LINEEYE

LE-580FX Window

User's Manual

CONTENTS

# 1. LE-580FX Software Installation

<Notice>
LE-580FX Window supports WinPcap Ver4.1.3. When you install the LE-580FX Window, WinPcap Ver4.1.3 will automatically be installed. If you have other version of WinPcap in your PC already, please uninstall it and then install LE-580FX Window.
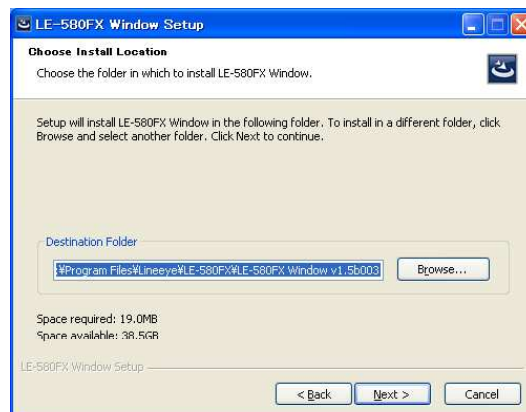

Setup program indicating LE-580FX Window(includes WinPcap) will be installed. Click **Next** for next step.

Please read license agreement. If confirm, please select accept option and click **I agree** for next step.
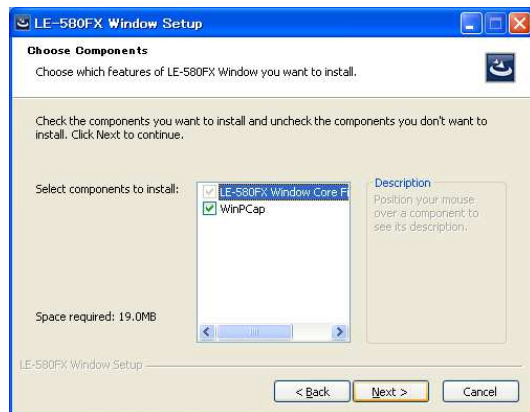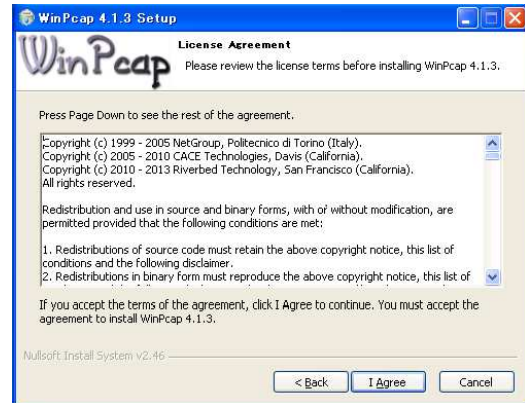

Please select installation of WinPcap or not. Click **Next** for next step.

Please check Destination folder and click **Next** to begin the installation.
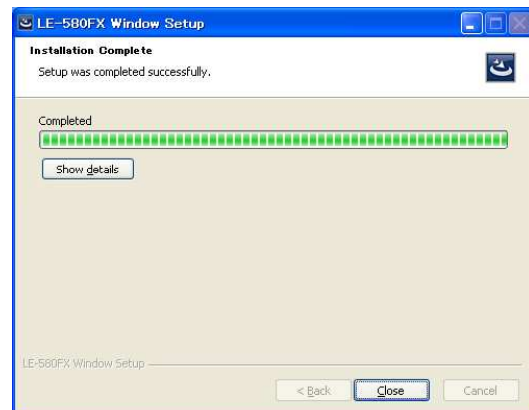
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Click **Next** to start the WinPcap installer.

Read the License Agreement. Click **I Agree** if you agree with the license.

This window will appear when finishing the WinPcap installation. Clich **Finish**.

Click **Close** to complete installation.

2. Main Window

The top menus of LE-580FX include the following parts: File Menu, Edit Menu, View Menu, Capture Menu, Media Type, Statistics Menu, PG Menu, Tools Menu, and Help Menu.

*Language (English/Japanese) is selectable from version 1.5. Invoke LE-580FX Window again after selecting the language.
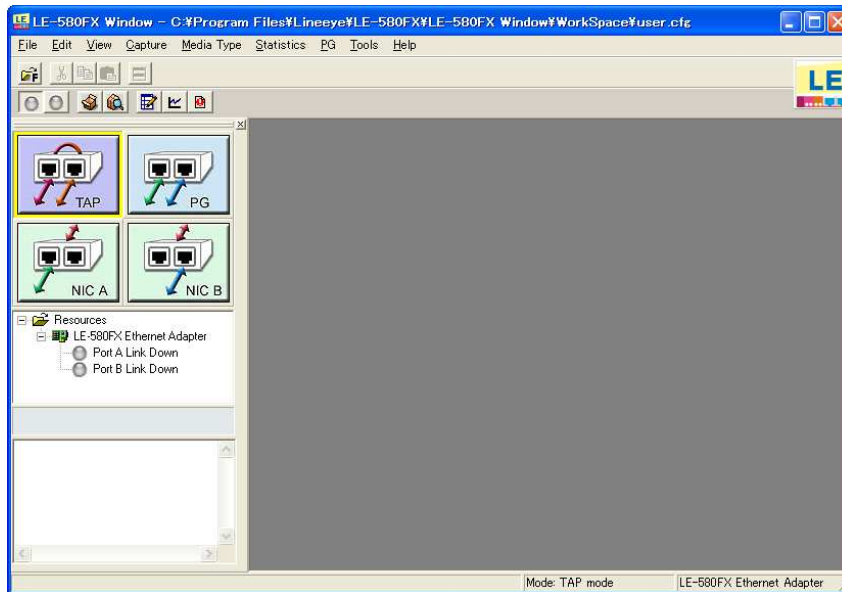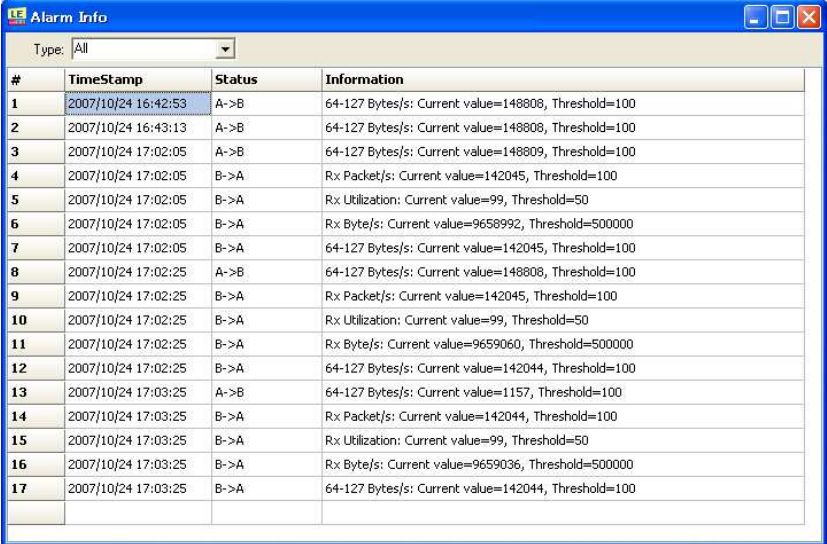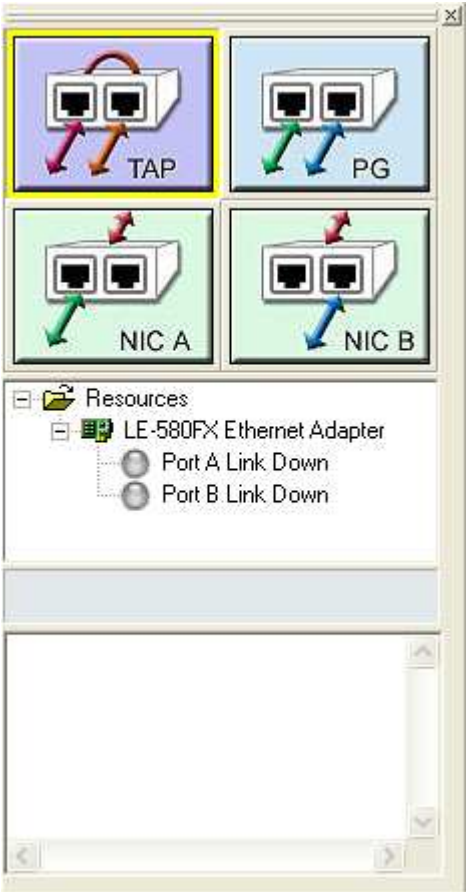

File Menu

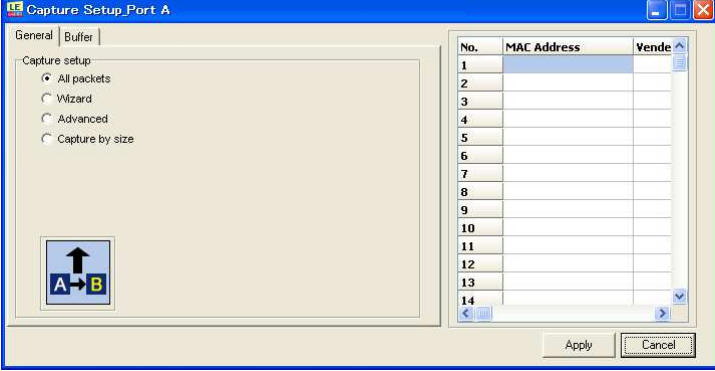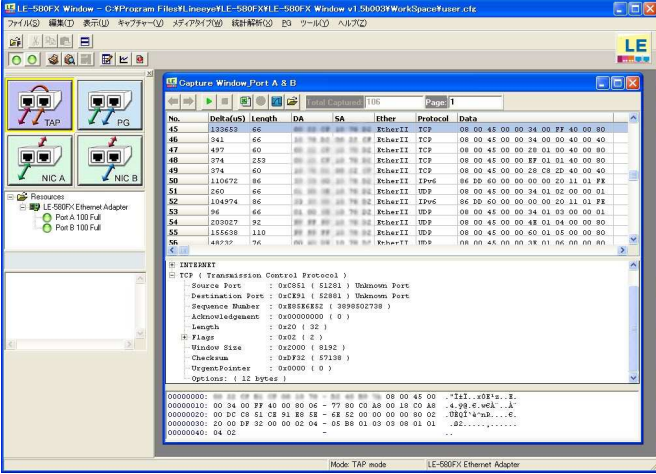| Menu Choice	Usage
Load Default Workspace	Loads default system value.
Load Monitor Log	Loads monitored log(statistic information).
Exit	Exits LE-580FX Window.

Edit Menu

Menu Choice	Usage
Cut	Cuts value
Copy	Copies value
Paste	Pastes value
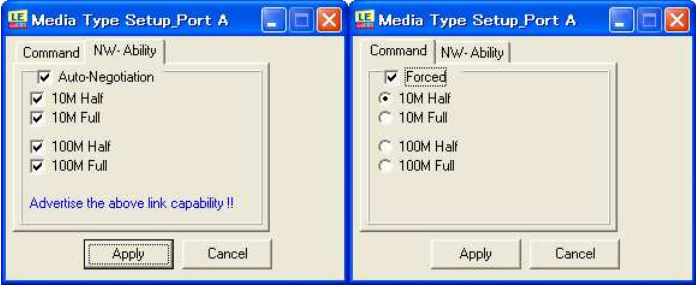
View Menu

Menu Choice	Usage
Alarm Info	 Invokes Alarm Info window.
Control Window	 Invokes Control window. (default invokes)

Capture Menu
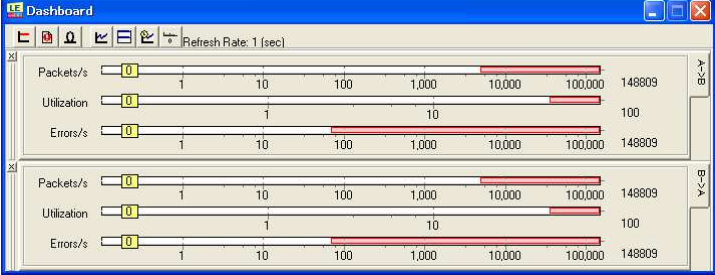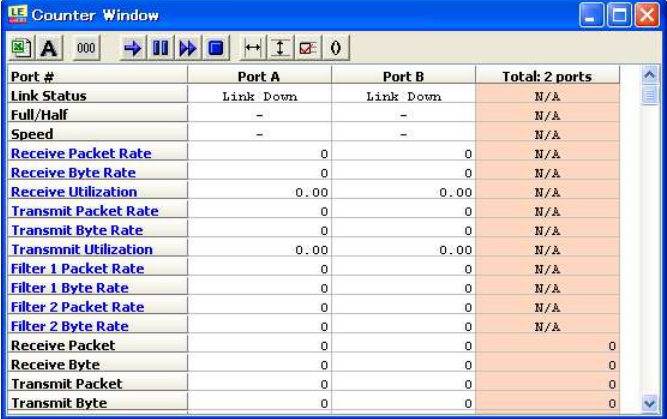
Menu Choice	Usage
Capture Setup	 Setups Capture conditions for PortA and Port B.
Capture Window	 Captures by conditions.
Capture Option	 Selects analysis soft Ethereal or WireShark which will be started from the Capture window.(Default : Ethereal) (Ethereal and WireShark need to be installed.)

