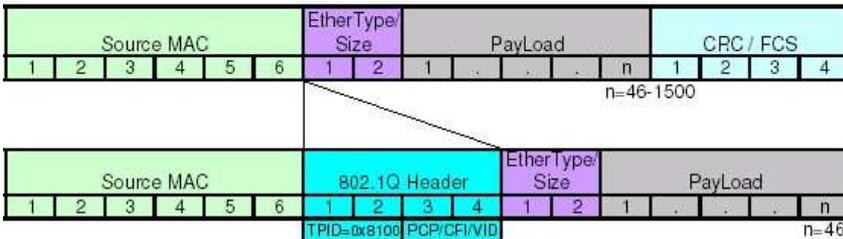


1.11.5.1. VLAN



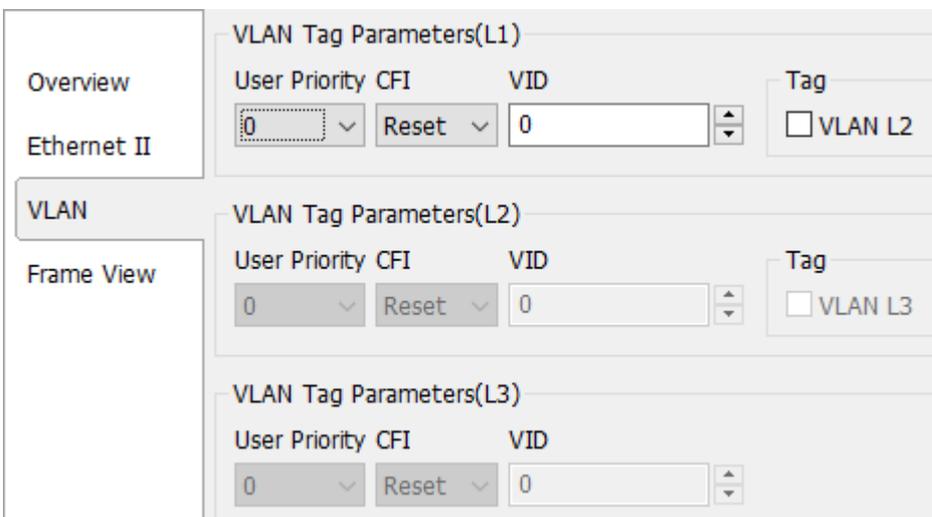
A virtual LAN, commonly known as a VLAN, is a group of hosts with a common set of requirements that communicate as if they were attached to the Broadcast domain, regardless of their physical location. The protocol most commonly used today in configuring virtual LANs is IEEE 802.1Q.

IEEE 802.1Q adds a 32-bit field between the source MAC address and the EtherType/Length fields of the original frame. The VLAN tag field has the following format:



VLAN Tag in Ethernet Frame

To configure the VLAN for streams generation, click the VLAN Tab



User priority (also called COS, class of service) and VID are most common parameter for the test

1.11.5.2. Q-in-Q

Overview

Ethernet II

Q-in-Q

Frame View

Link Layer Type

None

Ethernet II

IPX

PPPoE

User Defined

Tags

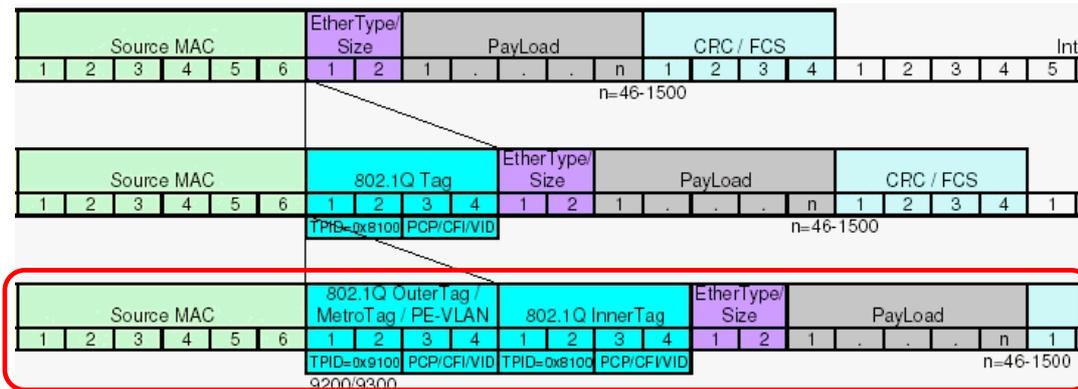
None

VLAN

Q-in-Q

MPLS

IEEE 802.1ad (Provider Bridges) is an amendment to IEEE standard IEEE 802.1Q-1998 and it is called Q-in-Q or Stacked VLANs



