

LE-8500X

LE-8500XR

Quick Start Guide

Thank you for your purchase of LE-series.

This booklet tells you only the basic operation. For more detailed information, please refer to the instruction manual (PDF) in the utility CD attached to the product.

When you unpack the product, make sure you have all following items

☐ Protocol Analyzer	1
☐ Interface Sub-board [SB-GE2] (attached to the analyzer)	1
☐ Hand strap (Already mounted)	1
☐ Wide input AC adapter (Input :AC100 ~ 240V/ Output :DC9V)	1
☐ LAN cable	2
☐ USB cable (Type A - C)	1
☐ External signal I/O cable [LE-4TG]	1
☐ Utility CD	1
☐ Quick Start Guide (this booklet)	1
☐ Carrying bag [LEB-01]	1
☐ Warranty	1

Please let us know if you find any damage to the product or accessories lacking.

Outline

LE-8500XR / LE-8500X series is the compact protocol analyzer which can measure 2 lines of Ethernet data at 10BASE-T/1000BASE-T and PoE (Power over Ethernet) at the same time. It has the On-line monitor function, Packet Generation (PG) function, Statistic function, and PoE function which are useful for developing/inspecting the communication system/devices, and finding the communication troubles.

USER LIMITATION

This product has not been developed for the use that needs exclusively high reliability and safety: aerospace apparatus, trunk communication apparatus, nuclear control apparatus, medical apparatus related with life maintenance etc. Therefore, do not use for those purposes.

LE-series models with Wi-Fi function (IEEE 802.11b/g/n) emit radio wave. Please do not use it near a medical device, microwave, high-level electronics, TV, radio, wireless station for mobile communication, or specified low power radio station. To use LE-series in the place where an administrator limits the use of radio devices, follow the instruction of the administrator.

The Wi-Fi module used for the LE-series conforms to SRRC(China), FCC (USA), CE (EU), TELEC (Japan), KCC (Korea), ISED (Canada), NCC (Republic of China), however, as its product (LE-series) the Wi-Fi function is available only in Japan, USA, Canada, and EU nations in compliance with RE directive (2014/53/EU).

To use the product other than above countries, order LE-series without Wi-Fi function. Please contact the sales department for more details.

Representation of the Operating Procedure

- Key operation is described in [].
- Continuous key operation is described as follows.
ex) Press [MENU] and then [0] → [MENU],[0].
- Screen display is described in “ ”.
- Reference page is displayed in (Pxxx).

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The content of this manual and specification of the product is subject to change without any notice

Safety Information

Please do not use the line monitor in the following conditions.

[Description of the symbol and mark]



Warning: There is a possibility of getting hurt, such as a death or a serious injury.



Caution: There is a possibility of getting injured or damaging the product.



Warning

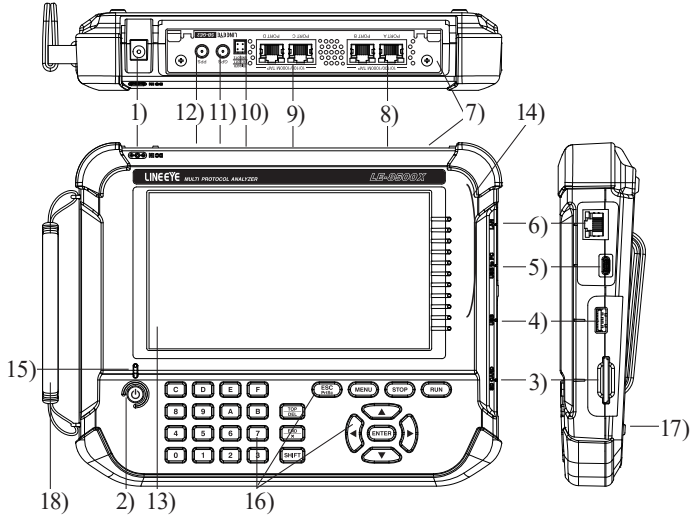
- Do not disassemble, modify or repair the line monitor
This may result in an injury, electric shock, and ignition.
- Turn off the power of analyzer and unplug the cables immediately when emanating smoke, odor or sound.
Continuous use may result in an electric shock, injure or ignition.
- Do not use the line monitor if there is inflammable gas.
This may result in ignition and explosion.
- Turn off the power and unplug the line monitor immediately when liquid or foreign substance gets into the line monitor.
Continuous use may result in ignition, electric shock and malfunction.
- Do not touch the line monitor with wet hand.
This may result in an electric shock and malfunction.
- Do not use the battery other than attached Lithium ion battery.
Do not short the electrode of the battery. Do not modify, decompose or heat the battery.
It may cause the ignition and explosion.



Caution

- Do not give a strong impact to the line monitor.
- Do not place the line monitor in following conditions.
 - Not flat or vibrated place.
 - Temperature or humidity is above the specification.
 - Change the temperature rapidly. ▪ Have a direct sun or near the fire.
 - Magnetic field. Have static electricity.
- Do not use the line monitor near the following devices.
 - Medical device, such as a heart pacemaker.
 - Automatic control devices easily affected by radio waves.
 - Devices controlled by the radio waves.

Nomenclature



Name	Function
1) AC adapter plug	Connects the AC adapter, which serves as a battery charger.
2) Power Switch	Press it for more than 1 sec to turn on/off the analyzer.
3) SD Card Slot	The inlet for a SD/SDHC card.
4) USB Host Port	USB Type-A connector Connect the USB flash drive or Printer.
5) USB Device Port	USB Type-C connector connected to a PC or battery charger.
6) LAN port	RJ-45 connector. A LED for linking (right) and a LED for 1000BASE (left). Use it for connecting the LAN cable from the PC.
7) Inter face Sub -Board	The interface sub-board (SB-GE2) for measuring 2 channels of GbE is inserted. Able to exchange to the optional interface sub-boards.
8) PORT A, B	GbE measurement ports (RJ-45 connector, fail safe TAP specification ^{*1}) Connect the LAN cables of target device to the port A/B.
9) PORT C, D	GbE measurement ports (RJ-45 connector) To use the monitor function, connect the LAN cables of target device. To use the PG function, use it as normal LAN port.
10) External Input Terminal	Input/output port for trigger signal at TTL level. Connect the attached external signal input/output cable.
11) Connector for GPS antenna	SMA (female) connector. Connect the optional GPS antenna to have the time synchronous by GPS.
12) Connector for PPS signal	SMA (female) connector Input/output the PPS time synchronous signal at TTL level.
13) 7 Inch Color Display	Touch panel of electrostatic capacity.
14) Line State LED	Display the status of measuring interface.
15) Power LED	Lighting in green when using. Blinking in red when charging battery.
16) Keypad	Entering commands and other operation.
17) Battery Cover	Open/close when replacing the battery.
18) Hand strap	Use to hold the product.

*1 : The linking between port A and B is continued even though it turns off the power of analyzer. However, the linking between port A and B is cut temporally when it starts/ends the analyzer.

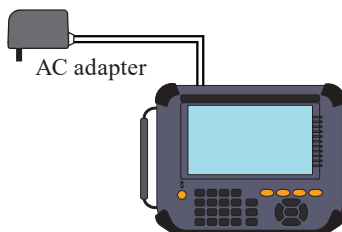
Power Supply and Battery

This analyzer runs by attached AC adapter, or built-in rechargeable battery.

■ Power Source

This analyzer runs by attached AC adapter, or built-in Lithium Ion battery.

- 📄 The battery running time is approx. 2 hours. (The running time is different by the usage of analyzer.)
- 📄 It does not run by the bus power from the USB device port.



■ Charge the Battery

Built-in Lithium Ion battery is charged while the power is supplied by the AC adapter. It is also chargeable by the bus power from the USB device port.