Media Type Menu
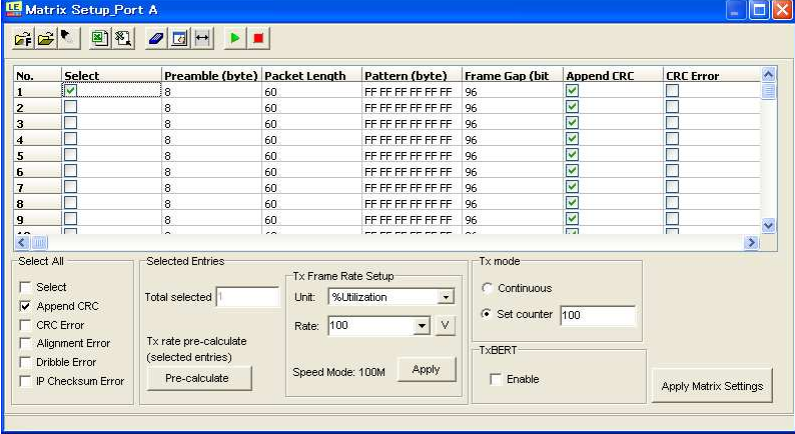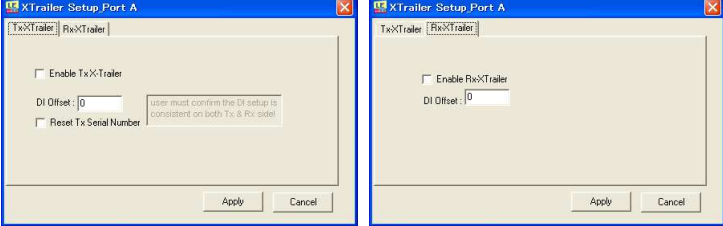
Menu Choice	Usage
Media Type	Invokes Media Type Setup window.

The **Command** tab controls the selection of various speeds and modes. The **NW-Ability** tab controls the use of auto-negotiation for advertising various speeds and modes.

Set the conditions of each port in the PG mode. (Each port works independently)

Set both ports as the same conditions in the TAP mode according to target device. (When the condition is different, it is not able to communicate.)

Default setting is Auto-Negotiation. |

Compliant version: LE-580FX Window V1.4/ FPGA V1.7 or later.

Statistics Menu

Menu Choice	Usage
Meter (Dashboard)	 Provides communication conditions of Port A and Port B through dashboard.
Meter (Threshold)	 Provides threshold configuration.
Counter window	 Invokes Counter window.

The choices for the **PG Menu** are described in the table below (for PG mode only):

Menu Choice	Usage
Matrix Setup	Invokes Matrix Setup window.
X-Trailer	Append X-Trailer and set offset value in the Tx tab and enable checking mechanism in the Rx tab.
Flow Control	Option for enabling Flow Control function of target port of LE-580FX in PG mode.
RxBERT	Option for enabling BERT pattern check function of target port of LE-580FX in PG mode.

The choices for the **Tools** （"ツール" **in Japanese**）**Menu** are described in the table below:

Menu Choice	Usage
IFG Converter	 Edits frame gap in the IFG Converter.
Device Info	 Provides device information in the lower half of the Control window.
FPGA Download	Makes version up for FPGA.
Language	Changes the language from English to Japanese. Invoke LE-580FX Window again after selecting the language. Note: After installing the LE-580FX Window, the initial display mode is in English on Windows OS of English version.

The choices for the **Help Menu** are described in the table below:

Menu Choice	Usage
About…	
	Provides version information of both software of LE-580FX Window and firmware of LE-580FX.

The buttons in the Main window tool bar are described in the table below:

Figure	Usage
	Opens a saved file.
	Saves current file.
	Loads default workspace.
	Shows link established.
	Shows link not established.
	Shows link speed in 10M.
	Invokes Capture Setup window.
	Invokes Capture window.
	Invokes Dashboard.
	Invokes Counter window.
	Invokes Warning Information window.
	Invokes Tile Horizontally window.

TAP mode is defaulted as the first operation of LE-580FX. When choosing PG/ NICA/ NICB mode, the Warning message will be shown for confirmation.

3. Matrix Setup

Go to the Main window top menu and choose **PG=>Matrix Setup** to invoke the "Matrix Setup Window".

Use Matrix to edit a series of packets with various combinations to be transmitted sequentially.
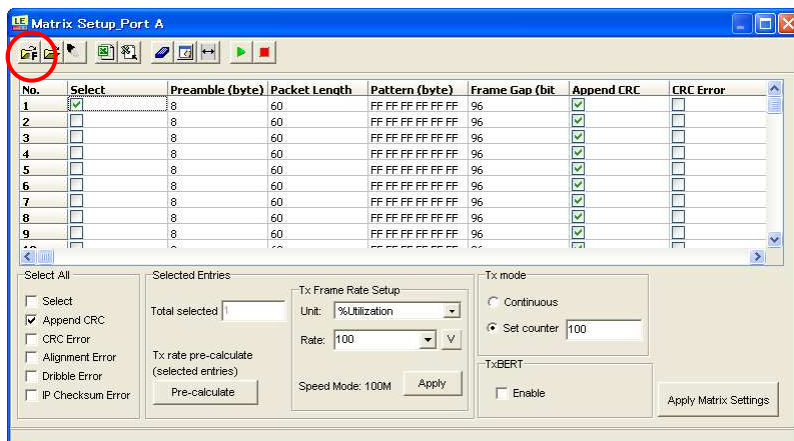
Click the **"Load Default"** button to invoke the factory default for Matrix setting. There are 10 packets designed in the Matrix default setting.

Click the **"Load from file"** button to load the saved Matrix file (excel format/mtx).

Click **"Load from .dts file"** button to load the captured data (monitored network traffic and statistic information) in the "Matrix Setup Window".

Click the **"Export to Excel File"** button to export current file into an Excel file.

Click the button. The **Export to Matrix Mode** message box will be shown to save the captured file as a Matrix file (with extension "mtx"). This feature is helpful especially when a Matrix file is loaded into the other port without re-edit packets, or a Matrix file is reloaded into the current port when the current configuration is erased.
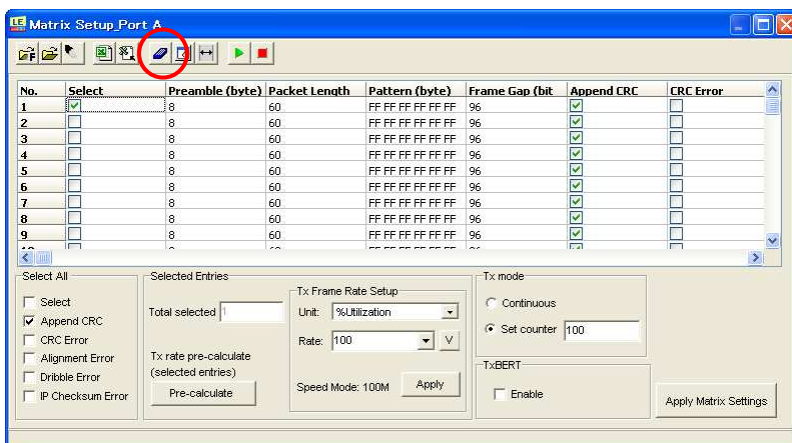
Click the **"Clear All"** button to clean the window. This is the Matrix Setup window of **Port B.**

Click **"Add new frames"** button to add the new frames.(up to 128 frames)

Click **"Set Columns Width"** button to adjust the width of "Matrix Setup Window".

: Start the packet transmission.

: Stop the packet transmisson.

3.1 Edit Packet Pattern

To edit packet pattern, click "Pattern" on the exact packet and the [...] button will be shown. Click the button to see the complete packet pattern.
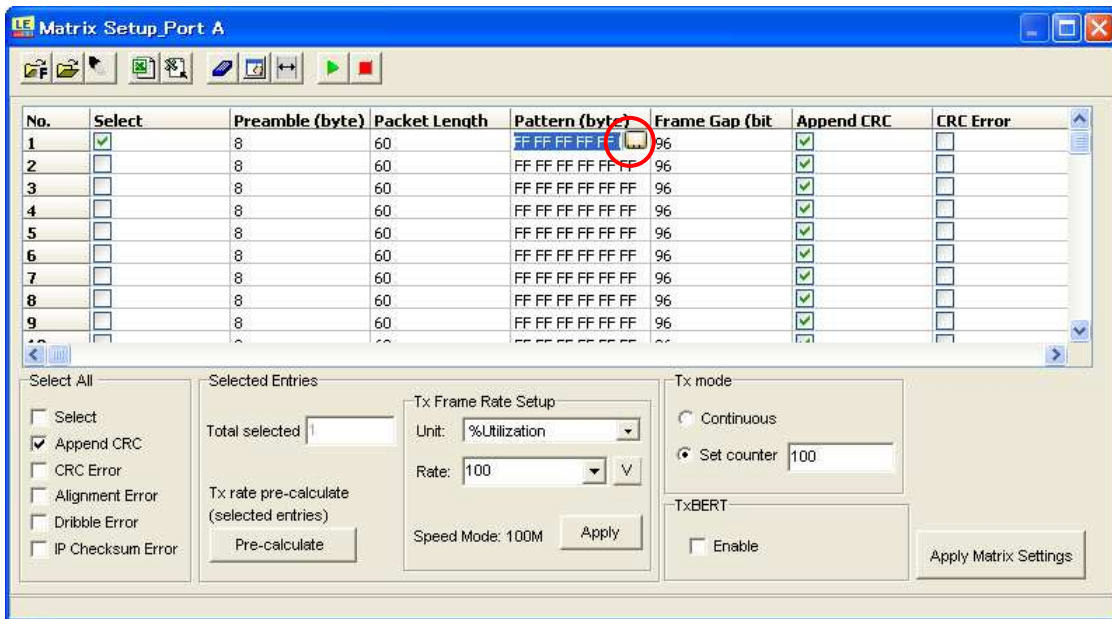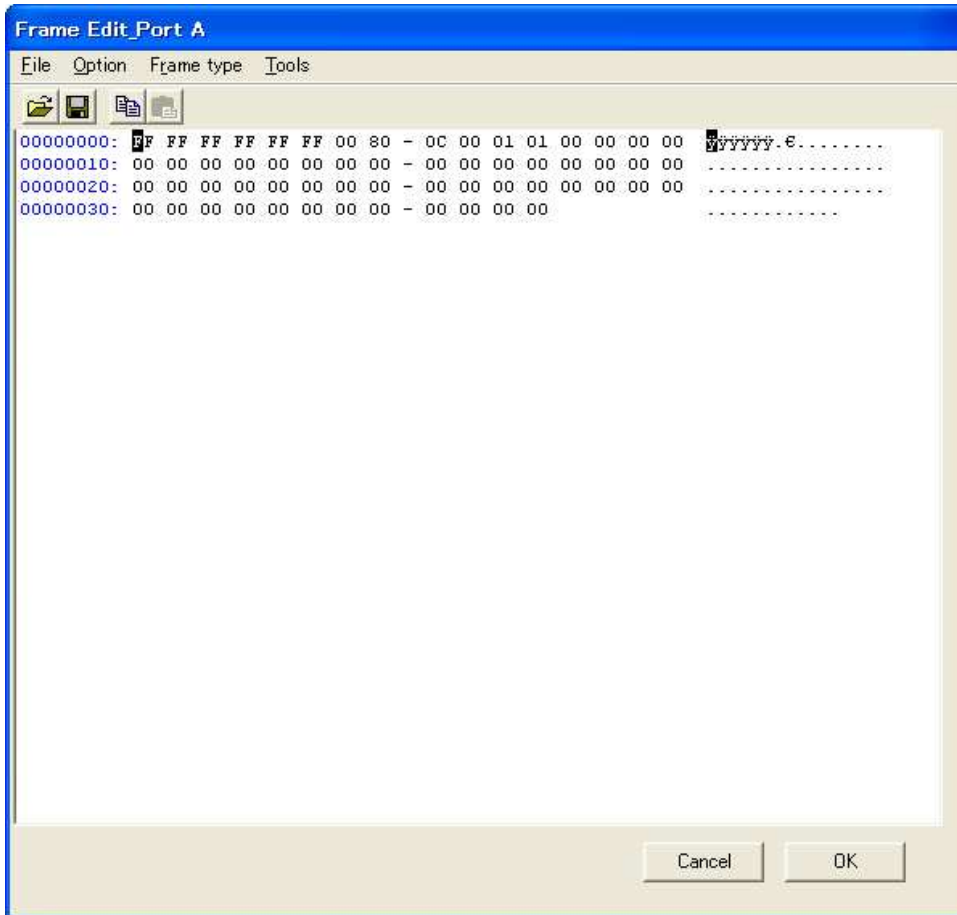
This **Frame Edit** window for the chosen packet will appear for more configurations.
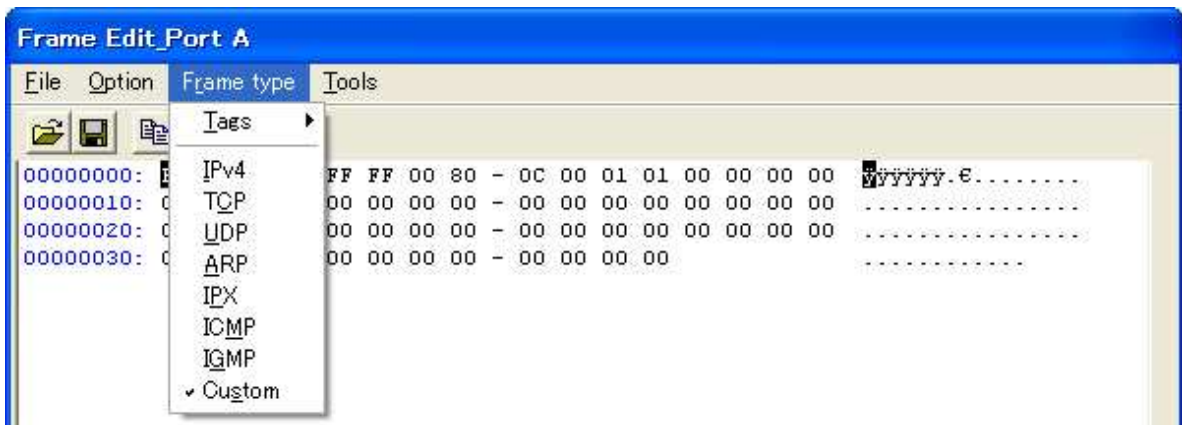
Move the cursor to the **Frame Type** tab to popup the menu for protocol type.