To configure the Q-in-Q for streams generation, click the Q-in-Q Tab

Overview

Ethernet II

Q-in-Q

Frame View

S-Tag

Ether Type User Priority CFI VID

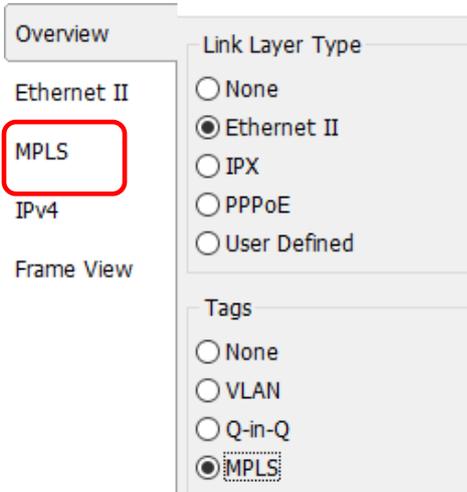
88 : A8 0 Reset 0

C-Tag

Ether Type User Priority CFI VID

81 : 00 0 Reset 0

1.11.5.3. MPLS

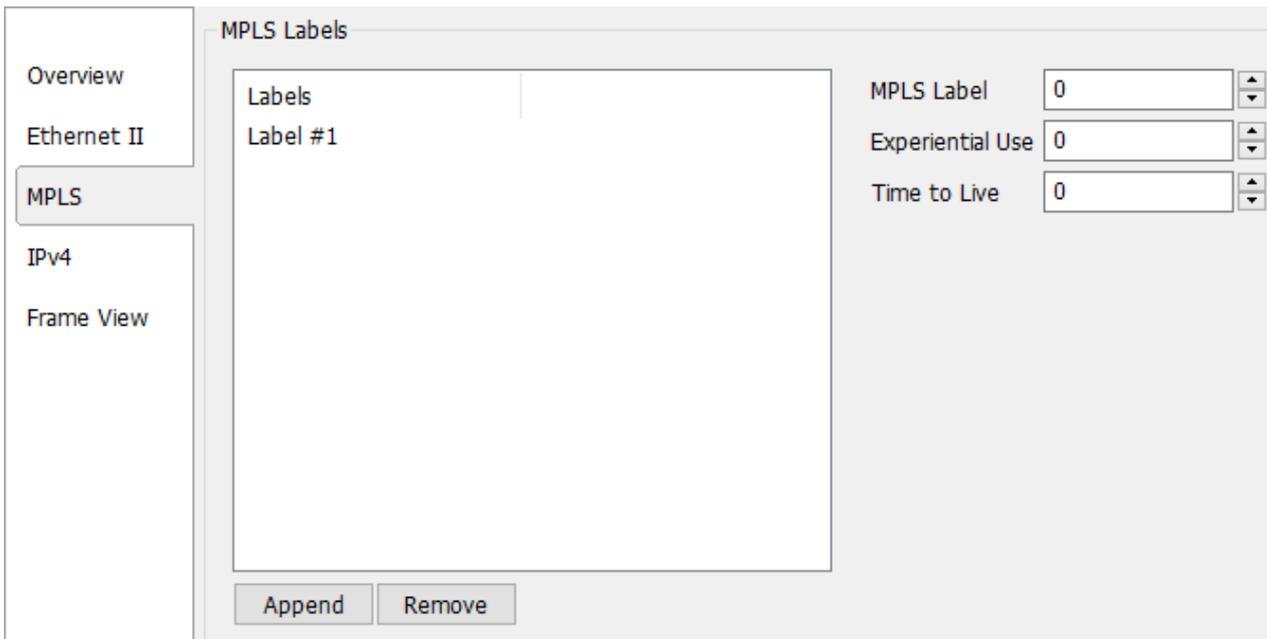


In computer networking and telecommunications, Multiprotocol Label Switching (MPLS) refers to a mechanism that directs and transfers data between Wide Area Networks (WANs) nodes with high performance, regardless of the content of the data. MPLS makes it easy to create "virtual links" between nodes on the network, regardless of the protocol of their encapsulated data.

MPLS works by prefixing packets with an MPLS header, containing one or more 'labels'. This is called a label stack. Each label stack entry contains four fields:

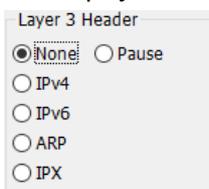
- A 20-bit label value.
- A 3-bit Traffic Class field for QoS (Quality of Service) priority (experimental) and ECN (Explicit Congestion Notification).
- A 1-bit bottom of stack flag. If this is set, it signifies that the current label is the last in the stack.
- An 8-bit TTL (time to live) field.

This can be defined by the configuration of this utility.

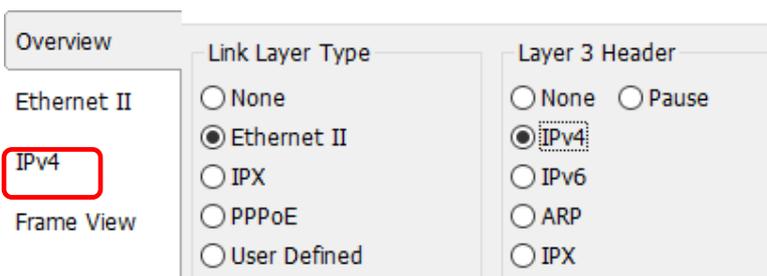


1.11.6. Layer 3 Header

In the payload of frame, layer 3 header as the items below is configurable



1.11.6.1. IPv4



IPv4: Internet Protocol version 4 (IPv4) is the fourth revision in the development of the Internet Protocol (IP) and it is the first version of the protocol to be widely deployed.

