AE5511

TrafficTesterPro

User's Manual

AS-84711-1EY

Yokogawa Electric Corporation

AS-84711-1EY Rev. 2.0

Thank you for purchasing this product by Yokogawa Electric Corp.

Warranty

Prior to shipment, all Yokogawa products must pass strict testing based on the Yokogawa Quality Assurance System. However, should any damage occur during manufacturing or shipping, please contact the sales office at our headquarters or your nearest Yokogawa representative.

Should this product experience any malfunction during the warranty period (within one year from the day of delivery) Yokogawa shall provide servicing free of charge. However, Yokogawa shall not be required to provide servicing free of charge for malfunction or damage resulting from user error, rework or modifications performed by the user, or natural disasters, even during the warranty period. Also, the customer may only use GBIC or XENPAK modules that were purchased by the customer from Yokogawa. Servicing and repair of this product are only available inside Japan.

Foreword

This manual explains the operating procedures of the AE5511 TrafficTesterPro (hereinafter, *the instrument*), and consists of five chapters. Chapter 1 provides an overview of the product, chapter 2 explains preparations that should be made prior to using the instrument, chapter 3 gives the main parts of the instrument and introduces its basic operation, chapter 4 provides a detailed explanation of functions, and chapter 5 discusses maintenance.

Revision 1.1: March, 2005

Safety Terms and Reference Pages

The following explains the meanings and uses of safety terms appearing in this manual.

1. DANGER, WARNING, CAUTION, NOTE, Footnote
   (1) Order of Importance
   In item (2), the safety terms are listed in order of importance (DANGER, WARNING, CAUTION, NOTE, Footnote).
   (2) Meanings

DANGER:	Emphasizes critical information concerning actions or situations that can result in death.
WARNING:	Indicates actions or situations that can result in bodily injury.
CAUTION:	Indicates actions or situations that can result in damage to or shutdown of instruments.
NOTE:	Supplementary information regarding exceptions, repair issues, and limitations that does not fall into the categories of DANGER, WARNING, CAUTION, or Footnotes.
Footnote:	Terminology, informal symbols and other supplementary information. Footnotes are always included at the bottom of the page on which the footnotes are designated (using an asterisk (*) or superscript number).

2. Reference Pages
   Pages that can be referred to for additional information are indicated in the text as necessary.

- Windows, Internet Explorer, HyperTerminal, and Macintosh are registered trademarks of Microsoft Corporation.
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Safe and Correct Use of the Instrument

Symbols

A variety of safety symbols appear in this manual to help the user operate the instrument safely and correctly, and to prevent damage or injury to the user or other personnel or property. The following describes the meanings of these symbols. Please make sure you understand these symbols before reading the rest of the manual.

DANGER	Indicates information that must be correctly adhered to in order to prevent severe injury or death.
WARNING	Indicates information that must be correctly adhered to in order to prevent the possibility of severe injury or death.
Caution	Indicates information that must be correctly adhered to in order to prevent the possibility of injury to personnel or damage to instruments.

Indicates information that must be correctly adhered to in order to prevent either the possibility of injury to personnel only, or damage to instruments only.

Indicates that the earth wire must be connected for safety.

Indicates a specific prohibited item in a figure, or, when not specified, a general statement of prohibition.

Indicates actions or situations that can result in fire.

Indicates actions or situations in which fingers can become injured, such as actions related to the use of doors or slots.

Indicates situations in which, under certain conditions, the presence of spark or flame around the instrument can cause it to catch fire.

Indicates situations in which, under certain conditions, electric shock can occur.

Indicates an action by a general user.

Indicates situations in which, under certain conditions, explosions can occur.

Indicates that disassembly of the instrument by the user is prohibited due to the possibility of injury resulting from electric shock.

Indicates that during malfunction, or when the possibility of a lightning strike exists, the user should remove the power plug from the power outlet.

Indicates that users are prohibited from touching specific locations on the instrument due to the possibility that, under certain conditions, injury resulting from electric shock can occur.

Indicates that the user is prohibited from using non-waterproof instruments near water due to the possibility of injury resulting from electric shorting.

Indicates situations in which, under certain conditions, injury can occur as a result of high temperatures.

Safety Precautions

To ensure proper and safe operation of the instrument, please read and understand the operating procedures and safety information provided in this manual prior to beginning operation. Before using the instrument, make sure you read and understand the contents of this user's manual, especially these safety precautions, and that you are able to correctly operate the instrument. After reading this manual, please keep it in a convenient location for reference in case questions arise during the use of the instrument.

1. Restrictions on Location of Use

Do not allow water or condensation to contact the instrument.
-> Fire, electric shock, or malfunction can result.

2. Restrictions on Conditions of Use

Do not use with power supply voltages other than those indicated by this manual.
-> Fire, electric shock, or malfunction can result.

When connecting the instrument to commercial power, connect directly to a dedicated power outlet.

Do not use extension cords as they can overheat and cause fire.

When using the included 3-prong to 2-prong adapter, make sure the polarity of the adapter matches that of the outlet when plugging it in. Failure to do so can result in emission of heat or fire.

3. Installation

3.1 General Installation Notes

Do not plug too many cords into a single power supply outlet.
-> Heating of the cables or fire can result.

Insert the power plug securely into the power outlet.
-> If metal or other objects are allowed to contact the plug, fire or electric shock can result.

Never connect the earth wire to a gas pipe.

3.2 Installation Conditions and Restrictions

Do not place the instrument in areas with high humidity or large amounts of dust.
-> Electric shock or malfunction can result.

Do not place the instrument on unstable or inclined surfaces.
-> Physical damage can result if the instrument tips over or falls to the ground.

Do not place the instrument in areas with frequent vibration or physical shock.
-> Physical damage can result if the instrument tips over or falls to the ground.

Do not insert or drop any metal objects into any openings on the instrument, or inside the instrument.
-> Fire, electric shock, or malfunction can result.

Do not bring the power cord near any hot objects.
-> The coating on the cord can melt, causing fire or electric shock.

When unplugging the power cord always pull by the plug, never pull by the cord itself.
-> Pulling the power cord can cause damage leading to fire or electric shock.

Never plug in or unplug the power cord with wet hands.
-> Electric shock can result.

Never use a power supply of a rating other than the one indicated for use in this manual.
-> Fire or electric shock can result.

Do not place the instrument in direct sunlight or areas of high temperatures.
-> The internal temperature of the instrument can rise, causing fire.

When connecting or disconnecting the earth wire, first remove the power plug from the AC outlet.
-> If the power cord is connected to the AC outlet when connecting or disconnecting the earth wire, electric shock can result.

3.3 Actions Prohibited during Installation

Always unplug the power cord from the outlet, and check that all externally connected wires and cables are removed before moving the instrument.
-> Otherwise, the cords can become damaged, causing fire or electric shock.

Do not impair, damage, or attempt to modify the power cord.
-> Heating, pulling, or placing heavy objects on the power cord can cause damage leading to fire or electric shock.

4. Preparing for Use

Please read the user's manual thoroughly.

5. Operation

Only operate the instrument according to the procedures described in this user's manual.

If "Caution," "Warning," or "Danger" is indicated in the user's manual, follow the corresponding instructions.

Do not apply physical shock to the instrument, such as when moving it.
-> The instrument includes precision components that can become damaged as a result of physical shocks.

Always use a AC100 V, 50/60 Hz power supply with this instrument.
-> Using the wrong power supply can cause fire or malfunction.

To prevent injury to personnel due to electric shock, damage to internal components due to abnormal voltages, and trouble due to earth currents, always use the 3-prong power supply cord provided with the instrument. If a 3-prong power outlet is unavailable, use the 3-prong to 2-prong adapter included with the instrument.
Always connect the earth wire extending from the adapter.

Never place containers holding liquids or metallic objects on top of the instrument.
-> If water or metal objects spill onto or enter the instrument, fire, electric shock, or malfunction can result.

If the possibility of a lightning strike exists, remove the power plug and any cables attached to the measuring or remote ports.

Never attempt any modification of the power cord, and never bend, twist, or pull it forcefully.
-> Fire or electric shock can result.

Never disassemble or rework the instrument.
-> Fire, electric shock, or malfunction can result.

For safety, always unplug the power cord from the outlet during periods of extended non-use.

Take care not to pinch your fingers when exchanging option modules.

6. Maintenance and Inspection

Periodic maintenance and inspection of the instrument is recommended. If dust particles are allowed to accumulate inside the instrument for long periods of time, fire or malfunction can result. For further information, please see the end of this user's manual, or contact your nearest Yokogawa representative.

7. Corrective Actions When Problems Occur

If the power cord becomes damaged, please have it replaced.
-> Otherwise fire or electric shock can result.

If a foreign object happens to enter the instrument, turn OFF the power switch, remove the power plug from the outlet, and contact your nearest Yokogawa representative.
-> Otherwise fire, electric shock, or malfunction can result.

If you detect any abnormal conditions such as smoke or unusual odors coming from the instrument, this may indicate the possibility of fire, electric shock, or malfunction. Immediately turn OFF the power switch and remove the power plug from the outlet, confirm that the abnormality ceases, and have the instrument repaired by a certified Yokogawa technician. Do not attempt to repair the instrument yourself, as doing so can be very dangerous.

If you accidentally drop or damage the instrument, turn OFF the power switch, remove the power plug from the outlet, and contact your nearest Yokogawa representative.
-> Otherwise fire, electric shock, or malfunction can result.

If the instrument experiences an abnormality, do not attempt to repair the instrument yourself.
-> Electric shock or damage can result. Also, any repairs conducted without authorized consent will not be covered by the product warranty.

Table of Contents

Chapter 1 Overview

This chapter presents an overview of the instrument's features, specifications, and configuration.

1.1 Product Overview

TrafficTesterPro is an Ethernet traffic tester with support for multiple ports. The instrument provides solutions for network equipment with Ethernet functionality (media converters, LAN switches, routers, transmission devices, and so forth), and can be used during development, for performance evaluation during manufacturing, and for effective throughput measurement during network performance testing when building IP networks, and offers latency, and bit error testing functions. TrafficTesterPro requires no special software, and can be easily operated remotely from a Web browser.

The user's manuals available for this instrument are as follows:
Operation and Settings: AS-84711_R4.0.pdf
Automatic Measurement Functions: AS-84711_R3.0 (Auto Test Supplement).pdf

Also, please refer to the respective user's manuals for each interface unit (hereinafter, *unit*).

1.1.1 Product Features

The following is a list of the product's features.

(1) TrafficTesterPro is availalbe with three units, each supporting multiple ports.
16-Port 10/100BASE-T Unit
4-Port 1000BASE-X Unit (GBIC)
2-Port 1000BASE-X Unit (XENPAK)
(2) 1000BASE-SX and 1000BASE-LX are supported by the GBIC module
(3) 10GBASE-LR、10GBASE-ER is supported with the XENPAK module.
(4) Supports network equipment evaluation and testing functions
Generates full-wire rate traffic
Throughput measurement
BERT (bit error rate testing) functions
Measures frame delay and frame gap
(5) Can be controlled from a Web browser
(6) Measured results can be saved to .csv or .html files.
(7) Automatic measurement functions via remote control (telnet).
(8) Capture function (10GBASE-X Unit only)

WARNING

- This instrument has functions allowing it to transmit frames at high loads from its measurement ports. Incorrect operation can result in breakdown or deterioration of network media or related devices.
- Sufficient care must be taken when performing tests while connected to networks. Yokogawa does not assume any responsibility for damages resulting from incorrect operation.

1.1.2 Application Example

Multiple units of TrafficTesterPro can be controlled from a single PC via LAN, allowing performance evaluation of multi-port LAN equipment.

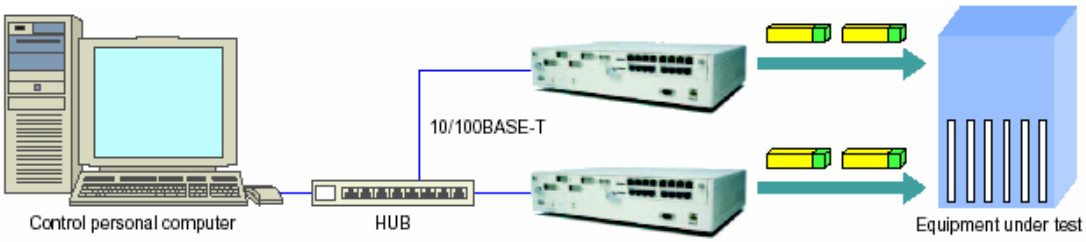
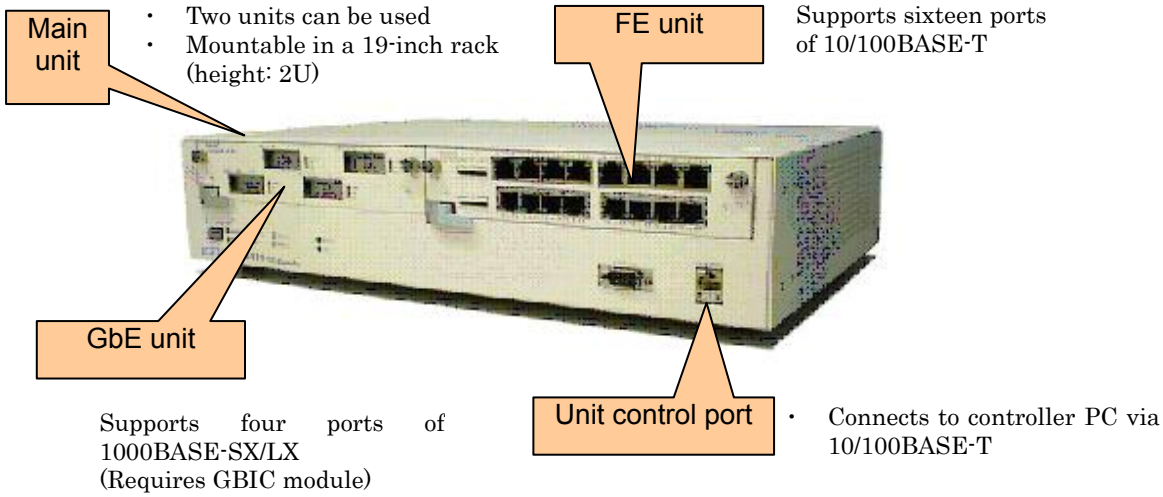


Figure 1.1-1 Application example

1.1.3 Overview of Parts

The following is a description of only the major sections of the instrument. For a more detailed description of each part of the instrument, see chapter 3.

AE5520 10/100BASE-T and AE5521 1000BASE-X Unit



AE5522 10GBASE-X Unit

- Supports two ports of 10GBASE-X (Requires XENPAK module)

Figure 1.1-2 Overview of parts

1.1.4 Network Environment

The instruments can be connected to the controller PC via LAN, allowing remote control and displaying of measured results using a Web browser. A single PC can control multiple AEs (from multiple windows).

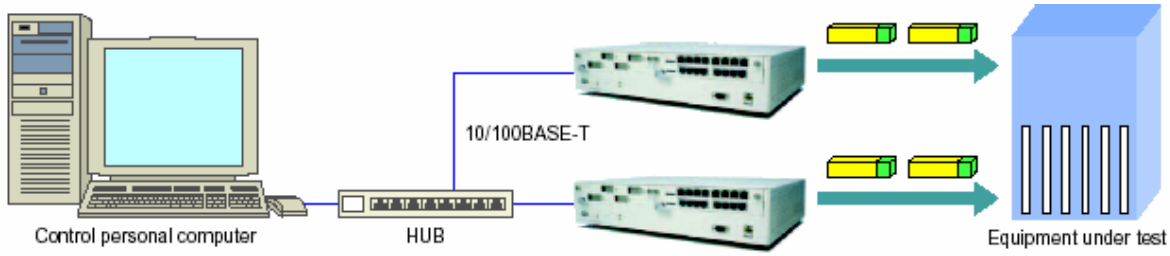


Figure 1.1-3 Network environment

1.1.5 Main Functions

The instrument is equipped to perform the following primary functions.

1. Full-wire rate traffic generation on all ports and statistical display
2. Bit error testing using quasi-random signal patterns
3. Measurement of latency within network instruments and network delay

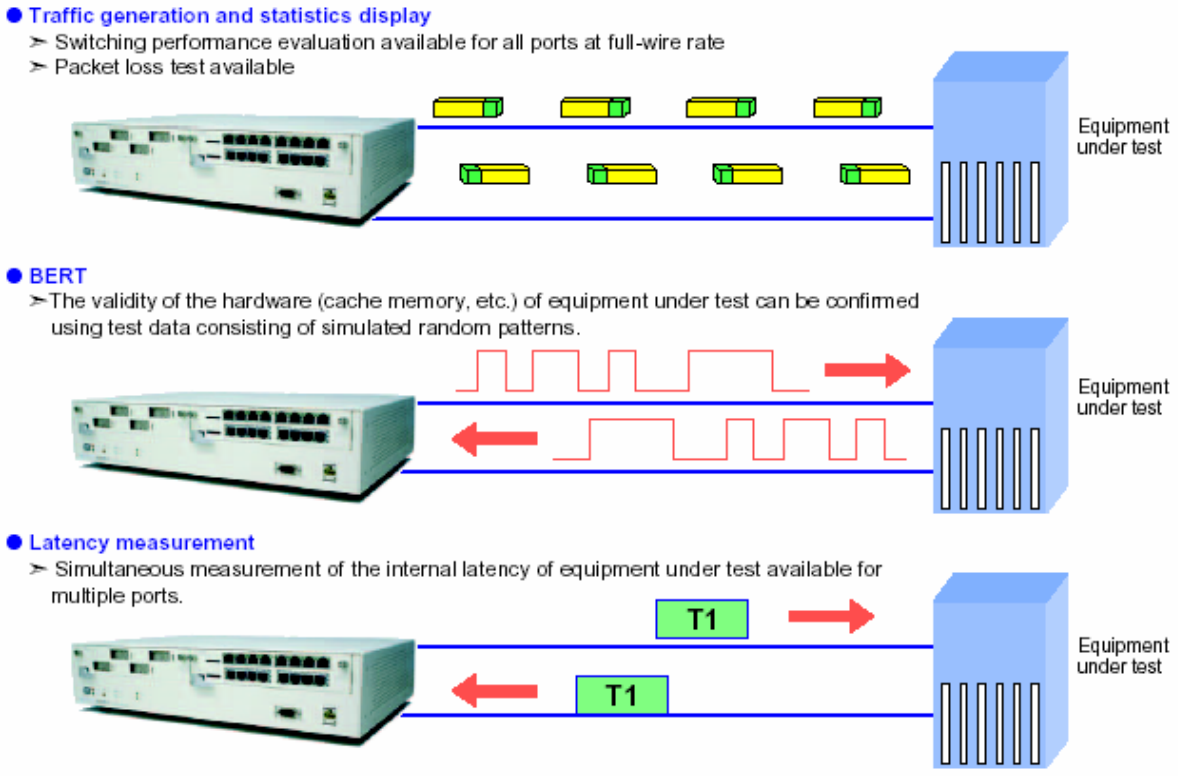


Figure 1.1-4 Main functions (1)

4. Automatic measurement using remote commands transmitted via telnet.
   For details, see the manual, “Auto Testing Supplement.”

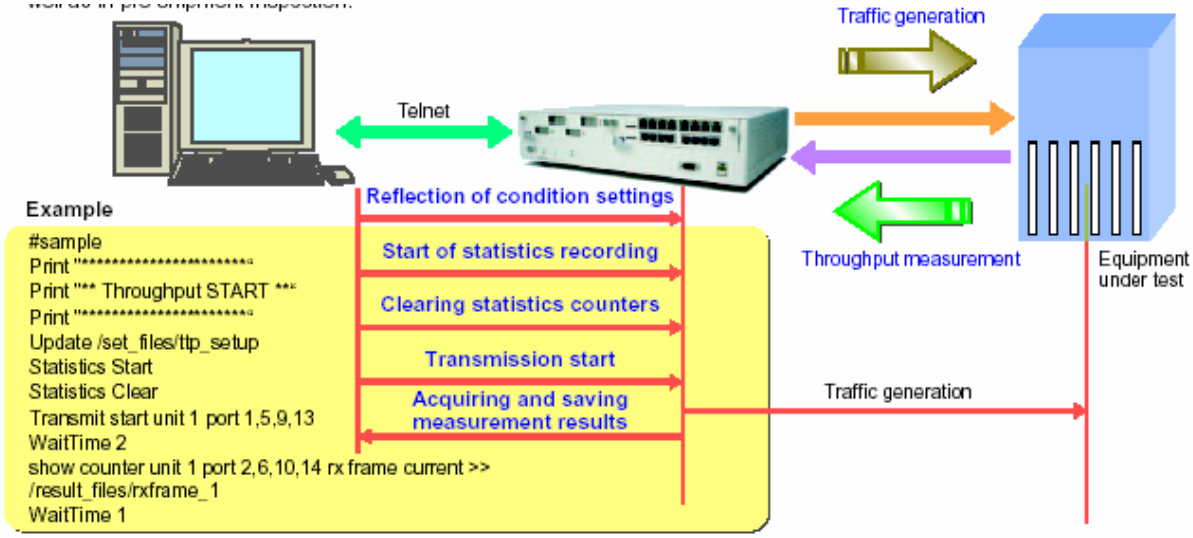


Figure 1.1-5 Main functions (2)

1.2 Specifications

This section provides an explanation of the device and functional specifications of the AE5511 TrafficTesterPro.

1.2.1 Device Specifications

The device specifications of the instrument are shown in table 1.2.1.

Table 1.2.1 Device specifications

Item	Sub-Item	Description
Ext. I/F	CONTROL port	RJ45 port for 10BASE-T/100BASE-TX
	CONSOLE port	RS232C port (DSUB 9 x 1)
Display LEDs	POWER	Power ON/OFF display
	STANDBY	Power standby status display
	HDD	Hard disk drive access status display
	REMOTE	CONTROL/CONSOLE connection status display
	STATUS	Instrument operational status display
	STATUS 1	Unit 1 status display
	STATUS 2	Unit 2 status display
	LINK	CONTROL port link status display
Switches	MAIN POWER (main power switch)	Rocker switch (rear panel) POWER ON: Power standby POWER OFF: Power OFF
	POWER (power switch)	Press button switch (front panel) Turns the power ON when the MAIN POWER is ON.
Power supply	Voltage	AC90–264V
	Frequency	48–63Hz
	Power consumption	200 VA or less
Dimensions and weight	Dimensions	H88 × W435 × D300 (mm) 2U, mountable in a 19-inch rack
	Weight	Approximately 7 kg (main unit only)
Operating environment	Temperature	5°C–40°C
	Humidity	35%–85%

1.2.2 Functional Specifications

The following are the specifications of the measurement functions of the AE5511 TrafficTesterPro.

1.2.2.1 Traffic Mode Functions

In Traffic mode, frame data for transmission and traffic models can be arbitrarily specified. The following table shows the detailed specifications of Traffic mode.

Table 1.2.2 Device specifications of Traffic mode

Function			Description		
			10/100BASE-T	1000BASE-X	10GBASE-X
Transmit	Mode	Constant rate	Can be specified in the range 48BT–1s[1]	Can be specified in the range 32BT–1s[1]	Can be specified in the range 72BT–1s[1]
		Setting resolution	10M: Units of 400 ns 100M: Units of 40 ns	Units of 32 ns	Units of 0.8 ns
		Burst IFG	Same as constant rate.		
		No. of bursts:	Can be specified in the range 1–65,535		
		Interval	Can be specified in the range 1µs–1 s, setting resolution: Units of 1 µs		
		Transmission mode	Continuous, single (no. of frames can be specified in the range 1–4,294,967,295) Time specification (can be specified in the range 1–1440 min.)		
	Transmitted data (fixed)	Defined no. of frames	128 frames/port: Frame length of 9,999 bytes or less * Single frame will be reserved for insert frame.		
		Frame length	18–9,999Byte	18–9,999Byte	48–9,999Byte
		Defined fields	Ipv4/IPv4 multicast, IPv6, IPX, TCP, UDP, ICMP, ICMPv6, IGMP, ARP, PAUSE, IEEE802.3 format, MAC address, VLAN tag, MPLS, EoMPLS headers		
		MAC address increment function	DA address and SA address increment can be set.		
		FSC error function	FCS error can be set in units of frames		
		Insert frame function	Insert frame can be transmitted (click the **Insert** button in the Statistics screen)		
	Transmitted data (variable)	Defined no. of frames	Single frame per port		
		Frame length	18–9,999 bytes	18–9,999 bytes	48–9,999 bytes
		Variable fields	MAC[DA/SA], VLAN tag [VLAN ID/Priority], MPLS shim header, EoMPLS shim header [label value/EXP], IPv4 [DA/SA/Tos(Diffserv)], IPv6 [DA/SA/traffic class(Diffserv)/flow label], TCP [dest. port no./source port no.], UDP [dest. port no./source port no.], payload		
		Frame length	64–9,999 bytes (increment, decrement, random)		
Receive	Filter		Two 6-byte filter patterns can be set		
			Offset can be specified (0–5 bytes)		
	Statistics	Statistical items	See tables 4.5.47 and 4.5.8 (see table 4.5.48 for the error hierarchy)		
		Interval	Fixed at 1 second		
		Display (record) format	Displays both current value (in 1 s intervals) and accumulated values		
		Record	When statistics are stopped, final accumulated results can be saved. (in HTML or CSV format)		
Layer 1 control	Auto negotiation		ON (advertisement specification enabled)/OFF	-	
	Flow control		Manually set: ON/OFF		

	MDI/MDI-X	MDI (straight), MDI-X (cross), auto cross	-	-
Protocol emulation		ARP reply		
		PING reply		
Auto acquire MAC address		Sends an ARP request frame to the target IP address, then after automatically resolving the MAC address of the unit under test, embeds the acquired MAC address in the destination address of the frame to be transmitted and transmits the frame.		
LFS (link fault signaling) function		-	-	Transmit and receive LF (local fault) and RF (remote fault)

1. IFG can be given units of ns, µs, %, bit, frame/s, or bps.

1.2.2.2 Latency Mode Functions

In Latency mode, time-stamped frames are transmitted and received in order to measure the delay. In this mode, two ports must be specified. The following table shows the detailed specifications of Latency mode.

Table 1.2.3 Detailed specifications of Latency mode

Function			Description		
			10/100BASE-T	1000BASE-X	10GBASE-X
Transmit	Transmission mode	Constant rate	Can be specified in the range 48BT–1s[1]	Can be specified in the range 32BT–1s[1]	Can be specified in the range 72BT–1s[1]
		Setting resolution	10M: Units of 400 ns 100M: Units of 40 ns	Units of 32 ns	Units of 0.8 ns
		Transmission mode	Continuous, single (no. of frames to transmit can be specified in the range from 1–4,294,967,295), time (can be specified in the range from 1–1440 minutes)		
	Transmitted data	Defined no. of frames	Single frame per port		
		Frame length	64 bytes–9,999 bytes		
		Defined fields	IPv4, IPv4 multicast, IPv6, IPX, TCP/UDP, ICMP, ICMPv6, IGMP IEEE802.3 format MAC address VLAN tags MPLS/EoMPLS headers		
		FCS error function	FCS error can be specified		
		Time stamp	Resolution: 0.1 µs Size: 32 bits		
Receive	Filter		Two 6-byte filter patterns can be set		
			Offset can be specified (0–5 bytes)		
	Statistics	Statistical items	See tables 4.6.37 and 4.6.38 (see table 4.6.38 for the error hierarchy)		
		Interval	Fixed at 1 second		
		Display (record) format	Displays both current value (in 1 s intervals) and accumulated values		
		Record	When measurement is stopped, final accumulated results can be saved (in HTML or CSV format).		
		Maximum measurement time	Approximately 430 seconds		
		Resolution	0.1 µs		
		Accuracy	3 µs ± 1 digit	1 µs ± 1 digit	1 µs ± 1 digit
Layer 1 control	Auto negotiation		ON (advertisement specification enabled)/OFF		-
	Flow control		Manual setting ON/OFF		
	MDI/MDI-X		MDI (straight), MDI-X (cross), auto cross	-	-
Protocol emulation			ARP reply		
			PING reply		

1. IFG can be given units of ns, µs, %, bit, frame/s, or bps.

1.2.2.3 BERT Mode Functions

In BERT mode, PN patterns are stored in the frame payload and tests are performed to see whether bit errors occur in PN patterns of frames passed through the device under test. The following table shows the detailed specifications of BERT mode.

Table 1.2.4 Detailed specifications of BERT mode

Function			Description		
			10/100BASE-T	1000BASE-X	10GBASE-X
Transmit	Transmission mode	Constant rate	Can be specified in the range 48BT–1s[1]	Can be specified in the range 32BT–1s[1]	Can be specified in the range 72BT–1s[1]
		Setting resolution	10M: Units of 400 ns 100M: Units of 40 ns	Units of 32 ns	Units of 0.8 ns
		Transmission stop	Continuous, single (no. of frames to send can be specified in the range from 1–4,294,967,295), time (can be specified in the range from 1–1440 minutes)		
	Transmitted data	Defined no. of frames	Single frame per port		
		Frame length	64–9,999 bytes		
		Frame length	64–9,999 bytes (increment, decrement, random)		
		Defined fields	IPv4, IPv4 multicast, IPv6, IPX, TCP, UDP, ICMP, ICMPv6, IGMP IEEE802.3 format MAC address VLAN tags MPLS/EoMPLS headers Test pattern: PN patterns		
		FCS error function	FCS error can be specified		
		Add bit error function	Allows addition of bit errors by frames (1 bit units)		
		No. of PN stages	PN15		
Receive	Filter		Two 6-byte filter patterns can be set		
			Offset can be specified (0–5 bytes)		
	Statistics	Statistical items	See table 4.7.42. (see table 4.7.42 for the error hierarchy)		
		Interval	Fixed at 1 second		
		Display (record) format	Displays both current value (in 1 s intervals) and accumulated values		
		Record	When statistics are stopped, final accumulated results can be saved (in HTML or CSV format).		
Layer 1 control	Auto negotiation		ON (advertisement specification enabled)/OFF		-
	Flow control		Manually set: ON/OFF		
	MDI/MDI-X		MDI (straight), MDI-X (cross), auto cross	-	-
Protocol emulation			ARP reply		
			PING reply		

1. IFG can be given units of ns, µs, %, bit, frame/s, or bps.

1.2.2.4 Capture Function

The Capture function is only available with the AE5522 10GBASE-X Unit. This function enables display of frame headers, frame lengths, frame statuses, and other information about received frames in summary form or in detail from a HEX dump. The following table shows the detailed specifications of the Capture function.

Table 1.2.5 Device specifications of the Capture function

Function	Description	
Availability	AE5522 10GBASE-X Unit	
Modes	All modes (Traffic/Latency/Bert) can be specified (run independently)	
Capture range/size	Frame	Range: DA–FCS Size: 48–9999 bytes
	Event	LF/RF receive, link up/down
Capture buffer capability	Approximately 130 kB/port (64 bytes x 2048 frames/port)	
Capture buffer capability details	Capture range can be specified according to frame size (slice setting)	
	Frame length	No. of frames
	1. 64 Byte 2. 256 Byte 3. 2048 Byte 4. 16384 Byte	Select 2048, 512, 64, or 8 frames Select 512, 64, or 8 frames Select 64 or 8 frames 8 frames
Capture filter (filter)	Record all frames	Record all received frames
	Record normal frames	Record normally received frames only.
	Record error frames	Record the following error frames: CRC error, undersize, oversize, symbol error, bit error
	User settings	Comparison pattern: 6 bytes (max) x 2 patterns can be set Mask pattern: 6 bytes (max) x 2 patterns can be set Offset: 0–58 bytes can be specified
		With user settings, normal frame filters, error frame filters, and layer 1 filters can be set simultaneously
Trigger position	Select from three types: Top, Center, or End	
Capture record mode	With the capture buffer operation, you can select whether to automatically stop or loop when the buffer is full.	
Trigger types	User settings	Trigger pattern: 6 bytes (max) x 2 patterns can be set Mask pattern: 6 bytes (max) x 2 patterns can be set Offset: 0–58 bytes can be specified
	Error frames	CRC error, undersize, oversize, symbol error, bit error
	Insert frames	Triggers on inserted frames
	LF/RF receive	Set the reception of an LF/RF signal as a trigger condition
	Link up/down	Set link up/down as a trigger condition
	None	No trigger event (Note) With this condition, the trigger position can only be ON/OFF (auto stop)
Capture display list	1. Capture overview display Frame No.: Frame-captured order Time stamp value: Δ display (resolution: 100 nsec) Frame status: Status of received frame Size: Displays frame length of received frame -DA: Destination address -SA: Source address -Type: Ethertype/frame length -Data: Payload data (hex display) 2. Capture detail display Select single frame, Hex dump display	

Save captured frames	1. Overview display can be saved Can be saved in Etherreal compatible format (TCP dump format) Can be saved in original format 　　Can be displayed in TrafficTesterPro's capture screen Can be saved in CSV format 2. Detail display Can be saved in frame builder format Can be saved as a :***.frst file (TrafficTesterPro's frame file saving format: saved as custom (no MAC))

Other Functions

Table 1.2.6 Other functional specifications

Item	Description
Self check function	Confirms normal operation of the instrument using a CPU memory check and loopback test.
Upgrade function	Allows upgrading of the system software via the Web (CGI).
File function	Enables saving and loading of specified files. Statistics files can be saved in CSV or HTML format.
Auto test function	The instrument includes a command control interface and script execution functions, enabling automatic testing. For details, see the manual, “Auto Test Supplement.”

1.2.3 Performance Characteristics

Table 1.2.7 shows the performance characteristics of the AE5511 TrafficTesterPro.

Table 1.2.7 Performance

Item	Sub-Item	Description		
		10/100BASE-T	1000BASE-X	10GBASE-X
Transmission	Traffic	Can generate traffic of up to 107.7% (can be generated at IFG48bit (min. value))	Can generate traffic of up to 110.5% (can be generated at IFG32bit (min. value))	Can generate traffic of up to 103.7% (can be generated at IFG72bit (min. value))
	IFG settings	10 Mbps •4800nsec–1sec (in units of 400 ns) 100 Mbps •480nsec–1sec (in units of 40 ns)	1000 Mbps •32nsec–1sec (in units of 32 ns)	10Gbps •7.2nsec–1sec (in units of 0.8 ns)
	Interval setting during burst mode	1 µs–1 s (in units of 1 µs)		
Reception		Can receive traffic rates of up to 107.7%	Can receive traffic rates of up to 110.5%	Can receive traffic rates of up to 103.7%
Statistics	Traffic	Maximum number of frames (1.84467440651196e+019) Maximum number of bytes (1.84467440651196e+019)		
	Statistics interval	1 sec		
Ping/Arp Reply	Response time	100 µs or less		

1.3 System Components

This section provides an overview of the components and options of the AE5511 TrafficTesterPro.

1.3.1 Main Unit

The components of the main unit are listed in table 1.3.1.

Table 1.3.1 Components of the main unit

No.	Name	Qty.	Notes
1	AE5511 TrafficTesterPro	1	Main unit (with two option slots)
Additional Items			
2	CONSOLE connection cable	1	Cross, D-sub 9 pin (female) to D-sub 9 pin (female), 1.5 m
3	CONTROL connection cable	1	Cross cable for connecting to the controlling PC, 1.5 m
4	Power cord	1	With UL3P adapter plug, 3 m
5	User's manual	1	CD-ROM
6	Start-up manual	1	Separate user's manual

1.3.2 Optional Units

The optional units for the instrument are listed in table 1.3.2.

Table 1.3.2 Optional units

No.	Name	Notes
1	AE5520 10/100BASE-T Unit	16 10BASE-T / 100BASE-TX ports
	User's manual	Included
2	AE5521 1000BASE-X Unit	4 1000BASE-LX ports GBIC not included.
	User's manual	Included
3	AE5522 10GBASE-X Unit	2 10GBASE-LR ports A XENPAK module is available as an option
	User's manual	Included
4	1000BASE-SX GBIC module	The customer may only use GBIC modules that were purchased from Yokogawa.
5	1000BASE-LX GBIC module	
6	10GBASE-LR XENPAK module	The customer may only use XENPAK modules that were purchased from Yokogawa.
7	10GBASE-ER XENPAK module	The customer may only use XENPAK modules that were purchased from Yokogawa.
8	Rack mount kit	Hardware for mounting the instrument in a 19-inch rack.

Chapter 2 Preparing for Use

This chapter explains unpacking, repacking, and receiving and testing of the instrument, and lists general precautions to be taken during use. Please read this section in advance to ensure correct operation of the instrument.

2.1 Unpacking and Repacking

This section describes unpacking and repacking of the instrument, checking the contents of the package, and performing mechanical and operational tests.

2.1.1 Unpacking the Instrument

When the instrument is shipped from the factory, it is thoroughly tested both mechanically and electrically to guarantee normal operation. Upon receipt of the package, please unpack the instrument as soon as possible and confirm that no damage occurred during shipping.

While unpacking, take care not to damage any of the internal cardboard boxes or cushioning materials (other than the disposable packaging material such as the packaging paper) as these materials can be reused later when moving or storing the instrument.

2.1.2 Checking the Contents of the Package

After opening the package, refer to table 1.3.1 and confirm that none of the component parts of the unit are missing or damaged.

2.1.3 Mechanical Inspection

Inspect the instrument to confirm that its overall appearance is normal, and to look for any damage to switches or connectors that may have occurred during shipping.

2.1.4 Operational Test

If no abnormalities were found during the mechanical inspection, perform an operational test to check the functioning of the instrument. Confirm that the instrument functions according to its specifications.

2.1.5 If Damage or Other Abnormalities Are Found

If damage or abnormal functioning is discovered during tests and inspections, please contact your nearest Yokogawa representative.

2.1.6 Repacking the Instrument

The instrument should be repacked before moving it. When repacking, use the original packing materials that were used during delivery. If any of the materials are damaged or missing, package the instrument according to the following.

(1) Wrap the instrument in sturdy tarpauline or plastic sheets. Apply cushioning to any protrusions to prevent damage.

(2) Store the wrapped instrument from the previous step in a wooden or cardboard box that is 10 cm larger than the wrapped instrument on all sides.

(3) Fill in the gaps between the sides of the instrument and the box with polyurethane foam or some other cushioning material. Damage can result during movement of the instrument if insufficient cushioning material is added.

(4) After closing the box, seal with adhesive tape (cardboard boxes only).

(5) Indicate the contents of the box, sender’s name, receiver’s name, and any other necessary information on an easily-visibile location on the box.

2.2 Installing the Instrument

This section outlines the power supply voltage, operating conditions, and installation methods that should be used for safe operation of the instrument.

2.2.1 Choosing a Suitable Area

2.2.1.1 Environmental Conditions

The instrument should be used in temperatures of 5°C to 40°C and humidity of 35% to 85%. Avoid using the instrument in locations with a large amount of dust, in direct sunlight, or where corrosive gasses are present.

2.2.1.2 Installation Location

The instrument should be installed and operated on a flat and even surface. Note that the instrument's cooling fan runs when the power is turned ON, and that nothing should be blocking the ventilation holes on the left and right side of the instrument during operation.

2.2.2 Rack-Mounting the Instrument

The instrument can be mounted in a 19-inch rack according to the following instructions.

(1) Attach the rack mount hardware
Attach the rack mount hardware as shown in figure 2.2-1.

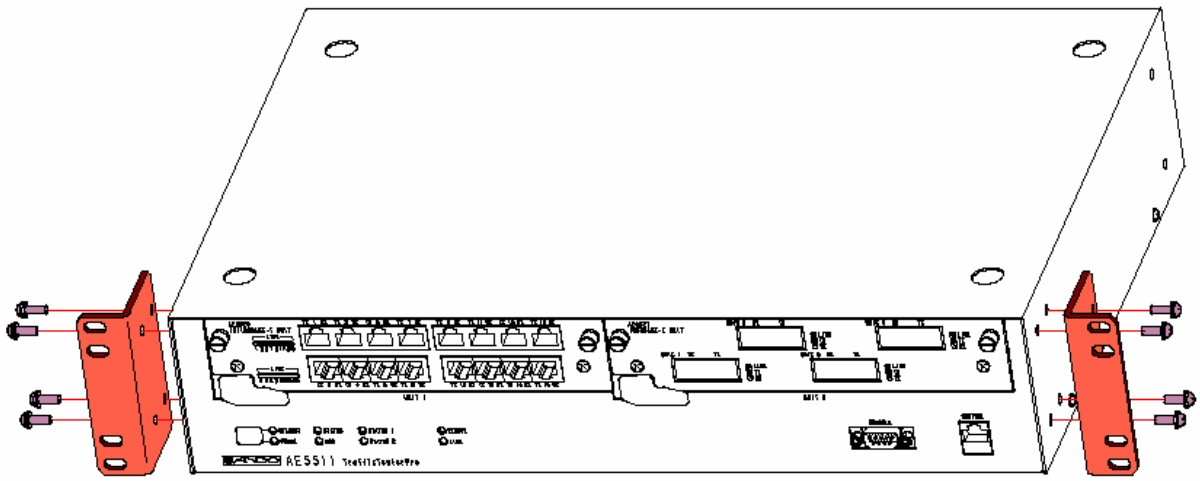


Figure 2.2-1 Attaching the rack mount hardware

(2) Mount the instrument on the rack

Mount the instrument on the rack as shown in figure 2.2-2.

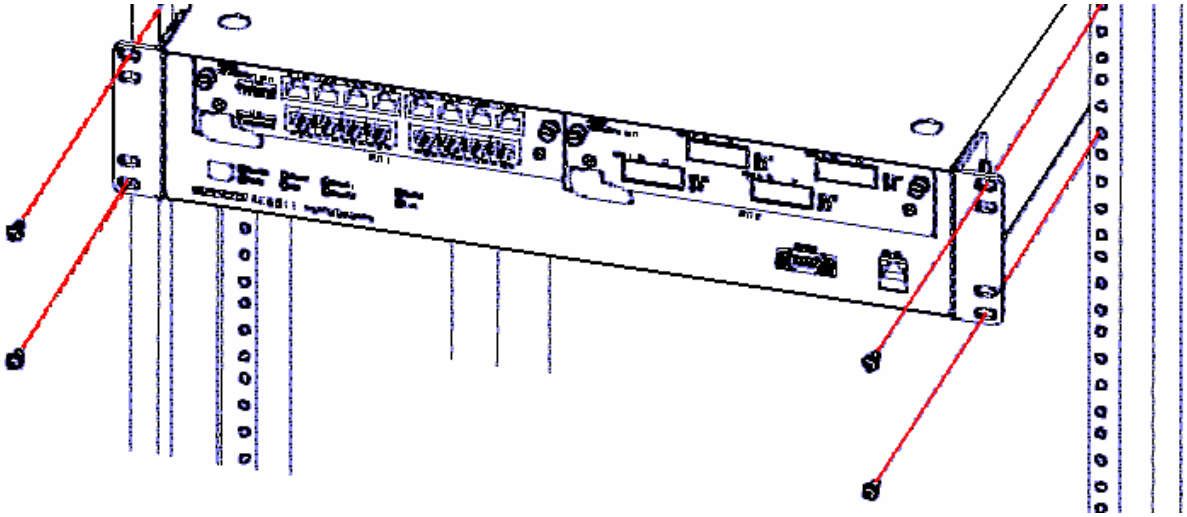


Figure 2.2-2 Mounting the instrument on the rack

2.3 Connecting the Power Supply

The instrument is designed to function normally when connected to a power supply of AC100 V ± 10%, 48–63 Hz. Before connecting the AC power, take appropriate steps to prevent the following:

- Bodily injury due to electric shock
- Internal damage to instruments due to abnormal voltages
- Trouble due to earth currents

The following describes safety measures related to the power supply.

2.3.1 Power Cord Polarity

Grounded 3-prong power outlets are configured as shown in figure 2.3-1 with a voltage pole or *live line* (L), a ground or *neutral line* (N), and a protective ground line or *earth* (E). The plug on the 3-prong power cord that comes with the instrument is designed to match the polarity of a 3-prong (or grounded 2-prong) outlet when inserted.

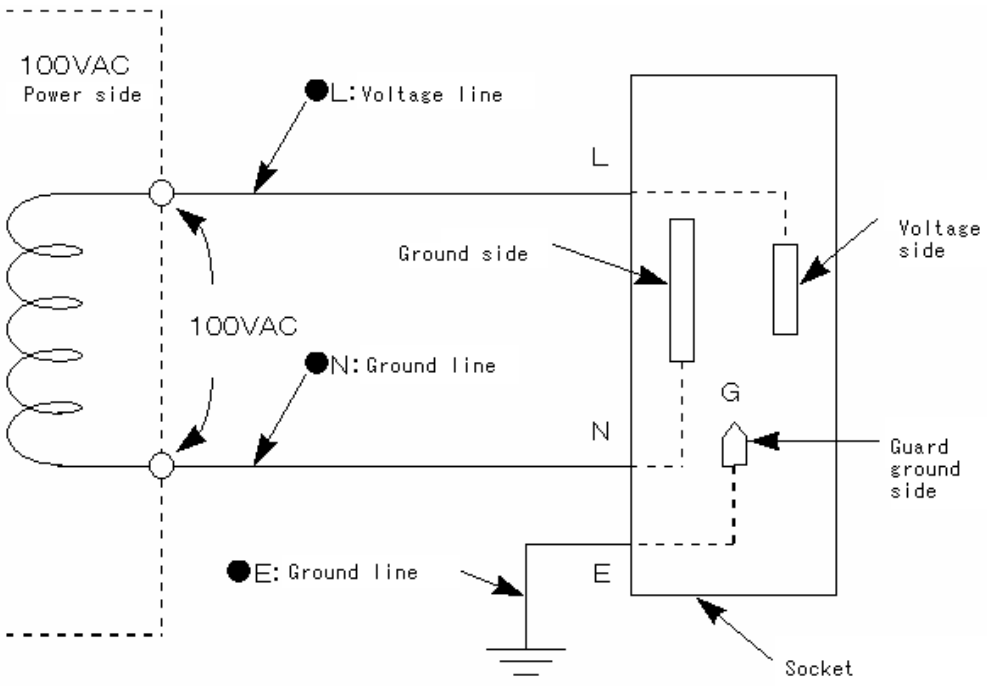


Figure 2.3-1 Three-prong power plug and outlet

2.3.2 Protective Grounding

If a 3-prong power outlet is unavailable, use the 3-prong to 2-prong adapter shown in figure 2.3-2, and be sure to connect the earth wire protruding from the adapter to the grounding terminal on the outlet.

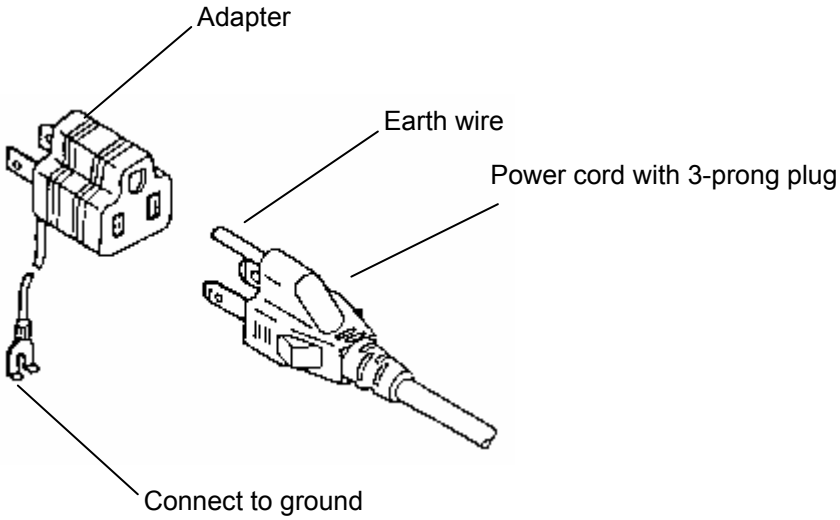
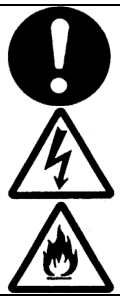


Figure 2.3-2 Ground wire on the conversion adapter

DANGER

- When removing or inserting the power cord, hold by the plug, not by the cord itself. Use a 3-prong power cord. If the grounding wire is not securely attached, bodily injury due to electric shock, damage to instruments due to high voltages, or trouble due to earth currents can result.
- When using the included 3-prong to 2-prong adapter, make sure the polarity of the adapter matches that of the outlet when plugging it in. Failure to do so can result in emission of heat or fire.



2.4 Installing Interface Units

Figure 2.4-1 shows the installation of interface units. As shown in the figure, insert the interface units into the slots along the guide rails, then fasten tightly with screws. When removing interface units, loosen and remove the screws, unlock the removal locks, release the connection of the connectors, then pull out the unit from the instrument. Always make sure that the instrument is turned OFF when inserting or removing units. When an interface unit is not installed, attach a blank panel to prevent accidents.

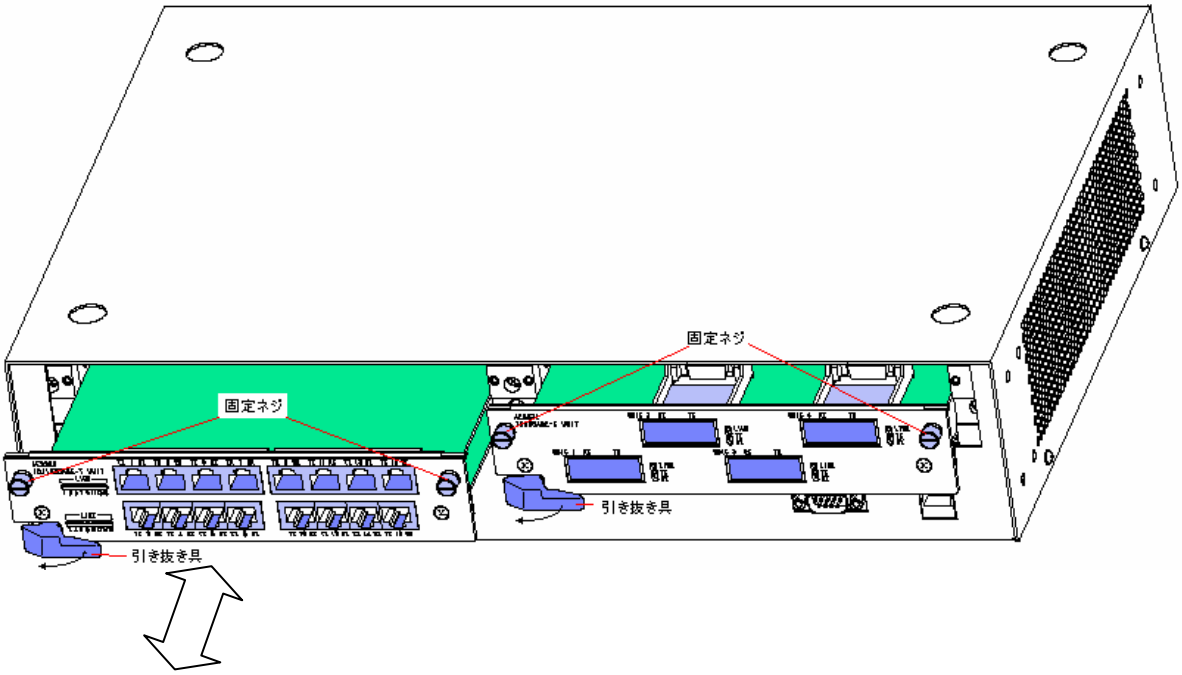


Figure 2.4-1 Inserting interface units

Caution

- Make sure the STANDBY and POWER LEDs on the front panel of the instrument are not illuminated before inserting or removing units. Otherwise, damage may result.
- Similarly, make sure the STANDBY LED is illuminated, or the STANDBY and POWER LEDs on the front panel of the instrument are not illuminated before inserting or removing GBIC or XENPAK modules.

Chapter 3 Main Parts of the Instrument and Basic Operation

This chapter explains some of the major parts of the instrument, and introduces some of the basic operating procedures of the instrument.

3.1 Main Parts of the Instrument

This section introduces the main components of the front and rear panel and their functions.

3.1.1 Front Panel

Figure 3.1-1 shows the front panel of the instrument.

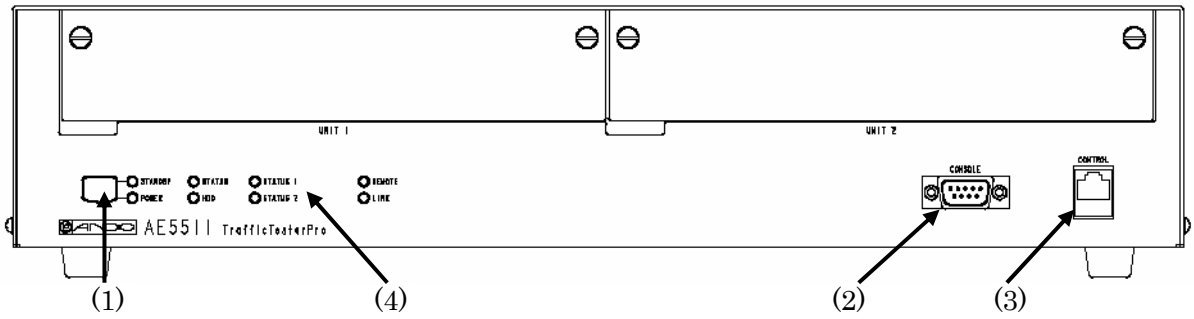


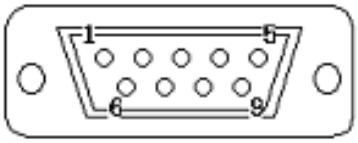
Figure 3.1-1 Front panel

(1) POWER switch

Pressing this button when in power standby mode turns the power ON. To be in power standby mode, the MAIN POWER switch on the rear panel must be turned ON.

(2) CONSOLE port

This is a 9 pin D-sub serial port connector that can be used to connect the instrument to an external console for control. To connect to a controller PC, use the CONSOLE connection cable that came with the instrument. The pin arrangement of the CONSOLE port is shown in the figure below.

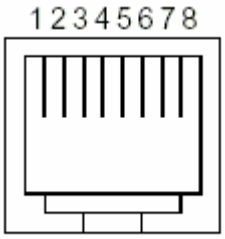


pin	signal	pin	signal
1	DCD	6	DSR
2	RX	7	RTS
3	TX	8	CTS
4	DTR	9	RI
5	GND		

Figure 3.1-2 CONSOLE port pin arrangement

(3) CONTROL port

This is an Ethernet port that can be used to connect to a PC in order to control the instrument from a Web browser. An RJ45 type connector is used, and the network interface is 10BASE-T/100BASE-TX (supports auto negotiation). To connect to a controller PC, use the CONTROL connection cable that came with the instrument. The pin arrangement of the CONTROL port is shown in the figure below.



Pin	Signal	Pin	Signal
1	TX+	5	-
2	TX-	6	RX-
3	RX+	7	-
4	-	8	-

Figure 3.1-3 CONTROL port pin arrangement

(4) Status display LEDs

These are LEDs that display the statuses of the instrument. The statuses indicated by the LEDs are shown in table 3.1.1.

Table 3.1.1 LED indications

LED Name	Statuses Indicated
HDD	Hard disk drive being accessed.
LINK	Illuminates during CONTROL port link up status
POWER	Illuminates when power is ON.
REMOTE	Illuminates when CONSOLE or CONTROL ports are connected.
STATUS	Lights green when the instrument is functioning normally
	Blinks green when instrument is starting up, shutting down, or undergoing the self test.
	Lights red when memory check is NG, when the fan alarm activates, when there is an abnormality in the CPU and during execution of the self test.
STATUS 1	Lights green when unit 1 is functioning normally
	Blinks green when unit 1 is undergoing the self test
	Lights red when unit 1 experiences an abnormality
STATUS 2	Lights green when unit 2 is functioning normally
	Blinks green when unit 2 is undergoing the self test
	Lights red when unit 2 experiences an abnormality
STANDBY	Illuminates when in power standby mode.

3.2.1 Rear Panel

Figure 3.1-4 shows the rear panel of the instrument.

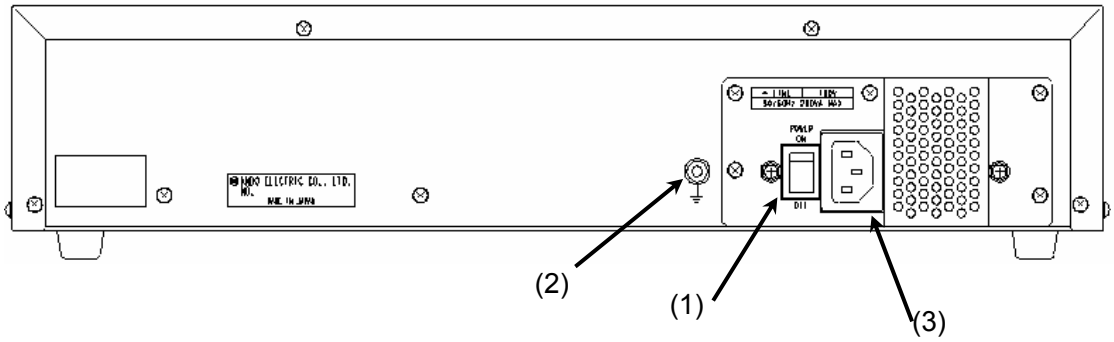


Figure 3.1-4 Rear panel

(1) MAIN POWER switch
Turning the MAIN POWER switch ON places the instrument in power standby mode.

(2) Earth terminal
The functional ground terminal.

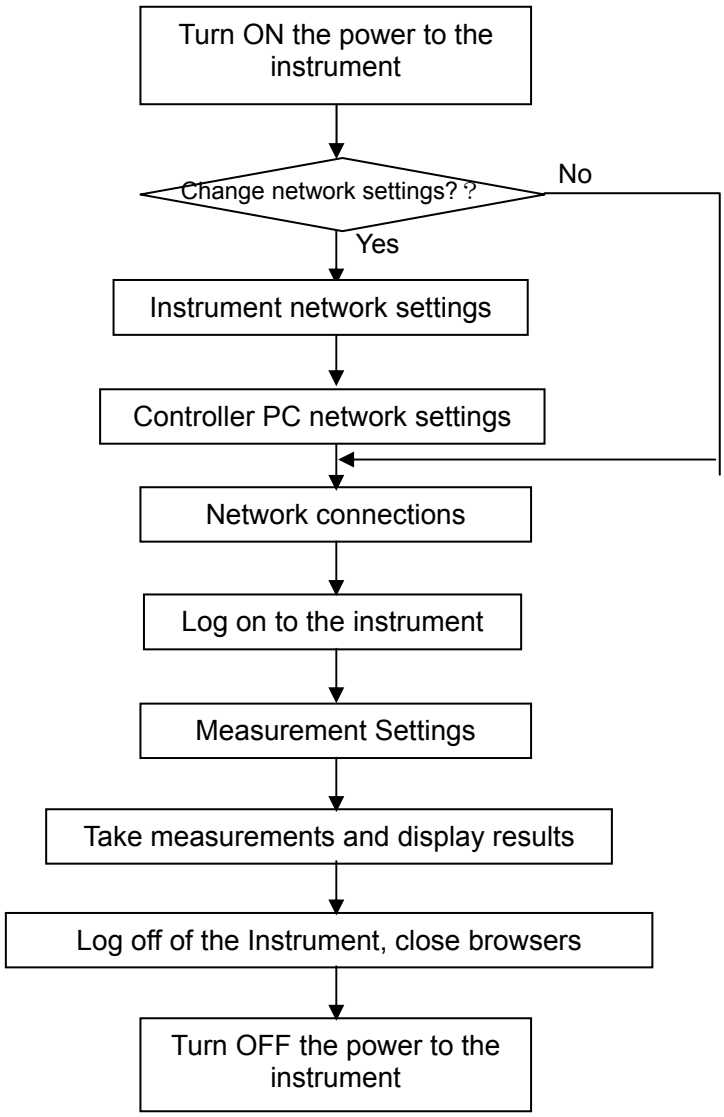
(3) AC power supply inlet
Connect the power cord that came with the instrument to this inlet.

3.2 Operating the Instrument

This section provides an overview of the measurement functions of the instrument.

3.2.1 Operational Flow Chart

The following shows the flow of basic operation. See below for further details on each step.



3.2.2 Turning the Power ON

(1) Connect the console cable

This step (connecting the console cable) is not necessary if you have already entered network settings on the instrument (skip to step 2). Otherwise, connect the instrument to the controller PC using the CONSOLE connection cable that came with the instrument.

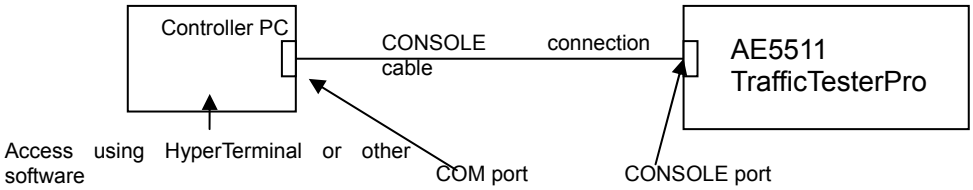


Figure 3.2-1 Connecting the console connection cable

Start the terminal software on the controller PC, then enter settings according to table 3.2.1. See section 4.10, “Console Setting Screen” for information on the console settings for the terminal software.

Table 3.2.1 Terminal software communication settings

Setting	Value
Comm. speed	38,400 bps
Data bits	8
Parity	None
Stop bit	1
Flow control	Yes (Xon/Xoff)

(2) Turn ON the MAIN POWER switch

Turning ON the MAIN POWER switch on the rear panel places the instrument in power standby mode. The STANDBY LED on the rear panel illuminates. See figure 3.1-4 for the location of the MAIN POWER switch.

(3) Turn ON the POWER switch

Confirm that the instrument is in power standby mode, then turn ON the POWER switch on the front panel. See figure 3.1-1 for the location of the POWER switch. When the STATUS LED stops blinking (and illuminates), the instrument has finished starting up.

Caution

If the STATUS indicator does not blink even when the POWER switch is turned ON, turn the POWER switch OFF by pressing it continuously for one second or longer. After turning the power OFF, turn the power back on again. If the STATUS indicator still does not blink, consult the AE5511 Startup Manual, or contact your nearest Yokogawa representative as shown on the inquiry contact list.

3.2.3 Entering Network Settings on the Instrument

This step is not necessary if you have already entered network settings on the instrument. Skip to the next procedure.

Once a network connection is made with the controller PC, you can enter network settings on the instrument from a Web browser (for details, see section 4.9.1.1, “(2) Entering Network Settings”).

The following items should be referred to only if no network settings have been entered, or when confirming if DHCP was selected on the Web browser settings.

The examples below are written as if the reader is using HyperTerminal. See section 4.10, “Console Setting Screen” for information on the console settings for the terminal software.

(1) Display the main menu

When the instrument is turned ON and allowed to start up, the screen below appears on the terminal software. Type the *logon* command, and press the **ENTER** key. If you enter Auto, the screen changes to automatic test measurement mode.

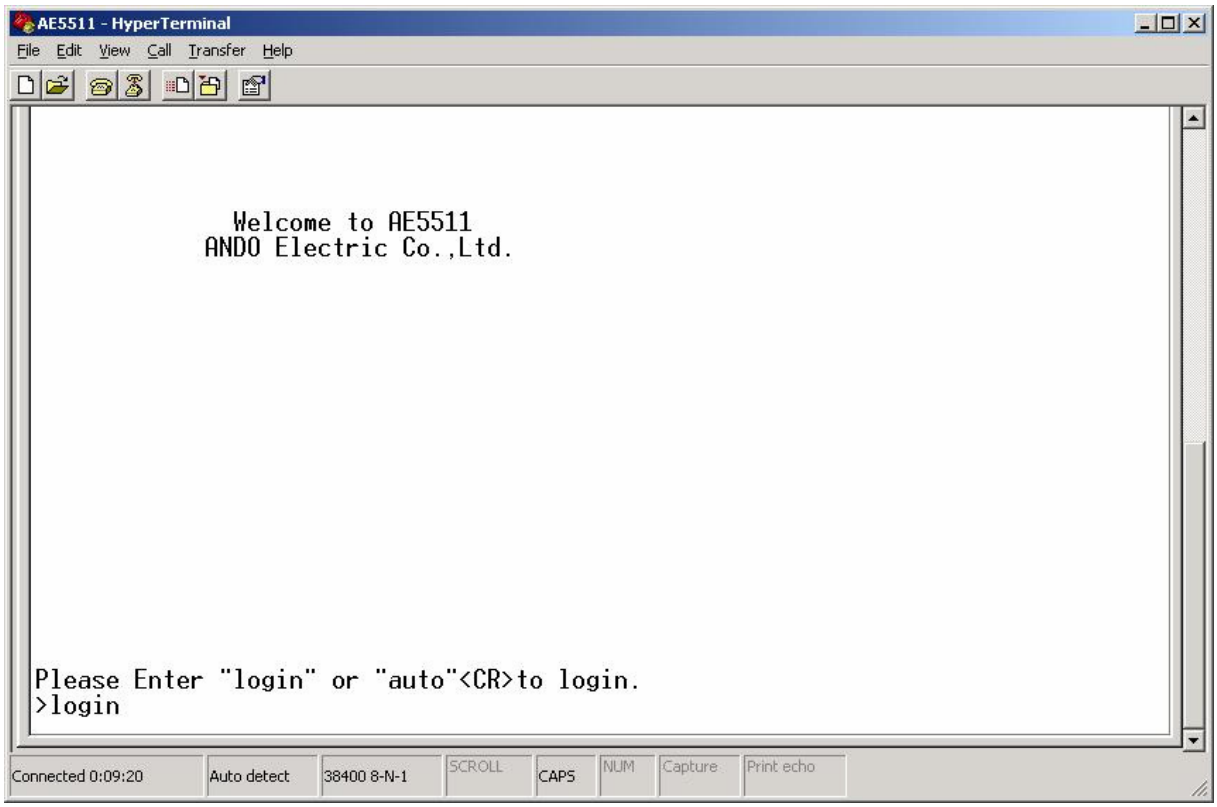


Figure 3.2-2 Console logon screen

(2) Display the network setting screen

A menu of executable items appears on the console. Choose **1. NETWORK SETTING**, and press the **ENTER** key.

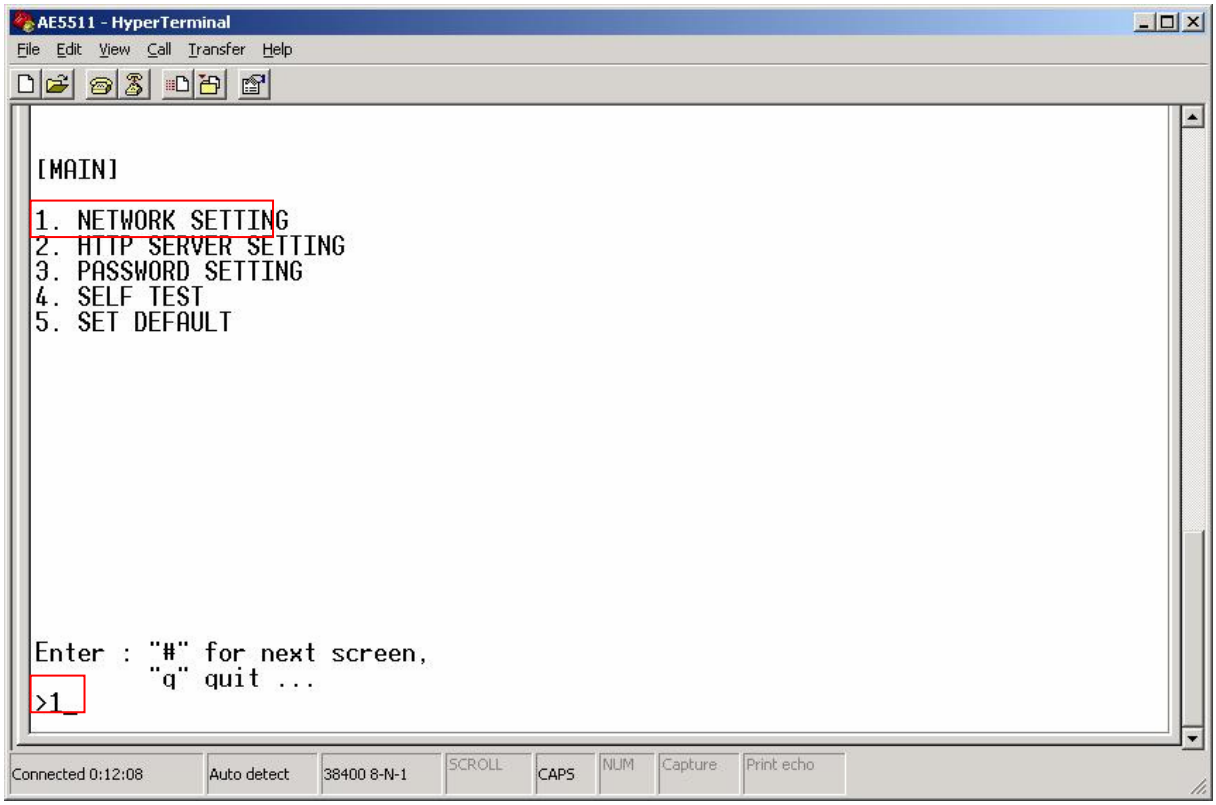


Figure 3.2-3 Main menu

(3) Enable/disable DHCP

A menu appears allowing you to choose manual (fixed) input of each network setting, or automatic acquisition of settings via DHCP server. To enter manual settings, choose **1. DISABLE**. To obtain settings automatically from a DHCP server, choose **2. ENABLE**. Press the **ENTER** key after making your selection. The following explains the procedure when manual setting (1) was selected above.

> **Note** :
> When changing the setting (from manual to automatic and vice versa), you must restart the instrument to enable the new setting. This is especially important with manually entering the IP address, subnet mask, and default gateway.
> See section 3.2.11 “(1) Shutting Down by Holding the Front Panel Switch” for instructions on turning OFF the power. See section 3.2.2, “Turning the Power ON” for instructions on how to turn ON the power.

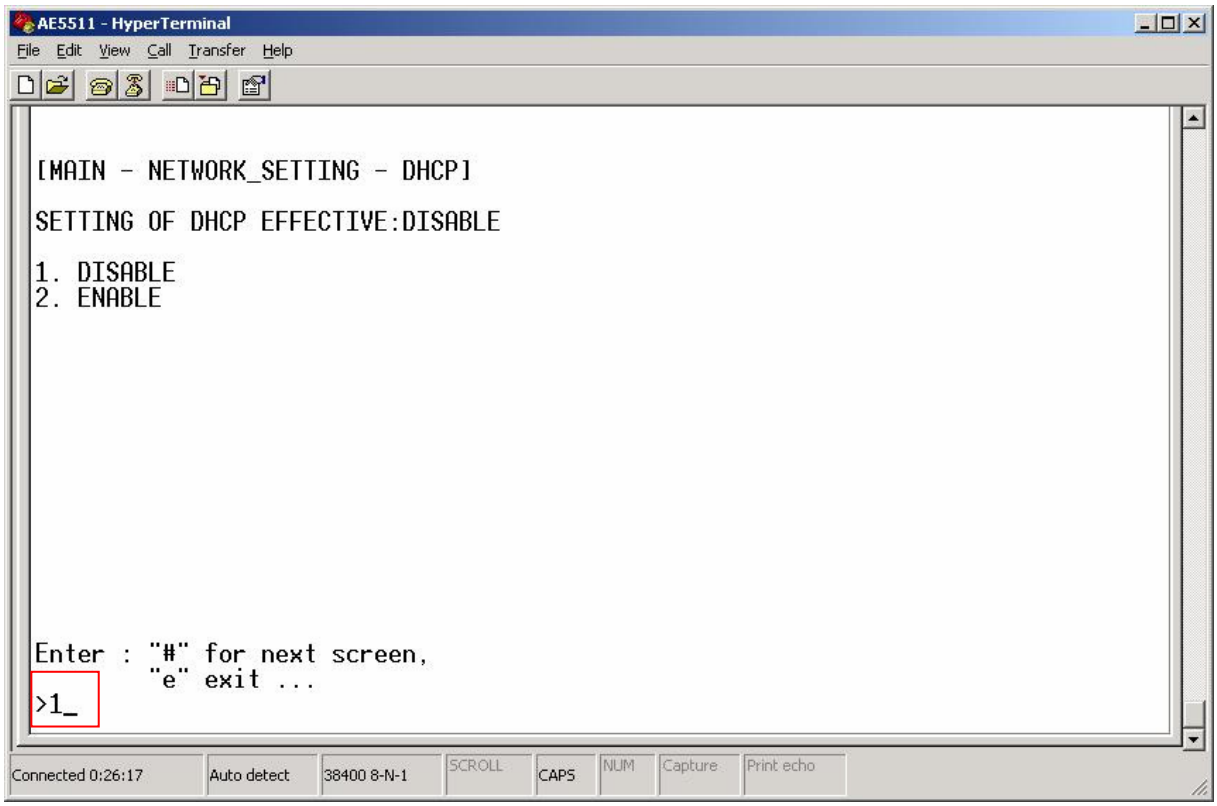


Figure 3.2-4 Network setting method selection screen

(4) Setting confirmation screen

This is a screen for confirming the DHCP setting. To accept the setting type *y*, then press the **ENTER** key.

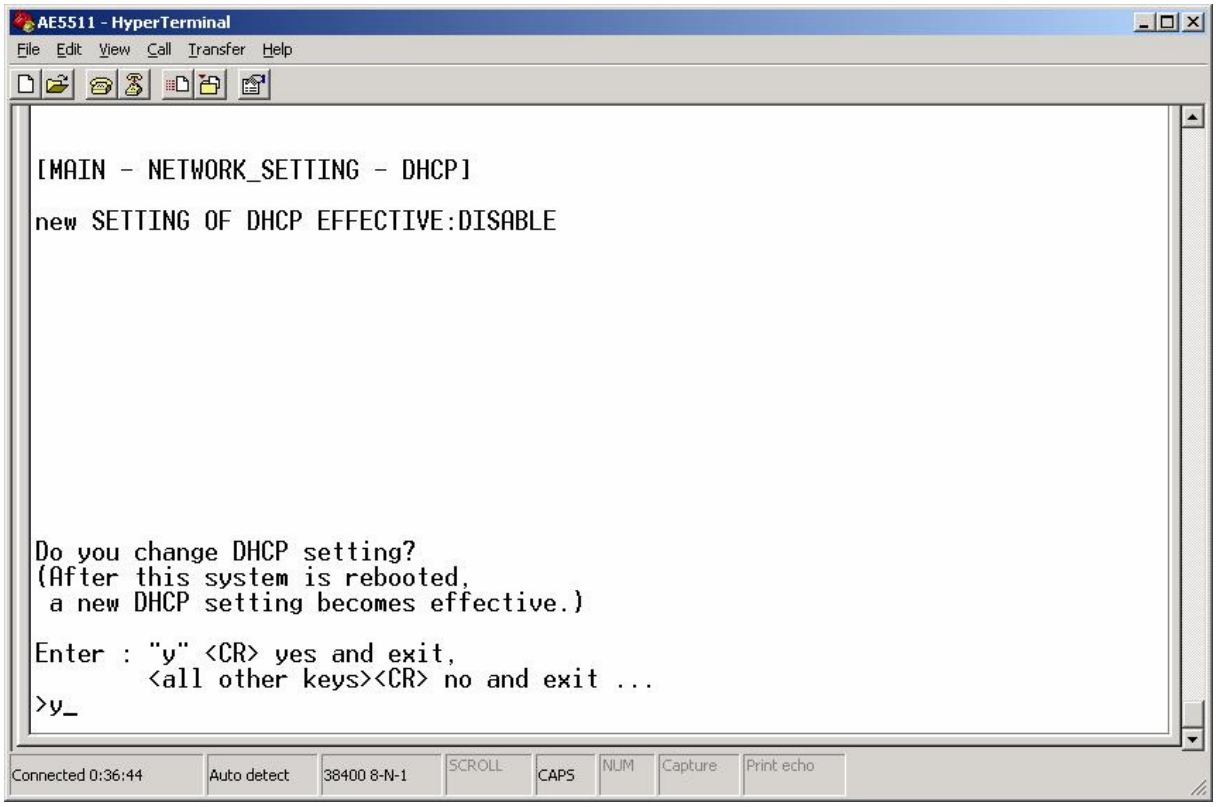


Figure 3.2-5 DHCP setting confirmation screen

(5) Network setting menu

This screen displays the current network settings. The minimal settings required are the IP address and net mask. The default gateway setting should be entered as needed. The following continues the explanation of the procedure for entering the IP address. Type *2*, then press the **ENTER** key.