In addition to Custom setting, you may choose other protocols, such as

IPv4/TCP/UDP/ARP/IPX/ICMP/IGMP.
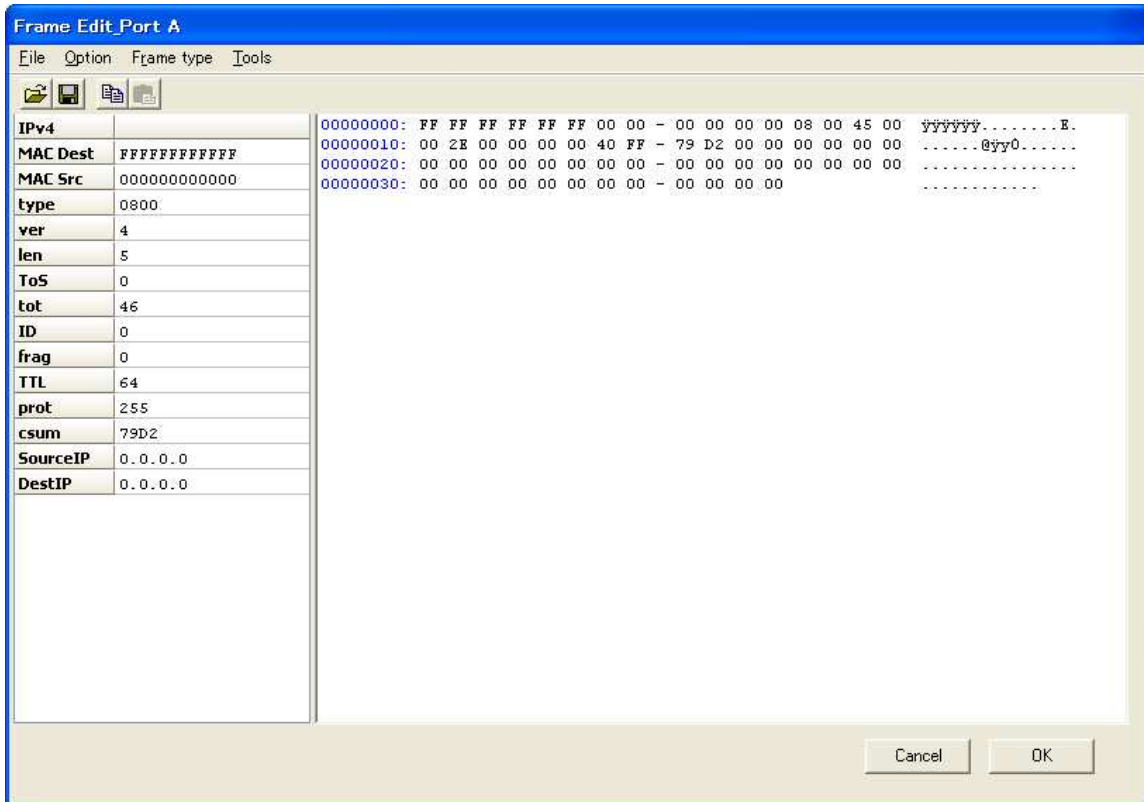
Please read the specification for each protocol setting.
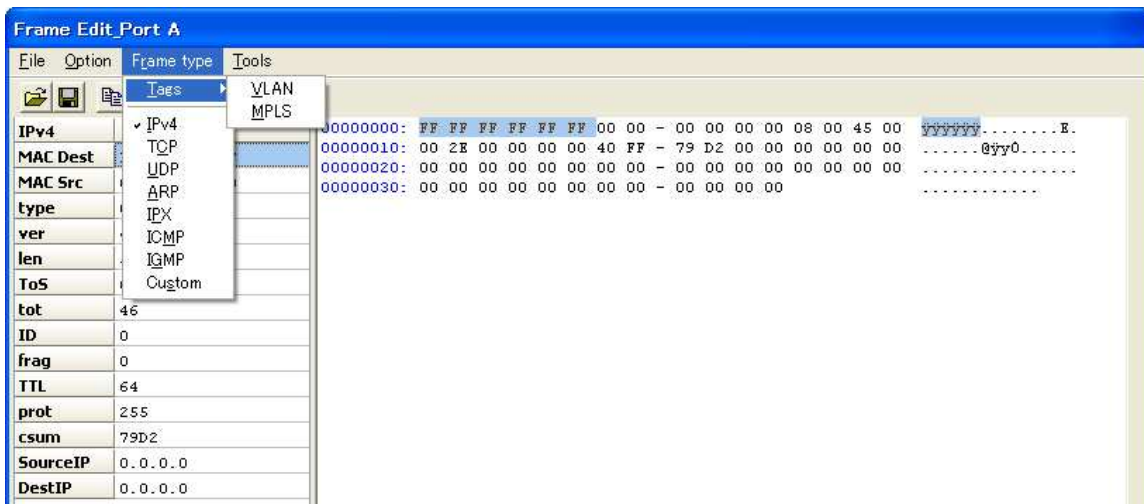
For Tags selection, choose "VLAN(Virtual Local Area Network)" or "MPLS(Multi-Protocol Label Switching)".

VLAN: Add the VLAN number as tag information in the frame(MAC frame) to distinguish the vertual LAN.

MPLS: Add the label in the frame and make the forwarding faster.

Choose "MPLS" and then MPLS dialog will appear.

Choose the number of MPLS label. (up to 6)
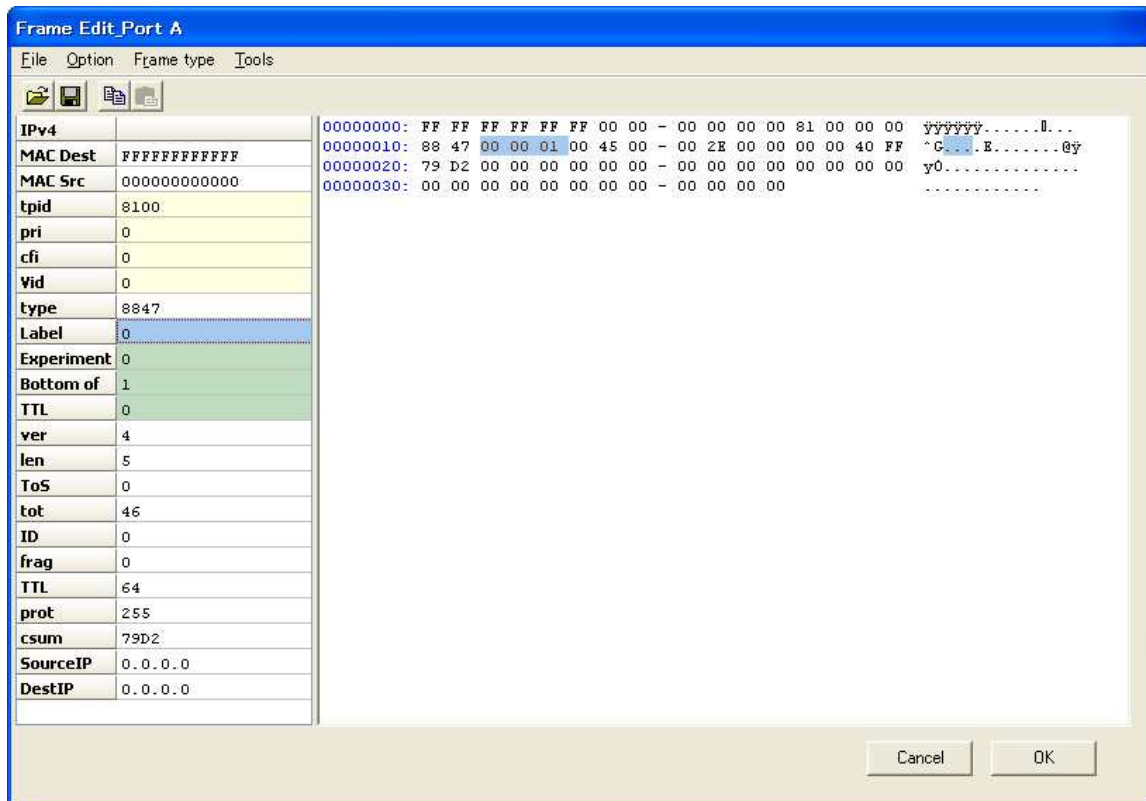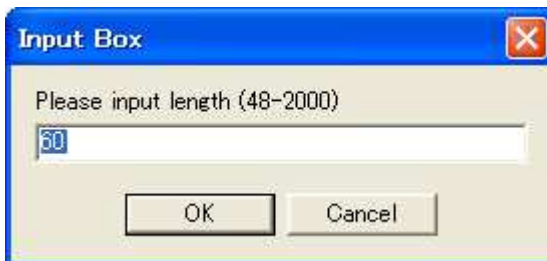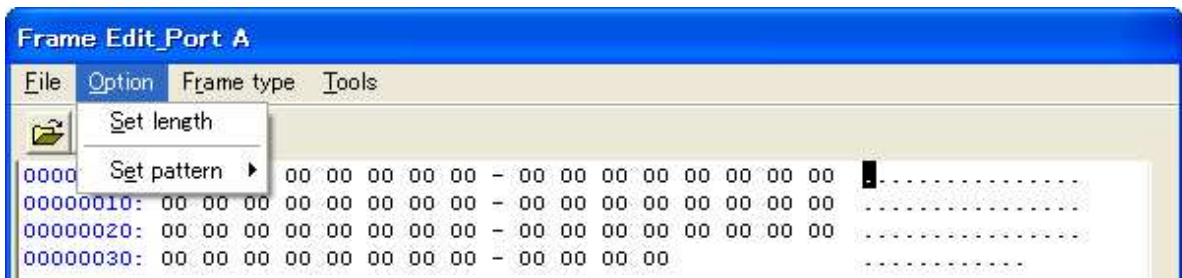
Choose **"Set Length"** to edit packet length. Input the packet size from 48(min. size will be different in packet type) to 2000 in the "Input Box". Or you can mark the packet data.
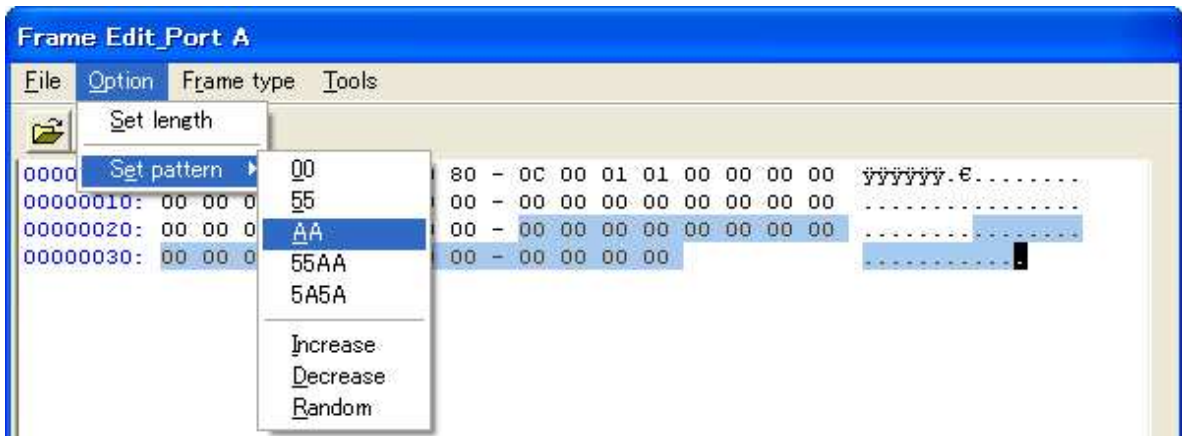
(1) Mark the packet data where you want to change.

(2) Choose "AA" as set pattern.

(3) Click "OK" and go back to the Matrix Window.

(4) Click "Apply Matrix Settings".
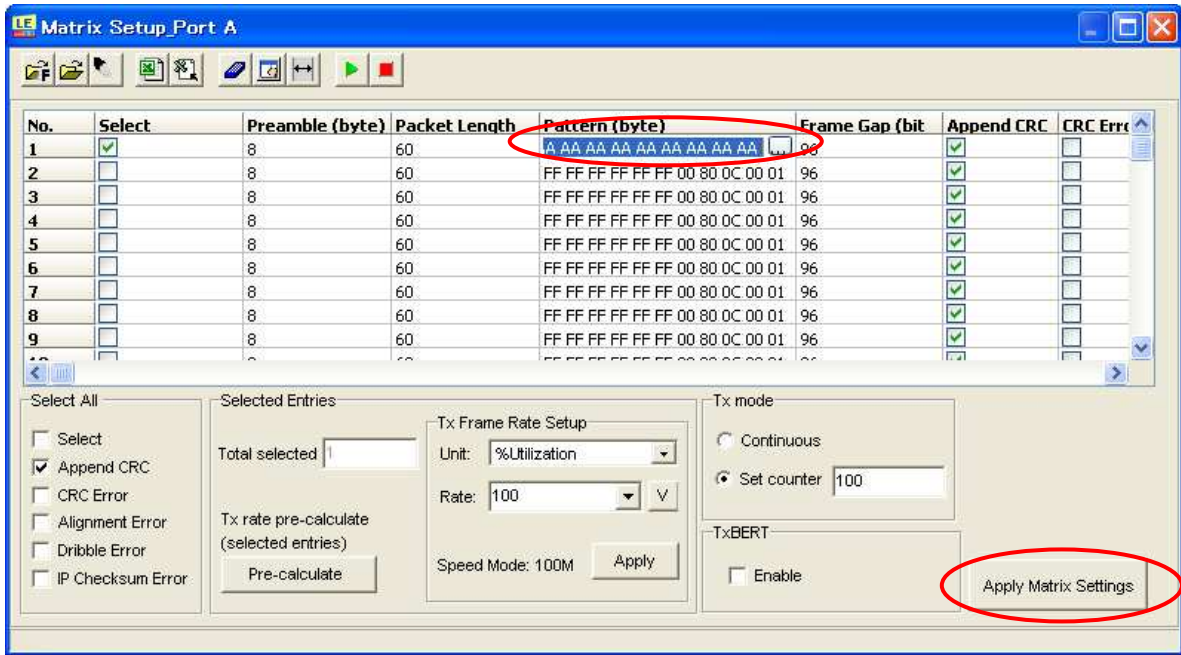
At the column of Pattern (byte), the packet pattern will be changed accordingly.