The structure of IP header is illustrated below

bit offset	0-3	4-7	8-15	16-18	19-31
0	Version	Header length	Differentiated Services	Total Length	
32	Identification		Flags	Fragment Offset	
64	Time to Live	Protocol		Header Checksum	
96	Source Address				
128	Destination Address				
160	Options				
160 or 192+	Data				

The utility has user configurable interface to match the structure of IPv4 header

The screenshot shows the 'IPv4' configuration section of the utility. It includes a sidebar with 'Overview', 'Ethernet II', 'IPv4', and 'Frame View'. The main area is titled 'Internet Protocol Address' and contains the following fields:

- Destination Address: 192.168.1.0
- Source Address: 192.168.0.0
- (TOS Bit 0-2) Precedence: 000 - Routine
- (TOS Bit 3) Delay: 0 - Normal
- (TOS Bit 4) Throughput: 0 - Normal
- (TOS Bit 5) Reliability: 0 - Normal
- (TOS Bit 6) Cost: 0 - Normal
- (TOS Bit 7) Reserved: 0
- Identification: 0
- Fragment: May Fragment
- Last Fragment: Last Fragment
- Fragment Offset (x8): 0
- Time to Live: 64
- Protocol: 255 - Reserved

A: Differentiated Services (DS) was originally defined as the TOS (**Type of Services**) field; this field is now defined by RFC 2474 for Differentiated services (DiffServ) and by RFC 3168 for Explicit Congestion Notification (ECN), matching IPv6.

B: Most common protocols numbers are listed below and the utility has detail configuration of these protocol.

- 1: Internet Control Message Protocol (ICMP)
- 2: Internet Group Management Protocol (IGMP)
- 6: Transmission Control Protocol (TCP)
- 17: User Datagram Protocol (UDP)

IPv6: This protocol will be supported later.

1.11.6.2. ARP

The screenshot shows a configuration window with three tabs: 'Overview', 'Ethernet II', and 'ARP'. The 'ARP' tab is selected and highlighted with a red box. Under 'Link Layer Type', 'Ethernet II' is selected with a radio button. Under 'Layer 3 Header', 'ARP' is selected with a radio button. Other options include 'None', 'Pause', 'IPv4', 'IPv6', 'PPPoE', and 'IPX'.

ARP: Address Resolution Protocol (ARP) is the method for finding a host's link layer (hardware) address when only its Internet Layer (IP) or some other Network Layer address is known. ARP is primarily used to translate IP addresses to Ethernet MAC addresses.

The structure of ARP header is illustrated below

bit offset	0 - 7	8 - 15	16 - 31
0	Hardware type (HTYPE)		Protocol type (PTYPE)
32	Hardware length (HLEN)	Protocol length (PLEN)	Operation (OPER)
64	Sender hardware address (SHA) (first 32 bits)		
96	Sender hardware address (SHA) (last 16 bits)	Sender protocol address (SPA) (first 16 bits)	
128	Sender protocol address (SPA) (last 16 bits)	Target hardware address (THA) (first 16 bits)	
160	Target hardware address (THA) (last 32 bits)		
192	Target protocol address (TPA)		

The utility has user configurable interface to match the structure of ARP header

The screenshot shows a configuration window with three tabs: 'Overview', 'Ethernet II', and 'ARP'. The 'ARP' tab is selected. The configuration fields are as follows: Hardware Type is set to '1 - Ethernet'; Protocol Type is '08:00'; Hardware Address Length is '6'; Protocol Address Length is '4'; Operation is '1 - ARP Request'. On the right, the addresses are: Sender Hardware Address '00-00-00-00-00-02', Sender Protocol Address '192.168.0.0', Target Hardware Address '00-00-00-00-00-01', and Target Protocol Address '192.168.1.0'.

◆ **D**: IPX: Reserve function for next version

1.11.6.3. Pause

Overview
Ethernet II
Pause
Frame View

Link Layer Type
 None
 Ethernet II
 IPX
 PPPoE
 User Defined

Layer 3 Header
 None Pause
 IPv4
 IPv6
 ARP
 IPX

Pause: PAUSE is a flow control mechanism on full duplex Ethernet link segments defined by IEEE 802.3x and uses MAC Control frames to carry the PAUSE commands.

Overview
Ethernet II
Pause
Frame View

MAC Address
A Destination Address: 01-80-C2-00-00-01
Source Address: 00-00-00-00-00-00

Pause Quanta
Type: 88:08 **B** Opcode: 00:01
C Pause: 32767

A: Destination Address: 01:80:C2:00:00:01. This particular address has been reserved for use in PAUSE frames.

B: Opcode: The MAC Control opcode for PAUSE is 00:01 (0X0001 in hexadecimal)

C: A PAUSE frame includes the period of pause time being requested, in the form of two byte unsigned integer (0 through 65535). This number is the requested duration of the pause.

1.11.7. Layer 4 Header

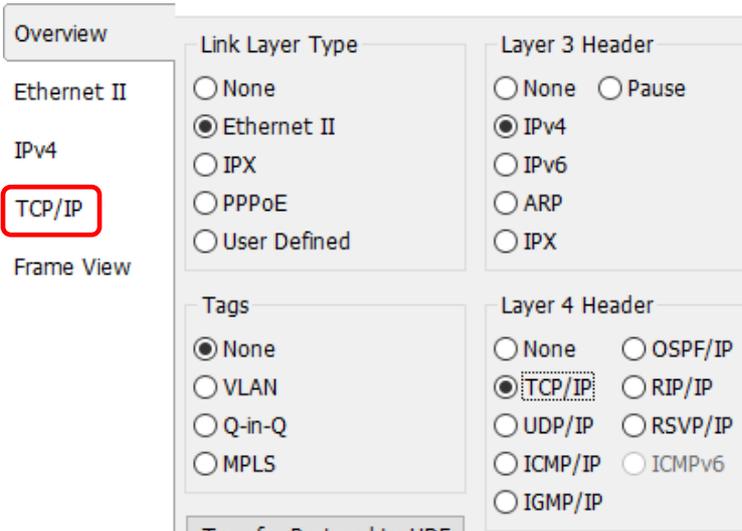
In the payload of frame, if IPv4 is selected