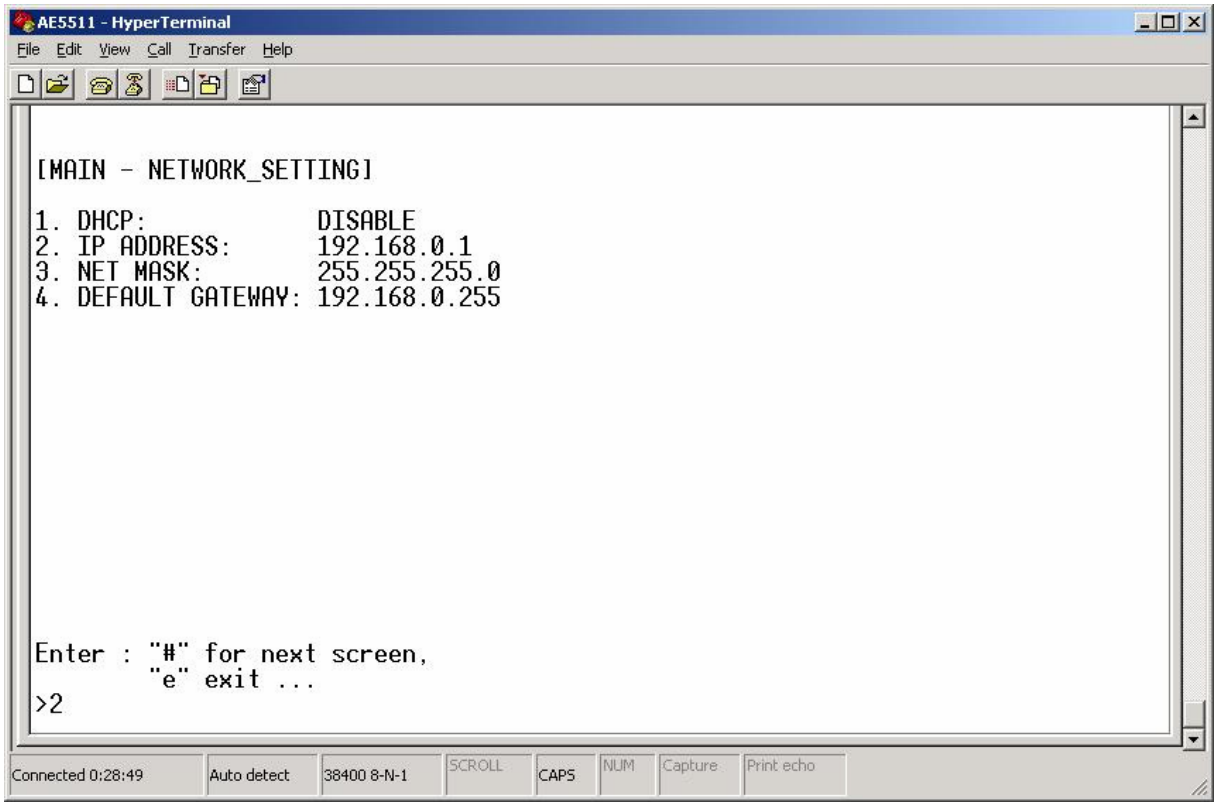


Figure 3.2-6 Network setting menu

(6) IP address setting screen

This is a screen for entering the IP address. Enter an available, fixed IP address. The following is the proper format for the address.

[XXX.XXX.XXX.XXX] (where XXX is a decimal from 0 to 255)

Enter the address then press the **ENTER** key.

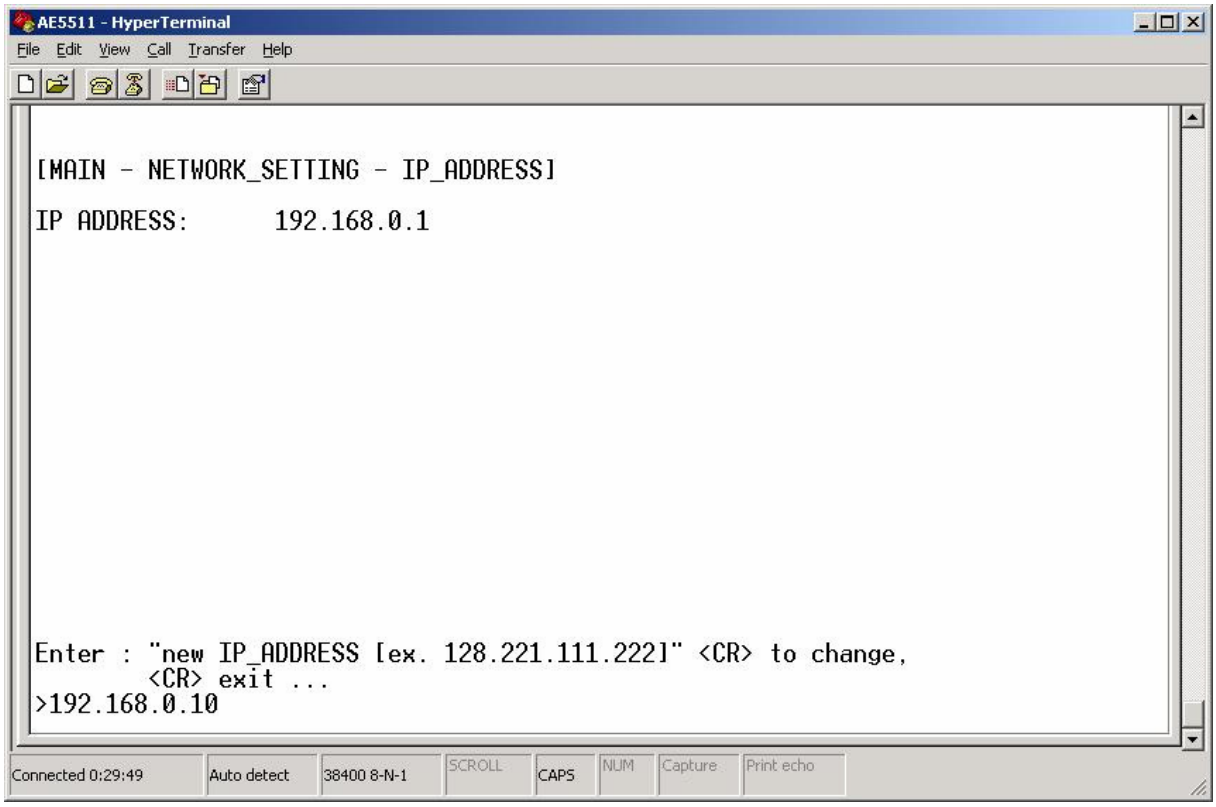


Figure 3.2-7 IP address setting screen (192.168.0.10 is only an example)

(7) IP address confirmation screen

This screen allows confirmation of the entered IP address. The old and new IP addresses (before and after the change) are displayed. To accept the new address, type *y*, or type any other key (other than ENTER) to reject it. Then, press the **ENTER** key.

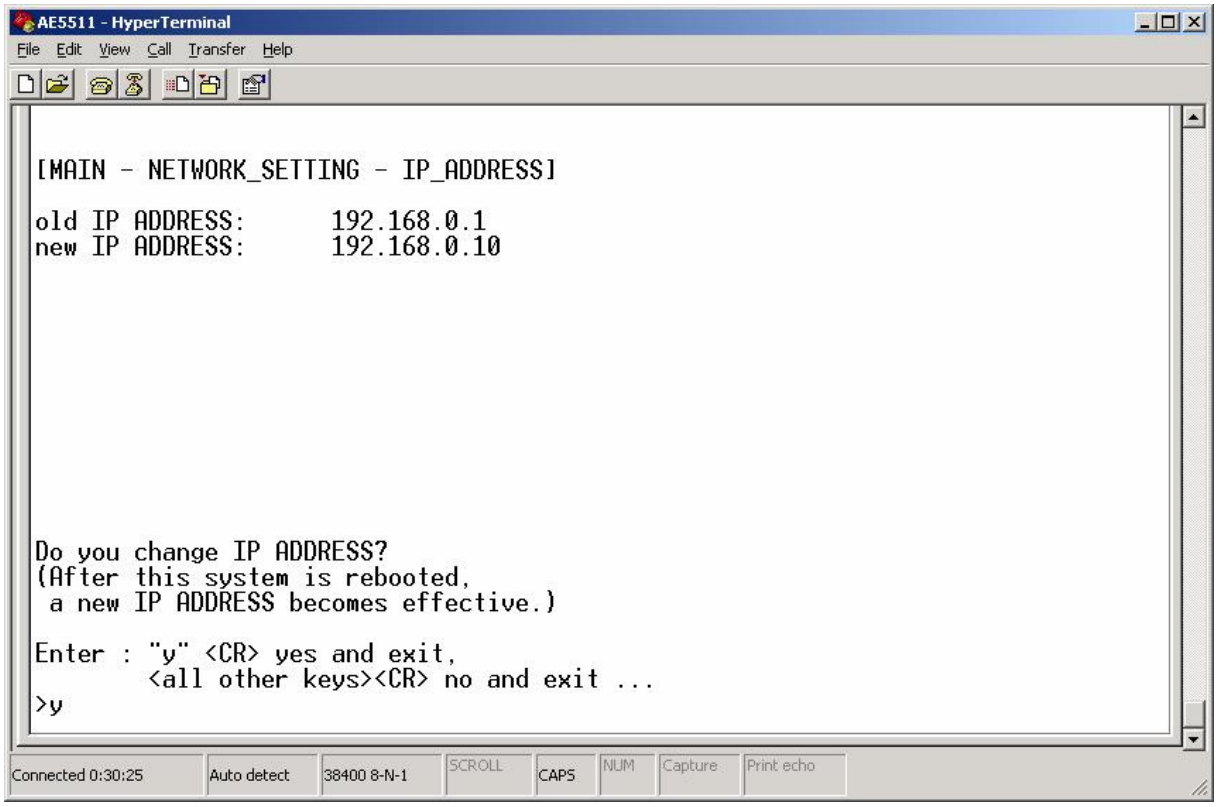


Figure 3.2-8 IP address confirmation screen

(8) Setting confirmation screen

The setting confirmation screen appears. In addition to the IP address, you can enter the net mask and default gateway settings (the procedure is the same as that for the IP address). After all settings are entered, type *e*, then press the **ENTER** key to return to the screen in figure 3.2-3.

> **Note** :
> If any one of the settings are changed, you must restart the instrument in order for the new setting to take effect. See section 3.2.11 "(1) Shutting Down by Holding the Front Panel Switch" for instructions on turning OFF the power. See section 3.2.2, "Turning the Power ON" for instructions on how to turn ON the power.

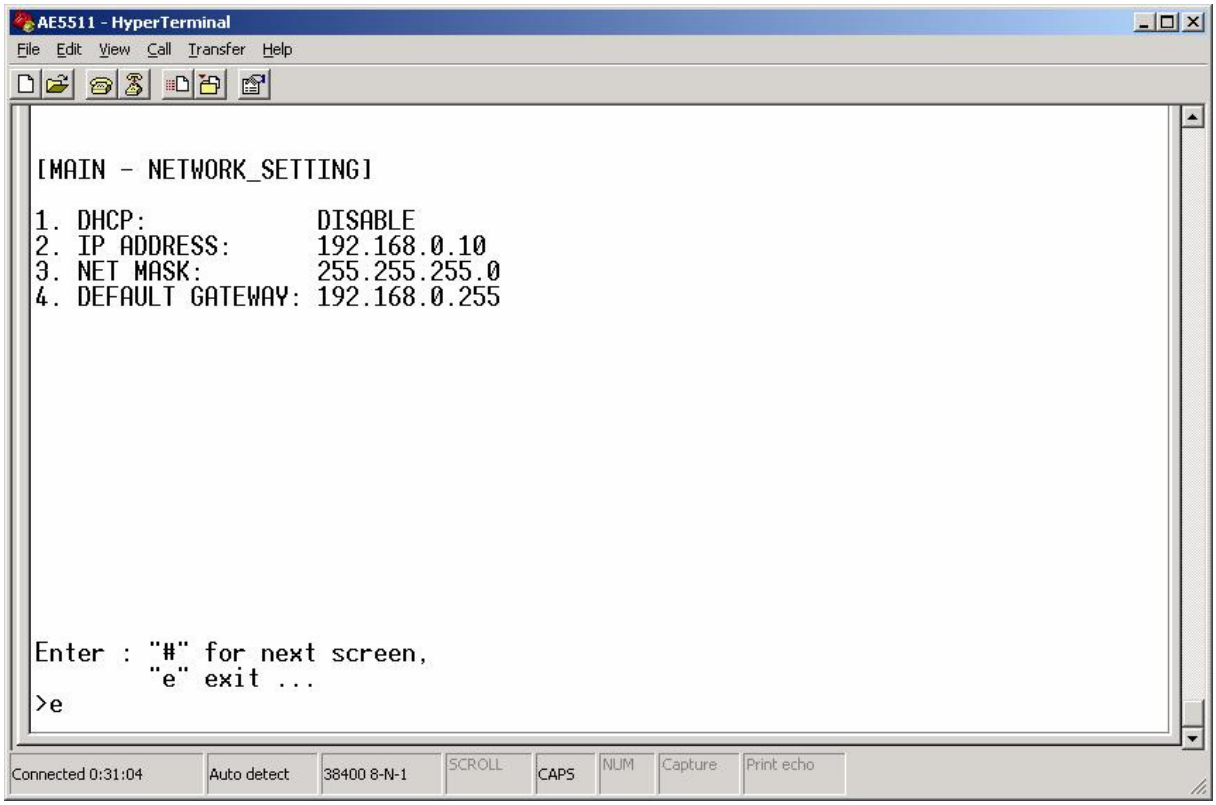


Figure 3.2-9 Setting confirmation screen

(9) Console logoff screen

If you type *q* in figure 3.2-3, you can log off of console control.　This concludes network settings, and you can disconnect the CONSOLE connection cable if desired.

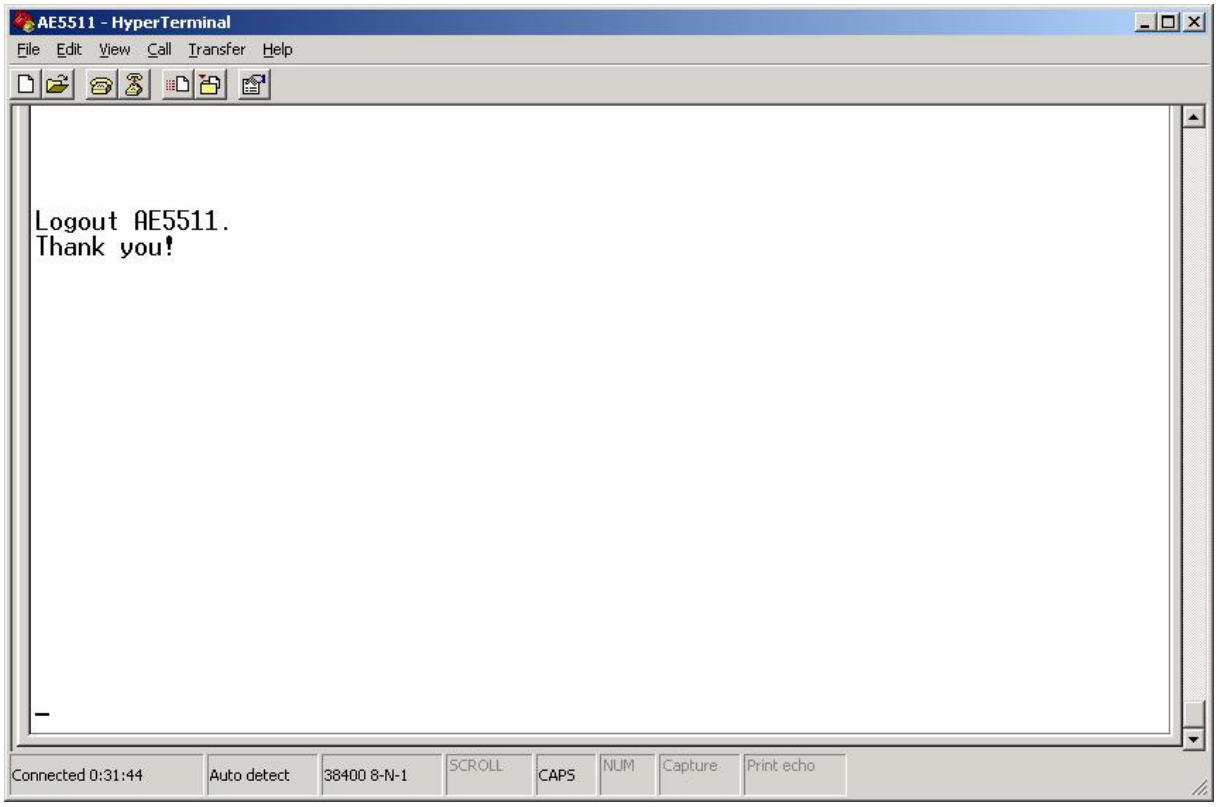
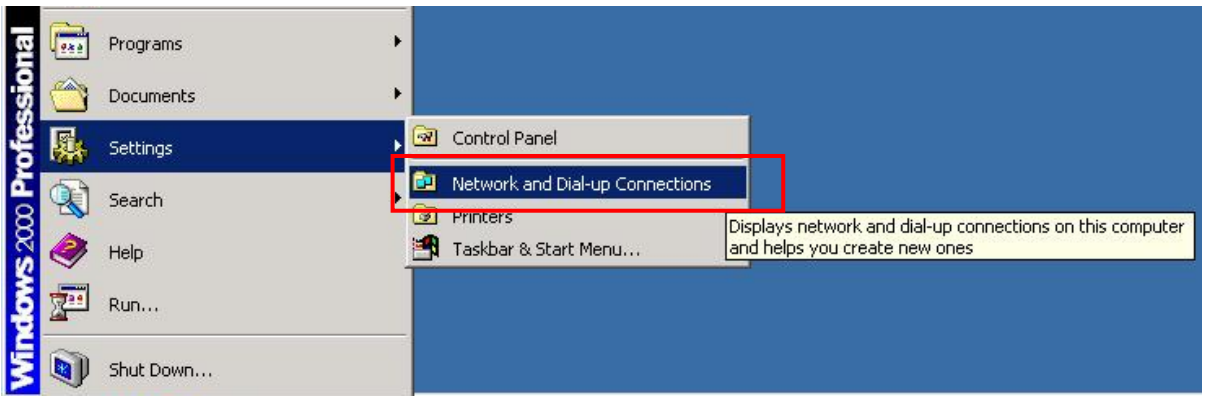


Figure 3.2-10 Logoff screen

3.2.4 Entering Network Settings on the Controller PC

The following explains the network settings that are entered on the controller PC when connecting to the instrument. The explanation of network settings in this manual is based on the Microsoft Windows 2000 operating system. When using a different operating system, see the user's manual or help file of that operating system for setting instructions.

(1) Network and dial-up connections
From the Windows Start menu, choose **Settings** > **Network and dialup connections**.



The window shown in figure 3.2-11 appears.

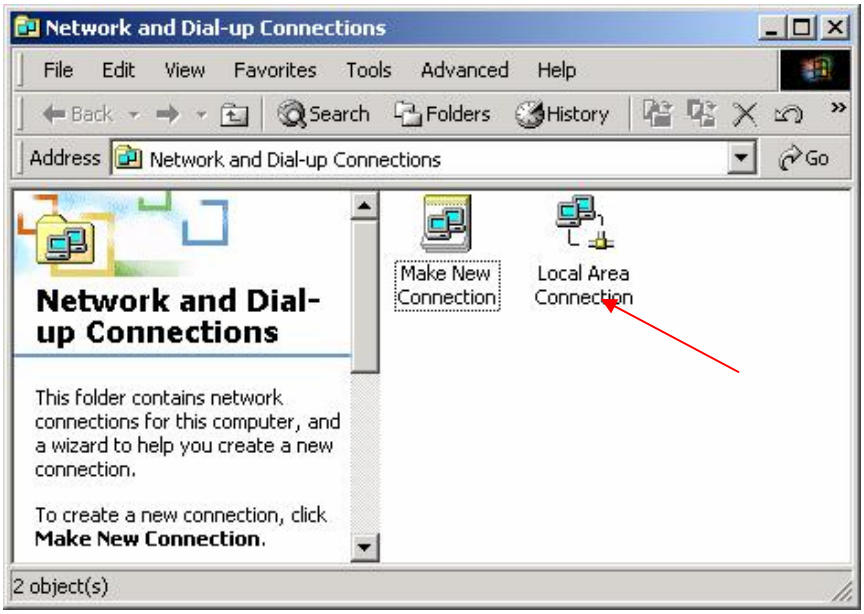


Figure 3.2-11 The network and dialup connection window

(2) Local area connection

Double-click the **Local Area Connection** icon shown in figure 3.2-11 to display the dialog box in figure 3.2-12, then click **Properties**.

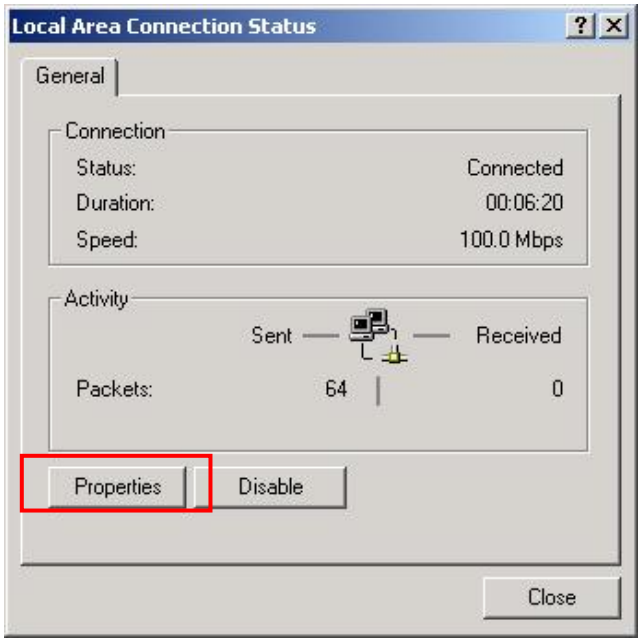


Figure 3.2-12 The local area connection status window

(3) Local area connection properties

Clicking Properties in the dialog box shown in figure 3.2-12 displays the Local Area Connection Properties window shown in figure 3.2-13. Select **Internet Protocol (TCP/IP)**, then click **Properties**.

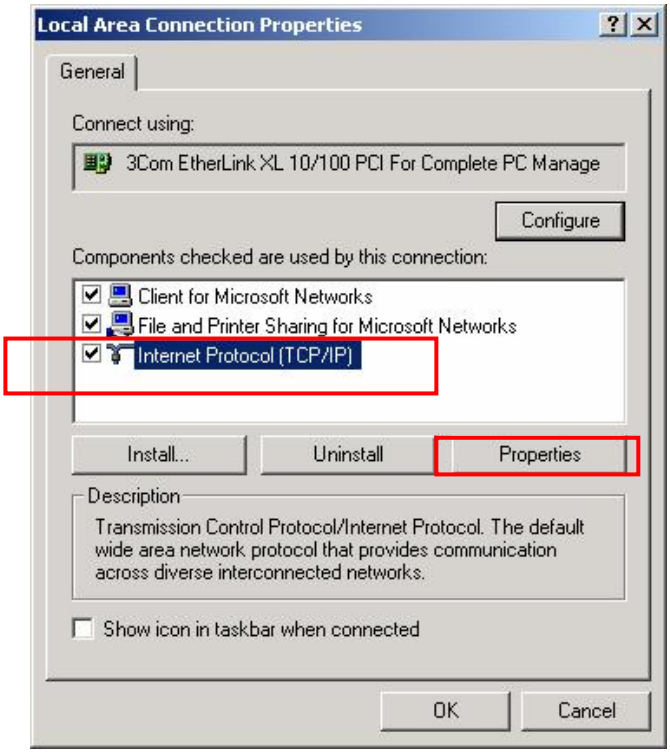


Figure 3.2-13 The local area connection properties window

(4) TCP/IP properties

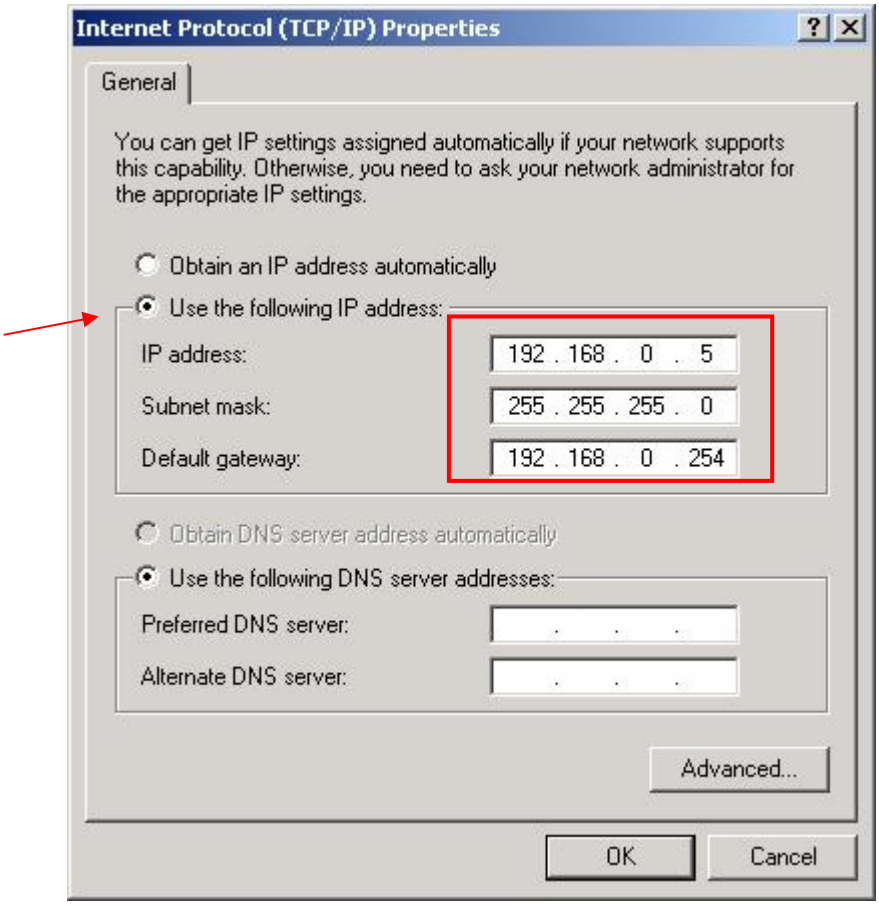
The dialog box in figure 3.2-14 appears. Select **Use the following IP address**, then enter the IP address, subnet mask, and default gateway. Enter the same subnet mask and default gateway setting as the instrument (if the controller PC and instrument are on the same network).

Setting Example

	Instrument	Controller PC
IP ADDRESS	192.168.0.10	192.168.05
NETMASK	255.255.0.0	255.255.0.0
DEFAULT GATEWAY	192.168.0.254	192.168.0.254

Figure 3.2-14 The internet protocol (TCP/IP) properties window

Once you have entered the settings, click **OK**. Click **OK** again to close the Local Area Connection Properties dialog box (figure 3.2-13).



3.2.5 Entering Internet Explorer Settings on the Controller PC

The following explains the Internet Explorer settings that are entered on the controller PC when connecting to the instrument. The explanation of Internet Explorer settings in this manual are based on the Microsoft Windows 2000 operating system. Follow the steps below to enter settings on Internet Explorer on the controller PC.

(1) From the Internet Explorer menu bar, choose **Tools** > **Internet Options**.

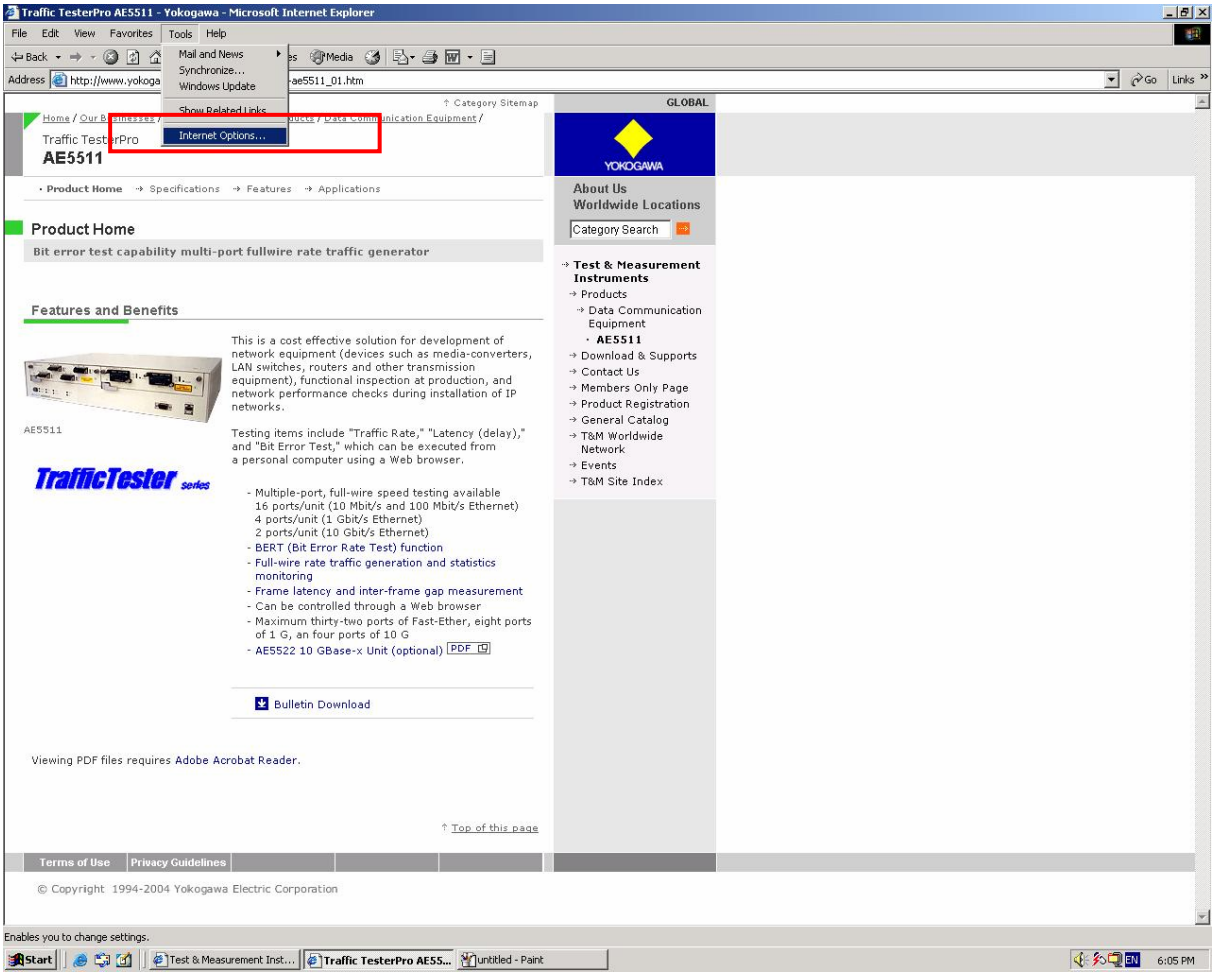


Figure 3.2-15 Selecting internet options from the Tools menu

(2) In the Internet Options window, click **Settings** (located under Temporary Internet Files).

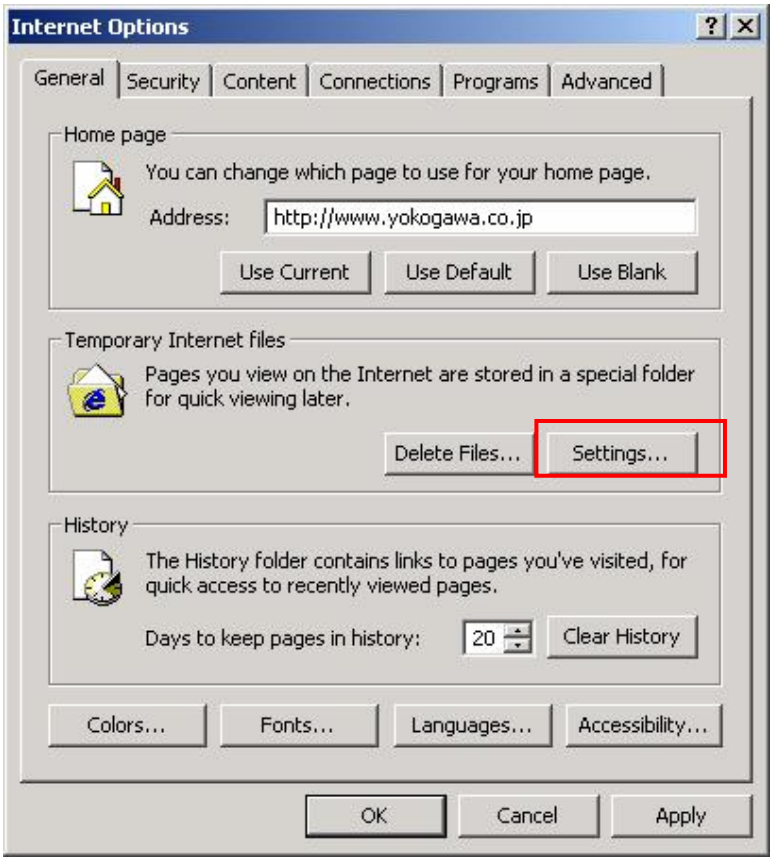


Figure 3.2-16 The internet options window

(3) In the Settings window, select **Automatically**, then click the **OK** button.

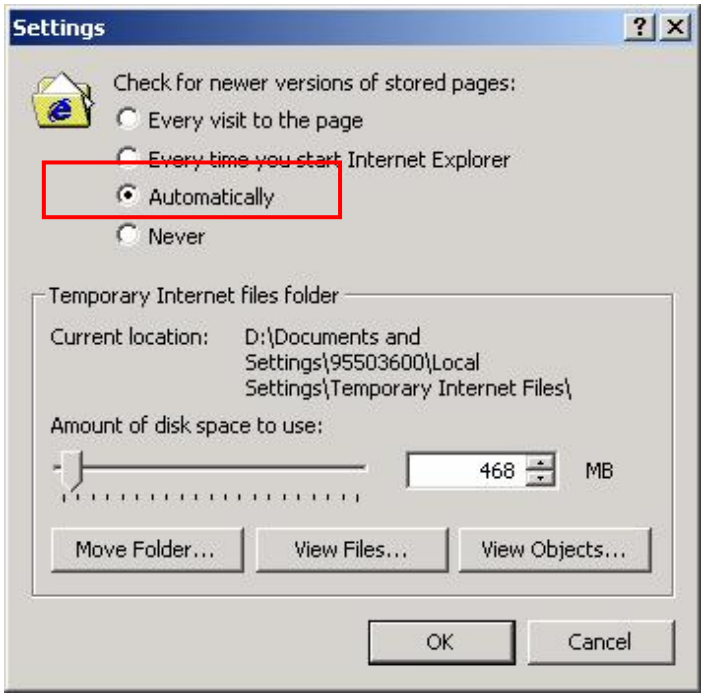


Figure 3.2-17 The settings window

(4) Save the settings

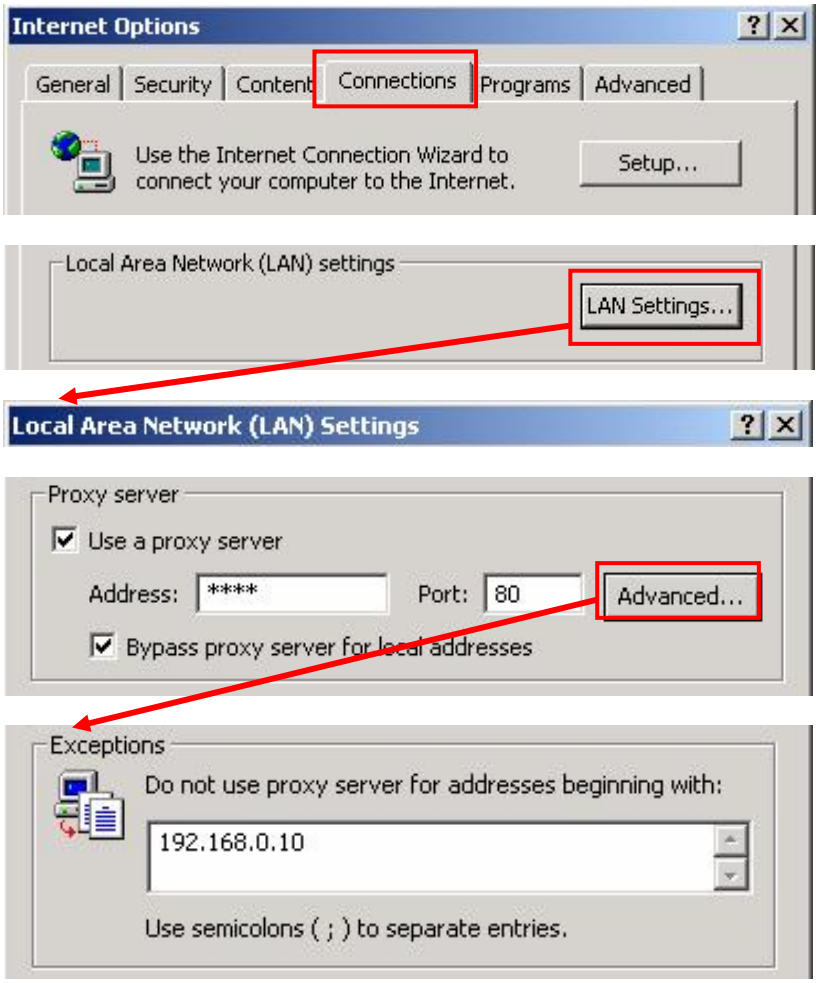
Click **OK** again to save the settings and close the Internet Options window from figure 3.2-16.

● Proxy Servers

If your browser's connection settings are configured for a proxy server, delays in response may occur when accessing the instrument. Therefore we recommend that you either not use a proxy server, or enter the IP address of the instrument for the local address.

In the Internet Options dialog box, click the **Connections** tab, and click the **LAN Settings** button to display the Local Area Network (LAN) Settings dialog box. Clear the **Use a proxy server for your LAN** option, or select the **Bypass proxy server for local addresses** check box and click the **Advanced** button, then enter the IP address of the instrument under **Do not use proxy server for addresses beginning with** in the Exceptions area (if another address has already been entered here, append a semicolon (;) to the end of the first address followed by the instrument's IP address).

Click **OK** in each dialog box opened above to close them.



3.2.6 Making Network Connections

Connect the instrument to the controller PC using the CONTROL connection cable that came with the instrument.

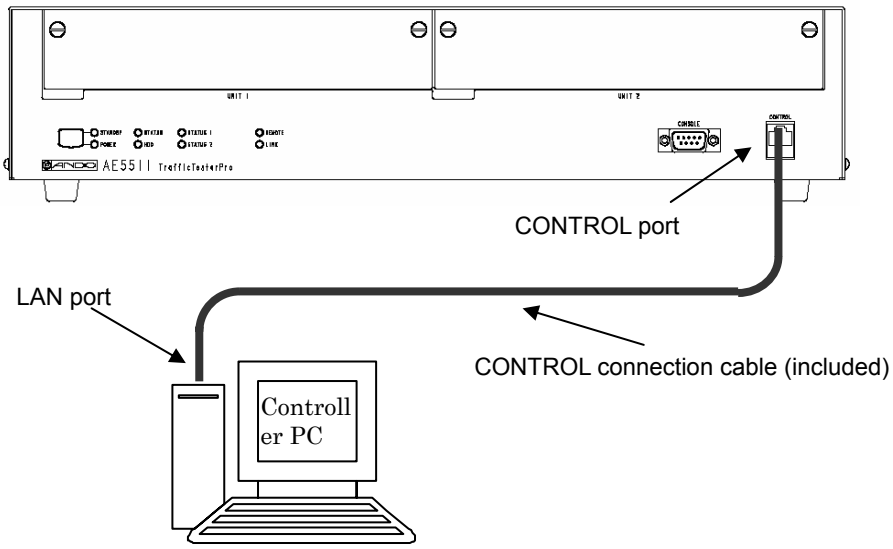


Figure 3.2-18 Connections with the CONTROL cable

Table 3.2.2 Controller PC system requirements

Item	Requirement
CPU	Celeron 1 GHz or higher
Memory	128 MB or more
Screen resolution	XGA (1024 x 768 pixels) or higher
LAN port	RJ-45, 10BASE-T/100BASE-TX
OS	Windows 98 SE, Windows 2000, Windows XP
Web browser	Internet Explorer 5.5 SP2 or later

Launch the Web browser on the controller PC. Enter the IP address set on the instrument into the Web browser's address box, then press the **ENTER** key (or click **Go**).

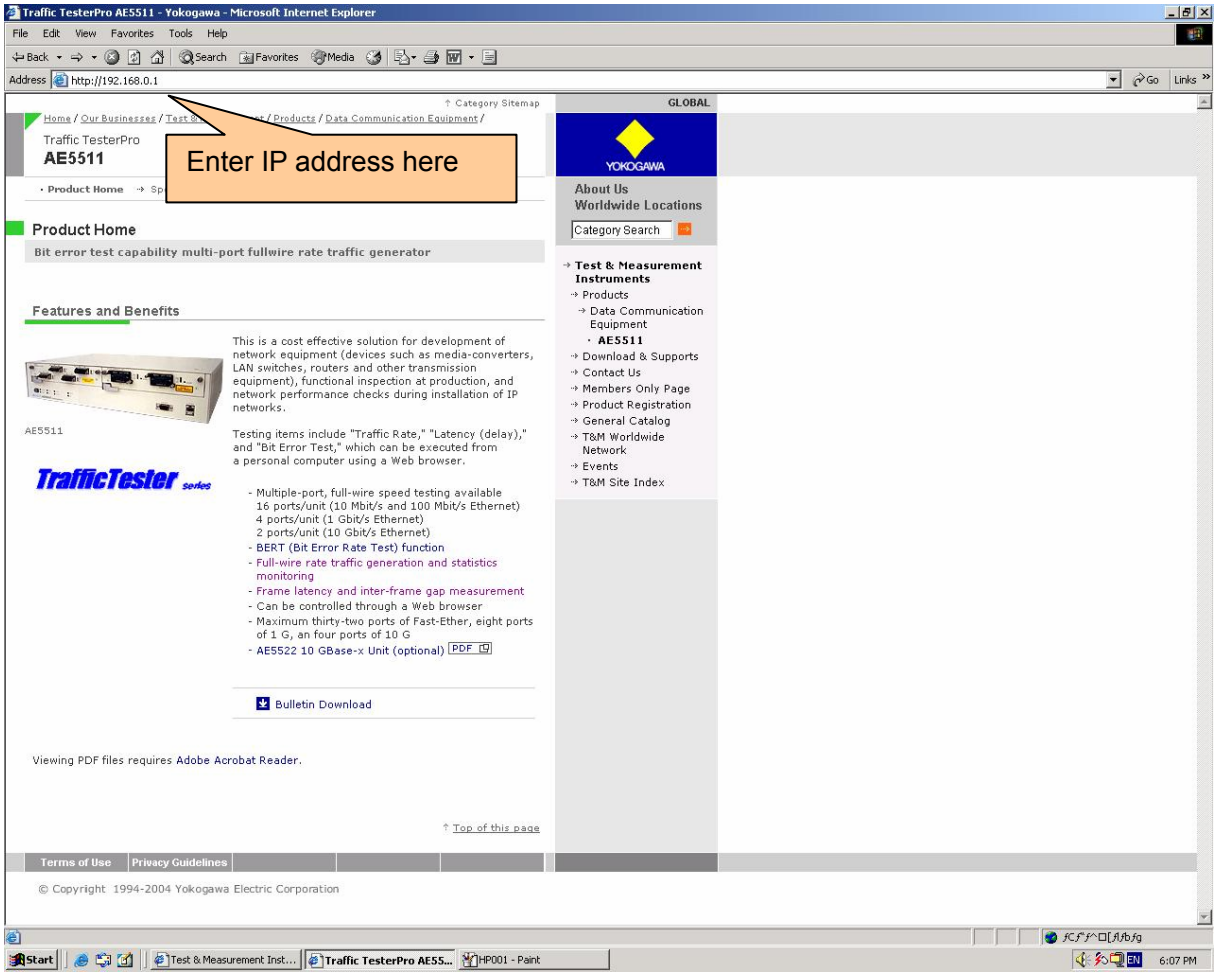
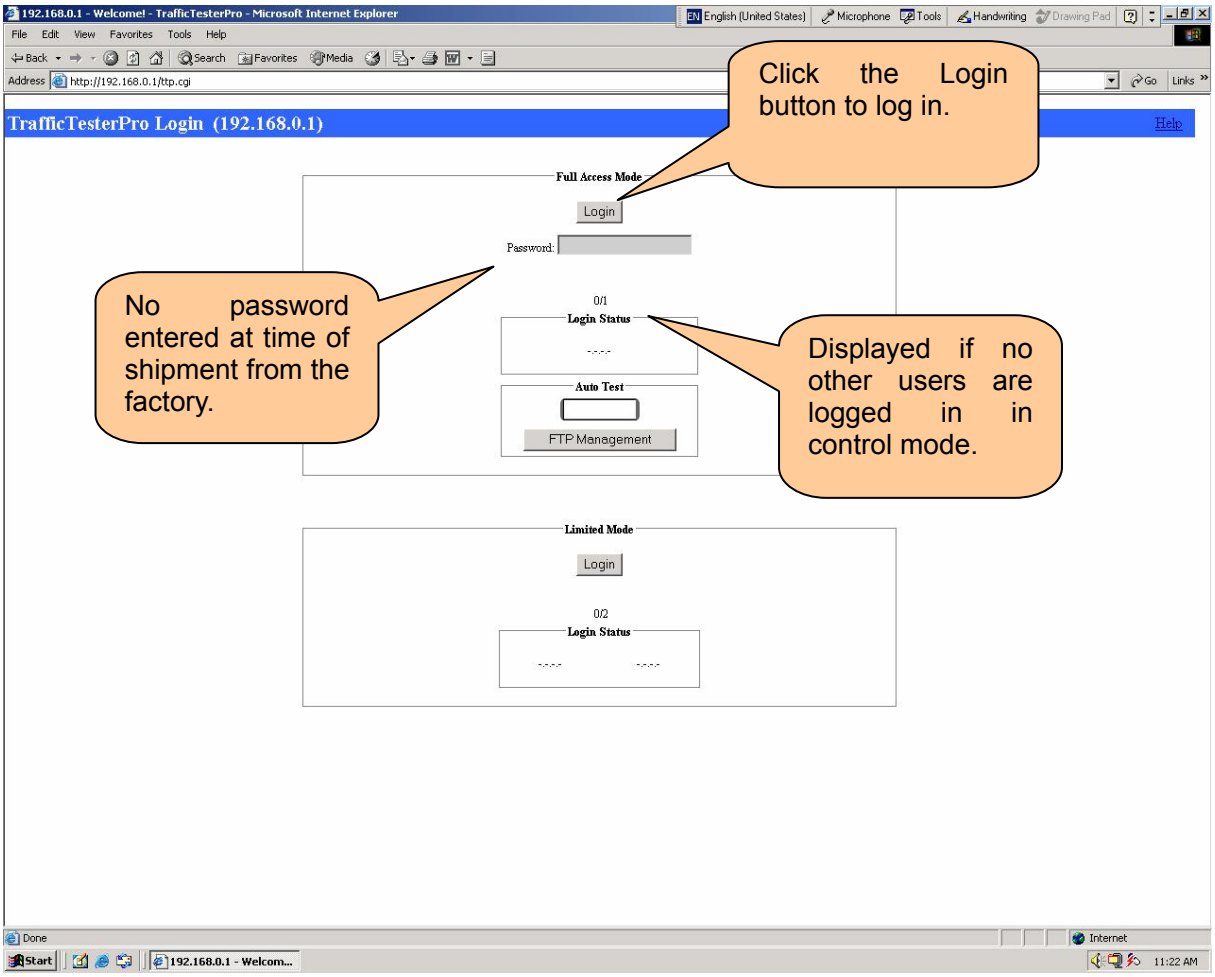


Figure 3.2-19 Inputting the IP address

3.2.7 Logging On to the Instrument

The logon screen appears. In order to perform control, you must log on in Control mode here. Before logging on, make sure that other users are not currently logged on in Control mode (no password is set on the instrument at the time of shipment, so leave the Password box blank and click the **Logon** button).

Figure 3.2-20 Logon screen



3.2.8 Entering Measurement Settings

You can enter measurement settings according to the following procedure.

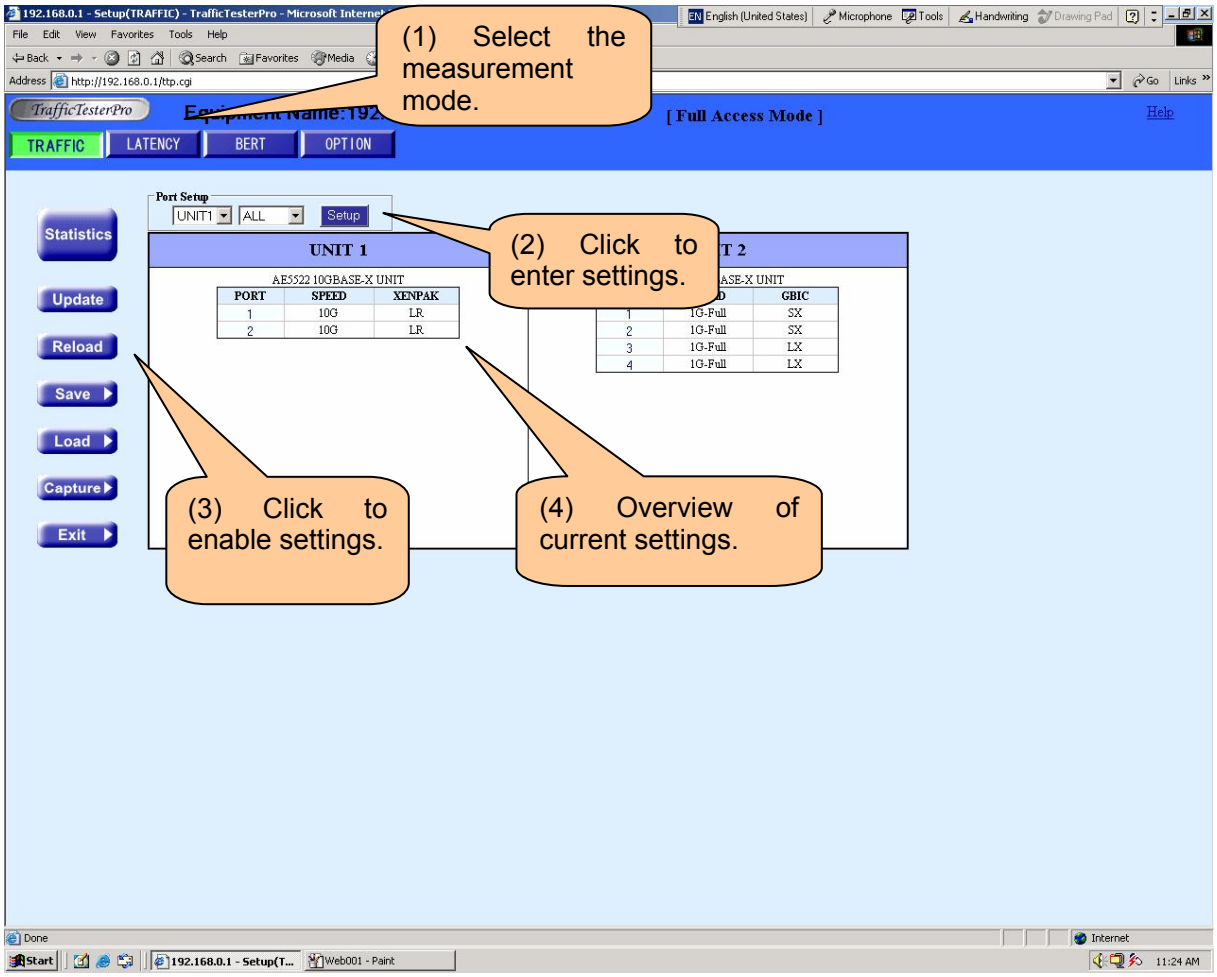


Figure 3.2-21 Measurement setting screen

(1) Select the measurement mode

Select the desired mode from the following. For details, see section 4.3.2, “Selecting the Mode.”

Table 3.2.3 Measurement modes

Mode	Description	Further Information
Traffic	Traffic generation mode	See 4.5 Traffic Mode
Latency	Delay measurement mode	See 4.6 Latency Mode
BERT	Bit error rate measurement mode	See 4.7 BERT Mode
Option	Option settings	See 4.9 Option Screen

(2) Enter settings

Select the port on which to configure settings, then click the **Setup** button or click a port number of one of the displayed units. A screen appears allowing you to enter detailed measurement settings. For details, see section 4.5.2, “Port Setting Screen.”

(3) Enable settings.

Click the **Enable Settings** button to apply the settings to the instrument. For details, see section 4.4.2.1, “Enabling Settings.”

(4) Confirm settings.

The current settings are displayed. Confirm that they are correct. For details, see section 4.5.1.2, “Displaying Unit Information.”

3.2.9 Performing Measurement and Displaying Results

You can start measurement by clicking the **Send Control Statistics** button in the measurement setting screen.

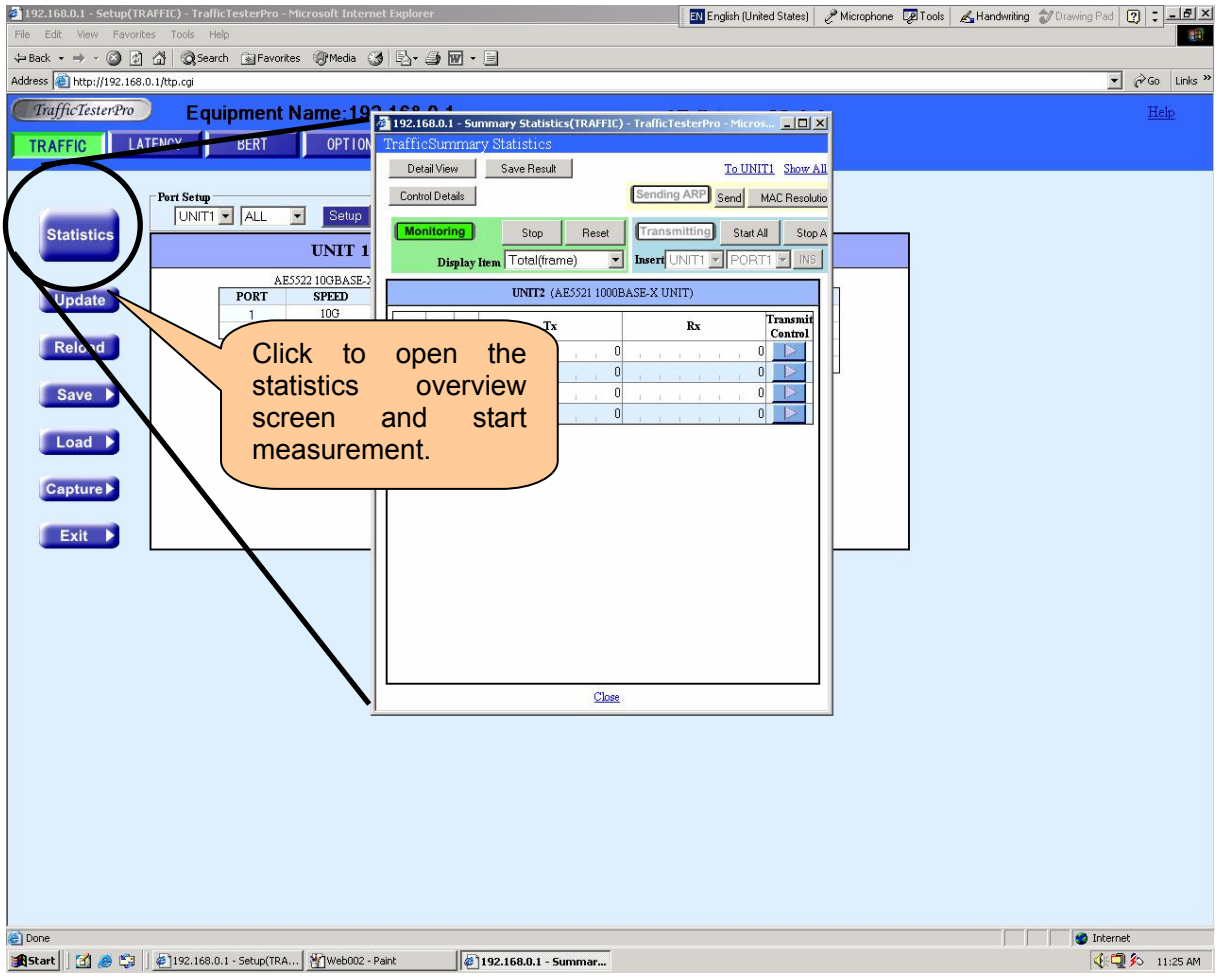


Figure 3.2-22 Performing measurements

3.2.10 Closing the Browser

Before closing the browser, you must first log off the instrument using the exit menu. The Exit menu is available from the top menu of Traffic, Latency, and BERT screens.

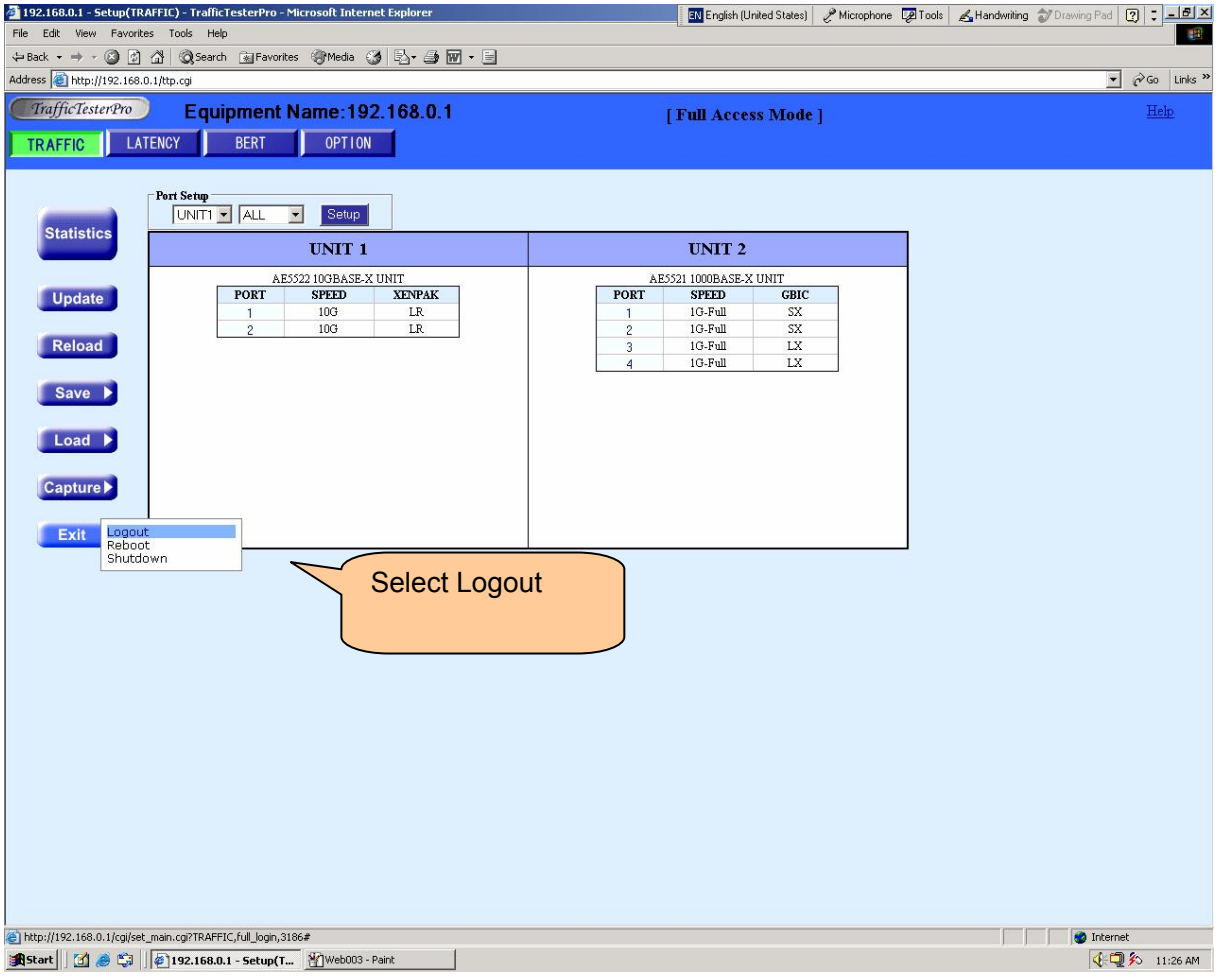


Figure 3.2-23 Logoff screen

Place the cursor over the Exit button, then click **Logoff** in the shortcut menu that appears.

3.2.11 Turning the Power to the Instrument OFF

(1) Shutting down by pushing the front panel switch

If you press and hold down the switch on the front panel for one second or longer, the instrument will shut down regardless of the presence of any logged on users. The STATUS LED blinks during shutdown. After ten to thirty seconds, the power shuts down automatically and enters standby mode.

(2) Shutting down from the Web control screen

Users logged on in Control mode can choose **Exit** > **Shutdown** from the Web control screen to shut down the instrument. Just like the method of pressing the front panel switch, the STATUS LED blinks during shutdown, and after ten to thirty seconds, the power shuts down automatically and enters standby mode.

If you shut down in this manner you can close the browser without logging out.

Caution

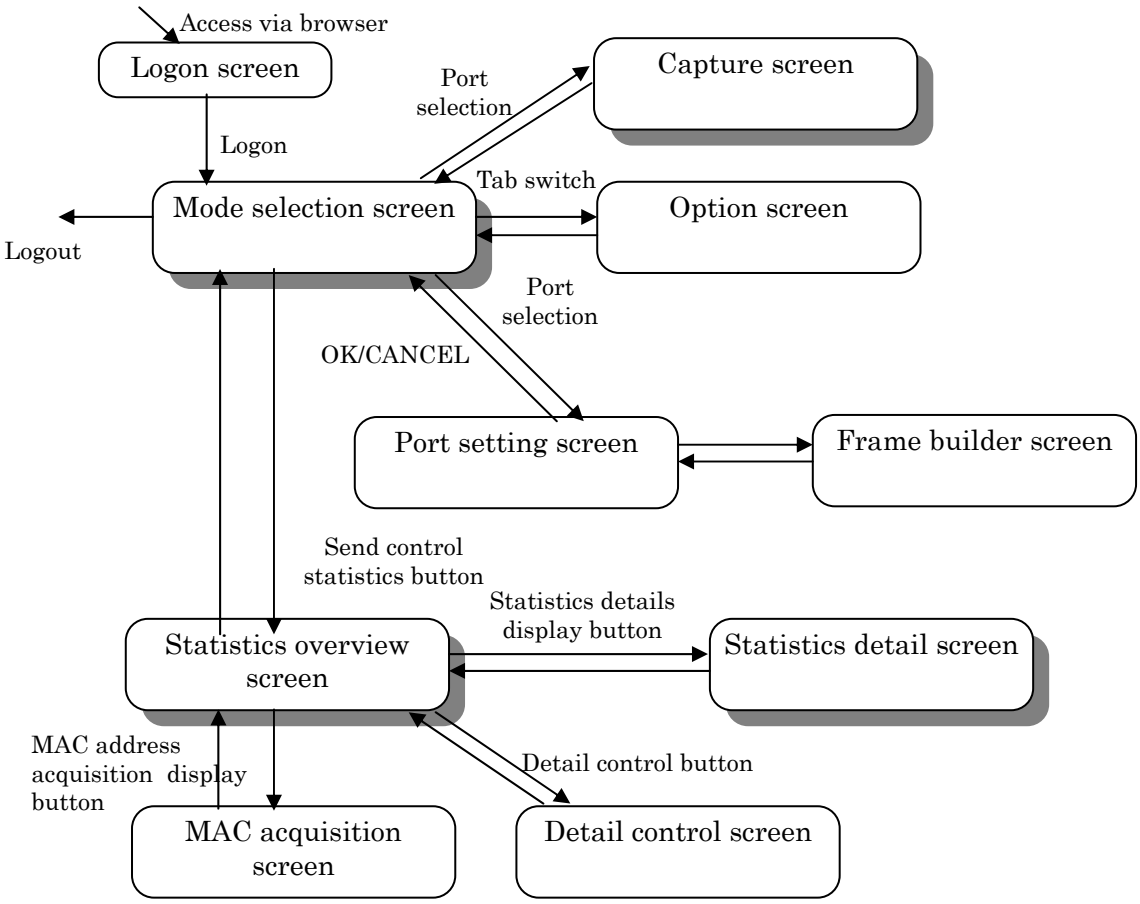
If the POWER switch on the front panel is held down for three seconds or longer, the instrument is forcibly shut down and a malfunction can result. When turning the power to the instrument OFF, you must use the shutdown method described in section 3.2.11.

Chapter 4 Detailed Description of Functions

This chapter provides an explanation of each function of the instrument.

4.1 Overview of Screens

This section provides a structural overview of screens, as shown in figure 4.1-1 below.



Note: Shaded cells can be opened in a separate window

Figure 4.1-1 Screen structure

4.2 Logon Screen

This section introduces the logon screen which appears as shown in figure 4.21 after the initial screen. This screen verifies that the person logging in is a valid user of the instrument. The screen allows the user to log on in Control mode or Edit mode.

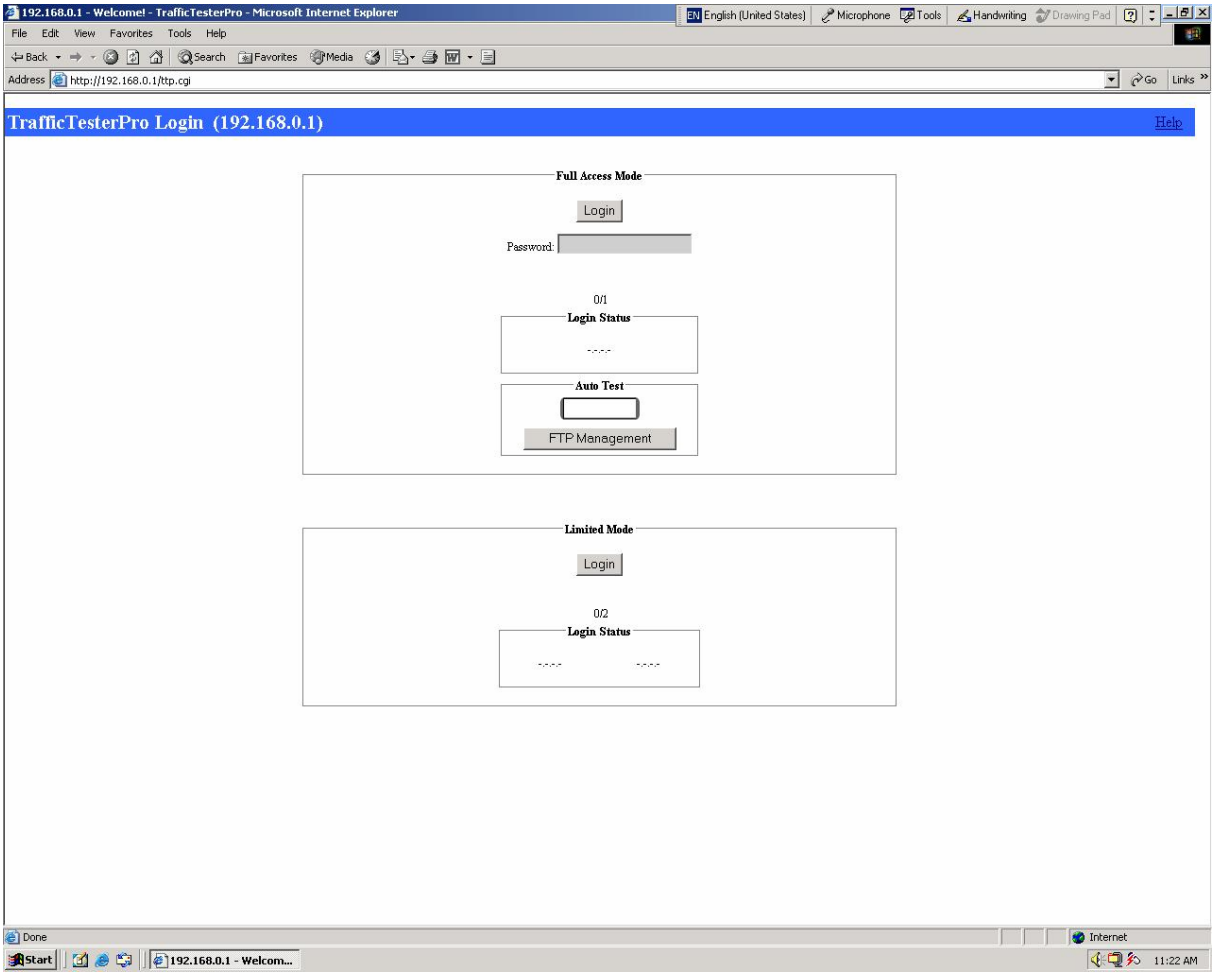


Figure 4.2-1 Logon screen

4.2.1 Control Mode

When logged on in this mode, you can enter measurement settings, and start or stop measurement. Specifically, the following settings and functions can be manipulated.

- System settings
- Measurement settings
- Measurement start/stop control
- Online control
- Enabling of settings on the instrument
- Loading and saving of measurement settings

Only one user can be logged on at a time in this mode. If another user is already logged on, a second user cannot also log on.

4.2.1.1 Login Button

Click this button to log on to the instrument. Before logging on, you must enter a password.

4.2.1.2 Password Input Box

Enter your password in this box when logging on. You must enter the password set on the instrument.

Note that no password is set on the instrument at the time of shipment from the factory. For instructions on setting the password, see section 4.9.1.2 (1) Password setting."

4.2.1.3 Current Number of Users Logged On

This item displays the number of users logged on in Control mode. Only one user can log on in this mode at a time. Remember that you cannot log on if another user is already logged on.

4.2.1.4 Logged On

This item displays the terminal IP address used by currently logged on user. If no users are logged on, "– . – . – . –" is displayed. Also, "Console" is displayed if users are logged on at the console, and Control mode log on is prohibited.

4.2.1.5 Auto Test

"Running" is displayed if an auto test script file is running. If you click the Login button during execution of an auto test, the message "Stop script?" is displayed. Click **OK** to stop the script and redisplay the logon screen.

4.2.1.6 FTP File Control

You can click this item to display a separate window and access the instrument via Internet Explorer's FTP function. When doing so, an FTP logon password is required. If folders exist for auto test script files and setting files, and auto test measurement results files, you can easily add files to those folders or delete files from them.

4.2.2 Edit Mode

When logged on in this mode, you can use functions other than execution control (measurement start/stop) and system settings. Specifically, the following settings and functions can be manipulated.

- Measurement settings
- Loading and saving of measurement settings

Up to two users can be logged on at a time in this mode. If two other users are already logged on, a third user cannot also log on.

4.2.2.1 Login button

Click this button to log on to the instrument.

4.2.2.2 Current Number of Users Logged On

This item displays the number of users logged on in Edit mode. Only two users can log on in this mode at a time. Remember that you cannot log on if two other users are already logged on.

4.2.2.3 Logged On

This item displays the terminal IP address used by currently logged on users. The IP addresses of up to two logged on users are displayed. If no users are logged on, "– . – . – . –" is displayed.

4.3 Mode Selection Screen

This section gives an example of the screen that appears immediately after logging on to the instrument. In this screen, you can specify the measurement mode, enter port information, and perform control of certain functions.

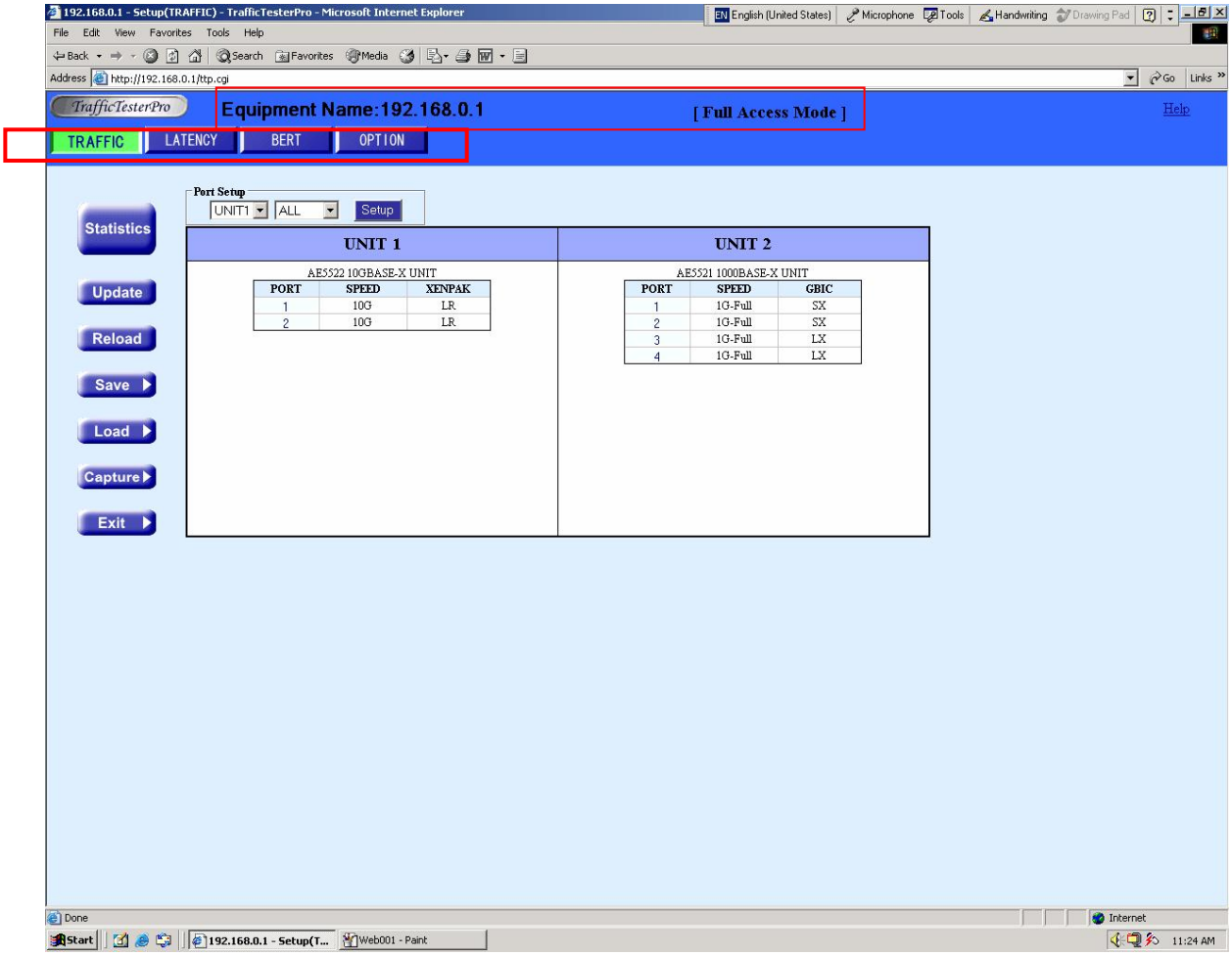


Figure 4.3-1 Mode selection screen (when Traffic mode is selected)

4.3.1 Device Name/Logon Mode

The name of the system specified under system settings is displayed here. For details on specifying device names, see section 4.9.1.1, “Entering Settings on the Main Unit.” The mode in which the current user is logged on is displayed.

4.3.2 Selecting the Mode

You can select a measurement mode using the buttons shown in figure 4.3-2.

Figure 4.3-2 Mode selection buttons (when in Traffic mode)

4.3.2.1 Traffic Mode

You can click the TRAFFIC button to enter the traffic generation mode. In this mode, Ethernet frames can be transmitted to a port on an arbitrary unit, or to all ports. Also a statistical function is available in which statistics on received Ethernet frames are calculated. For details, see section 4.5, “Traffic Mode.”

When this mode is selected, information about the units installed in the instrument and their measurement ports is displayed in the center of the screen.

4.3.2.2 Latency Mode

You can click the LATENCY button to enter Latency mode, in which time-stamped frames are transmitted and received in order to measure the delay. In this mode, two ports must be specified. For details, see section 4.6, “Latency Mode.”

When this mode is selected, information about combinations of units installed in the instrument and measurement ports is displayed in the center of the screen.

4.3.2.3 BERT Mode

You can click the BERT button to enter BERT mode, in which you can test whether bit errors occur in the I/O data of the unit under test. For details, see section 4.7, “BERT Mode.”

When this mode is selected, information about the units installed in the instrument and its measurement ports is displayed in the center of the screen.

4.3.2.4 Options

You can click the OPTION button to specify optional settings on the instrument. Time settings, remote port network settings, and other utility settings can be entered. For details, see section 4.9, “Option Screen.”

4.4 Items Common to All Modes

This section describes screen elements of the instrument that are common to the Traffic, Latency, and BERT modes.

4.4.1 Controlling Transmission and Statistics

Figure 4.4-1 Transmission control and statistics button

When you click this button, the statistics overview screen for Traffic, Latency, or BERT mode opens, allowing control of measurement.

See section 4.5.4, for the statistics overview screen of Traffic mode.
See section 4.6.4, for the statistics overview screen of Latency mode.
See section 4.5.4, for the statistics overview screen of BERT mode.

Note that these screens are only displayed and operable when logged on in Control mode.

4.4.2 Enabling and Retrieving Settings

The functions described in this section allow you to enable measurement settings entered in the browser on the instrument, or retrieve settings already set on the instrument to the PC. Note that these screens are only displayed and operable when logged on in Control mode.

4.4.2.1 Enabling Settings

Click the **Enable settings** button to activate the measurement settings currently displayed on the browser on the instrument. This process may take some time. If you return to this screen after having pressed the OK button in the port setting screen, the color of the port number box changes. This indicates that the new settings have not been enabled on the instrument; click **Enable Settings** to do so.

Figure 4.4-2 Enable settings button

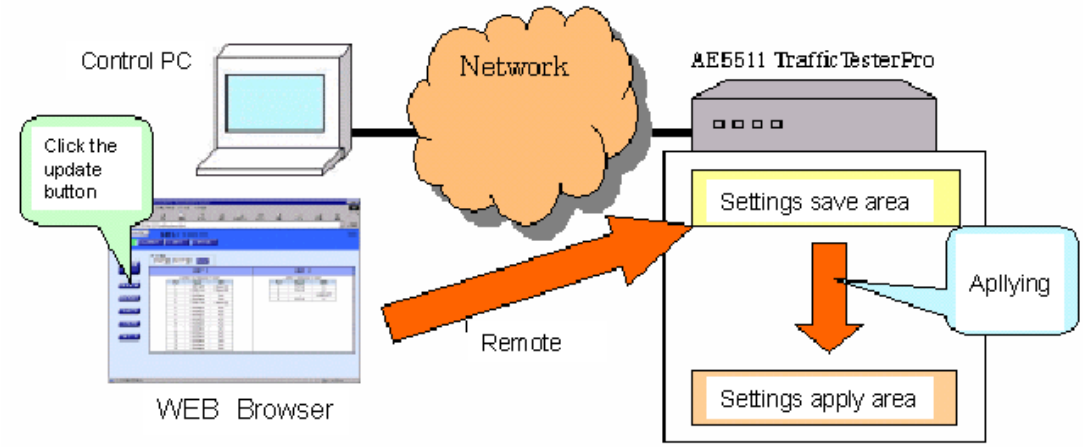


Figure 4.4-3 Overview of enabling settings

4.4.2.2 Retrieving Settings

Click the **Retrieve Settings** button to download the settings currently active on the instrument to the controller PC.