Mark the packets in the "Select" box which you want to transmit

The total selected packets are indicated in the "Information" window.

You can set other configuration as follow. Mark them if necessary.
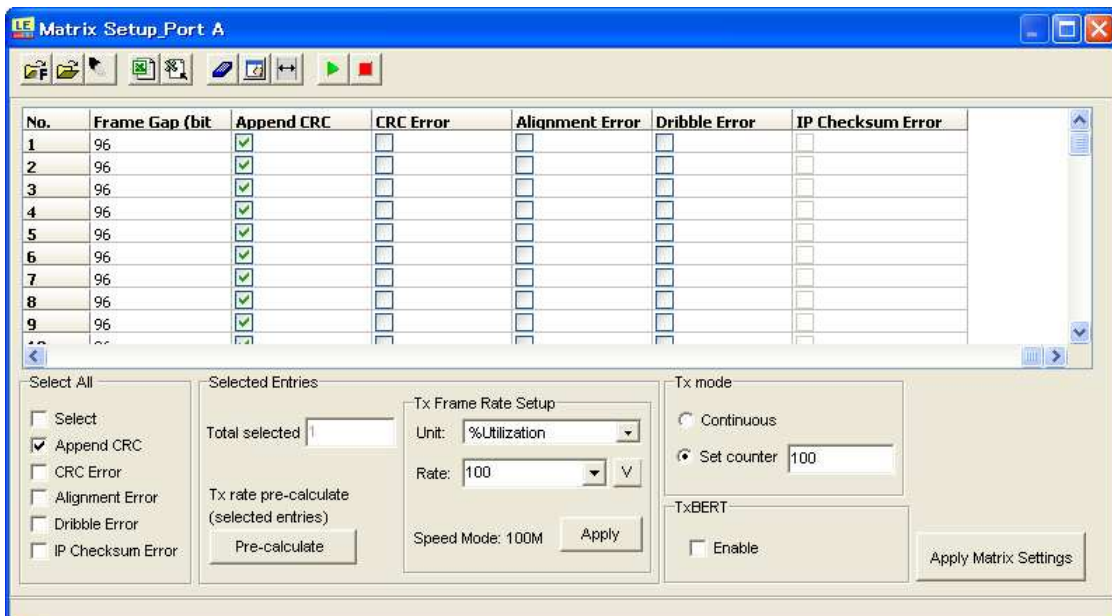
Append CRC: Add CRC

CRC ERROR: Add CRC error

Alignment Error: Add alignment error.

Dribble Error: Add dribble error.

IP Checksum Error: Add IP checksum error.

Click "Apply Matrix Settings" button every time you change the configuration.

3.2 Other Configuration
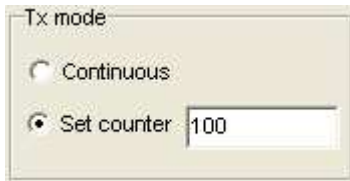
To send packets consecutively, choose **"Continuous"** mode in the **"Tx Mode"** pane.

Or choose **"Set Counter"** mode and input how many times you want to transmit. Up to

65535 packets can be set as a batch.
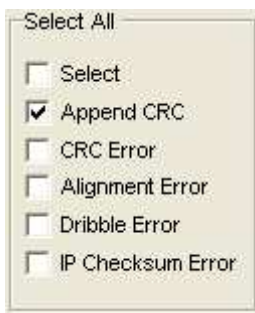
Your marked items in the **Select All** pane will be reflected to the transmission packets.
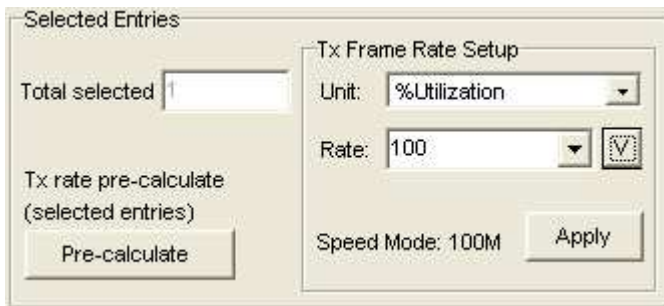
Above is utility for inter-frame gap setup of selected entries.

Select target entries, set Unit/ Rate and click **"Apply"**. It calculates the frame gap value

and fills into selected entries individually.

Unit:nsec,usec,msec,sec,packet/sec,%Utilization,DataBits/sec,FrameBits/sec,totalBits/
sec,BitTime
Rate:100,95.45,90.32,85.28,80,75,70,65.12,60,50.08,50,45.04,40,35,30,25,20,15,10,5

Select target entries and click **"Pre-caluculate"** to show the total transmitting rate of

selected entries.

Click [V] button to show values of Rate field in different units.

Check **"Enable"** to transmit BERT.

Please note, after TxBERT is being enabled, content of all generated packets are replaced with content of BERT except DA, SA, and Frame Type field.

Mark "Enable ExBERT" in the "RxBERT" to check PRBS(2^23-1) in Rx.
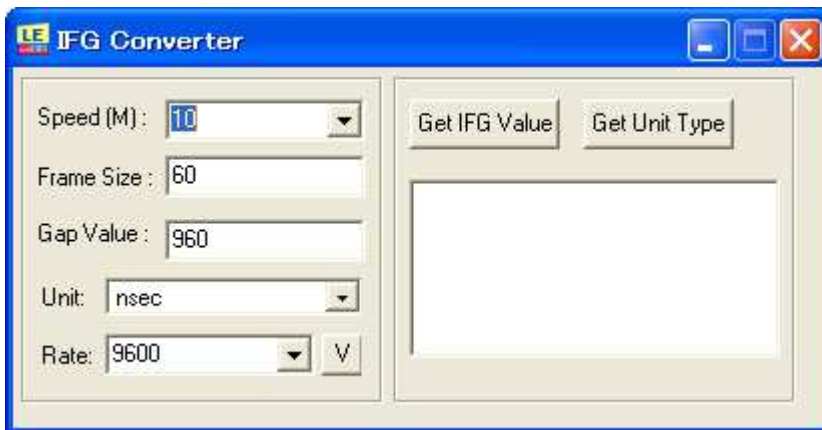
Use "IFG converter" to calculate the frame gap.

Click "GET IFG Value" after setting of speed, Frame Size, Unit, Rate. The result(bit time) will be displayed in the right side.

Mark on "Enable Flow Control" in the "Flow Control" to apply the flow control for Ethernet.
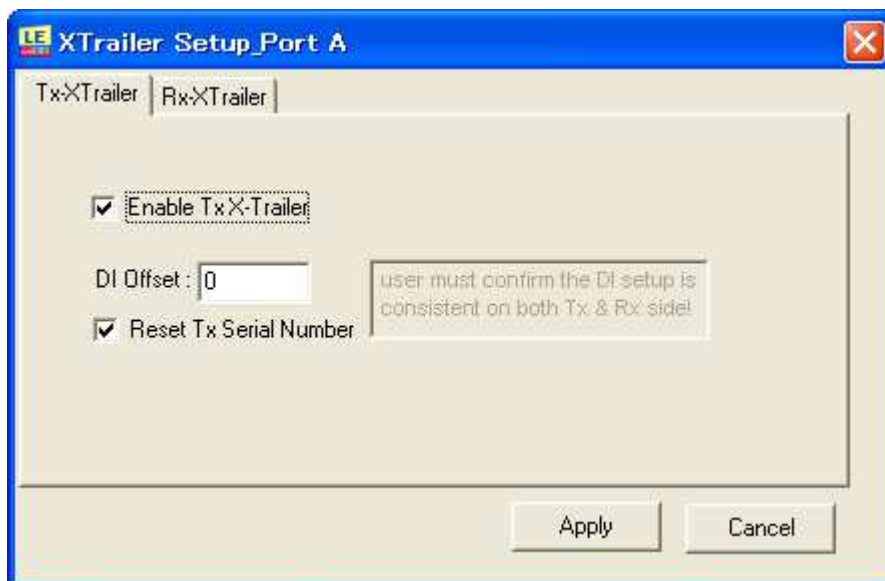
Tx X-Trailer is made to check whether the frame data is transmitted properly between LAN devices. You can insert checksum at the end of the data before CRC. By checking this checksum, you are able to know the consistency of the data.

Normally, CRC is added at the end of frame. LAN devices, such as router and switch, count CRC again before transmission. If the data is altered accidentally because of bug etc., CRC will be made by the wrong information. And you may not able to find the problems in the CRC.

Header	data	CRC
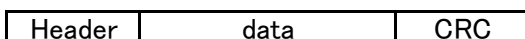
If you use X-Trailer, you can insert 8byte of checksum before CRC. This checksum has the sequence numbers etc., and you are able to have further check.

Header	data	X−Trailer	CRC
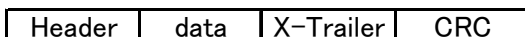
"DI Offset" need to be set for X-Trailer. For example, DI offset is 16, X-Trailer check data integrity for content of packets between 17th byte till end of packets(CRC is not included).

Header	data	CRC
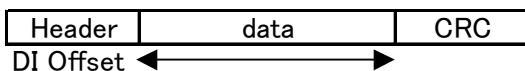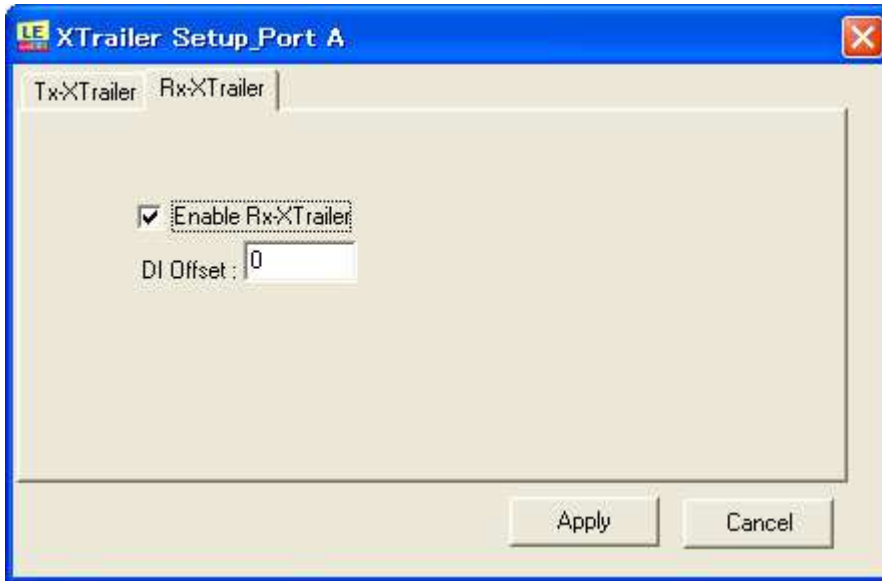
DI Offset ◄―――――――――►

To enable X-Trailer when receiving, mark on "Enable Rx X-Trailer".

Please note it is necessary to set the same DI offset setting for both transmit and receive of X-Trailer to make this function work correctly.

You can check the result of X-Trailer in the "DI Checksum Error" or "Sequence Miss" in the Counter Window.

4. Capture Setup Window

Go to the Main window top menu and choose **Capture=>Capture Setup** or simply click

the **Capture Setup** button to invoke the Capture Setup window.

4.1 General
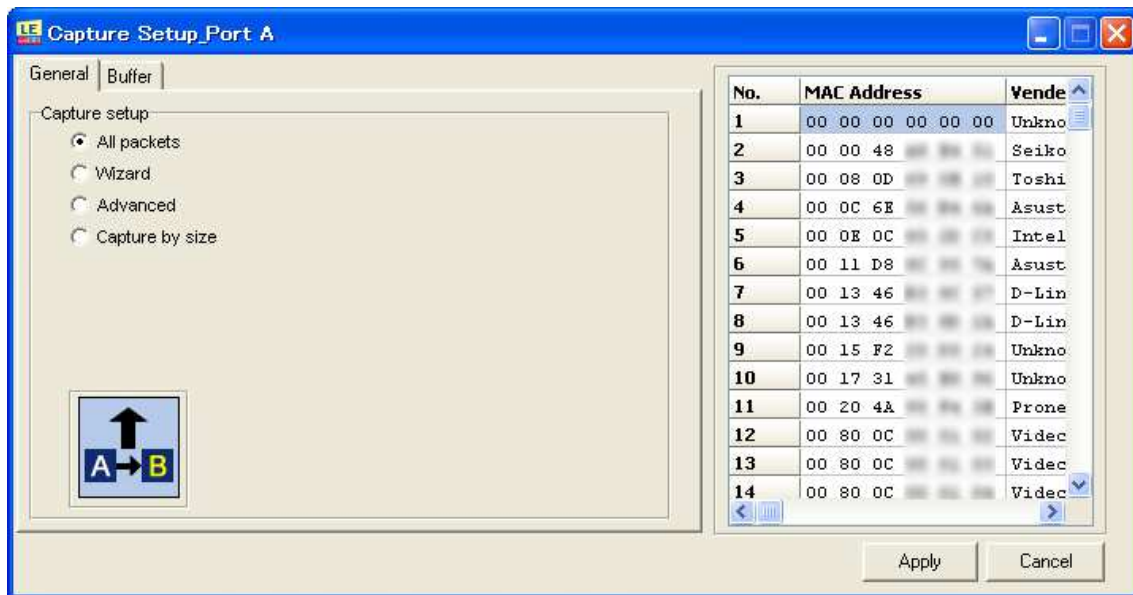
In the **"General"** Tab of the Capture Setup Window, there are "Capture setup" and "MAC address" table.