Layer 3 Header
 None Pause
 IPv4
 IPv6
 ARP
 IPX

Then Layer 4 header as below is configurable

Layer 4 Header
 None OSPF/IP
 TCP/IP RIP/IP
 UDP/IP RSVP/IP
 ICMP/IP ICMPv6
 IGMP/IP

1.11.7.1. TCP/IP



The Transmission Control Protocol (TCP) is one of the core protocols of the Internet Protocol Suite.

The structure of TCP segment is illustrated below. The TCP header starts after bit 160 of the IP header.

TCP Header

Bit offset	0-3	4-7	8-15								16-31
0	Source port						Destination port				
32	Sequence number										
64	Acknowledgment number										
96	Data offset	Reserved	CWR	ECE	URG	ACK	PSH	RST	SYN	FIN	Window Size
128	Checksum						Urgent pointer				
160	Options (optional)										
160/192+	Data										

Flags (8 bits) (called Control bits) – contains 8 1-bit flags

- CWR (1 bit) – Congestion Window Reduced (CWR) flag is set by the sending host to indicate that it received a TCP segment with the ECE flag set (added to header by [RFC 3168](#)).
- ECE (ECN-Echo) (1 bit) – indicate that the TCP peer is [ECN](#) capable during 3-way handshake (added to header by [RFC 3168](#)).
- URG (1 bit) – indicates that the URGeNT pointer field is significant
- ACK (1 bit) – indicates that the ACKnowledgment field is significant

- PSH (1 bit) – Push function
- RST (1 bit) – Reset the connection
- SYN (1 bit) – Synchronize sequence numbers
- FIN (1 bit) – No more data from sender

The utility has user configurable interface to match the structure of TCP segment

The screenshot shows the 'TCP/IP' configuration panel in the Lineeye utility. On the left is a navigation menu with 'Overview', 'Ethernet II', 'IPv4', 'TCP/IP' (selected), and 'Frame View'. The main area is titled 'TCP Parameters' and contains several input fields: 'Source Port' (00:00), 'Destination Port' (00:50), 'Sequence Number' (00:00:00:00), 'Acknowledgement Number' (00:00:00:00), 'Header Length (x4)' (5), 'Window' (08:71), 'Checksum' (Correct), and 'Urgent Pointer' (00:01). To the right, under 'Flags', there are six checkboxes: 'Urgent Pointer Valid', 'Reset Connection', 'Acknowledge Valid', 'Synchronize Sequence', 'Push Function', and 'No More Data From Sender', all of which are currently unchecked.

1.11.7.2. UDP/IP

The screenshot shows the 'UDP/IP' configuration panel in the Lineeye utility. The left navigation menu has 'Overview', 'Ethernet II', 'IPv4', 'UDP/IP' (selected and highlighted with a red box), and 'Frame View'. The main area is divided into three sections: 'Link Layer Type' with radio buttons for 'None', 'Ethernet II' (selected), 'IPX', 'PPPoE', and 'User Defined'; 'Layer 3 Header' with radio buttons for 'None', 'Pause', 'IPv4' (selected), 'IPv6', 'ARP', and 'IPX'; and 'Layer 4 Header' with radio buttons for 'None', 'OSPF/IP', 'TCP/IP', 'RIP/IP', 'UDP/IP' (selected and highlighted with a dashed box), 'RSVP/IP', 'ICMP/IP', 'ICMPv6', and 'IGMP/IP'. A partially visible section at the bottom is titled 'Transfer Protocol to UDP'.

UDP/IP

The User Datagram Protocol (UDP) is one of the core members of the Internet Protocol Suite, the set of network protocols used for the Internet.

The structure of UDP segment is illustrated below. The UDP segment starts after bit 160 of the IP header

bits	0 - 15	16 - 31
0	Source Port	Destination Port
32	Length	Checksum
64	Data	

The utility has user configurable interface to match the structure of UDP segment

1.11.7.3. ICMP/IP

ICMP/IP

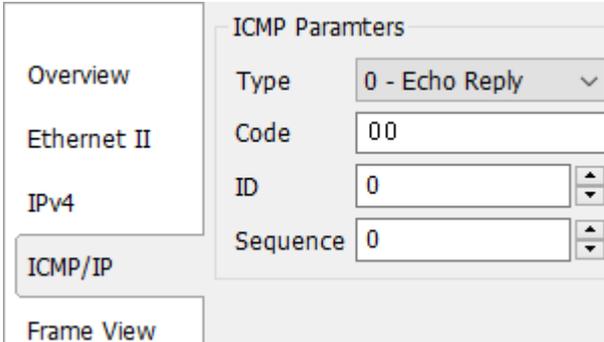
The Internet Control Message Protocol (ICMP) is one of the core protocols of the Internet Protocol Suite.