Figure 4.4-4 Retrieve Settings button

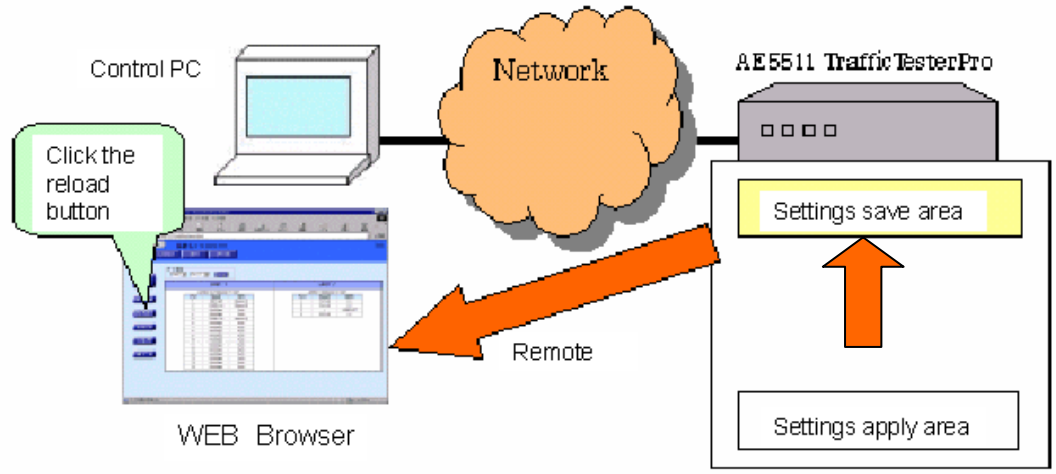


Figure 4.4-5 Overview of retrieving settings

4.4.3 Saving and Loading Settings on the PC

The function described in this section allow you to save or load settings on the controller PC.

4.4.3.1 Saving Settings

The SAVE button allows you to save the settings currently displayed on the Web browser to the controller PC.

Figure 4.4-6 SAVE button shortcut menu

Place the cursor over the **SAVE** button to display the shortcut menu shown in figure 4.4-6.

- All
  Save all settings of Unit1 and Unit2.
- Unit1
  Save settings only of Unit1 (not displayed in Latency mode).
- Unit2
  Save settings only of Unit2 (not displayed in Latency mode).

When you select any of the above items, the save screen shown in figure 4.4-7 appears. Place the cursor over the file name display area and right-click. Select **Save File** from the shortcut menu to save the settings to the hard disk of the controller PC. The file save destination window appears, allowing you to specify a file name and save destination. The default file name is ttp_setup.pfst, and can be changed if desired. However, the extension cannot be changed. Up to twenty characters can be used for the file name, including the extension.

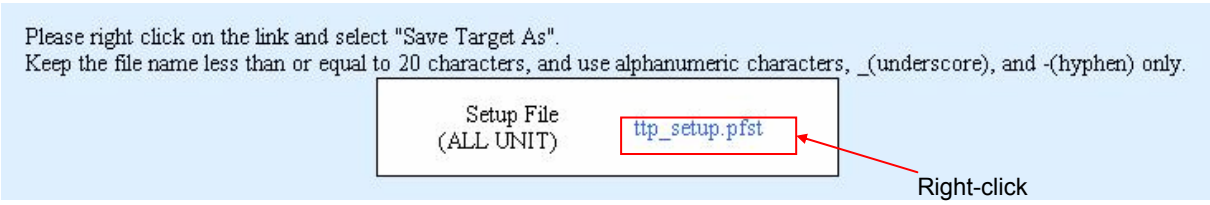


Figure 4.4-7 Save screen

The following figure gives an overview of the save operation.

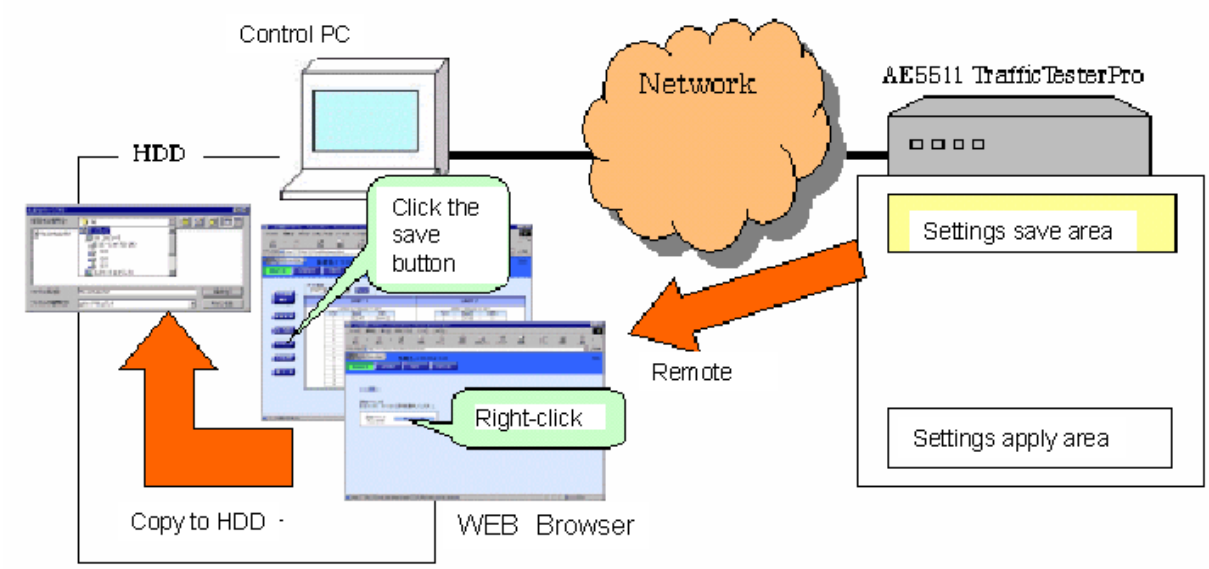


Figure 4.4-8 Overview of the save operation

4.4.3.2 Loading Settings

The LOAD button allows you to load settings saved from the hard drive of the controller PC.

Figure 4.4-9 LOAD button

Place the cursor over the LOAD button to display the shortcut menu shown in figure 4.4-9.

- All
  Load all settings for Unit1 and Unit2.
- Unit1
  Load settings for Unit1 (not displayed in Latency mode).
- Unit2
  Load settings for Unit2 (not displayed in Latency mode).

When you select one of the items above, the screen changes to the one shown in figure 4.4-10. Click **Browse**, select a file to load, then click the **LOAD** button. The time required to complete the loading operation depends on the number of frames in the data being loaded. If the number of frames is large, the time required for display may be long (several minutes may be required if 127 frames are saved.) However, note that simply loading a file does not enable the settings on the instrument. To enable the settings, see section 4.4.2.1, “Enabling Settings.”

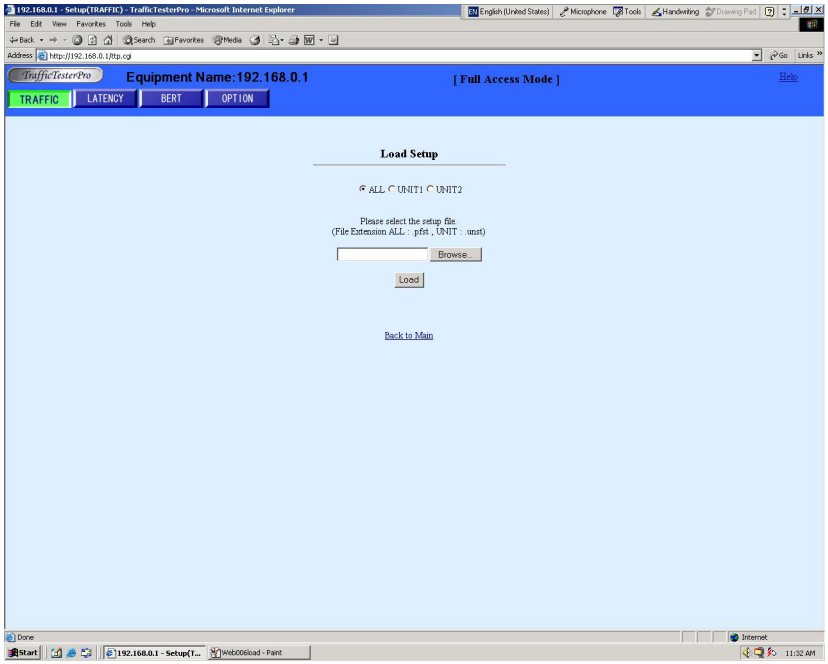


Figure 4.4-10 Load screen

The following figure gives an overview of the LOAD operation.

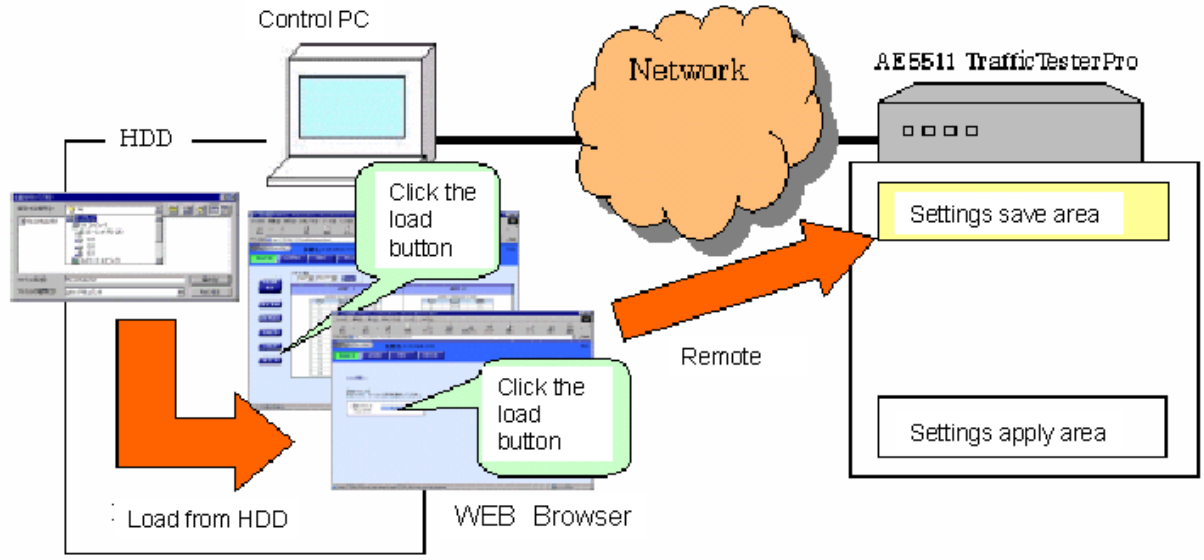


Figure 4.4-11 Overview of the load operation

4.4.4 Capturing Data

The Capture function allows you to capture received data. Place the cursor over the CAPTURE button and select a unit and port for which the Capture function is available. Note that the Capture function is only available with the AE5522 10GBASE-X Unit. It is not available on the AE5520 10/100BASE-T and the AE5521 1000BASE-X units.

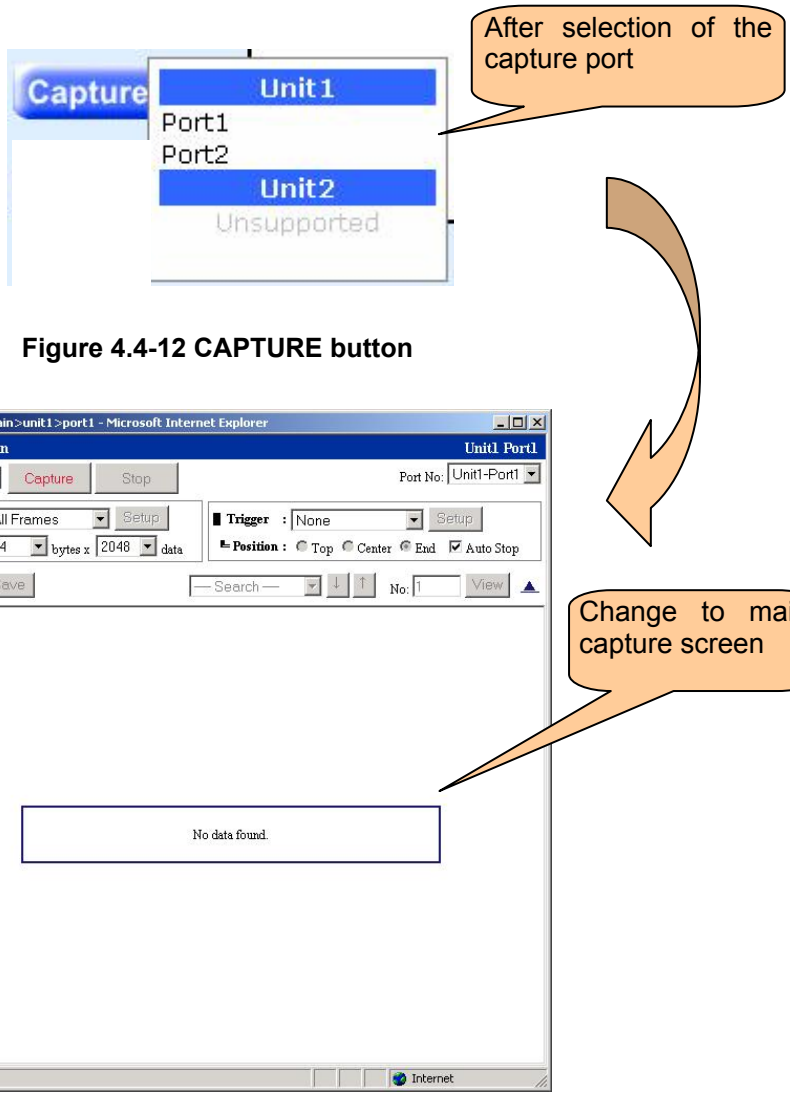


Figure 4.4-12 CAPTURE button

For a detailed description of the operation of this function, see section 4.8, “Capture Function.”

4.4.5 Exit

This is the procedure for logging off or shutting down the instrument. Place the cursor over the **Exit** button to display the shortcut menu shown in figure 4.5-1.

Figure 4.5-1 Exit button

4.4.5.1 Logging Off

Select **Logoff** to log off of the instrument. You must log off before closing the browser.

4.4.5.2 Rebooting

Select **Reboot** to reboot the main unit. This command only appears when logged on in Control mode.

4.4.5.3 Shutting Down

Select **Shutdown** to shut down the instrument. This command only appears when logged on in Control mode.

4.5 Traffic Mode

This section provides an explanation of Traffic mode.

4.5.1 Mode Selection Screen (Traffic Mode)

Table 4.5-1 below shows the mode selection screen when selecting Traffic mode.

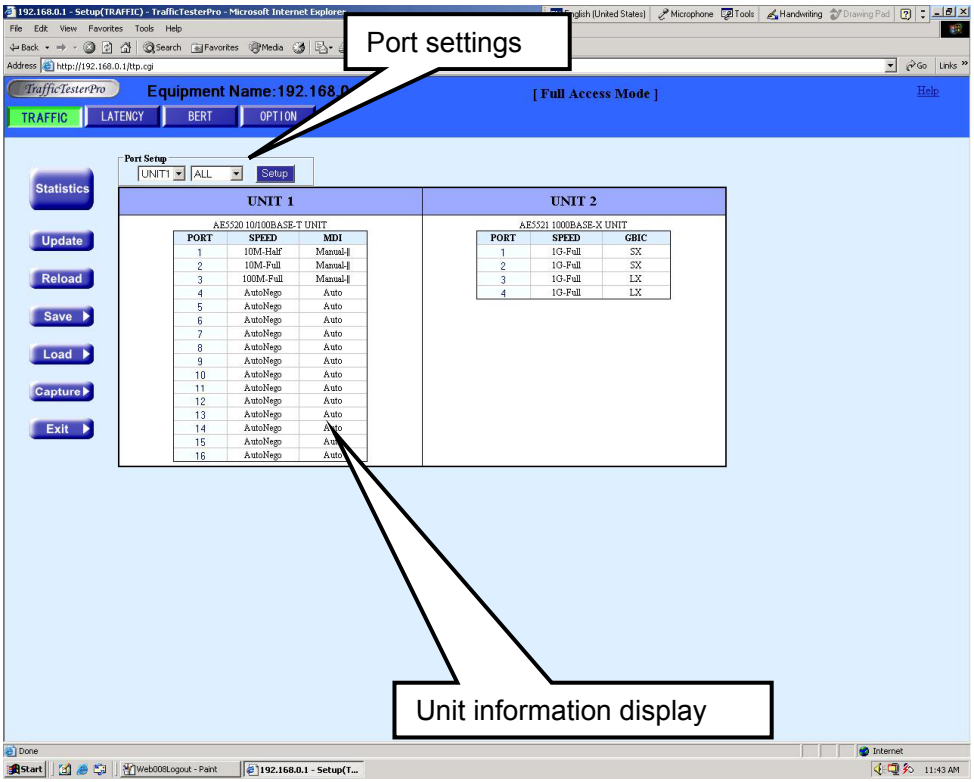


Figure 4.5-1 Mode selection screen (when Traffic mode is selected)

WARNING

- This instrument has functions allowing it to transmit frames at high loads from its measurement ports. Incorrect operation can result in breakdown or deterioration of network media or related devices.
- Sufficient care must be taken when performing tests while connected to networks. Yokogawa does not assume any responsibility for damages resulting from incorrect operation.
- Avoid pressing your browser's Back button as the setting values may not take effect.

4.5.1.1 Port Settings

You can specify the measurement ports on which to enter measurement settings.

Figure 4.5-2 Port settings

(1) Specify a unit
Select an installed unit. However, if a unit is not installed in slot 1 or slot 2, that unit cannot be selected.

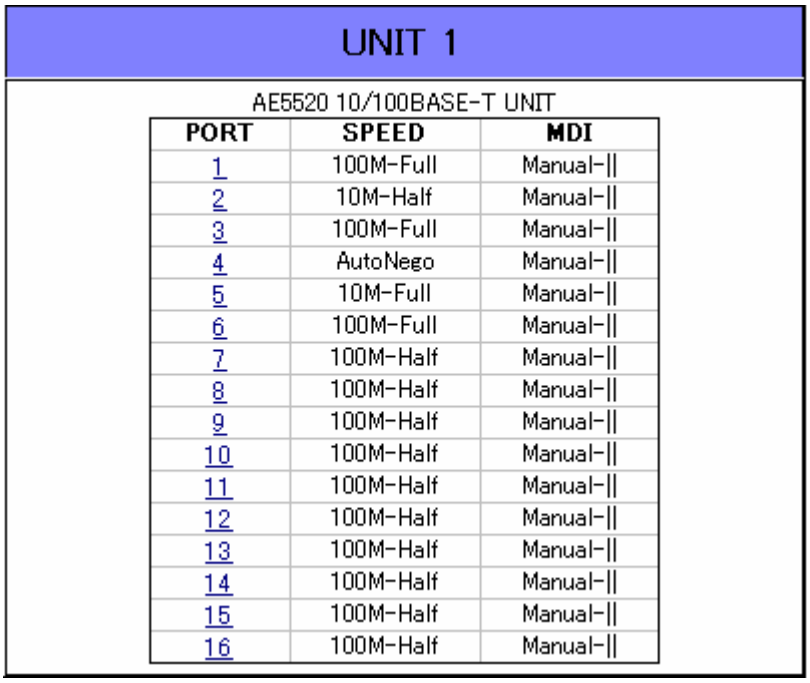
(2) Specify a measurement port
Select a measurement port for the unit selected in the previous item. If you select ALL, you can apply the same setting to all ports. However, if GBIC is not installed with the AE5521 1000BASE-X Unit, and if XENPAK is not installed with the AE5522 10GBASE-X Unit, that port cannot be selected.

(3) Setup button
Pressing this button sends you to a screen for entering detailed measurement settings related to the unit and measurement ports specified in the previous items. For details on the port setting screen, see section 4.5.2, “Port Setting Screen.”

4.5.1.2 Displaying Unit Information

An overview of the measurement information set for each measurement port is displayed.

(1) When the AE5520 10/100BASE-T Unit is installed



UNIT 1

AE5520 10/100BASE-T UNIT

PORT	SPEED	MDI
1	100M-Full	Manual-||
2	10M-Half	Manual-||
3	100M-Full	Manual-||
4	AutoNego	Manual-||
5	10M-Full	Manual-||
6	100M-Full	Manual-||
7	100M-Half	Manual-||
8	100M-Half	Manual-||
9	100M-Half	Manual-||
10	100M-Half	Manual-||
11	100M-Half	Manual-||
12	100M-Half	Manual-||
13	100M-Half	Manual-||
14	100M-Half	Manual-||
15	100M-Half	Manual-||
16	100M-Half	Manual-||

Figure 4.5-3 Overview of measurement port settings (when the AE5520 10/100BASE-T Unit is installed)

The AE5520 10/100BASE-T Unit has sixteen ports, and the link settings and MDI status for each of those port is displayed.

a. Name of unit

The model name of the unit installed in the slot is displayed.

AE5520 10/100BASE-T UNIT

Figure 4.5-4 Name of unit

b. PORT

The port numbers of the unit are displayed. In the case of the AE5520 10/100BASE-T Unit, information on sixteen ports is displayed. If you click one of these numbers, you are taken to the corresponding port setting screen.

c. SPEED

Displays the link setting. The following types are available.

Table 4.5.1 List of SPEED items

Type	Description
10M-Full	10BASE-T, full duplex, fixed
10M-Half	10BASE-T, half duplex, fixed
100M-Full	100BASE-TX, full duplex, fixed
100M-Half	100BASE-TX, half duplex, fixed
AutoNego	Auto negotiation setting

d. ||/X

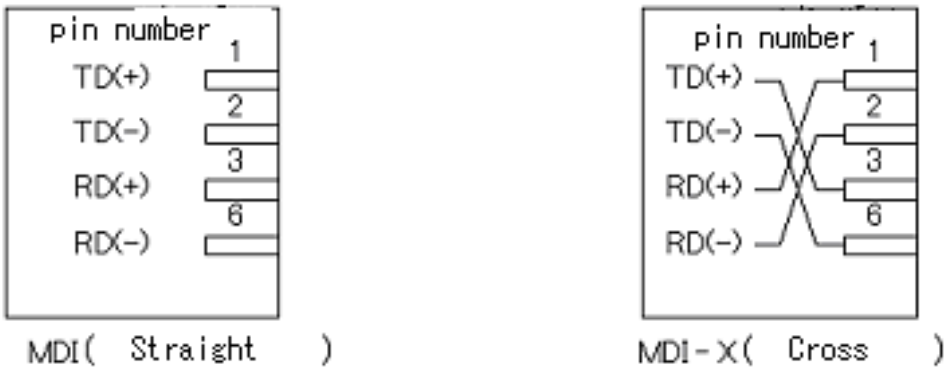
Displays the cross/straight setting. The following types are available.

Table 4.5.2 List of II/X items

Type	Description
Manual-||	MDI setting.
Manual-X	MDI-X setting.
Auto	MDI/MDI-X auto cross

Note

- MDI and MDI-X differ as follows:



- Normally, MDI is for the terminal side, whereas hubs and other network devices use MDI-X or MDI/MDI-X auto cross.

(2) When the AE5521 1000BASE-X Unit is installed

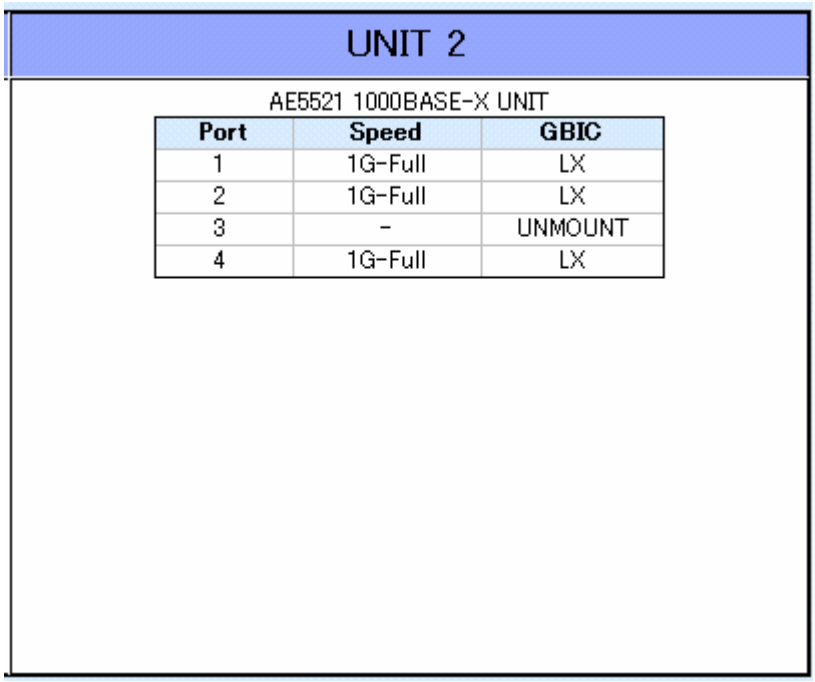


Figure 4.5-5 Overview of measurement port settings (when the AE5521 1000BASE-X Unit is installed)

The AE5521 1000BASE-X Unit has four ports, and the link settings and GBIC installation status for each port is displayed.

a. Name of unit

The model name of the unit installed in the slot is displayed.

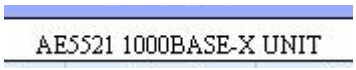


Figure 4.5-6 Name of unit

b. PORT

The port numbers of the unit are displayed. In the case of the AE5521 1000BASE-X Unit, information on four ports is displayed. If you click one of these numbers, you are taken to the corresponding port setting screen.

c. SPEED

Displays the link setting. The following types are available.

Table 4.5.3 List of SPEED items

Type	Description
1G-Full	1000BASE-X, full duplex, fixed
AutoNego	Auto negotiation setting
-	Displayed if the GBIC module is not installed.

d. GBIC

Displays the GBIC installation status. The following types are available.

Table 4.5.4 List of GBIC items

Type	Description
SX	Displayed if GBIC for the 1000BASE-SX is installed.
LX	Displayed if GBIC for the 1000BASE-LX is installed.
UNKNOWN	Displayed if a GBIC module is installed but could not be properly recognized.
UNMOUNT	Displayed if the GBIC module is not installed.

(3) When the AE5522 10GBASE-X Unit is installed

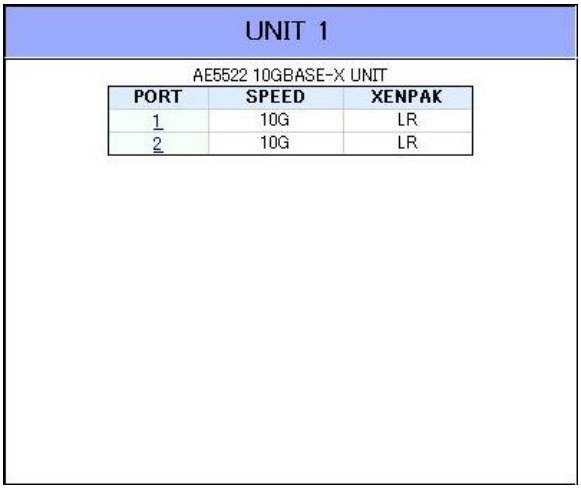


Figure 4.5-7 Overview of measurement port settings (when the AE5522 10GBASE-X Unit is installed)

The AE5522 10GBASE-X Unit has two ports, and the link settings and XENPAK installation status for each port is displayed.

a. Name of unit

The model name of the unit installed in the slot is displayed.

Figure 4.5-8 Name of unit

b. PORT

The port numbers of the unit are displayed. In the case of the AE5522 10GBASE-X Unit, information on two ports is displayed. If you click one of these numbers, you are taken to the corresponding port setting screen.

c. SPEED

Displays the link setting. The following types are available.

Table 4.5.5 List of SPEED items

Type	Description
10G	10GBASE-X, full duplex, fixed
-	Displayed if the XENPAK module is not installed.

d. XENPAK

Displays the XENPAK module installation status. The following types are available.

Table 4.5.6 List of XENPAK items

Type	Description
LR	Displayed if XENPAK for the 10GBASE-LR is installed.
UNKNOWN	Displayed if a XENPAK module is installed but could not be properly recognized.
UNMOUNT	Displayed if the XENPAK module is not installed.

4.5.2 Port Setting Screen (Traffic Mode)

This screen allows you to enter measurement conditions.

4.5.2.1 Port Settings Buttons

There are four major categories of settings: transmission settings, statistical conditions, line settings, and network emulation settings.

Figure 4.5-9 Port settings

(1) Transmission settings
Changes to the transmission traffic setting and insert frame setting screen.
(2) Statistical conditions
Changes to the error judgment setting screen where you can enter receive filter settings and oversize error judgment settings.
(3) Line settings
Changes to the auto negotiation setting and MDI/MDI-X switching setting screen.
(4) Network emulation settings
Changes to a screen for entering ARP reply, PING reply, and other response control settings, self port address settings, and MAC address automatic acquisition function settings.

4.5.2.2 Port Setting Header Items (Traffic Mode)

The header items for the port setting screen contains the following items.

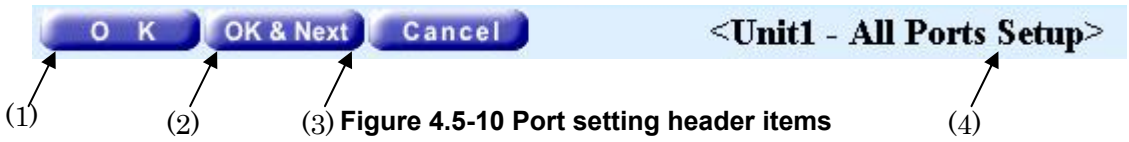


Figure 4.5-10 Port setting header items

(1) OK button
Saves the current port settings and returns to the mode setting screen.
(2) OK & NEXT button
Saves the current port settings and advances to the next port setting screen.
(3) Cancel button
Deletes the current port settings and returns to the mode setting screen.
(4) Display current port
Displays the port currently being set.

4.5.2.3 Entering Transmission Settings (Traffic Mode)

The transmission setting screen allows you to enter transmission condition settings.

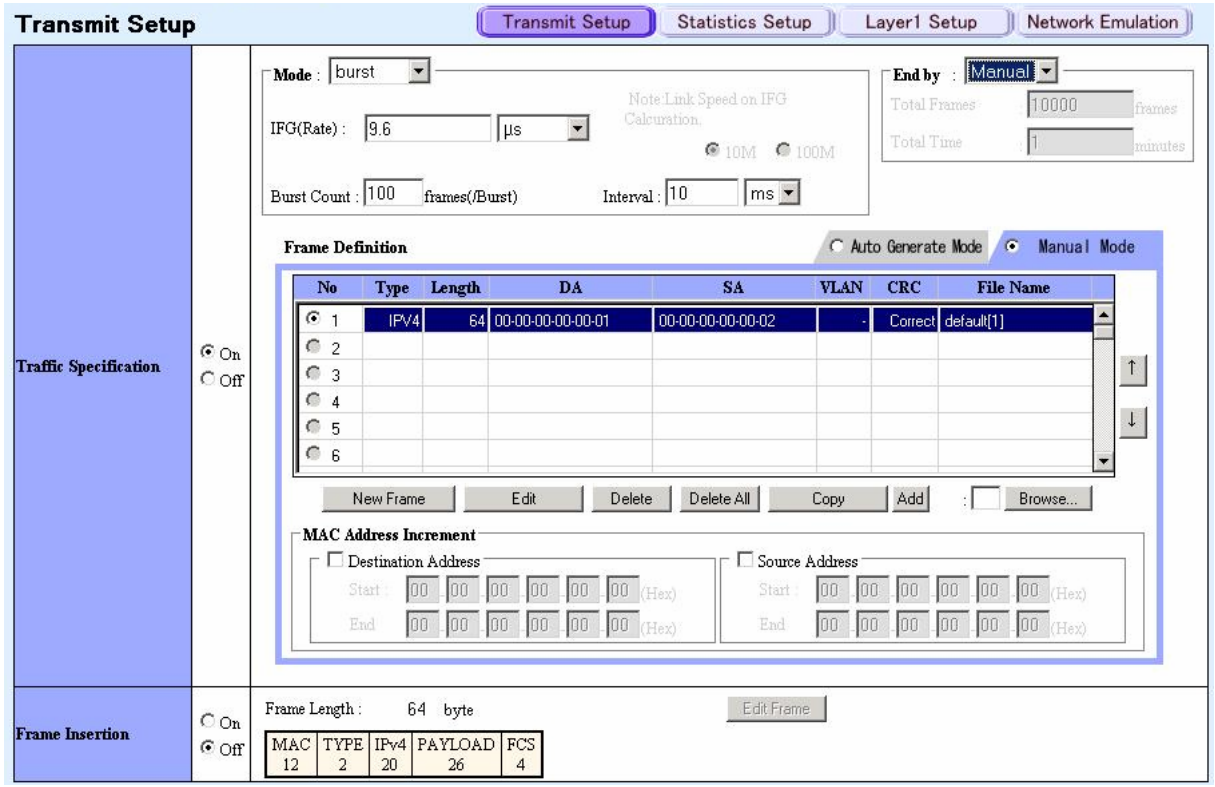


Figure 4.5-11 Transmission condition setting screen

Transmission settings consist of Transmission traffic, and Insert frame settings. Each setting group can be turned ON or OFF.

(1) Transmission traffic settings

The transmission operation is only available when the transmission traffic setting is turned ON. When OFF, transmission operation of transmission traffic cannot be performed.

a. Traffic mode

First, select a traffic mode as follows.

Table 4.5.7 List of traffic mode setting items

Traffic Mode	IFG Settings	No. of Bursts	Interval	Line speed for IFG calculation
Constant rate	Inter frame gap specification. Can be specified with various units (µs, ns, bit frame/s, %, bps)	N/A	N/A	Specify the speed of the measured line (100M or 10M) Note: Avail. only when auto nego. ON
Burst		Burst interval in numbers of frames	Specify the interval in ms.	

• **Traffic mode**

Two modes are available: Constant, and Burst. In Constant mode, the specified frames to be transmitted are repeatedly transmitted at constant intervals.

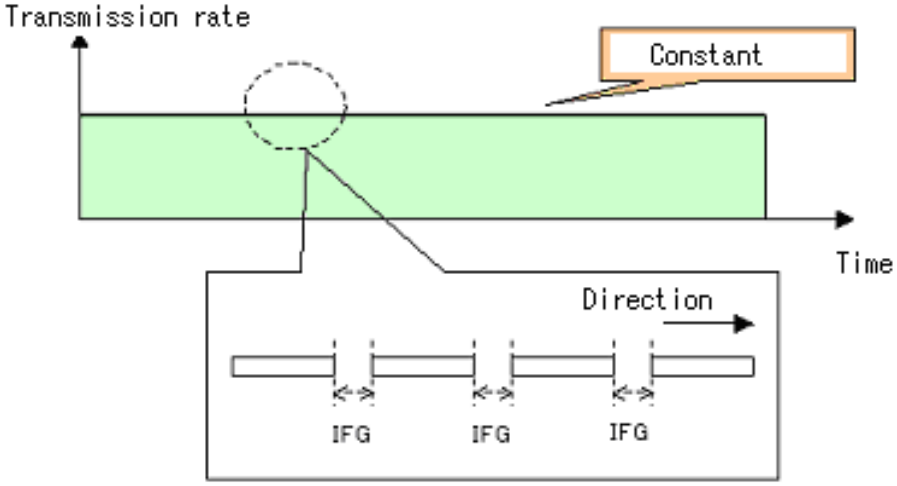


Figure 4.5-12 Overview of Constant rate mode

In Burst mode, frames are transmitted for a constant time, then transmission is stopped for a constant time, then the process repeates in a burst fashion.

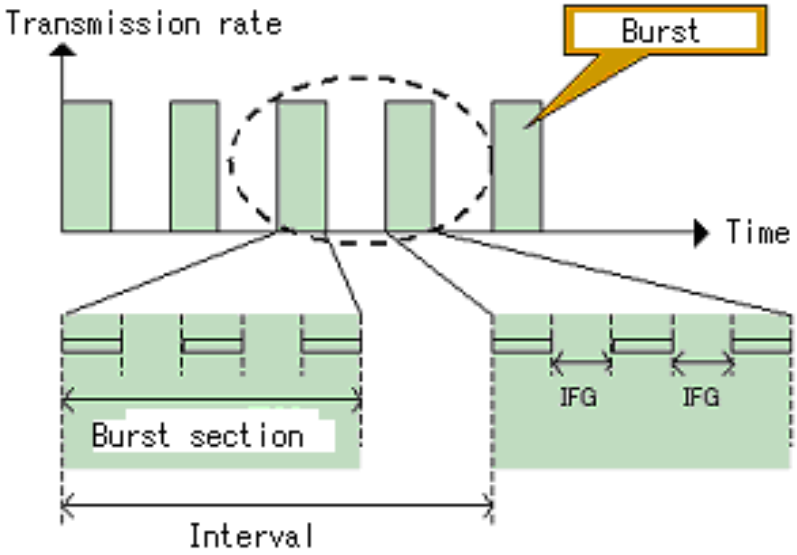


Figure 4.5-13 Overview of Burst mode

IFG (Rate)

You can select the inter frame gap. The specified range varies depending on the setting units and the line speed during IFG calculation as shown in the table below. When the units change, the values of those units are automatically updated.

Table 4.5.8 IFG setting range

Line Speed	Unit	Min.	Max.	Setting Units
10 Mbps	µs	4.8	999979.2	0.4
	ns	4800	999979200	400
	bit	48	9999792	4
	frame/s	16026	1	
	%	107.6923077	0.0067198	
	bps	8205312	512	
100 Mbps	µs	0.48	999997.92	0.04
	ns	480	999997920	40
	bit	48	99999792	4
	frame/s	160256	1	
	%	107.6923077	0.000672	
	bps	82051072	512	
1000 Mbps	µs	0.032	999999.808	0.032
	ns	32	999999808	32
	bit	32	999999808	32
	frame/s	1644737	1	
	%	110.5263158	0.0000672	
	bps	842105344	512	
10G Mbps	µs	0.0072	999999.9424	0.0008
	ns	72	999999942.4	0.8
	bit	72	9999999424	8
	frame/s	15432099	1	
	%	103.7037037	0.0000067	
	bps	7901234688	512	

* The min. and max. IFG above assumes frame lengths of sixty-four bytes.
* The frame/s, %, and bps setting units vary depending on the frame length of the set frames.

- **No. of Bursts (only when Burst is selected)**
  Specifies the number of frames per the burst interval. The available setting range is 1 to 65,535.

- **Interval (only when Burst is selected)**
  The interval can be specified in terms of time. The time can be specified in terms of ms and µs. The setting range is 1µs to 1000 ms (in units of 1 µs).

- **Line speed for IFG calculation**
  When using the AE5520 10/100BASE-T Unit and auto negotiation is ON under line settings, 10M and 100M can be selected. These settings are required for IFG calculation, so you must select a value for the line speed of the unit under test.

  If auto negotiation is OFF, it is not necessary to link with the SPEED line setting, so the line speed setting is dimmed. Also, the speed is fixed at 1000 Mbps when using the AE5521 1000BASE-X Unit, and 10Gbps when using the AE5522 10GBASE-X Unit, so the setting items are not displayed.

b. Transmission mode

You can select from Continuous, Single, or Time Specified.

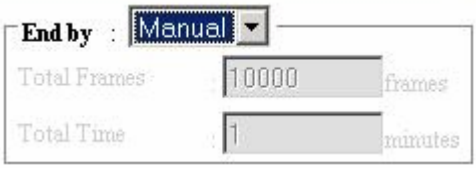


Figure 4.5-14 Transmission mode settings

In Continuous mode, once the transmission button is pressed, transmission continues until the stop button is pressed. In Single mode, the specified number of frames are transmitted once, then transmission stops. The setting range for the number of transmitted frames is from 1 to 4,294,967,295. In Time Specified mode, frames are transmitted continuously for a specified amount of time, then transmission stops.

c. Frame definition (fixed mode)

An overview of the currently defined frames to be transmitted is displayed. In this screen you can create new frames, edit, delete, and copy existing frames, or change the order in which frames are transmitted.

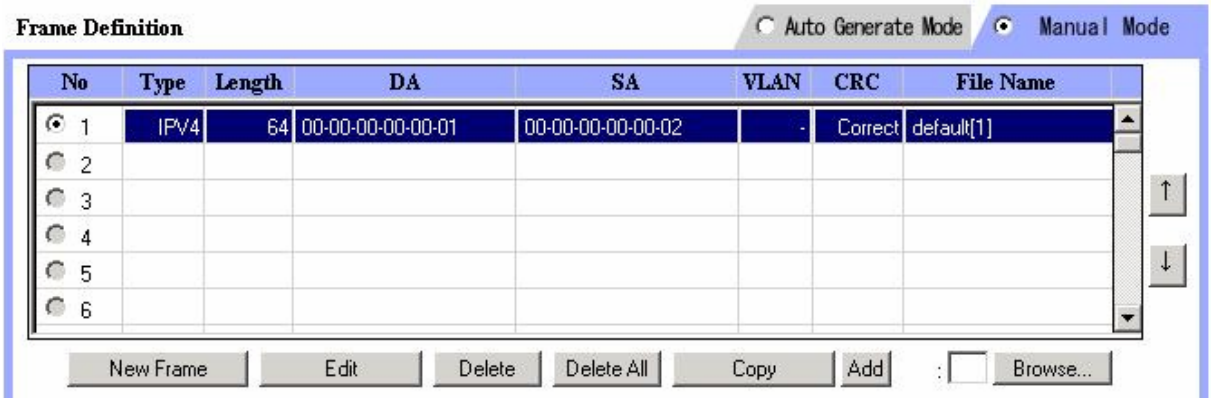


Figure 4.5-15 Frame definition screen

The following is an explanation of the screen in figure 4.5-15.

- **No.**
  The number of the defined frame. Up to 127 frames can be specified.
- **Type**
  Displays the top layer protocol within the Ethernet frame.
- **Frame length**
  Displays the length of the defined frame. The frame length is displayed in red if sixty-three bytes or less, or if it matches or exceeds the error judgment threshold set in the statistical conditions.
- **DA**
  Displays the destination MAC address within the Ethernet frame as a hex value.
- **SA**
  Displays the source MAC address within the Ethernet frame as a hex value.
- **VLAN**
  If a VLAN tag setting exists, displays the tag ID value. If multiple VLAN tags are displayed, the tag ID set for the first layer is displayed.
- **CRC**
  When a CRC error is added to the Ethernet frame, “Error” is displayed, and all other items are displayed as normal.
- **File name**
  Defined frames to be transmitted can be saved on the controller PC in units of frames. When saved, the file name is displayed.
- **Define New Frame button**
  Click to define a new frame for transmission. If no space is available for new frames, they cannot be added. See section 4.5.3, “Frame Builder Screen (Traffic Mode)” or further details.
- **Edit Frame button**
  Edits the currently selected frame.

- **Delete 1 button**
  Deletes the currently selected frame.
- **Delete All button**
  Deletes all currently selected frames.
- **Frame Copy button**
  Copies the currently selected frame. When copying a frame, there must be at least one unused frame space available.
- **Add button**
  Loads a saved frame information file and registers it. When adding a frame, there must be at least one unused frame space available.
- **Browse button**
  Displays the controller PC's files. When loading with the Add button, the file to be loaded is specified.

· **↑, ↓ buttons**
Lets you switch the order of the frames to be transmitted specified under frame definition.

d. Increment MAC address

This function automatically increments the MAC address of the frames to be transmitted.

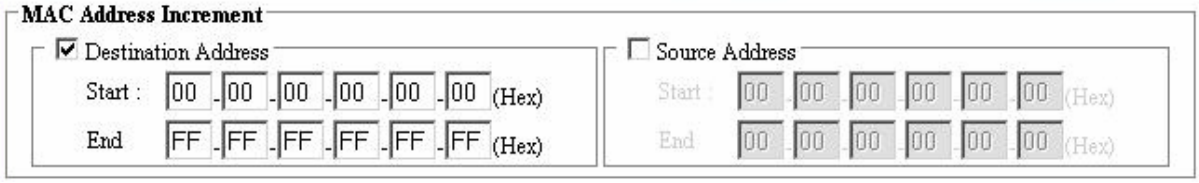


Figure 4.5-16 MAC address increment settings

The items to be set are the destination and source MAC addresses. By selecting the check boxes of each item, the MAC addresses are incremented at the start and stop ranges during transmission.

If the start and stop are the same value, they are not incremented, and the frames are transmitted as a fixed address.

If multiple frames are defined, the MAC address is incremented each time a frame is transmitted.

Note that when enabling the MAC address increment function, the destination and source MAC addresses specified in individual frame definitions are disabled.

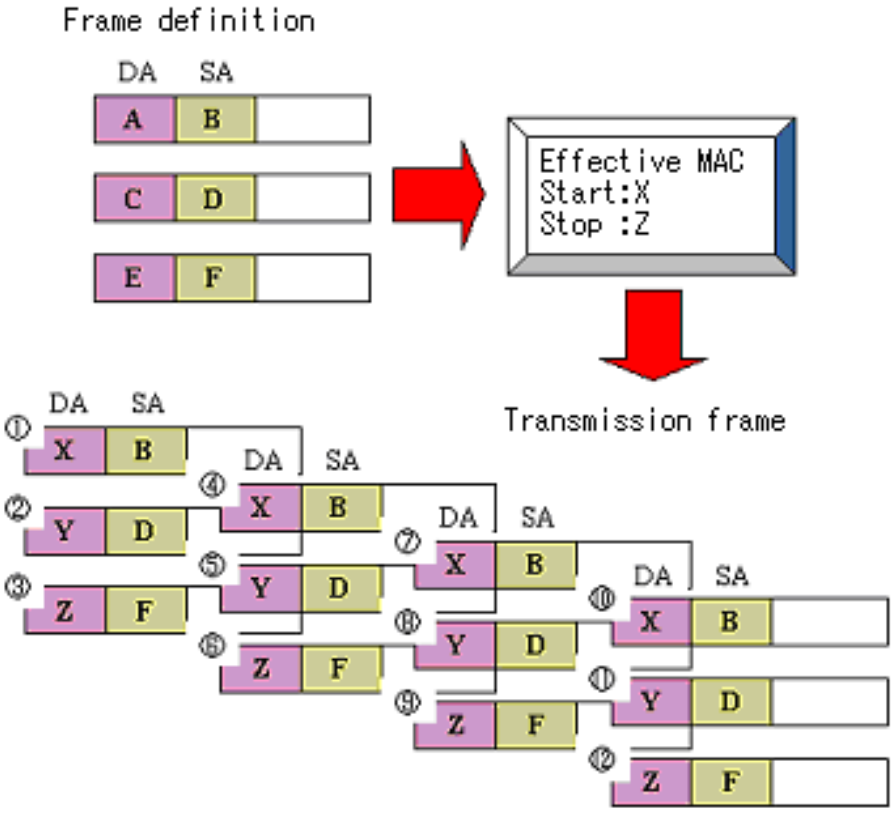


Figure 4.5-17 Overview of address increment function

e. Frame definition (variable field mode)

This function automatically increments the header fields of the frames to be transmitted. Only one frame's fields can be varied at a time. Select the Variable tab as shown in figure 4.5-18.

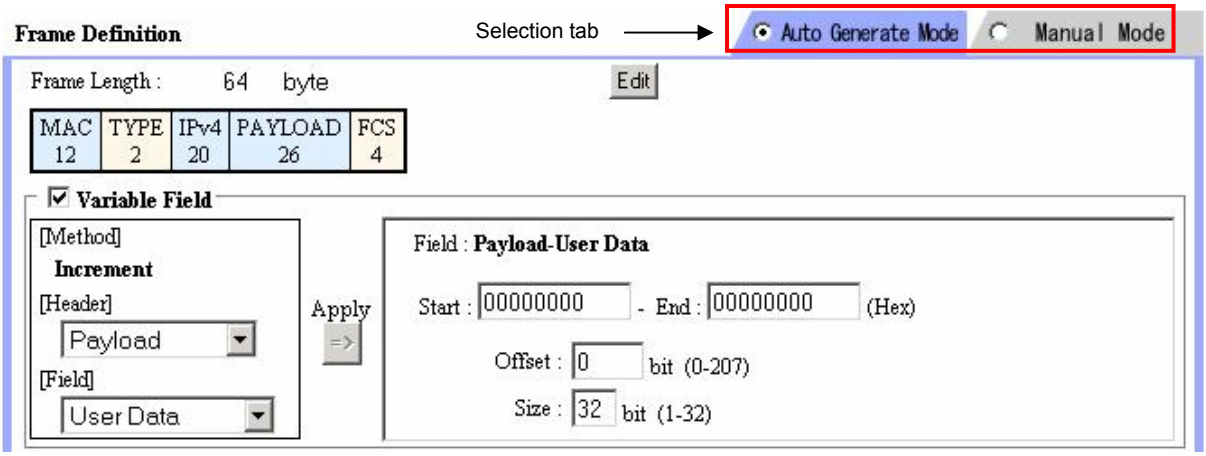


Figure 4.5-18 Field variation screen

The following is an explanation of the screen in figure 4.5-18.

- **Frame length**
  Displays the length of the defined frame. The frame length is displayed in red if sixty-three bytes or less, or if it matches or exceeds the error judgment threshold set in the statistical conditions. Also, when the frame length variable function is ON, this item is dimmed, and field variation is disabled.

- **Edit Frame button**
  Edits the currently defined frame.

- **Frame structure diagram**
  Displays the structure of the currently defined frame. You can link to headers displayed in blue, and when the vary field function is ON, the header you click appears in the header selection box.

- **Vary field check box**
  If you want to enable the Vary fields function, select the check box.

- **Header select box**
  You can select the header of the field to vary.

- **Field select box**
  You can select the part of the field to vary. The item changes depending on the currently selected header.

- **Finalize => button**
  Finalizes the field and header to vary, and opens the variable range setting screen.

• **Variable range setting screen**
Displays a screen for setting field variation conditions. Thirteen different screens can appear depending on the selected header and field. For details on the following, refer to f through r.

Table 4.5.9 Field variation setting items

Variable Field	Variable Range	Notes
MAC address	DA/SA: ##-##-00-00-00-00–##-##-ff-ff-ff-ff (Hex)	Choose DA or SA. Variable range is lower 4 bytes. # is fixed value input.
VLANtag	Priority: 0–7 (Dec)	Choose one or the other for stack.
	VLANID: 0–4095 (Dec)	
MPLS shim header	EXP field: 0–7 (Dec)	Choose one or the other for stack.
	Label value: 0–1048575 (Dec)	
IPv4 header	DA/SA: 0.0.0.0–255.255.255.255 (Dec)	Selectable for network and host
	TOS field: 0–255 (Dec)	
	ID field: 0–65535 (Dec)	
IPv6 header	Traffic class: 0–255 (Dec)	
	Flow label: 0–1048575 (Dec)	
	DA/SA: Set in 4 byte units	4 bytes are arbitrarily specified
Port number	TCP dest. port number: 0–65535 (Dec)	
	TCP source port number: 0–65535 (Dec)	
	UDP dest. port number: 0–65535 (Dec)	
	UDP source port number: 0–65535 (Dec)	
Payload	00000000–ffffffff (Hex)	Offset, size can be set in 1 byte units

f. MAC-DA/SA

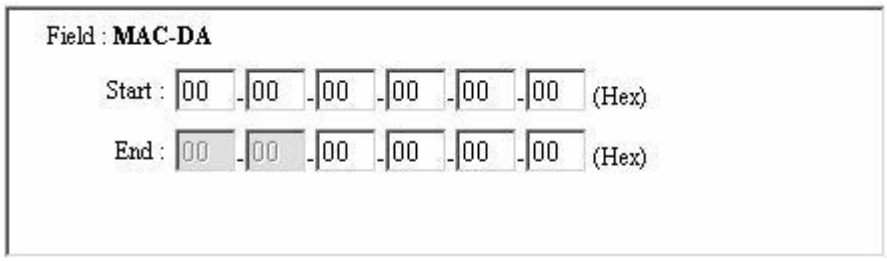


Figure 4.5-19 Variable range setting screen (MAC-DA, SA)

When the variable field is MAC-DA, the item being set is the destination MAC address, and when the variable field is MAC-SA, the item being set is the source MAC address. The top two bytes of the stop value cannot be edited, and are the same as the top two bytes of the start value. The MAC address is incremented between the start and stop values as transmission is carried out.

g. VLANtag-Priority

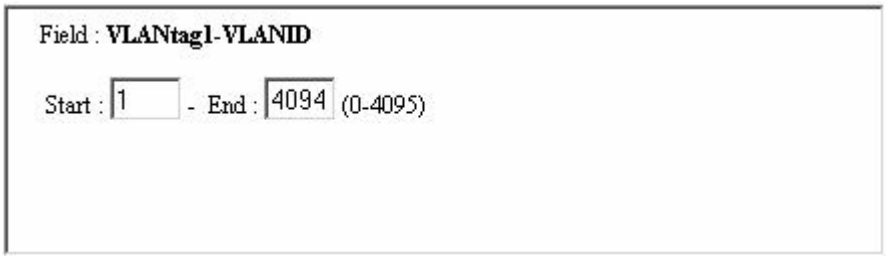


Figure 4.5-20 Variable range setting screen (VLANtag-Priority)

The item being set is the VLANtag Priority. You can set the variable range of the priority for each VLANtag. The setting range is from 0 to 7 (decimal).

h. VLANtag-VLANID

Figure 4.5-21 Variable range setting screen (VLANtag-VLANID)

The item being set is the VLANID of the VLANtag. You can set the variable range of the VLANID for each VLANtag. The setting range is from 0 to 4095 (decimal).

i. MPLS-EXP

Figure 4.5-22 Variable range setting screen (MPLS-EXP)

The item being set is the EXP of the MPLS tag. You can set the variable range of the EXP for each MPLS tag. The setting range is from 0 to 7 (decimal).

j. MPLS label value

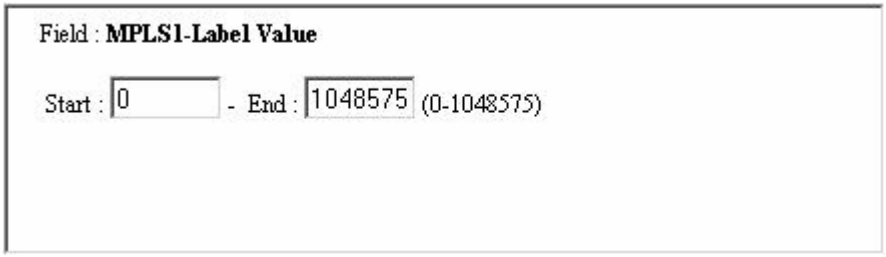


Figure 4.5-23 Variable range setting screen (MPLS-label value)

The item being set is the label value of the MPLS tag. You can set the variable range of the label value for each MPLS tag. The setting range is from 0 to 1048575 (decimal).

k. IPv4-DA,SA

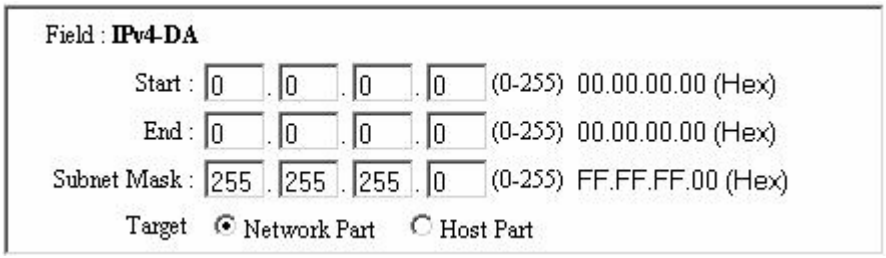


Figure 4.5-24 Variable range setting screen (IPv4-DA, SA)

When the variable field is IPv4-DA, the item being set is the destination address, and when the variable field is IPv4-SA, the item being set is the source address.

The Start, Stop, and Subnet mask settings are decimals, and the corresponding hex (hexadecimal) value is displayed on the right.

When changing the address in 1-bit units, you cannot specify both ones and zeros in the same address (1111 is acceptable but 1000 is not).

You can select to vary the network or host.

l. IPv4-TOS

Figure 4.5-25 Variable range setting screen (IPv4-TOS)

The item being set is the TOS field of the IPv4 header. The setting range is from 0 to 255 (decimal).

m. IPv4-ID

Figure 4.5-26 Variable range setting screen (IPv4-ID)

The item being set is the ID of the IPv4 header. The setting range is from 0 to 65535 (decimal).

n. IPv6 traffic class

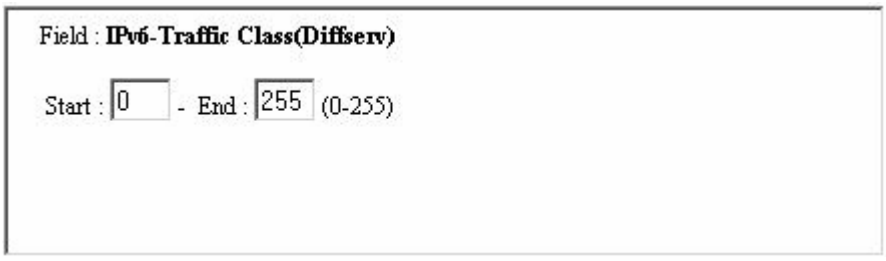


Figure 4.5-27 Variable range setting screen (IPv6-traffic class)

The item being set is the traffic class of the IPv6 header. The setting range is from 0 to 255 (decimal).

o. IPv6 flow label

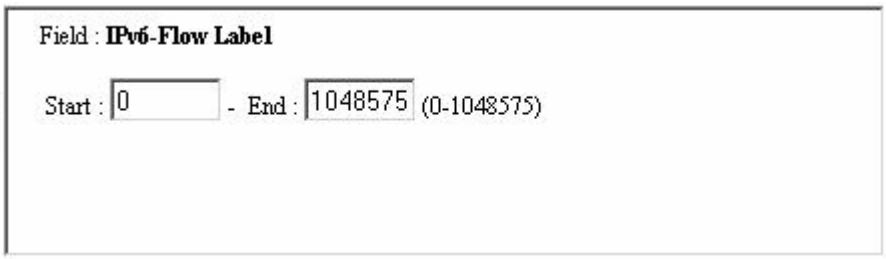


Figure 4.5-28 Variable range setting screen (IPv6-flow label)

The item being set is the flow label of the IPv6 header. The setting range is from 0 to 1048575 (decimal).

p. IPv6-DA,SA

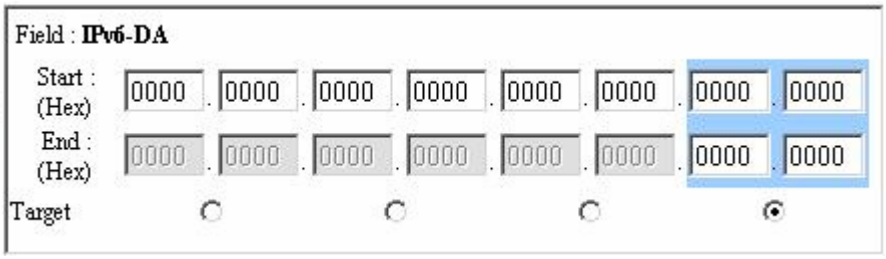


Figure 4.5-29 Variable range setting screen (IPv6-DA, SA)

When the variable field is IPv6-DA, the item being set is the destination address, and when the variable field is IPv6-SA, the item being set is the source address.

Select the radio button of the range to be varied. The corresponding ranges are highlighted in blue, indicating that you can specify the variable range in hex. The Stop address of parts that cannot be varied are dimmed, and take the same value as the Start address.

q. Port number

Figure 4.5-30 Variable range setting screen (port number)

When the variable field is TCP-DA or UDP-DA, the item being set is the destination port number, and when the variable field is TCP-SA or UDP-SA the item being set is the source port number. The setting range is from 0 to 65535 (decimal).

r. Payload

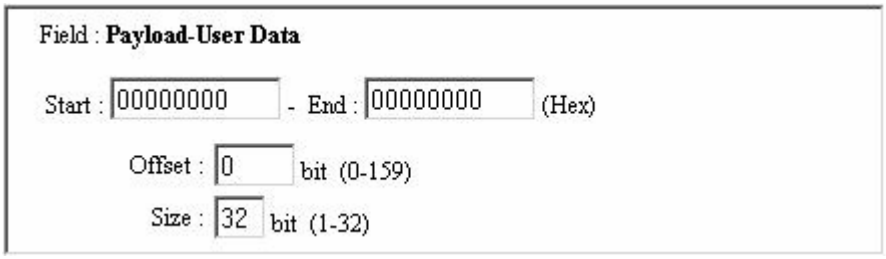


Figure 4.5-31 Variable range setting screen (Payload)

The item being set is the user data of the payload. You can specify the variable start position (offset) and the size of the variable part in bits, and then enter the start and stop values.

The offset and size setting range vary depending on the size of the payload in bytes. Also, the start and stop values may be restricted depending on the size setting.

s. Frame length variation

You can set the length of transmitted frames for Traffic mode. Select the check box to enable the frame length setting.

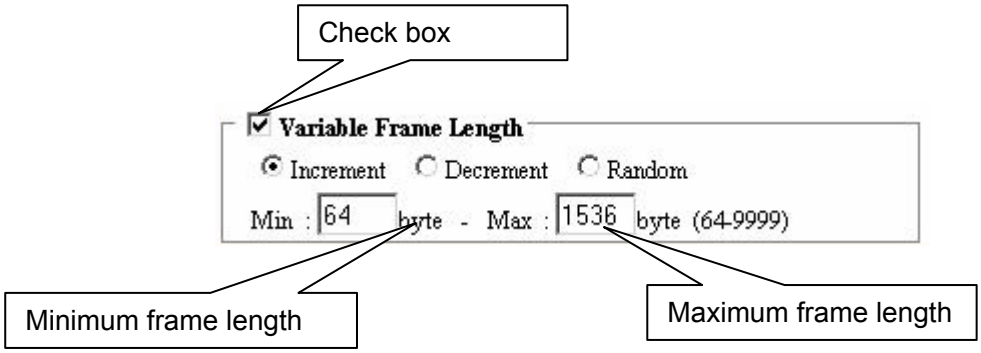


Figure 4.5-32 Frame length variation function

The following items can be set using the frame length variation function.

- **Increment**
  Selecting the Increment check box allows you to increase the frame length one byte at a time between the minimum and maximum values during transmission.

- **Decrement**
  Selecting the Decrement check box allows you to decrease the frame length one byte at a time between the maximum and minimum values during transmission.

- **Random**
  Selecting the Random check box allows you to transmit frames of random length between the minimum and maximum frame length values.

(2) Ethernet frame settings
This function allows you to turn Ethernet frames ON and OFF, and edit them.

Figure 4.5-33 Ethernet frame edit screen

When set to ON, pre-defined Ethernet frames are transmitted when you click the Transmit button in either the traffic statistics overview screen or the traffic statistics detail screen. (One Ethernet frame is transmitted per click of the button.)

Clicking the Ethernet frame Edit button displays the frame builder screen with which you can define Ethernet frames.

See section 4.5.3, “Frame Builder Screen” for instructions on how to set up the frame builder. For instructions on inserting Ethernet frames, see section 4.5.4 “Traffic Statistics Overview Screen” or section 4.5.5, “Traffic Statistics Detail Screen.”

4.5.2.4 Entering Statistical Conditions (Traffic Mode)

The statistical condition setting screen allows you to enter statistical condition settings. Statistical conditions consist of filter settings for received frames (receive filter), and settings for oversize errors (error judgment).

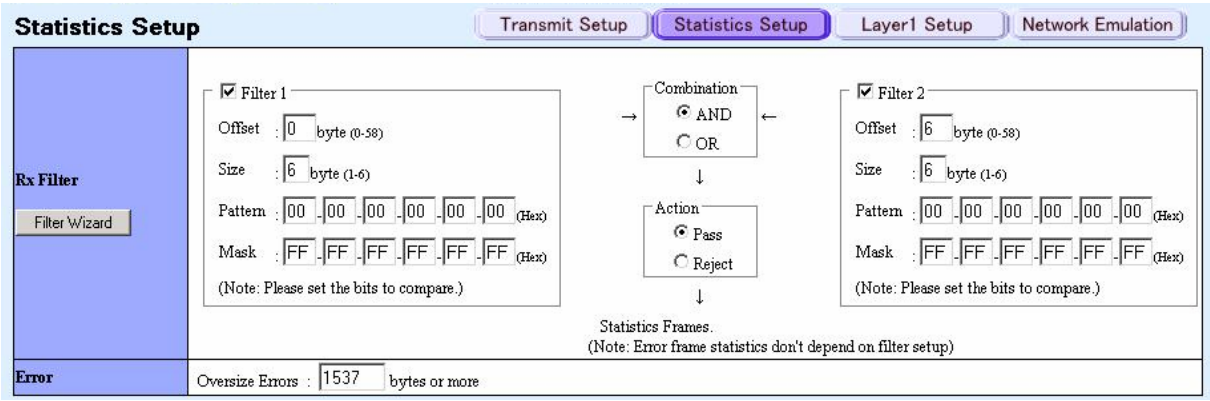


Figure 4.5-34 Statistical condition setting screen

(1) Receive filter

a. Pattern comparison

Pattern comparison settings are only enabled when at least one of the check boxes is selected. Pattern comparison is not performed if both check boxes are cleared.

Table 4.5.10 Pattern comparison setting items

Item	Description
Comparison pattern 1 and 2	Enables/disables pattern comparison settings. Enabled when selected.
Comparison start position	Sets the comparison start position. Input a decimal number in the range from 0 to 58 bytes.
Comparison length	Sets the comparison length. Input a decimal number in the range from 1 to 6 bytes.
Comparison pattern	Sets the comparison pattern. Input hexadecimal numbers totaling up to 6 bytes.
Mask pattern	Sets the mask pattern. Input hexadecimal numbers totaling up to 6 bytes. When the bit for comparison is set to 1, 1 is the bit for comparison.

b. Combinations

Pattern 1 and pattern 2 can both be enabled by selecting their check boxes. You can combine comparison pattern 1 and comparison pattern 2 using conditions.

Table 4.5.11 Combination setting items

Item	Description
AND	When the conditions for both comparison pattern 1 and comparison pattern 2 become true, the action takes place.
OR	When either the conditions for comparison pattern 1 or comparison pattern 2 become true, the action takes place.

c. Filter action

Always enabled. You can select a filter action condition of Pass or Reject.

Table 4.5.12 Filter action setting items

Item	Description
Pass	Frames matching the comparison pattern are set as frames for statistical calculations.
Reject	Frames matching the comparison pattern are not set as frames for statistical calculations.

Note: Error frames are counted regardless of the filter settings.

d. Filter menu button

Clicking this button launches the filter wizard setting screen. The following is an explanation of the settings in this screen.

Table 4.5.13 Statistical condition setting items

Item	Description
Filter menu	The receive filter wizard described in 4.5.2.4

(2) Receive filter wizard

The filter menu consists of MAC filter and VLAN filter settings. You can select either Receive only specified dest. MAC address (DA), Receive only specified source MAC address (SA), Receive only unicast (L2) frames, VLAN ID filter, or VLAN QOS filter.

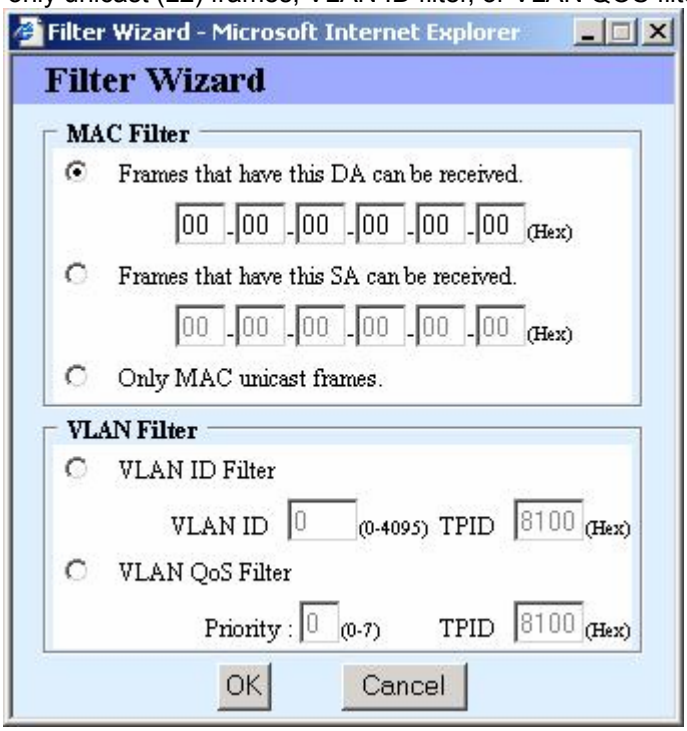


Figure 4.5-35 Receive filter setting screen

Table 4.5.14 Receive filter setting items

Item	Description
Receive only specified dest. MAC address (DA)	Automatically sets a filter for receiving only from a specified dest. MAC address. Input hexadecimal numbers totaling up to 6 bytes.
Receive only specified source MAC address (SA)	Automatically sets a filter for receiving only from specified source MAC address. Input hexadecimal numbers totaling up to 6 bytes.
Receive only unicast (L2) frames	Automatically sets a filter for receiving only unicast frames.
VLAN ID filter	Automatically sets a filter for receiving only frames of the specified VLAN ID and TPID. The VLAN ID is set using a decimal between 0 and 4095. The TPID can be set as a 2-byte hexadecimal (default value is 8100).
VLAN QOS filter	Automatically sets a filter for receiving only frames of the specified Priority and TPID. The Priority is set using a decimal between 0 and 7. The TPID can be set as a 2-byte hexadecimal (default value is 8100).

(3) Error judgement

Allows you to enter thresholds for oversize errors and judgment.

Table 4.5.15 Error judgment setting items

Item	Description
Oversize error	The oversize error threshold can be entered. You can input a decimal in the range from 65 to 10,000 bytes.

4.5.2.5 Entering Line Settings (Traffic Mode)

The line setting screen allows entry of line settings. The settings vary depending on the selected unit.

(1) Line settings for the AE5520 10/100BASE-T Unit
Line settings for the AE5520 10/100BASE-T Unit consist of auto negotiation and MDI/MDI-X switching.

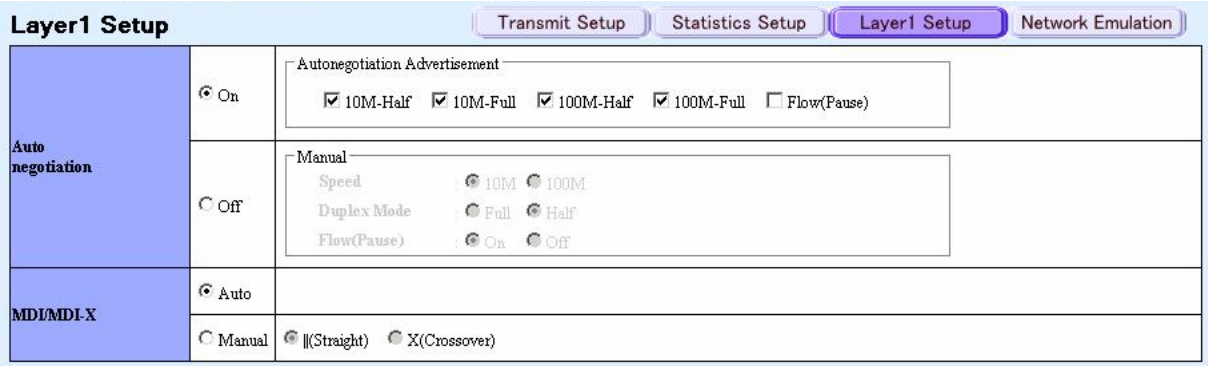


Figure 4.5-36 Line setting screen (when using the AE5520 10/100BASE-T Unit)

a. Auto negotiation setting

You can turn auto negotiation ON or OFF. When ON, the capability display settings are available. When OFF, the manual settings are available.

<A> Capability display
The following settings for the capability display can be enabled or disabled:
10M-Half, 10M-Full, 100M-Half, 100M-Full, Flow (Pause)

<B> Manual settings
Manual settings that can be entered are SPEED, Duplex Mode, and Flow (Pause).

Table 4.5.16 Manual setting items

Item	Description
Speed	Sets the SPEED. You can select 100M or 10M.
Duplex Mode	Sets the Duplex mode. Select either Full or Half.
Flow (Pause)	Sets the Flow (Pause). Select either ON or OFF.

b. MDI/MDI-X switching

With MDI/MDI-X switching, you can select an MDI/MDI-X setting of Auto or Manual. However, you can only select Auto if auto negotiation is ON. When Manual is selected, you can select II (straight) or X (cross).

(2) Line settings for AE5521 1000BASE-X Unit
The only line settings for the AE5521 1000BASE-X Unit are the auto negotiation settings.

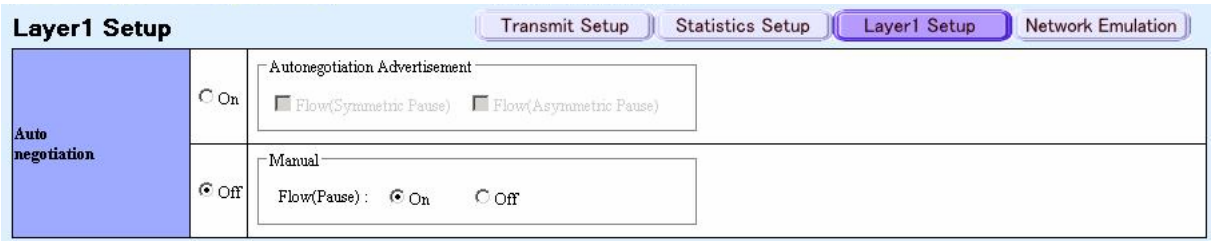


Figure 4.5-37 Line setting screen (when using the AE5521 1000BASE-X Unit)

a. Auto negotiation setting

You can turn auto negotiation ON or OFF. When ON, the capability display settings are available. When OFF, the manual settings are available.

<A> Capability display

The following settings for the capability display can be enabled or disabled.

Flow (Symmetric Pause), Flow (Asymmetric Pause)

<B> Manual settings

With manual settings, Flow (Pause) can be set.

Table 4.5.17 Manual setting items

Item	Description
Flow (Pause)	Sets the Flow (Pause). Select either ON or OFF.

(3) Line setting for AE5522 10GBASE-X Unit

The only line setting that can be entered for the AE5521 1000BASE-X Unit is the flow control (Pause) setting.

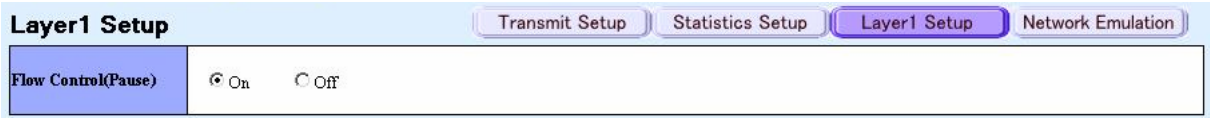


Figure 4.5-38 Line setting screen (when using the AE5522 10GBASE-X Unit)

a. Flow control setting

You can turn flow control ON or OFF.

Table 4.5.18 Flow control setting items

Item	Description
Flow (Pause)	Sets the Flow (Pause). Select either ON or OFF.

4.5.2.6 Entering Network Emulation Settings (Traffic Mode)

The network emulation setting screen allows entry of network emulation settings and consists of the response control, self port address settings, and MAC address auto-acquisition settings.

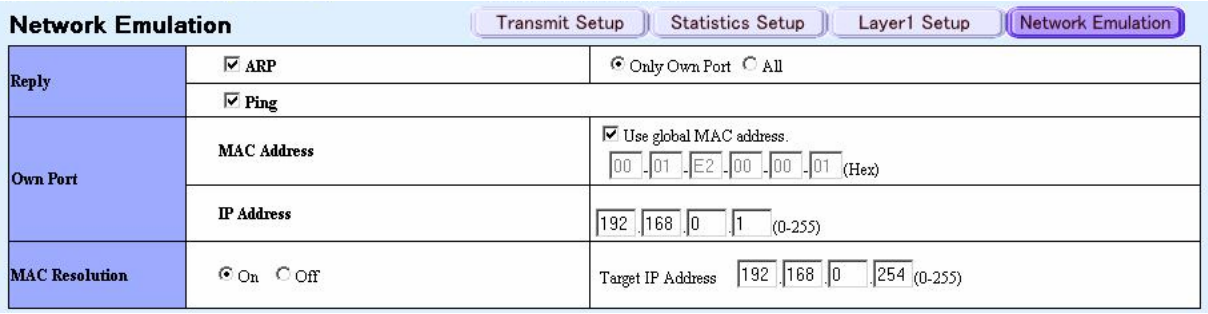


Figure 4.5-39 Network emulation setting screen

(1) response control

The response control settings consists of ARP reply and PING reply settings.

a. ARP reply

Selecting this check box enables the ARP reply function for ARP requests. When enabled, select an ARP setting of either **self port address only** or **Reply to all ARPs**.

b. PING reply

Selecting this check box enables the PING reply function for PING requests.

(2) self port address setting

The self port address settings consist of MAC address and IP address settings.

a. MAC address

You can select whether to use a global MAC address or a specified MAC address. Select the **Use the MAC address of this port** check box to specify a global MAC address. When you clear the check box, you can enter an arbitrary MAC address. Input hexadecimal numbers totaling up to 6 bytes.

b. IP address

Each octet can be specified from 0 to 255. This is the IP address used for ARP or PING replies.

(3) Auto-acquire MAC address

You can turn the MAC address auto-acquire function ON and OFF. When ON, you can set the target IP address on which the MAC address is resolved.