In the Capture Setup pane, set packets receiving conditions to be captured and analyzed. Choose **"Wizard"** to invoke the Wizard tab. Choose **"All Packets"** to capture all packets. Choose **"Advanced"** to capture Filter and Error conditions. Choose **"Capture by size"** to capture lengths desired.

In the MAC Address table, LE-580FX will automatically detect MAC address of on-line devices.

4.2 Wizard
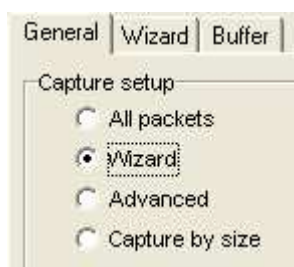
To invoke the Wizard tab, select the box of **Wizard**.
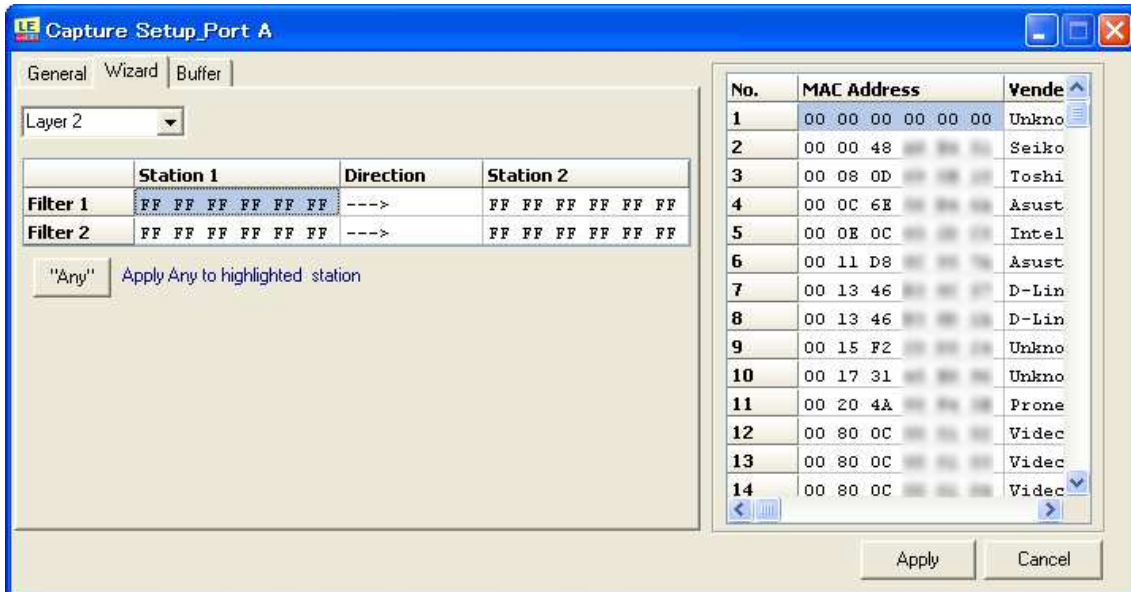
Capture by MAC Direction
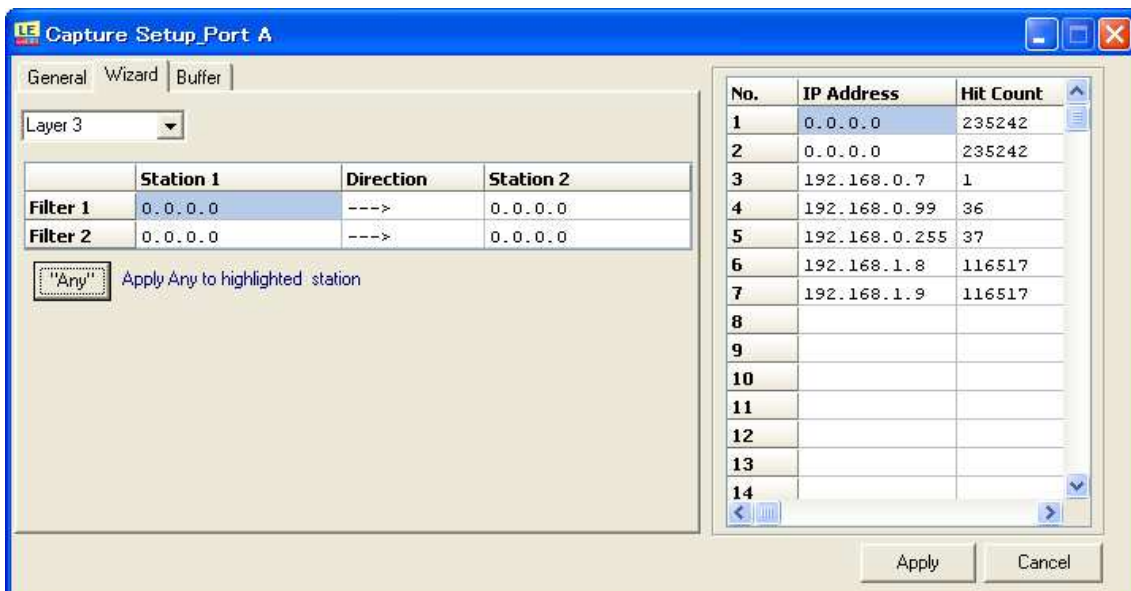
Capture by IP Direction

In the **Wizard** Tab, choose layer 2 (MAC) or layer 3 (IP address) conditions to be captured by LE-580FX for analysis. Edit the range of packets to be transmitted or choose direction of transmission. Choose Station1 or Staion2 and click "Any" button to set all addresses.

4.3 Filter setting
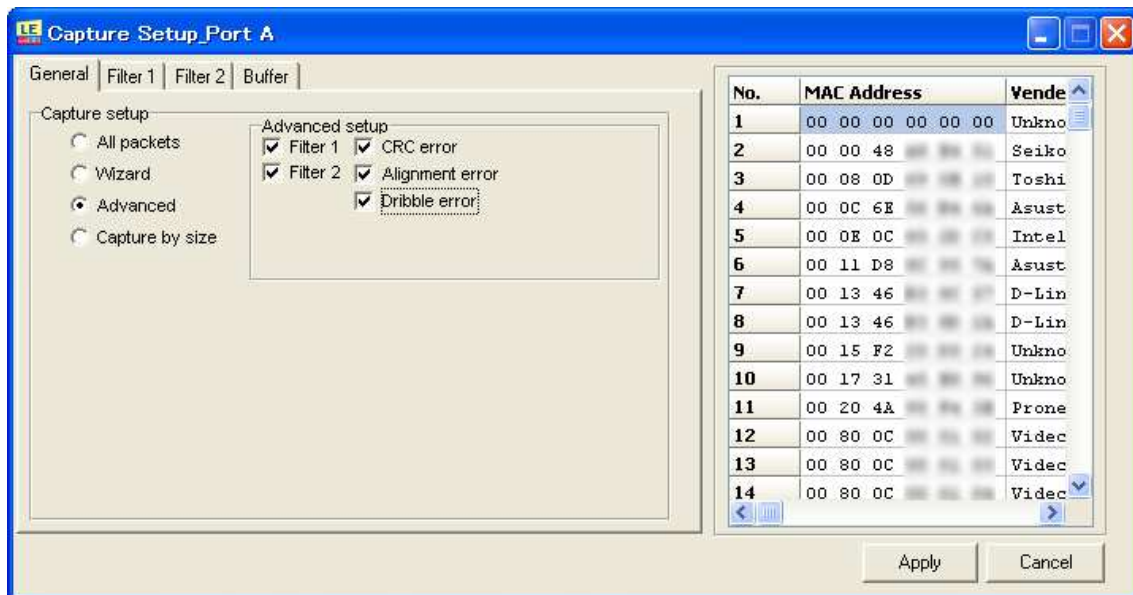
To invoke the Filter tabs or trigger error conditions, select the box of **Advanced**.

Mark on Filter1 and Filter2 in the "Advanced Setup" to popup the tabs for each filter.

Only PG mode supports capturing error packets.

(TAP mode captures all packets include error packets by marking on "All Packets".

Errors:

- **CRC Error** (packets with FCS checksum error)
- **Alignment Error** (packets with FCS checksum error and 1 nibble less than setup length)
- **Dribble Error** (packets with correct FCS checksum but having an additional 1 nibble attached)

4.3.1 Templates
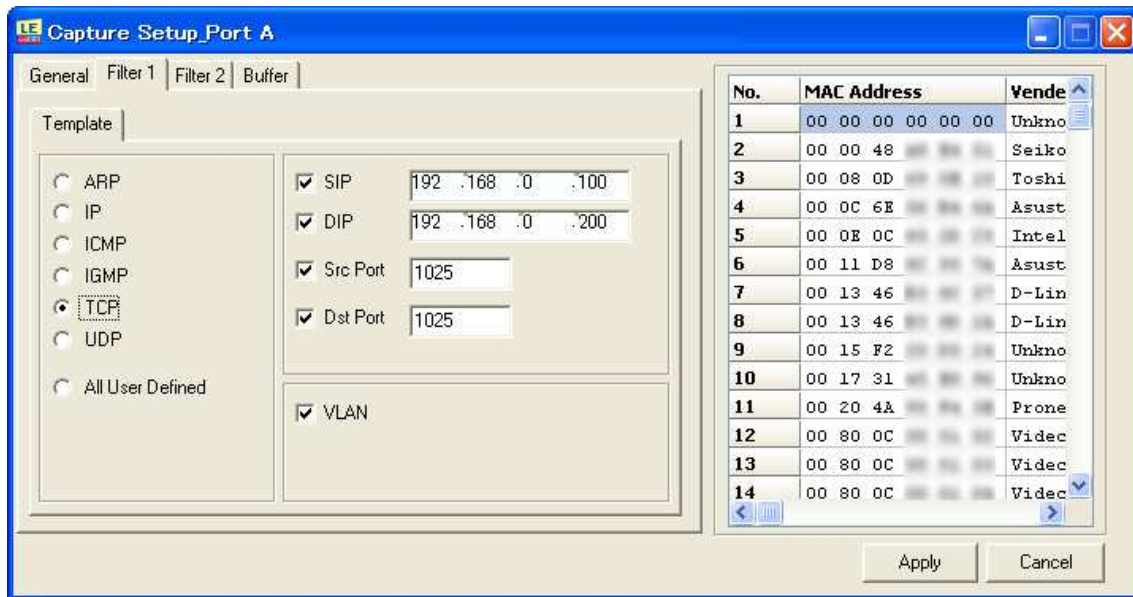
In the **Template** Tab of the Filter Tab, choose protocol type and protocol contents(SIP, DIP, Src Port, Dst Port) for trigger condition of filtering.

4.3.2 User Definition

Invoke the **Setup** tab of Filter tab. Please note that this feature is also available in the TAP mode. If it is in the PG mode, click the **TAP** button in the Control window to switch mode. Choose the **All User Defined** option and the Setup tab will emerge.

In the Setup tab of the Filter tab, choose UDF combinations and edit Length/ Offset/ Trigger/ Mask values (Mask values have to be set in bit).

UDF1/UDF2 of trigger is up to 6byte and everything else is up to 4byte. Set don't care setting as "0" in the mask. The one you marked in the "Select" will work.

The following UDF combinations are available:

UDF1 or UDF2 or UDF3 or UDF4 or UDF5 or UDF 6

UDF1 and (UDF2 or UDF3 or UDF4 or UDF5 or UDF 6)

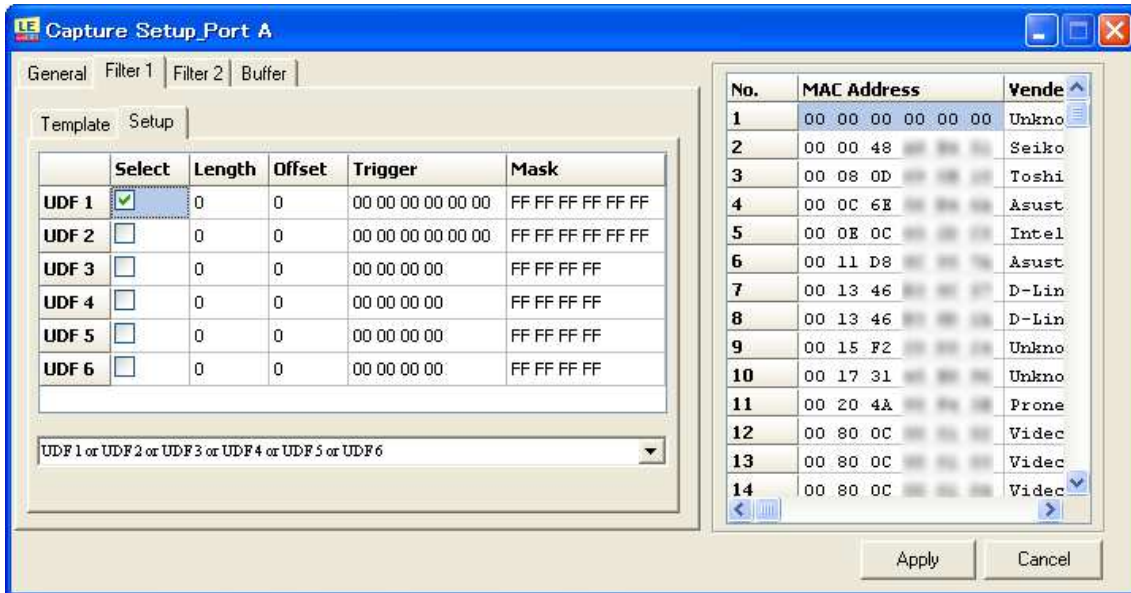UDF1 and UDF2 and (UDF3 or UDF4 or UDF5 or UDF 6)

UDF1 and UDF2 and UDF3 and (UDF4 or UDF5 or UDF 6)