The structure of ICMP segment is illustrated below

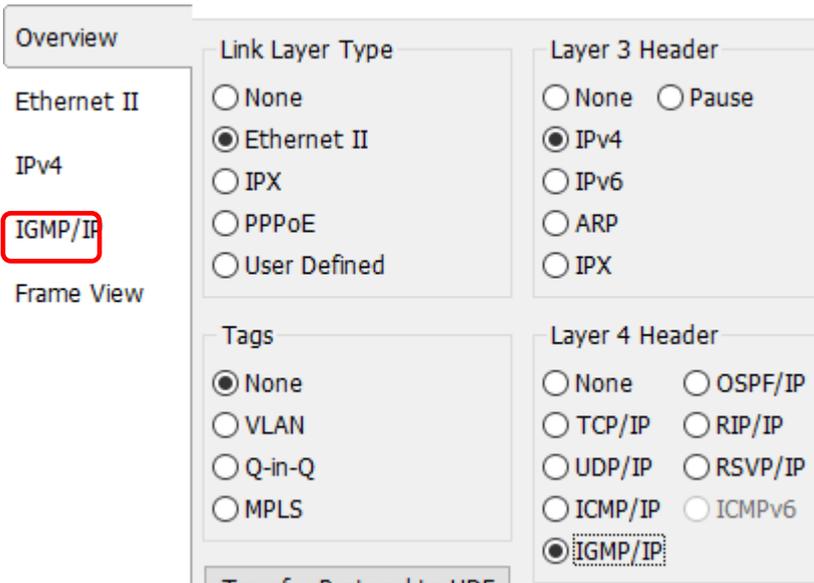
The ICMP header starts after bit 160 of the IP header

Bits	160-167	168-175	176-183	184-191
160	Type	Code	Checksum	
192	ID		Sequence	

The utility has user configurable interface to match the structure of ICMP segment



1.11.7.4. IGMP/IP



IGMP/IP

The Internet Group Management Protocol (IGMP) is a communications protocol used to manage the membership of Internet Protocol multicast groups.

The structure of IGMP segment is illustrated below. The IGMP header starts after bit 160 of the IP header

+	Bits 0 - 7	8 - 15	16 - 23	24 - 31
0	Type	Max Resp Time	Checksum	
32	Group Address			

The utility has user configurable interface to match the structure of IGMP segment

There are three versions of IGMP

Overview	IGMP Paramters
Ethernet II	Version <input type="text" value="2"/>
IPv4	Type <input type="text" value="Group Membership Query"/>
IGMP/IP	Max Response Time <input type="text" value="8"/>
Frame View	Group Address <input type="text" value="0 . 0 . 0 . 0"/>
	Other Setting
	Get Source IP <input type="text" value="Change Group Address"/>

1.12. BERT

BERT Test
✕

Save Clear Start Stop

Transfer pairs: A <-> B | Packet Length(w/o CRC) 1512 (multiple of 4)

Transmit mode: Continuous

Port A DA 00-22-A2-A1-A0-01 SA 00-22-A2-A1-A0-02 Utilization: 100

Port B DA 00-22-A2-A1-A0-02 SA 00-22-A2-A1-A0-01 Utilization: 100

	Port A	Port B	Total: 2 Ports
Link Status	Link Up	Link Up	-
Speed Mode	100M Full	100M Full	-
Tx Packet	0	0	0
Tx Byte	0	0	0
Tx Packet Rate	0	0	N/A
Tx Line Rate	0.00	0.00	N/A
Tx Utilization	0.00	0.00	N/A
Rx Packet	0	0	0
Rx Byte	0	0	0
Rx Packet Rate	6	0	N/A
Rx Line Rate	0.00	0.00	N/A
Rx Utilization	0.00	0.00	N/A
BERT Error	0	0	0
CRC	0	0	0
Tx Start Time	-	-	-
Tx End Time	-	-	-

Note

- o The BERT pattern used here is PRBS, and its number of elements is $2^{31}-1$.
- o The packet length (in bytes) you input here must be divisible by 4 bytes(32 bits).
- o The MAC address you input here will be applies to the 64th stream of all streams generated by LE590-SG.

The bit error rate test (BERT) function transmits a pattern from each port, checks the received pattern, and verifies the transmission quality.

While the BERT operates, the contents of the packet to be transmitted are switched to those of the BERT setting.

1.13. Router NAT

Router NAT

000 ▶ ■ ⬇
Clear Start Stop Set to Stream

Port Setting

Test LAN Port Port A Port B

Test WAN Port Port A Port B

Packet Setting

Packet Length(w/o CRC)