4.5.3 Frame Builder Screen (Traffic Mode)

The frame builder screen appears when you press the Define New frame or Edit frame button in the frame definition section of the transmission settings. You can set up the frames to be transmitted in this screen. The following is an example of the frame builder screen.

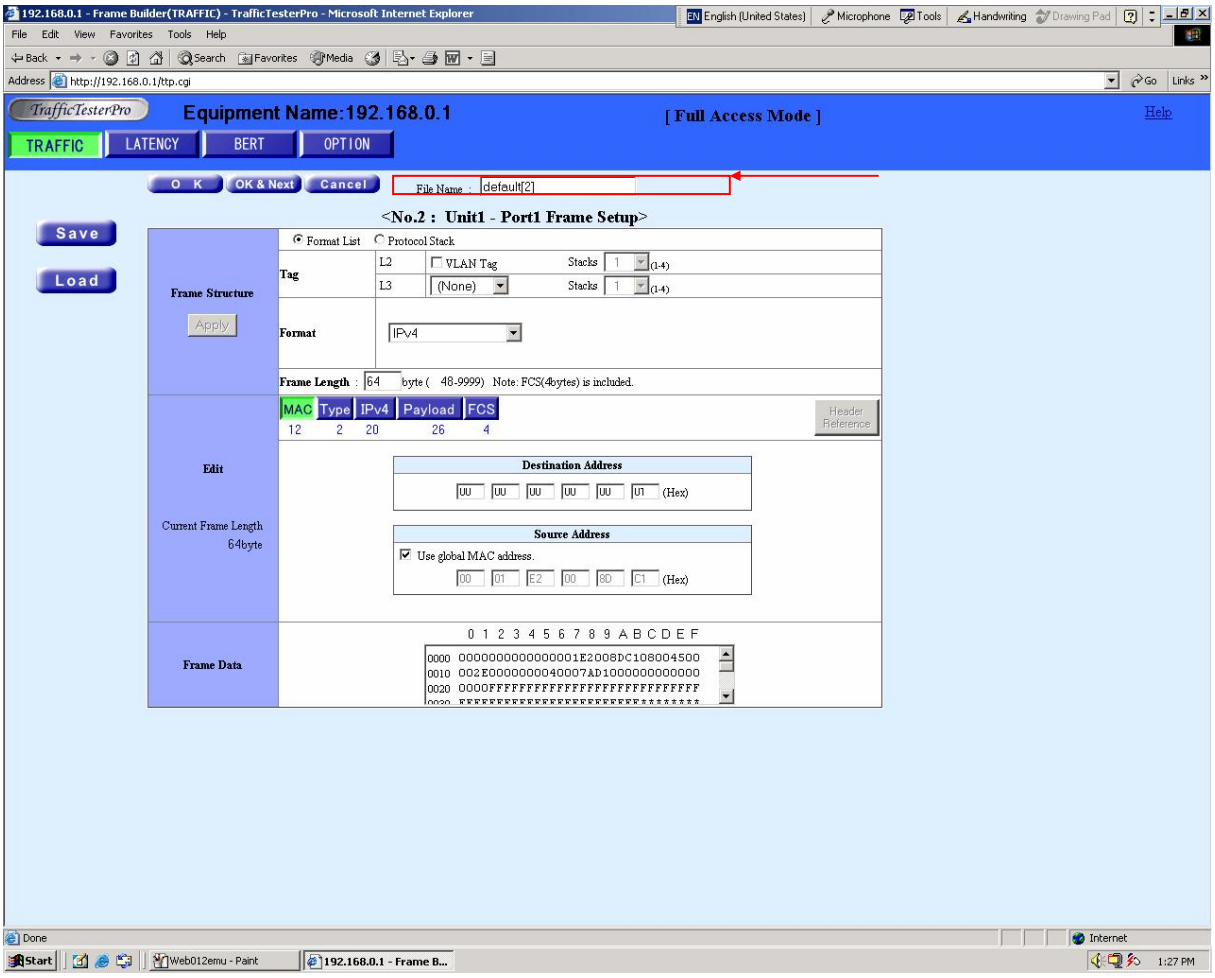


Figure 4.5-40 Frame builder screen example

File name: You can specify the name of the file to which the frame will be saved. Use up to ten alphabetic characters plus numbers (up to three digits enclosed in square brackets ([ ])). The actual frame file saved on the controller PC will have the extension, .frst. The extension is not displayed here. This file name can be changed when saving.

4.5.3.1 Frame Structure (Traffic Mode)

This is an explanation of the basic parts of a frame. The frame structure settings that are displayed when List Selection is selected is shown in figure 4.5-41, and the display contents are shown in figure 4.5-19. The frame structure settings that are displayed when Specify protocol stack is selected is shown in figure 4.5-42, and the display contents are shown in figure 4.5-20. After any of the fields are modified, you can press the Finalize button to update the edited frame fields.

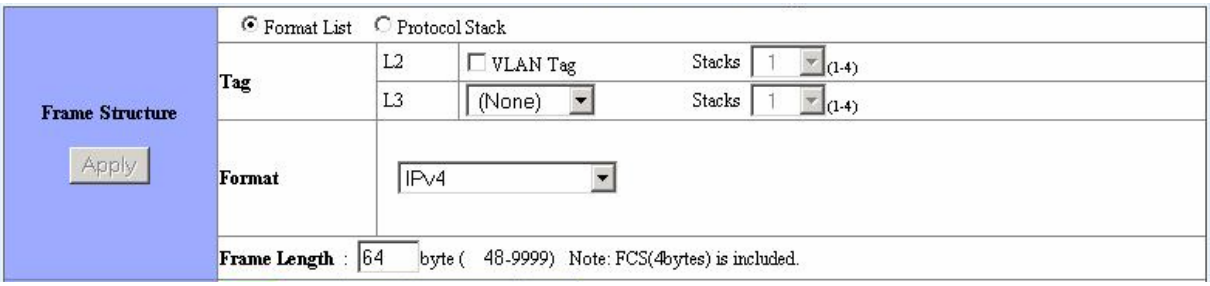


Figure 4.5-41 Frame structure setting screen (list selection)

Table 4.5-19 Frame structure setting items (list selection)

Item	Description
List selection/protocol stack specification	Select a format setting method of list selection or protocol stack specification (in this example, list selection is selected).
Tag (L2)	You can select/clear VLANTag for layer 2. When selected, you can select a number of stacks from 1 to 4.
Tag (L3)	You can select a tag for layer 3 of None, MPLS, or EoMPLS. When MPLS or EoMPLS is selected, you can select the number of stacks from 1 to 4.
Format	Select the frame format from the pull down menu. The following formats are available. Pause, ARP, IPv4, IPv4+UDP, IPv4+TCP, ICMP, IPv6, IPX, IPv4multicast, IPv4 multicast+UDP, Custom (MAC Y), Custom (MAC None)
Frame length	Sets the frame length. You can set a frame length that includes FCS. The maximum is fixed at 9999 bytes, but you can change the minimum depending on the frame format and presence/absence of tags. The following shows the minimum values that can be set with no tags. Frame format — Min. Variation not allowed Pause/ARP — Fixed at 64 bytes IPv4/IPv4 multicast : 38 bytes, IPv4+UDP/IPv4 multicast+UDP : 46 bytes IPv4+TCP : 58 bytes ICMP : 42 bytes IPv6 : 58 bytes IPX : 48 bytes Custom (MAC Y)/(MAC None) : 18 bytes

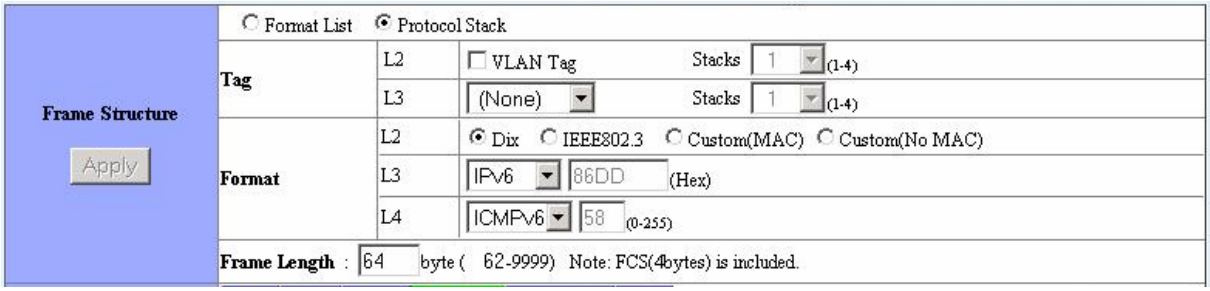


Figure 4.5-42 Frame structure setting screen (protocol stack specification)

Table 4.5-20 Frame structure setting items (protocol stack specification)

Item	Description
List selection/protocol stack specification	Select a format setting method of list selection or protocol stack specification (in this example, protocol stack is selected)
Tag (L2)	You can select/clear VLANTag for layer 2. When selected, you can select a number of stacks from 1 to 4.
Tag (L3)	You can select a tag for layer 3 of None, MPLS, or EoMPLS. When MPLS or EoMPLS is selected, you can select a number of stacks from 1 to 4.
Format (L2)	Sets the L2 format. Select from Dix, IEEE802.3, Custom (MAC Y), and Custom (MAC none)
Format (L3)	Sets the L3 format. Cannot be set if the L2 format is Custom (MAC Y) or Custom (MAC none). When the L2 format is Dix or IEEE802.3, select either User, IPv4, IPv6, or IPX. When (User) is selected, set an arbitrary 2-byte hexadecimal number.
Format (L4)	Sets the L4 format. Cannot be set if the L2 format is Custom (MAC Y) or Custom (MAC none), of if the L3 format is (User) or IPX. When the L3 format is IPv4, select either (User), TPC, UDP, IGMP, or ICMP. When the L3 format is IPv6, select either (User), TPC, UDP, IGMP, ICMP, or ICMPV6. When (User) is selected, set an arbitrary value from 0 to 255.
Frame length	Sets the frame length. You can set a frame length that includes FCS. The maximum is fixed at 9999 bytes, but you can change the minimum depending on the frame format and presence/absence of tags. The following shows the minimum values that can be set with no tags.

L2 format	L3 format	L4 format	Min. value
Custom (MAC Y)/(MAC None)	—	—	18 byte
Dix	USER	—	18 byte
IEEE802.3			21 bytes
Dix	IPX	—	48 bytes
IEEE802.3			51 bytes
L2 format	L3 format	L4 format	Min.
Dix	IPv4	USER	38 bytes
IEEE802.3			41 bytes
Dix		TCP	58 bytes
IEEE802.3			61 bytes
Dix		UDP/IGMP	46 bytes

Frame length (cont.)

	IEEE802.3			49 bytes
	Dix		ICMP	42 bytes
	IEEE802.3			45 bytes
	Dix	IPv6	USER	58 bytes
	IEEE802.3			61 bytes
	Dix		TCP	78 bytes
	IEEE802.3			81 bytes
	Dix		UDP/IGMP	66 bytes
	IEEE802.3			69 bytes
	Dix		ICMP/ICMPv6	62 bytes
	IEEE802.3			65 bytes

4.5.3.2 Editing Frames (Traffic Mode)

You can specify each field of a frame. The fields that can be edited depending on the field structure are displayed as buttons.

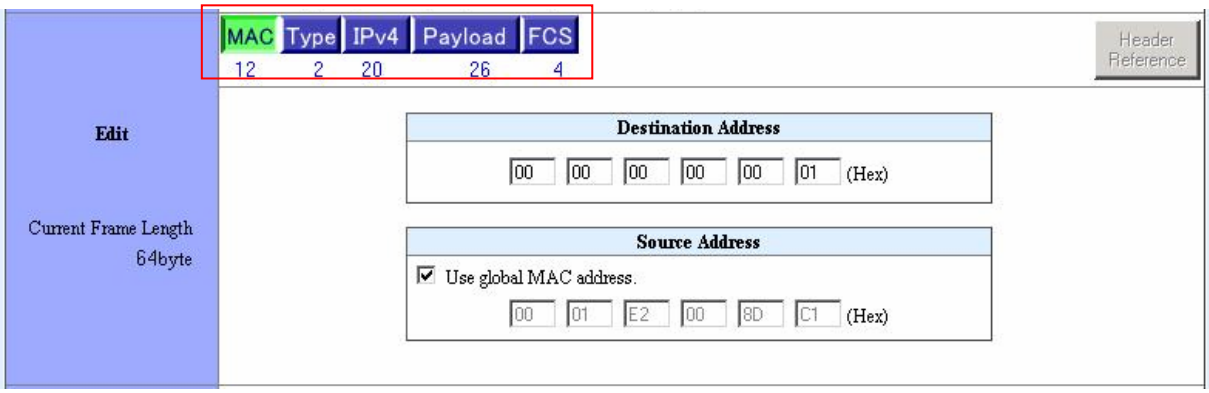


Figure 4.5-43 Frame structure edit screen example

Table 4.5.21 Frame edit setting items

Item	Description
MAC	Sets the MAC address. Normally something other than Custom (MAC None) is displayed.
VLANTag	Sets the VLANTag. The VLANTag button is only displayed when the VLANTag setting is active.
Type	Sets the Type. The Type button is only displayed when the Type setting is active.
LENGTH	Sets the LENGTH. The LENGTH button is only displayed when the LENGTH setting is active.
LLC/SNAP	Sets the LLC/SNAP. The LLC/SNAP button is only displayed when the LLC/SNAP setting is active.
MPLS	Sets the MPLS. The MPLS button is only displayed when the MPLS setting is active.
IPv4	Sets the IPv4. The IPv4 button is only displayed when the IPv4 setting is active.
IPv6	Sets the IPv6. The IPv6 button is only displayed when the IPv6 setting is active.
IPX	Sets the IPX. The IPX button is only displayed when the IPX setting is active.
TCP	Sets the TCP. The TCP button is only displayed when the TCP setting is active.
UDP	Sets the UDP. The UDP button is only displayed when the UDP setting is active.
ICMP	Sets the ICMP. The ICMP button is only displayed when the ICMP setting is active.
ICMPv6	Sets the ICMPv6. The ICMPv6 button is only displayed when the ICMPv6 setting is active.
IGMP	Sets the IGMP. The IGMP button is only displayed when the IGMP setting is active.
Payload	Sets the Payload. The Payload button is only displayed when the Payload setting is active.
Pause Parameter	Sets Pause Parameter. The Pause Parameter button is only displayed when the Pause Parameter setting is active.
ARP Parameter	Sets ARP Parameter. The ARP Parameter button is only displayed when the ARP Parameter setting is active.
FCS	Sets the FCS. The FCS button is always displayed.
Header reference figure	Displayed when one of the following buttons is selected: VLANTag, MPLS, IPv4, IPv6, IPX, TCP, UDP, ICMP, or IGMP. The header format corresponding to each of the buttons are displayed in pop-up windows.

(1) MAC address setting (Traffic mode)

This function allows you to edit the destination or source MAC address of Ethernet frames. When EoMPLS is selected under Tag (L3) as shown in section 4.5.3.1, “Frame Structure,” the MAC button appears in green.

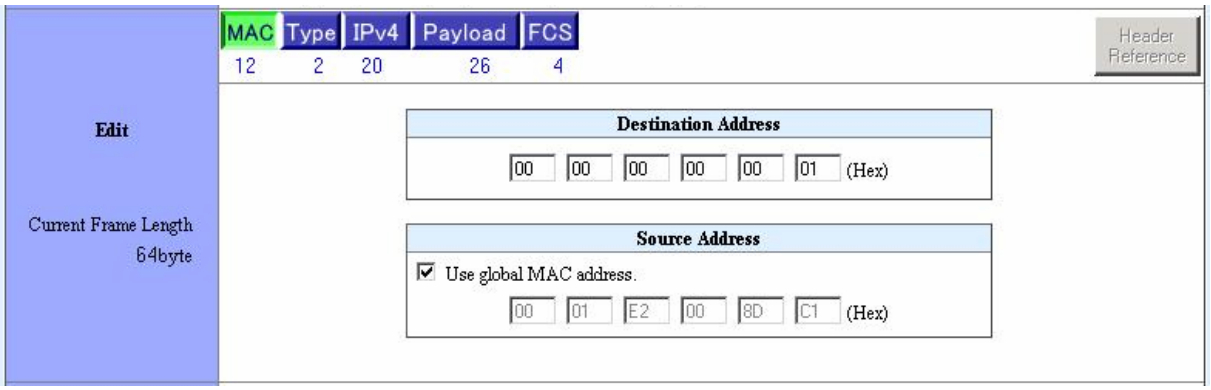


Figure 4.5-44 MAC address setting screen

Table 4.5.22 MAC address setting items

Item	Description
Destination address (DA)	Sets the destination MAC address. You can input a hexadecimal number in the range from 00h to FFh. When L3 is IPv4 Multicast/PAUSE, (fixed) is automatically set, and manual input is disabled.
Source address (SA)	Sets the source MAC address. You can input a hexadecimal number in the range from 00h to FFh. When selecting to use the global MAC address of this port, the global MAC address is automatically set, and manual input is disabled.

(2) VLANTag setting part (Traffic mode)
This function allows you to edit VLANTags. Each tag can carry four identifiers.

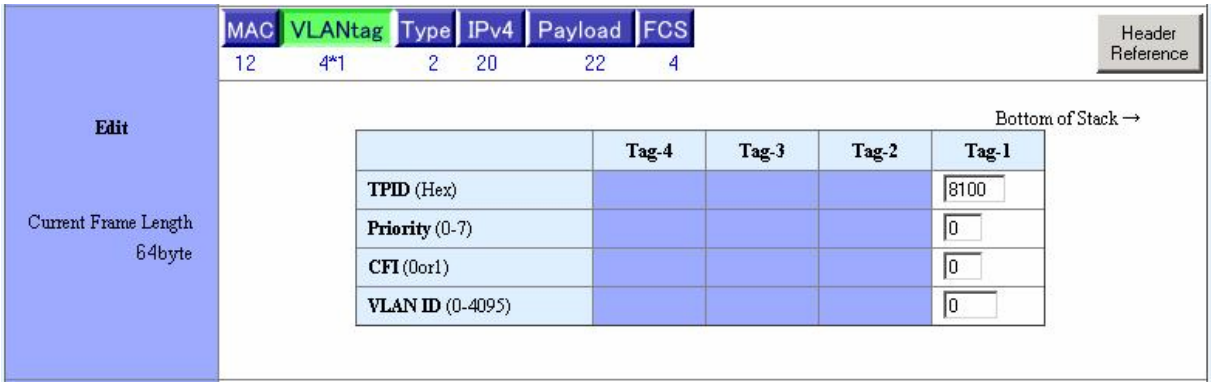


Figure 4.5-45 VLANTag setting screen

Table 4.5.23 VLANTag setting items

Item	Description
TPID (Hex)	Sets the tag protocol ID. You can input a hexadecimal number in the range from 0000h to FFFFh.
Priority (0–7)	Sets the VLANTag's user priority. You can input a decimal in the range from 0 to 7.
CFI (0 or 1)	Sets the VLANTag's CFI. You can specify 1 or 0.
VLAN ID (0–4095)	Sets the VLANTag's VLAN ID. You can input a decimal in the range from 0 to 4,095.
Header reference figure	Clicking this button displays the VLANTag header format in a separate window.

The setting items for Tag1 to Tag4 are all the same.

(3) Type setting (Traffic mode)

This function allows you to edit the Type field of Ethernet frames. When EoMPLS is selected under Tag (L3) as shown in section 4.5.3.1, “Frame Structure,” the Type button appears in green.

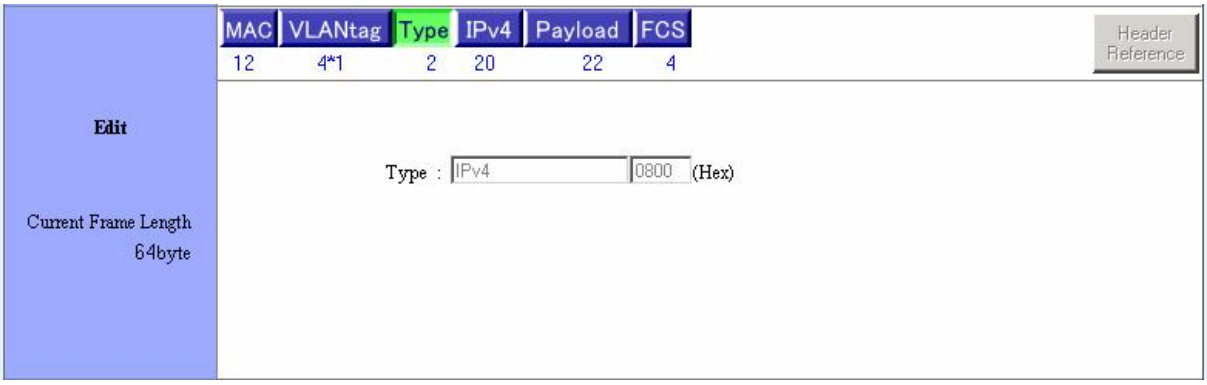


Figure 4.5-46 Type setting screen

Table 4.5.24 Type setting items

Item	Description
MPLS Unicast/MPLS Multicast/User	Sets the type when MPLS is enabled. Select MPLS Unicast, MPLS Multicast, or User.
Type (Hex)	Sets the type when L3 (User) is selected. Can be set as a 2-byte hexadecimal.

(4) Length setting (Traffic mode)
This function allows you to edit the Length field of IEEE802.3 frames.

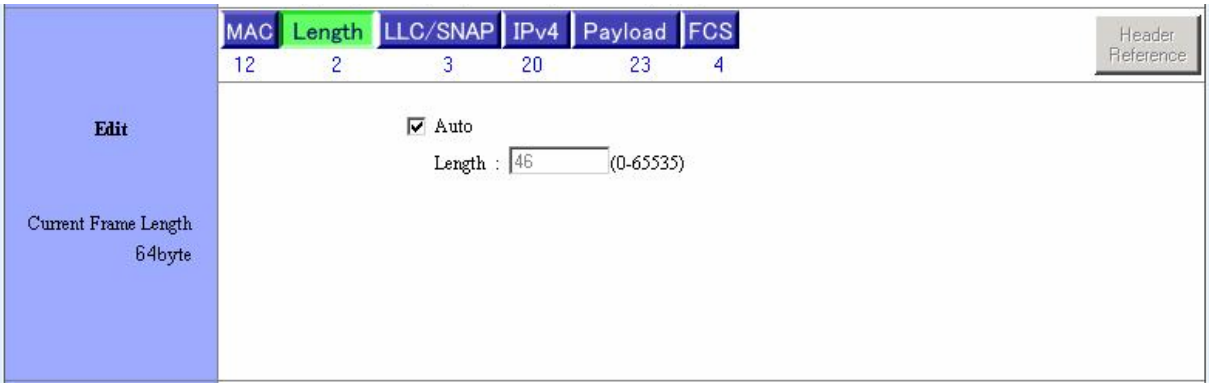


Figure 4.5-47 Length setting screen

Table 4.5.25 Length setting items

Item	Description
Auto-calculation	Select this check box to automatically calculate the length.
Length	Can be set when auto-calculation is not selected. You can input a decimal in the range from 0 to 65,535.

(5) LLC/SNAP settings (Traffic mode)
This function allows you to enter LLC and SNAP settings.

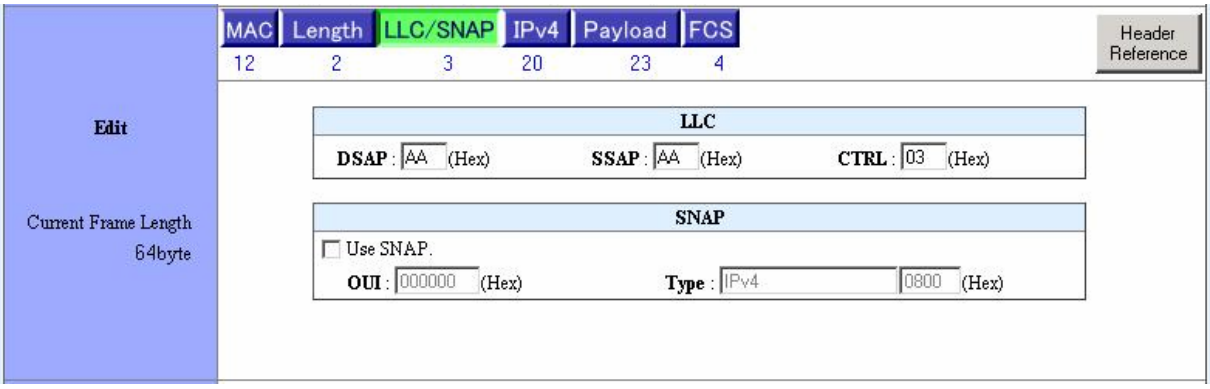


Figure 4.5-48 LLC/SNAP setting screen

Table 4.5.26 LLC/SNAP setting items

Item	Description
LLC: DSAP (Hex)	Sets the DSAP field within the LLC header. You can input a hexadecimal number in the range from 00h to FFh.
LLC: SSAP (Hex)	Sets the SSAP field within the LLC header. You can input a hexadecimal number in the range from 00h to FFh.
LLC: CTRL (Hex)	Sets the CTRL field within the LLC header. You can input a hexadecimal number in the range from 00h to FFh.
Add SNAP header	Lets you insert a SNAP header into the frame.
SNAP: OUI (Hex)	When inserting a SNAP header into a frame, sets the OUI field within the SNAP header. You can set an arbitrary 3-byte hexadecimal number.
SNAP: MPLS Unicast/MPLS Multicast/User	When inserting a SNAP header into a frame and MPLS is enabled, you can set the type. Select MPLS Unicast, MPLS Multicast, or User.
SNAP: Type (Hex)	When inserting a SNAP header into a frame and L3 is (User), you can set the type as a 2-byte hexadecimal.
Header reference figure	Clicking this button displays the LLC/SNAP header format in a separate window.

(6) MPLS settings (Traffic mode)

This function allows you to set MPLS. Each tag can carry four identifiers. When EoMPLS is selected under Tag (L3) as shown in section 4.5.3.1, “Frame Structure,” the MPLS button appears in green (see (7) EoMPLS settings).

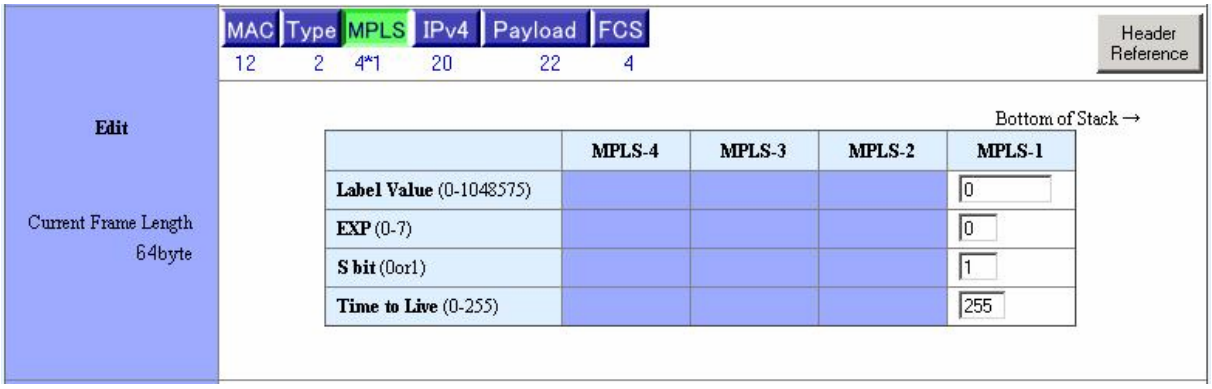


Figure 4.5-49 MPLS setting screen

Table 4.5.27 MPLS setting items

Item	Description
Label value (0–1,048,575)	Sets the label value. You can input a decimal in the range from 0 to 1,048,575.
EXP (0–7)	Sets EXP. You can input a decimal in the range from 0 to 7.
S bit (0 or 1)	Sets the S bit. You can specify 1 or 0.
Time-to-live (TTL) (0–255)	Sets the existence time (TTL). You can input a decimal in the range from 0 to 255.
Header reference figure	Clicking this button displays the MPLS shim header format in a separate window.

The setting items for MPLS1 to MPLS4 are all the same.

(7) EoMPLS settings (Traffic mode)
This function allows you to set EoMPLS.

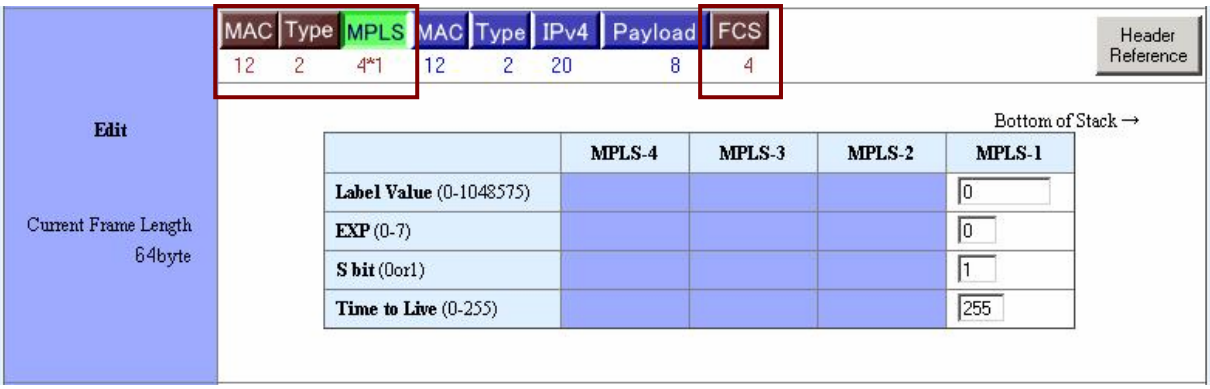


Figure 4.5-50 EoMPLS setting screen

When EoMPLS is selected under Tag (L3) as shown in section 4.5.3.1, “Frame Structure,” the MAC, TYPE, MPLS, and FCS buttons appear in tea green. The contents of the items are the same as previously mentioned.
(Contents of MAC=(1), Type=(3), MPLS=(6), FCS=(19)).

(8) IPv4 settings (Traffic mode)
This is an IPv4 editing function.

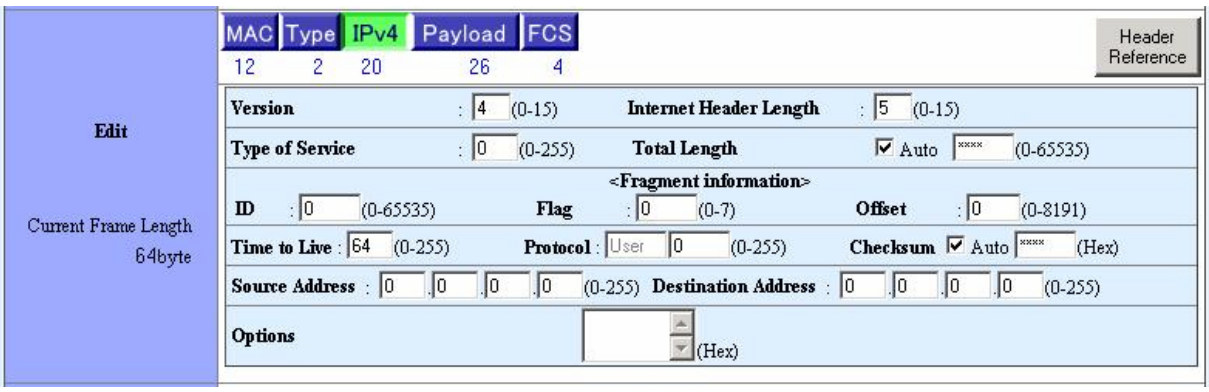


Figure 4.5.51 IPv4 setting screen

Table 4.5.28 IPv4 setting items

Item	Description
Version (Ver)	Sets the IP header version. You can input a decimal in the range from 0 to 15.
Header length (IHL)	Sets the length of the IP header. You can input a decimal in the range from 0 to 15.
Type of service (TOS)	Sets the IP header type of service. You can input a decimal in the range from 0 to 255.
Total length (Total LEN)	Sets the total length of the IP header. You can input a decimal in the range from 0 to 65,535. When auto-calculation is selected, the setting cannot be manually input here.
Fragment ID	Sets the ID of the IP header. You can input a decimal in the range from 0 to 65,535.
Fragment flag	Sets the flag of the IP header. You can input a decimal in the range from 0 to 7.
Fragment offset	Sets the offset of the IP header. You can input a decimal in the range from 0 to 8,191.
Time-to-live (TTL)	Sets the existence time of the IP header. You can input a decimal in the range from 0 to 255.
Protocol	Sets the protocol of the IP header. Normally displays the protocol set for the frame's L4. When User is selected, you can input a decimal in the range from 0 to 255.
Checksum	Sets the checksum of the IP header. Can be set as a 2-byte hexadecimal. When auto-calculation is selected, the setting cannot be input manually here.
Source address (SA)	Sets the source IP address of the IP header. You can input a decimal for each digit in the range from 0 to 255.
Destination address (DA)	Sets the destination IP address of the IP header. You can input a decimal for each digit in the range from 0 to 255.

Option field data	Can be set when the header length (IHL) is 6 or more. Sets the option field data of the IP header. You can input a hexadecimal number in the range from 0 to FF (4 bytes can be set every time IHL increases by 1).
Header reference figure	Clicking this button displays the IPv4 header format in a separate window.

(9) IPv6 settings (Traffic mode)
This is an IPv6 editing function.

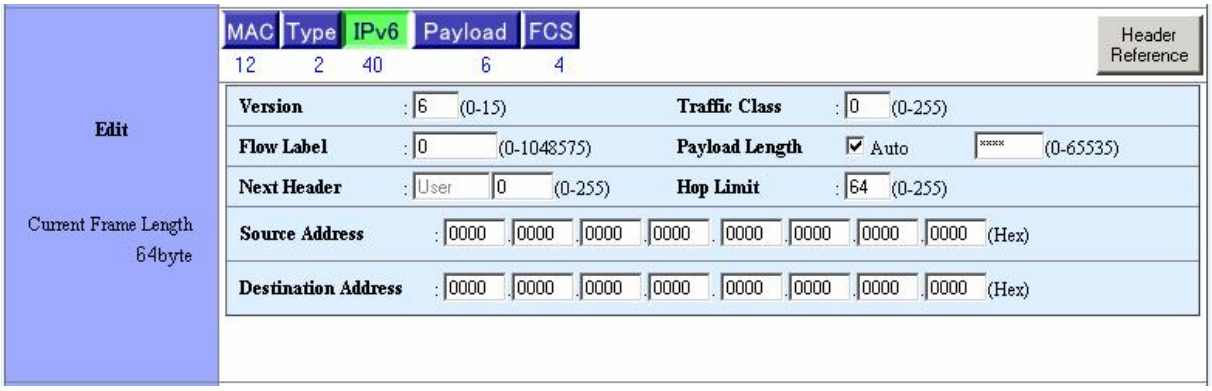


Figure 4.5.52 IPv6 setting screen

Table 4.5.29 IPv6 setting items

Item	Description
Version (Ver)	Sets the IP header version. You can input a decimal in the range from 0 to 15.
Traffic class	Sets the traffic class of the IP header. You can input a decimal in the range from 0 to 255.
Flow label	Sets the flow label of the IP header. You can input a decimal in the range from 0 to 1,048,575.
Payload length	Sets the payload length of the IP header. You can input a decimal in the range from 0 to 65,535. When auto-calculation is selected, the setting cannot be input manually here.
Succession header	Sets the protocol of the IP header. Normally displays the protocol set for the frame's L4. When User is selected, you can input a decimal in the range from 0 to 255.
Hop limit	Sets the hop limit of the IP header. You can input a decimal in the range from 0 to 255.
Source address (SA)	Sets the source IP address of the IP header. Input hexadecimal numbers totaling up to sixteen bytes.
Destination address (DA)	Sets the destination IP address of the IP header. Input hexadecimal numbers totaling up to sixteen bytes.
Header reference figure	Clicking this button displays the IPv6 header format in a separate window.

(10) IPX settings (Traffic mode)
This is an IPX editing function.

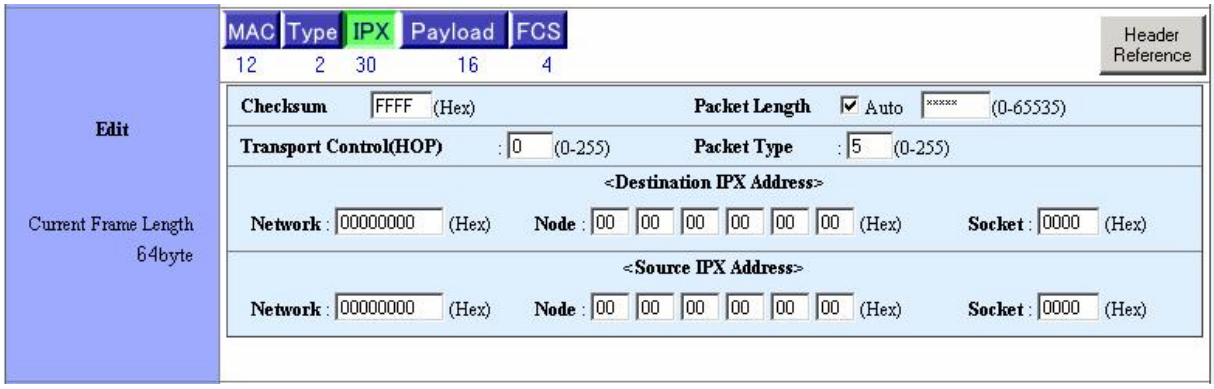


Figure 4.5-53 IPX setting screen

Table 4.5.30 IPX setting items

Item	Description
Checksum	Checksum can be set as a 2-byte hexadecimal.
Packet length	Sets the packet length. You can input a decimal in the range from 0 to 65,535. When auto-calculation is selected, the setting cannot be input manually here.
Transport control (HOP)	Sets the transport control. You can input a decimal in the range from 0 to 255.
Packet type	Sets the packet type. You can input a decimal in the range from 0 to 255.
Destination IPX address (DA): Network	Sets the network of the destination IPX address. Can be set as a 4-byte hexadecimal (filled in with 0s if 4 bytes or less).
Destination IPX address (DA): node	Sets the node of the destination IPX address. 6 bytes can be set, each byte using a hexadecimal.
Destination IPX address (DA): Socket	Sets the socket of the destination IPX address. Can be set as a 2-byte hexadecimal.
Source IPX address (SA): Network	Sets the network of the source IPX address. Can be set as a 4-byte hexadecimal (filled in with 0s if 4 bytes or less)
Source IPX address (SA): node	Sets the node of the source IPX address. Input hexadecimal numbers totaling up to 6 bytes.
Source IPX address (SA): Socket	Sets the socket of the source IPX address. Can be set as a 2-byte hexadecimal.
Header reference figure	Clicking this button displays the IPX header format in a separate window.

(11) TCP settings (Traffic mode)
This is a TCP editing function.

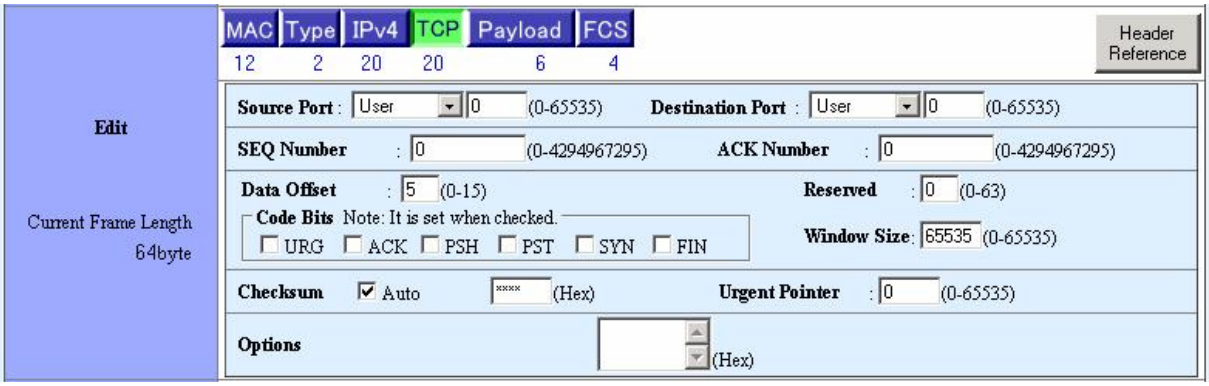


Figure 4.5-54 TCP setting screen

Table 4.5.31 TCP setting items

Item	Description
Source port number	Sets the port number. The following can be selected: User, Echo, Discard, Daytime, Chargen, ftp-data, ftp, telnet, Smtp, Time, Name, Nickname, Ntp, Nntp, Domain, (http/www), pop3, or Sunrpc. When User is selected, you can input a decimal in the range from 0 to 65,535.
Destination port number	Sets the destination port number. The following can be selected: User, Echo, Discard, Daytime, Chargen, ftp-data, ftp, telnet, Smtp, Time, Name, Nickname, Ntp, Nntp, Domain, (http/www), pop3, or Sunrpc. When User is selected, you can input a decimal in the range from 0 to 65,535.
Sequence number	Sets the sequence number. You can input a decimal in the range from 0 to 4,294,967,295.
Confirmation response number	Sets the confirmation response number. You can input a decimal in the range from 0 to 4,294,967,295.
Data offset	Sets the data offset. You can input a decimal in the range from 0 to 15.
Reserve (Rev)	Sets the reservation. You can input a decimal in the range from 0 to 15.
Code bit: URG	Sets URG of the code bit. Set to 1 when selected.
Code bit: ACK	Sets ACK of the code bit. Set to 1 when selected.
Code bit: PSH	Sets PSH of the code bit. Set to 1 when selected.
Code bit: PST	Sets PST of the code bit. Set to 1 when selected.
Code bit: SYN	Sets SYN of the code bit. Set to 1 when selected.
Code bit: FIN	Sets FIN of the code bit. Set to 1 when selected.
Window size	Sets the window size. You can input a decimal in the range from 0 to 65,535.
Checksum	Sets the checksum. Can be set as a 2-byte hexadecimal. When auto-calculation is selected, the setting cannot be input manually here.
Emergency pointer	Sets the emergency pointer. You can input a decimal in the range from 0 to 65,535.
Option field data	Can be set when the data offset is 6 or more. Sets the option field data. You can input a hexadecimal number in the range from 00h to FFh (4 bytes can be set every time the data offset increases by 1).
Header reference figure	Clicking this button displays the TCP header format in a separate window.

(12) UDP settings (Traffic mode)
This is a UDP editing function.

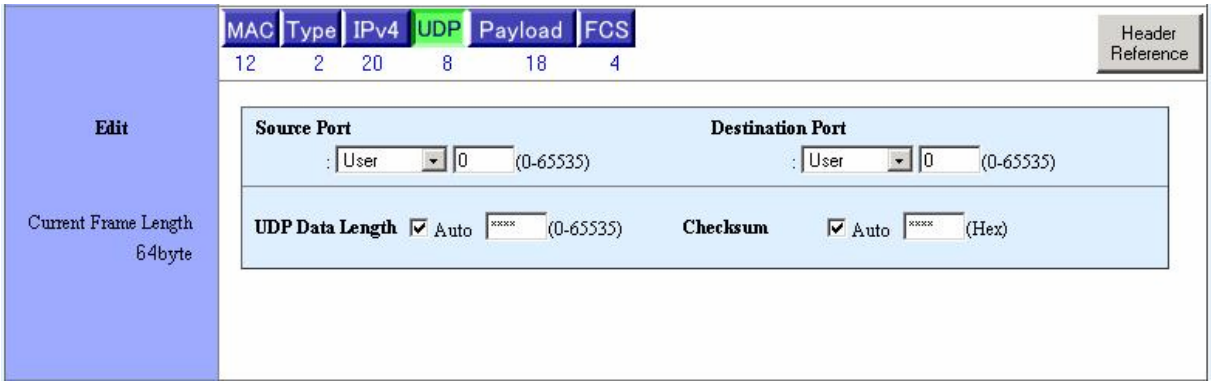


Figure 4.5-55 UDP setting screen

Table 4.5.32 UDP setting items

Item	Description
Source port number	Sets the source port number. The following can be selected: User, Echo, Discard, Daytime, Chargen, Time, Name, Nickname, Domain, Bootps, Bootpc, Tftp, Sunrpc, ntp, snmp, Snmp-tr, ap, or nfs. When User is selected, you can input a decimal in the range from 0 to 65,535.
Destination port number	Sets the destination port number. The following can be selected: User, Echo, Discard, Daytime, Chargen, Time, Name, Nickname, Domain, Bootps, Bootpc, Tftp, Sunrpc, ntp, snmp, Snmp-tr, ap, or nfs. When User is selected, you can input a decimal in the range from 0 to 65,535.
UDP Data length	Sets the UDP data length. You can input a decimal in the range from 0 to 65,535. When auto-calculation is selected, the setting cannot be input manually here.
Checksum	Sets the checksum. Can be set as a 2-byte hexadecimal. When auto-calculation is selected, the setting cannot be input manually here.
Header reference figure	Clicking this button displays the UDP header format in a separate window.

(13) ICMP settings (Traffic mode)
This is an ICMP editing function.

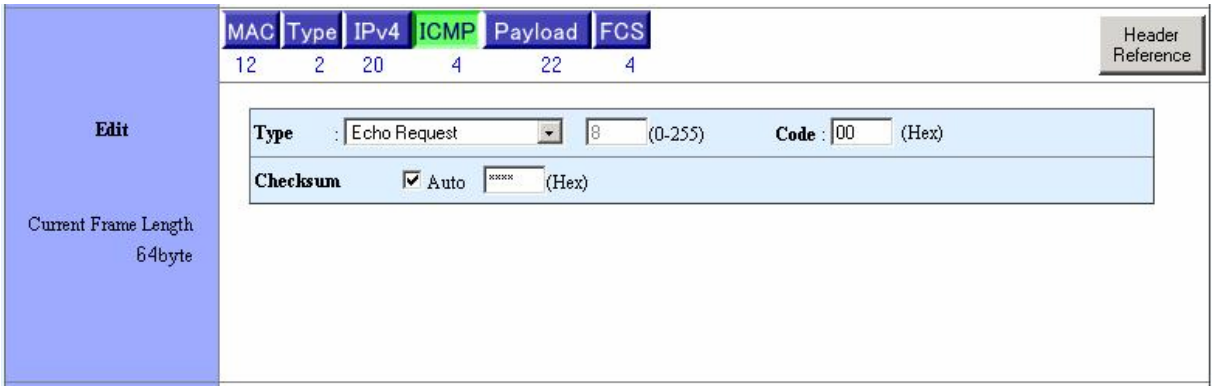


Figure 4.5-56 ICMP setting screen

Table 4.5.33 ICMP setting items

Item	Description
Type	Sets the type. Select from the following: User, echo response, final arrival impossible notification, send suppress request, channel change request, echo request, timeout notification, illegal parameter notification, time request, time response, address mask request, address mask response, and trace route. When User is selected, you can input a decimal in the range from 0 to 255.
Code	Sets the code. You can input a hexadecimal number in the range from 00h to FFh.
Checksum	Sets the checksum. Can be set as a 2-byte hexadecimal. When auto-calculation is selected, the setting cannot be input manually here.
Header reference figure	Clicking this button displays the ICMP header format in a separate window.

(14) ICMPv6 settings (Traffic mode)
This is an ICMPv6 editing function.

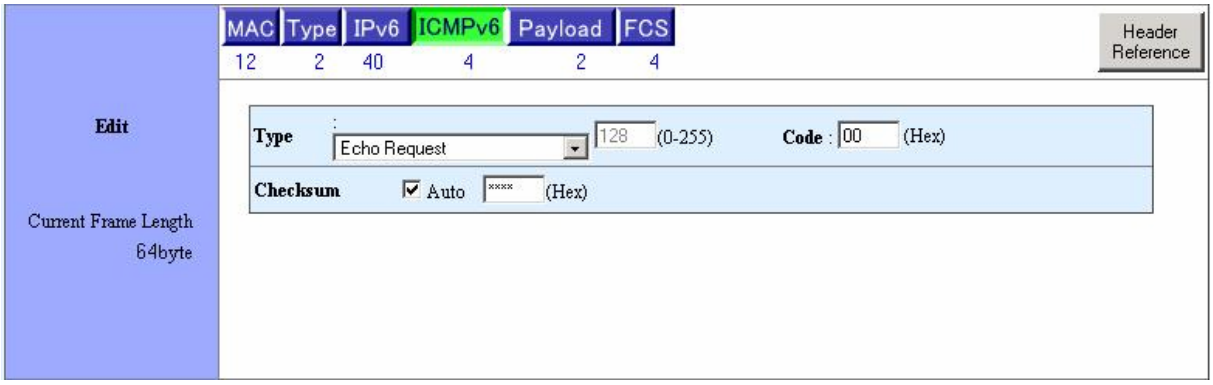


Figure 4.5-57 ICMPv6 setting screen

Table 4.5.34 ICMPv6 setting items

Item	Description
Type	Sets the type. Select from the following: User, final arrival impossible notification, packet exceeded notification, timeout notification, illegal parameter notification, echo request, echo response, MC listener inquiry, MC listener report, MC listener end, router request, router notification, neighboring host request, neighboring host notification, and channel change request. When User is selected, you can input a decimal in the range from 0 to 255.
Code	Sets the code. You can input a hexadecimal number in the range from 00h to FFh.
Checksum	Sets the checksum. Can be set as a 2-byte hexadecimal. When auto-calculation is selected, the setting cannot be input manually here.
Header reference figure	Clicking this button displays the ICMP header format in a separate window.

(15) IGMP settings (Traffic mode)
This is an IGMP editing function.

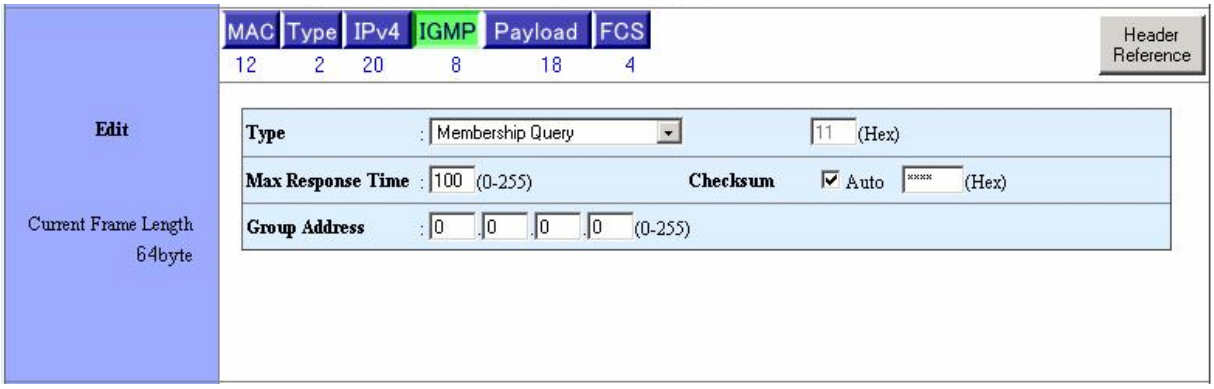


Figure 4.5-58 IGMP setting screen

Table 4.5-36 IGMP setting items

Item	Description
Type	Sets the type. Select from the following: User, membership request, membership report from version 1, membership report from version 2, and breakaway from group. When User is selected, you can input a hexadecimal number in the range from 00h to FFh.
Maximum response time	Sets the maximum response time. You can input a decimal in the range from 0 to 255.
Checksum	Sets the checksum. Can be set as a 2-byte hexadecimal. When auto-calculation is selected, the setting cannot be input manually here.
Group address	Sets the group address. You can input each octet in the range from 0 to 255.
Header reference figure	Clicking this button displays the IGMP header format in a separate window.

(16) Payload settings (Traffic mode)
This is a payload editing function.

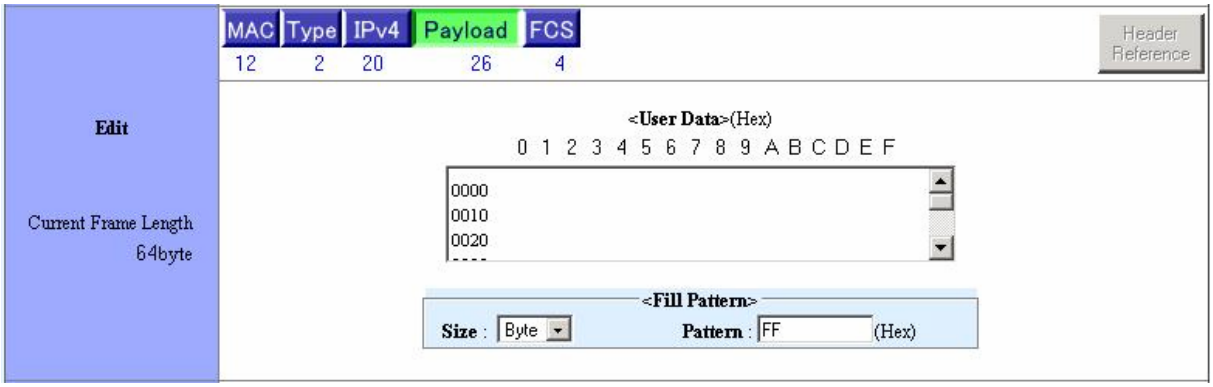


Figure 4.5-59 Payload setting screen

Table 4.5.36 Payload setting items

Item	Description
User data	Sets the user data. You can input hexadecimal numbers in the range from 00h to FFh.
Filter pattern: Size	Sets the size of the filter pattern. Select from Byte, word, and Long.
Filter pattern: pattern	Sets the pattern of the filter pattern. If Byte is selected for the filter pattern size, you can set 1 byte with a hexadecimal number, or for word, 2 bytes with a hexadecimal number, or for Long, 4 bytes with a hexadecimal number. For each case, if the input value does not reach the required number of digits, start the value on the right and fill in 0s to the left.

(17) Pause Parameter settings (Traffic mode)
This is a PAUSE packet editing function.

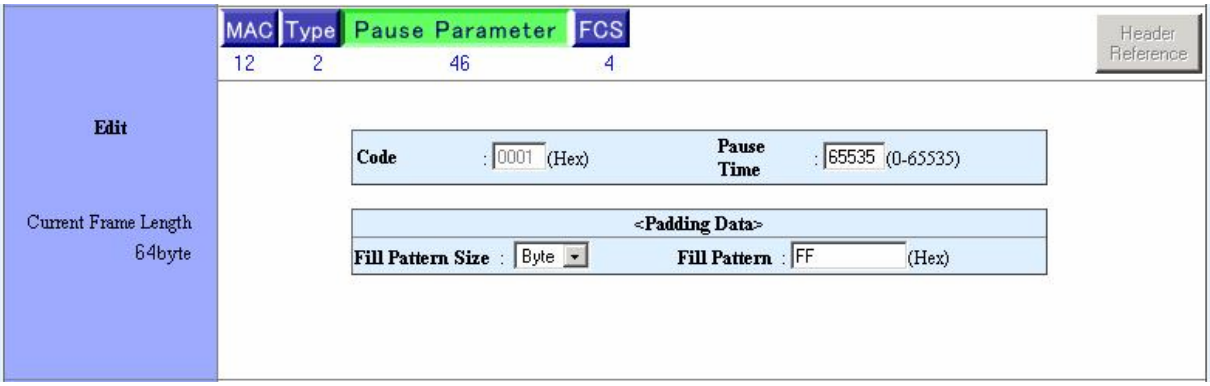


Figure 4.5-60 Pause Parameter setting screen

Table 4.5.37 Pause parameter setting items

Item	Description
Abort time	Sets the abort time. You can input a decimal in the range from 0 to 65,535.
Code	Displays the code. Fixed to 0001h in hexadecimal.
Padding data: Fill pattern size	Sets the fill pattern size of the padding data. Select from Byte, word, and Long.
Padding data: Filter pattern	Sets the fill pattern of the padding data. If Byte is selected for the filter pattern size, you can set 1 byte with a hexadecimal number, or for word, 2 bytes with a hexadecimal number, or for Long, 4 bytes with a hexadecimal number. For each case, if the setting value does not reach the required number of digits, start the value on the right and fill in 0s to the left.

(18) ARP Parameter settings (Traffic mode)
This is an ARP editing function.

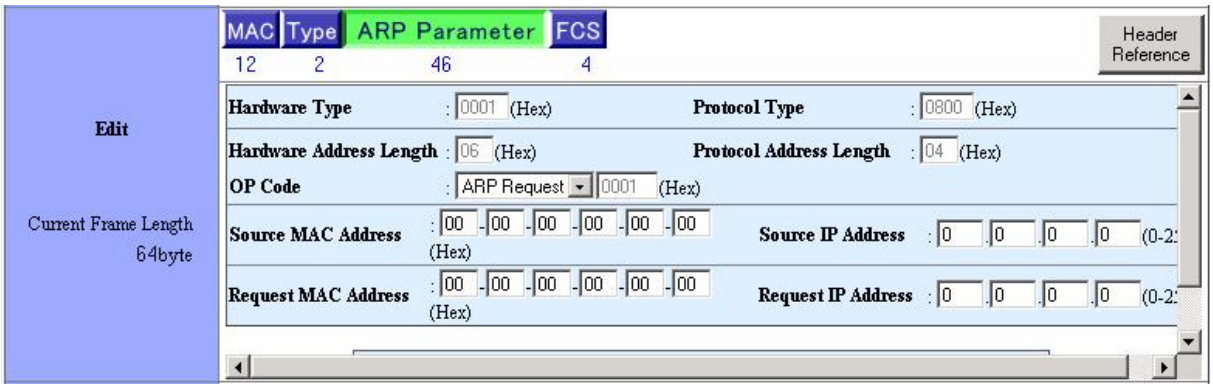


Figure 4.5-61 ARP parameter setting screen

Table 4.5.38 ARP parameter setting items

Item	Description
Hardware type	Displays the hardware type. Fixed to 0001h in hexadecimal.
Protocol type	Displays the protocol type. Fixed to 0800h in hexadecimal.
Hardware address length	Displays the hardware address length. Fixed to 06h in hexadecimal.
Protocol address length	Displays the protocol address length. Fixed to 04h in hexadecimal.
OP code	Sets the OP code. You can select from User, ARP request, or ARP response. When User is selected, can be set as a 2-byte hexadecimal.
Source MAC address	Sets the source MAC address. You can set each hexadecimal number in the range from 00h to FFh.
Source IP address	Sets the source IP address. You can input each octet in the range from 0 to 255.
Request MAC address	Sets the request MAC address. You can set each hexadecimal number in the range from 00h to FFh.
Request IP address	Sets the request IP address. You can input each octet in the range from 0 to 255.
Padding data: Fill pattern size	Sets the fill pattern size of the padding data. Select from Byte, word, and Long.
Padding data: Filter pattern	Sets the fill pattern of the padding data. If Byte is selected for the filter pattern size, you can set 1 byte with a hexadecimal number, or for word, 2 bytes with a hexadecimal number, or for Long, 4 bytes with a hexadecimal number. For each case, if the setting value does not reach the required number of digits, start the value on the right and fill in 0s to the left.
Header reference figure	Clicking this button displays the ARP header format in a separate window.

(19) FCS settings (Traffic mode)

This is an FCS editing function. When EoMPLS is selected under Tag (L3) as shown in section 4.5.3.1, “Frame Structure,” the FCS button appears in green. When CRC error is selected, the FCS button appears in red (even when EoMPLS is selected).

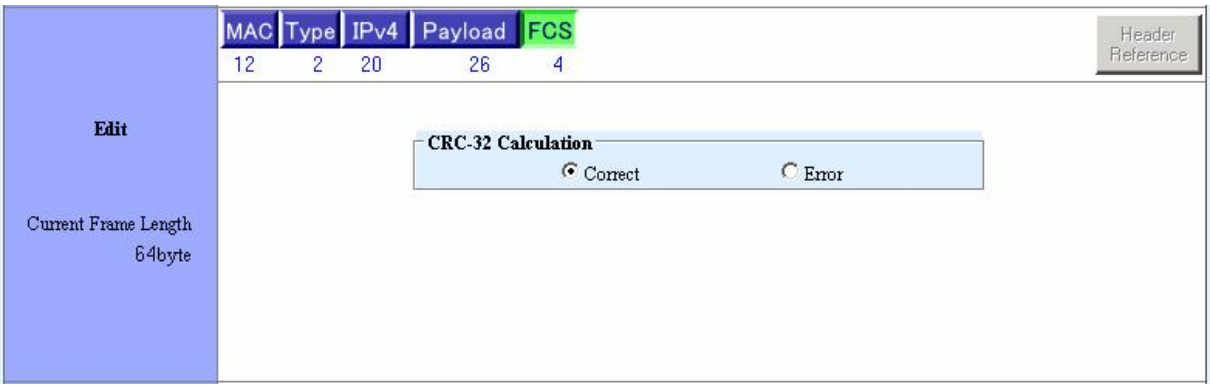


Figure 4.5-62 FCS setting screen (+FCS button color)

Table 4.5.39 FCS setting items

Item	Description
CRC-32 auto-calculation	Sets the CRC-32 auto-calculation. You can select Normal or CRC error.

(20) Header format (Traffic mode)

When the characters of the header reference button in the upper right of the frame edit area are displayed in black, if you click the button, the currently set frame header format is displayed in a separate window.

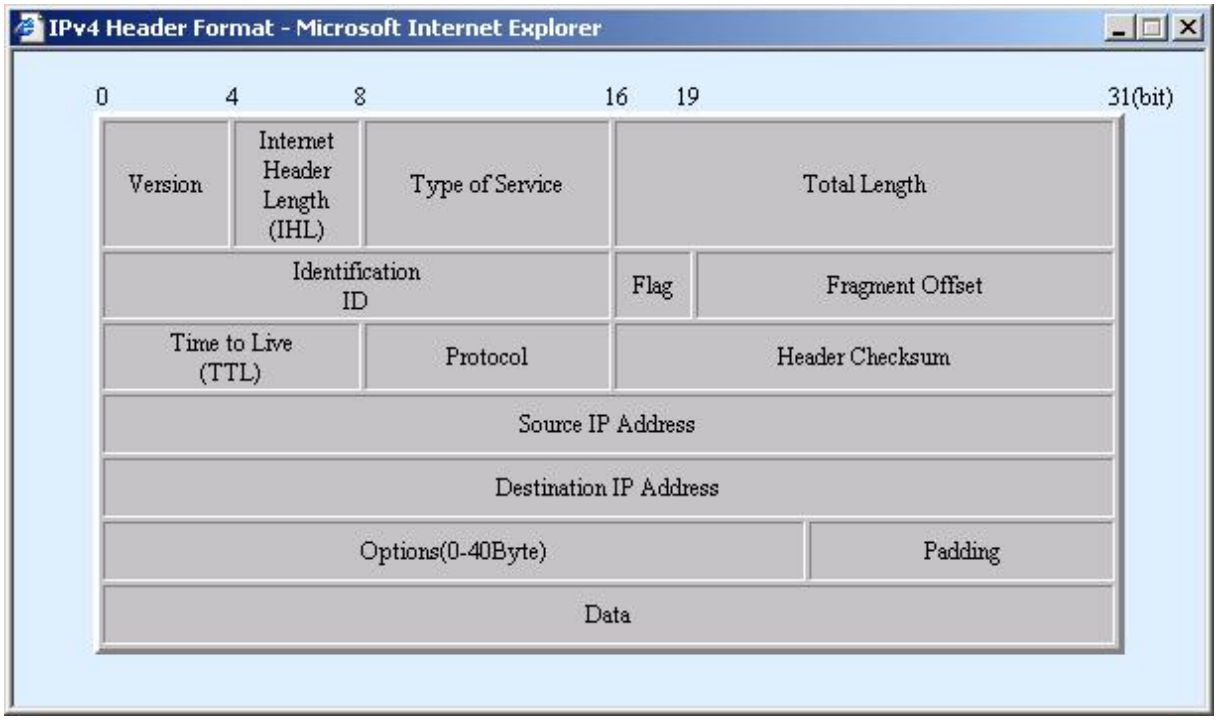


Figure 4.5-63 Header format (example of IPv4)

4.5.3.3 Frame Data (Traffic mode)

This function performs a hex dump display of the information assembled in the frame builder.

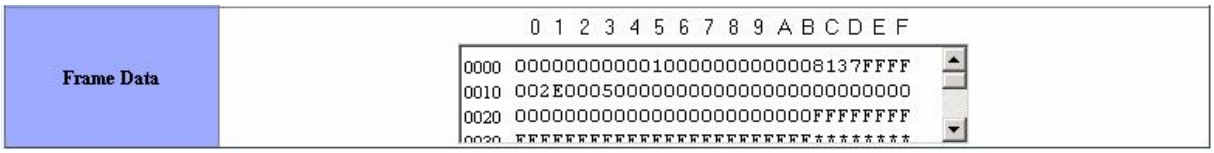


Figure 4.5-64 Frame data display screen

Table 4.5-40 Frame data display items

Item	Description
Fields of frames being edited	Input data and '……' are alternately displayed.
FCS Fields	Displayed as ********

4.5.3.4 Saving Frames (Traffic Mode)

You can save edited frame information to a file.

(1) Initial save screen

Clicking the SAVE button displays the initial save screen shown below. The file name set in frame builder is displayed.

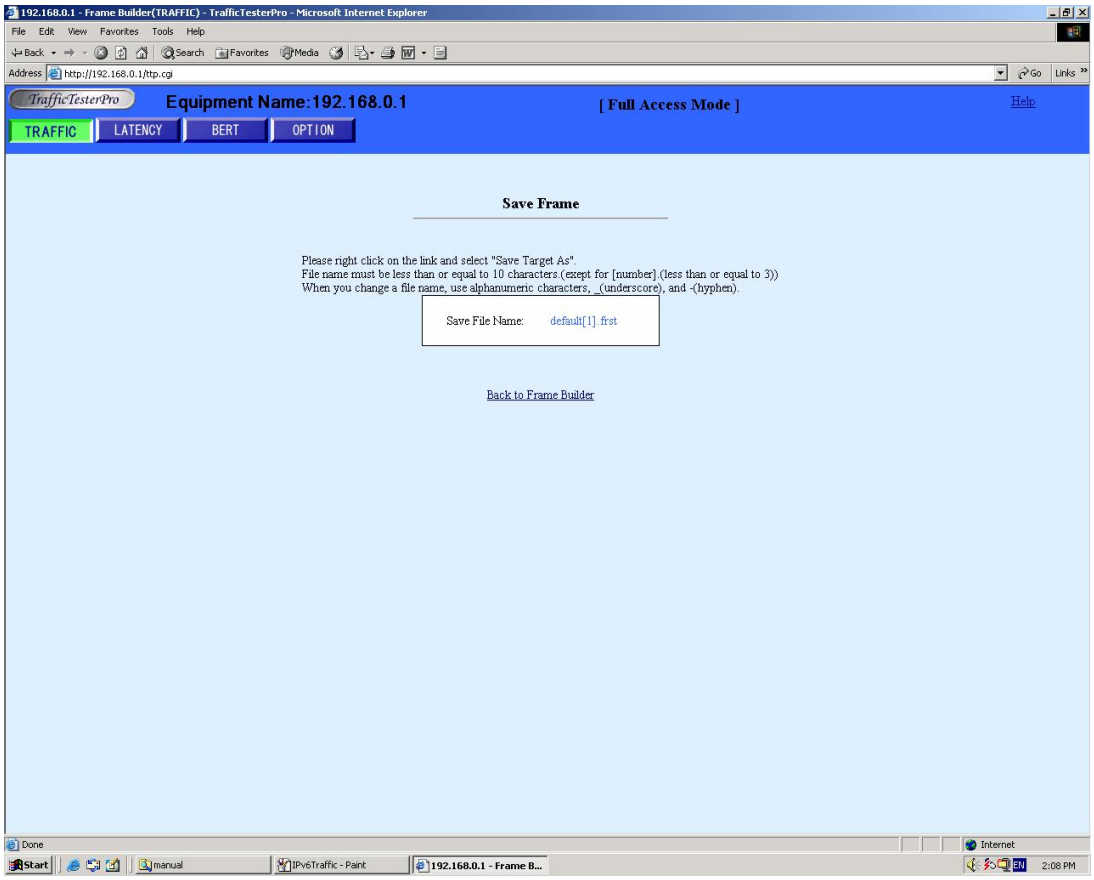
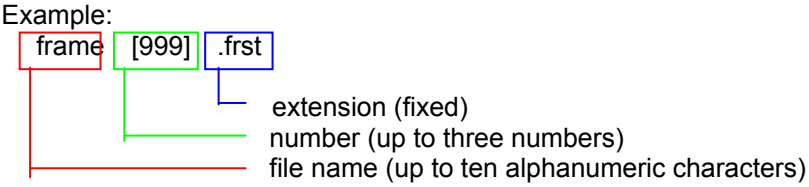


Figure 4.5-65 Initial save screen

The file name can be changed when saving. The file name must contain ten or fewer alphanumeric characters (including underscores and hyphens), followed by up to three-digit numbers surrounded by square brackets, and ending with the extension (.frst).

Example:



(2) Shortcut menu

If you place your cursor over the save file name and right-click, a shortcut menu appears as shown in the figure below. Select **Save As**.

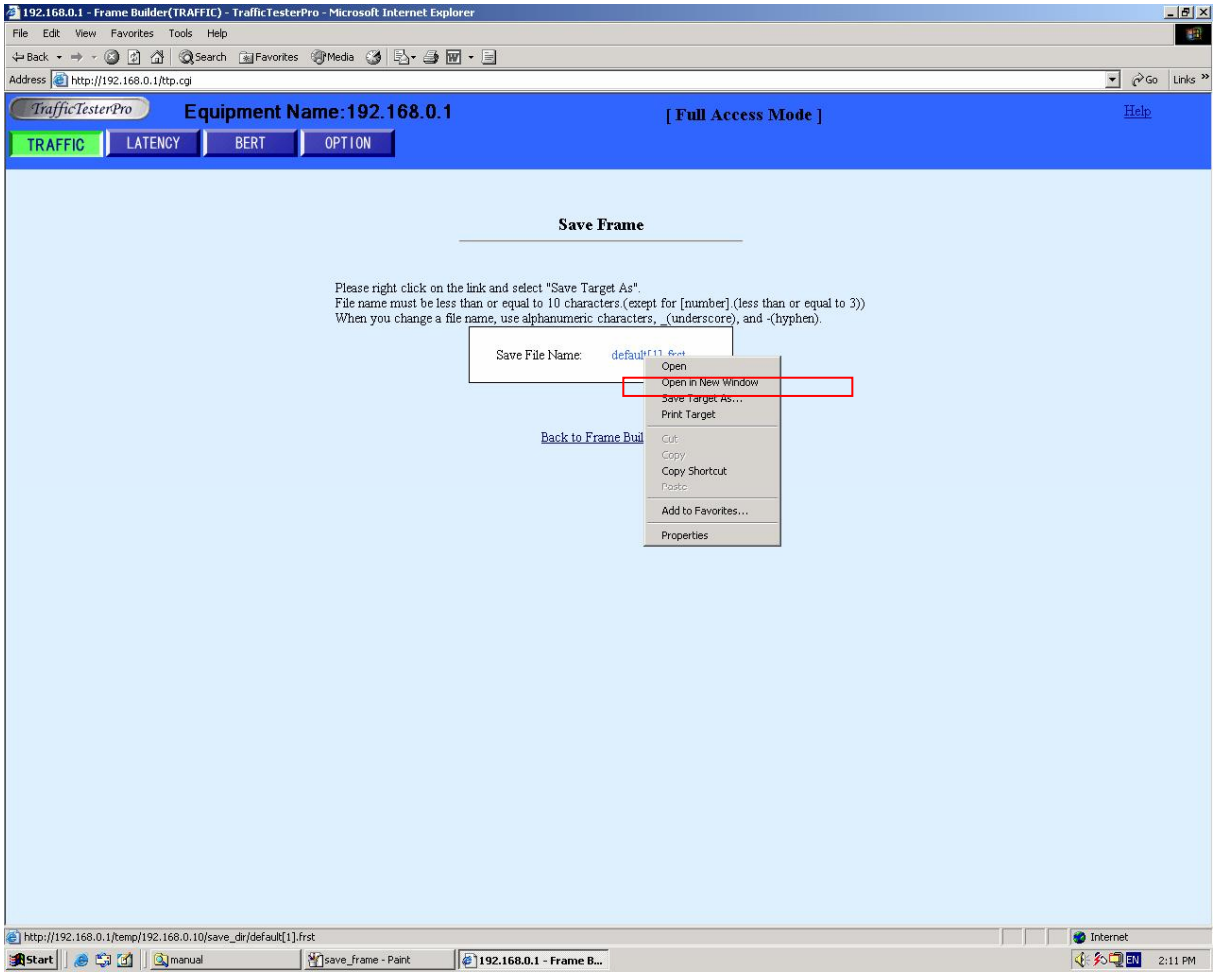


Figure 4.5-66 Shortcut menu

(3) **Save As** dialog box

Select **Save As** to display a dialog box allowing you to specify the save location for the file. You can specify the desired location on the controller PC for the file. The exact operation depends on the Windows environment of the controller PC you are using. For further details, please refer to documentation for your particular platform. For the file name, specify any file name that satisfies the file naming rules (in the example below, the AE5511 folder of the controller PC was chosen for the save location, and the *frame[001].frst* was specified for the file name).

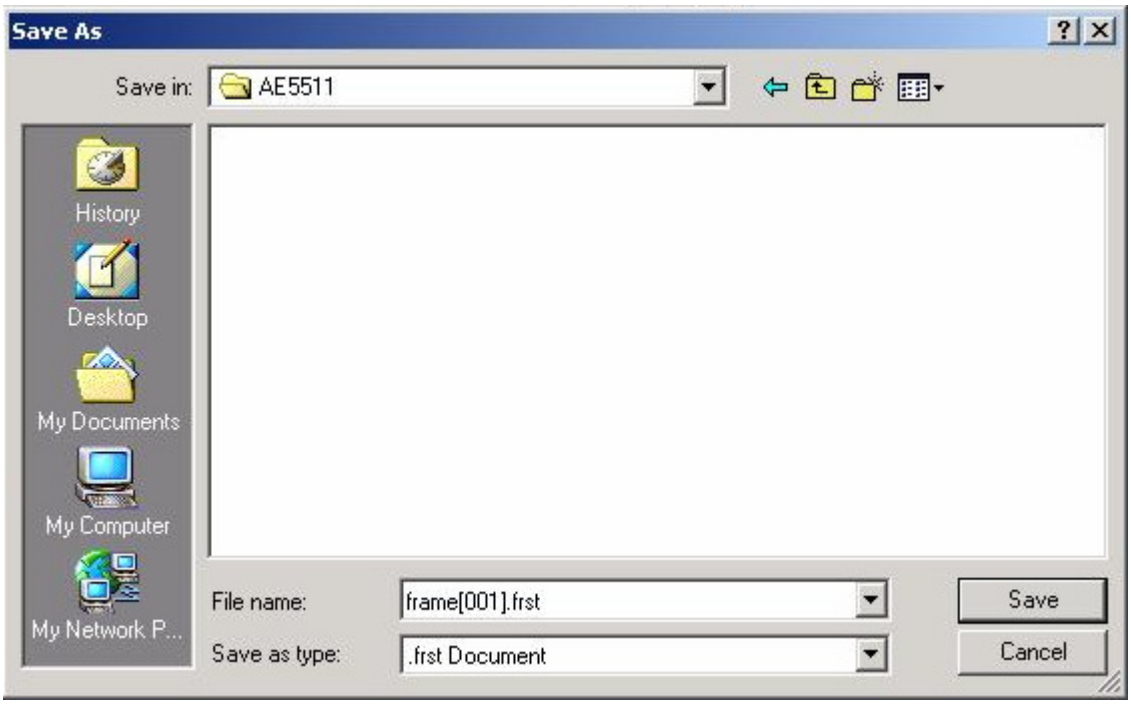


Figure 4.5-67 Save file location specification screen

Specify a save location and file name, then click **Save**. The frame information is saved to a file of the specified name in the specified location. If a file of the same name already exists in that location, the following message appears. Click **Yes** to overwrite, or **No** to cancel.

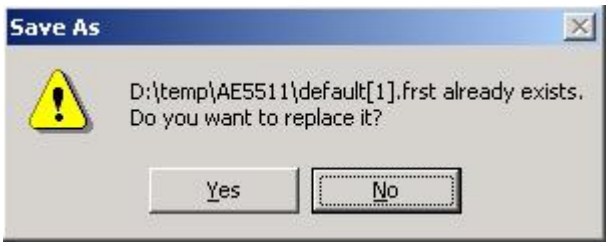


Figure 4.5-69 Overwrite confirmation screen

Once the frame information has been stored, you are returned to the initial save screen. If you are done saving frame information, click **Return to Frame Edit Screen**.

4.5.3.5 Loading Frames (Traffic Mode)

Use this function to load and edit previously saved frame information.

(1) Initial load screen

Clicking the Load button displays the initial load screen shown below. You can specify a file to load by typing its name directly (full pathname), or by clicking Browse and selecting the desired file on the controller PC.