UDF1 and UDF2 and UDF3 and UDF4 and (UDF5 or UDF 6)

UDF1 and UDF2 and UDF3 and UDF4 and UDF5 and UDF 6

(UDF1 or UDF2 or UDF3 or UDF4) and (UDF5 or UDF 6)

(UDF1 and UDF2 and UDF3 and UDF4) or (UDF5 and UDF 6)

(UDF1 and UDF2) or (UDF3 and UDF4 and UDF5 and UDF 6)

4.4 Capture by size

In the **Capture by Size** pane, packet size (X) can be set to be larger/ less/ in between
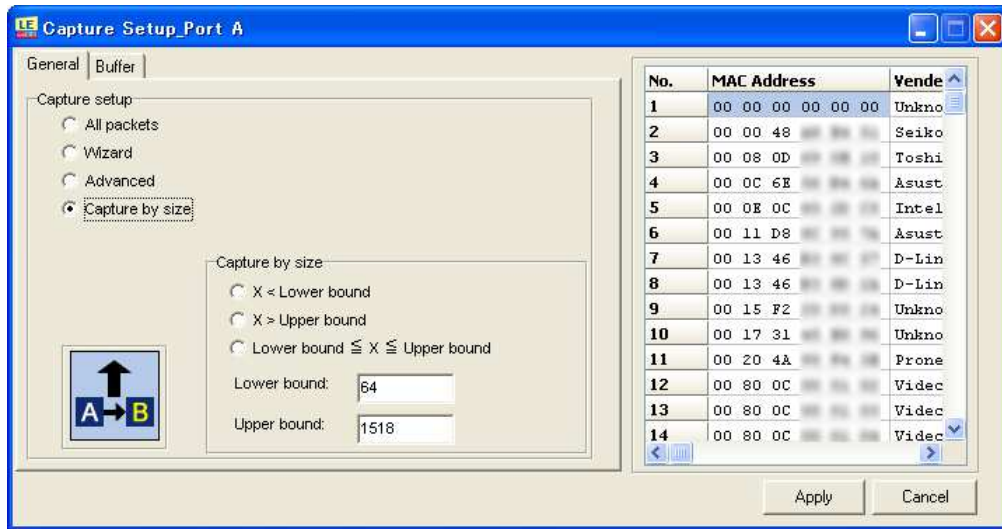
user-defined bounds. (The length ranges from 64(48) to 1536(2032) bytes in TAP(PG)

mode.)

Click "Apply" button after the configuration.

<Important>
Please click "Apply" button every time after the configuraion.
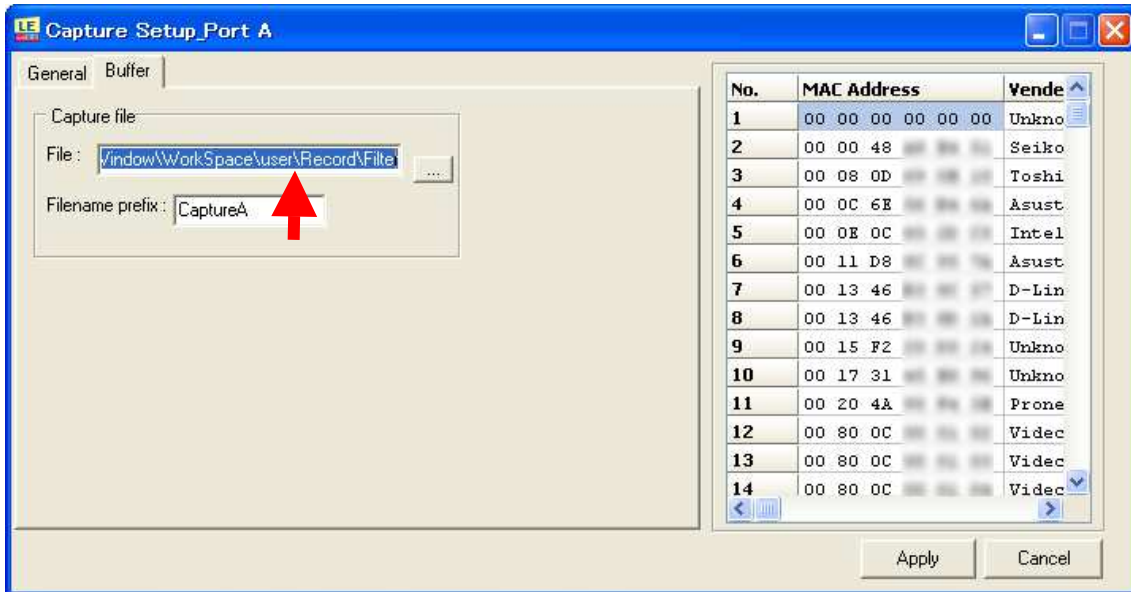
4.5 File to saving data

You can select the file where you can save the packet data before capturing.

Invoke Buffer tab in the "Capture setup" and click [...] to open the **Select Default Directory** window.

5. Dashboard

Go to the Main window top-level menu and choose **Statistics=>Meter=>Dashboard** or

simply click the **Show Diagram** button to invoke the Dashboard.

There are 4 parts for PG mode in the Dashboard: Port A Tx, Port A Rx, Port B Tx, and

Port B Rx. And there are 2 parts for TAP mode: PortA->PortB, PortB->PortA.

The three horizontal bars of each part show the rate of Packets/s, Utilization, and

Errors/s,
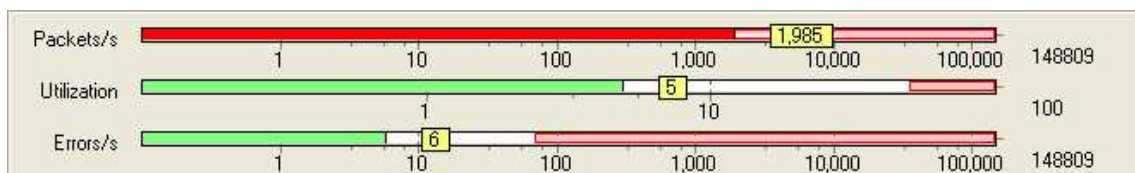
For the horizontal bars, red represents the data value is larger than the threshold value,

green represents the data value is less than the threshold value. In this case, Utilization,

and Errors/s do not exceed the threshold (they all green).

Click the **Show Diagram** button to fold/unfold the Dashboard window.
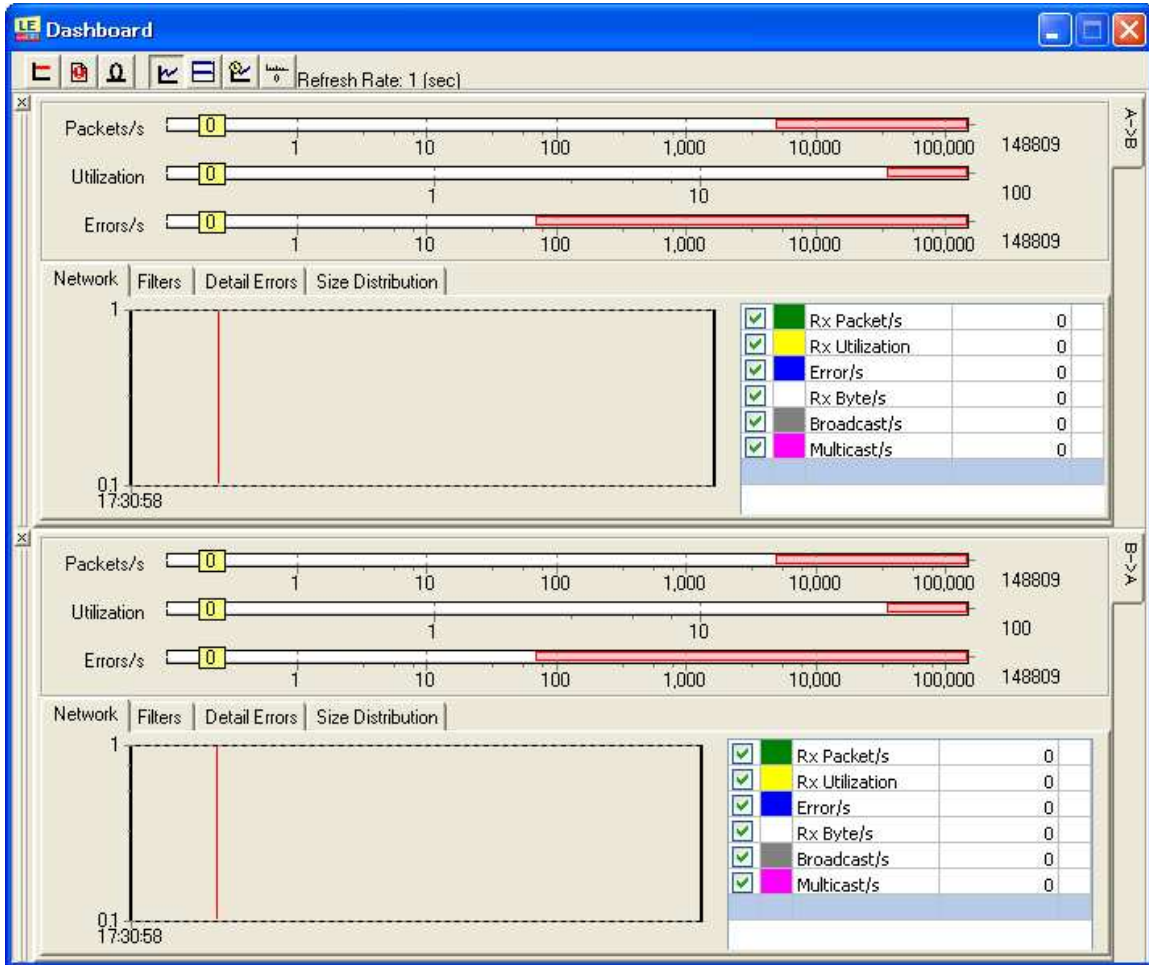
TAP mode:

PG mode:
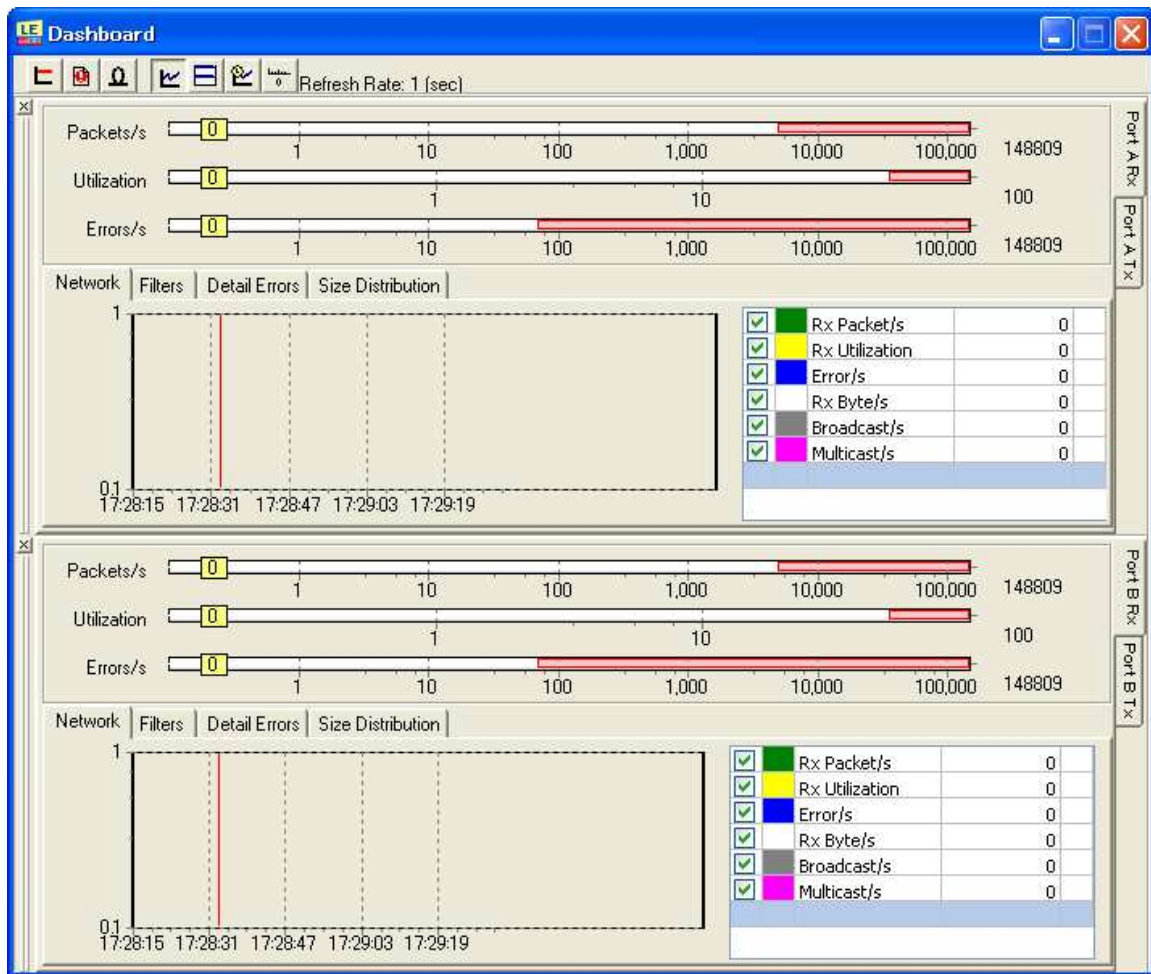
There are 2 individual tabs in Tx: Network and Collisions.

And there are 4 individual tabs in RX: Network, Filter, Detail Errors, Size Distributions.

In the Rx **Network** tab, 6 types of data (Rx Packets/s, Rx Utilization, Errors/s, Rx Byte/s, Broadcasts/s, and Multicasts/s) are shown.