Connection Setting

Connection Wait Timeout

LAN Link Type

Test LAN Port IP

LAN Gateway IP

WAN Link Type

Test WAN Port IP

WAN Gateway IP

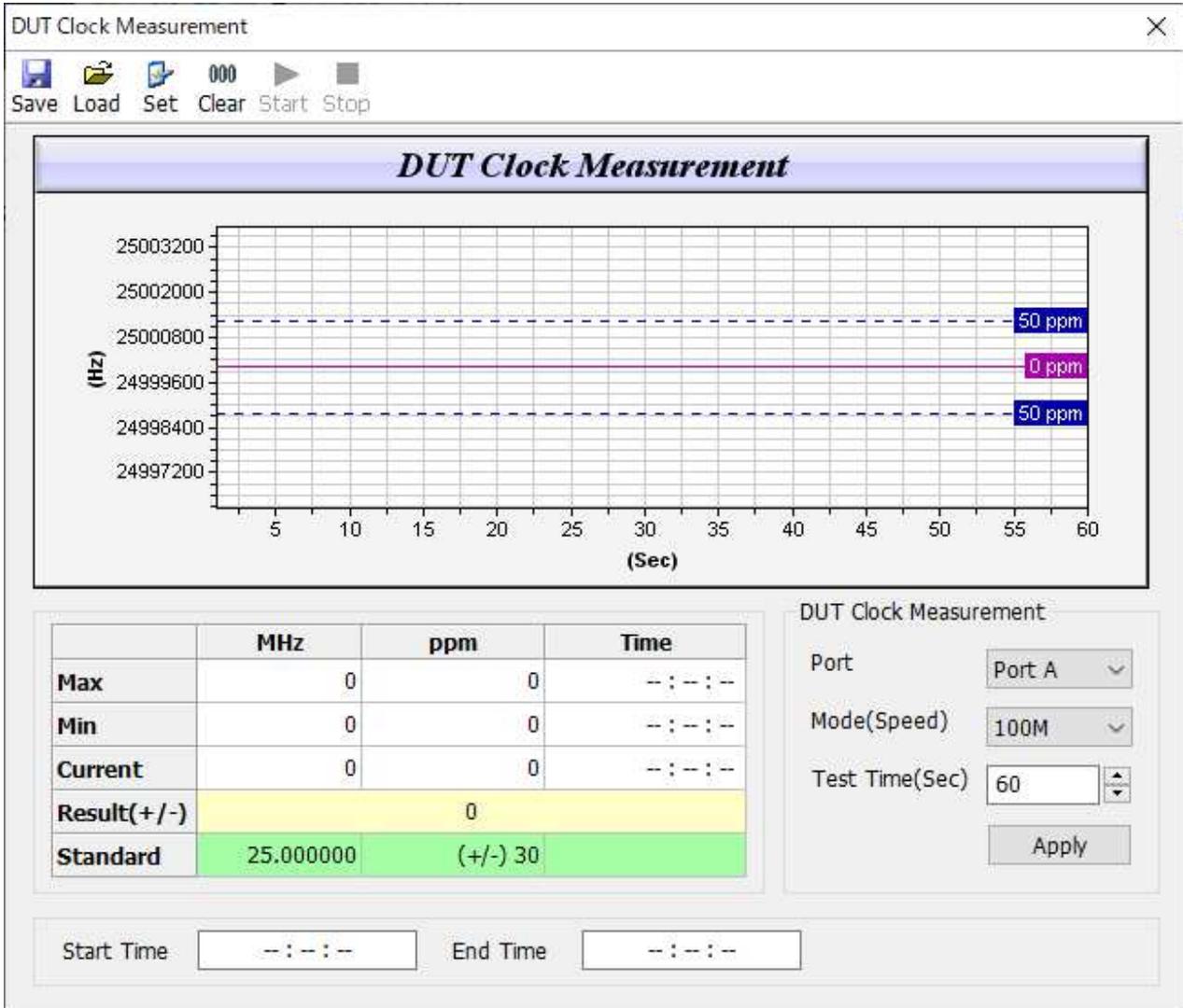
Result

Test LAN Port MAC	
Test LAN Port IP	
Test LAN Port Source Port Number	
Test WAN Port MAC	
Test WAN Port IP	
Test WAN Port Source Port Number	
LAN Gateway MAC	
LAN Gateway IP	
DUT WAN Port MAC	
DUT WAN Port IP	
DUT WAN Port Source Port Number	
Router NAT Result	

Validates the address translation (NAT) of the router. While the router NAT is running, the contents of the packet being sent are switched to the router NAT configuration.

1.14. DUT Clock Measurement

With the LE-590TX's high-accuracte (1ppm) temperature compensated oscillator it measures the oscillator frequency of DUT (device under test) and evaluates whether it is faster or slower than the standard speed (ppm scale).

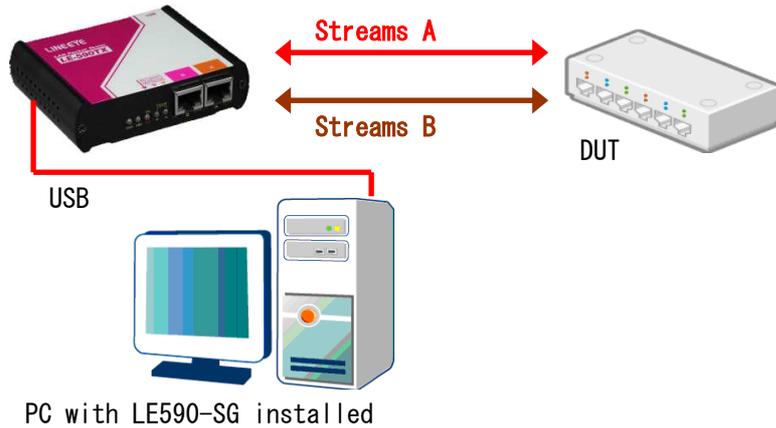


2. Operation of LE-590TX with LE590-SG

To chapter tell you how to use this device to test the DUT

2.1. Hardware connection

To use this device, user can connect it to DUT as the illustration below



Then LE-590TX can generate test stream to DUT and also receive data stream from DUT for analysis

2.2. Operation of LE590-SG

2.2.1. Generate Test Streams to DUT

To generate the test streams, user should configure the pattern and contents of the test streams