Power supply	Analyzer	Status	Charge Time	Power LED blinking
AC adapter	OFF	—	About 3.5 hours	Approx.1sec cycle
	ON	Stop measuring	Max. 6 hours *1	Approx.4sec cycle
		Measuring	No charge	No charge
USB bus power	OFF	Use attached USB cable	Max. 6 hours *1	Approx. 4 sec cycle
		Use Type-C battery charger etc. *2	About 4.5 hours	Approx.1.5 sec cycle
	ON	—	No charge	No blinking

*1 : This will not be full charging because of the small amount of current (approx. 160mA).

*2 : It will be the same when it connects to the PC with a USB port in Type-C connector.

- 📄 This analyzer is not charged in full before shipping. To use the analyzer at the first time, charge it full.
- 📄 Charge the analyzer under the temperature of 5 to 40 °C. It will not start charging below 5 °C.
- 📄 If you are not going to use it for a long term, charge the battery in full. After that, try to charge the battery every 6 months.

■ Replacement of battery

If the analyzer can no longer drive by the battery, or the service time after charging becomes extremely short, replace the battery.

Refer to the instruction manual for more details of replacement of battery.

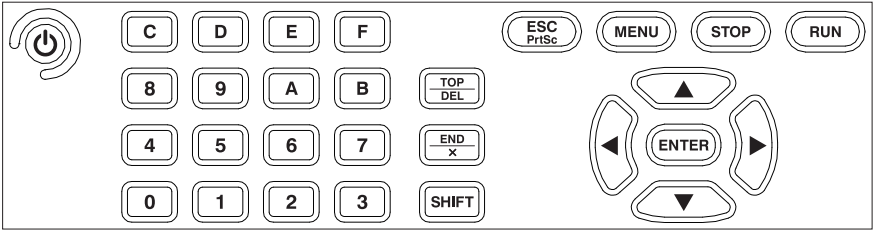
- 📄 Old battery has to be handled in an appropriate manner.

Warning < Notice for battery >

- Do not short the terminal of the battery.
 - Use the battery and battery charger specified by LINEEYE.
 - Do not disassemble or modify the battery.
 - Do not use the analyzer near the heater or leave it in the place with high temperature.
- It can cause heat, fire, explosion, electric shock, liquid spill and malfunction.

Key operation

There is a keyboard to input data and operate commands.



■ Keys

Operations	Function
[]	Turn ON/OFF the power. Press it for more than 1sec.
[RUN]	Start monitoring, measuring or testing operation.
[STOP]	Stop monitoring, measuring or testing operation.
[MENU]	Return to the top menu.
[ESC]	Return to the previous display. Return to the data display from configuration.
[], []	Scroll one data line. Move the cursor on the condition setting.
[], []	Scroll one character of data. Change the setting on the condition setting.
[ENTER]	Apply selected settings.
[0] ~ [F]	Enter numerical values.
[TOP/DEL]	Delete the entry indicated by the cursor.
[END/X]	Enter the data of “Don't Care”.
[SHIFT]	Press to use the expanded alternate function of each key.
[SHIFT]+[TOP/DEL]	Jump to the top of data.
[SHIFT]+[END/X]	Jump to the end of the screen.
[SHIFT]+[ESC]	Save the screen image. / Hardware copy.
[SHIFT]+[MENU]	Display/hide the description of LEDs.
[SHIFT]+[RUN]	Brighter the LCD back light.
[SHIFT]+[STOP]	Darker the LCD back light.

* [X]+[Y] indicates the operation of pressing [X] and [Y] together at the same time.

Shortcut keys are available from [MENU] and [0] ~ [F].

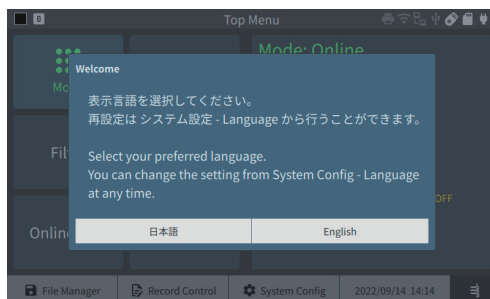
To go back the factory setting, press “System Settings” -> “Version”-> “Factory reset”
→ 「Version」 (P7)

Initial Settings

To turn on the power, press [⏻] for a second. After displaying the opening screen for about 15 seconds, it will start running.

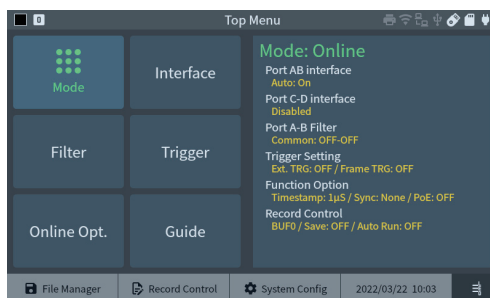
Select the language at the first time using the analyzer. If it is selected already, it displays the top menu.

Both LE-8500XR and LE-8500X models are displayed as “LE-8500X”.



To set each configuration, touch the configuration menu or select by [▲], [▼],[◀],[▶] keys and then press [ENTER].

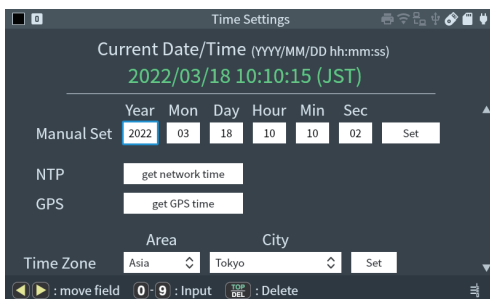
To set each items, touch the item or select by arrow keys or [0] ~ [F] keys.



To set the current time, touch the current time on the right bottom of the screen.

Shortcut key [MENU] , [D]

The current time is displayed in the order of Year/Month/Day, Hour: Minute: Second (24hour).



If using the GPS antenna, received time from GPS is displayed.

- Information of time and date is used for time stamp and Auto start/stop. Make sure to input the current time and date precisely.

Record Control

Touch “Record Control” from top menu and set the record conditions of measured data.

Shortcut key [MENU] , [B]

Touch “Capt. Buffer” on the left upper or press [SHIFT] + [▶] or [SHIFT] + [◀]

☐ Capture Buffer

Recording area :

Select the recording area of buffer memory from full size (BUF0) or half size (BUF1/BUF2).

Protected :

Select whether or not protect data in the capture buffer to prohibit overwriting.

Write Control :

Select Ring buffer (endless recording) or Full stop when the capture buffer is full.

☐ Auto save

Auto save function saves monitored data in the memory card automatically. Set “Auto backup” function which saves data when it ends the measurement.

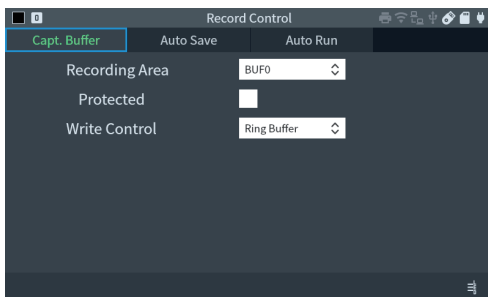
→ 「Auto Save」 (P23)

→ 「Auto back-up function」 (P24)

☐ Auto run

Start measuring automatically at the specific period of time.

→ 「Auto Run Function」 (P25)



System Setting and Version

Touch “System Settings” from top menu.

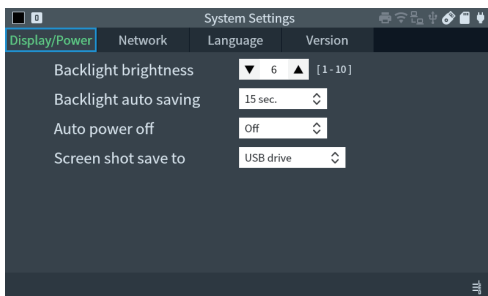
Shortcut key [MENU] , [C]

Touch each tab or press [SHIFT]+[▶] , [SHIFT]+[◀]

☐ Display / Power

Set backlight brightness, automatic dimming for power saving, auto power off function, screenshot, and printer settings.