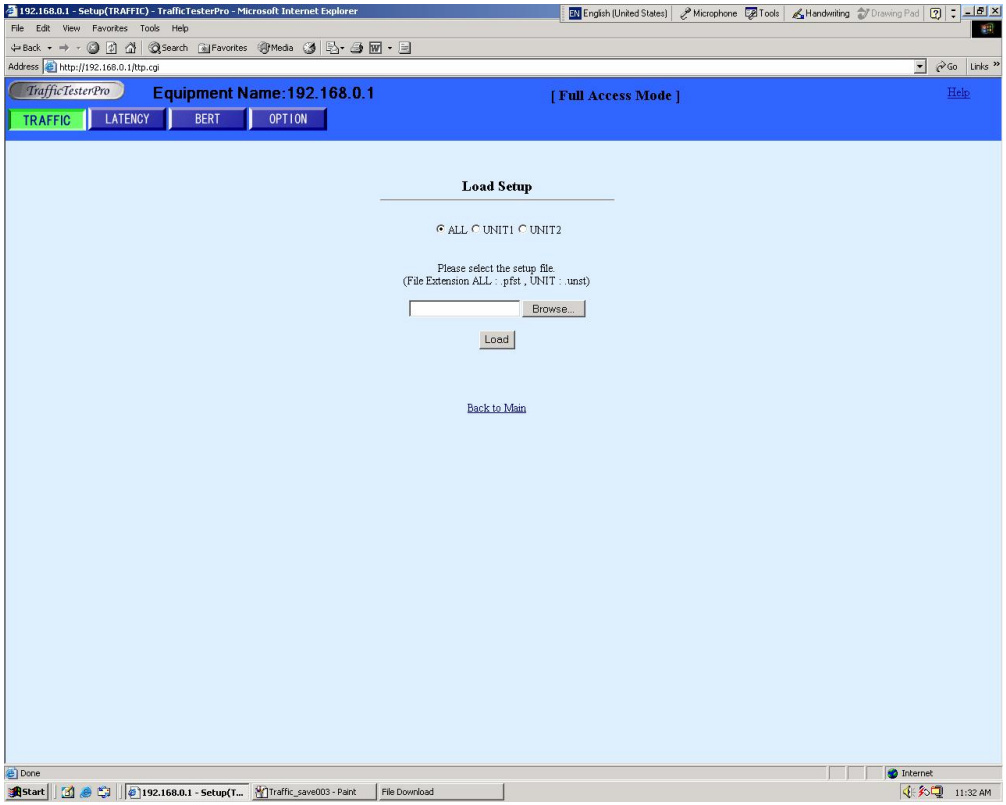


Figure 4.5-69 Initial load screen

(2) File selection screen

The following describes the procedure for selecting a file to load from the controller PC. Clicking the Browse button displays the file selection screen shown below. Specify the folder containing the desired file, then select the file (in the example below, the *frame[001].frst* file was selected from the *AE551* folder).

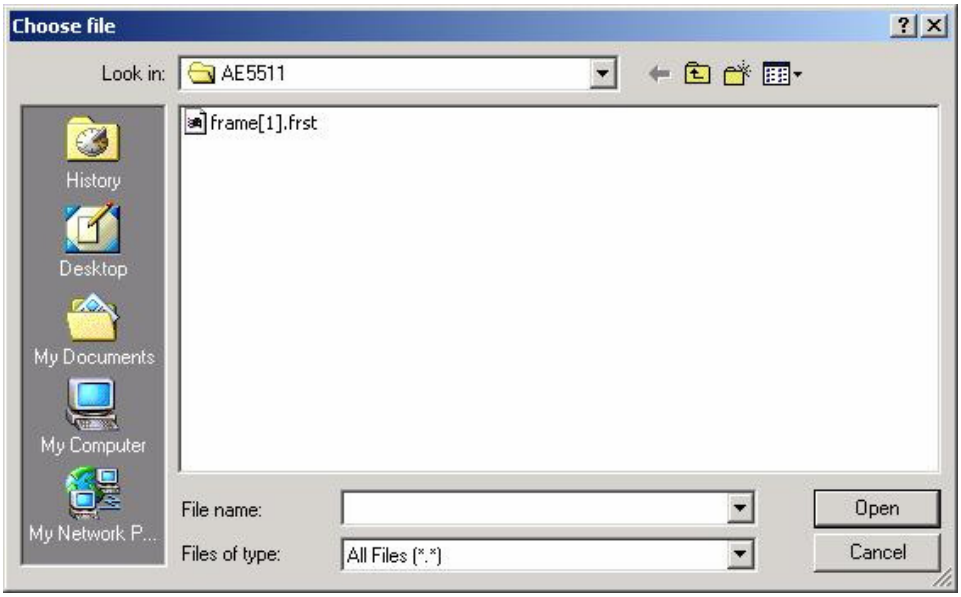


Figure 4.5-70 File selection screen

(3) Load file name confirmation screen

If you input or select a file name, it is displayed in the box as shown in the figure below.

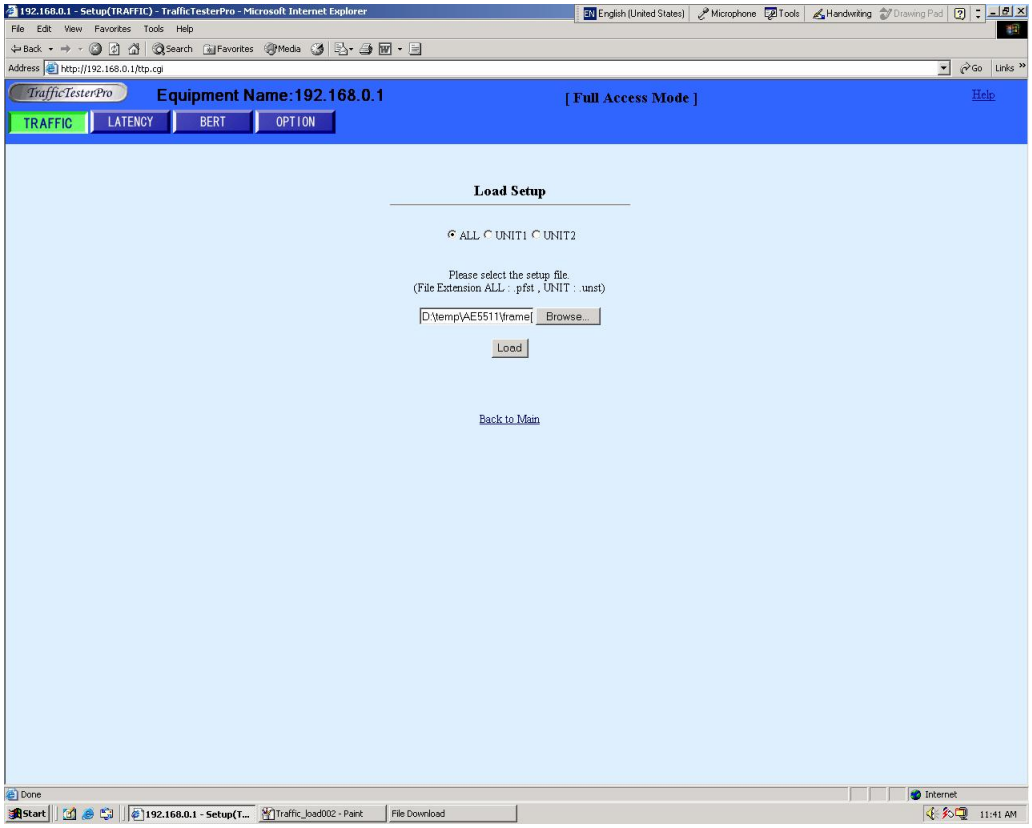


Figure 4.5-71 Load file name confirmation screen

(4) Load complete screen

Press the **Load** button in the load file confirmation screen to call up the specified frame information file. If the file is successfully loaded, the frame builder screen appears. Only files saved on the instrument can be loaded. If you attempt to load a file without the .frst extension, the following error message appears. Click **OK**, then try the load again, choosing a file with the correct extension.

Figure 4.5-72 Load file error message

4.5.3.6 Leaving the Frame Builder Screen (Traffic Mode)

Click the **OK** button shown in figure 4.5-43 to leave the frame builder screen. The specified frame information is copied to the corresponding frame definition area.

4.5.3.7 Continuing to the Next Frame (Traffic Mode)

Click the **OK & NEXT** button shown in figure 4.5-43 to copy the specified frame information to the corresponding frame definition area, and display the next frame information registered in the frame definition. Specification of the information for the next frame is now possible. However, if no next frame information has been registered, the file name is updated (default[n]: note that *n* is the smallest registered sequential number starting with 1.), and the next default[n] frame information can be set.

4.5.3.8 Canceling the Operation (Traffic Mode)

Press the **Cancel** button shown in figure 4.5-43 to delete the specified frame information, leave the frame builder screen, and return to the screen in figure 4.5-15.

4.5.4 Traffic Statistics Overview Screen

You can click the Transmission control/statistics button in the left of the traffic screen to display the traffic statistics overview screen.

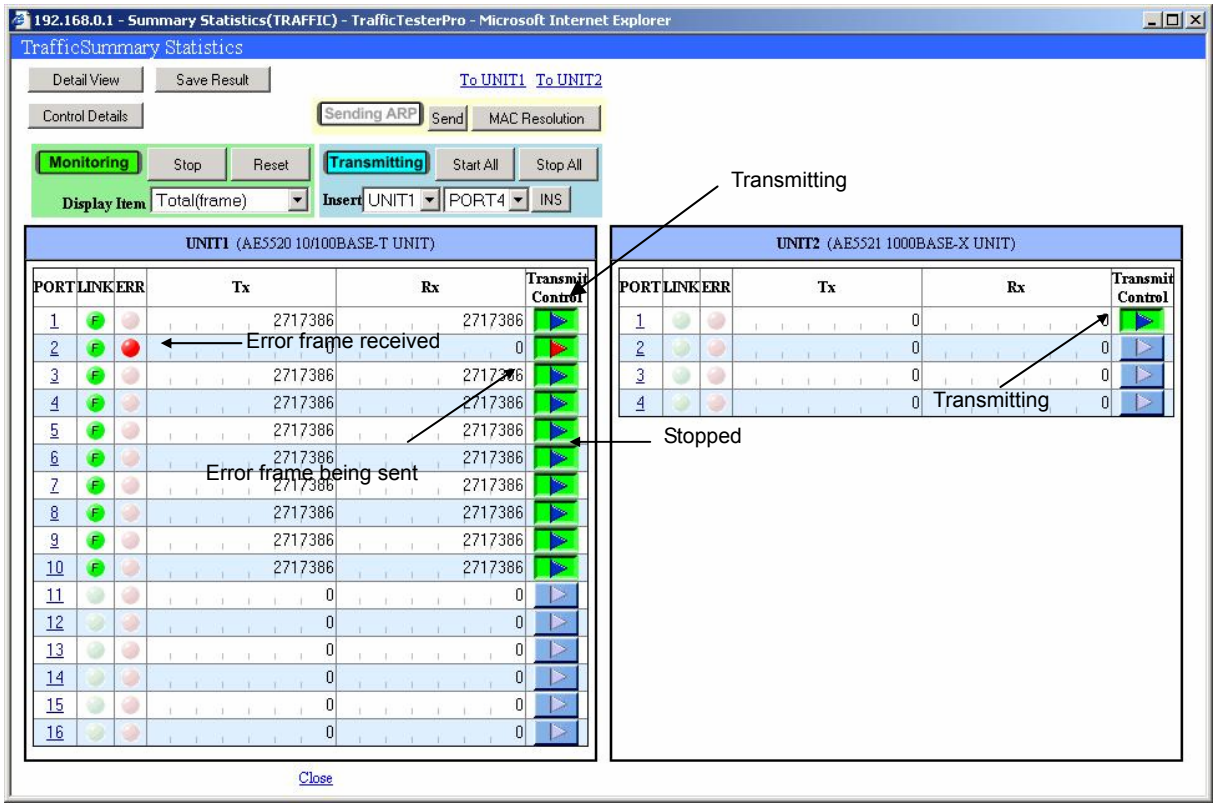


Figure 4.5-73 Traffic statistics overview screen (full display)

Table 4.5.41 Traffic statistics overview selection items

Selection Items	Description
Display units	You can select the display contents of the frame to be transmitted or received from the pull down menu. Select Total (frame), Total (byte), rate (frame/s), rate (%), rate (bps), or IFG max (ms). (Total was selected in the example above.)
Insert: Unit selection	Sets the unit that will transmit the insert frames. Only units having ports whose Insert Frame setting has been turned ON under transmission settings can be selected (in the example above, UNIT1 was selected).
Insert: Port selection	Sets the port that will transmit the insert frames. You can select all ports whose Insert Frame setting has been turned on in the transmission settings (ALL), or specify ports individually (in the example above, PORT2 was selected).
Display switching To UNIT1 display To UNIT2 display To All display	The screen display has three modes, UNIT1 only, UNIT2 only, or All (UNIT1+UNIT2). The currently active option is not displayed, and you can choose one of the remaining two options (in the above example, you can switch from All to either UNIT1 or UNIT2.)

Table 4.5.42 Traffic Statistics Overview button items

Button Item	Description
Statistics detailal display	Displays the statistics details screen from 4.5.5 Traffic in a separate pop up window.
Save statistics	Saves the statistics to a file. For details, see section 4.5.4.3, “Saving Statistics.”
Start/stop statistics	Starts/stops statistical calculation on all ports. When the Start Statistics button is clicked, the message “Start statistics” is displayed, and the button changes to the Stop Statistics button. Pressing the Stop Statistics button stops statistical calculation, and the button changes back to the Start Statistics button. Also, when calculation stops, a window appears prompting you to save the results.
Reset	Clears statistical data on all ports.
Transmit all	Transmits test frames from all ports set for transmission.
All stop	Stops transmission of test frames on all ports.
Transmit (insert)	Transmits a single frame defined as an insert frame from the selected port. Applies to all ports whose insert frame setting has been turned ON in the transmission settings as shown in 4.5.2.2.
Transmission control	Starts/stops transmission of test frames on individual ports. Displays a gray triangle on a blue background when stopped, and a blue triangle on a green background during transmission. When error frames are included in transmission frames, the triangle turns red.
Acquisition	Performs automatic acquisition of the MAC address, and displays the acquisition results. Automatic acquisition of MAC address is turned ON in the network emulation settings, and the port on which the target IP address is set sends an ARP request to the device under test, and resolves the MAC address. (ARP request frames are transmitted on all specified ports when the button us clicked.) Up to three APR request frames are transmitted.
Display MAC acquisition screen	Displays the automatically acquired MAC address. The address is updated each time the button is pressed. Press the button to confirm the MAC address acquisition results. If acquisition of the MAC address fails, “acquisition failed” is displayed. * See section 4.5.4.1 “Auto-Acquiring the MAC Address” for further information on the function.
Detailed control	Starts and stops transmission of LF (Local Fault) and RF (Remote Fault). * LF/RF transmission is only available with the AE5522 10GBASE-X Unit.

Table 4.5.43 Traffic statistic overview display items

Item	Description
(Unit name)	Displays the model name of the inserted unit. Displays (AE5520 10/100BASE-T UNIT), (AE5521 1000BASE-X UNIT), or (AE5522 10GBASE-X UNIT). The model names of uninstalled units are not displayed.
PORT	Displays port numbers. If you click one of these numbers, the corresponding statistics detail screen is displayed.
LINK	Displays the link status. ● For the AE5520 10/100BASE-T Unit • Green F: Link up at 100M, Full • Green H: Link up at 100M, Half • Yellow F: Link up at 10M, Full • Yellow H: Link up at 10M, Half • Light gray: Link down ● For the AE5521 1000BASE-X Unit • Green: Linked up • Light gray: Link down ● For the AE5522 10GBASE-X Unit • Green: Linked up • Light gray: Link down • Red: Receiving LF • Yellow: Receiving RF
ERR	Displays the error status. Illuminates red when at least one of all the received statistical frames has an error.
Transmit	Displays statistics on transmitted frames in the units specified under Display units.
Receive	Displays statistics on received frames in the units specified under Display units.

4.5.4.1 Auto-Acquiring the MAC Address

You can automatically acquire the MAC address of the device under test, and save the acquired MAC address to the destination MAC address of the frame data to be transmitted.

(1) Acquisition screen

When the Acquire button is clicked in the statistics overview screen, the “Acquiring MAC” message is displayed in yellow as shown below.

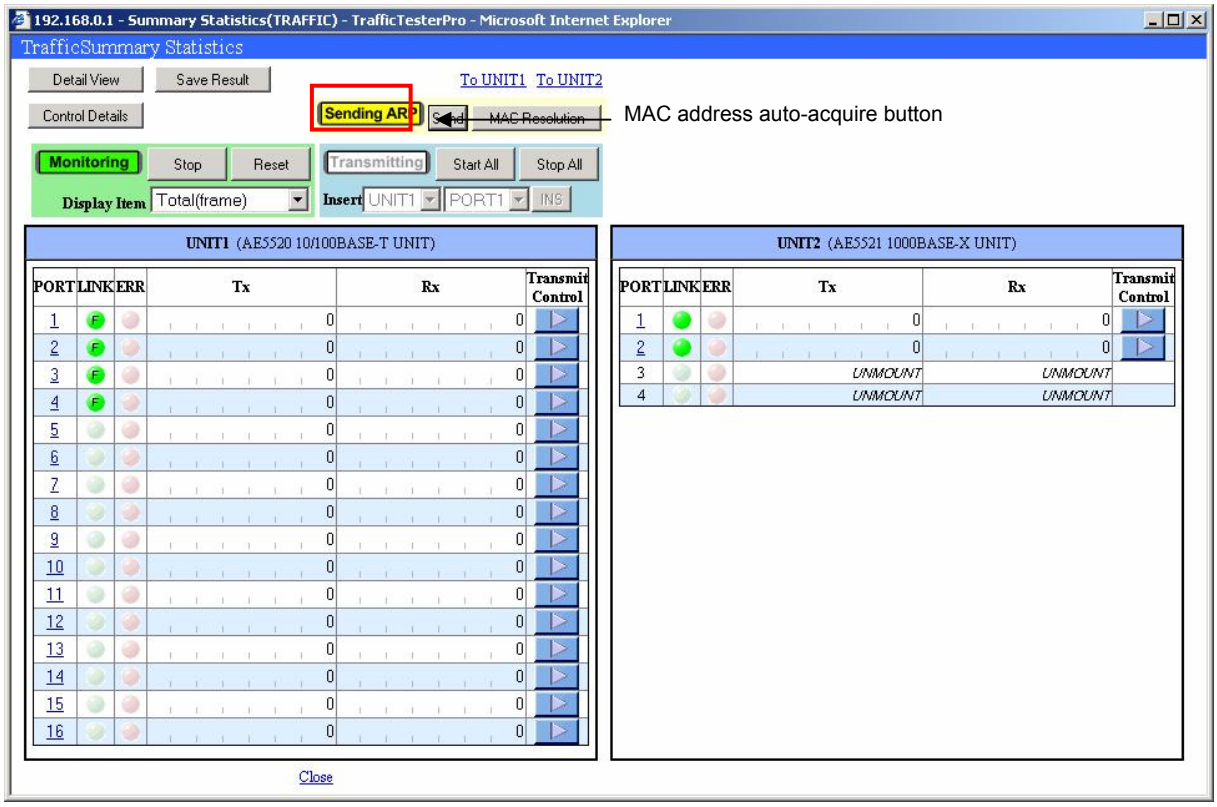


Figure 4.5-74 MAC address acquisition screen

An ARP request frame is transmitted to the target IP address of the device under test from the instrument, and the ARP reply frame is received from the device under test.

Figure 4.5-75 Overview of MAC address auto-acquire operation

(2) Screen after MAC address acquired

If nothing is displayed Acquiring MAC box, automatic MAC address acquisition is complete.

With the automatic MAC address acquisition operation, since ARP request and reply frames are transmitted and received, check the count display status to make sure that the count is reset prior to starting statistics, and check other relevant statuses.

When automatic acquisition of the MAC address is complete, the screen in figure 4.5-77 is automatically displayed.

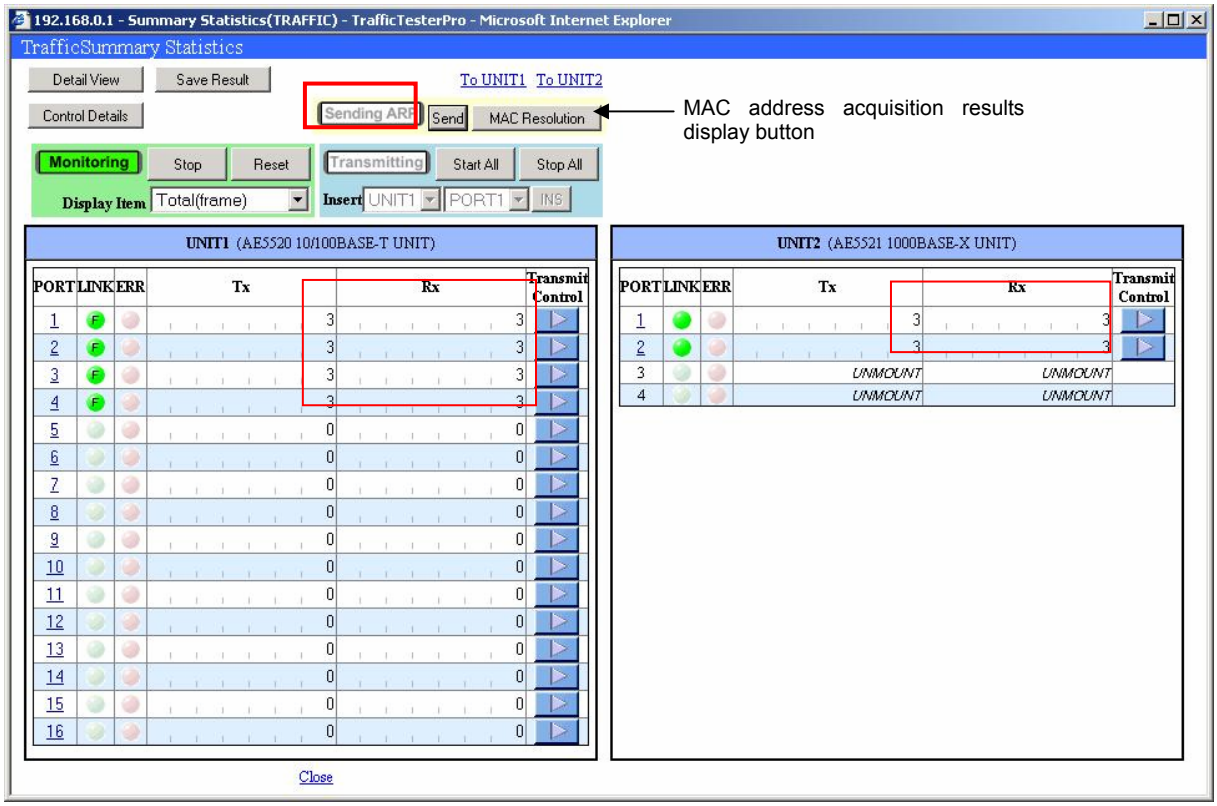


Figure 4.5-76 Screen after MAC acquisition

(3) Display MAC acquisition screen
Clicking the Display MAC acquisition screen button displays the MAC address acquisition results.

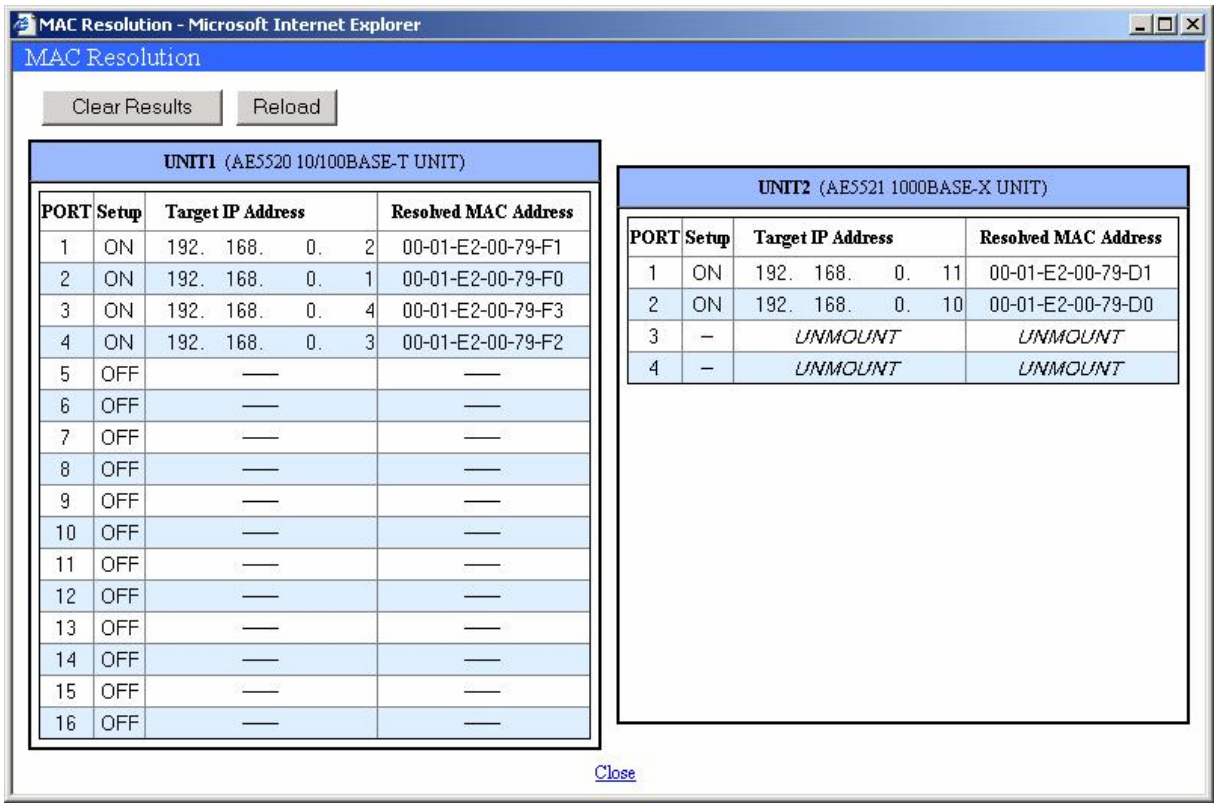


Figure 4.5-77 MAC address acquisition results screen

Table 4.5.44 MAC acquisition screen display items

Item	Description
Update	Updates the screen with the latest information
Clear	Clears the MAC address acquisition results on all ports. The destination MAC address is not copied to the transmission frames.
(Unit name)	Displays model name of the inserted unit. Displays (AE5520 10/100BASE-T UNIT), (AE5521 1000BASE-X UNIT), or (AE5522 10GBASE-X UNIT). The model names of uninstalled units are not displayed.
PORT	Displays each port number.
Settings	Turns the MAC address auto-acquire function ON And OFF.
Target IP address	Displays the target IP address set on each port.
MAC address auto-acquire results	Displays the MAC address acquisition results on each port • When ARP has not been resolved [Not executed] • When ARP resolution was not successful [MAC address] • When ARP resolution is failing [Acquisition failure] (red)

4.5.4.2 Detailed Control (LFS Function)

This is an LFS (link fault signaling) function that allows you to transmit the LF (local fault) and RF (remote fault). (LFS control is only available with the AE5522 10GBASE-X Unit.)

(1) Detailed control screen

When the Detailed control button is clicked in the statistics overview screen, the detailed control screen is displayed as shown below.

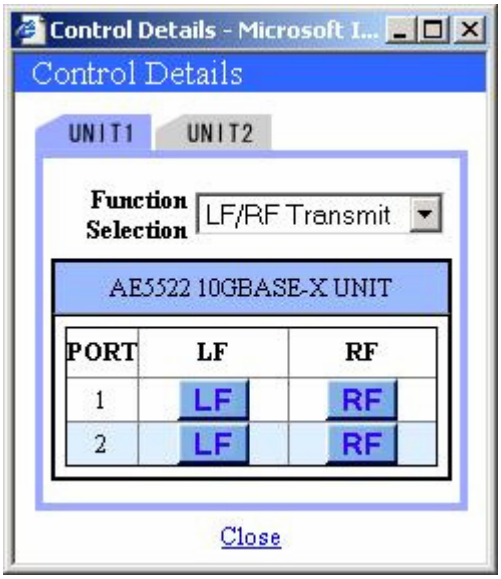


Figure 4.5-78 Detailed control screen

(2) LF transmission screen

When the LF button in the detailed control screen is clicked, LF is transmitted.

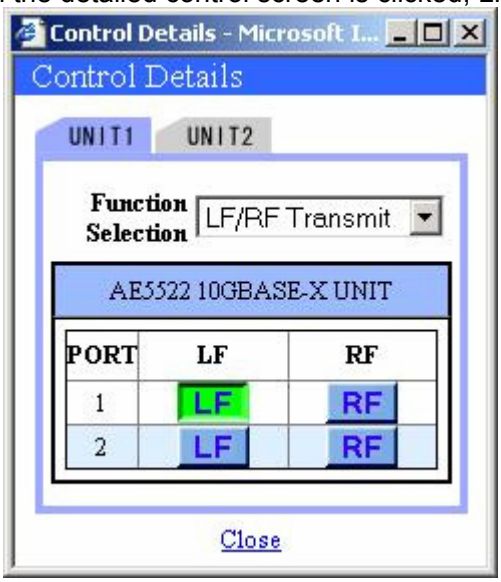


Figure 4.5-79 LF transmission screen

After LF transmission, LF is displayed under transmission control in the overview statistics screen. When LF is received, is displayed under LINK.

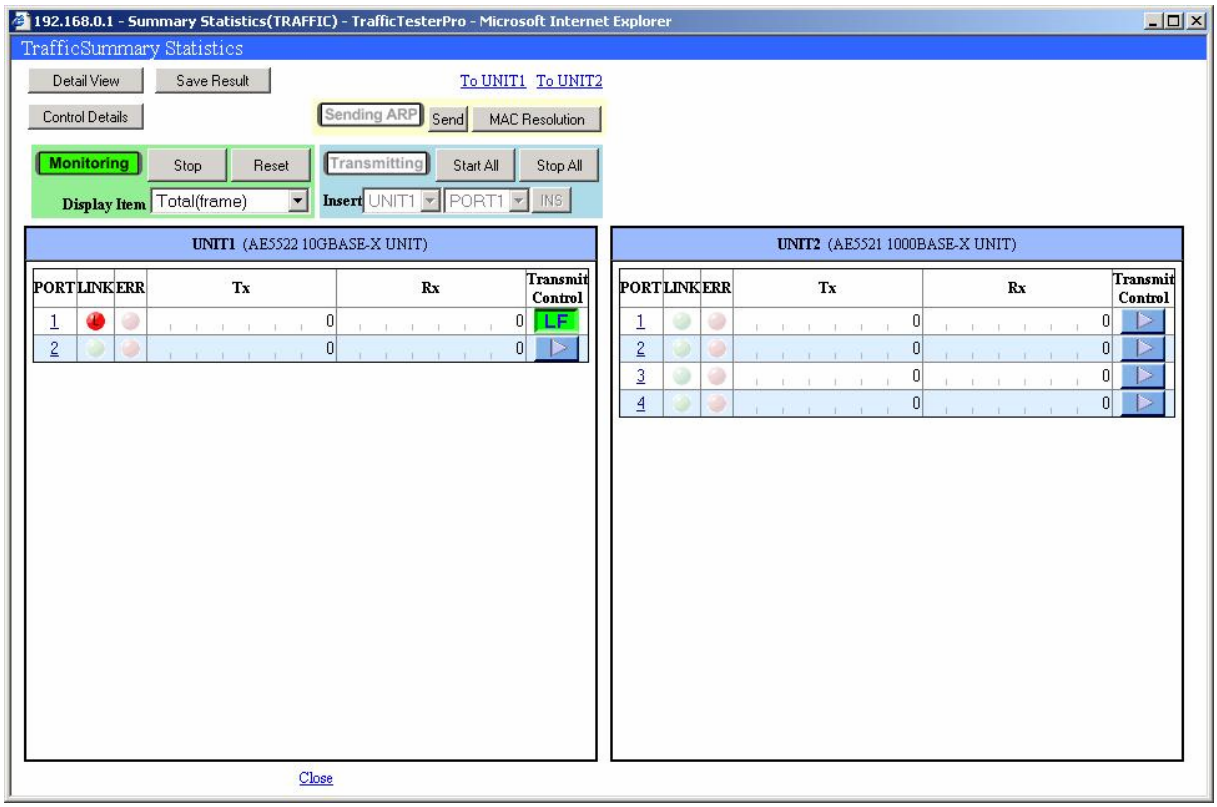
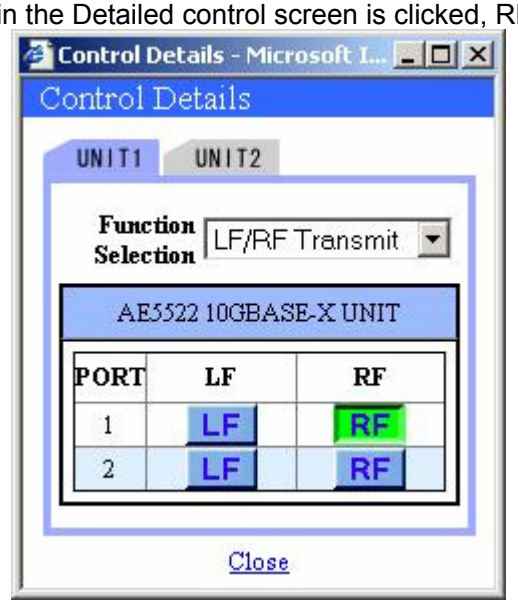


Figure 4.5-80 LF transmission screen - statistics overview

(3) RF transmission screen

When the RF button in the Detailed control screen is clicked, RF is transmitted.



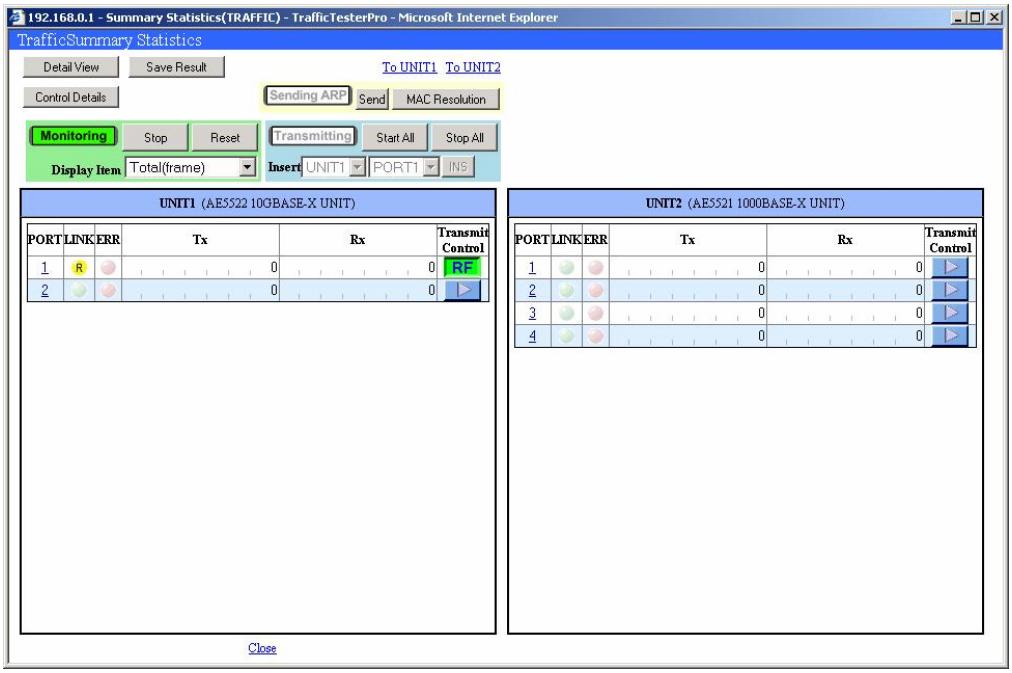


Figure 4.5-81 RF transmission screen

After RF transmission, RF is displayed under transmission control in the overview statistics screen. When RF is received, is displayed under LINK.

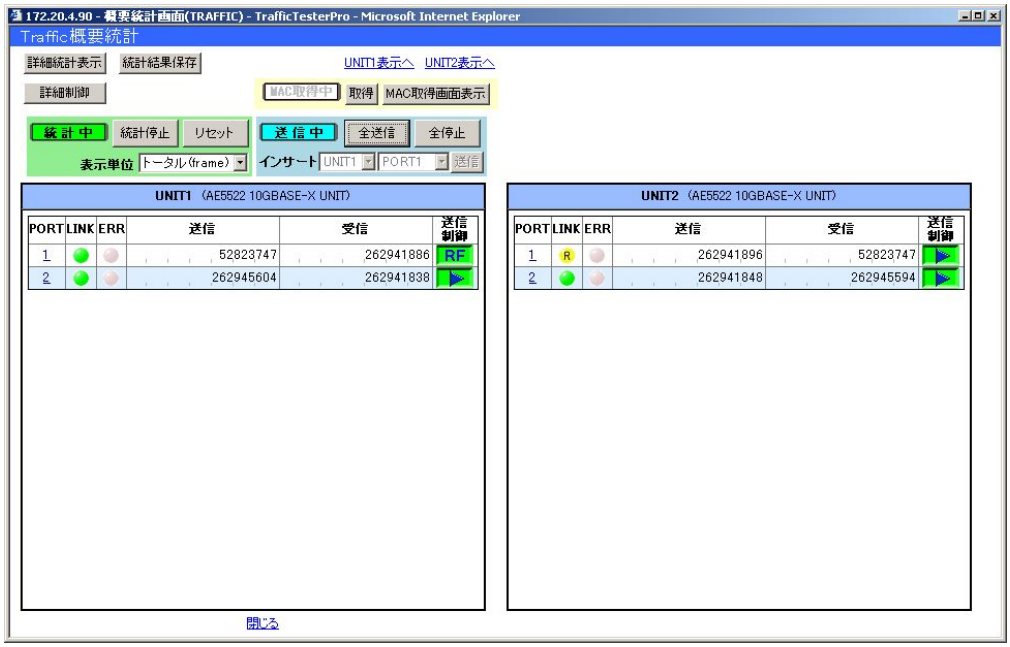


Figure 4.5-82 RF transmission screen - statistics overview

4.5.4.3 Saving Statistics

You can save the statistics to a file.

(1) Initial save screen
When clicking OK in the save confirmation screen that appears when clicking the statistics stop button, or when clicking the save statistics button when statistics stop, the save statistics screen appears as shown below. If you press the start/stop button during statistical calculation the statistics stop confirmation message appears; click **OK** to advance to the save screen after statistics have stopped, or click **Cancel** to abort saving and continue with statistical calculation. You can choose HTML or CSV format for the file to be saved, and each file name is displayed (these file names can be changed).

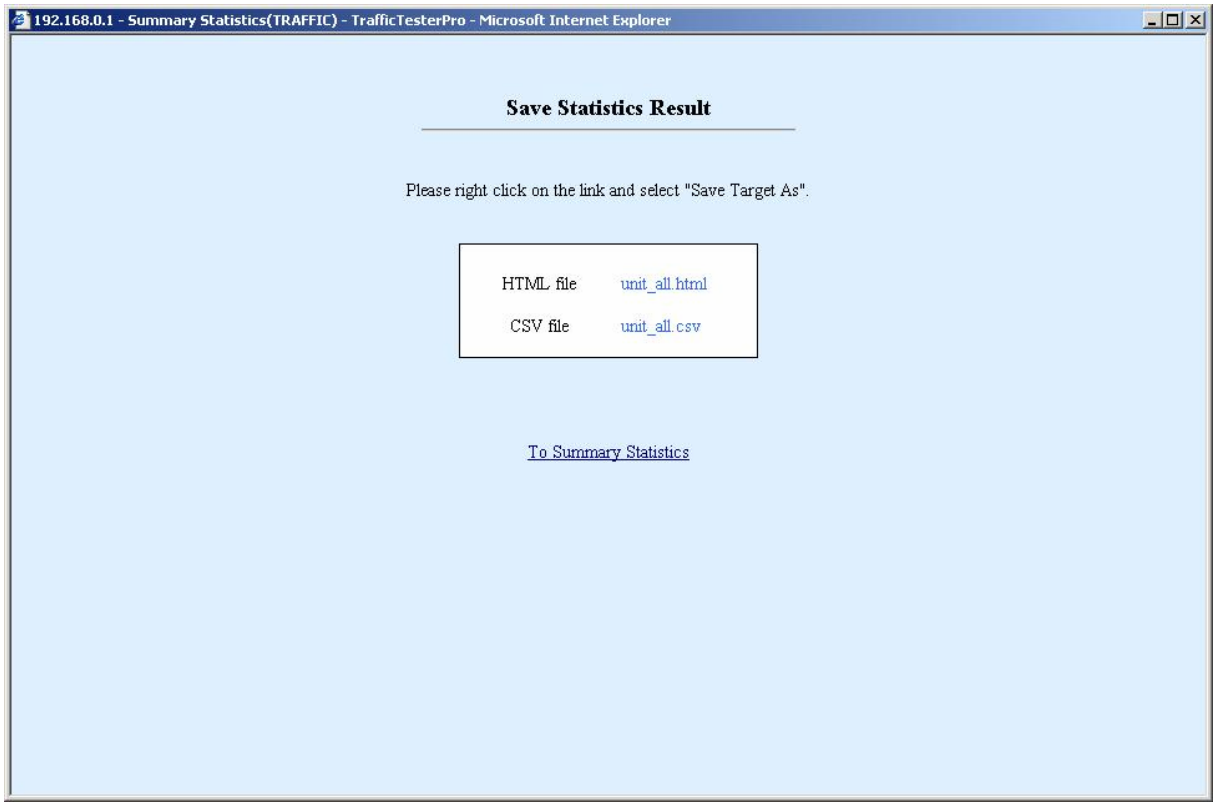


Figure 4.5-83 Save statistics screen

(2) Shortcut menu

If you place your cursor over the file name next to the desired format and right-click, a shortcut menu appears as shown in the figure below (HTML is selected in the following example).

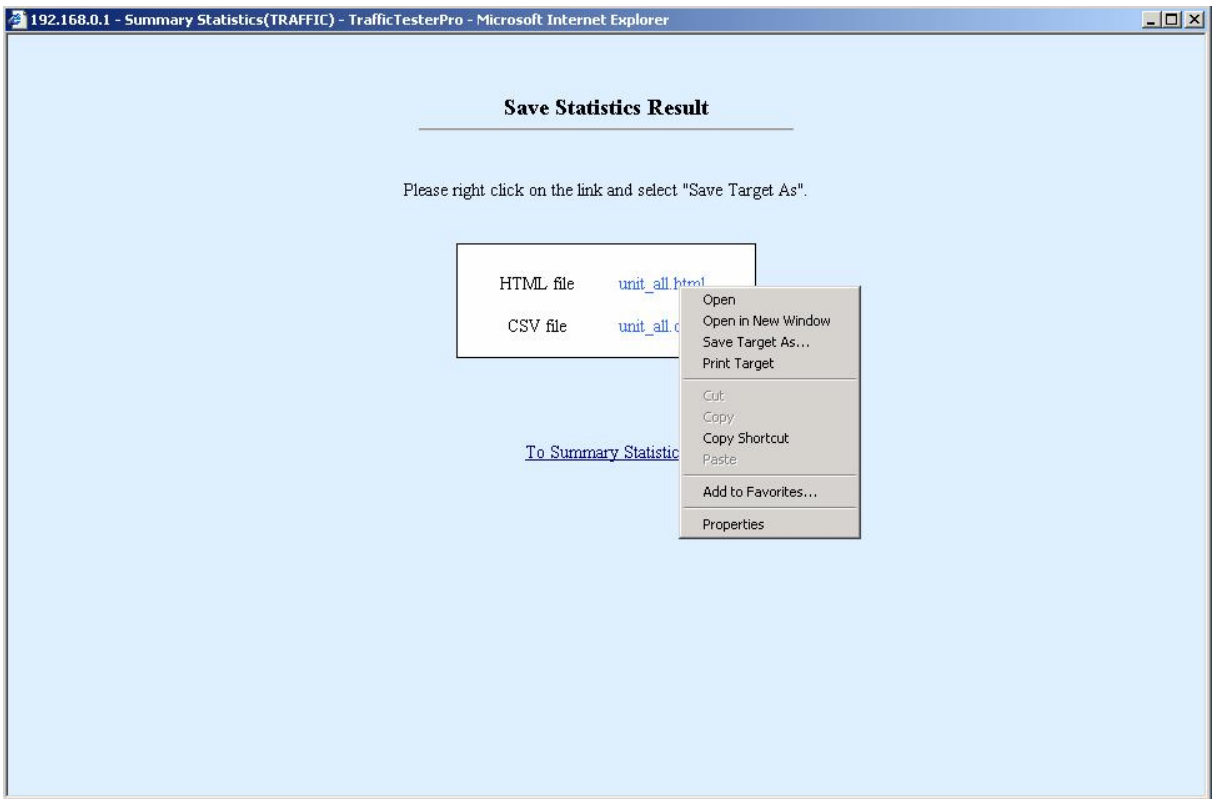


Figure 4.5-84 Shortcut menu

(3) **Save As** screen (for HTML)
Select **Save As** to display a dialog box allowing you to specify the save location for the file.

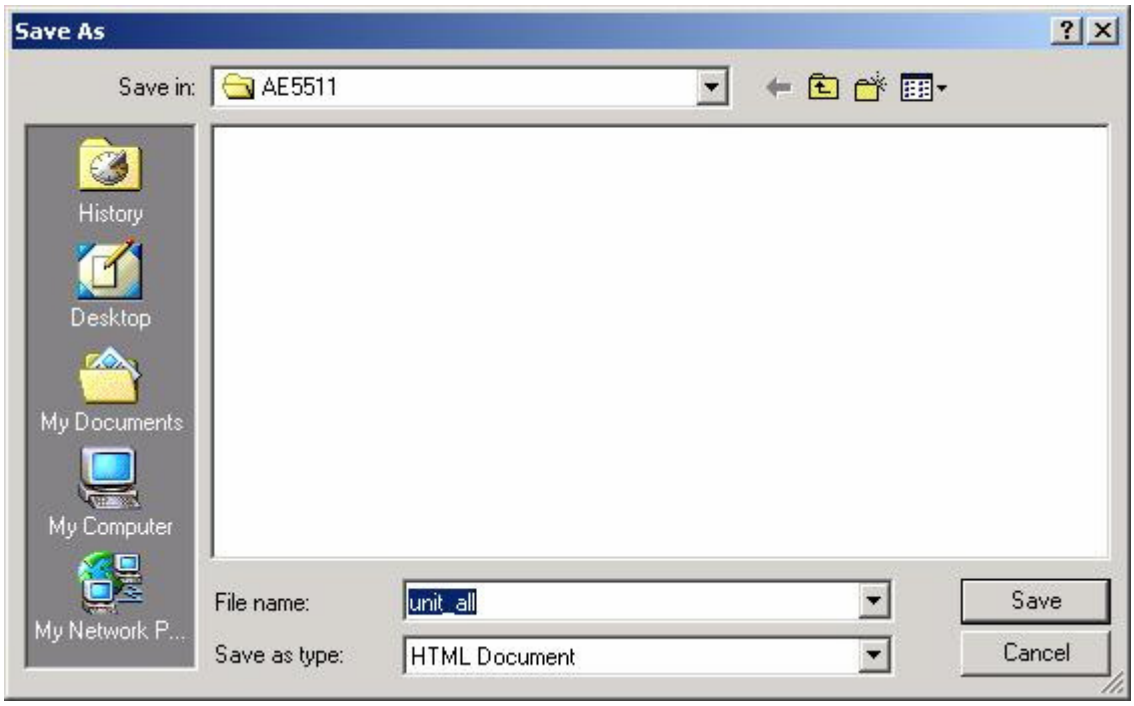


Figure 4.5-85 Save As screen (for HTML)

Specify a save location and file name, then click **Save**. The statistics are saved to a file of the specified name in the specified location.

If a file of the same name already exists in that location, the following message appears. Click **Yes** to overwrite, or **No** to cancel.

Figure 4.5-86 Overwrite confirmation screen (for HTML)

When the statistics are saved, you are returned to the save statistics screen shown in figure 4.5-83, allowing you to save additional files. If you are done saving statistics, click **Return to statistics overview screen**.

(4) **Save As** screen (for CSV)
Select **Save As** to display a dialog box allowing you to specify the save location for the file.

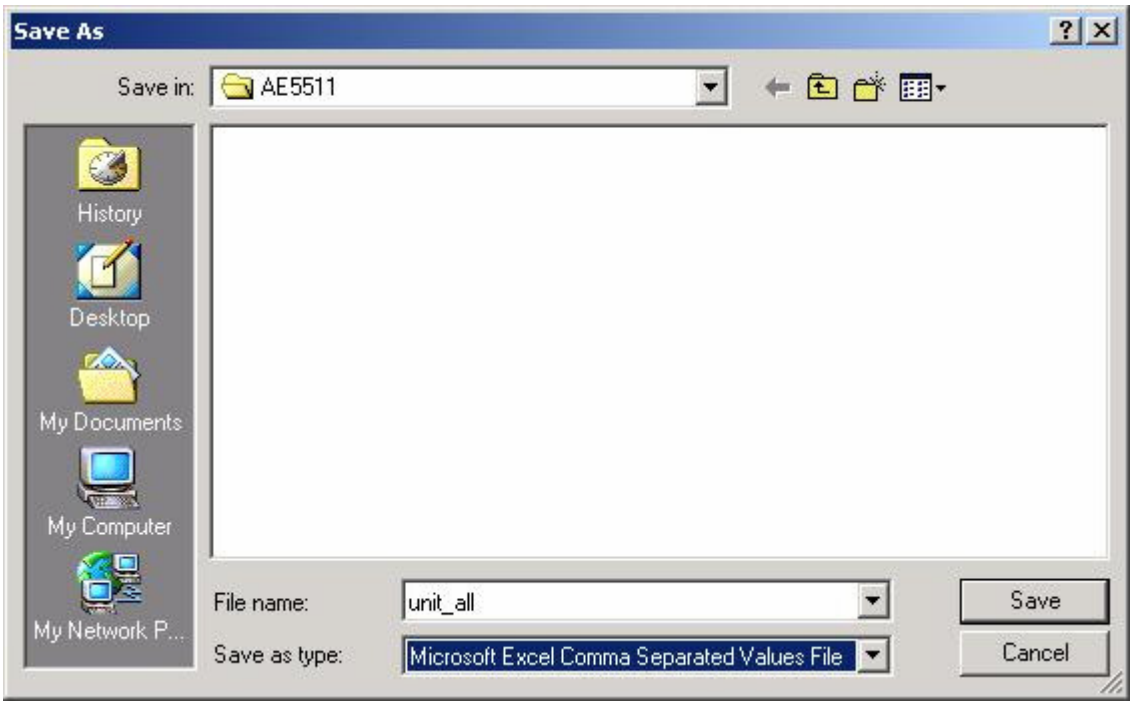


Figure 4.5-87 Save As screen (for CSV)

Specify a save location and file name, then click **Save**. The statistics are saved to a file of the specified name in the specified location.

If a file of the same name already exists in that location, the following message appears. Click **Yes** to overwrite, or **No** to cancel.

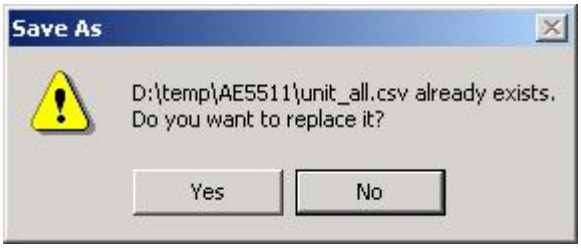


Figure 4.5-88 Overwrite confirmation screen (for CSV)

When the statistics are saved, you are returned to the save statistics screen shown in figure 4.5-83, allowing you to save additional files. If you are done saving statistics, click **Return to Statistics Overview screen**.

4.5.5 Traffic Statistics Detail Screen

Figure 4.5-89 Traffic statistics detail screen

Table 4.5.45 Traffic statistics detail selection items

Item	Description
UNIT1: Port Selection	Selects the port number on Unit1 for which you wish to display details. Only enabled ports can be selected.
UNIT2: Port Selection	Selects the port number on Unit2 for which you wish to display details. Only enabled ports can be selected.

Table 4.5.46 Traffic details statistics button items

Item	Description
Statistics overview display	The statistics overview display window becomes active.
Counter reset: Reset	Clears the statistical data and measurement time of the selected ports.
Insert frames: Transmit	Becomes active when the insert frame function is enabled. Transmits frame defined as insert frames on the selected ports. One frame is transmitted per click of the button.

Table 4.5.48 Traffic statistics details display items (1)

Item	Description
<UNIT1>/<UNIT2>	Displays the model names of the inserted units. Displays (AE5520 10/100BASE-T UNIT), (AE5521 1000BASE-X UNIT), or (AE5522 10GBASE-X UNIT).
UNIT	Displays the number of the selected unit.
PORT	Displays the number of the selected port.
LINK	Displays the link status. For the display contents, see table 4.5.43.
ERR	Displays the error status. Illuminates red when at least one of all the received statistical frames has an error.
SPEED	Displays link speed–Duplex.
MDI (for the AE5520 Unit)	Displays straight (||), or cross (X)
GBIC (for the AE5521 Unit)	Displays the GBIC type.
XENPAK for the AE5522 Unit)	Displays the XENPAK type.
Measurement time	Displays the measurement time (the time from the start of statistics)
Insert frames	Counts the inserted frames.

Table 4.5.48 Traffic statistics detail display items (2)

Item		Description
Total	Frame	Displays the total number of transmitted and received frames.
	Bytes	Displays the total number of transmitted and received bytes.
	Reply	Displays the total number of transmitted replies.
	Collisions	Displays the total number of transmitted collisions. (Displays statistics with the AE5520 Unit only)
	Pause frames	Displays the total number of received pause frames.
	Error frames	Displays the total number of transmitted and received error frames. (Sum of error frames below)
	CRC error *	Displays the total number of transmitted and received CRC error frames.
	Undersize*	Displays the total number of transmitted and received undersize errors.
	Oversize*	Displays the total number of transmitted and received oversize errors.
	Alignment errors*	Displays the total number of received alignment errors. (Displays statistics with the AE5520 Unit only)
	Symbol errors*	Displays the total number of received symbol errors.
	IFG max (µs)	Displays the IFG max value (µs) of the total received frames.
	IFG min (µs)	Displays the IFG min value (µs) of the total received frames.
	IFG avg (µs)	Displays the IFG avg value (µs) of the total received frames.
Current	Frame	Displays the current number of transmitted and received frames.
	Bytes	Displays the current number of transmitted and received bytes.
	Rate (%)	Displays the current transmission and reception rate (%).
	Rate (bps)	Displays the current transmission and reception rate (bps).
	Error frames	Displays the current number of transmitted and received error frames. (Sum of error frames below)
	CRC error *	Displays the current number of transmitted and received CRC error frames.
	Undersize	Displays the current number of transmitted and received undersize errors.
	Oversize	Displays the current number of transmitted and received oversize errors.
	Alignment errors	Displays the current number of received alignment errors. (Displays statistics with the AE5520 Unit only)
	Symbol errors	Displays the current number of received symbol errors.
* Error hierarchy		Errors are received in order of priority as follows: If errors are received simultaneously, the lower priority error is not the current one.

Error	Priority
Symbol errors	High
Undersize/oversize errors	|
Alignment errors	|
CRC errors	Low

4.6 Latency Mode

This section provides an explanation of Latency mode.

4.6.1 Mode Selection Screen (Latency Mode)

Figure 4.6-1 below shows the mode selection screen when selecting Latency mode.

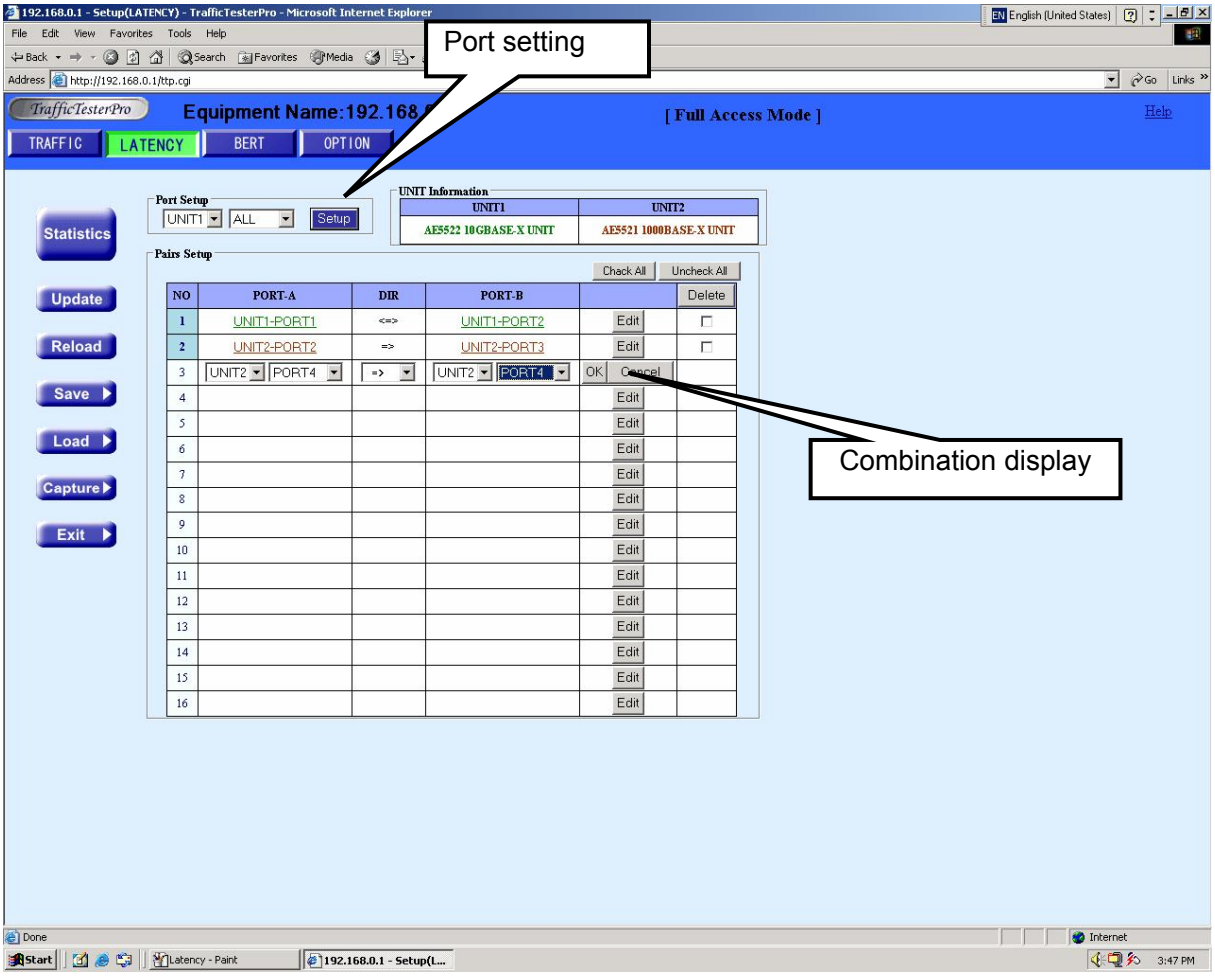


Figure 4.6-1 Mode selection screen (when Latency mode is selected)

Latency measurement differs from other modes in that measurements are only taken between UNIT ports installed in a single instrument.

WARNING

- This instrument has functions allowing it to transmit frames at high loads from its measurement ports. Incorrect operation can result in breakdown or deterioration of network media or related devices.
  - Sufficient care must be taken when performing tests while connected to networks. Yokogawa does not assume any responsibility for damages resulting from incorrect operation.
- Avoid pressing your browser's Back button as the setting values may not take effect.

4.6.1.1 Entering Port Settings

Figure 4.6-2 Port settings

You can specify the measurement ports on which to enter measurement settings.

(1) Specify a unit
Select an installed unit. However, if a unit is not installed in slot 1 or slot 2, that unit cannot be selected.

(2) Specify a measurement port
Select a measurement port for the unit selected in the previous item. If you select ALL, you can apply the same setting to all ports. However, if GBIC is not installed with the AE5521 1000BASE-X Unit, and if XENPAK is not installed with the AE5522 10GBASE-X Unit, that port cannot be selected.

(3) Setup button
Pressing this button sends you to a screen for entering detailed measurement settings related to the unit and measurement port specification in the previous items. For details on the port setting screen, see section 4.6.2, “Port Setting Screen.”

4.6.1.2 Setting Up Combinations

Latency measurement involves specifying combinations of transmitting and receiving sides. Up to sixteen combinations can be specified. Combination setting numbers are designated for measurement, and you can specify one or both directions. Combinations are displayed in green for UNIT1 ports, and in tea green for UNIT2 ports.

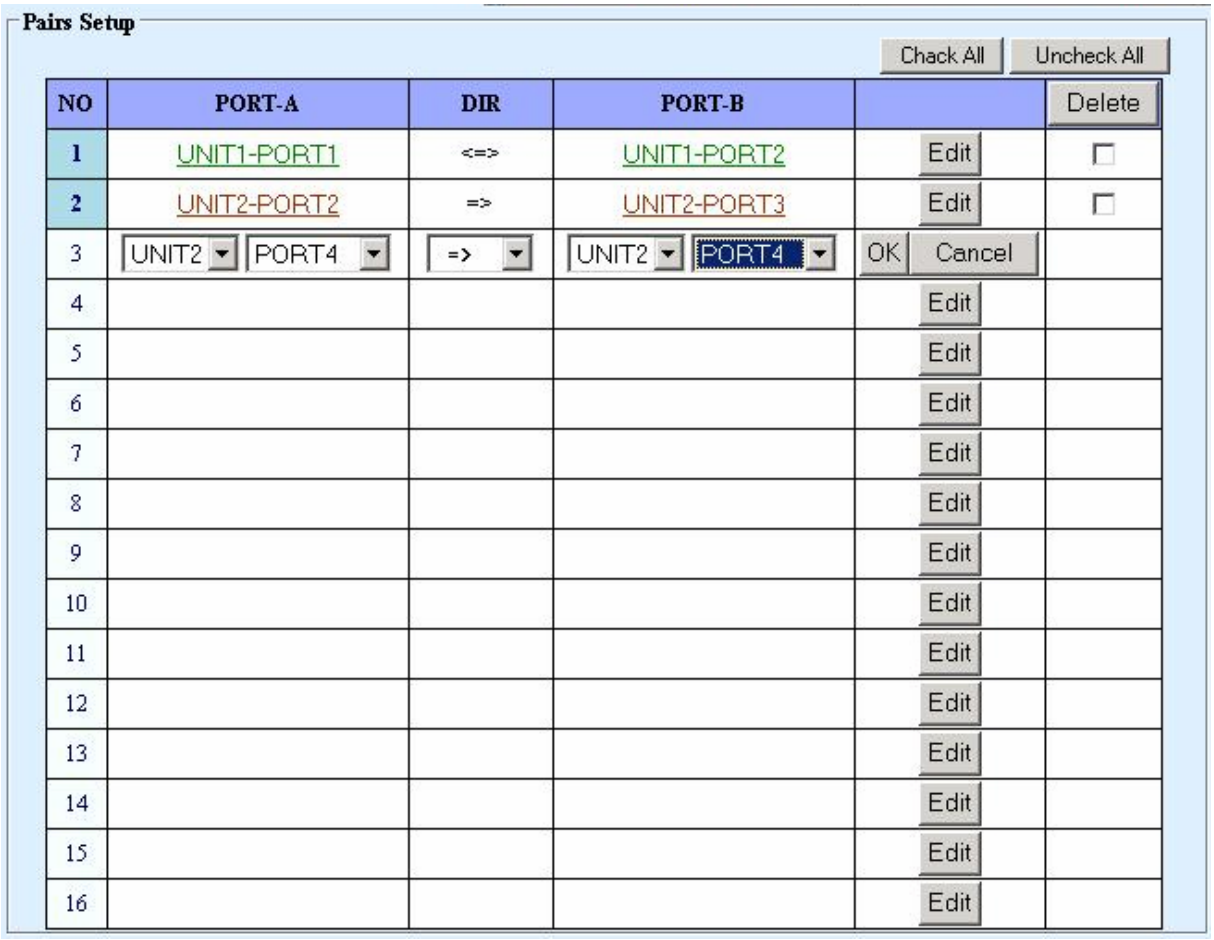


Table 4.6-3 Latency combination setting screen

Table 4.6.1 Latency combination setting items

Setting Item	Description
Edit	Sets the port combinations for Latency measurement.
UNIT (PORT-A)	Enabled when the Edit button is clicked. Specifies the UNIT on PORT-A.
PORT (PORT-A)	Enabled when the Edit button is clicked. Specifies the PORT on PORT-A.
DIR	Enabled when the Edit button is clicked. Sets the direction. PORT-A→-B, PORT-A←-B, or both. Also, if the same port for PORT-A and PORT-B are specified, the PORT-A->PORT-B setting takes effect.
UNIT (PORT-B)	Enabled when the Edit button is clicked. Specifies the UNIT on PORT-B.
PORT (PORT-B)	Enabled when the Edit button is clicked. Specifies the PORT on PORT-B.
OK	Enabled when the Edit button is clicked. Pressing this button accepts changes and closes combination setting editing. After clicking OK, the links for the displayed units and ports are displayed as follows: UNIT1 ports: green, UNIT2 ports: tea green.
Cancel	Enabled when the Edit button is clicked. Pressing this button aborts changes and closes combination setting editing.
Delete	Deletes specified combinations. Combinations whose check boxes in the right of the window are selected will be deleted.
Select All	Selects all specified combinations for deletion.
Clear all	Clears all check boxes of combinations marked selected for deletion.

4.6.2 Port Setting Screen (Latency Mode)

The functions described in this section allow you to enter measurement conditions. There are four major categories of settings: transmission settings, statistical conditions, line settings, and network emulation settings. For information on the port setting condition button display, see section 4.5.2.1.

4.6.2.1 Port Setting Header Items (Latency Mode)

The header items for the port setting screen contains the following display items.

Figure 4.6-4 Port setting header items

(1) OK button
Saves the current port settings and returns to the mode setting screen.

(2) OK & NEXT button
Saves the current port settings and advances to the next port setting screen.

(3) Cancel button
Deletes the current port settings and returns to the mode setting screen.

(4) Display current port
Displays the port currently being set.

4.6.2.2 Entering Transmission Settings (Latency Mode)

The transmission settings screen allows you to enter port transmission conditions. To change to the port setup screen, after setting a combination, click the unit and port number link that is displayed after you click the OK button.

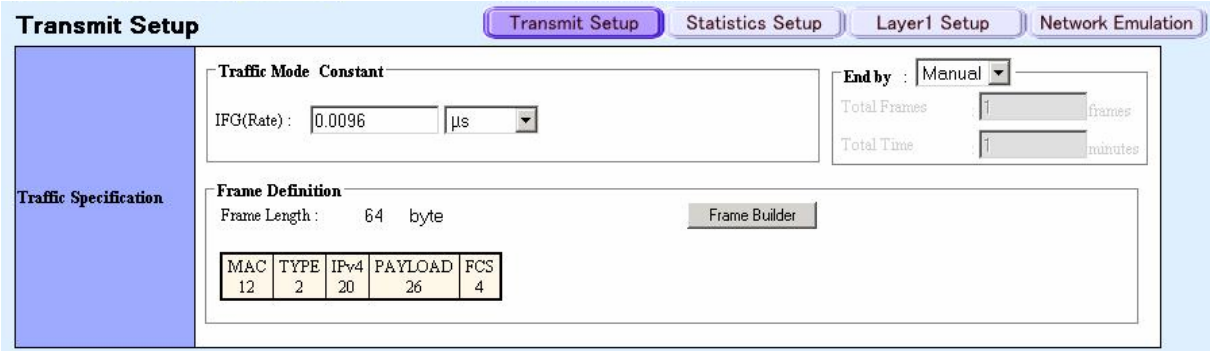


Figure 4.6-5 Transmission setting screen

Transmission settings consist of transmission mode and traffic mode settings. The frame definition area displays the frame structure specified in the frame builder.

(1) Frame builder
Press this button to enter detailed settings for the frames to be transmitted. The frame structure and other items specified in frame builder are displayed. Details of the frame builder screen are explained in section 4.6.3, “Frame Builder Screen.”
(2) Traffic mode
Enter the traffic mode setting first. The following items can be set.

Table 4.6.2 List of traffic mode setting items

Traffic Mode	IFG Settings	Line speed for IFG calculation
Constant rate	Inter Frame Gap can be specified with a variety of units (µs, ns, bit frame/s, %, bps)	Specifies speed of line under test

a. Traffic mode

In constant rate mode, the specified frames to be transmitted are repeatedly transmitted at constant intervals.

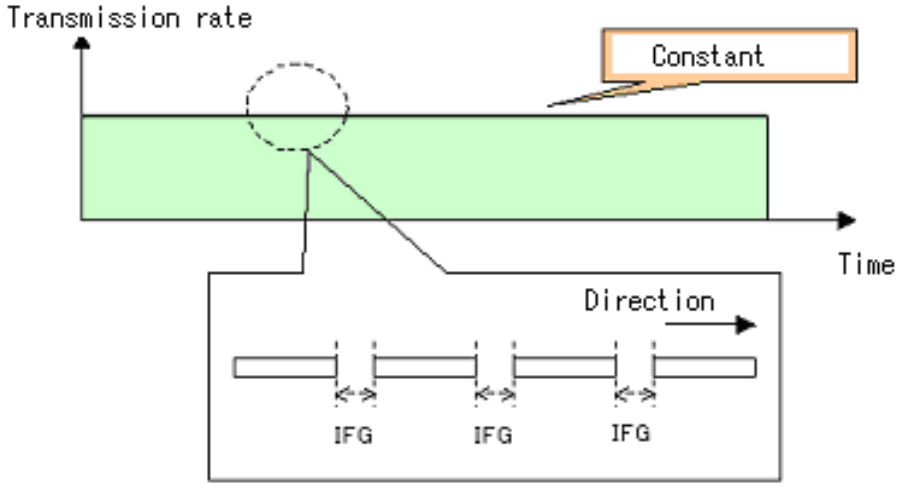


Figure 4.6-6 Overview of constant rate mode

b. IFG

Specifies the inter frame gap. The specified range varies depending on the setting units and the line speed during IFG calculation as shown below. When the units change, the values of those units are automatically updated.

Table 4.6.3 IFG setting range

Line Speed	Units	Min.	Max.	Setting Units
10 Mbps	µs	4.8	999979.2	0.4
	ns	4800	999979200	400
	bit	48	9999792	4
	frame/s	16026	1	
	%	107.6923077	0.0067198	
	bps	8205312	512	
100 Mbps	µs	0.48	999997.92	0.04
	ns	480	999997920	40
	bit	48	99999792	4
	frame/s	160256	1	
	%	107.6923077	0.000672	
	bps	82051072	512	
1000 Mbps	µs	0.032	999999.808	0.032
	ns	32	999999808	32
	bit	32	999999808	32
	frame/s	1644737	1	
	%	110.5263158	0.0000672	
	bps	842105344	512	
10G Mbps	µs	0.0072	999999.9424	0.0008
	ns	72	999999942.4	0.8
	bit	72	9999999424	8
	frame/s	15432099	1	
	%	103.7037037	0.0000067	
	bps	7901234688	512	

* The above IFG min. and max. values assume a frame length of sixty-four bytes.
* The frame/s, %, and bps setting units vary depending on the frame length of the set frames.

c. Line speed for IFG calculation

Settings required for calculating IFG. You must select the same line speed as the unit under test. However, when specifying a port of the AE5521 1000BASE-X Unit the speed is fixed at 1000 Mbps, and when specifying the AE5522 10GBASE-X Unit it is fixed at 10Gbps, so no settings need be entered (there is no display of setting items.)

(3) Trasmission mode

You can select from Continuous, Single, or Time Specified.

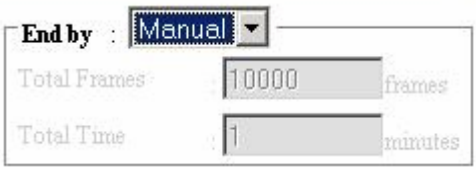


Figure 4.6-7 Transmission mode settings

In Continuous mode, once the transmission button is pressed, transmission continues until the stop button is pressed. In Single mode, the specified number of frames are transmitted once, then transmission automatically stops. The setting range for the number of transmitted frames is from 1 to 4,294,967,295. In Time Specified mode, frames are transmitted continuously for a specified amount of time, then transmission stops.

4.6.2.3 Entering Statistical Conditions (Latency Mode)

The statistical condition setting screen allows you to enter statistical conditions. Statistical conditions consist of filter settings for received frames (receive filter), and settings for oversize errors (error judgment).

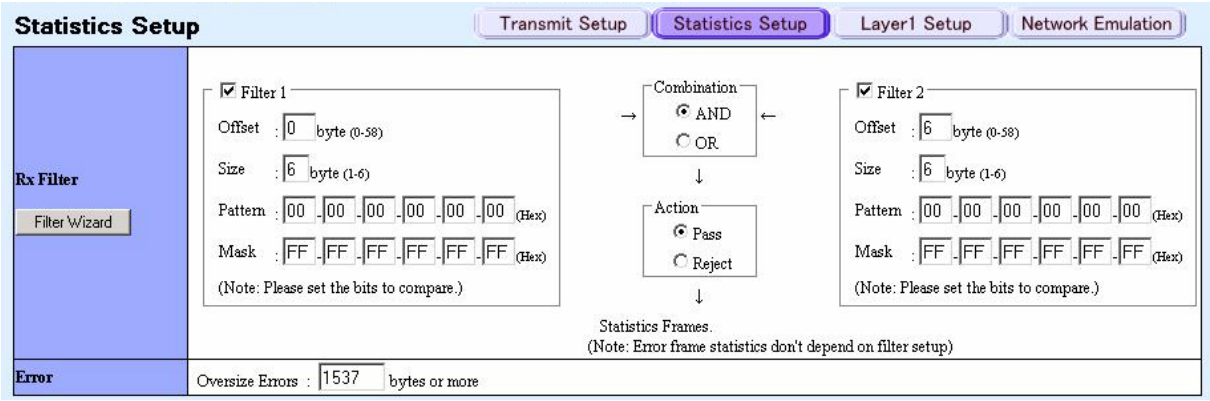


Figure 4.6-8 Statistical condition setting screen

(1) Receive filter

a. Pattern comparison

Pattern comparison settings are only enabled when set to ON. Pattern comparison is not performed when OFF.

Table 4.6.4 Pattern comparison setting items

Item	Description
Comparison pattern 1 and 2	Enables/disables pattern comparison settings. Enabled when selected.
Comparison start position	Sets the comparison start position. Input a decimal number in the range from 0 to 58 bytes.
Comparison length	Sets the length of comparison. Input a decimal number in the range from 1 to 6 bytes.
Comparison pattern	Sets the comparison pattern. Input hexadecimal numbers, 1 byte per box.
Mask pattern	Sets the mask pattern. Input hexadecimal numbers, 1 byte per box. The bit for comparison is set to 1.

b. Combinations

Combination settings are enabled when the usage setting for both is turned ON in 4.5.2.4 (1) a. You can combine comparison pattern 1 and comparison pattern 2 with conditions.

Table 4.6.5 Combination setting items

Item	**Description**
AND	When the conditions for both comparison pattern 1 and comparison pattern 2 become true, the action takes place.
OR	When either the conditions for comparison pattern 1 or comparison pattern 2 become true, the action takes place.

c. Filter action

Always enabled. You can select a filter action condition of Pass or Reject.

Table 4.6.6 Filter action setting items

Item	Description
Pass	Frames matching the comparison pattern are set as frames for statistical calculations.
Reject	Frames matching the comparison pattern are not set as frames for statistical calculations.

Note: Error frames are counted regardless of the filter settings.

Table 4.6.7 Statistical condition setting button items

Item	Description
Filter menu	The receive filter wizard described in 4.5.2.4 pops up in a separate window.

d. Receive filter wizard settings

The filter menu consists of MAC filter and VLAN filter settings. You can select either Receive only specified dest. MAC address (DA), Receive only specified source MAC address (SA), Receive only unicast (L2) frames, VLAN ID filter, or VLAN QOS filter.

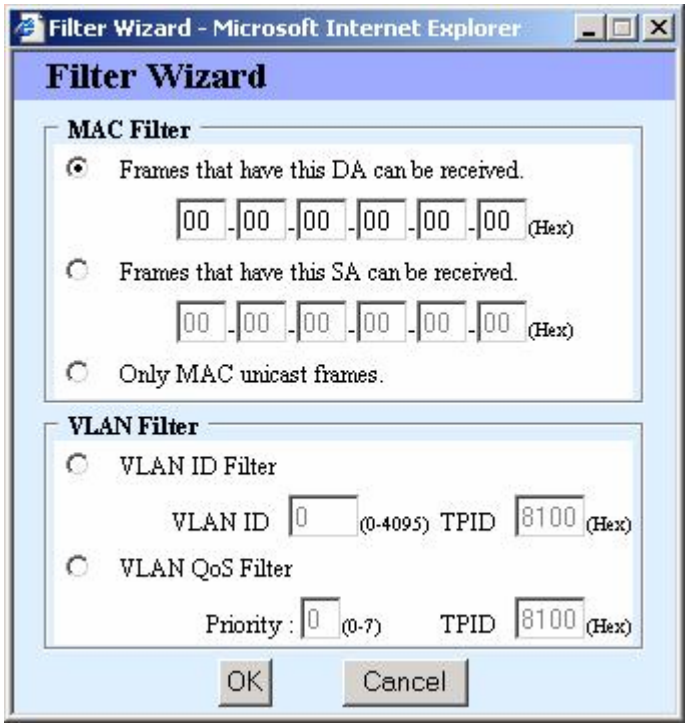


Figure 4.6-9 Receive filter setting screen

Table 4.6.8 Receive filter setting items

Item	Description
Receive only specified dest. MAC address (DA)	Automatically sets a filter for receiving only from a specified dest. MAC address. Input hexadecimal numbers totaling up to sixteen bytes.
Receive only specified source MAC address (SA)	Automatically sets a filter for receiving only from a specified source MAC address. Input hexadecimal numbers totaling up to sixteen bytes.
Receive only unicast (L2) frames	Automatically sets a filter for receiving only unicast frames.
VLAN ID filter	Automatically sets a filter for receiving only frames of the specified VLAN ID and TPID. The VLAN ID is set using a decimal between 0 and 4095. The TPID can be set as a 2-byte hexadecimal. (Default value is 8100.)
VLAN QOS filter	Automatically sets a filter for receiving only frames of the specified Priority and TPID. The Priority is set using a decimal between 0 and 7. The TPID can be set as a 2-byte hexadecimal. (Default value is 8100.)