Click   , System shows

Port A : Multi Streams Generation

Save Load Default View Gap Calculator

Tx Rate: Auto Generated Tx Rate

Stream Transmit Mode: Continuous

Stream #	Select Stream	Alias	Length (w/o CRC)	Frame Payload	Rate	Rx Frame/Gap Control			App Cl
					Utilization	IFG (Byte)	IBG (Byte)	Frames	
1	<input type="checkbox"/>	Base 1	60	All 0	10.00	n/a	n/a	n/a	

```

00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F | 0123456789ABCDEF
0000 FF FF FF FF FF FF 00 00 00 00 00 08 06 00 01  yyyyyy.....
0010 08 00 06 04 00 01 00 22 A2 A0 B0 00 C0 A8 00 00  |.00|. "e ".Ã"..
0020 00 22 A2 A1 A0 00 C0 A8 01 00 00 00 00 00 00 00  |."e; .Ã"..
0030 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  |.....
    
```

Apply

Select the streams volume user want to generate. It can be 1~64
 User can create many streams; however, only tick streams that user want to send

Stream #	Select Stream
1	<input type="checkbox"/>
2	<input checked="" type="checkbox"/>

Double click value in the grid of length, then user can change the value. Select random or input the length directly.

Length (w/o CRC)

60

60

Random

Short-Long

Select the unit and input the value of the parameter that the packets will be generated.

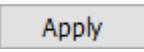
Rate	Rx Frame/Gap
Utilization	IFG (Byte) IBG (Byte)
Packet per Second:	PPS
<input checked="" type="checkbox"/> Utilization:	%
Line Rate:	Mbps

- PPS: Packet per Second. Volume of packets that will be generated per second.
- Utilization: Percentage of Wirespeed transmission
- Line Rate: Mbytes per second in transmission

Tick to activate X-TAG if user needs

X-TAG	
En	X-ID
<input checked="" type="checkbox"/>	6
<input type="checkbox"/>	n/a

Click Frame Editor to edit the pattern and contents of stream packets. Please refer to 1.11 Frame Editor about how to use frame editor
When all procedures are done, the read-only basic information at last few items is shown automatically

Then input count and click  to take effect.

2.2.2. Start to generate test streams

When all configurations is done, click Control Panel on Toolbar



The Counter Window interface displays a Counter Panel with a toolbar and a data table. The toolbar includes buttons for Save, Clear, Hide, Show, Resize, Export to Excel, Tx Learning Pkts A, and Tx Learning Pkts B. The data table shows statistics for Port A, Port B, and Total: 2 Ports. The Operation panel on the right allows controlling packet generation and capture for All Ports, Port A, and Port B.

	Port A	Port B	Total: 2 Ports
Link Status	Link Up	Link Up	
Speed mode	100M Full	100M Full	
Tx Packet	105,330	0	105,330
Tx Byte	6,741,120	0	6,741,120
Tx Packets Rate	14,881	0	
Tx Line Rate(Mbps)	10.00	0.00	N/A
Tx Utilization(%)	10.00	0.00	N/A
Rx Packet	0	106,492	106,492
Rx Byte	0	6,860,096	6,860,096
Rx Packets Rate	0	14,881	
Rx Line Rate(Mbps)	0.00	10.00	N/A
Rx Utilization(%)	0.00	10.00	N/A
Collision	-	-	-
Error & Loss Packet	-	-	-
Packet Size Statistics	-	-	-
Layer2 Packet Counts	-	-	-
Network Layer	-	-	-
SDFR	-	-	-
X-TAG Packet	0	106,492	106,492
Tx Start Time	2019/02/13 17:10:48	-	-
Tx End Time	-	-	-
First Error Time	-	-	-
Last Error Time	-	-	-

Click control button on operation button to control the packet generation

Expand sub-item counter to see more details of counters.

2.2.3. Capture Specified Packets

To capture packets/frames of incoming streams to PC via USB port, configure capture criteria is required.

Click   button on toolbar. The system shows the capture criteria settings

Port A : Capture Criteria

Protocol	SDFR	Result
<input type="checkbox"/> Capture all packets		
MAC	Network	Protocol
<input type="checkbox"/> Broadcast	<input type="checkbox"/> Ethernet-II	<input type="checkbox"/> TCP
<input type="checkbox"/> Multicast	<input type="checkbox"/> ARP	<input type="checkbox"/> UDP
<input type="checkbox"/> Unicast	<input type="checkbox"/> IPv4	<input type="checkbox"/> FTP
<input type="checkbox"/> VLAN	<input type="checkbox"/> IPv6	<input type="checkbox"/> RTP
<input type="checkbox"/> CRC error	<input type="checkbox"/> IPX	<input type="checkbox"/> OSPF
<input type="checkbox"/> Over Size	<input type="checkbox"/> ICMP	<input type="checkbox"/> RSVP
<input type="checkbox"/> Under 64 bytes	<input type="checkbox"/> IGMP	
<input type="checkbox"/> Pause packet	<input type="checkbox"/> SNAP	
	<input type="checkbox"/> BPDU	
	<input type="checkbox"/> None IPv4	
	<input type="checkbox"/> IPv4 with extension header	
	<input type="checkbox"/> IPv4 checksum error	