In the **Filters** tab, 4 Filter items (Filter1 Packet/s, Filter 1 Byte/s, Filter 2 Packet/s, and Filter 2 Byte/s) are shown.
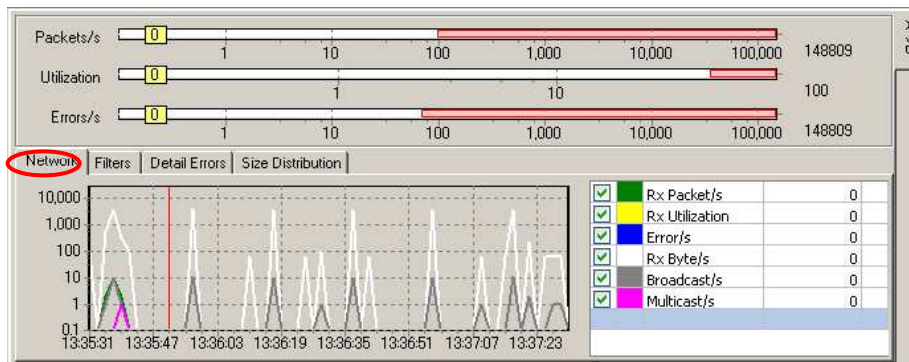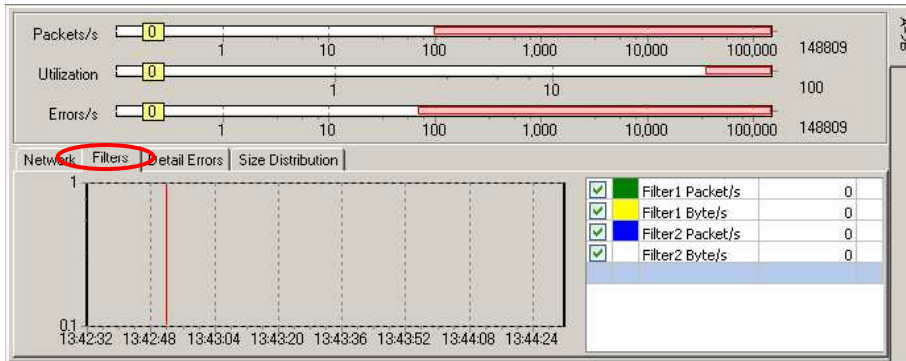

In the **Detail Error** tab, 7 error types (TCP Checksum, IP Checksum, Alignment Error/s, Dribble Error/s, CRC Error/s, DI Error/s, and Sequence Miss/s (Series Error/s)) are shown.
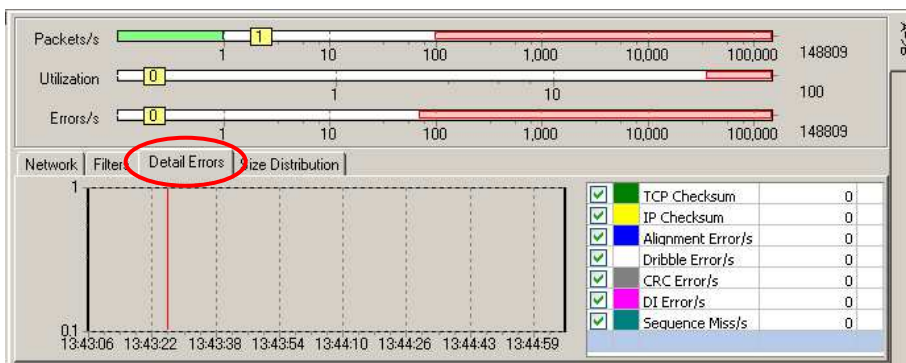
In the **Size Distribution** tab, 7 items (Undersize/s, 64-127 Bytes/s, 128-255 Bytes/s, 256-511 Bytes/s, 512-1023 Bytes/s, 1024-1518, and Oversize/s) are shown. Represented in different color, the pie chart consists of various packet lengths.
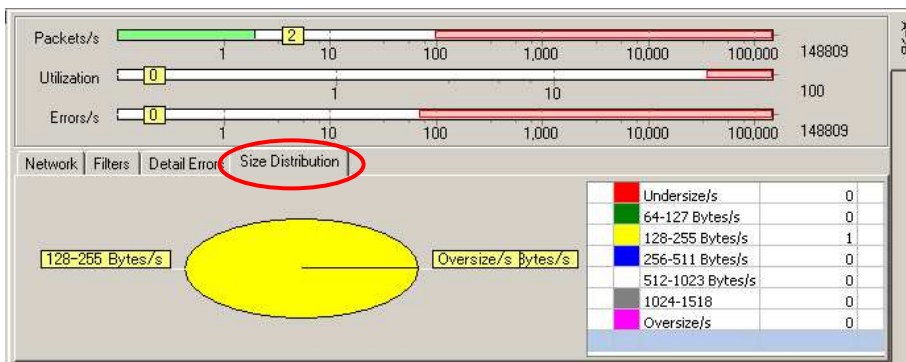
In this case, DUT are sending packets with length in the range of 64 to 127 bytes, so the pie chart will be completely green.

In the Tx **Network** tab, 4 types of data (Tx Packets/s, Tx Utilization, Collision/s, and Tx Byte/s) are shown.

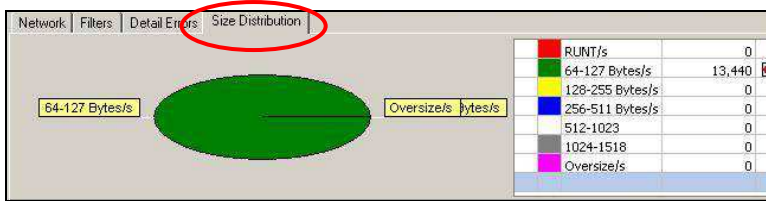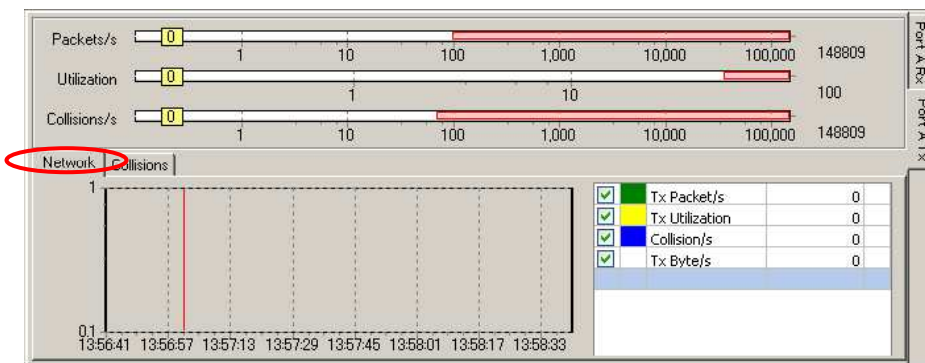In the **Collisions** tab, 5 collision items (Total Collision/s, Single Collision/s, Multi Collision/s, Ex Collision/s and Late Collision/s) are shown.

Click the **Threshold** button to invoke the Threshold window, where various data can be set with a threshold value. To reset individual item, click the **Reset** button. **Reset All** button is for resetting all items.
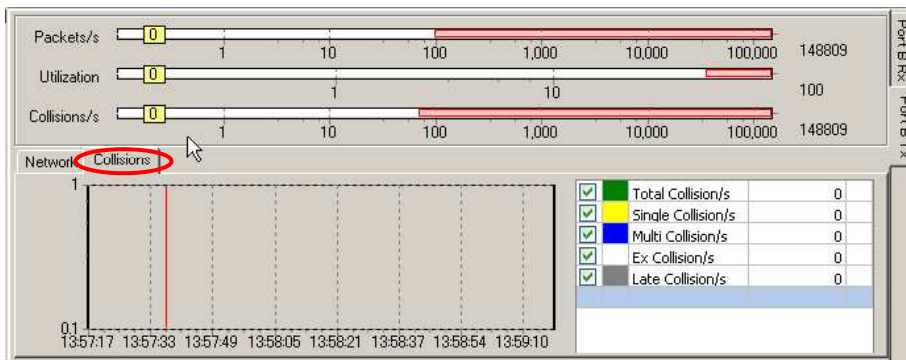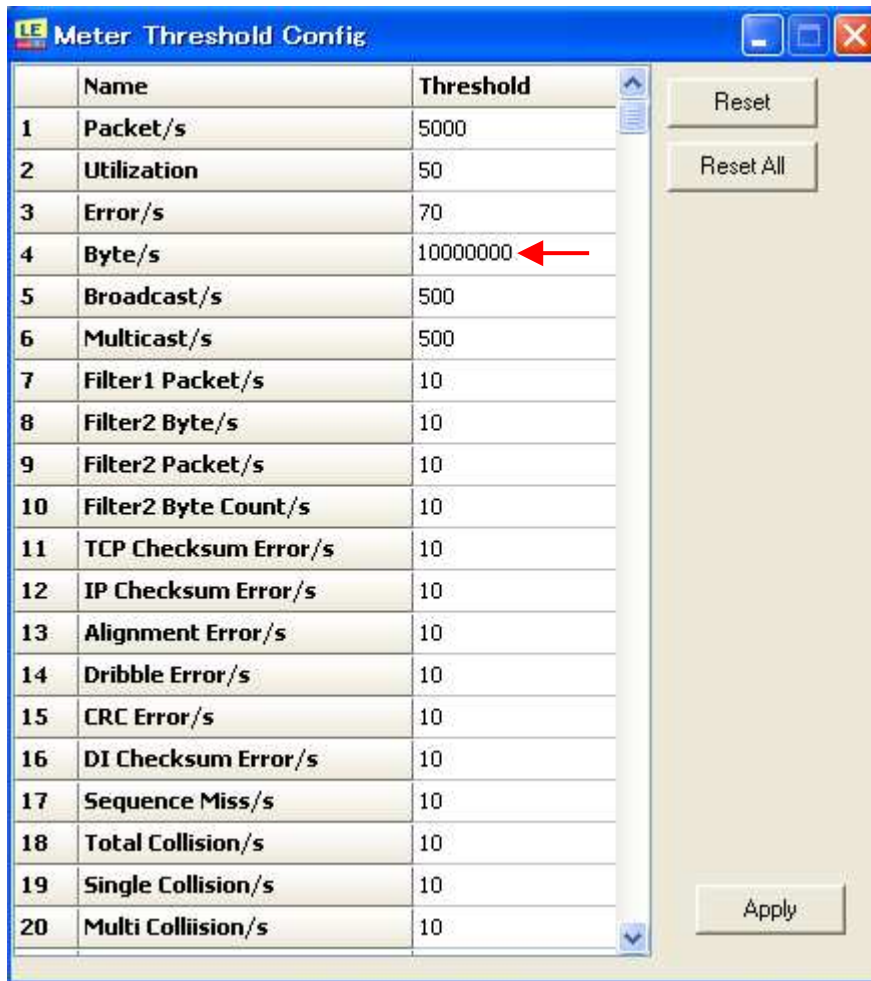
The data are checked per time that has been set at "Data Refresh Rate".

In this case, for better demonstration, threshold value for Bytes/s is changed to 10,000,000. Click "Apply" button after configuration.

When the sampled data reach the threshold, the time will be displayed in "Alarm info".

Alarm Info function assumes use of short period test until about 24 hours.
It is not possible to long-term continuous measurement.

Example of using Dashboard:

Connect LAN devices(DUT1, DUT2) into PortA and PortB of LE-580FX. Each data will be transmitted/received in the PortA and PortB. LE-580FX transmit captured data into PC. That data will be shown in the Dashboard.

PortA => PortB

PortA <= PortB
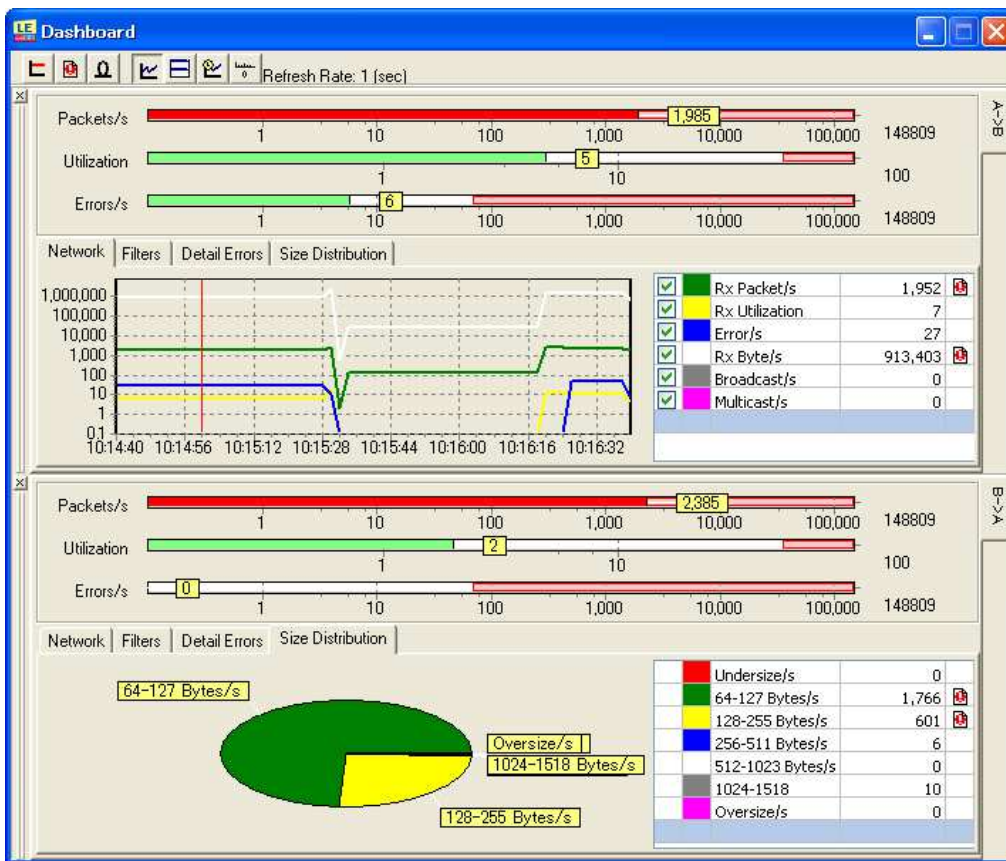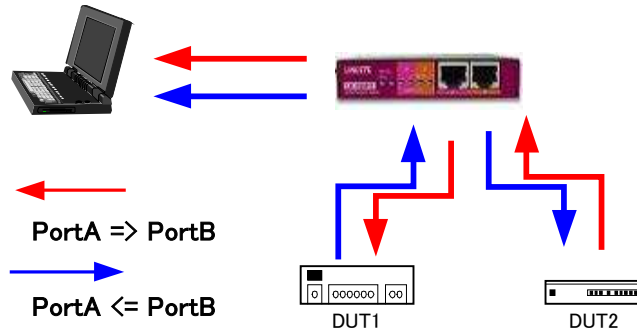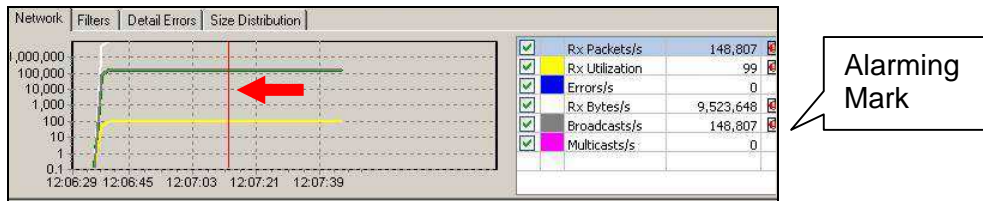
The vertical thin red line (pointed by the red arrow) indicates the time at which the data are sampled. In this case, white line symbolizes Rx Bytes/s, green line symbolizes Rx Packets/s, blue line symbolizes Errors/s, and yellow line symbolizes Utilization. The data having value larger than threshold value will be attached with a little alarming mark next to the numbers.