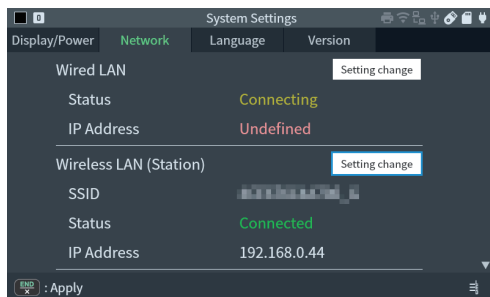
 Auto Power Off function does not work during measurement.



□ Network

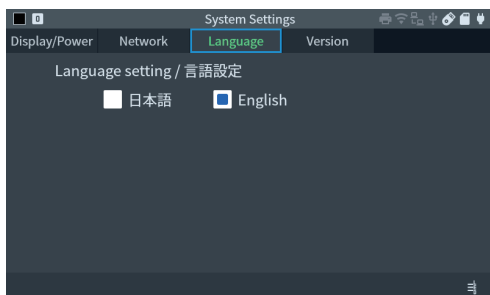
Set each setting for wired LAN and wireless LAN. As a factory setting, wireless LAN is turned off. To change the setting of wireless LAN, touch “Setting change” and select “station mode” or “access point mode”.

📄 LE-8500X does not have the wireless function.



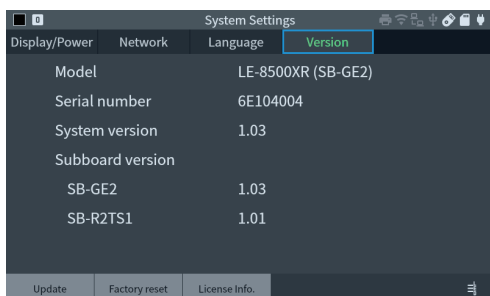
□ Language

Select language from Japanese or English.



□ Version

Serial number and firmware version are displayed. It is able to update the firmware and reset the firmware.

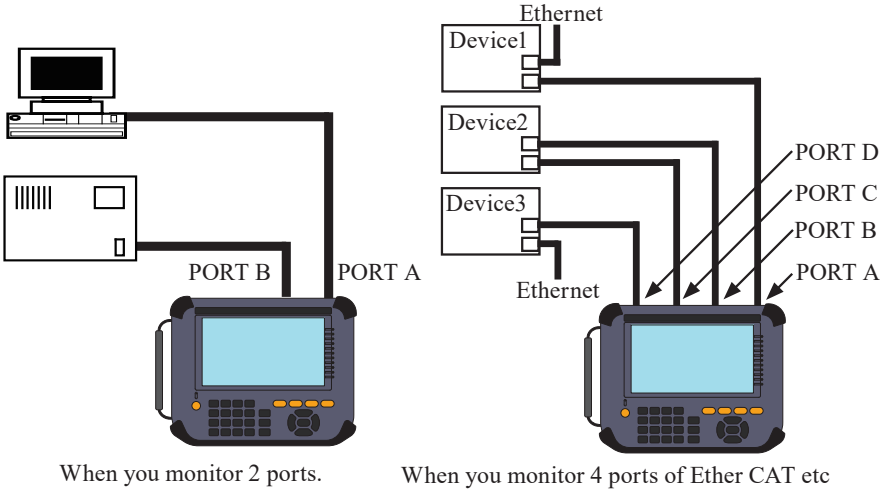


■ Online Monitor Function

Touch “Mode” from top menu and select “Online”.

□ Connection

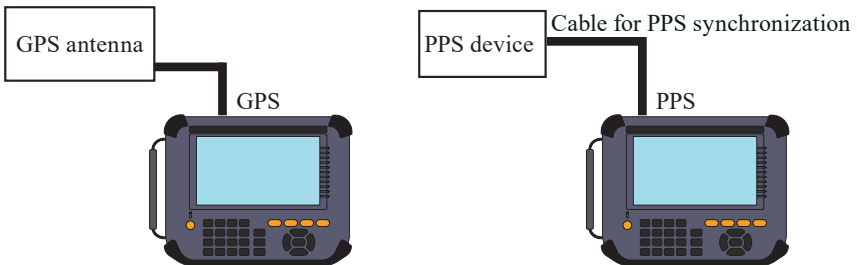
Connect the LAN cables (in which the communication data between the target devices run) with each port as follows. When you need additional cables for branch connection, use the attached LAN cable or a straight cable of the category 5e or later.



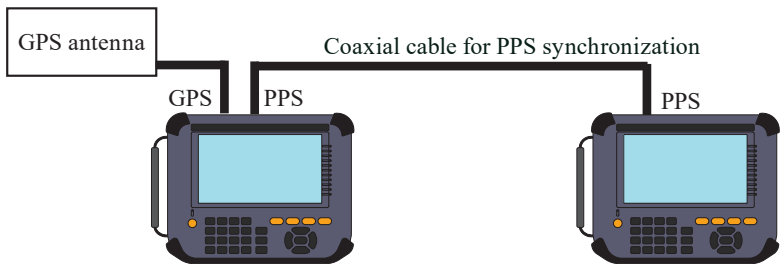
📄 Delay is occurred when it passes through the TAP circuit in the analyzer.

Delay time is approx. $1.3\mu\text{s}$ - $1.5\mu\text{s}$ for 1000BASE-T/100BASE-TX and $5\mu\text{s}$ for 10BASE-T.

Time stamp information can be synchronized with PPS signal from GPS or external PPS device.



To use one GPS active antenna and synchronize 2 sets of LE-8500X, connect devices as following.



□ Interface setting

Touch “Interface”. Set each setting of port A/B and port C/D individually.

Shortcut key [MENU] ,[1]

□ Filter setting

Touch “Filter”. It is able to set “Tx” and “Rx” individually.

Shortcut key [MENU] ,[0]
→ □Filter Function□ (P19)

□ Trigger setting

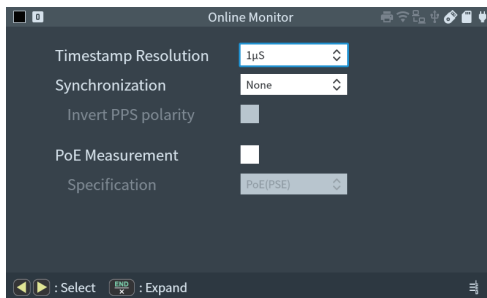
Touch “Trigger”. It is able to generate triggers by external signal, frame condition and so on.

Shortcut key [MENU] ,[2]
→ 「Trigger Setup」 (P22)

□ Online Monitor setting

Touch “Online Opt.”. Set the resolution and time stamp.

Shortcut key [MENU] ,[3]



□ Start and Stop measurement

Press [RUN] to start monitoring. Measured data is displayed at real time and recorded in the capture memory.

Press [STOP] to finish measuring.

□ Frame display

It displays the LAN frames with the time stamp information on the screen.

Scroll data by [▲] [▼] keys or swipe the screen.

Press [ENTER] to display more details.

Touch “PoE” to display PoE information if it is measured.

Time stamp

Source address

Destination address

Protocol

“Time Resolution”

ss.nsec or mm:ss.mssec*1

↓

hh : mm : ss. msec

↓

MM / DD hh : mm : ss

↓

YY / MM / DD hh : mm

↓

Δtime(sec) *2

*1: Displayed resolution of time stamp is set in the configuration.

*2: Elapsed time from previous frame.

Time	Len	P	Source	Dest	Protocol
32:17.445902	215	A	192.168.0.7	239.255.255.250	UDP
32:18.071925	60	A	192.168.0.20	192.168.0.106	TCP
32:18.073329	60	B	192.168.0.106	192.168.0.20	TCP
32:18.123813	60	A	192.168.0.20	192.168.0.106	TCP
32:18.815690	60	A	192.168.0.20	192.168.0.106	TCP
32:18.816303	60	B	192.168.0.106	192.168.0.20	TCP
32:18.837183	60	B	192.168.0.106	192.168.0.20	TCP
32:18.837412	60	A	192.168.0.20	192.168.0.106	TCP
32:19.222895	60	A	00:24:A5:4B:8A:86	FF:FF:FF:FF:FF:FF	[8899]
32:19.420985	60	A	10:6F:3F:B3:56:DC	FF:FF:FF:FF:FF:FF	[8899]
32:20.767703	60	A	192.168.0.20	192.168.0.106	TCP
32:20.769108	60	B	192.168.0.106	192.168.0.20	TCP
32:20.811334	60	A	192.168.0.20	192.168.0.106	TCP
32:21.222682	60	A	00:24:A5:4B:8A:86	FF:FF:FF:FF:FF:FF	[8899]
32:21.343442	60	A	192.168.0.20	192.168.0.106	TCP

Press [SHIFT] + “Relative Time” to start the time stamp from zero when it starts measuring.