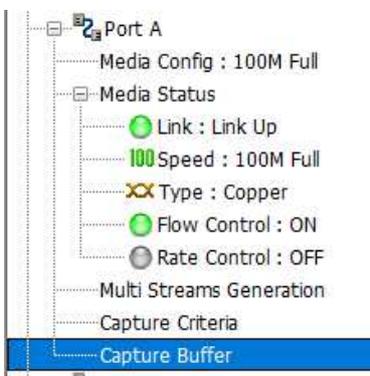
X-Tag

Packet length filter(with CRC)

Filter length (Bytes) =

User can configure criteria of Protocol, SDFR according to section エラー! 参照元が見つかりません。 エラー! 参照元が見つかりません。

Then Click Capture Buffer of selected port



Start capture from the Capture Buffer window

Port A : Capture Buffer

Save as Pcap Save as SG format ▶ Start ◻ Stop ◻ Clear

Packets Stored in PC : 9008 Max. Packets Shown in Buffer 10000

No #	Delta Time(us)	Summary	Length (with CRC)	DA	SA	VLAN	Protocol	DIP	SIP
1	0.000	HIT	64	FF:FF:FF:FF:FF:FF	00:00:00:00:00:00	N/A	IPv4	192.168.1.0	192.168.0.0
2	1282.000	HIT	64	FF:FF:FF:FF:FF:FF	00:00:00:00:00:00	N/A	IPv4	192.168.1.0	192.168.0.0
3	1282.000	HIT	64	FF:FF:FF:FF:FF:FF	00:00:00:00:00:00	N/A	IPv4	192.168.1.0	192.168.0.0
4	1282.000	HIT	64	FF:FF:FF:FF:FF:FF	00:00:00:00:00:00	N/A	IPv4	192.168.1.0	192.168.0.0
5	1282.000	HIT	64	FF:FF:FF:FF:FF:FF	00:00:00:00:00:00	N/A	IPv4	192.168.1.0	192.168.0.0
6	1282.000	HIT	64	FF:FF:FF:FF:FF:FF	00:00:00:00:00:00	N/A	IPv4	192.168.1.0	192.168.0.0
7	1282.000	HIT	64	FF:FF:FF:FF:FF:FF	00:00:00:00:00:00	N/A	IPv4	192.168.1.0	192.168.0.0
8	1282.000	HIT	64	FF:FF:FF:FF:FF:FF	00:00:00:00:00:00	N/A	IPv4	192.168.1.0	192.168.0.0
9	1282.000	HIT	64	FF:FF:FF:FF:FF:FF	00:00:00:00:00:00	N/A	IPv4	192.168.1.0	192.168.0.0
10	2564.000	HIT	64	FF:FF:FF:FF:FF:FF	00:00:00:00:00:00	N/A	IPv4	192.168.1.0	192.168.0.0
11	1282.000	HIT	64	FF:FF:FF:FF:FF:FF	00:00:00:00:00:00	N/A	IPv4	192.168.1.0	192.168.0.0
12	1282.000	HIT	64	FF:FF:FF:FF:FF:FF	00:00:00:00:00:00	N/A	IPv4	192.168.1.0	192.168.0.0
13	1282.000	HIT	64	FF:FF:FF:FF:FF:FF	00:00:00:00:00:00	N/A	IPv4	192.168.1.0	192.168.0.0

Summary

- ◻ CRC Error
- ◻ Alignment Error
- ◻ Dribble Bits
- ◻ 2nd CRC (DI) Error
- ◻ IP Checksum Error
- ◻ Bert Error
- ◻ IP Fragment
- ◻ IP Extension
- ◻ UDP
- ◻ TCP
- ◻ IP
- ◻ VLAN

Item Name	Value
◻ Ethernet II	
◻ INTERNET	
Version: IP, Internet Protocol	4
Length	20
Type of Service	
Total length	46 (0x002E)
Identification	0x0000
Flags	
Fragment offset	0
Time to Live	0x40
Protocol: reserved	0xFF
Header checksum	0xF780
Source IP Address	192.168.0.0
Destination IP Address	192.168.1.0

```

00 01 02 03 04 05 06 07 08 09 0A 0B 0C
00000000 FF FF FF FF FF FF 00 00 00 00 00 0
00000010 00 2E 00 00 00 40 FF F7 80 C0 A8 0
00000020 01 00 00 00 00 00 00 00 00 00 00 0
00000030 00 00 00 00 00 00 00 00 00 00 00 A

```

The result of captured frame is shown on Capture Buffer window.

2.2.4. View counter of captured packet and others

User can view the counters of captured packet by SDFR criteria

Click Control Panel on Toolbar

Reconnect ▶ Counter TxSC USC SG A SG B Cap,C A Cap,C B DUT BERT Router NAT

Expand SDFR sub-counter item by clicking "+" of + SDFR, user the see the packet counts that is captured by SDFR criteria

User also can see conters of other events.

[-] SDFR	-	-	-
┆- DA rule hit	0	1,314,639	1,314,639
┆- SA rule hit	0	1,314,639	1,314,639
┆- VID rule hit	0	0	0
┆- SIP Addr. rule hit	0	0	0
┆- DIP Addr. rule hit	0	0	0
┆- DPort rule hit	0	0	0
┆- SPort rule hit	0	0	0

4F., Marufuku Bldg., 39-1, Karahasi, Nishihiragaki-cho, Minami-ku, Kyoto, 601-8468, Japan

TEL: 075-693-0161 FAX: 075-693-0163

URL: <https://www.lineeye.com>

Email: info@lineeye.co.jp

M-29590SGE/LE