Click the **Alarm Info** button to invoke the window for Alarm Information. The data having value larger than threshold value will be shown in the Alarming Info.

Click the **Reset** button to reset the Dashboard.

Click the **Save Meters Interval** button to invoke the **Save to Chart Files Interval** window.

 In this case, data will be saved into following as ALG file every 60 minutes (default):

“C:¥Program Files¥LINEEYE¥LE-580FX¥LE-580FX Window v1.5b003¥WorkSpace¥user¥Record ¥Monitor¥20110310”

Folder "20110310" will automatically made based on the date(year/month/day).

Network tab, Filter tab, and Detail Error tab will be saved.

You can load the file from Main Window top menu; File=>Load Monitor log

Click the **Refresh Timer** button to invoke the **Data Refresh Rate** window. In this case, the dashboard will be refreshed every second (default).

6. Counter Window

Go to the Main window top menu and choose **Statistics=>View Counter Window** or simply click the **View Counter Window** button [icon] to invoke the Counter Window for detailed statistics of selected ports.

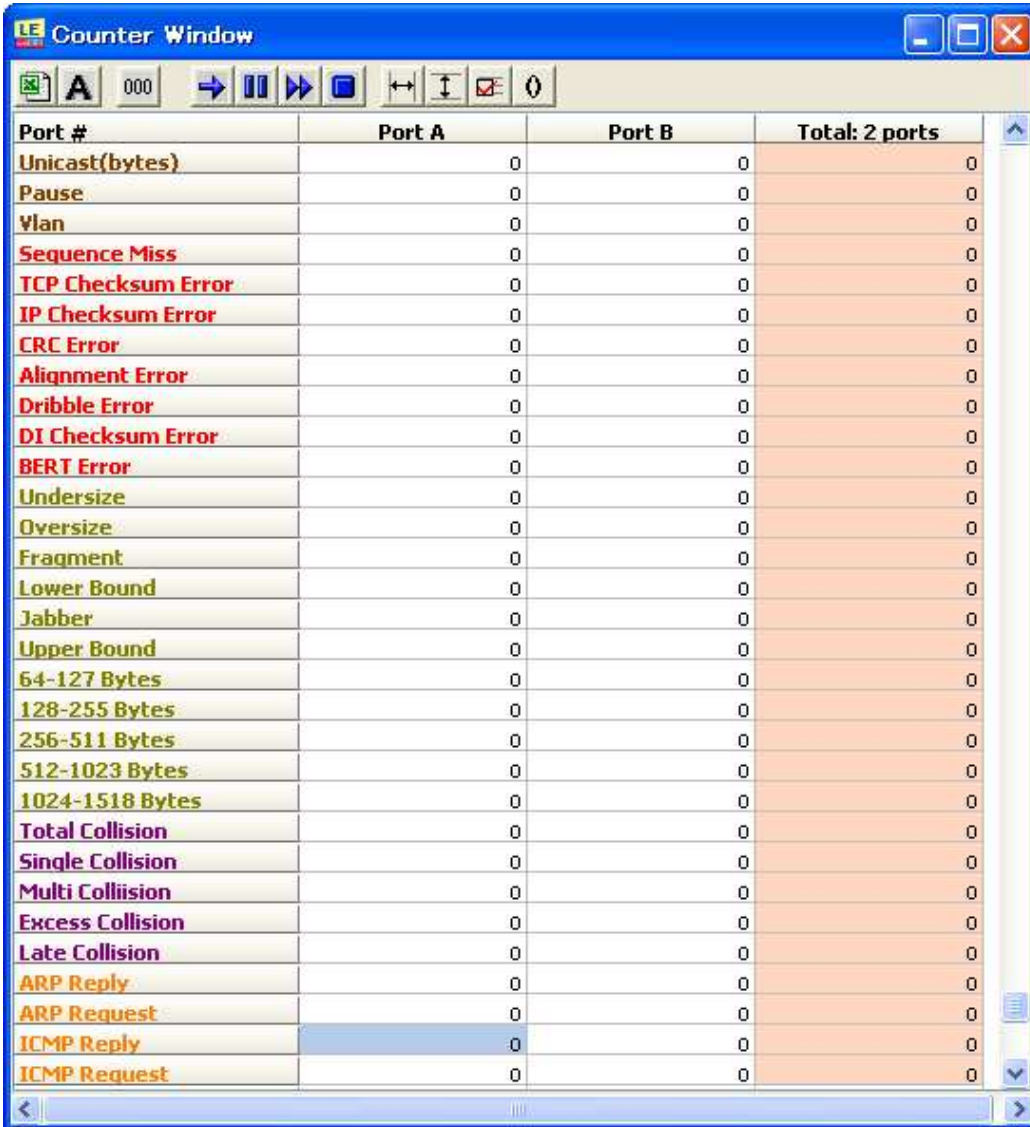| Port #	Port A	Port B	Total: 2 ports
Unicast(bytes)	0	0	0
Pause	0	0	0
Vlan	0	0	0
Sequence Miss	0	0	0
TCP Checksum Error	0	0	0
IP Checksum Error	0	0	0
CRC Error	0	0	0
Alignment Error	0	0	0
Dribble Error	0	0	0
DI Checksum Error	0	0	0
BERT Error	0	0	0
Undersize	0	0	0
Oversize	0	0	0
Fragment	0	0	0
Lower Bound	0	0	0
Jabber	0	0	0
Upper Bound	0	0	0
64-127 Bytes	0	0	0
128-255 Bytes	0	0	0
256-511 Bytes	0	0	0
512-1023 Bytes	0	0	0
1024-1518 Bytes	0	0	0
Total Collision	0	0	0
Single Collision	0	0	0
Multi Colliision	0	0	0
Excess Collision	0	0	0
Late Collision	0	0	0
ARP Reply	0	0	0
ARP Request	0	0	0
ICMP Reply	0	0	0
ICMP Request	0	0	0

Click the **Start Selected Port Counter** button [icon] to start counting packets from the selected port. Click the **Stop Selected Port Counter** button [icon] to stop counting packets from the selected port. Click the **Start All Counter** [icon] to start counting packets from all the ports. Click the **Stop All Counter** [icon] to stop counting packets from all the ports.

Click the **Export to Excel File** button [icon] to export the current file to an Excel file.

Click the **Font Setup** button [A] to invoke the **Font** window to adjust fonts.

Click the **Reset** button [000] to reset the counter.

To enhance user-friendliness, click the **Item Select** button [☑] to bring out the **Row Selection** window to select specific items to show on the Counter window.

Click the **Hide Zero Rows** button [0] to remove items with 0 value to avoid confusion.

Click the **Adjust Column Width** button [↔] to adjust column width (in pixel).
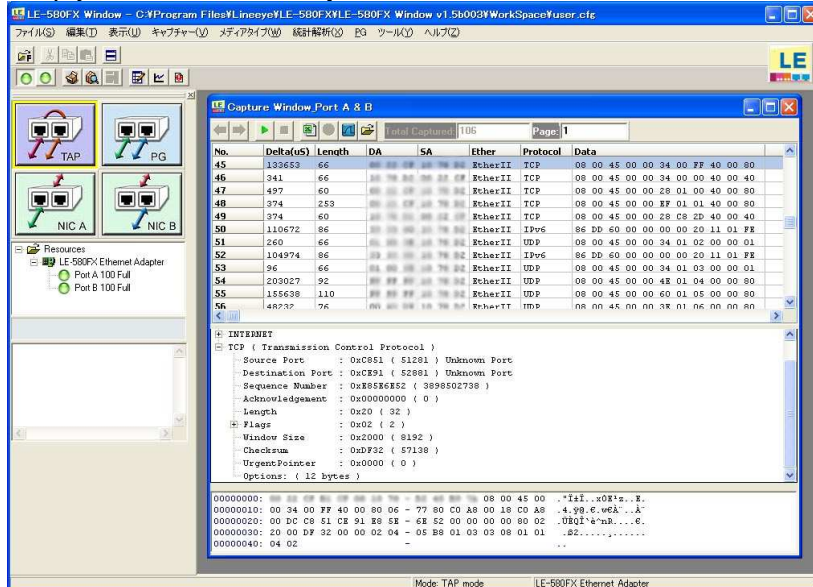

Click the **Adjust Row Height** button [↕] to adjust row height (in pixel).

The range of packet size that is able to be count is from 52 to 2K bytes

7. Capture Window

Go to the Main window top-level menu and choose **Capture=>Capture Window** or
simply click the **View Capture Window** button to invoke the Capture window.

Frame Display

Protocol Decode

Data Display

The complete Ethernet packet for the protocol configuration will be demonstrated in the
Capture window for in-depth analysis. Specifications of various protocols as well as
packets contents are clearly displayed in hexadecimal and ASCII format. The Capture
window is divided into the following three parts:

Frame Display: The top area of the Capture View window contains a summary of
each frame captured.

Protocol Decode: The middle section of the Capture View window is a protocol-
dependent decode of the selected packet's contents.

Data Display: The bottom of the Capture View window shows the entire contents of
the selected packet. The left hand column is the packet offset, expressed in
hexadecimal. This is followed by sixteen bytes of data display, all in Hexadecimal,
and the right hand column contains a display of the data in ASCII.

In the Total Capture box in the Capture Window, there will be the total number of
packets until capture end. Captured data will be saved automatically in every 500
frames. The Page box tells you the which number of file is displaying now.

* LE-580FX Window(above v1.5) can save packets up to 250,000,000(500,000 files).

Click the **Start Capture** button [img] to start capturing data. Once the button is clicked, the following **Warning** message will show to ask about deleting all files with certain prefix. Choose **OK**. If you do not want to delete the file, click Cancel and choose the folder to save.
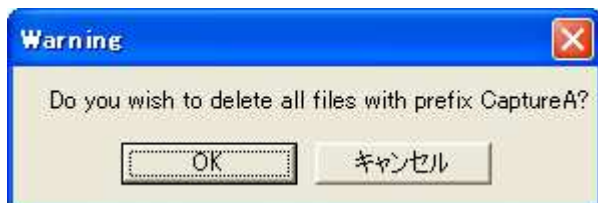
Click the **Stop Capture** button [img] to stop capturing data. When stopping the capturing, it displays the packets of data file.

Click the **Next Page** button [img] to show the next data file. 500 frames will be saved at once in the Capture Window. To show more frames, you need to click this button.

Click the **Previous Page** button [img] to display the previous data file.

Click the **Export to Excel File** button [img] to export current file to an Excel file.

Click the [img] button to invoke **Ethereal**. (When Ethereal is selected by Capture option.)

Click the [img] button to invoke **Wire Shark**. (When Wire Shark is selected by Capture option.)

Click the [img] button to open former records by capture buffer. Data captured by the Capture window of LE-580FX can be saved in the place you set in the Buffer tab.

Please do not install WinPcap when installing Wire Shark or Ethereal.

The range of packet size that can be captured in TAP mode is from 64 to 1536 bytes(including CRC). And that in PG mode is from 64 to 1536 bytes. Because of the limitation of PC performance and Networks, the ability of LE-580FX window in capturing is not well as Wireshark or Ethereal.
Wireshark and Ethereal are recommend in capturing packets.

Meaning of status:

Delta(us)   : Time from receiving previous packet until receiving next packet (unit:1us. Max: 57minutes).

Length   : packet size (byte)
(TAP mode does not include the size of CRC, but in PG mode includes it.)

DA   : MAC address of transmission in hexadecimal.

SA   : MAC address of receiving in hexadecimal.

Ether   : either of DIX Ethernet II or IEEE 802.3 frame

Protocol   : Protocol type

Data   : frame in hexadecimal in dump display.

8. NIC Mode

LE-580FX will act as pure network interface card with Auto-MDIX supported. When only one port is connected to network while the other port is left empty, it could be performed normal network activities (sending e-mail, browsing the internet, etc) without LE-580FX window control. (MAC address is shown in the bottom of the product)

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