☰ “OVERRUN” is displayed when there is data missing under the condition of huge amount of data.

Data packet is missing.

“OVERRUN” is displayed.

Time	Len	P	Source	Dest	Protocol
11:51.997064	82	A	192.168.0.3	192.168.0.255	UDP
11:52.009046	342	B	0.0.0.0	255.255.255.255	DHCP
11:52.009419	60	A	00:AA:DE:E8:51:1A	FF:FF:FF:FF:FF:FF	ARP
11:52.108587	590	A	192.168.0.1	192.168.0.106	DHCP
11:52.108963	342	B	0.0.0.0	255.255.255.255	DHCP
11:52.111996	590	A	192.168.0.1	192.168.0.106	DHCP
OVERRUN					
11:52.339796	76	A	192.168.0.200	224.0.0.251	UDP
11:52.340784	86	A	192.168.0.33	224.0.0.251	UDP
11:52.680636	60	A	10:6F:3F:B3:56:DC	FF:FF:FF:FF:FF:FF	[8899]
11:52.737356	130	A	192.168.0.7	192.168.0.255	UDP
11:53.005972	60	B	00:20:4A:95:8E:8B	FF:FF:FF:FF:FF:FF	ARP
11:53.006093	60	A	00:AA:DE:E8:51:1A	00:20:4A:95:8E:8B	ARP
11:53.035933	60	B	192.168.0.106	0.0.0.0	TCP
11:53.340725	70	A	192.168.0.200	224.0.0.251	UDP

□ Detailed display

Display the details of the frame, which is displayed on the top of the Frame Display.

Press [ENTER] to change the display to frame display.

Time	Len	P	Source	Dest	Protocol
32:18.071925	60	A	192.168.0.20	192.168.0.106	TCP
32:18.073329	60	B	192.168.0.106	192.168.0.20	TCP
32:18.123813	60	A	192.168.0.20	192.168.0.106	TCP
32:18.815690	60	A	192.168.0.20	192.168.0.106	TCP

Ethernet II

Destination: 00:20:4A:95:8E:8B

Source: 6C:4B:90:C1:66:BB

Type: IP (0x0800)

FCs: E1 1A 75 78

Internet Protocol

Version: 4

Header length: 20

Service type: 0x00

Total length: 42

Identification: 0x9225 (37413)

☰ Refer to specification of each protocol for more details.

- HEX dump view

Touch “Dump” in the detailed display.



← The target frame for dump view.

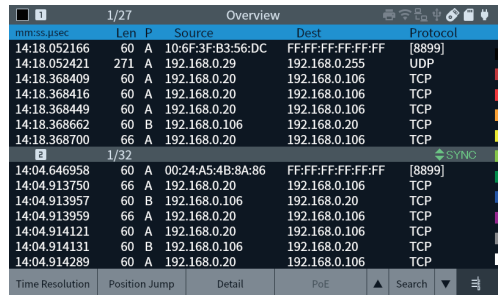
It is able to scroll data by swiping the screen.

Dump display of Ethernet frame.

Scroll frames by [▲] [▼] keys.

- Split Display

Display saved data of BUF1 and BUF2 at the same time. It is useful to compare two data for finding problems by press [SHIFT]+ “Split Display”. To scroll two data synchronously, enable “SYNC”



- Position Jump

Touch “Position Jump” to display specified frame number.

- Mark & Jump

Mark and name the frame where the cursor is pointing by [SHIFT]+[1]-[9].

Marked frames are named as M1 to M9.

To rename the frame, use different number.

To delete the marking, type the same number again.

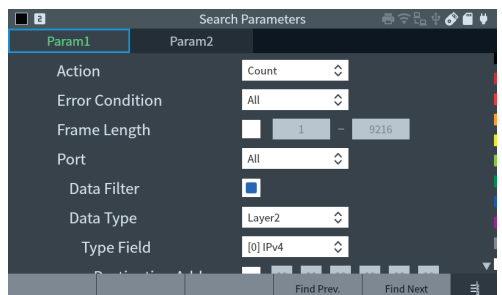
To display (jump) the marked frame, touch [1]-[9].

Press [0] to display previous frames

- Search

Touch “Search” to find the specific errors and frames which matched with the specified conditions.

Display matched data or count the number of frames.

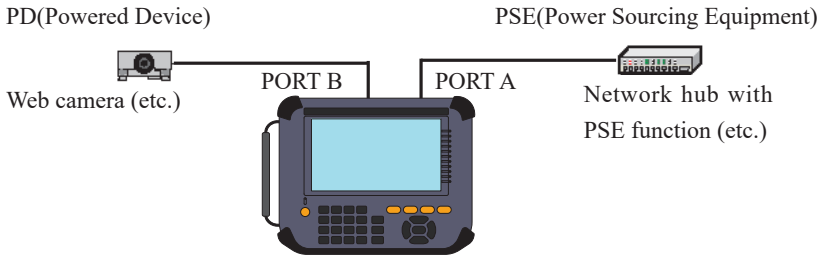


■ PoE Measurement Function

Touch “Mode” at the top menu, and select “PoE”

□ Connection

Connect PSE (Power Sourcing Equipment) into the port A and PD (Powered Device) into the port B.



ⓘ Cannot measure the PoE line where more than 720mA of current flows for about 3 seconds continuously.

□ PoE Setup

Tap “PoE Opt.”. Set the specification of PoE and recording cycle.

□ Start and End measuring

Press [RUN] to start selected function, and [STOP] to end measuring.

□ Result

PoE display, dump display and graph are changeable.

While PoE and on-line monitor are measuring at the same time, touch “Online” to go back to LAN frame display.

• PoE Overview display

Display the results of measurement and judgement (OK/NG). If the result is within the range of PoE setting, “OK” is displayed. The result of judgement is displayed only when the voltage exceeds 29V.



• PoE dump Display window

Display the list of results.

Display the list of results. Scroll the display by [▲][▼]keys or swipe the screen.

TimeStamp	TypeA	Power	Voltage	Current	TypeB	Power	Voltage	Current
00,000,002.180	1.8	47.3	39	0.0	0.0	0.0	0	0
00,000,002.190	1.7	47.3	37	0.0	0.0	0.0	0	0
00,000,002.200	1.7	47.3	37	0.0	0.0	0.0	0	0
00,000,002.210	1.7	47.3	37	0.0	0.0	0.0	0	0
00,000,002.220	1.6	47.3	35	0.0	0.0	0.0	0	0
00,000,002.230	1.6	47.3	35	0.0	0.0	0.0	0	0
00,000,002.240	1.6	47.3	35	0.0	0.0	0.0	0	0
00,000,002.250	1.6	47.3	34	0.0	0.0	0.0	0	0
00,000,002.260	1.6	47.3	33	0.0	0.0	0.0	0	0
00,000,002.270	1.6	47.3	33	0.0	0.0	0.0	0	0
00,000,002.280	1.6	47.3	33	0.0	0.0	0.0	0	0
00,000,002.290	1.5	47.3	32	0.0	0.0	0.0	0	0
00,000,002.300	1.5	47.3	31	0.0	0.0	0.0	0	0
00,000,002.310	1.5	47.3	31	0.0	0.0	0.0	0	0
00,000,002.320	1.5	47.3	31	0.0	0.0	0.0	0	0

Timestamp Position Jump Online Graph

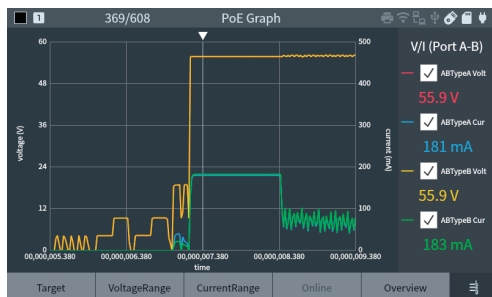
- PoE graph display

Mark on the box on the right side of the screen. Selected data is displayed in graph.