(2) Error judgement
Allows you to enter thresholds for oversize errors and judgment.

Table 4.6.9 Error judgment setting items

Item	Description
Oversize error	The oversize error threshold can be entered. You can input a decimal in the range from 65 to 10,000 bytes.

4.6.2.4 Entering Line Settings (Latency Mode)

The line setting screen allows entry of line settings. The settings vary depending on the selected unit.

(1) Line settings for the AE5520 10/100BASE-T Unit

The line settings for the AE5520 10/100BASE-T Unit consist of auto negotiation and MDI/MDI-X switching settings.

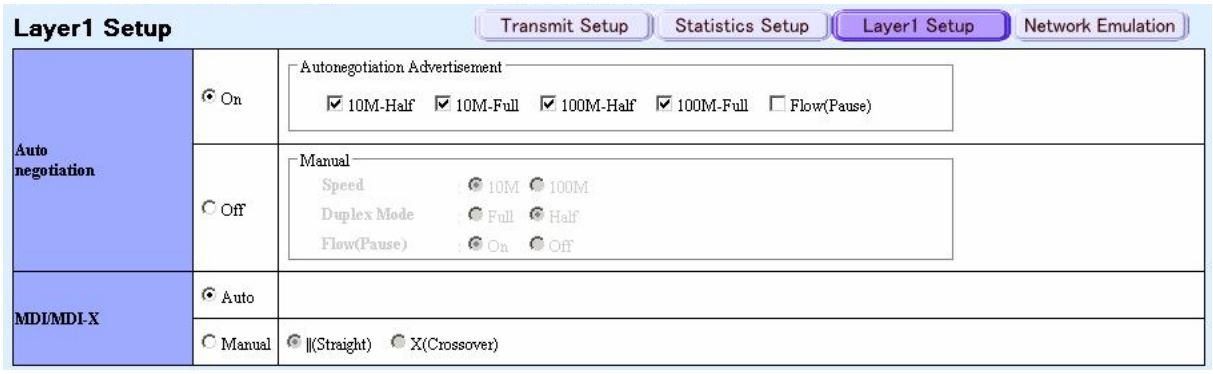


Figure 4.6-10 Line setting screen (when using the AE5520 10/100BASE-T Unit)

a. Auto negotiation setting

You can turn auto negotiation ON or OFF. When ON, the capability display settings are available. When OFF, the manual settings are available.

<A> Capability display

The following settings for the capability display can be enabled or disabled.
10M-Half, 10M-Full, 100M-Half, 100M-Full, Flow (Pause).

<B> Manual settings

Manual settings that can be entered are SPEED, Duplex Mode, and Flow (Pause).

Table 4.6.10 Manual setting items

Item	Description
SPEED	Sets the SPEED. You can select 100M or 10M.
Duplex Mode	Sets the Duplex mode. Select either Full or Half.
Flow (Pause)	Sets the Flow (Pause). Select either ON or OFF.

b. MDI/MDI-X switching

MDI/MDI-X switching can be set to Auto or Manual. However, you can only select Auto when auto negotiation is ON. When Manual is selected, you can select || (straight) or X (cross).

(2) Line setting for AE5521 1000BASE-X Unit
The line setting for the AE5521 1000BASE-X Unit is the auto negotiation setting.

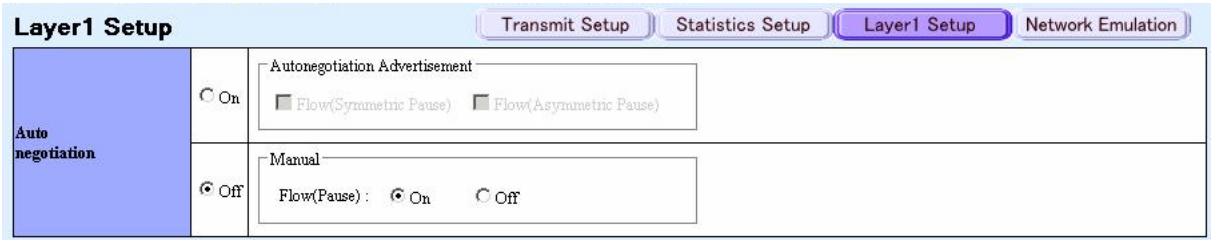


Figure 4.6-11 Line setting screen (when using the AE5521 1000BASE-X Unit)

a. Auto negotiation setting

You can turn auto negotiation ON or OFF. When ON, the capability display settings are available. When OFF, the manual settings are available.

<A> Capability display
The following settings for the capability display can be enabled or disabled.
Flow (Symmetric Pause), Flow (Asymmetric Pause)

<B> Manual settings
With manual settings, Flow (Pause) can be set.

Table 4.6.11 Manual setting items

Item	Description
Flow (Pause)	Sets the Flow (Pause). Select either ON or OFF.

(3) Line setting for AE5522 10GBASE-X Unit
The line setting that can be entered for the AE5521 1000BASE-X Unit is the flow control (Pause) setting.

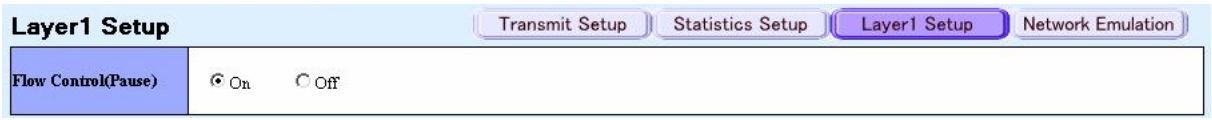


Figure 4.6-12 Line setting screen 3 (when using the AE5522 10GBASE-X Unit)

a. Flow control setting

You can turn flow control ON or OFF.

Table 4.6.12 Flow control setting items

Item	Description
Flow (Pause)	Sets the Flow (Pause). Select either ON or OFF.

4.6.2.5 Entering Network Emulation Settings (Latency Mode)

The network emulation setting screen allows entry of network emulation settings which consists of the response control and self port address settings.

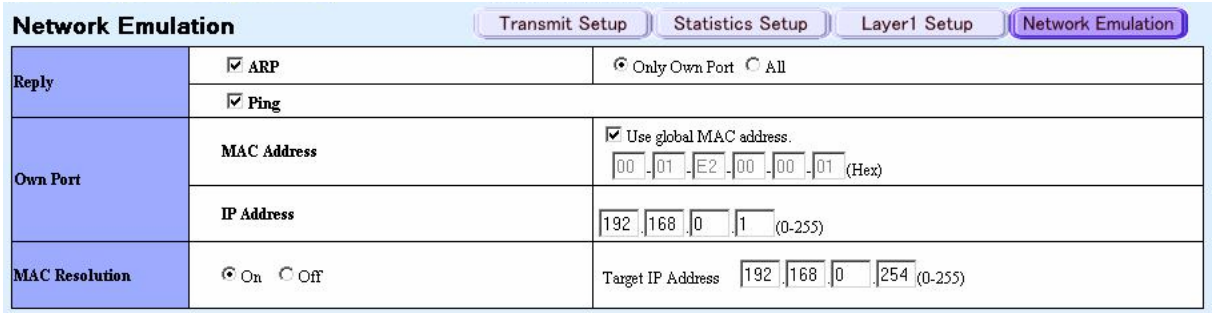


Figure 4.6-13 Network emulation setting screen

(1) response control

The response control settings consist of ARP reply and PING reply settings.

a. ARP reply

Selecting this check box enables the ARP reply function for ARP requests. When enabled, select an ARP setting of either **self port address only** or **Reply to all ARPs**.

b. PING reply

Selecting this check box enables the PING reply function for PING requests.

(2) self port address setting

The self port address settings consist of MAC address and IP address settings.

a. MAC address

You can select whether to use a global MAC address or a specified MAC address. Select the **Use the MAC address of this port** check box to specify a designated global MAC address. When you clear the check box, you can enter an arbitrary MAC address. Input hexadecimal numbers totaling up to 6 bytes.

b. IP Address

Each octet can be specified from 0 to 255. This IP address is used when ARP reply or PING reply is selected.

4.6.3 Frame Builder Screen (Latency Mode)

You can enter frame settings in the frame builder screen that appears when you press the frame builder button in the transmission settings. The following is an example of the frame builder screen.

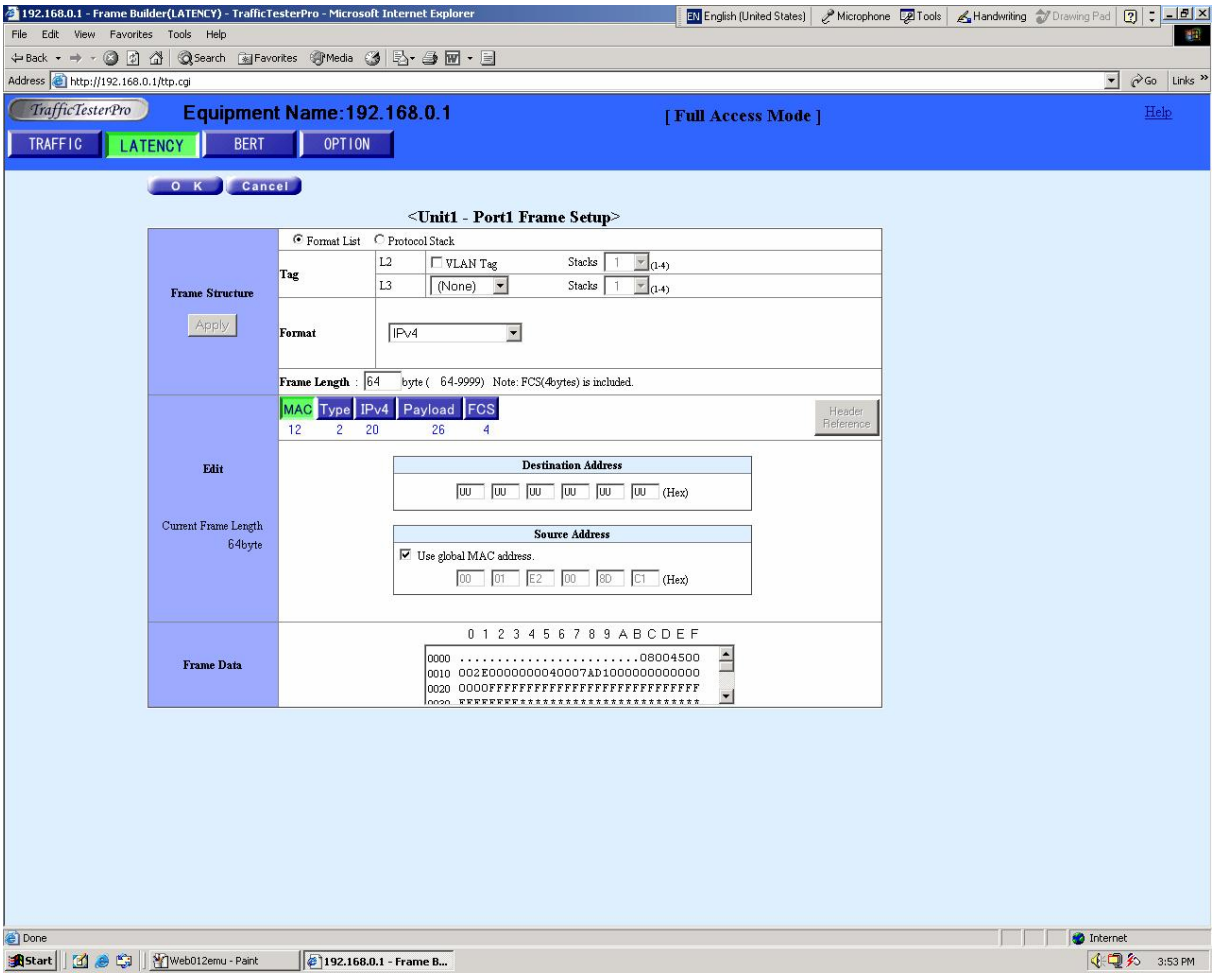


Figure 4.6-14 Frame builder screen example

4.6.3.1 Frame Structure (Latency Mode)

This is an explanation of the basic parts of a frame. The frame structure settings that are displayed when List Selection is selected is shown in figure 4.5-41, and the display contents are shown in figure 4.5-19. The frame structure settings that are displayed when Specify protocol stack is selected is shown in figure 4.5-42, and the display contents are shown in figure 4.5-20. After any of the fields are modified, you can press the Finalize button to update the edited frame fields.

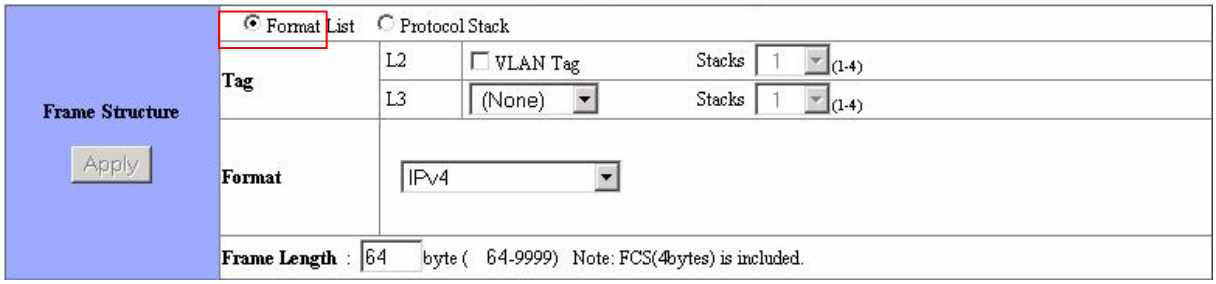


Figure 4.6-15 Frame structure settings screen (list selection)

Table 4.6-13 Frame structure setting items (list selection)

Item	Description
List selection/protocol stack specification	Select a format setting method of list selection or protocol stack specification (in this example, list selection is selected)
Tag (L2)	You can select/clear VLANTag for layer 2. When selected, you can select a number of stacks from 1 to 4.
Tag (L3)	You can select a tag for layer 3 of None, MPLS, or EoMPLS. When MPLS or EoMPLS is selected, you can select stack setting from 1 to 4.
Format	Select the frame format from the pull down menu. The following formats are available. IPv4, IPv4+UDP, IPv4+TCP, ICMP, IPv6, IPX, IPv4 multicast, IPv4 multicast +UDP, Custom (MAC Y), Custom (MAC none)
Frame length	Sets the frame length. You can set a frame length that includes FCS. The maximum is fixed at 9999 bytes, but you can change the minimum depending on the frame format and presence/absence of tags. The following shows the minimum values that can be set with no tags. Frame format — Min. IPv4, IPv4+UDP, ICMP, IPX, IPv4 multicast, IPv4 multicast +UDP, custom (MAC Y), custom (MAC none) : 64 byte IPv4+TCP/IPv6 : 66 bytes

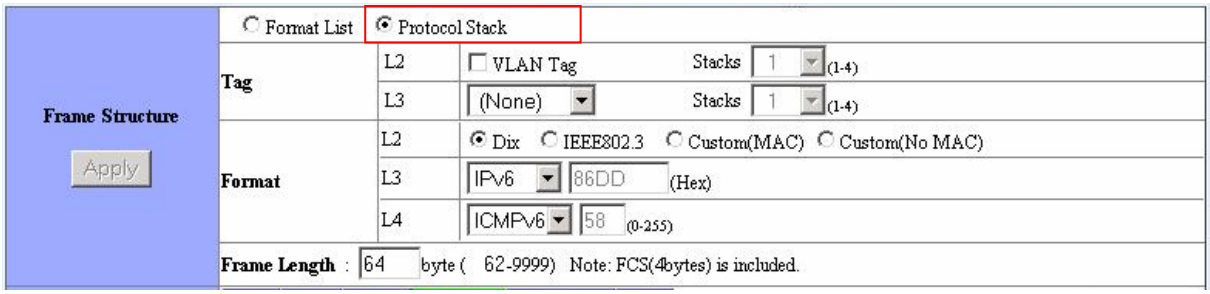


Figure 4.6-16 Frame structure settings screen (protocol stack specification)

Table 4.6-14 Frame structure setting items (protocol stack specification)

Item	Description
List selection/protocol stack specification	Select a format setting method of list selection or protocol stack specification (in this example, protocol stack is selected)
Tag (L2)	You can select/clear VLANTag for layer 2. When selected, you can select a number of stacks from 1 to 4.
Tag (L3)	You can select a tag for layer 3 of None, MPLS, or EoMPLS. When MPLS or EoMPLS is selected, you can select a number of stacks from 1 to 4.
Format (L2)	Sets the L2 format. Select from Dix, IEEE802.3, Custom (MAC Y), and custom (MAC none)
Format (L3)	Sets the L3 format. Cannot be set if the L2 format is Custom (MAC Y) or Custom (MAC none). When the L2 format is Dix or IEEE802.3, select either User, IPv4, IPv6, or IPX. When (User) is selected, set an arbitrary 2-byte hexadecimal number.
Format (L4)	Sets the L4 format. Cannot be set if the L2 format is Custom (MAC Y) or Custom (MAC none), of if the L3 format is (User) or IPX. When the L3 format is IPv4, select either (User), TPC, UDP, IGMP, or ICMP. When the L3 format is IPv6, select either (User), TPC, UDP, IGMP, or ICMP. When (User) is selected, set an arbitrary value from 0 to 255.

<table>
<tr><td>Frame length</td><td colspan="4">Sets the frame length. You can set a frame length that includes FCS. The maximum is fixed at 9999 bytes, but you can change the minimum depending on the frame format and presence/absence of tags. The following shows the minimum values that can be set with no tags.</td></tr>
<tr><td></td><td>L2 format</td><td>L3 format</td><td>L4 format</td><td>Min.</td></tr>
<tr><td></td><td>Custom (MAC Y)/(MAC None)</td><td>-</td><td>-</td><td>64 bytes</td></tr>
<tr><td></td><td rowspan="2">Dix/ IEEE802.3</td><td>(USER)/ IPX</td><td>—</td><td>64 bytes</td></tr>
<tr><td></td><td>IPv4</td><td>(USER)/UDP/ IGMP/ICMP</td><td>64 bytes</td></tr>
<tr><td></td><td>Dix</td><td rowspan="2"></td><td rowspan="2">TCP</td><td>66 bytes</td></tr>
<tr><td></td><td>IEEE802.3</td><td>69 bytes</td></tr>
<tr><td></td><td>Dix</td><td rowspan="8">IPv6</td><td rowspan="2">(USER)</td><td>66 bytes</td></tr>
<tr><td></td><td>IEEE802.3</td><td>69 bytes</td></tr>
<tr><td></td><td>Dix</td><td rowspan="2">TCP</td><td>86 bytes</td></tr>
<tr><td></td><td>IEEE802.3</td><td>89 bytes</td></tr>
<tr><td></td><td>Dix</td><td rowspan="2">UDP/IGMP</td><td>74 bytes</td></tr>
<tr><td></td><td>IEEE802.3</td><td>77 bytes</td></tr>
<tr><td></td><td>Dix</td><td rowspan="2">ICMP/ICMPv6</td><td>70 bytes</td></tr>
<tr><td></td><td>IEEE802.3</td><td>73 bytes</td></tr>
</table>

4.6.3.2 Editing Frames (Latency Mode)

You can specify each field of a frame. The fields that can be edited depending on the field structure are displayed as buttons.

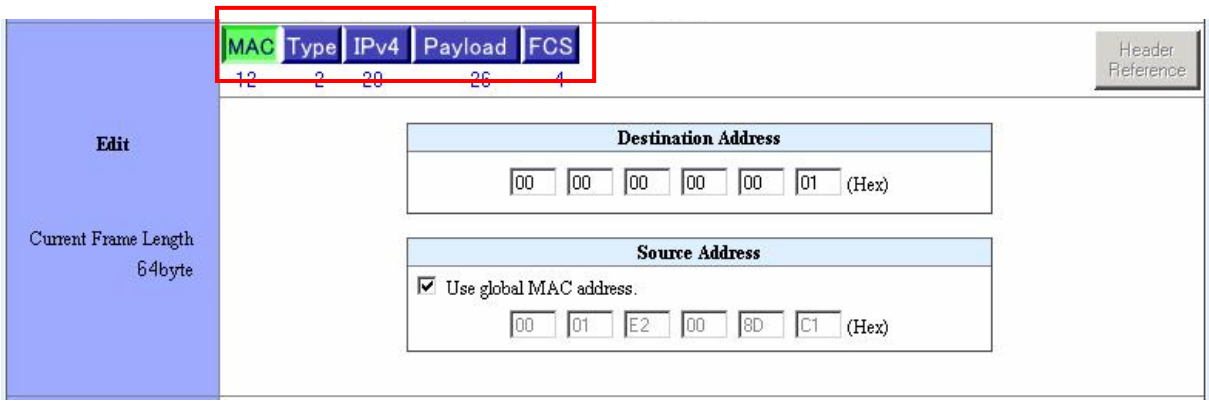


Figure 4.6-17 Frame editing screen

Table 4.6.15 Frame edit setting items

Item	Description
MAC	Sets the MAC address. The MAC button is always displayed.
VLANTag	Sets the VLANTag. The VLANTag button is only displayed when the VLANTag setting is active.
Type	Sets the Type. The Type button is only displayed when the Type setting is active.
Length	Sets the Length. The Length button is only displayed when the Length setting is active.
LLC/SNAP	Sets the LLC/SNAP. The LLC/SNAP button is only displayed when the LLC/SNAP setting is active.
MPLS	Sets the MPLS. The MPLS button is only displayed when the MPLS setting is active.
IPv4	Sets the IPv4. The IPv4 button is only displayed when the IPv4 setting is active.
IPv6	Sets the IPv6. The IPv6 button is only displayed when the IPv6 setting is active.
IPX	Sets the IPX. The IPX button is only displayed when the IPX setting is active.
TCP	Sets the TCP. The TCP button is only displayed when the TCP setting is active.
UDP	Sets the UDP. The UDP button is only displayed when the UDP setting is active.
ICMP	Sets the ICMP. The ICMP button is only displayed when the ICMP setting is active.
ICMPv6	Sets the ICMPv6. The ICMPv6 button is only displayed when the ICMPv6 setting is active.
IGMP	Sets the IGMP. The IGMP button is only displayed when the IGMP setting is active.
Payload	Sets the Payload. The Payload button is only displayed when the Payload setting is active.
FCS	Sets the FCS. The FCS button is always displayed.
Header reference figure	Displayed when one of the following buttons is selected: VLANTag, MPLS, IPv4, IPv6, IPX, TCP, UDP, ICMP, or IGMP. The header format figure corresponding to each of the buttons are displayed in pop-up windows.

(1) MAC address settings (Latency mode)

This is a function for editing the destination or source MAC address of Ethernet frames. When EoMPLS is selected under Tag (L3) as shown in section 4.6.3.1, “Frame Structure,” the MAC button appears in green.

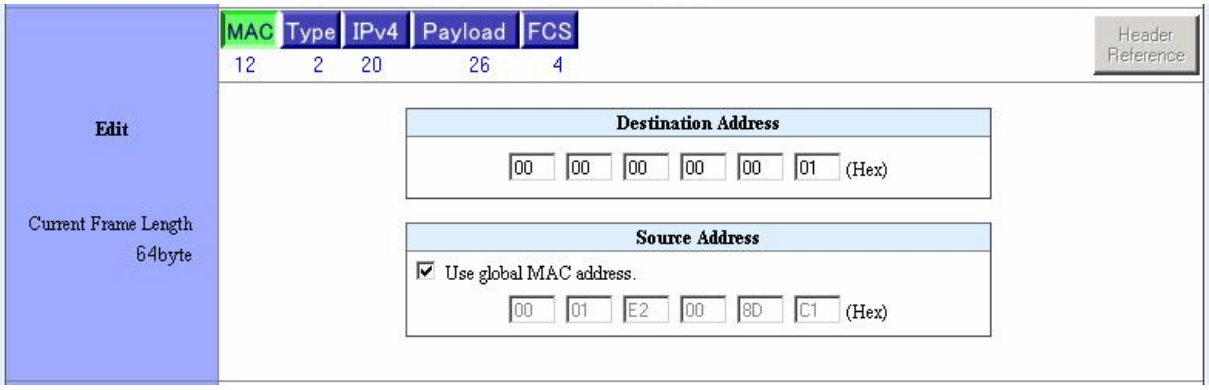


Figure 4.6-18 MAC address setting screen

Table 4.6.16 MAC address setting items

Item	Description
Destination address (DA)	Sets the destination MAC address. You can input a hexadecimal number in the range from 00h to FFh. When L3 is IPv4 Multicast, (fixed) is automatically set, and manual input is disabled.
Source address (SA)	Sets the source MAC address. You can input a hexadecimal number in the range from 00h to FFh. When selecting to use the global MAC address of this port, the global MAC address is automatically set, and manual input is disabled.

(2) VLANTag settings (Latency mode)
This is a VLANTag editing function. Each tag can carry four identifiers.

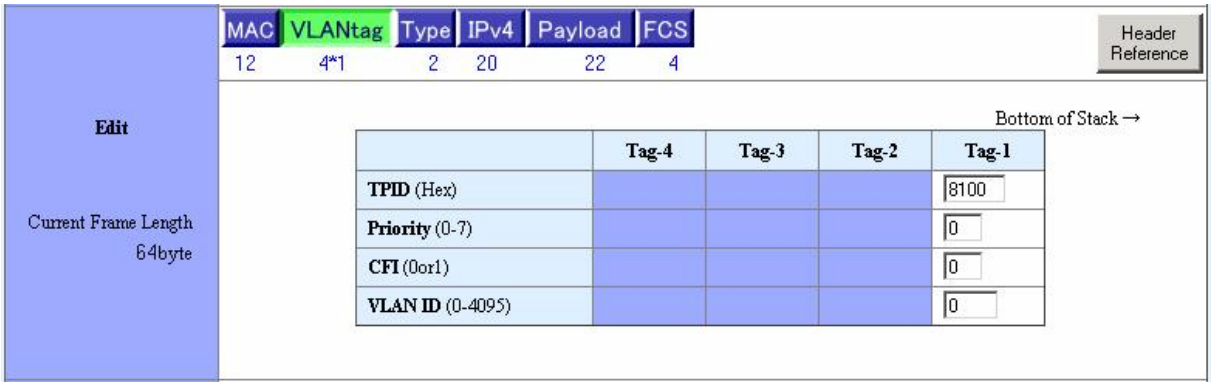


Figure 4.6-19 VLANTag setting screen

Table 4.6.17 VLANTag setting items

Item	Description
TPID (Hex)	Sets the tag protocol ID. You can input a hexadecimal number in the range from 0000h to FFFFh.
Priority (0–7)	Sets the frame's user priority. You can input a decimal in the range from 0 to 7.
CFI (0 or 1)	Sets the CFI of the frame. You can specify 1 or 0.
VLAN ID (0–4,095)	Sets the VLAN ID of the frame. You can input a decimal in the range from 0 to 4,095.
Header reference figure	Clicking this button displays the VLANTag header format in a separate window.

The setting items for Tag1 to Tag 4 are all the same.

(3) Type settings (Latency mode)
This function lets you to edit the Type field of Ethernet frames. When EoMPLS is selected under Tag (L3) as shown in section 4.6.3.1, “Frame Structure,” the TYPE button appears in green.

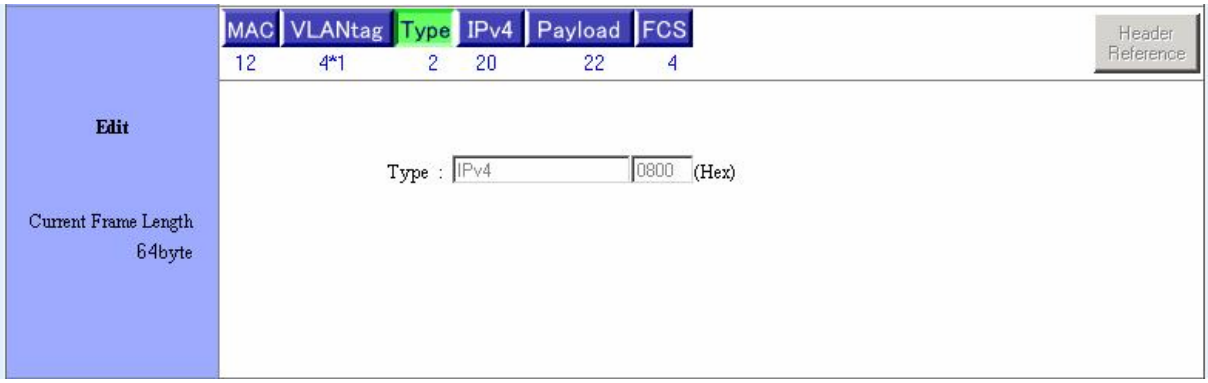


Figure 4.6-20 Type setting screen

Table 4.6.18 Type setting items

Item	Description
MPLS Unicast/MPLS Multicast/User	Sets the type when MPLS is enabled. Select MPLS Unicast, MPLS Multicast, or User.
Type (Hex)	Sets the type when L3 (User) is selected. Can be set as a 2-byte hexadecimal.

(4) Length settings (Latency mode)
This function lets you to edit the Length field of IEEE802.3 frames.

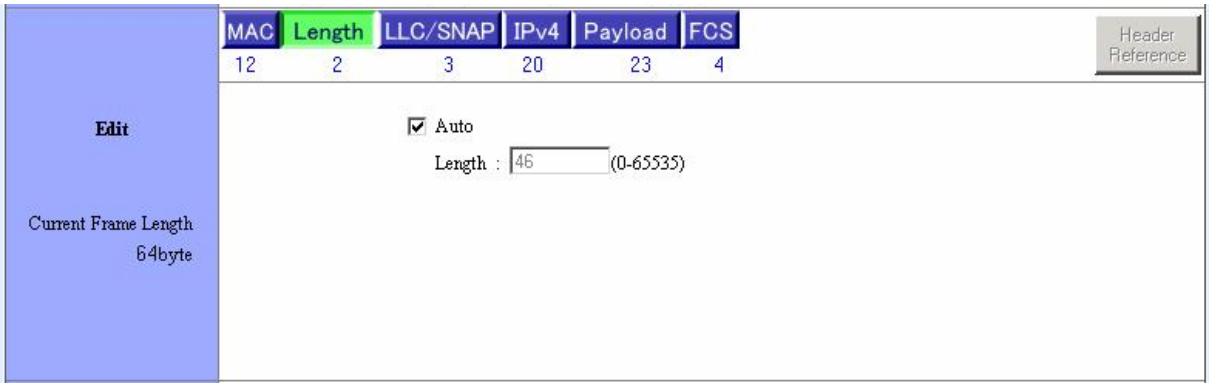


Figure 4.6-20 Type setting screen

Table 4.6.19 Length setting items

Item	Description
Auto-calculation	Select this check box to automatically calculate the length.
Length	Can be set when auto-calculation is not selected. You can input a decimal in the range from 0 to 65,535.

(5) LLC/SNAP settings (Latency mode)
This function lets you to enter LLC/SNAP settings.

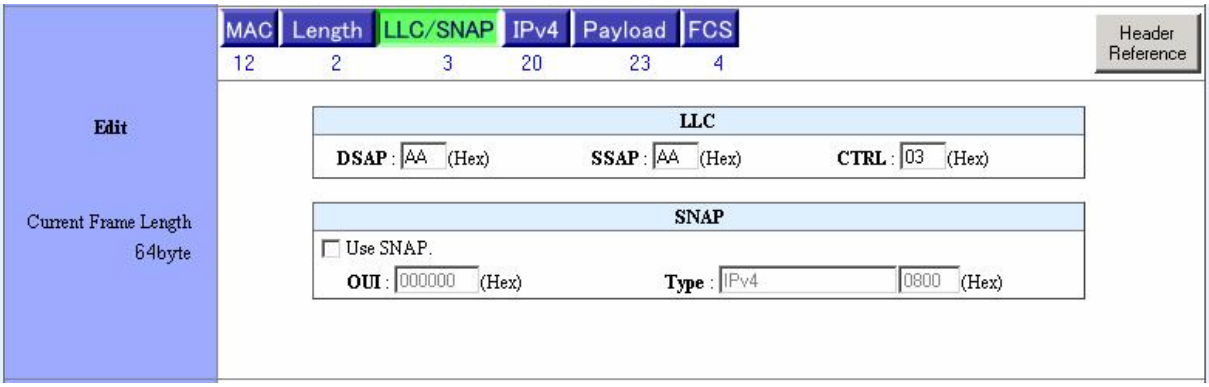


Figure 4.6-22 LLC/SNAP setting screen

Table 4.6.20 LLC/SNAP setting items

Item	Description
LLC: DSAP (Hex)	Sets the DSAP field within the LLC header. You can input a hexadecimal number in the range from 00h to FFh.
LLC: SSAP (Hex)	Sets the SSAP field within the LLC header. You can input a hexadecimal number in the range from 00h to FFh.
LLC: CTRL (Hex)	Sets the CTRL field within the LLC header. You can input a hexadecimal number in the range from 00h to FFh.
Add SNAP header	Lets you insert a SNAP header into the frame.
SNAP: OUI (Hex)	When inserting a SNAP header into a frame, sets the OUI field within the SNAP header. You can set an arbitrary 3-byte hexadecimal number.
SNAP: MPLS Unicast/MPLS Multicast/User	When inserting a SNAP header into a frame and MPLS is enabled, sets the Type. Select MPLS Unicast, MPLS Multicast, or User.
SNAP: Type (Hex)	When inserting a SNAP header into a frame and L3 is (User), sets the Type. Can be set as a 2-byte hexadecimal.
Header reference figure	Clicking this button displays the LLC/SNAP header format in a separate window.

(6) MPLS settings (Latency mode)

This function lets you to set MPLS. Each tag can carry four identifiers.

When EoMPLS is selected under Tag (L3) as shown in section 4.6.3.1, “Frame Structure,” the MPLS button appears in green (see (7) EoMPLS settings).

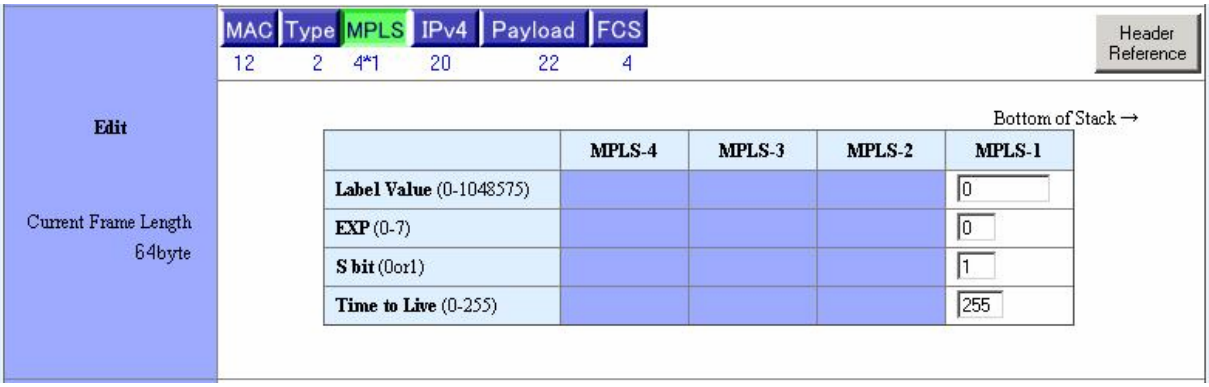


Figure 4.6-23 MPLS setting screen

Table 4.6.21 MPLS setting items

Item	Description
Label value (0–1,048,575)	Sets the label value. You can input a decimal in the range from 0 to 1,048,575.
EXP (0–7)	Sets EXP. You can input a decimal in the range from 0 to 7.
S bit (0 or 1)	Sets the S bit. You can specify 1 or 0.
Time-to-live (TTL) (0–255)	Sets the existence time (TTL). You can input a decimal in the range from 0 to 255.
Header reference figure	Clicking this button displays the MPLS shim header format in a separate window.

The setting items for MPLS1 to MPLS4 are all the same.

(7) EoMPLS settings (Latency mode)
This function lets you to set EoMPLS.

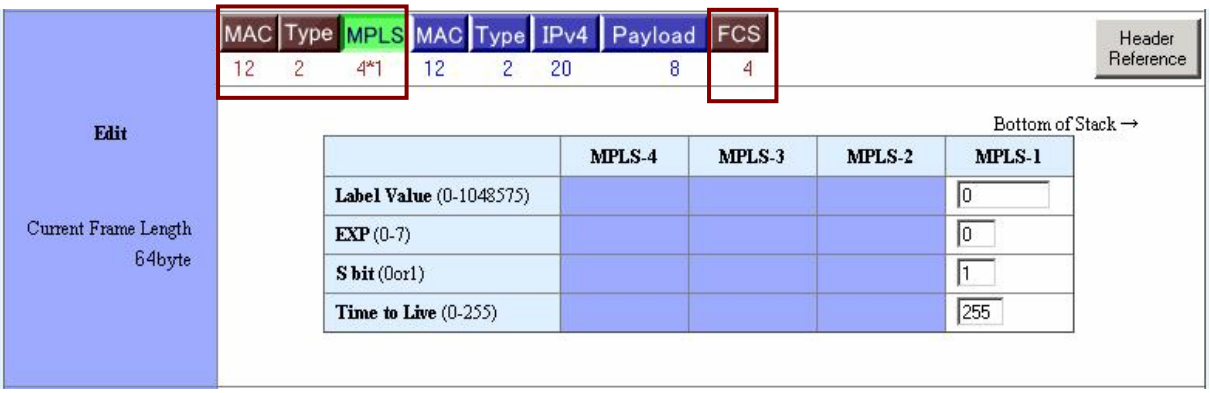


Figure 4.6-24 MPLS setting screen (when type settings is selected)

When EoMPLS is selected under Tag (L3) as shown in section 4.6.3.1, “Frame Structure,” the MAC, TYPE, MPLS, and FCS buttons appear in green. The contents of the items are the same as previously mentioned.
(Contents of MAC=(1), Type=(3), MPLS=(6), FCS=(17))

(8) IPv4 settings (Latency mode)
This is an IPv4 editing function.

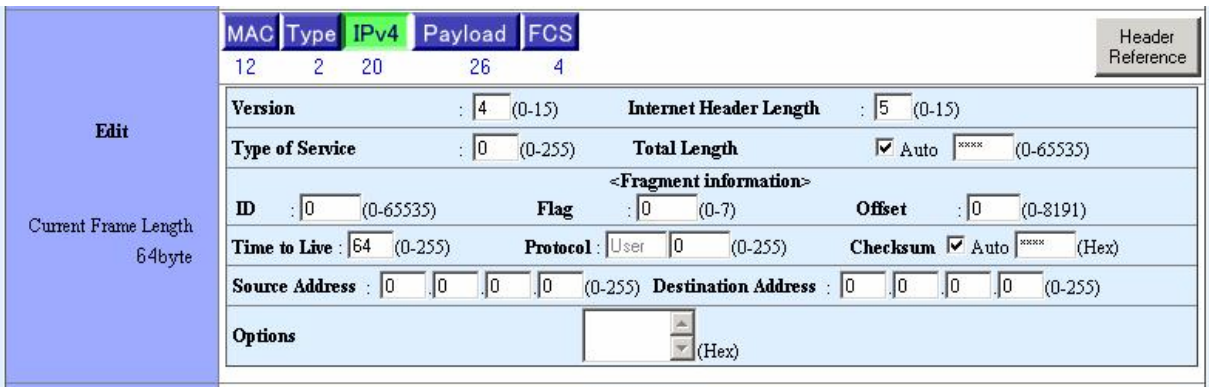


Figure 4.6-25 IPv4 setting screen

Table 4.6.22 IPv4 setting items

Item	Description
Version (Ver)	Sets the IP header version. You can input a decimal in the range from 0 to 15.
Header length (IHL)	Sets the length of the IP header. You can input a decimal in the range from 0 to 15.
Type of service (TOS)	Sets the IP header type of service. You can input a decimal in the range from 0 to 255.
Total length (Total LEN)	Sets the total length of the IP header. You can input a decimal in the range from 0 to 65,535. When auto-calculation is selected, the setting cannot be input manually here.
Fragment ID	Sets the ID of the IP header. You can input a decimal in the range from 0 to 65,535.
Fragment flag	Sets the flag of the IP header. You can input a decimal in the range from 0 to 7.
Fragment offset	Sets the offset of the IP header. You can input a decimal in the range from 0 to 8191.
Time-to-live (TTL)	Sets the existence time of the IP header. You can input a decimal in the range from 0 to 255.
Protocol	Sets the protocol of the IP header. Normally displays the protocol set for the frame's L4. When User is selected, you can input a decimal in the range from 0 to 255.
Checksum	Sets the checksum of the IP header. Can be set as a 2-byte hexadecimal. When auto-calculation is selected, the setting cannot be input manually here.
Source address (SA)	Sets the source IP address of the IP header. You can input a decimal for each digit in the range from 0 to 255.
Destination address (DA)	Sets the destination IP address of the IP header. You can input a decimal for each digit in the range from 0 to 255.
Option field data	Can be set when the header length (IHL) is 6 or more. Sets the option field data of the IP header. You can input a hexadecimal number in the range from 0 to FF (4 bytes can be set every time IHL increases by 1)
Header reference figure	Clicking this button displays the IPv4 header format in a separate window.

(9) IPv6 settings (Latency mode)
This is an IPv6 editing function.

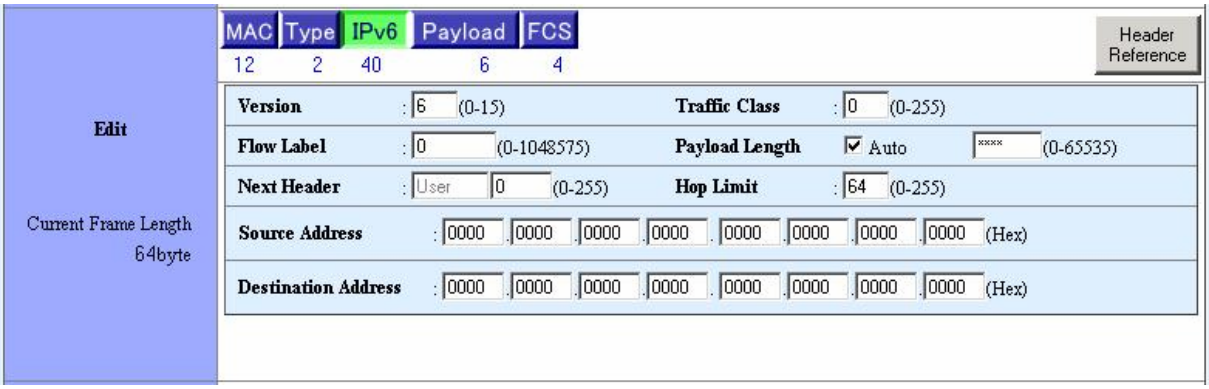


Figure 4.6-26 IPv6 setting screen

Table 4.6.23 IPv6 setting items

Item	Description
Version (Ver)	Sets the IP header version. You can input a decimal in the range from 0 to 15.
Traffic class	Sets the traffic class of the IP header. You can input a decimal in the range from 0 to 255.
Flow label	Sets the flow label of the IP header. You can input a decimal in the range from 0 to 1,048,575.
Payload length	Sets the payload length of the IP header. You can input a decimal in the range from 0 to 65,535. When auto-calculation is selected, the setting cannot be input manually here.
Succession header	Sets the protocol of the IP header. Normally displays the protocol set for the frame's L4. When User is selected, you can input a decimal in the range from 0 to 255.
Hop limit	Sets the hop limit of the IP header. You can input a decimal in the range from 0 to 255.
Source address (SA)	Sets the source IP address of the IP header. Input hexadecimal numbers totaling up to sixteen bytes.
Destination address (DA)	Sets the destination IP address of the IP header. Input hexadecimal numbers totaling up to sixteen bytes.
Header reference figure	Clicking this button displays the IPv6 header format in a separate window.

(10) IPX settings (Latency mode)
This is an IPX editing function.

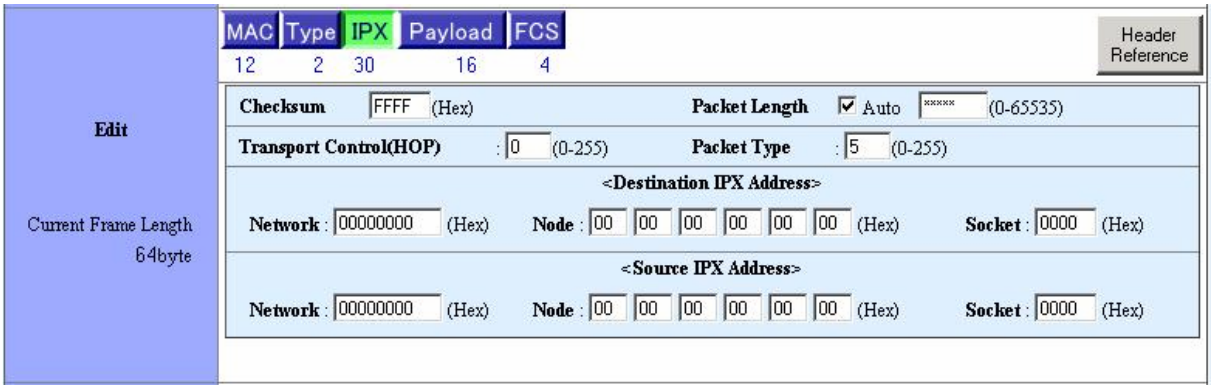


Figure 4.6-27 IPX setting screen

Table 4.6.24 IPX setting items

Item	Description
Checksum	Checksum can be set as a 2-byte hexadecimal.
Packet length	Sets the packet length. You can input a decimal in the range from 0 to 65,535. When auto-calculation is selected, the setting cannot be input manually here.
Transport control (HOP)	Sets the transport control. You can input a decimal in the range from 0 to 255.
Packet type	Sets the packet type. You can input a decimal in the range from 0 to 255.
Destination IPX address (DA): Network	Sets the network of the destination IPX address. Can be set as a 4-byte hexadecimal (filled in with 0s if 4 bytes or less).
Destination IPX address (DA): node	Sets the node of the destination IPX address. Input hexadecimal numbers totaling up to 6 bytes.
Destination IPX address (DA): Socket	Sets the socket of the destination IPX address. Can be set as a 2-byte hexadecimal.
Source IPX address (SA): Network	Sets the network of the source IPX address. Can be set as a 4-byte hexadecimal (filled in with 0s if 4 bytes or less).
Source IPX address (SA): node	Sets the node of the source IPX address. Input hexadecimal numbers totaling up to 6 bytes.
Source IPX address (SA): Socket	Sets the socket of the source IPX address. Can be set as a 2-byte hexadecimal.
Header reference figure	Clicking this button displays the IPv4 header format in a separate window. Measured values are displayed here.

(11) TCP settings (Latency mode)
This is a TCP editing function.

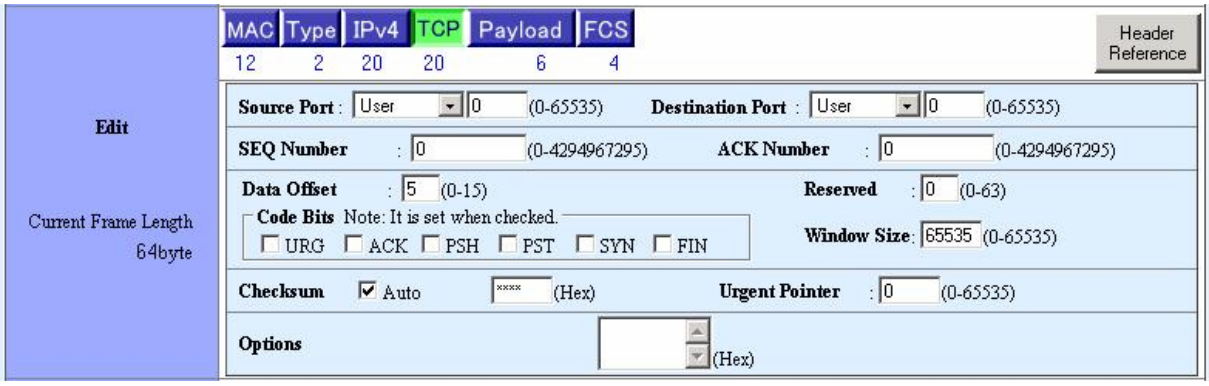


Figure 4.6-28 TCP setting screen

Table 4.6.25 TCP setting items

Item	Description
Source port number	Sets the transmission port number. The following can be selected: User, Echo, Discard, Daytime, Chargen, ftp-data, ftp, telnet, Smtp, Time, Name, Nickname, Domain, (http/www), pop3, or Sunrpc. When User is selected, you can input a decimal in the range from 0 to 65,535.
Destination port number	Sets the destination port number. The following can be selected: User, Echo, Discard, Daytime, Chargen, ftp-data, ftp, telnet, Smtp, Time, Name, Nickname, Domain, (http/www), pop3, or Sunrpc. When User is selected, you can input a decimal in the range from 0 to 65,535.
Sequence number	Sets the sequence number. You can input a decimal in the range from 0 to 4,294,967,295.
Confirmation response number	Sets the confirmation response number. You can input a decimal in the range from 0 to 4,294,967,295.
Data offset	Sets the data offset. You can input a decimal in the range from 0 to 15.
Reserve (Rev)	Sets the reservation. You can input a decimal in the range from 0 to 15.
Code bit: URG	Sets the URG code bit. Set to 1 when selected.
Code bit: ACK	Sets the ACK code bit. Set to 1 when selected.
Code bit: PSH	Sets the PSH code bit. Set to 1 when selected.
Code bit: PST	Sets the PST code bit. Set to 1 when selected.
Code bit: SYN	Sets the SYN code bit. Set to 1 when selected.
Code bit: FIN	Sets the FIN code bit. Set to 1 when selected.
Window size	Sets the window size. You can input a decimal in the range from 0 to 65,535.
Checksum	Sets the checksum. Can be set as a 2-byte hexadecimal. Checksum is not automatically calculated.
Emergency pointer	Sets the emergency pointer. You can input a decimal in the range from 0 to 65,535.
Option field data	Can be set when the data offset is 6 or more. Sets the option field data. You can input a hexadecimal number in the range from 0 to FF (4 bytes can be set every time the data offset increases by 1).
Header reference figure	Clicking this button displays the TCP header format in a separate window.

(12) UDP settings (Latency mode)
This is a UDP editing function.

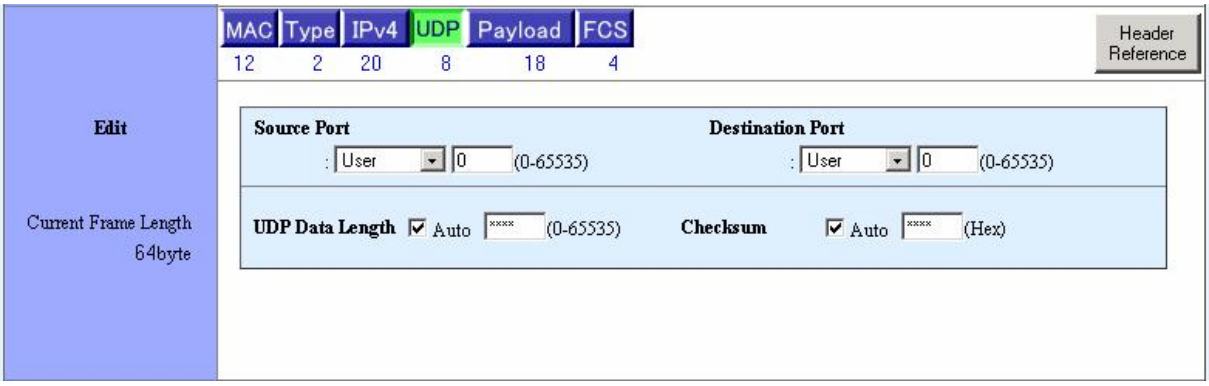


Figure 4.6-29 UDP setting screen

Table 4.6.26 TCP setting items

Item	Description
Source port number	Sets the transmission port number. The following can be selected: User, Echo, Discard, Daytime, Chargen, Time, Name, Nickname, Domain, Bootps, Bootpc, Tftp, Sunrpc, ntp, snmp, Snmp-tr, ap, or nfs. When User is selected, you can input a decimal in the range from 0 to 65,535.
Destination port number	Sets the destination port number. The following can be selected: User, Echo, Discard, Daytime, Chargen, Time, Name, Nickname, Domain, Bootps, Bootpc, Tftp, Sunrpc, ntp, snmp, Snmp-tr, ap, or nfs. When User is selected, you can input a decimal in the range from 0 to 65,535.
UDP Data length	Sets the UDP data length. You can input a decimal in the range from 0 to 65,535. When auto-calculation is selected, the setting cannot be input manually here.
Checksum	Sets the checksum. Can be set as a 2-byte hexadecimal. Checksum is not automatically calculated.
Header reference figure	Clicking this button displays the UDP header format in a separate window.

(13) ICMP settings (Latency mode)
This is an ICMP editing function.

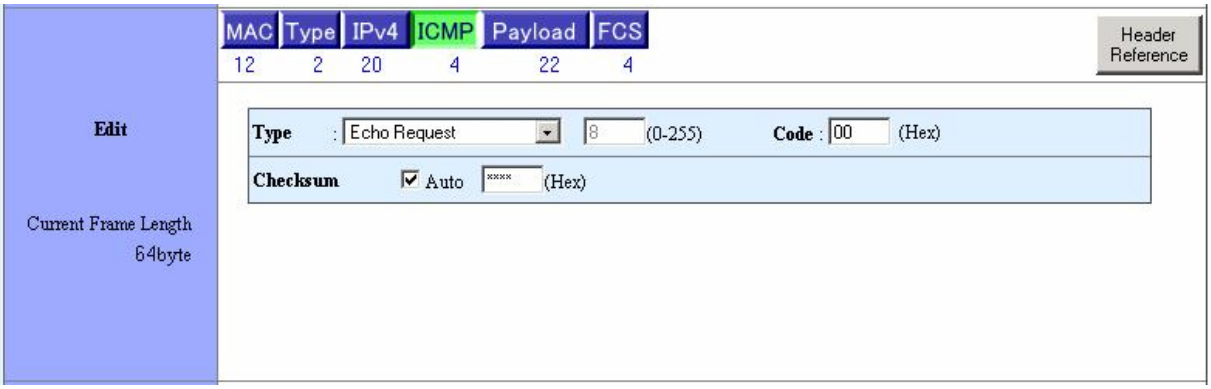


Figure 4.6-30 ICMP setting screen

Table 4.6.27 ICMP setting items

Item	Description
Type	Sets the type. Select from the following: User, echo response, final arrival impossible notification, send suppress request, channel change request, echo request, timeout notification, illegal parameter notification, time request, time response, address mask request, address mask response, and trace route. When User is selected, you can input a decimal in the range from 0 to 255.
Code	Sets the code. You can input a hexadecimal number in the range from 00h to FFh.
Checksum	Sets the checksum. Can be set as a 2-byte hexadecimal. Checksum is not automatically calculated.
Header reference figure	Clicking this button displays the ICMP header format in a separate window.

(13) ICMP IPv6 settings (Latency mode)
This is the ICMPv6 setting screen.

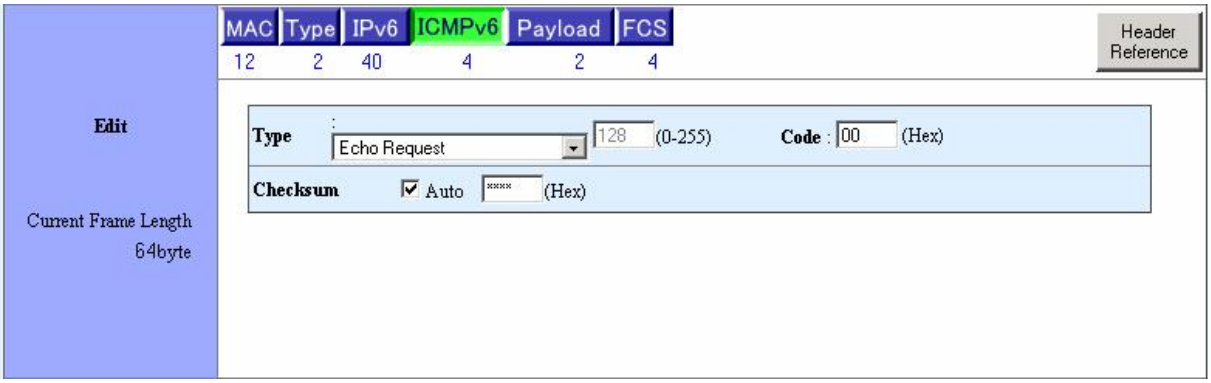


Figure 4.6-31 ICMPv6 setting screen

Table 4.6.28 ICMPv6 setting items

Item	Description
Type	Sets the type. Select from the following: User, final arrival impossible notification, packet exceeded notification, timeout notification, illegal parameter notification, echo request, echo response, MC listener inquiry, MC listener report, MC listener end, router request, router notification, neighboring host request, neighboring host notification, and channel change request. When User is selected, you can input a decimal in the range from 0 to 255.
Code	Sets the code. You can input a hexadecimal number in the range from 00h to FFh.
Checksum	Sets the checksum. Can be set as a 2-byte hexadecimal. Checksum is not automatically calculated.
Header reference figure	Clicking this button displays the ICMP header format in a separate window.

(14) IGMP settings (Latency mode)
This is an IGMP editing function.

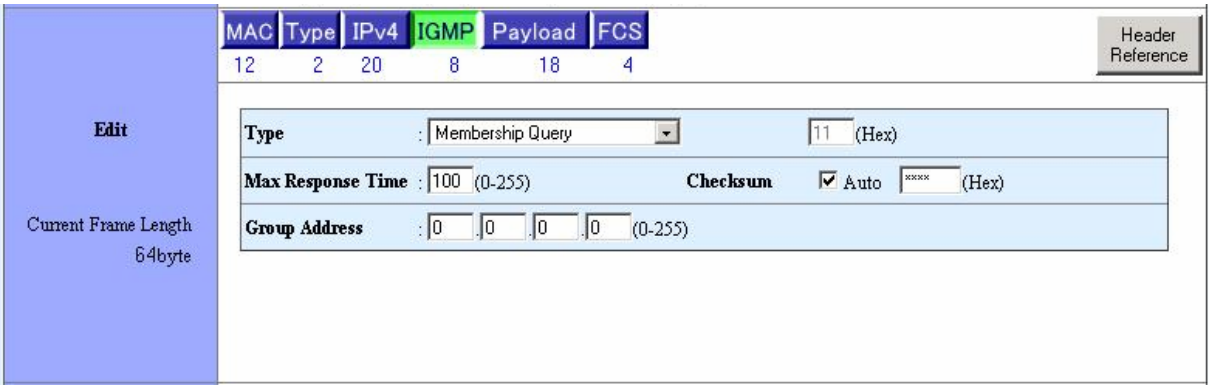


Figure 4.6-32 IGMP setting screen

Table 4.6.29 IGMP setting items

Item	Description
Type	Sets the type. Select from the following: User, membership request, membership report from version 1, membership report from version 2, and breakaway from group. When User is selected, you can input a hexadecimal number in the range from 00h to FFh.
Maximum response time	Sets the maximum response time. You can input a decimal in the range from 0 to 255.
Checksum	Sets the checksum. Can be set as a 2-byte hexadecimal. Checksum is not automatically calculated.
Group address	Sets the group address. You can input each octet in the range from 0 to 255.
Header reference figure	Clicking this button displays the IGMP header format in a separate window.

(15) Payload settings (Latency mode)
This is a payload editing function.

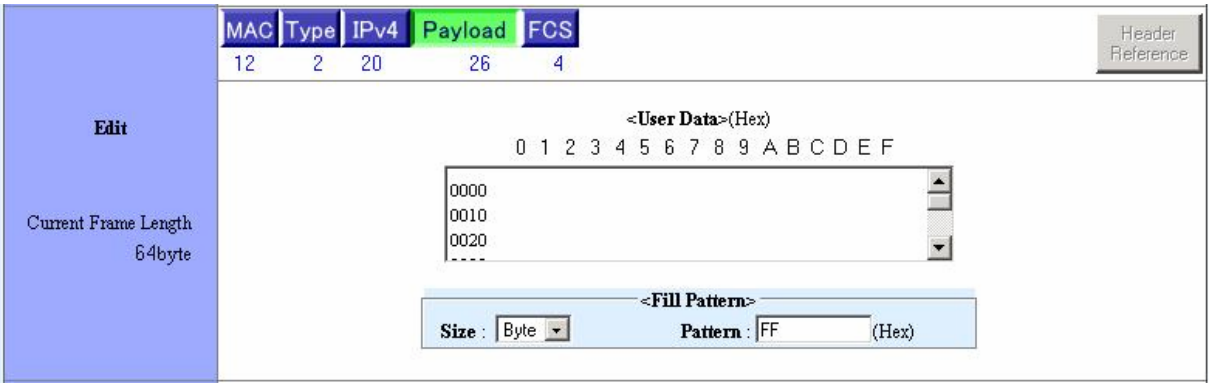


Figure 4.6-33 Payload setting screen

Table 4.6.30 Payload setting items

Item	Description
User data	Sets the user data. You can input a hexadecimal number in the range from 00h to FFh.
Filter pattern: Size	Sets the size of the filter pattern. Select from Byte, word, and Long.
Filter pattern: pattern	Sets the pattern of the filter pattern. If Byte is selected for the filter pattern size, you can set 1 byte with a hexadecimal number, or for word, 2 bytes with a hexadecimal number, or for Long, 4 bytes with a hexadecimal number. For each case, if the input vale does not reach the required number of digits, the value is started on the right and filled in with 0s to the left.

(17) FCS settings (Latency mode)

This is an FCS editing function. When EoMPLS is selected under Tag (L3) as shown in section 4.6.3.1, “Frame Structure,” the FCS button appears in green. When CRC error is selected, the FCS button appears in red (and when EoMPLS (is selected)).

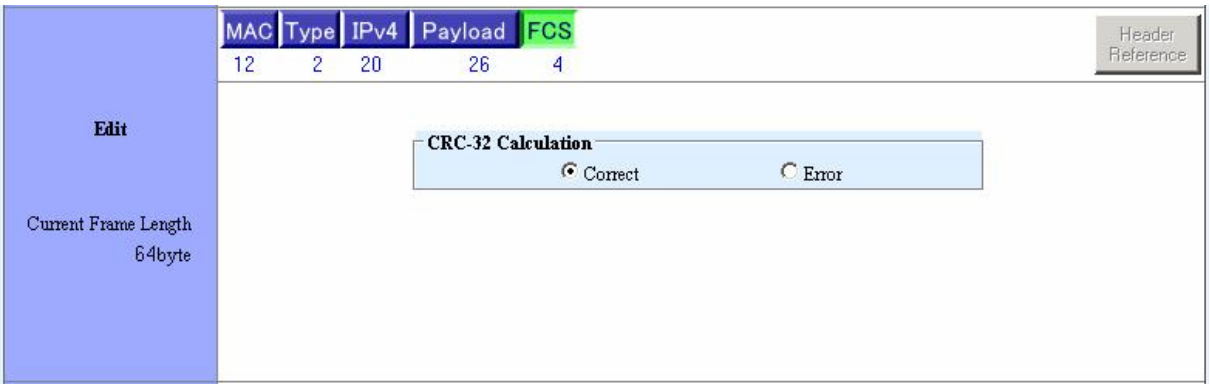


Figure 4.6-34 FCS setting screen (+FCS button color)

Table 4.6.31 FCS setting items

Item	Description
CRC-32 auto-calculation	Sets the CRC-32 auto-calculation. You can select Normal or CRC error.

(18) Header format chart (Latency mode)

When the characters of the header reference button in the upper right of the frame edit area are displayed in black, if you click the button, the currently set frame header format is displayed in a separate window.

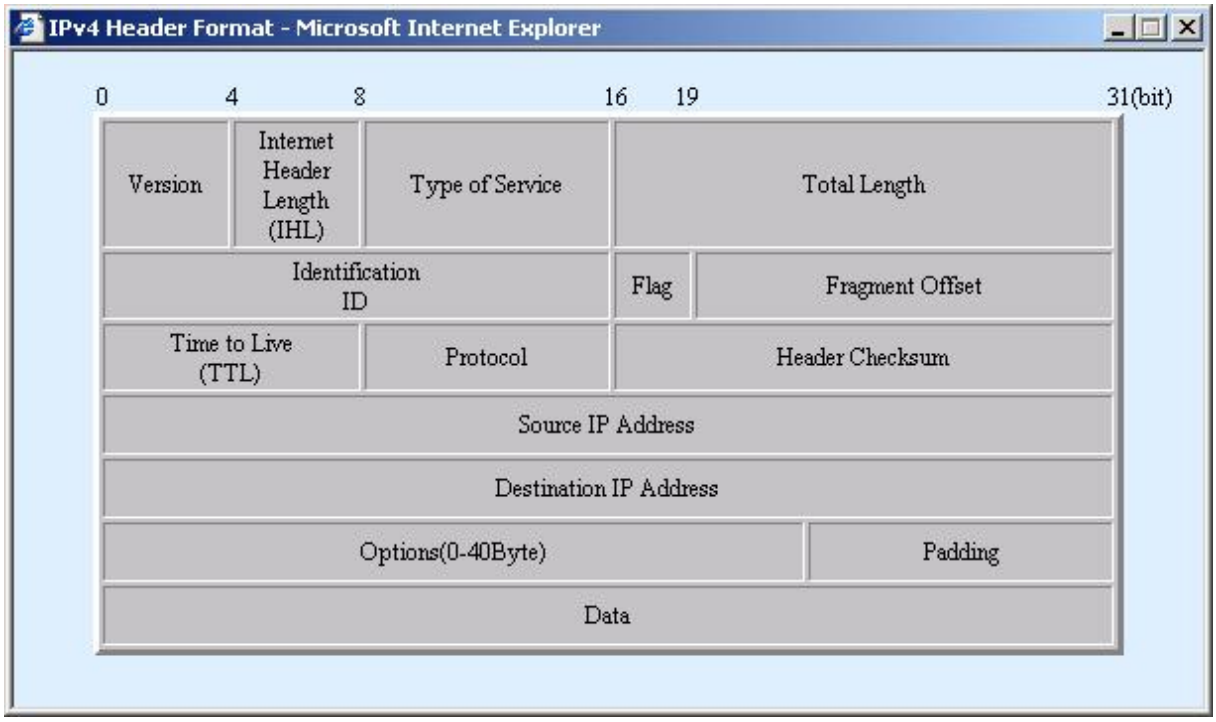


Figure 4.6-35 Header format chart (example of IPv4)

4.6.3.3 Frame Data (Latency Mode)

This function performs a hex dump display of the information assembled in the frame builder.

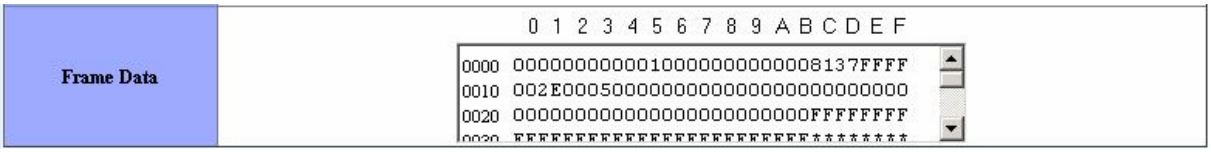


Figure 4.6-36 Frame display screen

Table 4.6.32 Frame data setting items

Item	Description
Fields of frames being edited	Input data and '……' are displayed alternately.
Time stamp field	Displayed as ********
FCS Field	Displayed as ******** (in black on screen)

4.6.3.4 Leaving the Frame Builder Screen (Latency Mode)

Press the **OK** button shown in figure 4.6-14 to return from the frame builder screen to the port setting screen. The specified frame information is copied to the corresponding frame definition area.

4.6.3.5 Canceling the Operation (Latency Mode)

Press the **Cancel** button in the frame builder display screen shown in figure 4.6-14 to delete the specified frame information and return from the frame builder screen to the port setting screen.

<- Frame builder display screen

↓

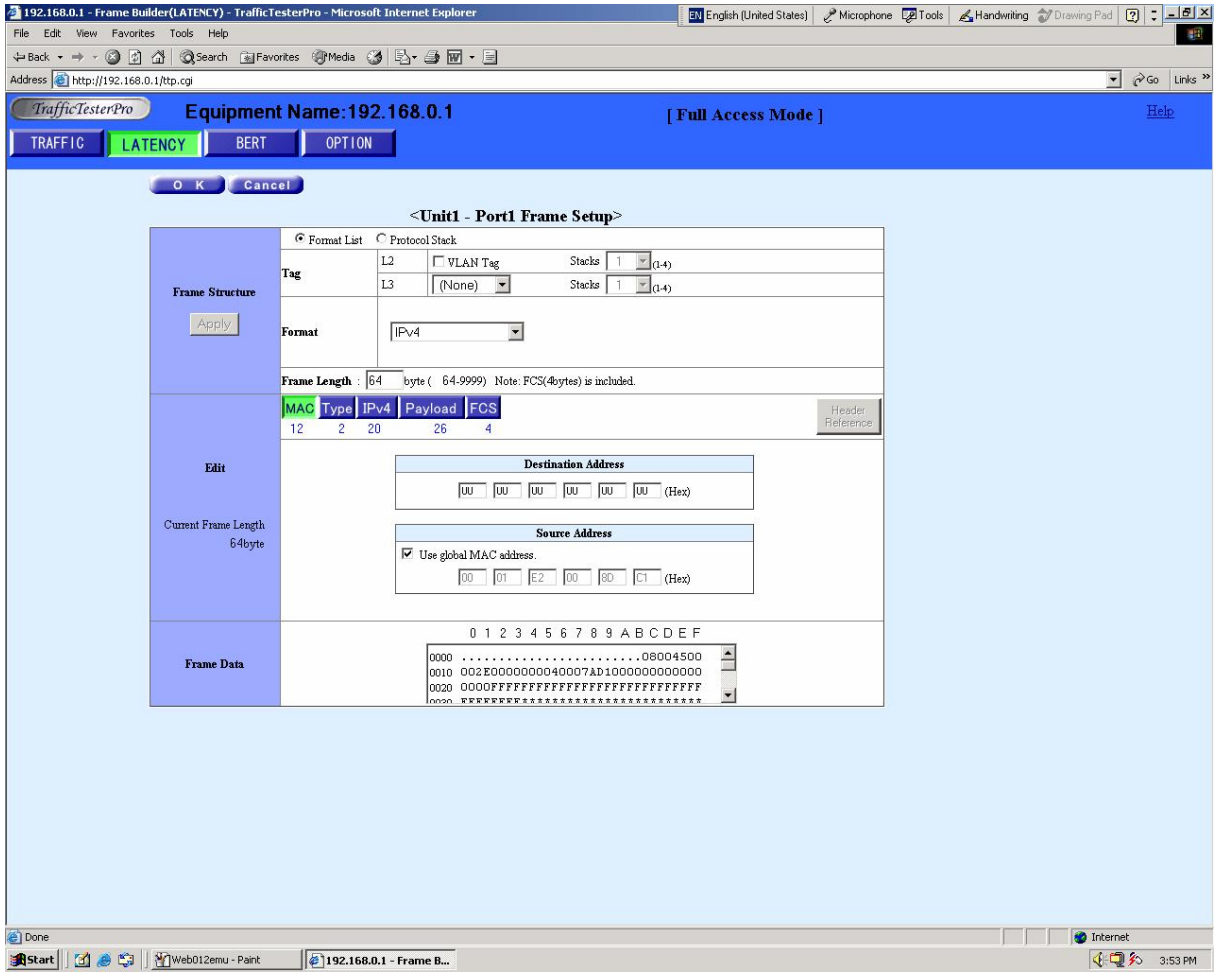


Figure 4.6-37 Port settings screen

4.6.4 Latency Statistics Overview

You can click the Transmission control/statistics button in the left of the Latency screen to display the latency statistics overview screen.

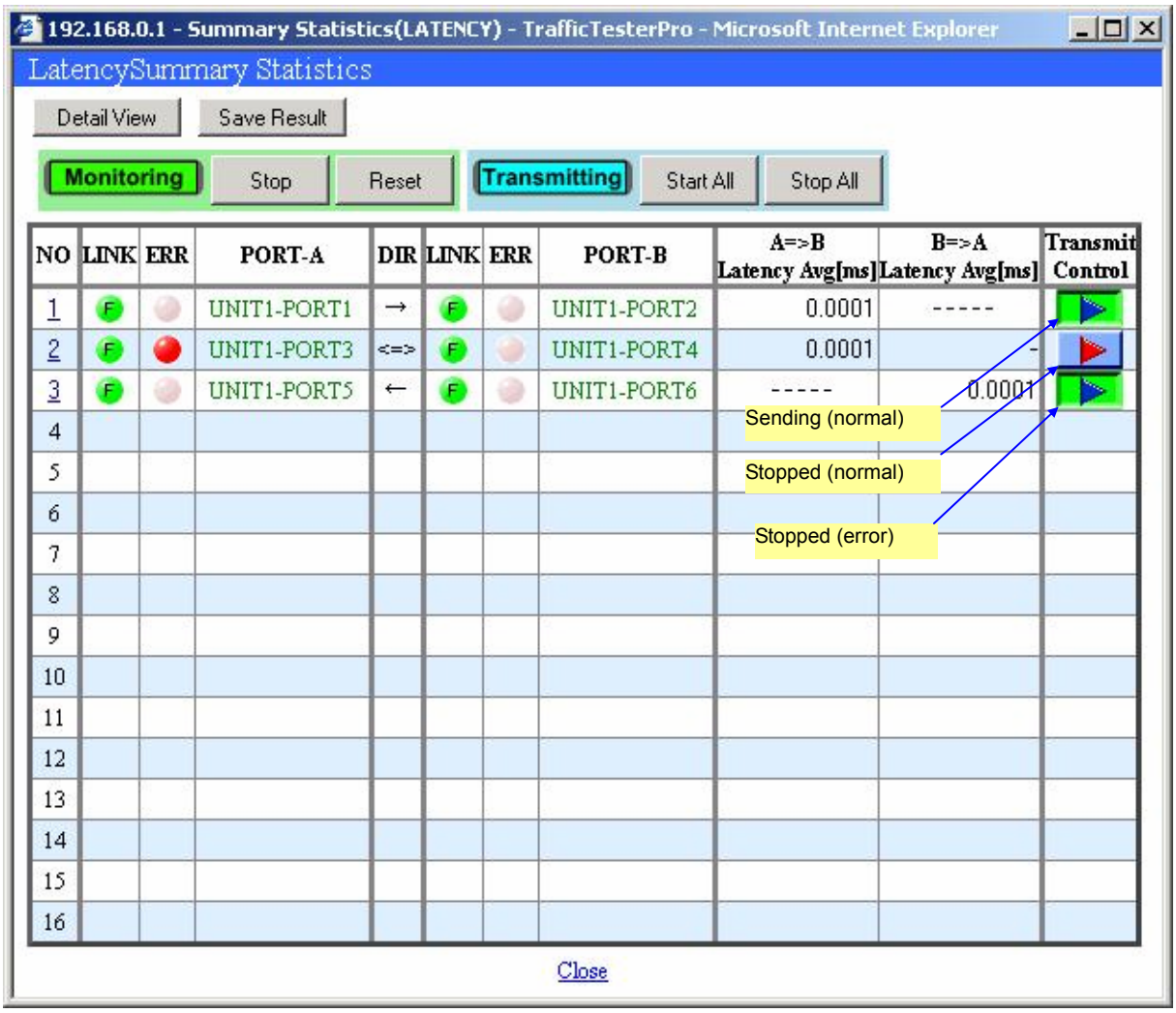


Figure 4.6-38 Latency statistics overview screen

Table 4.6.33 Latency overview statistical button items

Button Item	Description
Statistics detail display	Displays the Latency statistics detail screen in a separate pop up window.
Save statistics	Saves the statistics to a file. For details, see section 4.6.4.1, “Saving Statistics.”
Start/stop statistics	Starts/stops statistical calculation on all ports. When the Start Statistics button is clicked, the message “Start statistics” is displayed, and the button changes to the Stop Statistics button. Pressing the Stop Statistics button stops statistical calculation, and the button changes back to the Start Statistics button. Also, when calculation stops, a window appears prompting you to save the results.
Reset	Clears statistics data on all ports specified in the combination settings.
Transmit all	Transmits test frames on all ports specified in the combination settings.
All stop	Stops transmission of test frames on all ports specified in the combination settings.
Transmission control	Transmits (or stops transmission of) test frames from individual ports specified in the combination settings. If an error frame is being transmitted, the inner triangle is displayed in red.

Table 4.6.34 Latency statistics overview display items

Item	Description
NO	The combination number is displayed. If you click one of these numbers, the corresponding combination's statistics detail screen is displayed.
LINK	Displays the link status. ● For the AE5520 10/100BASE-T Unit F Green F: Link up at 100M, Full H Green H: Link up at 100M, Half F Yellow F: Link up at 10M, Full H Yellow H: Link up at 10M, Half Light gray: Link down ● For the AE5521 1000BASE-X Unit Green: Linked up Light gray: Link down ● For the AE5522 10GBASE-X Unit Green: Linked up Light gray: Link down Red: Receiving LF Yellow: Receiving RF
ERR	Displays the error status. Illuminates red when at least one of all the received statistical frames has an error.
PORT-A and PORT-B	The unit number assigned to PORT-A or PORT-B in the combination settings or the PORT number is displayed.
DIR	Displays the transmission direction as follows. →: From PORT-A to PORT-B ←: From PORT-B to PORT-A ⇔: From PORT-A to PORT-B and vice versa
A→B Delay average [ms]	Displays the delay time of the frames transmitted from PORT-A to PORT-B. If no frames are received, a dash (–) is displayed. If <- is displayed for DIR (B is not received), ----- is displayed.
B→A Delay average [ms]	Displays the delay time of the frames transmitted from PORT-B to PORT-A. If no frames are received, a dash (–) is displayed. If -> is displayed for DIR (A is not received), ----- is displayed.

4.6.4.1 Saving Statistics

You can save the statistics to a file.

(1) Initial save screen
If you press the start/stop button during statistical calculation the statistics stop confirmation message appears. Press **OK** to advance to the save screen after statistics have stopped, or press **Cancel** to abort saving and continue with statistics. You can choose HTML or CSV format for the file to be saved, and each file name is displayed (these file names can be changed).

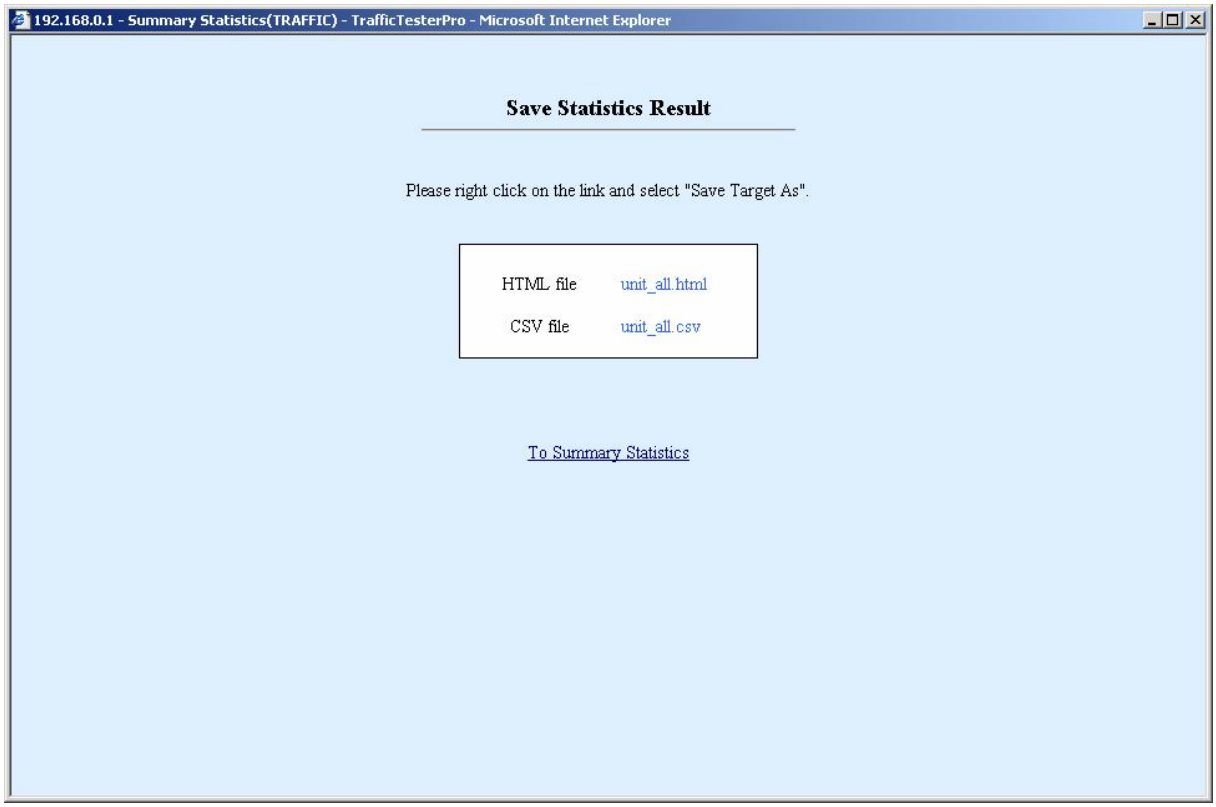


Figure 4.6-39 Statistics saving screen

(2) Shortcut menu

If you place your cursor over the save file name of the desired format and right-click, a shortcut menu appears as shown in the figure below (HTML is selected in the following example).

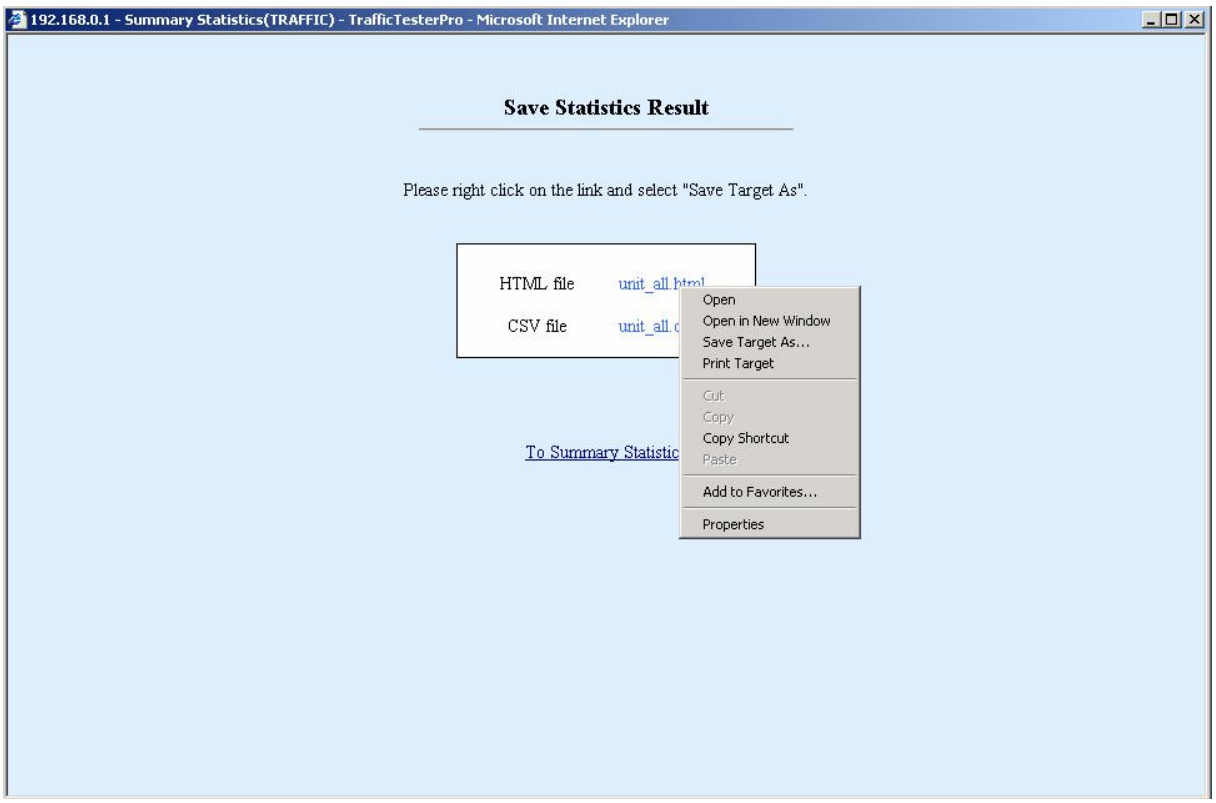


Figure 4.6-40 Shortcut menu

(3) **Save As** screen (for HTML)
Select **Save As** to display a dialog box allowing you to specify the save location for the file.

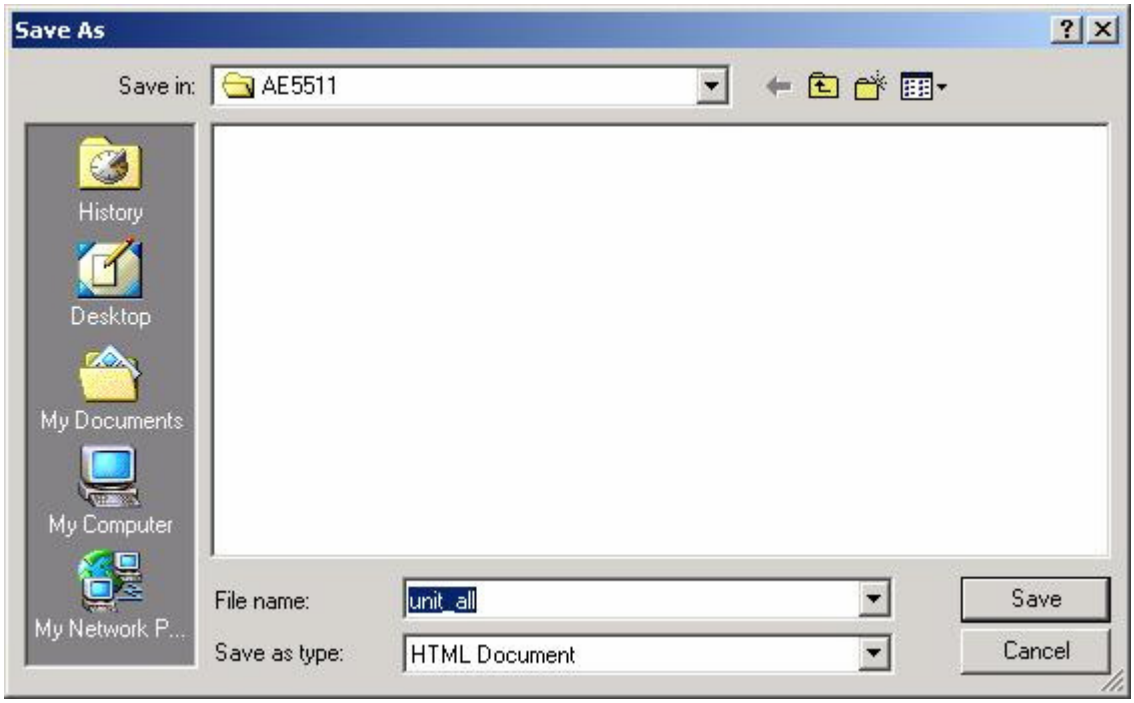


Figure 4.6-41 Save As screen (for HTML)

Specify a save location and file name, then click **Save**. The statistics are saved to a file of the specified name in the specified location.

If a file of the same name already exists in that location, the following message appears. Click **Yes** to overwrite, or **No** to cancel.

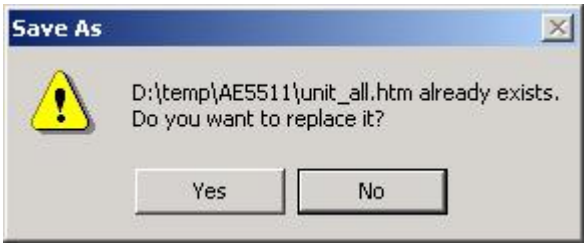


Figure 4.6-42 Overwrite confirmation screen (for HTML)

When the statistics are saved, you are returned to the statistics save screen shown in figure 4.6-39, allowing you to save additional files. If you are done saving statistics, click **Return to Statistics Overview screen**.

(4) **Save As** screen (for CSV)
Select **Save As** to display a dialog box allowing you to specify the save location for the file.

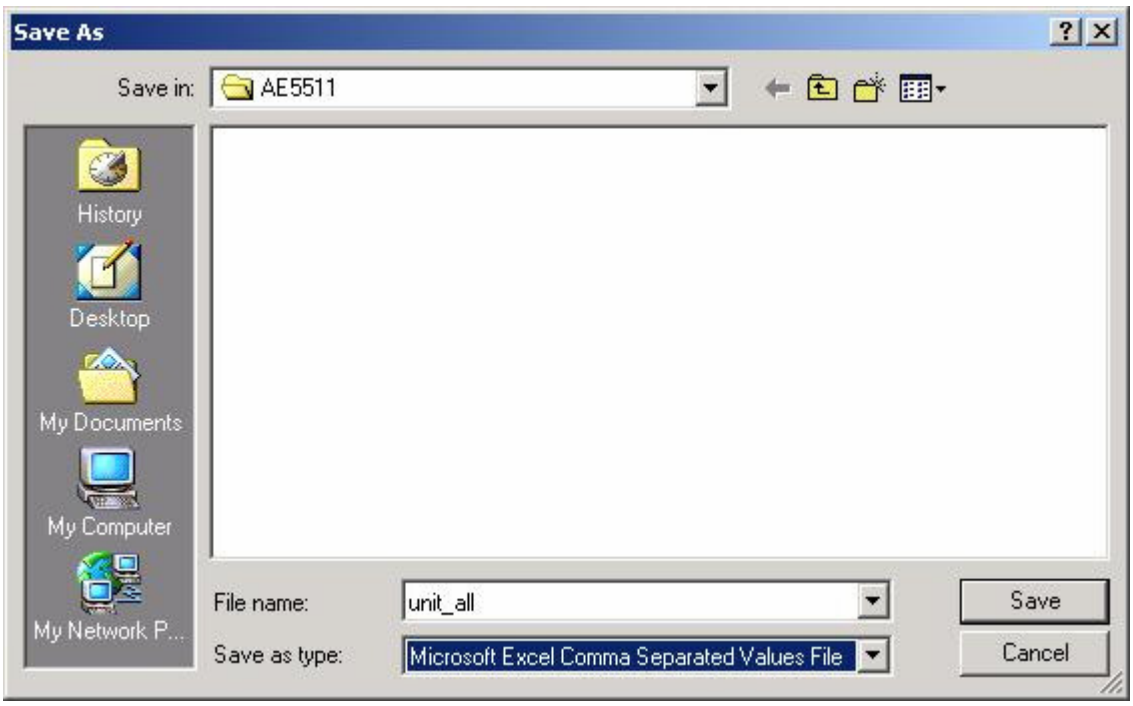


Figure 4.6-43 Save As screen (for CSV)

Specify a save location and file name, then click **Save**. The statistics are saved to a file of the specified name in the specified location.

If a file of the same name already exists in that location, the following message appears. Click **Yes** to overwrite, or **No** to cancel.

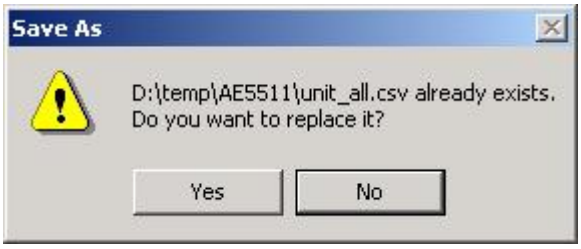


Figure 4.6-44 Overwrite confirmation screen (for CSV)

When the statistics are saved, you are returned to the statistics save screen shown in figure 4.6-39, allowing you to save additional files. If you are done saving statistics, click **Return to Statistics Overview screen**.

4.6.5 Latency Statistics Detail Screen

Figure 4.6-45 Latency statistics detail screen

Table 4.6.35 Latency statistics detail selection items

Item	Description
Combination number	Selects the combination number you wish to display. Only enabled combinations can be selected.

Table 4.6.36 Latency statistics detail button items

Item	Description
Statistics Overview display	The Statistics Overview display window becomes active.
Counter reset: Reset	Clears the statistical data and measurement time of the selected combinations.

Table 4.6.37 Latency statistics detail display items (1)

Item	Description
NO	The selected combination number is displayed.
PORT-A and PORT-B	The unit number assigned to PORT-A or PORT-B of the selected combination number and the PORT number is displayed.
DIR	Displays the transmission direction of the selected combination number as follows. →: From PORT-A to PORT-B ←: From PORT-B to PORT-A ⇔: From PORT-A to PORT-B and vice versa
Measurement time	Displays the measurement time from the start of statistics.
<PORT-A> LINK	Displays the link status of PORT-A . For the display contents, see table 4.6.34, “Latency Statistics Overview display items.”
<PORT-A> ERR	Displays the error status of PORT-A . Illuminates red when at least one of all the received statistical frames has an error.
<PORT-A> SPEED	Displays the link speed and duplex setting of PORT-A .
<PORT-A> MDI (when SPEED=10M/100M)	Displays straight (||) or cross (X) for PORT-A.
<PORT-A> GBIC (when SPEED=1G)	Displays the GBIC type of PORT-A .
<PORT-A> XENPAK (when SPEED=10G)	Displays the XENPAK type of PORT-A .
<PORT-B> LINK	Displays the link status of PORT-B. For the display contents, see table 4.6.34, “Latency Statistics Overview display items.”
<PORT-B> ERR	Displays the error status of PORT-B. Illuminates red when at least one of all the received statistical frames has an error.
<PORT-B> SPEED	Displays the link speed and duplex setting of PORT-B .
<PORT-B> MDI (when SPEED=10M/100M)	Displays straight (||) or cross (X) for PORT-B.
<PORT-B> GBIC (when SPEED=1G)	Displays the GBIC type of PORT-B .
<PORT-B> XENPAK (when SPEED=10G)	Displays the XENPAK type of PORT-B .

Table 4.6.38 Latency statistics details display items (2)

Item	Description
Frame	Displays the total number of transmitted and received frames on PORT-A and PORT-B.
Rate (%)*	Displays the current rate (%) of transmitted and received frames on PORT-A and PORT-B.
Rate (bps)*	Displays the current rate (bps) of transmitted and received frames on PORT-A and PORT-B.
Collisions	Displays the total number of transmission collisions on PORT-A and PORT-B. (statistics displayed only when SPEED=10M/100M. When SPEED=1G or 10G, and on the receive side, dashes (-----) are displayed.)
Pause frames	Displays the total number of received pause frames on PORT-A and PORT-B. Displays ----- on the transmission side.
Error frame*	Displays the total number of transmitted and received error frames on PORT-A and PORT-B. The sums of the following error frames are displayed: CRC error, undersize, oversize, alignment error, symbol error
Delay maximum (ms)	PORT-A Displays the maximum delay time of the frames transmitted from PORT-B to PORT-A. If -> is displayed for DIR, ----- is displayed. PORT-B Displays the max delay time of the frames transmitted from PORT-A to PORT-B. If <- is displayed for DIR, ----- is displayed. If no frames are received, a dash (–) is displayed. Displays ----- on the transmission side. The maximum number of digits that can be displayed is ten, with four digits after the decimal point.
Delay minimum (ms)	PORT-A Displays the minimum delay time of the frames transmitted from PORT-B to PORT-A. If -> is displayed for DIR, ----- is displayed. PORT-B Displays the minimum delay time of the frames transmitted from PORT-A to PORT-B. If <- is displayed for DIR, ----- is displayed. If no frames are received, a dash (–) is displayed. Displays ----- on the transmission side. The maximum number of digits that can be displayed is ten, with four digits after the decimal point.

<table>
<tr><td>Delay average (ms)</td><td>PORT-A
Displays the average delay time of the frames transmitted from PORT-B to PORT-A.
If -> is displayed for DIR, ----- is displayed.
PORT-B
Displays the average delay time of the frames transmitted from PORT-A to PORT-B.
If <- is displayed for DIR, ----- is displayed.
If no frames are received, a dash (–) is displayed.
Displays ----- on the transmission side.
The maximum number of digits that can be displayed is ten, with four digits after the decimal point.</td></tr>
<tr><td>* Error hierarchy</td><td>Errors are received in order of priority as follows: If errors are received simultaneously, the lower priority error is not the current one.

<table><tr><th>Error</th><th>Priority</th></tr><tr><td>Symbol errors</td><td>High</td></tr><tr><td>Undersize/oversize errors</td><td>|</td></tr><tr><td>Alignment errors</td><td>|</td></tr><tr><td>CRC errors</td><td>Low</td></tr></table></td></tr>
</table>

4.7 BERT Mode

This section provides an explanation of BERT mode.

4.7.1 Mode Selection Screen (BERT Mode)

Table 4.7-1 below shows the mode selection screen when selecting BERT mode.

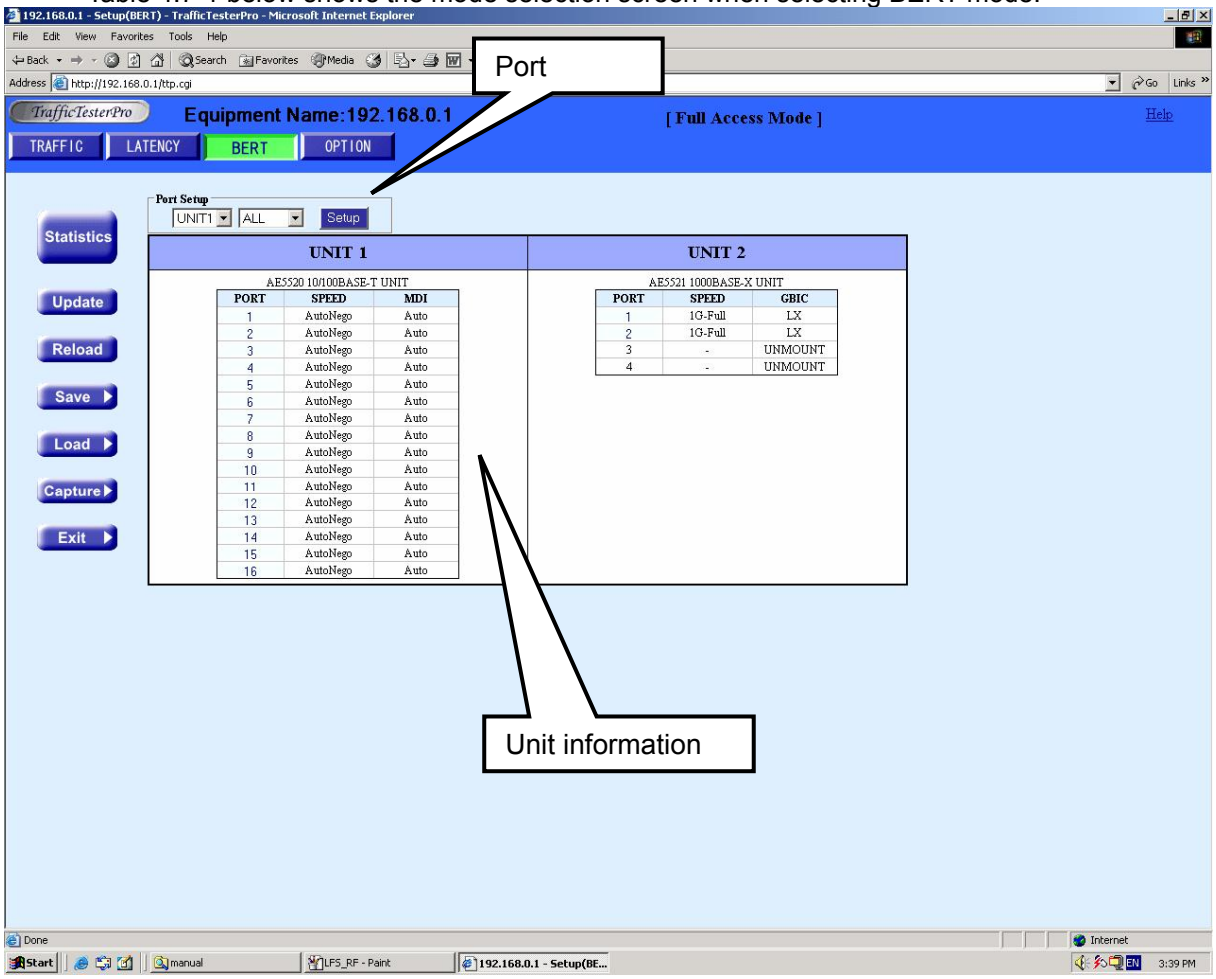


Figure 4.7-1 Mode selection screen (when selecting BERT mode)

WARNING

- This instrument has functions allowing it to transmit frames at high loads from its measurement ports. Incorrect operation can result in breakdown or deterioration of network media or related devices.
- Sufficient care must be taken when performing tests while connected to networks. Yokogawa does not assume any responsibility for damages resulting from incorrect operation.
- Avoid pressing your browser's Back button as the setting values may not take effect.

4.7.1.1 Entering Port Settings

Figure 4.7-2 Port settings

You can specify the measurement ports on which to enter measurement settings.

(1) Specify a unit
Select an installed unit. However, if a unit is not installed in slot 1 or slot 2, that unit cannot be selected.

(2) Specify a measurement port
Select a measurement port for the unit selected in the previous item. If you select ALL, you can apply the same setting to all ports. However, if GBIC is not installed with the AE5521 1000BASE-X Unit, and if XENPAK is not installed with the AE5522 10GBASE-X Unit, that port cannot be selected.

(3) Setup button
Pressing this button sends you to a screen for entering detailed measurement settings related to the unit and measurement port specification in the previous items. For details on the port setting screen, see section 4.7.2, “Port Setting Screen.”

4.7.1.2 Displaying Unit Information

An overview of the measurement information set for each measurement port is displayed.

When the AE5520 10/100BASE-T Unit is installed

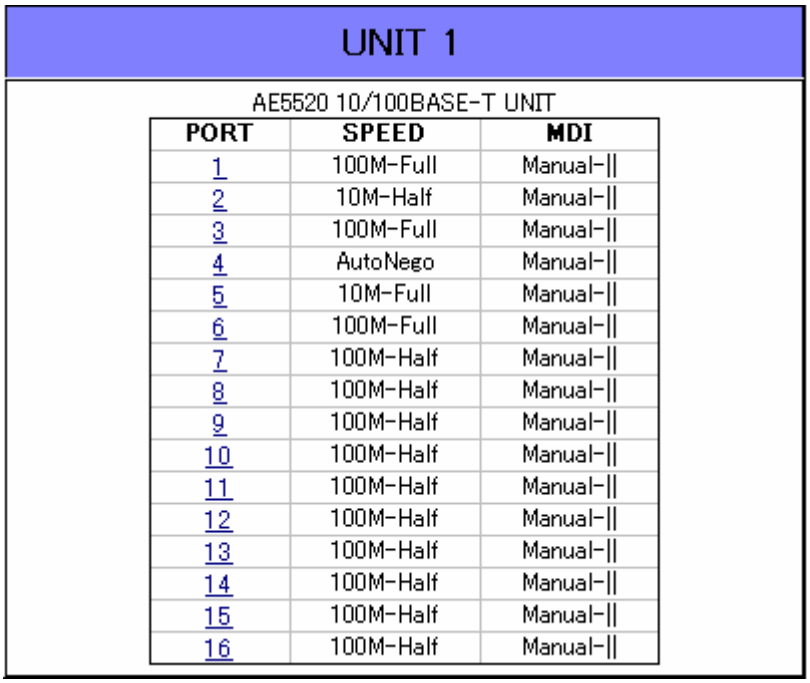


Figure 4.7-3 Overview of measurement port settings (when the AE5520 10/100BASE-T Unit is installed)

The AE5520 10/100BASE-T Unit has sixteen ports, and the link settings and MDI status for each port is displayed.

a. Name of unit

The model name of the unit installed in the slot is displayed.

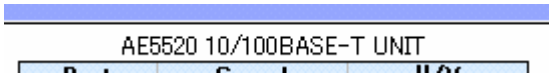


Figure 4.7-4 Name of unit

b. PORT

The displayed port number. For the AE5520 10/100BASE-T Unit, information on sixteen ports is displayed. If you click one of these numbers, you are taken to the corresponding port setting screen.

c. SPEED

Displays the link setting. The following types are available.

Table 4.7.1 List of SPEED items

Type	Description
10M-Full	10BASE-T, full duplex, fixed
10M-Half	10BASE-T, half duplex, fixed
100M-Full	100BASE-TX full duplex, fixed
100M-Half	100BASE-TX half duplex, fixed
AutoNego	Auto negotiation setting

d. II/X

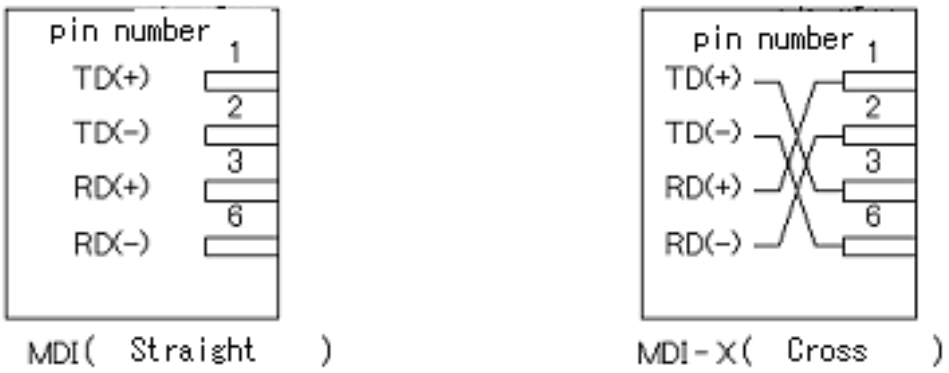
Displays the MDI settings. The following types are available.

Table 4.7.2 List of II/X items

Type	Description
Manual-Ⅱ	MDI setting.
Manual-X	MDI-X setting.
Auto	MDI/MDI-X auto cross

Note

● MDI and MDI-X differ as follows:



● Normally, MDI is for the terminal side, whereas hubs and other network devices use MDI-X or MDI/MDI-X auto cross.

(2) When the AE5521 1000BASE-X Unit is installed

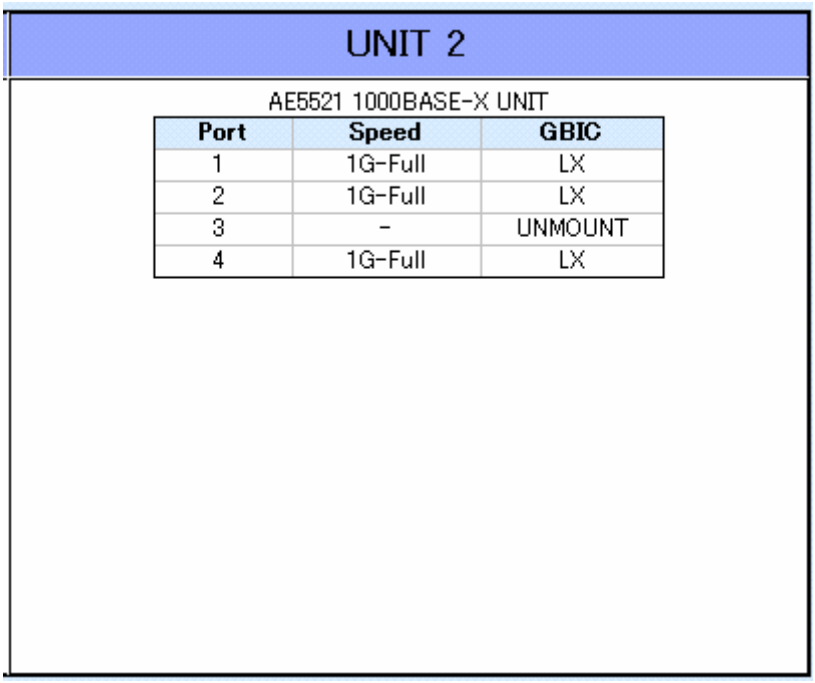


Figure 4.7-5 Overview of measurement port settings (when the AE5521 1000BASE-X Unit is installed)

The AE5521 1000BASE-X Unit has four ports, and the link settings and GBIC installation status for each port are displayed.

a. Name of unit

The model name of the unit installed in the slot is displayed.

Figure 4.7-6 Name of unit

b. PORT

The displayed port number. For the AE5521 1000BASE-X Unit, information on four ports is displayed. If you click one of these numbers, you are taken to the corresponding port setting screen.

c. SPEED

Displays the link setting. The following types are available.

Table 4.7.3 List of SPEED items

Type	Description
1G-FULL	1000BASE-X, full duplex, fixed.
AutoNego	Auto negotiation setting.
-	Displayed if the GBIC module is not installed.

d. GBIC

Displays the GBIC installation status. The following types are available.

Table 4.7.4 List of GBIC items

Type	Description
SX	Displayed if GBIC for the 1000BASE-SX is installed.
LX	Displayed if GBIC for the 1000BASE-LX is installed.
UNKNOWN	Displayed if a GBIC module is installed but could not be properly recognized.
UNMOUNT	Displayed if the GBIC module is not installed.

(3) When the AE5522 10GBASE-X Unit is installed

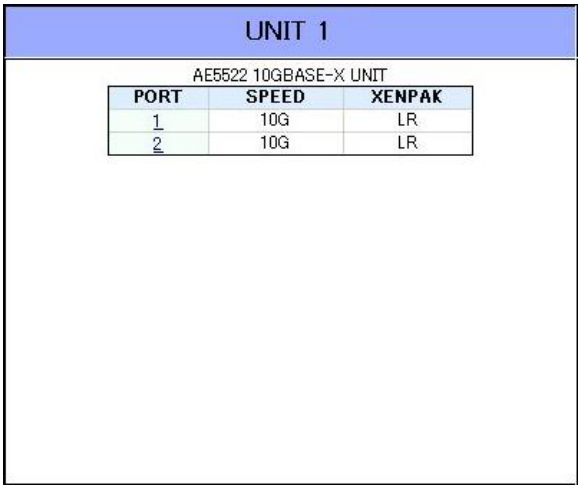


Figure 4.7-7 Overview of measurement port settings (when the AE5522 10GBASE-X Unit is installed)

The AE5522 10GBASE-X Unit has two ports, and the link settings and XENPAK installation status for each port is displayed.

a. Name of unit

The model name of the unit installed in the slot is displayed.

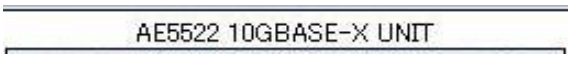


Figure 4.7-8 Name of unit

b. PORT

The displayed port number. For the AE5522 10GBASE-X Unit, information on two ports is displayed. If you click one of these numbers, you are taken to the corresponding port setting screen.

c. SPEED

Displays the link setting. The following types are available.

Table 4.7.5 List of SPEED items

Type	Description
10G	10GBASE-X, full duplex, fixed
-	Displayed if the XENPAK module is not installed.

d. XENPAK

Displays the XENPAK module installation status. The following types are available.

Table 4.7.6 List of XENPAK items

Type	Description
LR	Displayed if XENPAK for the 10GBASE-LR is installed.
UNKNOWN	Displayed if a XENPAK module is installed but could not be properly recognized.
UNMOUNT	Displayed if the XENPAK module is not installed.

4.7.2 Port Setting Screen (BERT Mode)

The port setting screen allows you to enter measurement conditions. There are four major categories of settings: transmission settings, BERT condition settings, line settings, and network emulation settings. For information on the port setting condition button display, see section 4.5.2.1.

4.7.2.1 Port Setting Header Items (BERT Mode)

The header items for the port setting screen contains the following display items.

Figure 4.7-9 Port setting header items

(1) OK button
Saves the current port settings and returns to the mode setting screen.
(2) OK & NEXT button
Saves the current port settings and advances to the next port setting screen.
(3) Cancel button
Deletes the current port settings and returns to the mode setting screen.
(4) Display current port
Displays the port currently being set.

4.7.2.2 Entering Transmission Settings (BERT Mode)

The transmission settings screen allows you to enter transmission conditions.

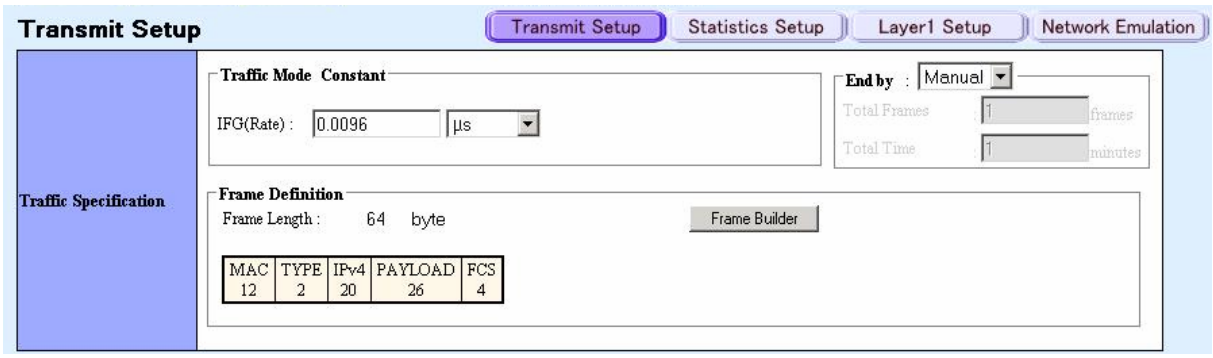


Figure 4.7-10 Transmission setting screen

These settings are only availalbe when the transmission traffic setting is set to ON. The transmission operation does not occur when OFF.

The following describes detailed transmission settings.

(1) Frame builder
Press this button to enter detailed settings for the frames to be transmitted. Details of the frame builder screen are explained in section 4.7.3, “Frame Builder Screen (BERT Mode).”

(2) Frame length variation function
You can set the transmission frame length for BERT mode. Select the check box to enable the frame length setting.

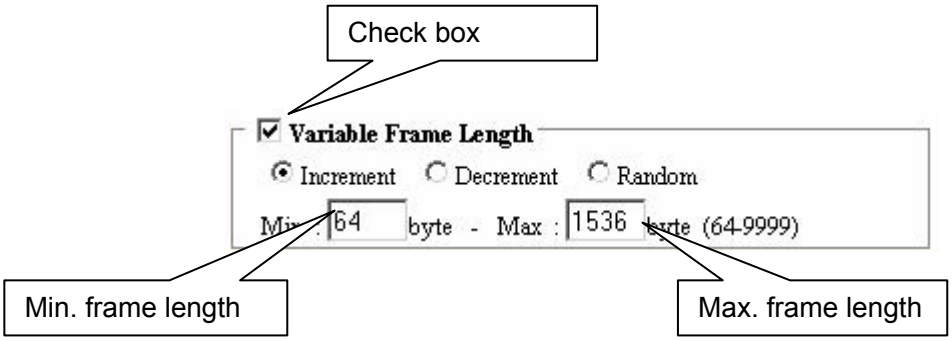


Figure 4.7-11 Frame length variation function

The following items can be set using the screen shown in figure 4.7-11.

• Increment
Selecting the Increment check box allows you to increase the frame length one byte at a time between the minimum and maximum values during transmission.

• Decrement
Selecting the Decrement check box allows you to decrease the frame length one byte at a time between the maximum and minimum values during transmission.

• Random
Selecting the Random check box allows you to transmit frames of random length between the minimum and maximum frame length values.

(3) Traffic mode
Enables entry of IFG settings for the transmitted frames.

Figure 4.7-12 Traffic mode

IFG stands for the *inter frame gap*. The specified range varies depending on the setting units and the line speed during IFG calculation as shown in the table below. When the units change, the values of those units are automatically updated. The available setting units are µs, ns, bit frame/s, %, and bps.

Table 4.7.7 IFG setting range

Line Speed	Units	Min.	Max.	Setting Units
10 Mbps	µs	4.8	999979.2	0.4
	ns	4800	999979200	400
	bit	48	9999792	4
	frame/s	16026	1	
	%	107.6923077	0.0067198	
	bps	8205312	512	
100 Mbps	µs	0.48	999997.92	0.04
	ns	480	999997920	40
	bit	48	99999792	4
	frame/s	160256	1	
	%	107.6923077	0.000672	
	bps	82051072	512	
1000 Mbps	µs	0.032	999999.808	0.032
	ns	32	999999808	32
	bit	32	999999808	32
	frame/s	1644737	1	
	%	110.5263158	0.0000672	
	bps	842105344	512	
10G Mbps	µs	0.0072	999999.9424	0.0008
	ns	72	999999942.4	0.8
	bit	72	9999999424	8
	frame/s	15432099	1	
	%	103.7037037	0.0000067	
	bps	7901234688	512	

* The above IFG min. and max. values assume a frame length of sixty-four bytes.
* The frame/s, %, and bps setting units vary depending on the frame length of the set frames.

(4) Trasmission mode

You can select from Continuous, Single, or Time Specified.

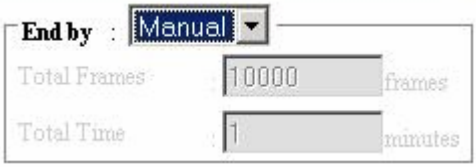


Figure 4.7-13 Transmission mode

In Continuous mode, transmission continues unless a transmission stop request is output. In Single mode, the specified number of frames are transmitted once, then transmission automatically stops. The setting range for the number of transmitted frames is from 1 to 4,294,967,295. In Time Specified mode, frames are transmitted continuously for a specified amount of time, then transmission stops.

4.7.2.3 Entering BERT Condition Settings

The Condition setting screen enables entry of BERT conditions. The following BERT condition settings are available: receive filter, error judgment, out-of-sync conditions, and comparison start position.

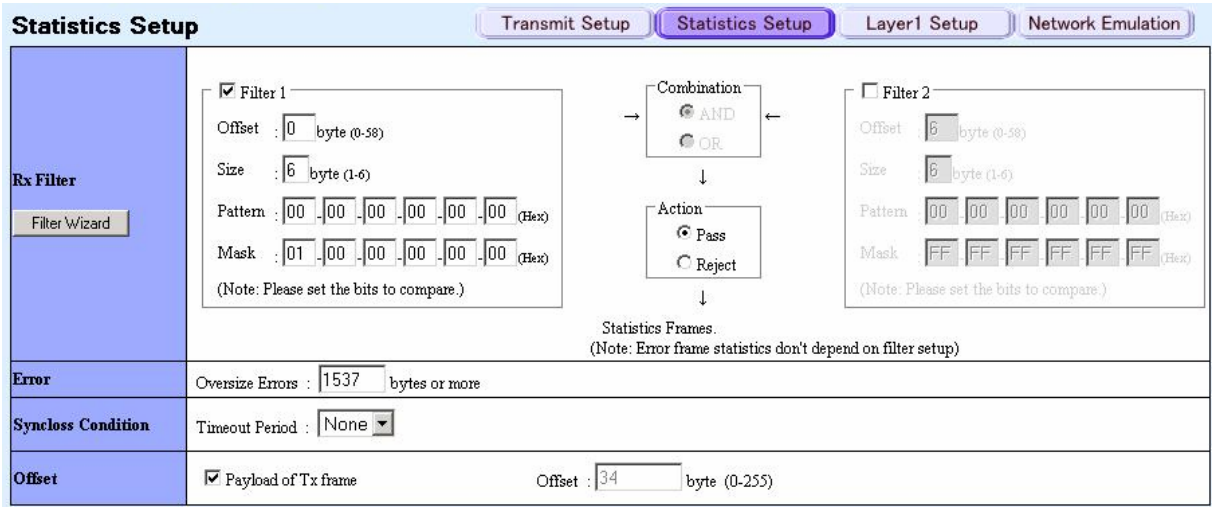


Figure 4.7-14 BERT condition settings

(1) Receive filter

Enables entry of filter conditions for the received frames.

a. Pattern comparison

Pattern comparison settings are only enabled when at least one of the check boxes is selected. Pattern comparison is not performed when both check boxes are cleared.

Item	Description
Comparison pattern 1 and 2	Enables/disables pattern comparison settings. Enabled when selected.
Comparison start position	Sets the comparison start position. Input a decimal number in the range from 0 to 58 bytes.
Comparison length	Sets the length of comparison. Input a decimal number in the range from 1 to 6 bytes.
Comparison pattern	Sets the comparison pattern. Input hexadecimal numbers totaling up to sixteen bytes.
Mask pattern	Sets the mask pattern. Input hexadecimal numbers totaling up to sixteen bytes. The bit for comparison is set to 1.

Table 4.7.8 Pattern comparison setting items

b. Combinations

Enabled when both usage settings for pattern comparison are turned ON in 4.7.2.3 (1) a. You can combine comparison pattern 1 and comparison pattern 2 using conditions.

Table 4.7.9 Combination setting items

Item	Description
AND	When the conditions for both comparison pattern 1 and comparison pattern 2 become true, the action takes place.
OR	When the conditions for either comparison pattern 1 or comparison pattern 2 become true, the action takes place.

c. Filter action

Always enabled. You can select a filter action condition of Pass or Reject.

Table 4.7.10 Filter action setting items

Item	Description
Pass	Frames matching the comparison pattern are set as frames for statistical calculations.
Reject	Frames matching the comparison pattern are not set as frames for statistical calculations.

Note: Error frames are counted regardless of the filter settings.

d. Filter menu button

Clicking this button launches the filter wizard setting screen. The following is an explanation of the settings in this screen.

Table 4.7.11 BERT condition setting button items

Item	Description
Filter menu	The receive filter wizard screen in figure 4.7-15 is displayed a separate pop up window.

(2) Receive filter wizard settings

The filter menu consists of MAC filter and VLAN filter settings. You can select either Receive only specified dest. MAC address (DA), Receive only specified source MAC address (SA), Receive only unicast (L2) frames, VLAN ID filter, or VLAN QOS filter.

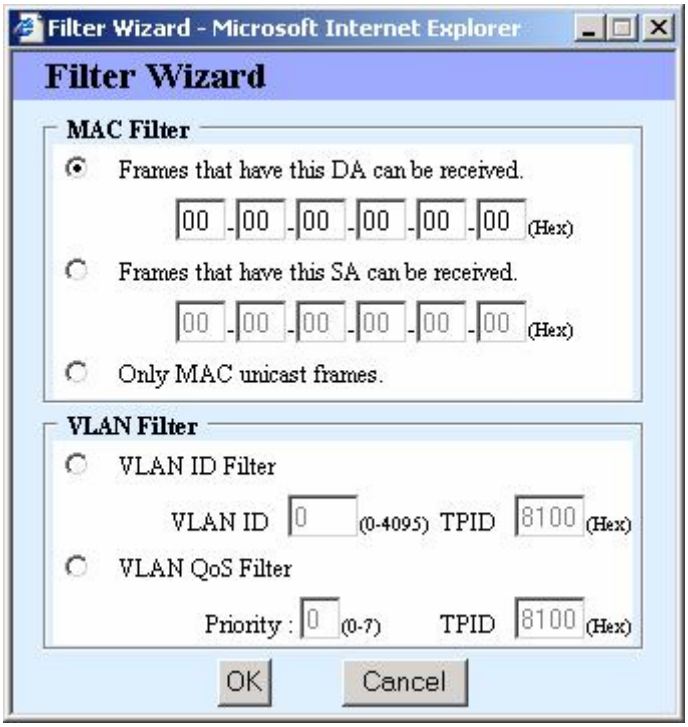


Figure 4.7-15 Filter wizard setting screen

Table 4.7.12 Receive filter setting items

Item	Description
Receive only specified dest. MAC address (DA)	Automatically sets a filter for receiving only from a specified dest. MAC address. Input hexadecimal numbers totaling up to sixteen bytes.
Receive only specified source MAC address (SA)	Automatically sets a filter for receiving only from a specified source MAC address. Input hexadecimal numbers totaling up to sixteen bytes.
Receive only unicast (L2) frames	Automatically sets a filter for receiving only unicast frames.
VLAN ID filter	Automatically sets a filter for receiving only frames of the specified VLAN ID and TPID. The VLAN ID is set using a decimal between 0 and 4095. The TPID can be set as a 2-byte hexadecimal. (Default value is 8100.)
VLAN QOS filter	Automatically sets a filter for receiving only frames of the specified Priority and TPID. The Priority is set using a decimal between 0 and 7. The TPID can be set as a 2-byte hexadecimal. (Default value is 8100.)

● Error judgement
Allows you to enter thresholds for oversize errors and judgment.

Table 4.7.13 Error judgment setting items

Item	Description
Oversize error	The oversize error threshold can be entered. You can input a decimal in the range from 65 to 10,000 bytes.

● Out-of-sync condition settings
Selects out-of-sync conditions of 2 seconds or None depending on the receive frame timeout.

(5) Comparison start position
Enables entry of the PN pattern comparison start position setting.

● When selected

Performs PN pattern comparison from the top position of the transmitted frame payload.

Figure 4.7-16 Measurement start position 1

● When cleared

The PN pattern comparison start position can be entered in the range from 0 to 255.

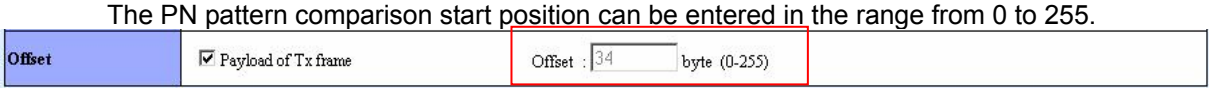


Figure 4.7-17 Measurement start position 2

4.7.2.4 Entering Line Settings (BERT Mode)

The line setting screen allows entry of line settings. The settings vary depending on the selected unit.

(1) Line settings for the AE5520 10/100BASE-T Unit

The line settings for the AE5520 10/100BASE-T Unit consist of auto negotiation and MDI/MDI-X switching settings.

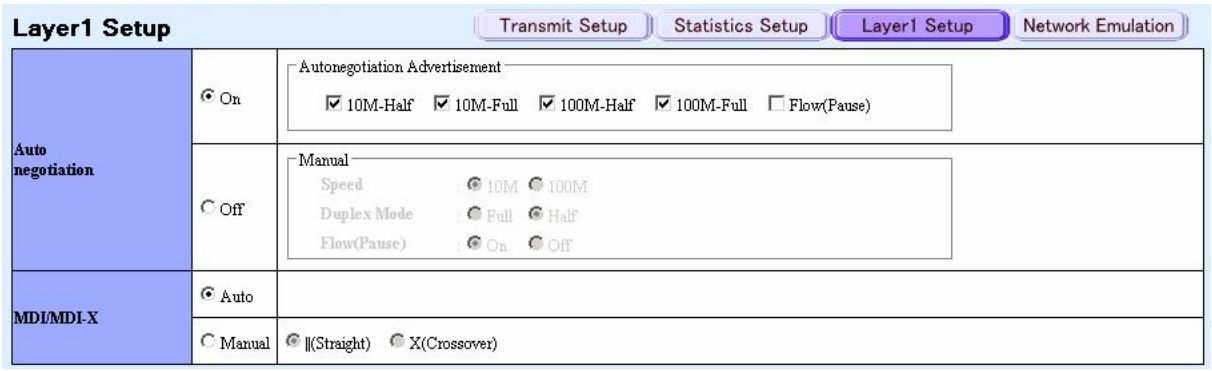


Figure 4.7-18 Line setting screen (when using the AE5520 10/100BASE-T Unit)

a. Auto negotiation setting

You can turn auto negotiation ON or OFF. When ON, the capability display settings are available. When OFF, the manual settings are available.

<A> Capability display

The following settings for the capability display can be enabled or disabled.
10M-Half, 10M-Full, 100M-Half, 100M-Full, Flow (Pause)

<B> Manual settings

Manual settings that can be entered are SPEED, Duplex Mode, and Flow (Pause).

Table 4.7.14 Manual setting items

Item	Description
Speed	Sets the SPEED. You can select 100M or 10M.
Duplex Mode	Sets the Duplex mode. Select either Full or Half.
Flow (Pause)	Sets the Flow (Pause). Select either ON or OFF.

b. MDI/MDI-X switching

With MDI/MDI-X switching, you can select an MDI/MDI-X setting of Auto or Manual. However, you can only select Auto when auto negotiation is ON. When Manual is selected, you can select II (straight) or X (cross).

(2) Line settings for AE5521 1000BASE-X Unit
The only line settings for the AE5521 1000BASE-X Unit are the auto negotiation settings.

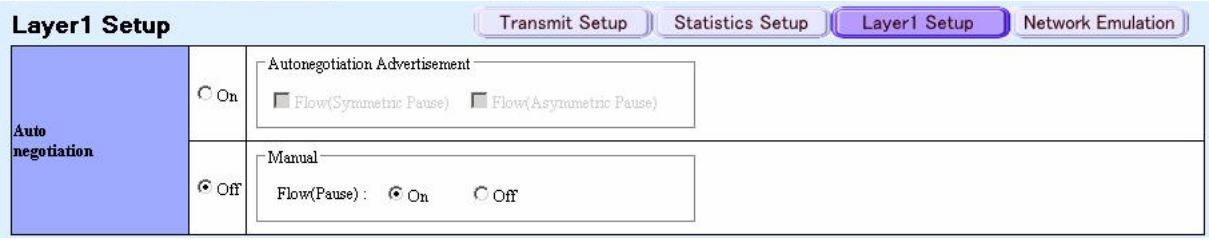


Figure 4.7-19 Line setting screen (when using the AE5521 1000BASE-X Unit)

a. Auto negotiation setting

You can turn auto negotiation ON or OFF. When ON, the capability display settings are available. When OFF, the manual settings are available.

<A> Capability display
The following settings for the capability display can be enabled or disabled.
Flow (Symmetric Pause), Flow (Asymmetric Pause)

<B> Manual settings
With manual settings, Flow (Pause) can be set.

Table 4.7.15 Manual setting items

Item	Description
Flow (Pause)	Sets the Flow (Pause). Select either ON or OFF.

(3) Line settings for AE5522 10GBASE-X Unit
The only line setting that can be entered for the AE5521 1000BASE-X Unit is the flow control (Pause) setting.

Figure 4.7-20 Line setting screen 3 (when using the AE5522 10GBASE-X Unit)

a. Flow control setting

You can turn flow control ON or OFF.

Table 4.7.16 Flow control setting items

Item	Description
Flow (Pause)	Sets the Flow (Pause). Select either ON or OFF.

4.7.2.5 Entering Network Emulation Settings (BERT Mode)

The network emulation screen allows entry of network emulation settings which consist of the response control and self port address settings.

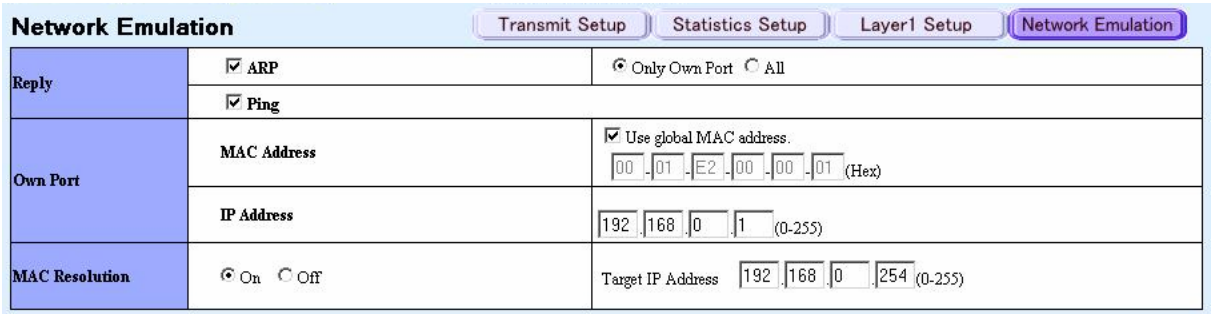


Figure 4.7-21 Network emulation setting initial screen

(1) response control

The response control settings consist of ARP reply and PING reply settings.

a. ARP reply

Selecting this check box enables the ARP reply function for ARP requests. When enabled, select an ARP setting of either **self port address only** or **Reply to all ARPs**.

b. PING reply

Selecting this check box enables the PING reply function for PING requests.

(2) self port address setting

The self port address settings consist of MAC address and IP address settings.

a. MAC address

You can select whether to use a global MAC address or a specified MAC address. Select the **Use the MAC address of this port** check box to specify a designated global MAC address. When you clear the check box, you can enter an arbitrary MAC address. Input hexadecimal numbers totaling up to 6 bytes.

b. IP Address

Each octet can be specified from 0 to 255. This is the IP address is used when ARP reply or PING reply is selected.

4.7.3 Frame Builder Screen (BERT Mode)

You can enter frame settings in the frame builder screen that appears when you press the frame builder button in the transmission settings. The following is an example of the frame builder screen.

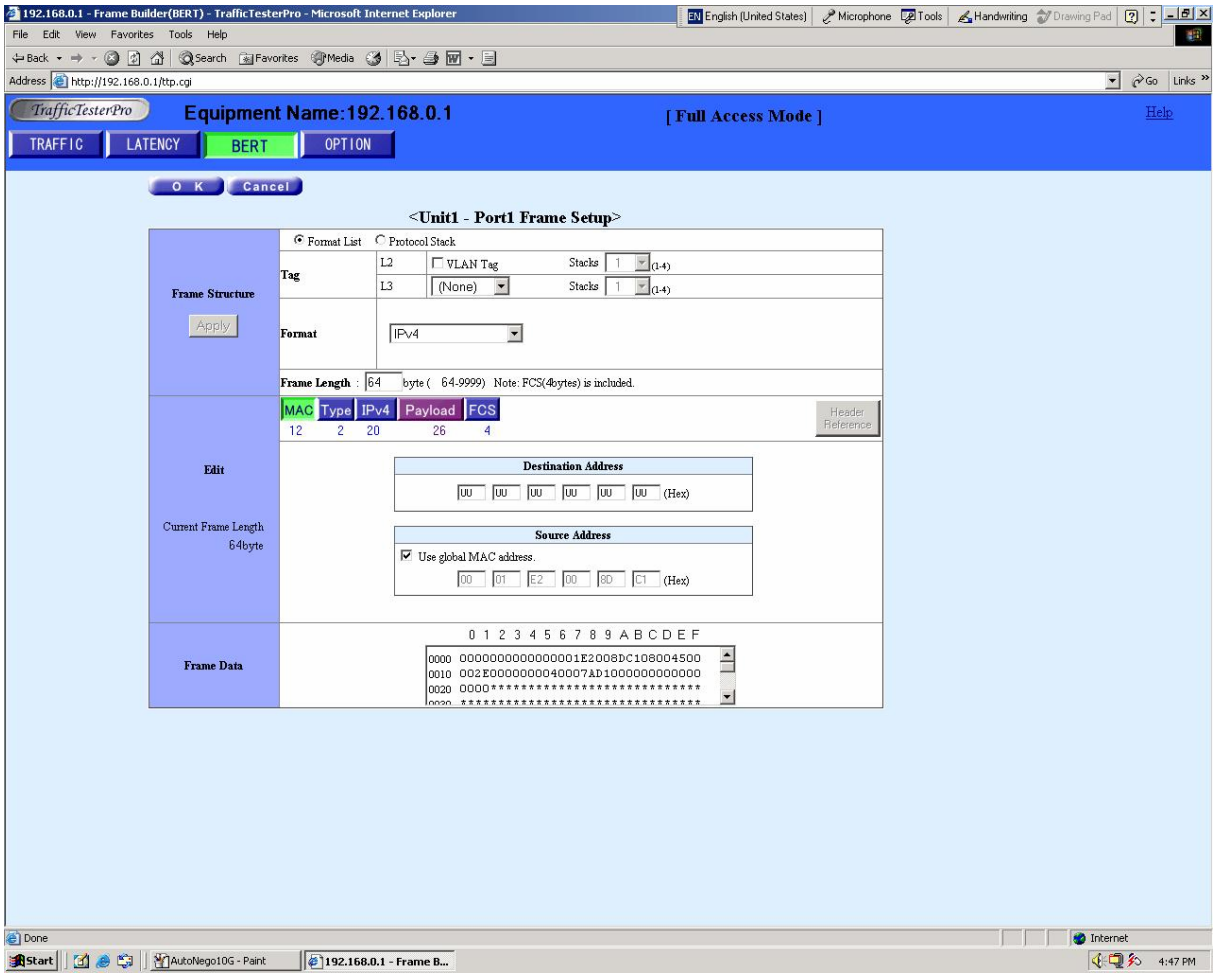


Figure 4.7-22 Frame builder display screen example

4.7.3.1 Frame Structure (BERT Mode)

This is an explanation of the basic parts of a frame. The frame structure settings that are displayed when List Selection is selected is shown in figure 4.7-23, and the display contents are shown in figure 4.7-17. The frame structure settings that are displayed when Specify protocol stack is selected is shown in figure 4.7-42, and the display contents are shown in figure 4.7-18. After any of the fields are modified, you can press the Finalize button to update the edited frame fields.

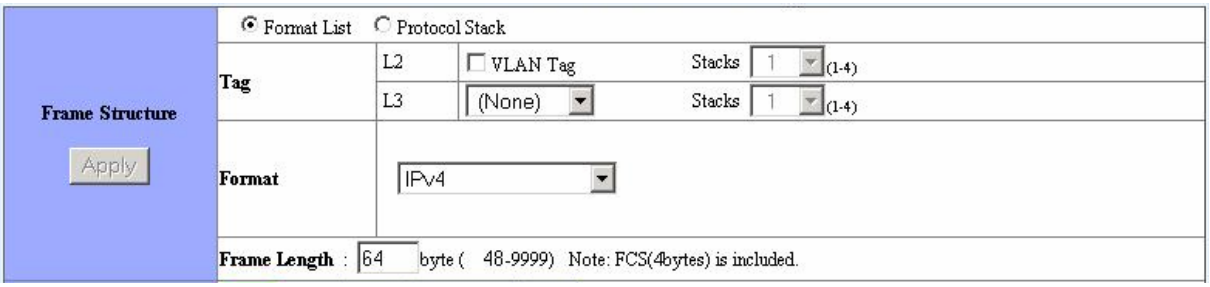


Figure 4.7-23 Frame structure settings screen (list selection)

Table 4.7-17 Frame structure setting items (list selection)

Item	Description
List selection/protocol stack specification	Select a format setting method of list selection or protocol stack specification (in this example, List selection is selected).
Tag (L2)	You can select/clear VLANTag for layer 2. When selected, you can select a number of stacks from 1 to 4.
Tag (L3)	You can select a tag for layer 3 of None, MPLS, or EoMPLS. When MPLS or EoMPLS is selected, you can select stack setting from 1 to 4.
Format	Select the frame format from the pull down menu. The following formats are available. Measurement format settings can be entered: IPv4, IPv4+UDP, IPv4+TCP, ICMP, IPv6, IPX, IPv4 multicast, IPv4 multicast +UDP, Custom (MAC Y), Custom (MAC none)
Frame length	Sets the frame length. You can set a frame length that includes FCS. The minimum varies depending on the presence or absence of tags, but with no tags it is sixty-four bytes and the maximum is fixed at 9999 bytes.

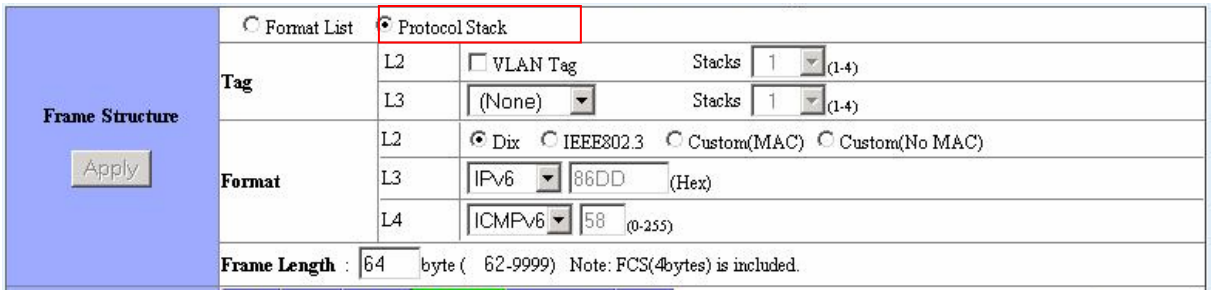


Figure 4.7-24 Frame structure settings screen (protocol stack specification)

Table 4.7-18 Frame structure setting items (protocol stack specification)

Item	Description
List selection/protocol stack specification	Select a format setting method of list selection or protocol stack specification (in this example, protocol stack is specified).
Tag (L2)	You can select/clear VLANTag for layer 2. When selected, you can select a number of stacks from 1 to 4.
Tag (L3)	You can select a tag for layer 3 of None, MPLS, or EoMPLS. When MPLS or EoMPLS is selected, you can select stack setting from 1 to 4.
Format (L2)	Sets the L2 format. Select from Dix, IEEE802.3, custom (MAC Y), and custom (MAC none)
Format (L3)	Sets the L3 format. Cannot be set if the L2 format is Custom (MAC Y) or Custom (MAC none). When the L2 format is Dix or IEEE802.3, select either User, IPv4, IPv6, or IPX. When (User) is selected, set an arbitrary 2-byte hexadecimal number.
Format (L4)	Sets the L4 format. Cannot be set if the L2 format is Custom (MAC Y)/(MAC none), of if the L3 format is (User) or IPX. When the L3 format is IPv4, select either (User), TPC, UDP, IGMP, or ICMP. When the L3 format is IPv6, select either (User), TPC, UDP, IGMP, or ICMP. When (User) is selected, can be set to an arbitrary value from 0 to 255.
Frame length	Sets the frame length. You can set a frame length that includes FCS in the range from 64 to 9999 bytes.

4.7.3.2 Editing Frames (BERT Mode)

You can specify each field of a frame. The fields that can be edited depending on the field structure are displayed as buttons.

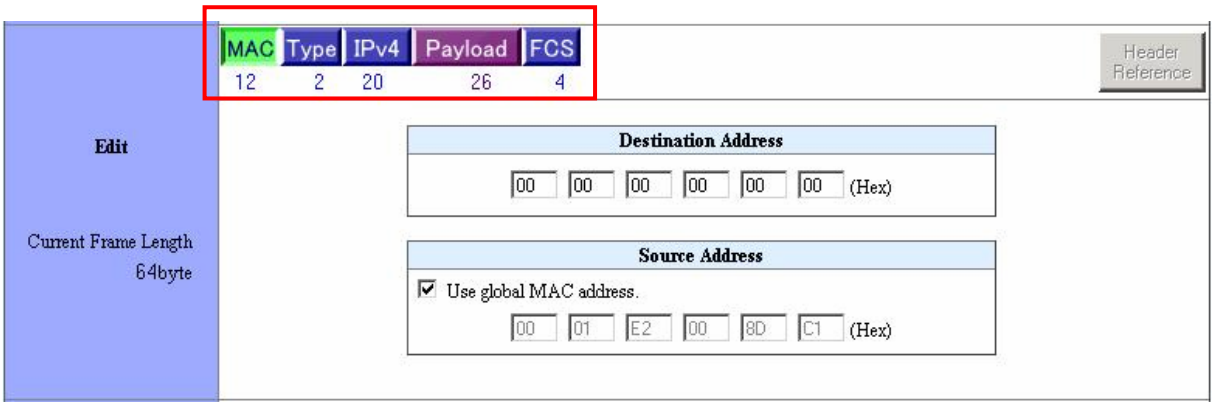


Figure 4.7-25 Frame edit screen example

Table 4.7.19 Frame edit setting items

Item	Description
MAC	Sets the MAC address. The MAC button is always displayed.
VLANTag	Sets the VLANTag. The VLANTag button is only displayed when the VLANTag setting is active.
Type	Sets the type. The Type button is only displayed when the Type setting is active.
Length	Sets the length. The Length button is only displayed when the Length setting is active.
LLC/SNAP	Sets the LLC/SNAP. The LLC/SNAP button is only displayed when the LLC/SNAP setting is active.
MPLS	Sets the MPLS. The MPLS button is only displayed when the MPLS setting is active.
IPv4	Sets the IPv4. The IPv4 button is only displayed when the IPv4 setting is active.
IPv6	Sets the IPv6. The IPv6 button is only displayed when the IPv6 setting is active.
IPX	Sets the IPX. The IPX button is only displayed when the IPX setting is active.
TCP	Sets the TCP. The TCP button is only displayed when the TCP setting is active.
UDP	Sets the UDP. The UDP button is only displayed when the UDP setting is active.
ICMP	Sets the ICMP. The ICMP button is only displayed when the ICMP setting is active.
ICMPv6	Sets the ICMPv6. The ICMPv6 button is only displayed when the ICMPv6 setting is active.
IGMP	Sets the IGMP. The IGMP button is only displayed when the IGMP setting is active.
Payload	Sets the payload. The Payload button is only displayed when the Payload setting is active.
FCS	Sets the FCS. The FCS button is always displayed.
Header reference figure	Displayed when one of the following buttons is selected: VLANTag, MPLS, IPv4, IPv6, IPX, TCP, UDP, ICMP, or IGMP. The header format corresponding to each of the buttons are displayed in pop-up windows.

(1) MAC address settings (BERT mode)

This function allows you to edit the destination or source MAC address of Ethernet frames. When EoMPLS is selected under Tag (L3) as shown in section 4.7.3.1, “Frame Structure,” the MAC button appears in green.

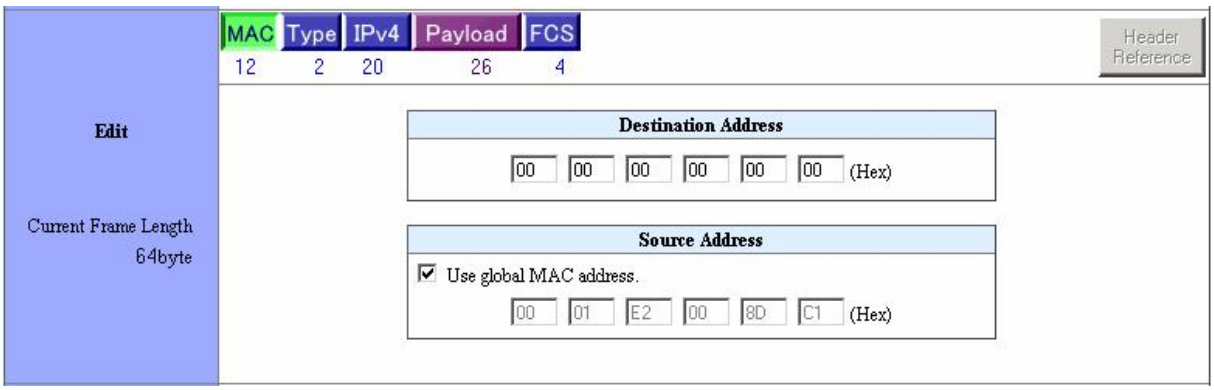


Figure 4.7-26 MAC address setting screen

Table 4.7.20 MAC address setting items

Item	Description
Destination address (DA)	Sets the destination MAC address. You can input a hexadecimal number in the range from 00h to FFh. When L3 is IPv4 Multicast, (fixed) is automatically set, and manual input is disabled.
Source address (SA)	Sets the source MAC address. You can input a hexadecimal number in the range from 00h to FFh. When selecting to use the global MAC address of this port, the global MAC address is automatically set, and manual input is disabled.

(2) VLANTag settings (BERT mode)
This function allows you to edit VLANTags. Each tag can carry four identifiers.

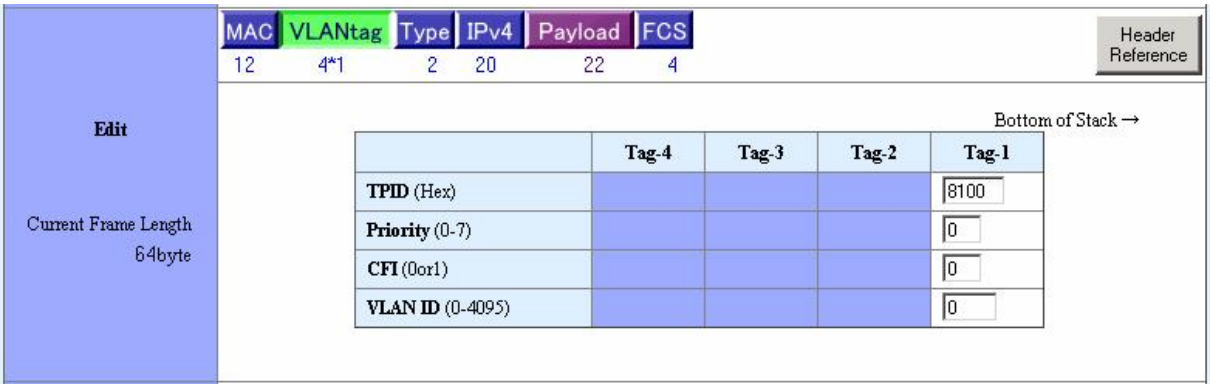


Figure 4.7-27 VLANTag setting screen

Table 4.7.21 VLANTag setting items

Item	Description
TPID (Hex)	Sets the tag protocol ID. Can be set as a 2-byte hexadecimal.
Priority (0–7)	Sets the VLANTag user priority. You can input a decimal in the range from 0 to 7.
CFI (0 or 1)	Sets the VLANTag CFI. You can specify 1 or 0.
VLAN ID (0–4095)	Sets the VLANTag's VLAN ID. You can input a decimal in the range from 0 to 4,095.
Header reference figure	Clicking this button displays the VLANTag header format in a separate window.

● The setting items for Tag1 to Tag4 are all the same.

(3) Type settings (BERT mode)

This function allows you to edit the Type field of Ethernet frames. When EoMPLS is selected under Tag (L3) as shown in section 4.7.3.1, “Frame Structure,” the TYPE button appears in green.

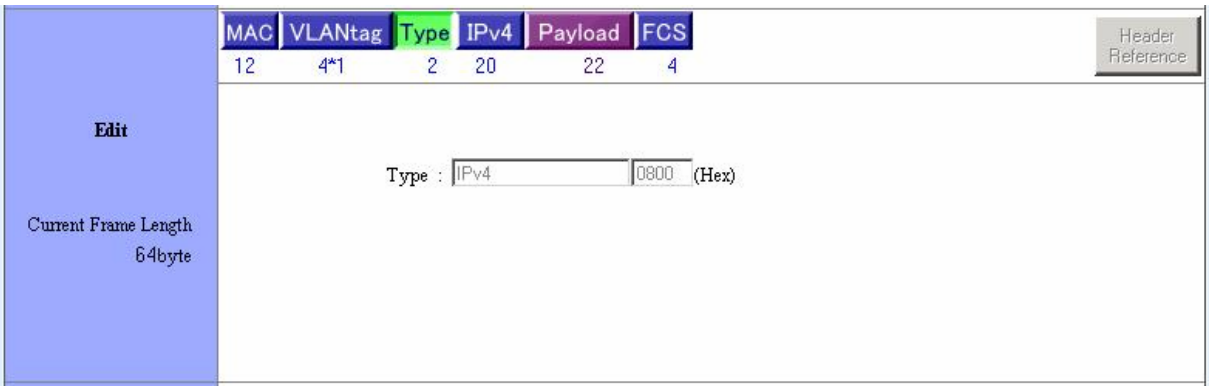


Figure 4.7-28 Type setting screen

Table 4.7.22 Type setting items

Item	Description
MPLS Unicast/MPLS Multicast/User	Sets Type when MPLS is enabled. Select MPLS Unicast, MPLS Multicast, or User.
Type (Hex)	Sets Type when L3 (User) is selected. Can be set as a 2-byte hexadecimal.

(4) Length settings (BERT mode)
This function allows you to edit the Length field of IEEE802.3 frames.

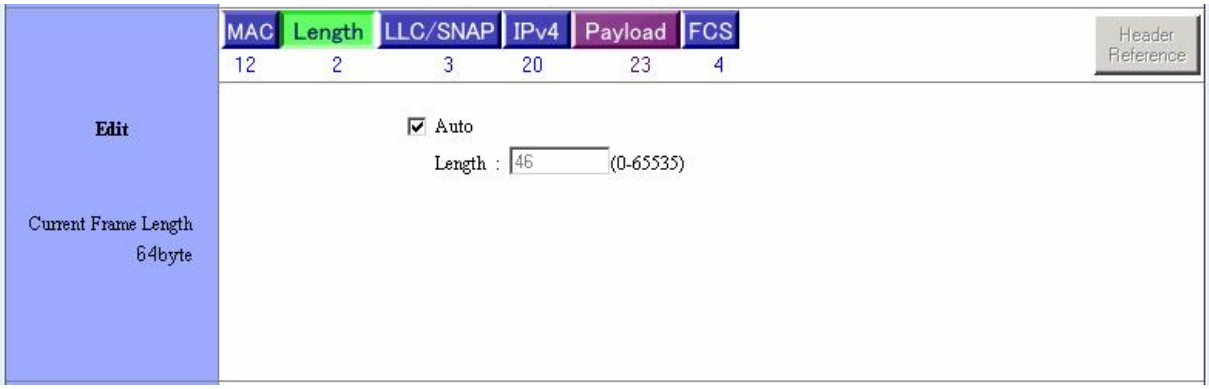


Figure 4.7-29 Length setting screen

Table 4.7.23 Length setting items

Item	Description
Auto-calculation	Select this check box to automatically calculate the length.
Length	Can be set when auto-calculation is not selected. You can input a decimal in the range from 0 to 65,535.

(5) LLC/SNAP settings (BERT mode)
This function allows you to enter LLC/SNAP settings.

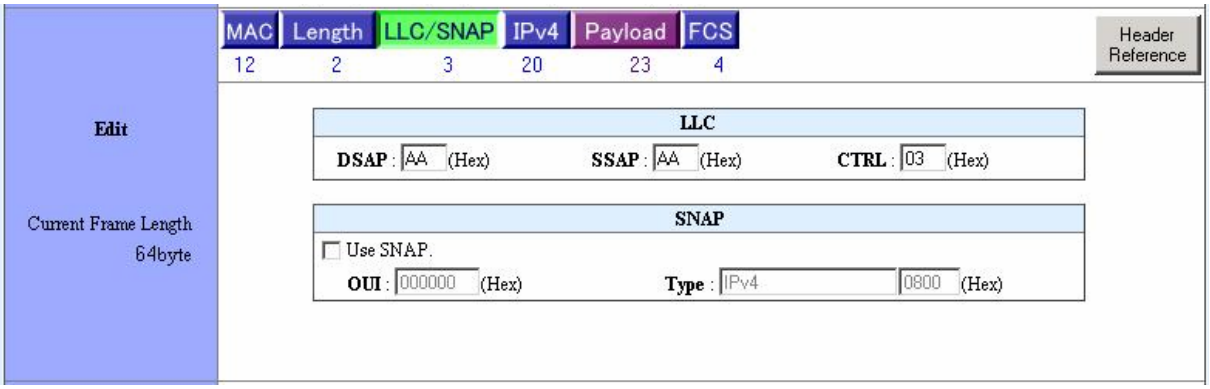


Figure 4.7-30 LLC/SNAP setting screen

Table 4.7.24 LLC/SNAP setting items

Item	Description
LLC: DSAP (Hex)	Sets the DSAP field within the LLC header. You can input a hexadecimal number in the range from 00h to FFh.
LLC: SSAP (Hex)	Sets the SSAP field within the LLC header. You can input a hexadecimal number in the range from 00h to FFh.
LLC: CTRL (Hex)	Sets the CTRL field within the LLC header. You can input a hexadecimal number in the range from 00h to FFh.
Add SNAP header	Lets you insert a SNAP header into the frame.
SNAP: OUI (Hex)	When inserting a SNAP header into a frame, sets the OUI field within the SNAP header. You can set an arbitrary 3-byte hexadecimal number.
SNAP: MPLS Unicast/MPLS Multicast/User	When inserting a SNAP header into a frame and MPLS is enabled, sets the Type. Select MPLS Unicast, MPLS Multicast, or User.
SNAP: Type (Hex)	When inserting a SNAP header into a frame and L3 is (User), sets the Type. Can be set as a 2-byte hexadecimal.
Header reference figure	Clicking this button displays the LLC/SNAP header format in a separate window.