Touch “Target” to change the target data.

Scroll data by [◀][▶] keys or swipe the screen.

Press [SHIFT]+[◀][▶] to scroll faster.



■ Delay function

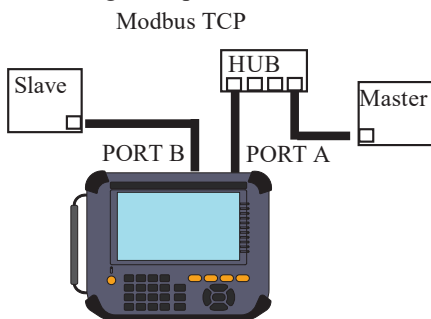
Touch “Mode” at top menu and select “Delay”

☐ Connection

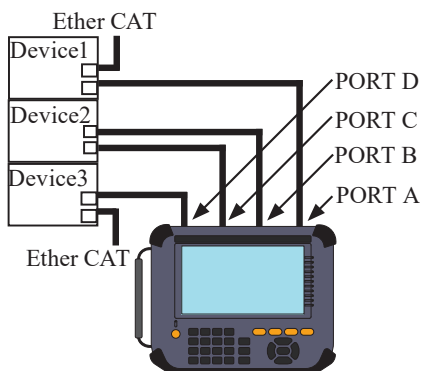
Tap “Delay Opt.” from the “Delay” function and select the ports to measure the time gap.

It measures the time gap between the ports specified by “Begin factor” and “End factor”.

< Setting example1 >



< Setting example2 >



☐ Delay setting

“Delay Opt.” and set the details of delay time measurement.

☐ Start and Stop Measurement

Press [RUN] to display the delay time in real time and [STOP] to end measuring.

Delay Page		
Delay	Count	211
	Last	1.512 μ S
	Maximum	1.528 μ S
	Minimum	1.472 μ S
	Average	1.506 μ S

■ Statistic Function

Touch “Mode” at top menu and select “Trend”.

☐ Connection

Connect the target network to the port A/B/C/D of analyzer.

Refer to the manual of “Connection” for On-line monitor function

→ 「Online Monitor Function」 (P8)

☐ Statistic setting

Tap “Trend Opt.” Set the target signal line, counter, and measurement cycle.

☐ Start and Stop Measurement

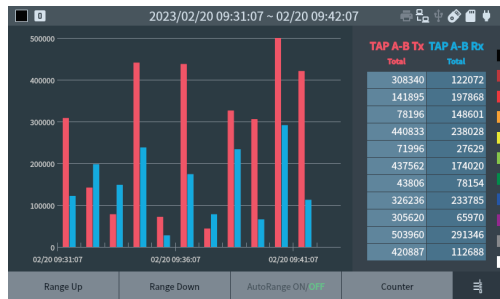
Press [RUN] to start measuring and [STOP] to end measuring.

☐ Result

Display the results in bar graph or counts the numbers.

▪ Bar graph

Display the results in bar graph.
Each bar is made when it passes the specified time range.



▪ Counter display

Display the total number of items for each port.

“Data Ratev” item displays the data rate.

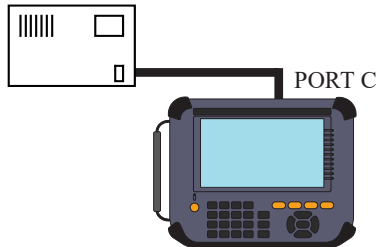
	TAP A-B Tx	TAP A-B Rx	TAP C-D Tx	TAP C-D Rx
120-255byte				
256-511byte	0	0	0	0
512-1023byte	0	0	0	0
1024-1518byte	325277	0	152530	0
1519byte-Over	0	0	0	0
CRC Error	0	0	0	0
Fragment Error	0	0	0	0
Data Rate(1sec.)	977.305 Mbps	0.00000 Kbps	552.375 Mbps	0.00000 Kbps
Data Rate(Avg.)	614.997 Mbps	0.00000 Kbps	277.739 Mbps	0.00000 Kbps

■ Packet Generator Function

Touch “Mode” at top menu and select “PG”

□ Connection

Connect the target device and analyzer using the LAN cable.



□ PG setting

Tap “ PG Opt.” and set the transmission packets and conditions.

□ Edit send packets

Touch “ Edit send table” from PG setting. Select enable/disable of 16 send tables. Touch selected table or press [ENTER] to edit the contents of the table.

The screenshot shows the 'Packet Generate(PG)' screen with the 'Send Table Summary' tab selected. It displays a table with 16 rows (No. 0 to 15) and columns for 'Select', 'Length', 'Pattern', and 'FrameGap'. The 'Length' column shows values like 54, 0, 0, etc. The 'FrameGap' column shows values like 128, 128, 128, etc. The bottom status bar shows 'ON/OFF' and 'ENTER : Edit'.

No.	Select	Length	Pattern	FrameGap
0	☒	54	12 34 56 78 9A BC FE DC	128
1	☐	0		128
2	☐	0		128
3	☐	0		128
4	☐	0		128
5	☐	0		128
6	☐	0		128
7	☐	0		128
8	☐	0		128

▪ Edit table

Input the send packets in HEX. Maximum 32000 bytes of packets for total 16 tables can be input.

Input the packets without FCS.

Set the frame gap as well.

While typing the data, press [ENTER] or touch the screen longer to cut/copy/paste data.

Touch “Protocol” and select protocol type etc.

The screenshot shows the 'Packet Generate(PG)' screen with the 'Data table 0' tab selected. It displays a grid for inputting data in hexadecimal. The 'Pos:' is 0 and 'Remain: 31946 Bytes'. The grid shows data being entered at position 0000. A 'Frame gap' of 128 is indicated on the right. The bottom status bar shows 'Paste' and 'Protocol'.

Pos:	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0000 :	12	34	56	78	9A	BC	FE	DC	BA	98	76	54	08	00	45	00
0010 :	00	0C	00	00	00	00	00	06	BA	ED	00	00	00	00	00	00
0020 :	00	00	00	00	00	00	00	00	00	01	00	00	00	01	00	00
0030 :	00	00	00	19	00	00										
0040 :																
0050 :																
0060 :																
0070 :																
0080 :																
0090 :																

- Edit protocol

Select the protocol type from Ethernet, IPv4, ARP, ICMP, TCP, UDP and set the appropriate header following the specification of each protocol.

Touch “Apply” to apply the setting and return to the data send table.

For more information of each protocol, refer to the specification of each protocol.

- Start and Stop Measurement

Press [RUN]. If the linking toward the selected transmission port is ready, “Transmit C Port” or “Transmit D Port” is displayed. Touch the button or [C]/[D] key to send the enabled transmission tables. When the transmission reaches to the selected times or press [STOP], the measurement stops.

- Test Result

The result of packet transmission is displayed on the screen.

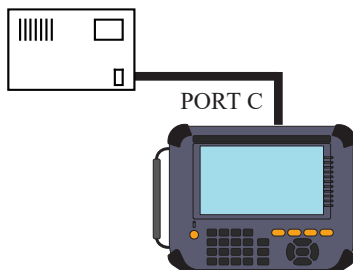
	C Tx	C Rx	D Tx	D Rx
Total	11148	24	0	0
Good		24		0
Broadcast		7		0
Multicast		17		0
Pause		0		0
0-63Byte		0		0
64Byte		6		0
65-127Byte		14		0

- Ping Function

Touch “Mode” at top menu and select “Ping”.

- Connection

Connect the target device and analyzer using the LAN cable.



☐ Ping Setup

Touch “Ping Opt.”. Set the send address and interval.

☐ Start and end measuring

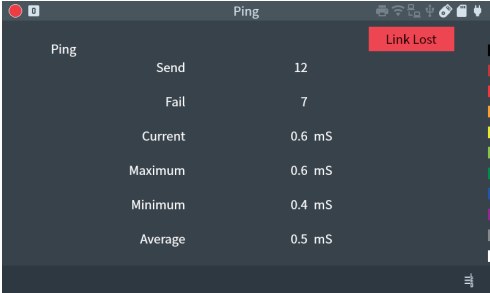
Press [RUN] to start the ping test from selected port.

It ends the test when it reaches to the 30000 times or press [STOP].

☐ Test Result

Display the results on the screen.

If it cannot send the ping command,
it displays the reason on the upper
right on the screen.



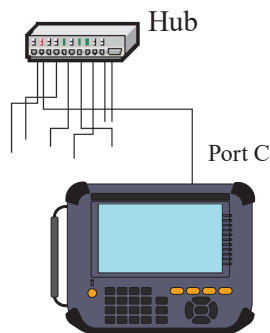
Ping	
Send	12
Fail	7
Current	0.6 mS
Maximum	0.6 mS
Minimum	0.4 mS
Average	0.5 mS

■ Port Blink Function

Tap “Mode” at top menu and select “Blink”

☐ Connection

Plug the LAN cable connected to the HUB into the Port C.



☐ Start and end measuring

Press [RUN] to repeat linking/unlinking from the PORT C to the port of the hub to which PORT C is connected.

The blinking cycle can be changed between 2 and 16 seconds by pressing [▲] [▼].

It will help you finding the connected cable by blinking the link LED of HUB.

■ Cable diagnostic Function

Tap “Mode” at the top menu, and select “Cable”

☐ How to connect

Connect the cable to be measured to PORT C of this device. Do not connect anything to the opposite end of the cable connected to this device.

☐ Setup Cable

Tap “Cable Opt.” Set the NVP value when required.

☐ Start and Stop Measurement

Press [RUN] to start measurement. It measures the condition and the cable length of the target. Press [STOP] to exit.

☐ Measurement results

It displays the diagnostic results and the status of each pair of cables (breaking(snapping), short circuit, split pair).

■ Link status information Function

Tap “Mode” at the top menu, and select “LinkInfo”

☐ How to connect

Connect the measurement target to PORT A, PORT B, PORT C, and PORT D of this device.

☐ Starting and ending measurement

Press [RUN] to start measurement. Displays link information for auto-negotiation of devices connected to each port.

Press [STOP] to exit.

☐ Measurement results

It displays the diagnostic results and the status of each pair of cables (breaking(snapping), short circuit, split pair).

■ BERT Function

Tap “Mode” at the top menu, and select “BERT”

☐ How to connect

Connect the port to be tested of the target device to PORT C and D.

☐ Start and Stop Measurement

Press [RUN] to start measuring.

BERT will start automatically. Any bit errors or CRC errors will be counted.

Press [STOP] to finish the measurement.

☐ Test Result

The result of BERT is displayed on the screen.

■ RFC2544 Function

Tap “Mode” at the top menu, and select “RFC2544”

☐ How to connect

Connect the port to be tested of the target device to PORT C and D.

☐ Start and Stop Measurement

Throughput, latency, frame loss rate, and back-to-back tests can be performed.

Press [RUN] to automatically start each test. Press [STOP] to finish the measurement.

☐ Test Result

Displays the results of each test.

Useful Functions

■ Filter Function

Filter function captures specific frames measured by on-line monitor function.

It is able set 2 filters for port A-B and for port C-D.

Touch “Filter” from on-line monitor function.

Shortcut key [MENU] ,[0]

☐ Mode

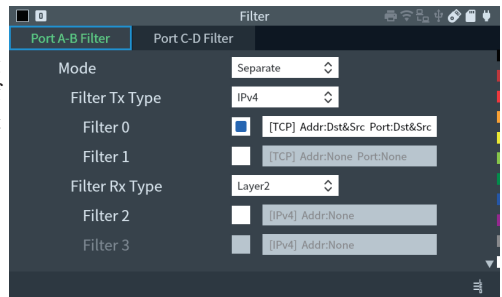
If selecting “Common”, the setting on Tx is applied on Rx as well. If selectin “Separate” it is able to set Tx and Rx separately.

☐ Type

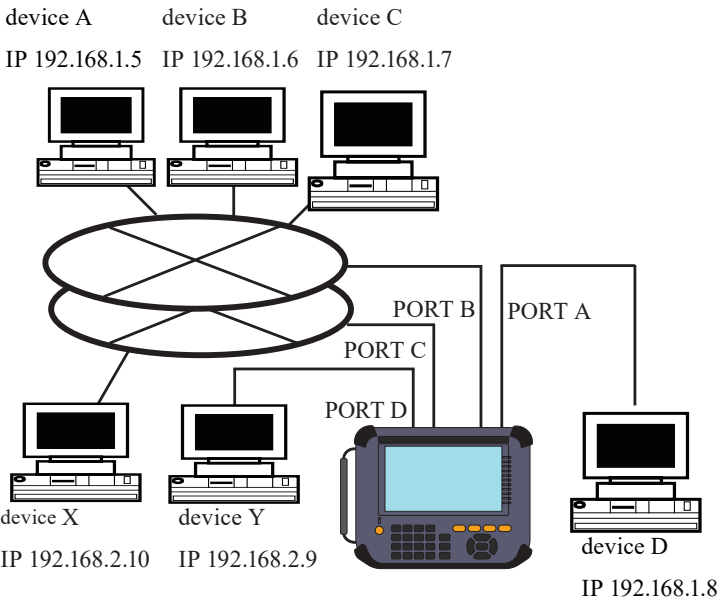
Select from Layer 2 or IPv4.

☐ Filter

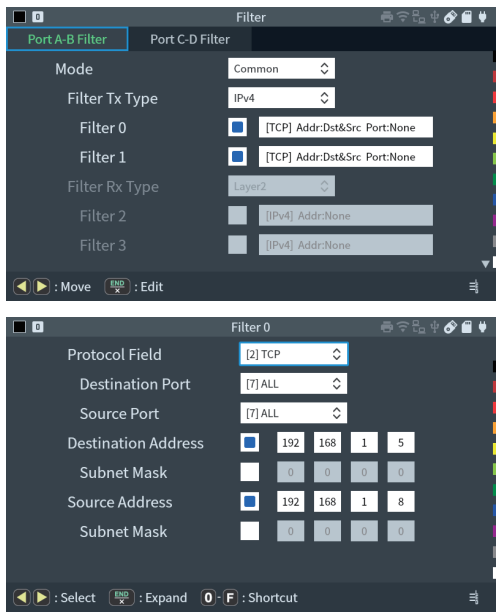
Select valid/invalid of filter function. Select valid and set the details of filter setting.

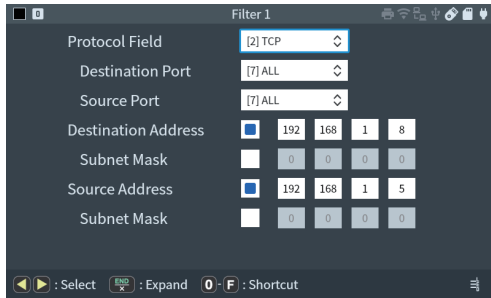


□ Example of filter setting



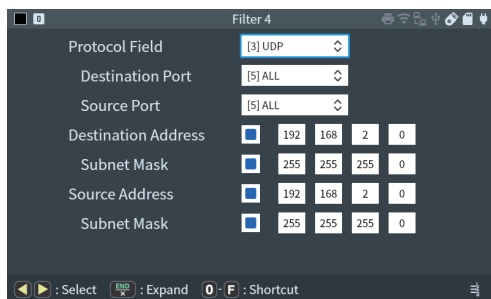
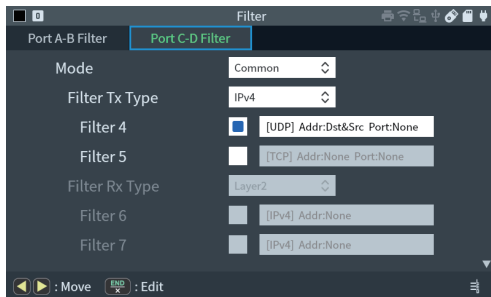
- Monitoring example of TCP/IP frames between Device A and D by filtering.





The filter 0 is configured to monitor TCP frames sent from the device D to device A and the filter 1 is configured to monitor TCP frames sent from the device A to device D. Configures this setting between port A-B.

- An example of the configuration to monitor only the UDP protocol communication between the devices X and Y which belong to the network address “192.168.2”



It is configured by filter 4 to monitor only the frames of UDP protocol which have “192.16.2” for the network address part of both source IP and destination IP.

■ Trigger Setup

Specific conditions or input from external terminal become the trigger factors, and outputs external signal or stops measuring.

Touch “Trigger” from on-line monitor function.

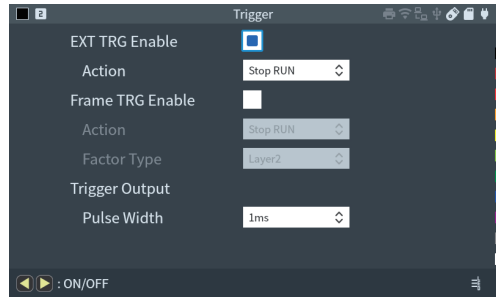
Shortcut key [MENU] ,[2]

□ External signal trigger

Low lever (TTL level) of the terminal signal connected to the external input terminal (IN1) becomes the trigger factor.

□ Frame trigger

When the frame is matched with the specified condition, it stops measuring or counts the matched times.

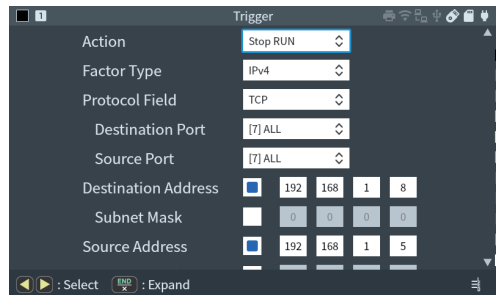


□ Output external signal

When the trigger condition is matched, low lever (TTL level) of pulse is output to the external terminal (OUT1).

□ Example of trigger

When TCP communication is captured from “192.168.1.5” to “192.168.1.8”, it stops measuring.



■ Network Emulation Function

By tapping "Interface" on the top menu screen and switching the unit to network emulation mode in the interface setting screen that is displayed, you can execute the measurement of the online monitor function or statistical analysis function while performing a test that imitates a poor network environment where delays and packet loss occur between ports A and B of the unit.

■ Save and Load of the Data

An SD/SDHC card or USB flash drive can be used as a storage device, and measurement data and setting data can be saved to it.

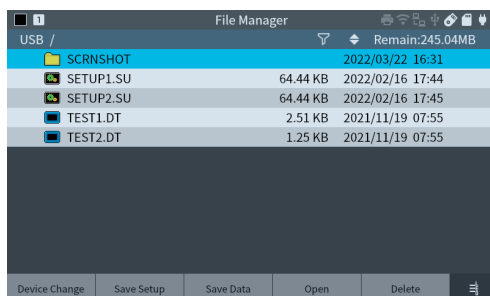
Tap “File Manager” to go to the file management screen.

(If the printer management screen appears, tap “File Manager” again.)

Shortcut key [MENU] ,[A]

Storage device has to be formatted as “FAT32”.

Touch “Device Change” to change the storage device (SD card or USB memory). Press[] to change the order of files, and [] to use the filter function (display only selected file type). Double click the folder to display the contents of files.



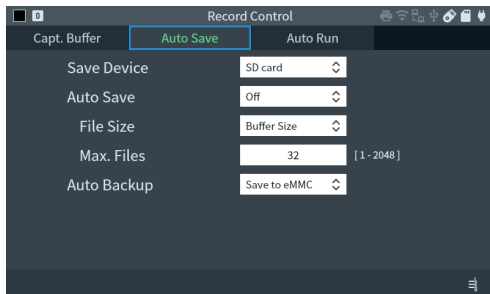
■ File output

Measurement data can be output to txt, csv, or pcapng files.

If you tap [SHIFT]+“Export” on the file management screen,a dialog will appear, so select an output method and output.

■ Auto Save

Auto save function saves measured log files in the SD card or USB memory automatically while it continues measuring. It is useful to find a problem which rarely happens. Touch “Record Control” at top menu and set “Auto Save” settings.



Save Device :

Select the storage device to save data.

Insert the SD card or USB memory into the analyzer.

Auto save :

Restart Continuous ring recording up to the maximum number of files.

Max-stop Saves up to the maximum number of files and stops measurement.

Append Continuous ring recording from the continuation of the existing auto save file.

 The files saved by auto save function will be deleted if selecting other than “Append”.

 Set the inner memory to be the ring buffer.

→ Set “Record Control” at top menu, go to “Capt. Buffer” -> “Write Control”.

File size :

Set the size of the communication log file to be automatically saved.

Max. Files :

Set the maximum number of files to be recorded.

 The communication log file name is # XXXXXXXX.DT (XXXXXXX is a sequential number that increases by 1 from 0000000)

When you start the measurement by [RUN], a confirmation message for overwriting the file will be displayed. Tap [RUN] or “Continue” to start measurement. If you do not want to lose the communication log file and want to save it to another device, press [STOP] and save it to a PC or other device.

If there is not enough power while using the auto save function, it will damage the files or storage device. To use that function, insert the AC adapter to the analyzer and secure the power supply.

■ Auto back-up function

Captured data will be deleted when it turns off the power of analyzer.

As a factory setting, measured data (latest 16M byte of data) will be saved in the inner eMMC automatically.

To save all measured data or to delete all data, change the setting of Auto back-up.

Auto Backup :

Off	No automatic backup.
Save to eMMC	Save about 16 Mbytes of the latest data into internal eMMC.
Save to File	Save all the measurement data to the storage device

■ Printout function

You can print the measurement data or print a hard copy (the screen display image).

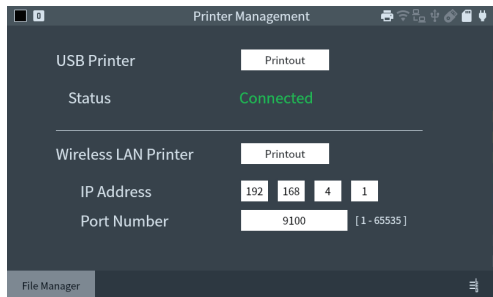
Tap “File Manager” to move to the printer management screen.

(If the file management screen is displayed, tap “Device Change” several times.)

Operate on the printer management screen to print the measurement data.

When you tap the print of the connection method you want to output, a dialog will appear, so specify any number and output.

For hard copy printing, select “USB printer” or “WLAN printer” for “Screen shot save to” on the Display/Power tab, and press [SHIFT]+[ESC] on any screen.



■ Auto Run Function

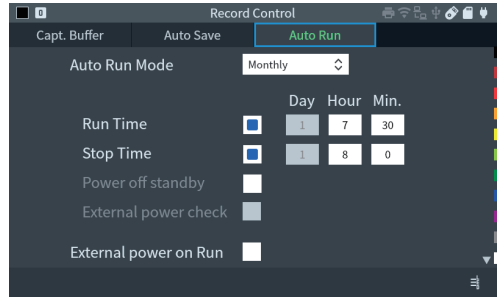
By specifying the date and time for the start and end of measurement, it automatically executes measurement for the specified period.

Touch “Record Control” at top menu and go to “Auto Run”.

Auto Run mode :

Select the repeat condition for automatic measurement.

Touch  to activate the checked item.



Set the automatic measurement period for “Run time” and “Stop time”

With the settings on this screen, measurement starts at 7:30 every day and ends automatically at 8:00.

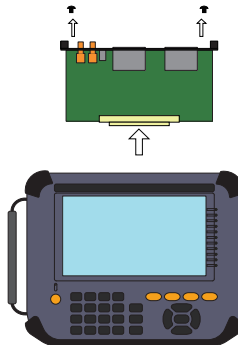
- 📄 If you want to start the measurement in conjunction with the power on of the target line, check “External power on Run”.

Measurable Interface Expansion

By using the option for measurement expansion, you can expand the communication target to be measured.

■ Exchange the board

Remove the standard interface sub board and replace it with the optional interface sub board.



■ Firmware

To use the optional expansion board, install the firmware from attached CD.

When using the optional expansion board at the first time, finish installation and copy the firmware which saved in the external storage.

PC Link Function

Using the attached utility software, you can perform remote operation while displaying the screen of the analyzer, transfer online monitored data to a PC, and convert it to Wireshark format.

Connect the analyzer to a computer via USB, LAN or Wi-Fi (supported models only).

■ Remote control of this analyzer

The key emulation software that performs operations such as key operations and screen taps on a PC.

- Run setup.exe in the lepckeyemu folder to install the software.
- Open the remote settings dialog in its toolbar and specify the LE-8500X series to connect to.

When connecting via USB, specify the serial number printed on the back of the analyzer, and when connecting via LAN or Wi-Fi (supported models only), specify the IP address.

- Start the connection with  in the toolbar.
- To finish it, disconnect with  in the toolbar.

While the analyzer is remotely connected you cannot control the analyzer physically by the buttons or touch panel. Please disconnect the remote connection for the operation.

For details on how to use it, go to “Help” “Contents” in the drop-down menu to display online help.

■ Transfer of online monitored data to a PC

Using the utility software that converts the communication data of the analyzer into a format that can be handled by Wireshark, you can transfer the online monitored data in the memory to a PC.

- Copy lepcapcv.exe in the lepcapcv folder to an appropriate folder on your computer and execute it.
- Specify the connection destination.

When connecting via USB, specify the serial number printed on the back of the analyzer, and when connecting via LAN or Wi-Fi (supported models only), specify the IP address.

- It executes start/stop measurement and import of the data.

For details on how to use the software, see readme.txt in the CD-ROM attached to the product.

 Wireshark must be installed to handle pcap and pcapng format files.

Specifications of Function and Hardware

Item	
Interface	RJ-45 connector. Port A/B/C/D: 10BASE-T/100BASE-TX/1000BASE-T Between port A&B is the fail-safe tap. ^{*1}
Capture memory	Capacity: 1G byte (96 ~ 10,560 byte for 1 frame, 64 byte for 1 PoE data)
On-line Monitor Function	Record LAN frames between port A&B and port C&D simultaneously, and display them.
Frame Size	60byte ~ 9K byte
Capture performance	About 4Gbps ^{*2}
Time stamp	Receiving time is added as time stamp for each received frame. Resolution : 8ns/1us/10us selectable
Data display/operation	2-split comparison display. Able to scroll, search and mark data.
Display	Translatable protocol: IPv4, ARP, ICMP, TCP, UDP, DHCP, Ether CAT, IPv6 , ICMPv6
Filter Function	Monitor only the specific frames that match one or two specified conditions.
Trigger Function	Factor: Receiving specific frame. Changing the status of external TTL signal. Action: Stop monitoring. Count number of matched times. Output external TTL signal.
Search Function	Search and display the specific frames that match the specific conditions, or counts the number of matched data.
Delay time Function	Measure the time difference of receiving specific frames between port A&B or port C&D. Display the results in max/ min/average/current value.
Statistic Function	It takes statistics of two frame counter values at specified intervals (2 to 240 seconds, 1 to 240 minutes) and can display the graph display, all frame counter values, and data rate in real-time.
PoE Measurement Function	Measure PoE/PoE+/PoE++(IEEE802.3af/at/bt) and LAN frame simultaneously. Recording interval: 1ms ~ 1 s, Max. recording time: 16.77 million times, Voltage : 0 ~ 60V (accuracy: $\pm 1\%$ F.S.), Current : 0 ~ ± 900 mA (accuracy: $\pm 1\%$ F.S.) ^{*3}
PG Function	Transmit arbitrary packets at the wire rate from port C or D. Up to 16 data tables (total 32K data) can be transmitted sequentially from each port.
Ping Function	Transmit a PING command from port C and display the number of responses and response time (max/ min/average/ current value).
Port Blink Function	Blink the link LED of the Hub to find the LAN cable connected to the port C.
Cable diagnostic function	Measures the cable length (3 to 100m), breaking/short circuit, split pair detection. ^{*7} Method of calculation of length: TDR Margin of error: ± 2 m ^{*8} NVP value configurable
Link status information Function	Auto-negotiation information connected to PORT A, B, C, D can be displayed and link information can be confirmed.
Network Emulation Function	Records frames flowing between ports A and B while inserting delays and packet loss, monitoring and display it in real time, displays statistical analysis. Fixed delay: 1ms to 10 seconds. Random delay: 1ms to 4 seconds. Packet loss: 1ppm to 100%. Bandwidth limit: 1kbps to 100Mbps. Maximum throughput: approx. 500Mbps (at minimum delay).

BERT Function	Bit Error Rate Test allows you to analyze whether bit errors are occurring
RFC2544 Function	Processing capacity can be analyzed using RFC2544-compliant throughput tests, latency tests, frame loss rate tests, and back-to-back tests
Auto save Function	Monitored data is automatically saved as a log file in the USB memory/SDHC while it keeps monitoring. ^{*4}
Useful Function	Auto back-up function. Auto RUN/STOP function. Power on run function. Ptingout function. Measured data can be converted and saved as pcapng/csv/txt format file.
LCD display	7 inch TFT color display (480x272dot) with capacitive touch panel
Line Status LED	11 LEDs. Indicate the linking status of port A, B, C, D. Indicate the speed (100BASE/TX, 1000BASE-T) and full-duplex for port A&B and C&D.
LAN Port	RJ45 connector for PC connection. 1000BASE-T Ethernet: IEEE 802.3
USB device port	Type-C connector for PC connection. Super Speed supported.
USB host port	Standard A connector for USB memory. Super Speed supported.
SD card slot	For standard size of SD/SDHC memory card. Compliant with SD association standard.
External I/O terminal	4-pin for trigger function
GPS Antenna Connector	SMA(female) connector
PPS Signal Connector	SMA(female) connector
Wi-Fi interface ^{*5}	IEEE802.11b/g/n. Frequency range: 2412MHz ~ 2484 MHz • Transmission power 802.11b: +18.5dBm 802.11g: +18.0dBm 802.11n: +17.0dBm
Power	Attached AC adapter. Lithium-ion rechargeable battery (model : P-26LW2) Battery drive time: 2 hours ^{*6}
Temperature	In operation : 0 ~ 40°C In storage : -20 ~ 50°C
Humidity	20 ~ 85%RH (no condensation)
Standard	CE (class A)
Dimensions (W×D×H) , Weight	234(W)×186(D)×44(H) mm, Approx. 990g

* 1 When the power of analyzer is turned off, port A&B are through connected.

* 2 Except for some specific situations, 1000BASE-T high-traffic lines of two channels can be recorded in the capture memory simultaneously without packet loss.

* 3 Cannot be used to measure PoE line where the current exceeding 720mA flows continuously for 3 seconds.

* 4 All frames may not be recorded in the storage because of the high traffic line or low performance of the external storage.

* 5 For LE-8500XR only. For PC connection.

* 6 According to our test conditions assuming a normal usage situation.

* 7 Due to the open measurement method, cable maps (wire connection information) cannot be displayed.

* 8 It does not include uncertainty of NVP value. The NVP value must be set appropriately depending on the cable.

Memo

For any technical issues

Read "FAQ" in our website or email us.

<https://www.lineeye.com/html/contactus.html>

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