(6) MPLS settings (BERT mode)

This function allows you to set MPLS. Each tag can carry four identifiers. When EoMPLS is selected under Tag (L3) as shown in section 4.7.3.1, “Frame Structure,” the MPLS button appears in green (see (7) EoMPLS settings).

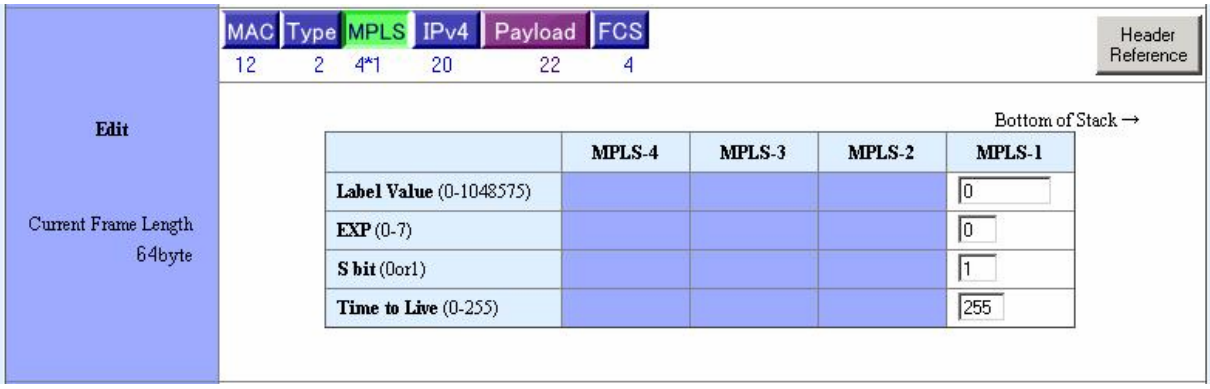


Figure 4.7-31 MPLS setting screen

Table 4.5.25 MPLS setting items

Item	Description
Label value (0–1,048,575)	Sets the label value. You can input a decimal in the range from 0 to 1,048,575.
EXP (0–7)	Sets EXP. You can input a decimal in the range from 0 to 7.
S bit (0 or 1)	Sets the S bit. You can specify 1 or 0.
Time-to-live (TTL) (0–255)	Sets the time-to-live (TTL). You can input a decimal in the range from 0 to 255.
Header reference figure	Clicking this button displays the MPLS header format in a separate window.

- The setting items for MPLS1 to MPLS4 are all the same.

(7) EoMPLS settings (BERT mode)
This function allows you to set EoMPLS.

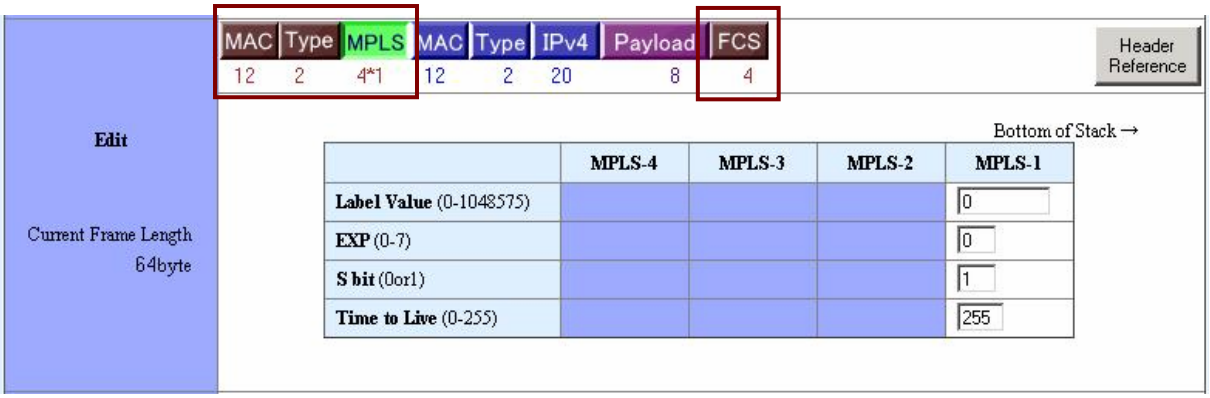


Figure 4.7-32 MPLS setting screen

When EoMPLS is selected under Tag (L3) as shown in section 4.7.3.1, “Frame Structure,” the MAC, TYPE, MPLS, and FCS buttons appear in green. The contents of the items are the same as previously mentioned.
(Contents of MAC=(1), Type=(3), MPLS=(6), FCS=(17))

(8) IPv4 settings (BERT mode)
This is an IPv4 editing function.

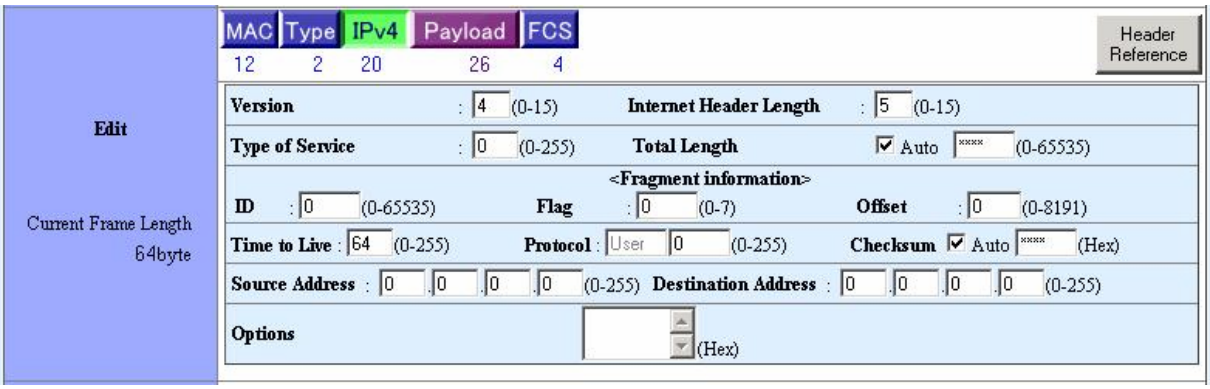


Figure 4.7.33 IPv4 setting screen

Table 4.7.26 IPv4 setting items

Item	Description
Version (Ver)	Sets the IP header version. You can input a decimal in the range from 0 to 15.
Header length (IHL)	Sets the length of the IP header. You can input a decimal in the range from 0 to 15.
Type of service (TOS)	Sets the IP header type of service. You can input a decimal in the range from 0 to 255.
Total length (Total LEN)	Sets the total length of the IP header. You can input a decimal in the range from 0 to 65,535. When auto-calculation is selected, the setting cannot be input manually here.
Fragment ID	Sets the ID of the IP header. You can input a decimal in the range from 0 to 65,535.
Fragment flag	Sets the flag of the IP header. You can input a decimal in the range from 0 to 7.
Fragment offset	Sets the offset of the IP header. You can input a decimal in the range from 0 to 8,191.
Time-to-live (TTL)	Sets the time-to-live of the IP header. You can input a decimal in the range from 0 to 255.
Protocol	Sets the protocol of the IP header. Normally displays the protocol set for the frame's L4. When User is selected, you can input a decimal in the range from 0 to 255.
Checksum	Sets the checksum of the IP header. Can be set as a 2-byte hexadecimal. When auto-calculation is selected, the setting cannot be input manually here.
Source address (SA)	Sets the source IP address of the IP header. You can input a decimal for each digit in the range from 0 to 255.
Destination address (DA)	Sets the destination IP address of the IP header. You can input a decimal for each digit in the range from 0 to 255.

Option field data	Can be set when the header length (IHL) is 6 or more. Sets the option field data of the IP header. You can input a hexadecimal number in the range from 0 to FF (4 bytes can be set every time IHL increases by 1)
Header reference figure	Clicking this button displays the IPv4 header format in a separate window.

(9) IPv6 settings (BERT mode)
This is an IPv6 editing function.

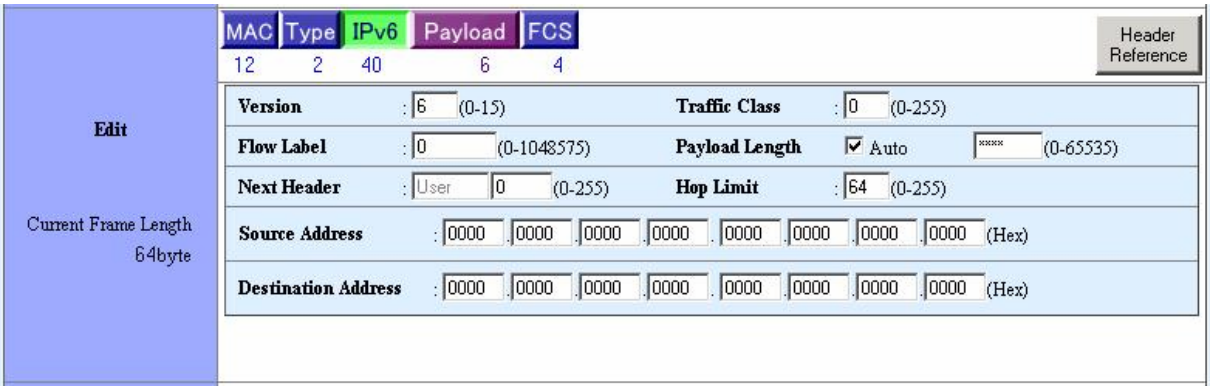


Figure 4.7.34 IPv6 setting screen

Table 4.7.27 IPv6 setting items

Item	Description
Version (Ver)	Sets the IP header version. You can input a decimal in the range from 0 to 15.
Traffic class	Sets the traffic class of the IP header. You can input a decimal in the range from 0 to 255.
Flow label	Sets the flow label of the IP header. You can input a decimal in the range from 0 to 1,048,575.
Payload length	Sets the payload length of the IP header. You can input a decimal in the range from 0 to 65,535. When auto-calculation is selected, the setting cannot be input manually here.
Succession header	Sets the protocol of the IP header. Normally displays the protocol set for the frame's L4. When User is selected, you can input a decimal in the range from 0 to 255.
Hop limit	Sets the hop limit of the IP header. You can input a decimal in the range from 0 to 255.
Source address (SA)	Sets the source IP address of the IP header. Input hexadecimal numbers totaling up to sixteen bytes.
Destination address (DA)	Sets the destination IP address of the IP header. Input hexadecimal numbers totaling up to sixteen bytes.
Header reference figure	Clicking this button displays the IPv6 header format in a separate window.

(10) IPX settings (BERT mode)
This is an IPX editing function.

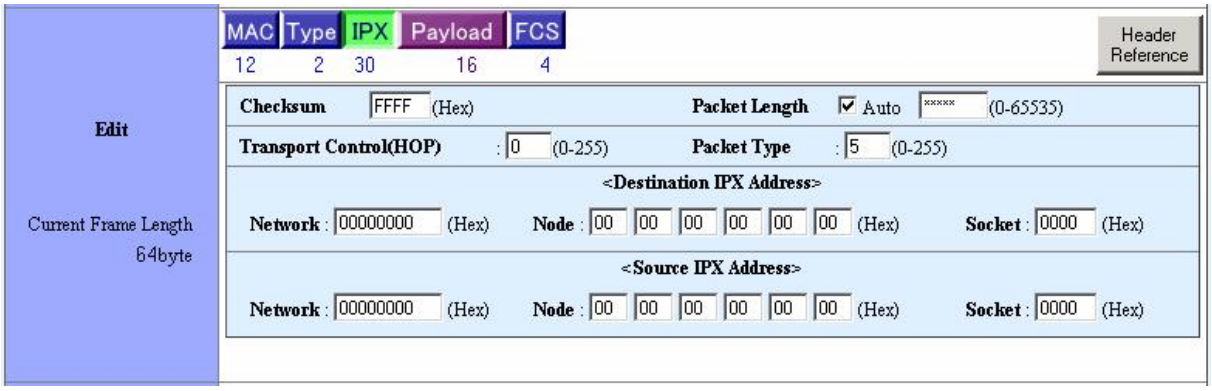


Figure 4.7-35 IPX setting screen

Table 4.7.28 IPX setting items

Item	Description
Checksum	Checksum can be set as a 2-byte hexadecimal.
Packet length	Sets the packet length. You can input a decimal in the range from 0 to 65,535. When auto-calculation is selected, the setting cannot be input manually here.
Transport control (HOP)	Sets the transport control. You can input a decimal in the range from 0 to 255.
Packet type	Sets the packet type. You can input a decimal in the range from 0 to 255.
Destination IPX address (DA): Network	Sets the network of the destination IPX address. Can be set as a 4-byte hexadecimal (filled in with 0s if 4 bytes or less)
Destination IPX address (DA): node	Sets the node of the destination IPX address. Input hexadecimal numbers totaling up to 6 bytes.
Destination IPX address (DA): Socket	Sets the socket of the destination IPX address. Can be set as a 2-byte hexadecimal.
Source IPX address (SA): Network	Sets the network of the source IPX address. Can be set as a 4-byte hexadecimal (filled in with 0s if 4 bytes or less)
Source IPX address (SA): node	Sets the node of the source IPX address. Input hexadecimal numbers totaling up to 6 bytes.
Source IPX address (SA): Socket	Sets the socket of the source IPX address. Can be set as a 2-byte hexadecimal.
Header reference figure	Clicking this button displays the IPX header format in a separate window.

(11) TCP settings (BERT mode)
This is a TCP editing function.

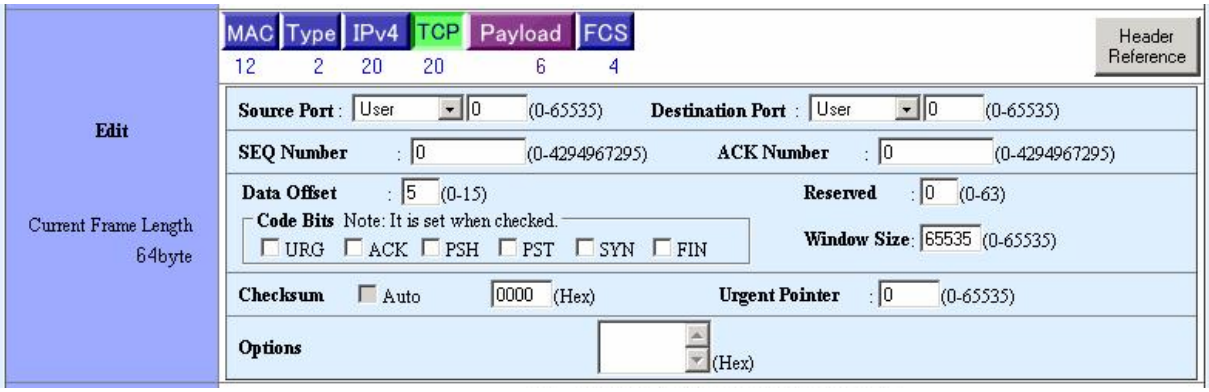


Figure 4.7-36 TCP setting screen

Table 4.7.29 TCP setting items

Item	Description
Source port number	Sets the transmission port number. The following can be selected: User, Echo, Discard, Daytime, Chargen, ftp-data, ftp, telnet, Smtp, Time, Name, Nickname, Domain, (http/www), pop3, or Sunrpc. When User is selected, you can input a decimal in the range from 0 to 65,535.
Destination port number	Sets the destination port number. The following can be selected: User, Echo, Discard, Daytime, Chargen, ftp-data, ftp, telnet, Smtp, Time, Name, Nickname, Domain, (http/www), pop3, or Sunrpc. When User is selected, you can input a decimal in the range from 0 to 65,535.
Sequence number	Sets the sequence number. You can input a decimal in the range from 0 to 4,294,967,295.
Confirmation response number	Sets the confirmation response number. You can input a decimal in the range from 0 to 4,294,967,295.
Data offset	Sets the data offset. You can input a decimal in the range from 0 to 15.
Reserve (Rev)	Sets the reservation. You can input a decimal in the range from 0 to 15.
Code bit: URG	Sets the URG code bit. Set to 1 when selected.
Code bit: ACK	Sets the ACK code bit. Set to 1 when selected.
Code bit: PSH	Sets the PSH code bit. Set to 1 when selected.
Code bit: PST	Sets the PST code bit. Set to 1 when selected.
Code bit: SYN	Sets the SYN code bit. Set to 1 when selected.
Code bit: FIN	Sets the FIN code bit. Set to 1 when selected.
Window size	Sets the window size. You can input a decimal in the range from 0 to 65,535.
Checksum	Sets the checksum. Can be set as a 2-byte hexadecimal. Checksum is not automatically calculated.
Emergency pointer	Sets the emergency pointer. You can input a decimal in the range from 0 to 65,535.
Option field data	Can be set when the data offset is 6 or more. Sets the option field data. You can input a hexadecimal number in the range from 0 to FF (4 bytes can be set every time data offset increases by 1).
Header reference figure	Clicking this button displays the TCP header format in a separate window.

(12) UDP settings (BERT mode)
This is a UDP editing function.

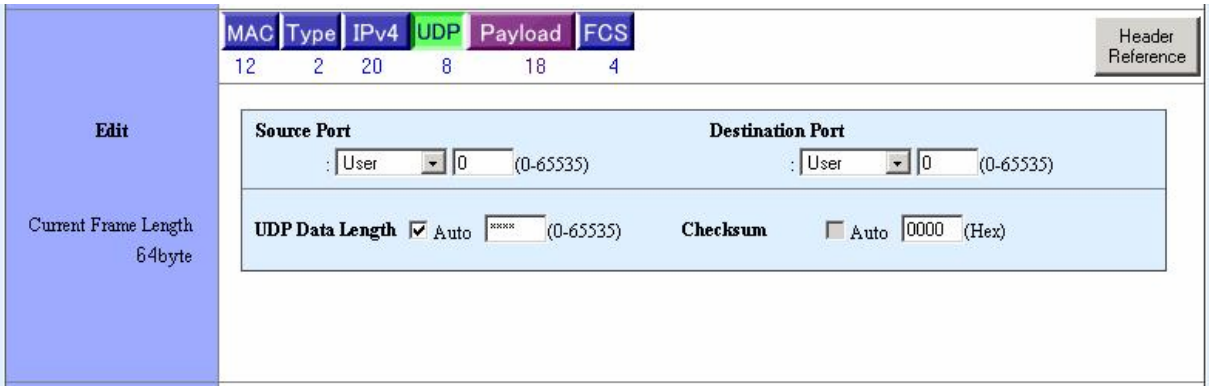


Figure 4.7-37 UDP setting screen

Table 4.7.30 UDP setting items

Item	Description
Source port number	Sets the transmission port number. The following can be selected: User, Echo, Discard, Daytime, Chargen, Time, Name, Nickname, Domain, Bootps, Bootpc, Tftp, Sunrpc, ntp, snmp, Snmp-tr, ap, or nfs. When User is selected, you can input a decimal in the range from 0 to 65,535.
Destination port number	Sets the destination port number. The following can be selected: User, Echo, Discard, Daytime, Chargen, Time, Name, Nickname, Domain, Bootps, Bootpc, Tftp, Sunrpc, ntp, snmp, Snmp-tr, ap, or nfs. When User is selected, you can input a decimal in the range from 0 to 65,535.
UDP Data length	Sets the UDP data length. You can input a decimal in the range from 0 to 65,535. When auto-calculation is selected, the setting cannot be input manually here.
Checksum	Sets the checksum. Can be set as a 2-byte hexadecimal. Checksum is not automatically calculated.
Header reference figure	Clicking this button displays the UDP header format in a separate window.

(13) ICMP settings (BERT mode)
This is an ICMP editing function.

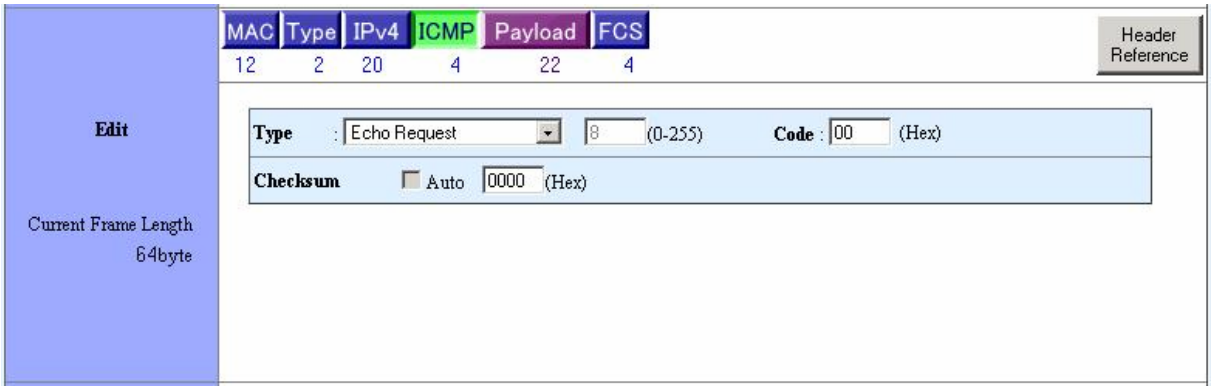


Figure 4.7-38 ICMP setting screen

Table 4.7.31 ICMP setting items

Item	Description
Type	Sets the type. Select from the following: User, echo response, final arrival impossible notification, send suppress request, channel change request, echo request, timeout notification, illegal parameter notification, time request, time response, address mask request, address mask response, and trace route. When User is selected, you can input a decimal in the range from 0 to 255.
Code	Sets the code. You can input a hexadecimal number in the range from 00h to FFh.
Checksum	Sets the checksum. Can be set as a 2-byte hexadecimal. Checksum is not automatically calculated.
Header reference figure	Clicking this button displays the ICMP header format in a separate window.

(14) ICMPv6 settings (BERT mode)
These are the ICMPv6 settings.

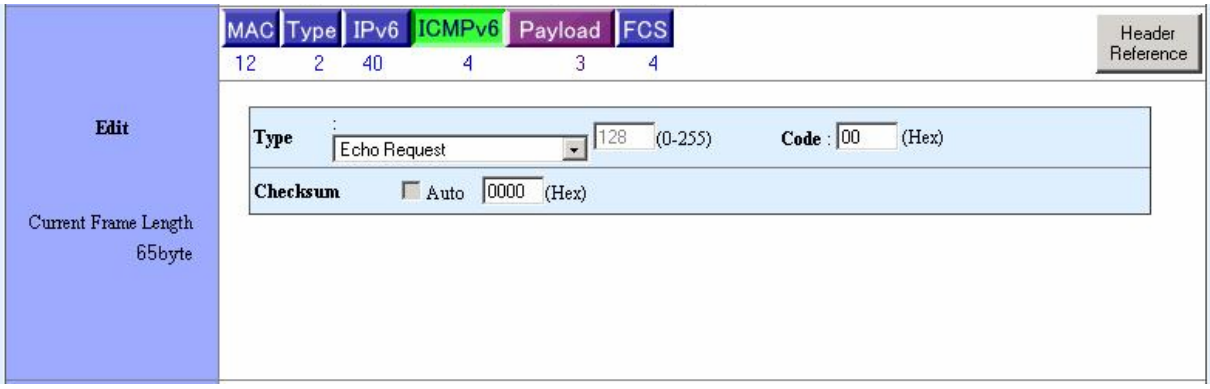


Figure 4.7-39 ICMPv6 setting screen

Table 4.7.32 ICMPv6 setting items

Item	Description
Type	Sets the type. Select from the following: User, final arrival impossible notification, packet exceeded notification, timeout notification, illegal parameter notification, echo request, echo response, MC listener inquiry, MC listener report, MC listener end, router request, router notification, neighboring host request, neighboring host notification, and channel change request. When User is selected, you can input a decimal in the range from 0 to 255.
Code	Sets the code. You can input a hexadecimal number in the range from 00h to FFh.
Checksum	Sets the checksum. Can be set as a 2-byte hexadecimal. Checksum is not automatically calculated.
Header reference figure	Clicking this button displays the ICMP header format in a separate window.

(15) IGMP Settings (BERT mode)
This is an IGMP editing function.

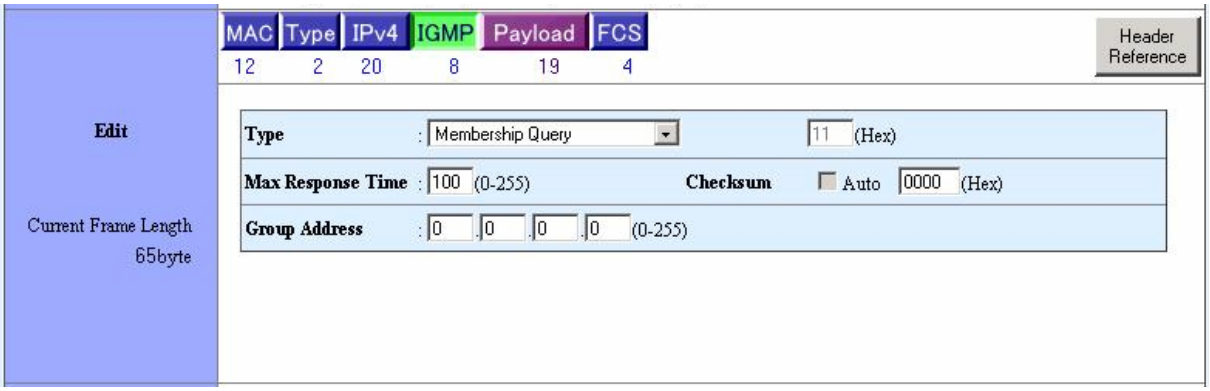


Figure 4.7-40 IGMP setting screen

Table 4.7.33 IGMP setting items

Item	Description
Type	Sets the type. Select from the following: User, membership request, membership report from version 1, membership report from version 2, and breakaway from group. When User is selected, you can input a hexadecimal number in the range from 00h to FFh.
Maximum response time	Sets the maximum response time. You can input a decimal in the range from 0 to 255.
Checksum	Sets the checksum. Can be set as a 2-byte hexadecimal. Checksum is not automatically calculated.
Group address	Sets the group address. You can input each octet in the range from 0 to 255.
Header reference figure	Clicking this button displays the IGMP header format in a separate window.

(16) Payload settings (BERT mode)

This is a payload editing function. PN patterns are included in the payload. In BERT mode, the payload header button is displayed in purple.

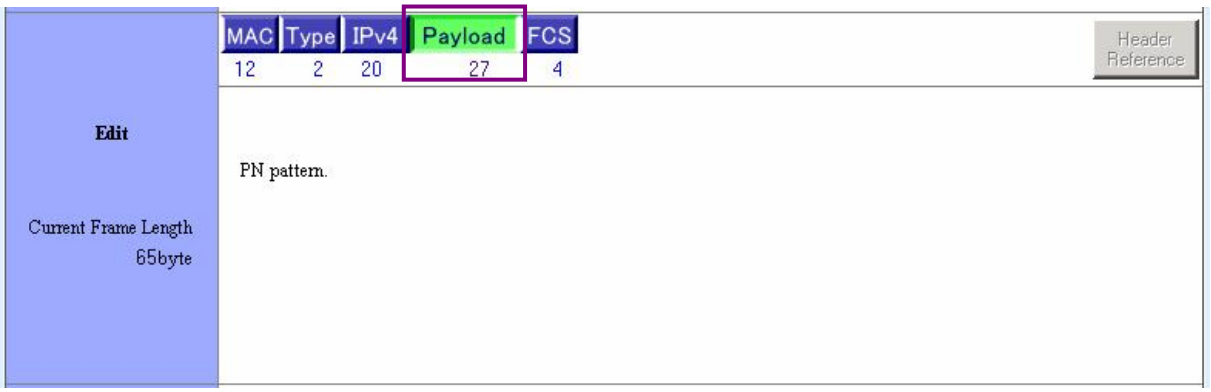


Figure 4.7-41 Payload setting screen

(17) FCS settings (BERT mode)

This is an FCS editing function. When EoMPLS is selected under Tag (L3) as shown in section 4.7.3.1, “Frame Structure,” the FCS header button appears in green. When CRC error is added, the FCS header button appears in red.

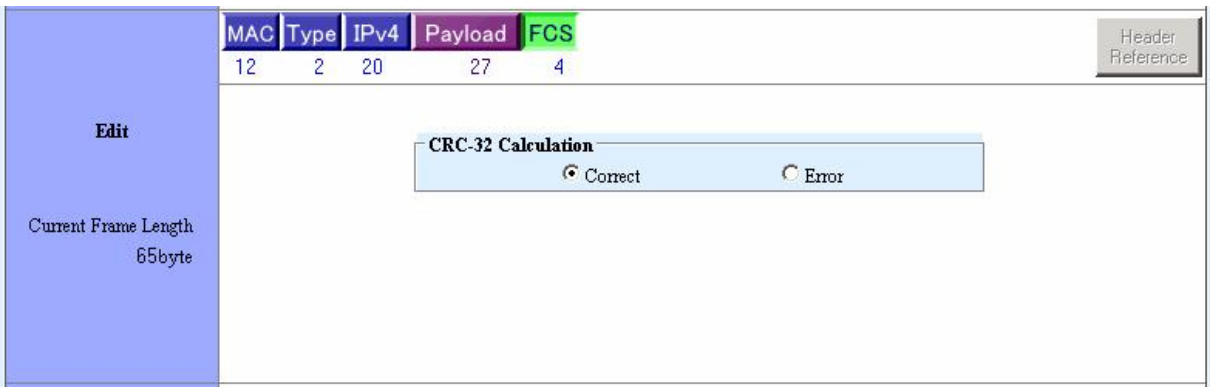


Figure 4.7-42 FCS setting screen (+FCS button color)

Table 4.7.34 FCS setting items

Item	Description
CRC-32 auto-calculation	Sets the CRC-32 auto-calculation. You can select Normal or CRC error.

(18) Header format (BERT mode)

When the characters of the header reference button in the upper right of the frame edit area are displayed in black, if you click the button, the currently set frame header format is displayed in a separate window.

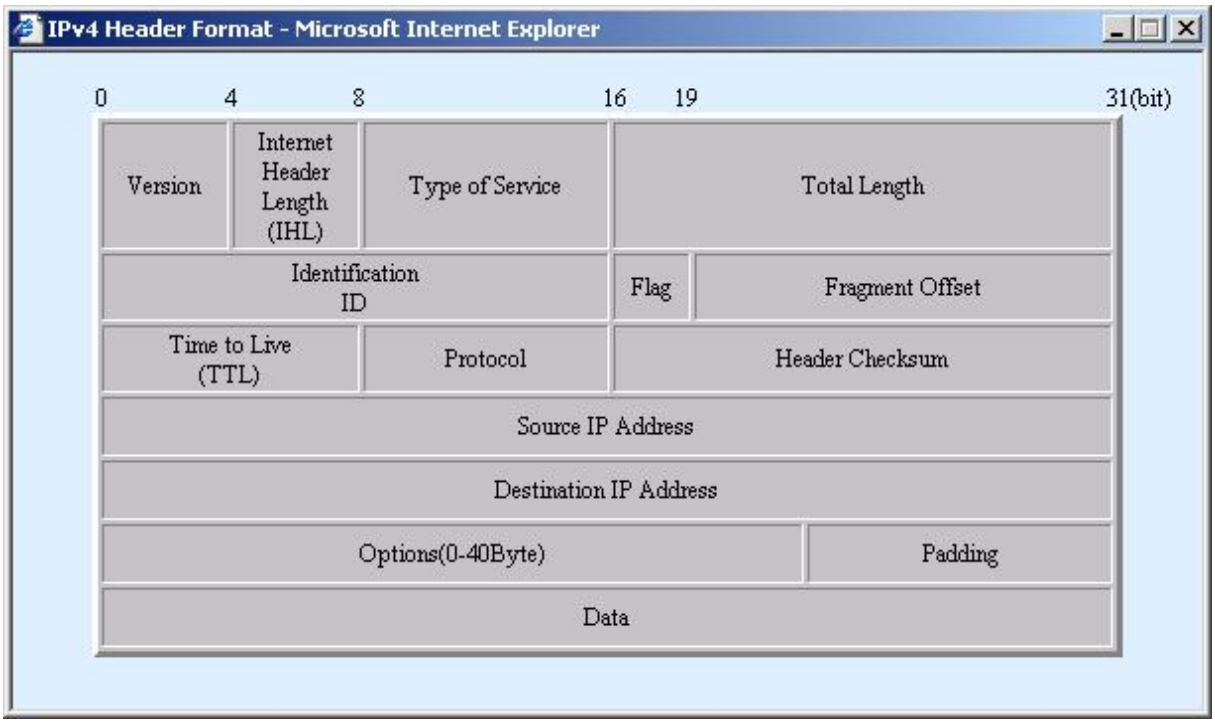


Figure 4.7-43 Header format (example of IPv4)

4.7.3.3 Frame Data (BERT Mode)

This function displays information about each protocol as a hex dump.

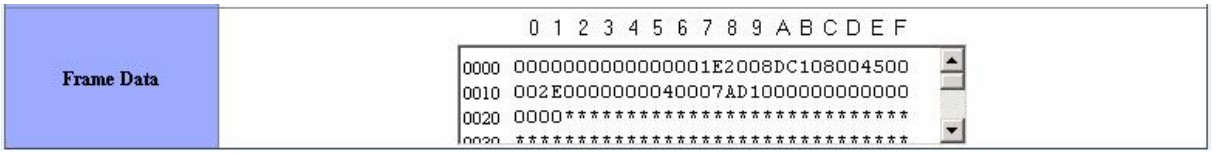


Figure 4.7-44 Frame data display screen

Table 4.7.35 Frame data display items

Item	Description
Fields of frames being edited	Input data and '……' are displayed alternately.
PN pattern field	Displayed as ********
FCS Field	Displayed as ******** (in black on screen)

4.7.3.4 Leaving the Frame Builder Screen (BERT Mode)

Press the **OK** button shown in figure 4.7.3.1 to change from the frame builder screen to the screen in the figure below. The specified frame information is copied to the corresponding frame definition area.

4.7.3.5 Canceling the Operation (BERT Mode)

Press the **Cancel** button shown in figure 4.7-22 to delete the specified frame information and change from the frame builder screen to the screen shown in the figure below.

<- Frame builder screen

↓

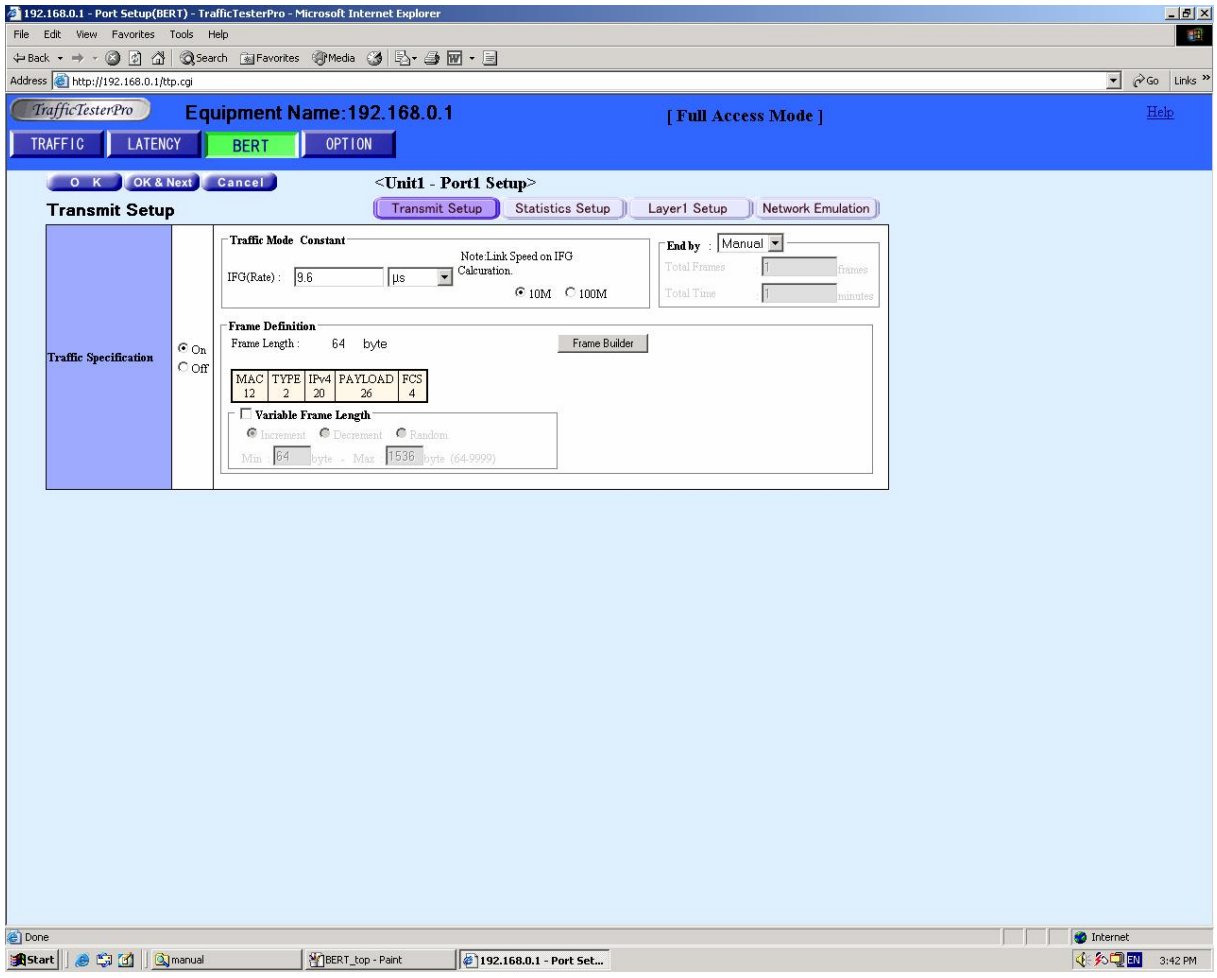


Figure 4.7-45 Port settings screen

4.7.4 BERT Statistics Overview Screen

Figure 4.7-46 BERT statistics overview screen

Table 4.7.36 BERT statistics overview selection items

Selection Items	Description
Display units	You can select the transmit/receive frame display contents from the pull down menu. Select bit error frame, bit error, out-of-sync, Total (frame), Total (byte), synch byte, rate (frame/s), rate (%), or rate (bps).
Bit error: Unit selection	Sets the unit to add to the bit error. Select Unit1 or Unit 2.
Bit error: Port Selection	Sets the port to add to the bit error. Select either All or Port. However, you cannot select a non-existent port.
Display auto cross To UNIT1 display To UNIT2 display To All display	The screen display has three modes, UNIT1 only, UNIT2 only, or All (UNIT1+UNIT2). The currently active option is not displayed, and you can choose one of the remaining two options (in the above example, you can switch from UNIT2 to either UNIT1 or ALL.)

Table 4.7.37 BERT Statistics Overview button items

Button Item	Description
Statistics detail display	Displays a separate pop up screen on 4.7.5 BERT.
Save statistics	Saves the statistics to a file. For details, see section 4.7.4.1, “Saving Statistics.”
Start/stop statistics	Starts/stops statistical calculation on all ports. When the Start Statistics button is clicked, the message “Start statistics” is displayed, and the button changes to the Stop Statistics button. Pressing the Stop Statistics button stops statistical calculation, and the button changes back to the Start Statistics button. Also, when calculation stops, a window appears prompting you to save the results.
Reset	Clears statistical data on all ports.
Transmit all	Transmits test frames from all ports.
All stop	Stops transmission of test frames from all ports.
Add	Adds bit error to transmission frames.
Transmit control	Starts/stops transmission of test frames on individual ports. Displays a gray triangle on a blue background when stopped, and a blue triangle on a green background during transmission. When error frames are included in transmission frames, the triangle turns red.

Table 4.7.38 BERT overview statistic selection items

Item	Description
(Unit name)	Displays model name of the inserted unit. Displays (AE5520 10/100BASE-T UNIT) or (AE5521 1000BASE-X UNIT). The model names of uninstalled units are not displayed.
PORT	Displays port numbers. If you click one of these numbers, the corresponding port's statistics detail screen is displayed.
LINK	Displays the link status. ● For the AE5520 10/100BASE-T Unit • Green F: Link up at 100M, Full • Green H: Link up at 100M, Half • Yellow F: Link up at 10M, Full • Yellow H: Link up at 10M, Half • Light gray: Link down ● For the AE5521 1000BASE-X Unit • Green: Linked up • Light gray: Link down ● For the AE5522 10GBASE-X Unit • Green: Linked up • Light gray: Link down • Red: Receiving LF • Yellow: Receiving RF
ERR	Displays the error status. Illuminates red when at least one of all the received statistical frames has a bit error or error frame.
SYNC	Displays the sync status. Illuminates green when synchronization of PN patterns is established.
Transmit	Displays transmission frame statistics in the units specified under Display units.
Receive	Displays receive frame statistics in the units specified under Display units.
Received bytes during synchronization	Displayed when Sync byte is selected under Display Units (Receive). Displays statistics for received bytes that were synchronized.

4.7.4.1 Saving Statistics

You can save the statistics to a file.

Initial save screen

If you press the start/stop button during statistical calculation the statistics stop confirmation message appears. Press **OK** to advance to the save screen after statistics have stopped, or press **Cancel** to abort saving and continue with statistics. You can choose HTML or CSV format for the file to be saved, and each file name is displayed (these file names can be changed).

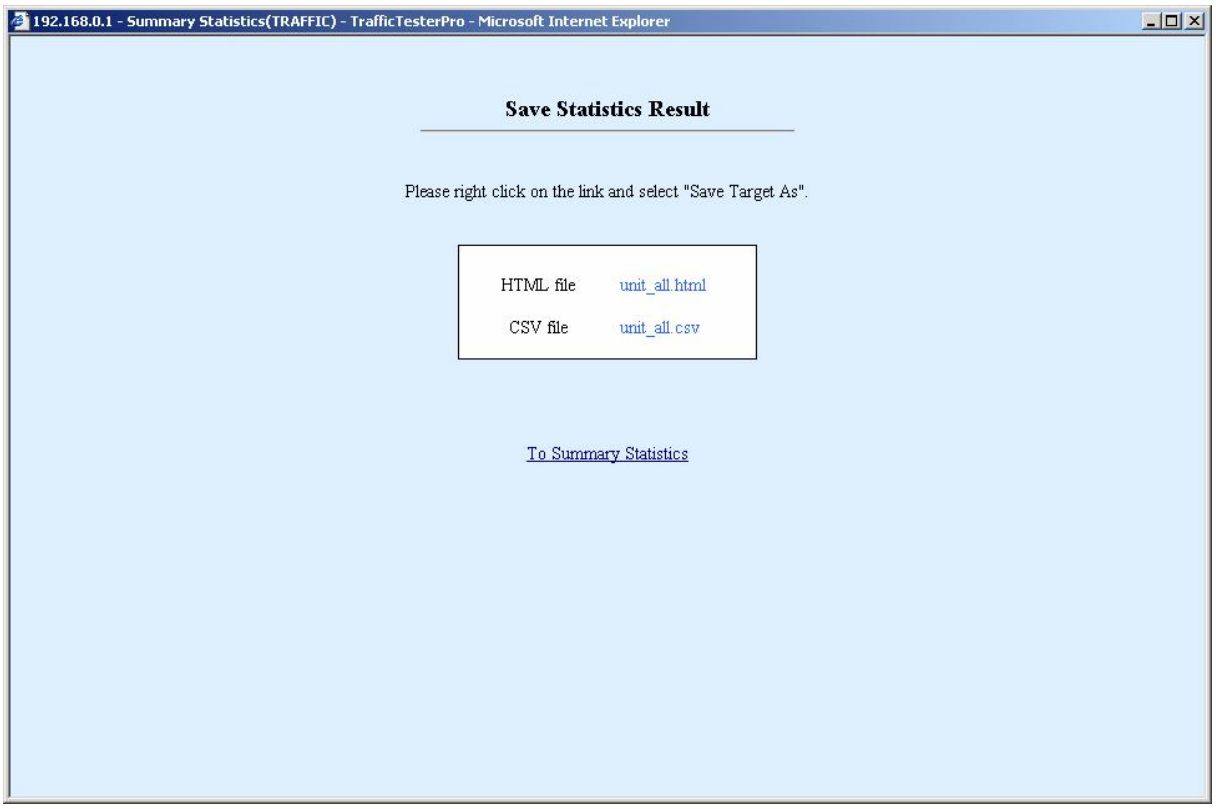


Figure 4.7-47 Initial save screen

(2) Shortcut menu

If you place your cursor over the save file name of the desired format and right-click, a shortcut menu appears as shown in the figure below (HTML is selected in the following example).

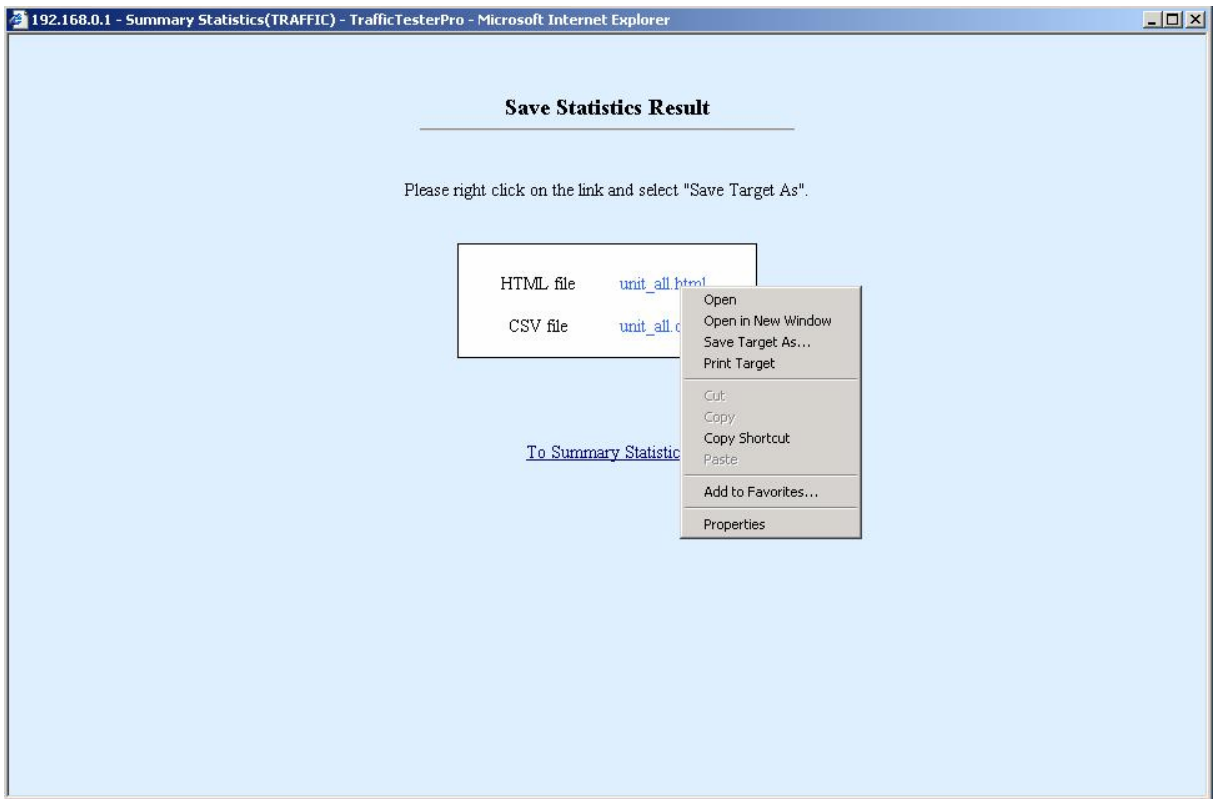


Figure 4.7-48 Shortcut menu

(3) **Save As** screen (for HTML)
Select **Save As** to display a dialog box allowing you to specify the save location for the file.

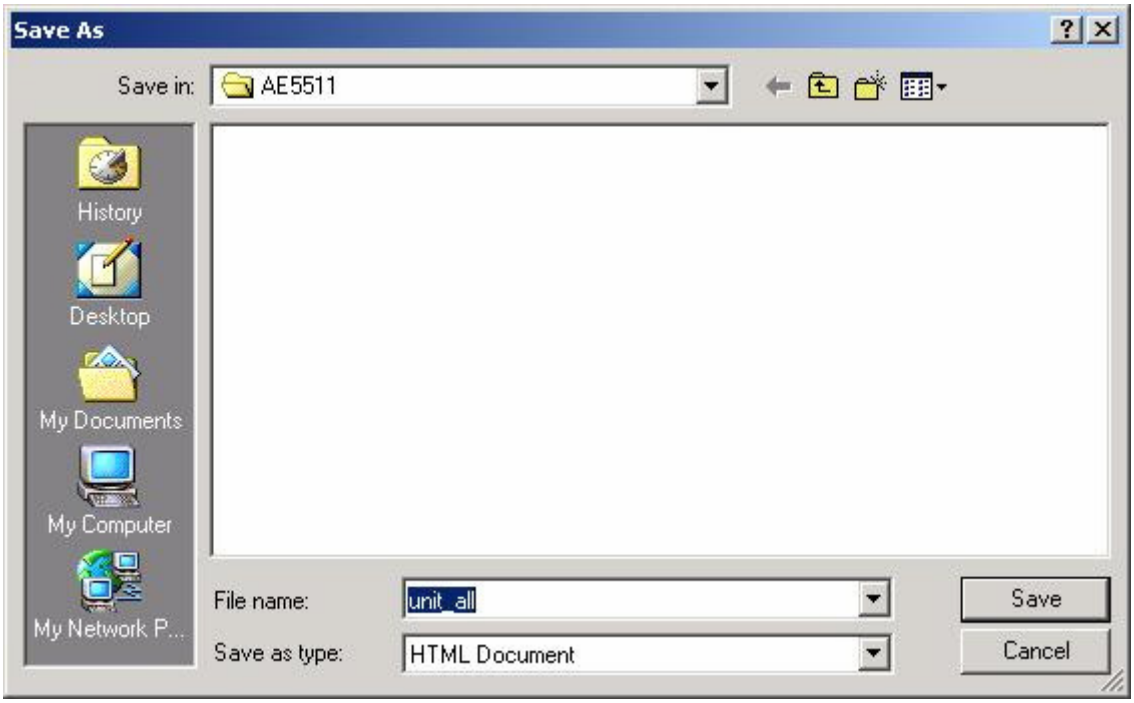


Figure 4.7-49 Save As screen (for HTML)

Specify a save location and file name, then click **Save**. The statistics are saved to a file of the specified name in the specified location.

If a file of the same name already exists in that location, the following message appears. Click **Yes** to overwrite, or **No** to cancel.

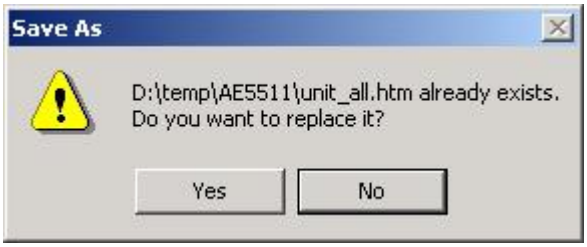


Figure 4.7-50 Overwrite confirmation screen (for HTML)

When the statistics are saved, you are returned to the statistics save screen shown in figure 4.7-47 Initial save screen, allowing you to save additional files. If you are done saving statistics, click **Return to Statistics Overview screen**.

(4) **Save As** screen (for CSV)
Select **Save As** to display a dialog box allowing you to specify the save location for the file.

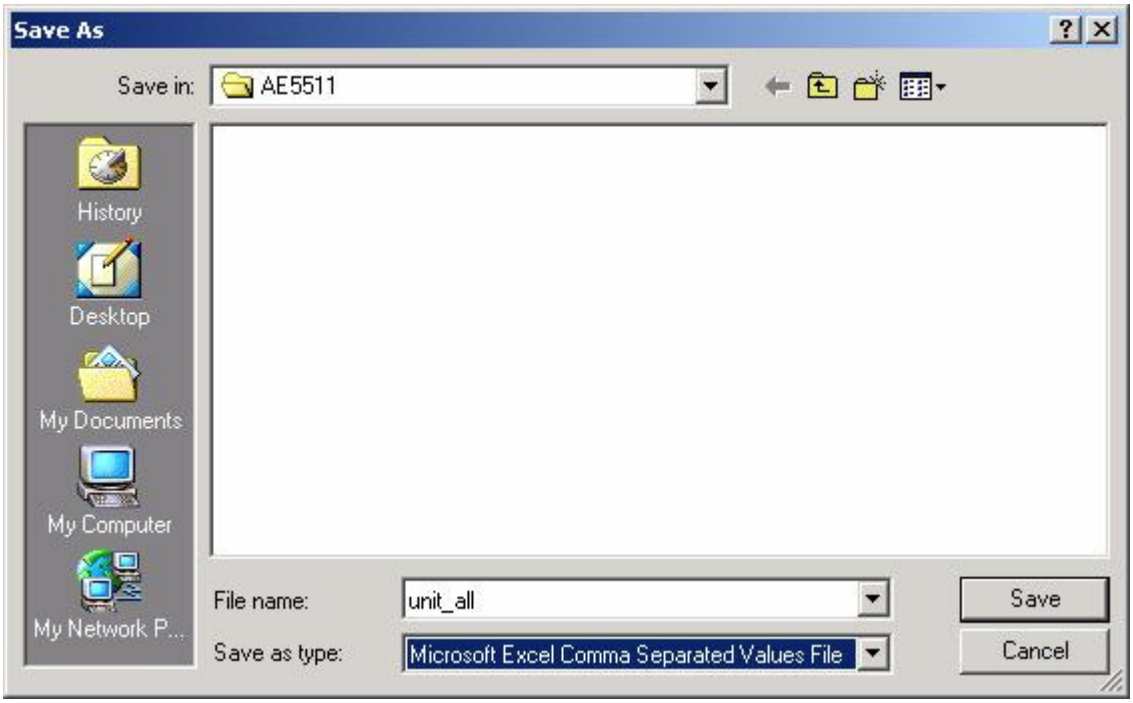


Figure 4.7-51 Save As screen (for CSV)

Specify a save location and file name, then click **Save**. The statistics are saved to a file of the specified name in the specified location.

If a file of the same name already exists in that location, the following message appears. Click **Yes** to overwrite, or **No** to cancel.

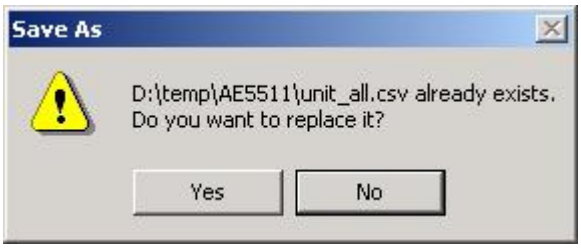


Figure 4.7-52 Overwrite confirmation screen (for CSV)

When the statistics are saved, you are returned to the statistics save screen shown in figure 4.7-52 Initial save screen, allowing you to save additional files. If you are done saving statistics, click **Return to Statistics Overview screen**.

4.7.5 BERT Statistics Detail Screen

Figure 4.7-53 BERT statistics detail screen

Table 4.7.39 BERT statistics detail selection items

Item	Description
UNIT1: Port Selection	Selects the port number on Unit1 for which you wish to display details. Only enabled ports can be selected.
UNIT2: Port Selection	Selects the port number on Unit2 for which you wish to display details. Only enabled ports can be selected.

Table 4.7.40 BERT statistics detail buttons

Item	Description
Statistics Overview display	The Statistics Overview display window becomes active.
Counter reset: Reset	Clears the statistical data and measurement time of the selected ports.
Bit error: Add	Adds bit error to transmission frames.

Table 4.7.41 BERT statistics detail display items (1)

Item	Description
<UNIT1>/<UNIT2>	Displays model name of the inserted unit. Displays Uninstalled, (AE5520 10/100BASE-T UNIT), or (AE5521 1000BASE-X UNIT).
UNIT	Displays number of the selected unit.
PORT	Displays number of the selected port.
LINK	Displays the link status. For the display contents, see table 4.7.38, “BERT Statistics Overview display items.”
ERR	Displays the error status. Illuminates red when at least one of all the received statistical frames has an error.
SYNC	Displays the sync status. Lights green when power is synchronization established.
SPEED	Displays link speed–Duplex.
MDI (for the AE5520 Unit)	Displays straight (||) or cross (X).
GBIC (for the AE5521 Unit)	Displays the GBIC type.
XENPAK (for the AE5522 Unit)	Displays the XENPAK type.
Measurement time	Displays the measurement time. The time is that from the start of statistics.

Table 4.7.42 BERT statistics detail display items (2)

Item		Description
Total	Bit error (bit)*	Transmit: Displays the added number of bit errors. Receive: Displays the total number of received bit errors.
	Out-of-sync	Displays the total number of received frames in which an out-of-sync occurred.
	Received bytes during synchronization	Displays the number of received bytes during synchronization.
	Frame	Displays the total number of transmitted and received frames.
	Bytes	Displays the total number of transmitted and received bytes.
	Reply	Displays the total number of transmitted replies.
	Collisions	Displays the total number of transmitted collisions. (Displays statistics with the AE5520 Unit only).
	Pause frames	Displays the total number of received pause frames.
	Error frames	Displays the total number of transmitted and received error frames. (Sum of error frames below).
	Frames including bit errors	Transmit: Displays the number of frames to which bit errors were added Receive: Displays the total number of frames including bit errors.
	CRC error *	Displays the total number of transmitted and received CRC error frames.
	Undersize*	Displays the total number of received undersize errors.
	Oversize*	Displays the total number of transmitted and received oversize errors.
	Alignment errors*	Displays the total number of received alignment errors. (Displays statistics with the AE5520 Unit only).
	Symbol errors*	Displays the total number of received symbol errors.
Current	Bit error (bit)	Displays the current number of received bit errors.
	Out-of-sync	Displays the current number of received frames in which an out-of-sync occurred.
	Received bytes during synchronization	Displays the current number of received bytes during synchronization.
	Frame	Displays the current number of transmitted and received frames.
	Bytes	Displays the current number of transmitted and received bytes.
	Rate (%)	Displays the current transmission and reception rate (%).
	Rate (bps)	Displays the current transmission and reception rate (bps).
	Error frames	Displays the current number of received error frames. (Sum of error frames below).
	Frames including bit errors	Displays the current number of received frames that include bit errors.
	CRC errors	Displays the current number of received CRC errors.
	Undersize	Displays the current number of received undersize errors.
	Oversize	Displays the current number of received oversize errors.
	Alignment errors	Displays the current number of received alignment errors. (Displays statistics with the AE5520 Unit only).
	Symbol errors	Displays the current number of received symbol errors.

<table>
<tr>
<td>* Error hierarchy</td>
<td>Errors are received in order of priority as follows: If errors are received simultaneously, the lower priority error is not the current one.
<table>
<tr><th>Error</th><th>Priority</th></tr>
<tr><td>Symbol errors</td><td>High</td></tr>
<tr><td>Undersize/oversize errors</td><td>|</td></tr>
<tr><td>Alignment errors</td><td>|</td></tr>
<tr><td>CRC errors</td><td>|</td></tr>
<tr><td>Bit error</td><td>Low</td></tr>
</table>
</td>
</tr>
</table>

4.8 Capture Function

This section provides an explanation of the Capture function. The Capture function is only available with the AE5522 10GBASE-X Unit.

4.8.1 Capture Operation

4.8.1.1 Overview of Capture Settings

Figure 4.8-1 provides an overview of entry of the operation of capture conditions. The capture conditions that you can set are capture filter, capture buffer capacity change, capture trigger, and trigger position. The capture operation can be carried out regardless of the mode (Traffic, Latency, or BERT).

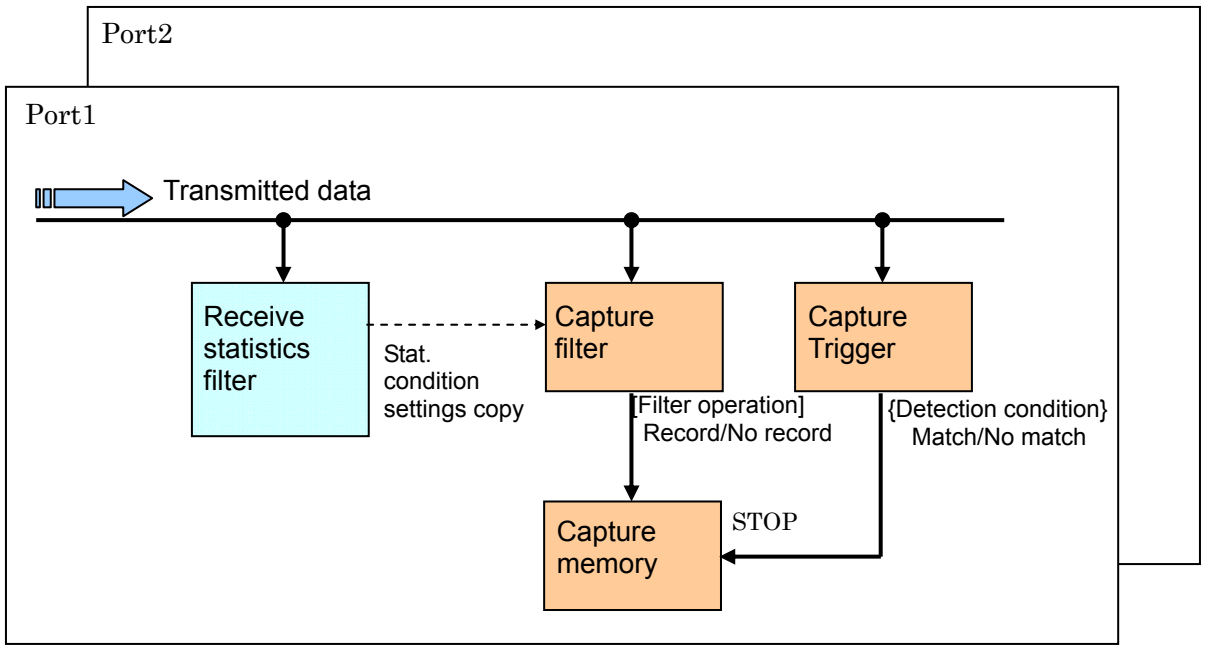


Figure 4.8-1 Capture condition settings operation overview

4.8.2 Capture Screen

4.8.2.1 Capture Main Screen

In the mode setting screen, place the mouse over Capture and select the relevant port. The Capture Main screen is shown in figure 4.8-2 below.

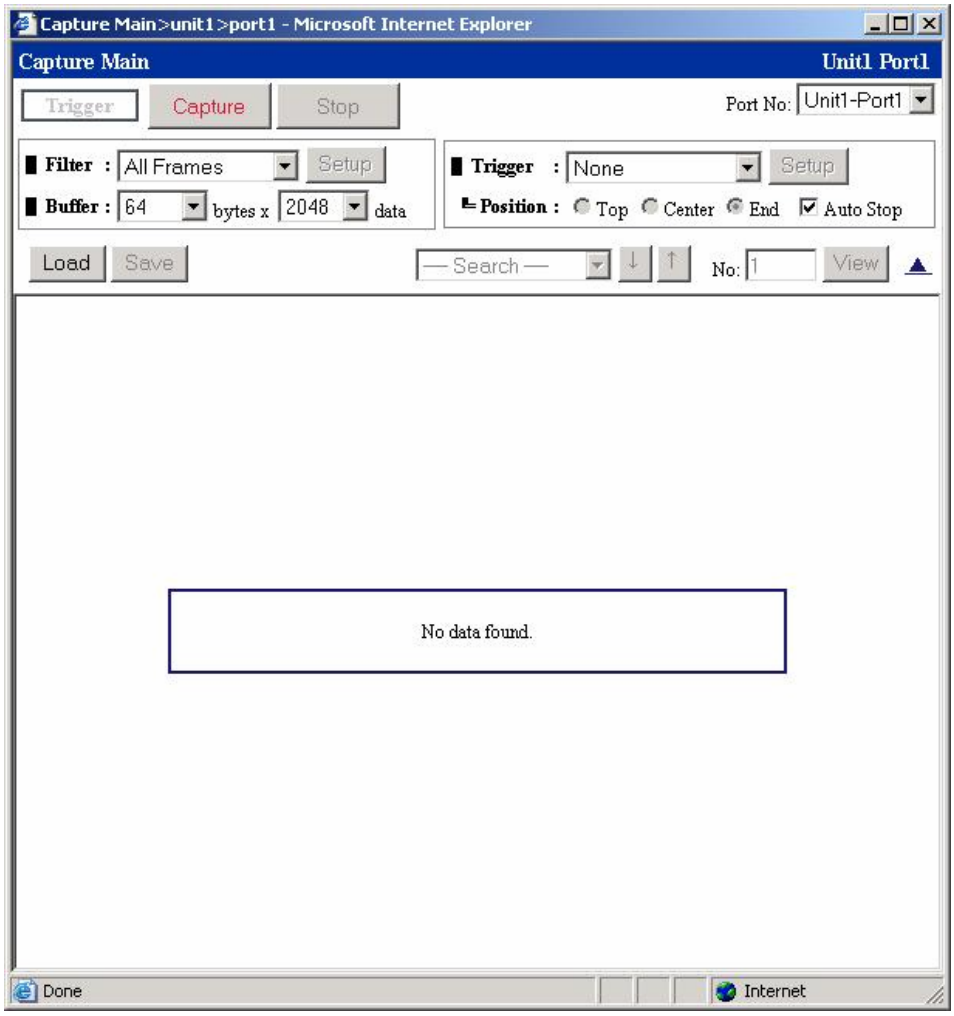


Figure 4.8-2 Capture main screen

Table 4.8-1 Capture main screen condition setting selection items

Selection Items	Description
Filter	Selects capture condition settings (pull down menu). You can select from the following: Record all frames Record normal frames Record error frames User settings
Filter: settings	This button only enabled when user setting is selected under Filters. Use the button to enter detailed filter settings. The available settings are Normal frame filter, Error frame filter, Layer 1 filter, and they can be specified simultaneously. For details, see (1) Filter conditions and user settings.
Buffer	Selects a capactiy for the capture buffer. You can select from the following: -For 64 bytes: 2048/512/64/8 (data) -For 256 bytes: 512/64/8 (data) -For 2048 bytes: 64/8 (data) -For 16384 bytes: 8 (data)
Triggers	Selects capture trigger condition settings (pull down menu). You can select from the following: None All frames Error frames CRC, undersize, oversize, symbol error, bit error Link up Link down LF/RF receive Insert transmit User settings
Trigger: Settings	This button only enabled when user setting is selected under Triggers. Use the button to enter detailed trigger settings. For details, see (2) Trigger conditions and user settings.
Position	Selects the trigger position. You can select from the following: -Top -Center -End
Auto stop	When trigger condition is set to None, you can enable or disable Auto-stop. When enabled, the capture operation is automatically stopped once all data are stored in the capture buffer. When disabled, data is captured in a looping fashion so that new data replaces old data.
Port No:	When other ports are selected, you can switch the capture screen. The Capture function can be operated independently by port of each unit.

(1) Filter conditions and user settings

When you select user settings, you can enter your own filter conditions. Three filter settings are available (normal frame filter, error frame filter, and layer 1 filter), and they can be specified simultaneously.

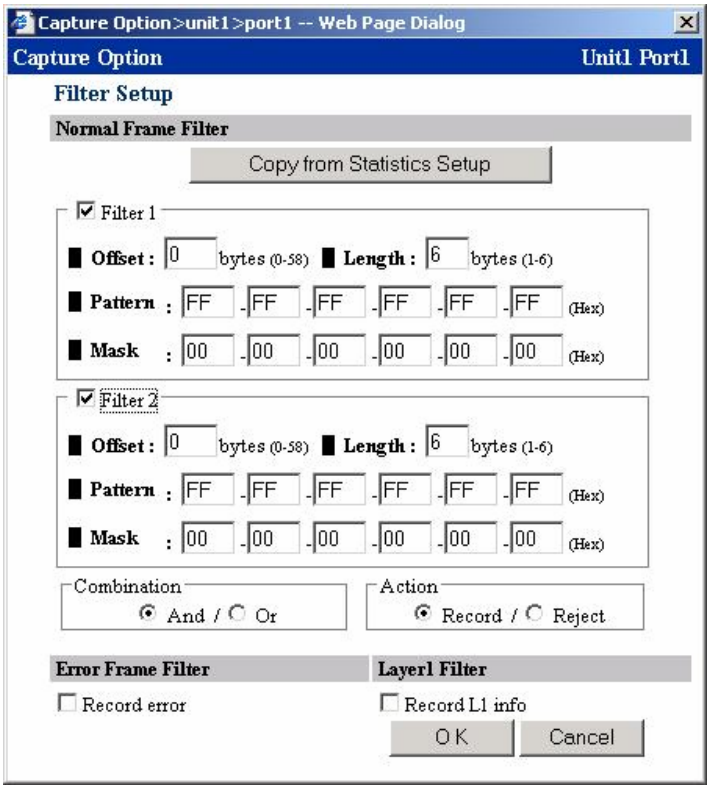


Figure 4.8-3 Filter setting - user setting screen

Table 4.8.2 Filter setting items

Setting Item	Description
Normal Frame Filter	
Filter 1, 2	Enables/disables comparison pattern settings. Enabled when check box is selected.
Comparison start position	Sets the comparison start position. Input a decimal number in the range from 0 to 58 bytes.
Comparison length	Sets the length of comparison. Input a decimal number in the range from 1 to 6 bytes.
Comparison pattern	Sets the comparison pattern. Input hexadecimal numbers totaling up to 6 bytes.
Mask pattern	Sets the mask pattern. Input hexadecimal numbers totaling up to 6 bytes. When the bit for comparison is set to 1, it is the bit for comparison.
Combinations and or	You can specify that the condition becomes true when the conditions on filter 1 and filter 2 are both true, or that the condition becomes true when either filter 1 or filter 2 is true.
Filter action Record/Reject	Specifies whether the frames matched in comparison pattern are the frames to be captured (record), or other frames (reject).
Match statistical condition settings	Copies the settings under statistical condition settings to the filter conditions.
Error Frame Filters	
Record errors	Sets whether to record error frames. Records when selected.
Layer 1 Filter	
Record layer 1 information	Sets whether to record layer 1 information. Records when selected.

(2) Trigger conditions and user settings

When you select user settings, you can enter your own trigger conditions.

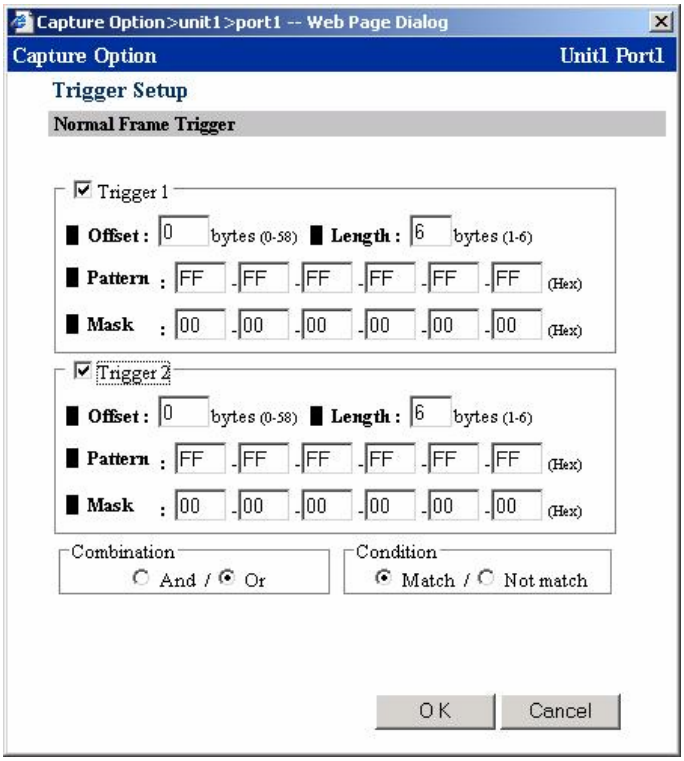


Figure 4.8-4 Trigger setting - user setting screen

Table 4.8.3 Trigger setting items

Setting Item	Description
Normal Frame Triggers	
Triggers 1 and 2	Enables/disables comparison pattern settings. Enabled when check box is selected.
Comparison start position	Sets the comparison start position. Input a decimal number in the range from 0 to 58 bytes.
Comparison length	Sets the length of comparison. Input a decimal number in the range from 1 to 6 bytes.
Comparison pattern	Sets the comparison pattern. Input hexadecimal numbers totaling up to 6 bytes.
Mask pattern	Sets the mask pattern. Input hexadecimal numbers totaling up to 6 bytes. When the bit for comparison is set to 1, it is the bit for comparison.
Combinations and or	You can specify that the condition becomes true when the conditions on trigger 1 and trigger 2 are both true, or that the condition becomes true when either trigger 1 or trigger 2 is true.
Detection conditions Match/NO match	Specifies whether the frames matched in pattern comparison are the triggering frames (Match), or other frames are the triggering frames (No match).

Table 4.8-4 Capture main screen button items

Button Item	Description
Capture	Starts the capture operation. During capture, the capture status is displayed (the capture count and other statistics). For information on the operation during capture, see (4) Screen during Capture.
Stop	Stops the capture operation. When capture is stopped, the Stop button is disabled. When you click the CAPTURE button, the Stop button is enabled.
Data display (display data results)	When the Stop button is clicked and data is stored to the buffer, the number of captured data and other capture results are displayed. For information on the data display, see (5) Data display. To view the captured data, press the Data display button.
Search/↑/↓	After displaying the captured data, you can search for and display desired data. You can select from the following: Trigger events Error frames CRC, undersize, oversize, symbol error, bit error Link up Link down LF/RF receive Also, using ↑/↓, you can search for the next data from the currently selected data.
Save	Saves the capture results to a file. You can select a save format of Original, Etherreal compatible, or CSV. For details, see (5) Saving.
Load	Loads capture results files in original format saved using the Save button and displays them. See (6), “Loading.”
Veiw	Displays data-displayed captured data in detail (in HEX dump format). Enter the data number of the data you wish to view, then press the View button. Note Bring the mouse to the data part and double-click to display the detailed screen. For more information, see (9), “Detailed display screen.”
↗ ↙	Click to display/hide the capture condition setting items (filters, buffers, and triggers).

(3) Screen during capture

- Press the **CAPTURE button** to display the capture operation screen.

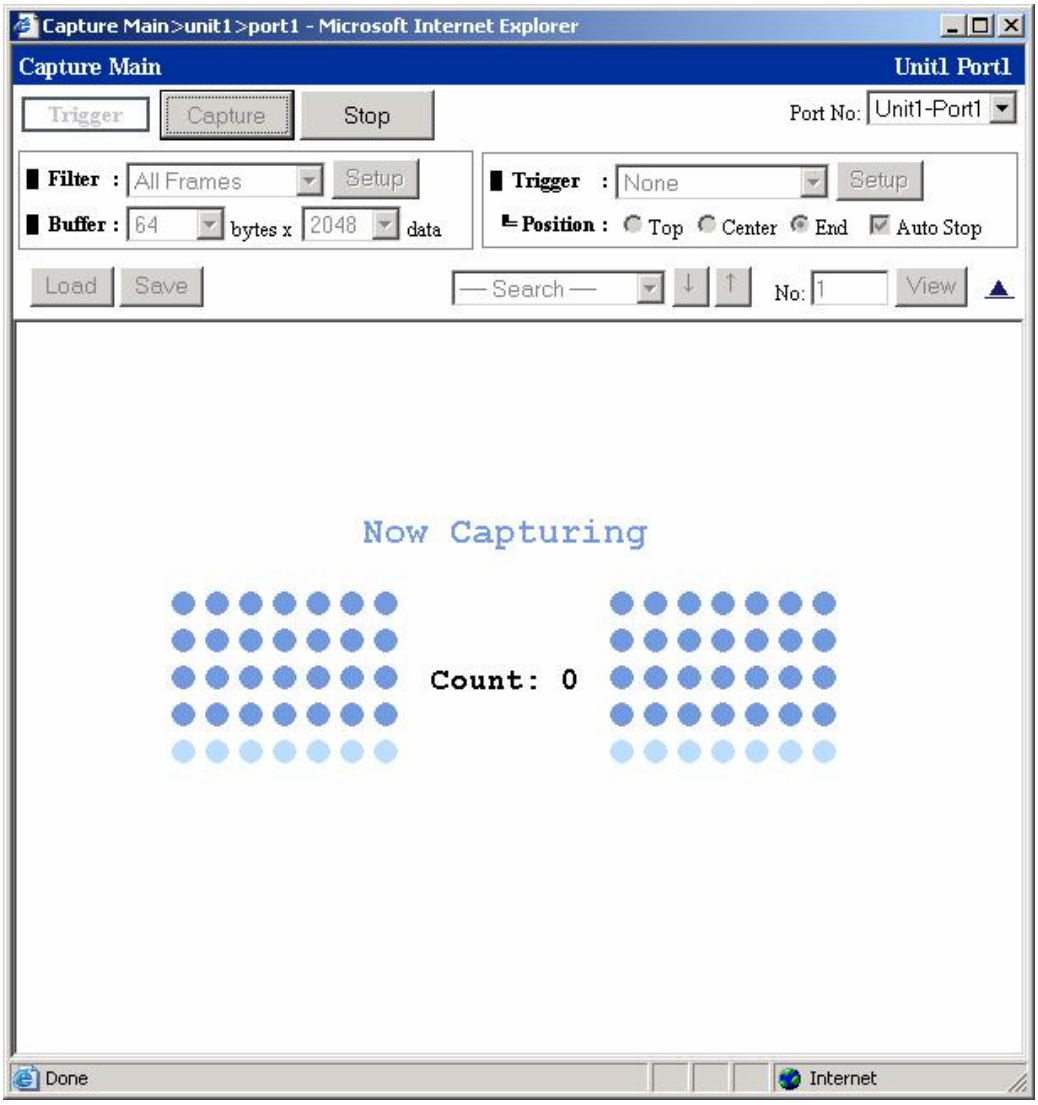


Figure 4.8-5 Screen during capture

(4) Data display

When the capture buffer is full, or when data is being recorded after clicking the Stop button, if trigger conditions are met and data is being recorded into the capture buffer, the capture results and settings are displayed.

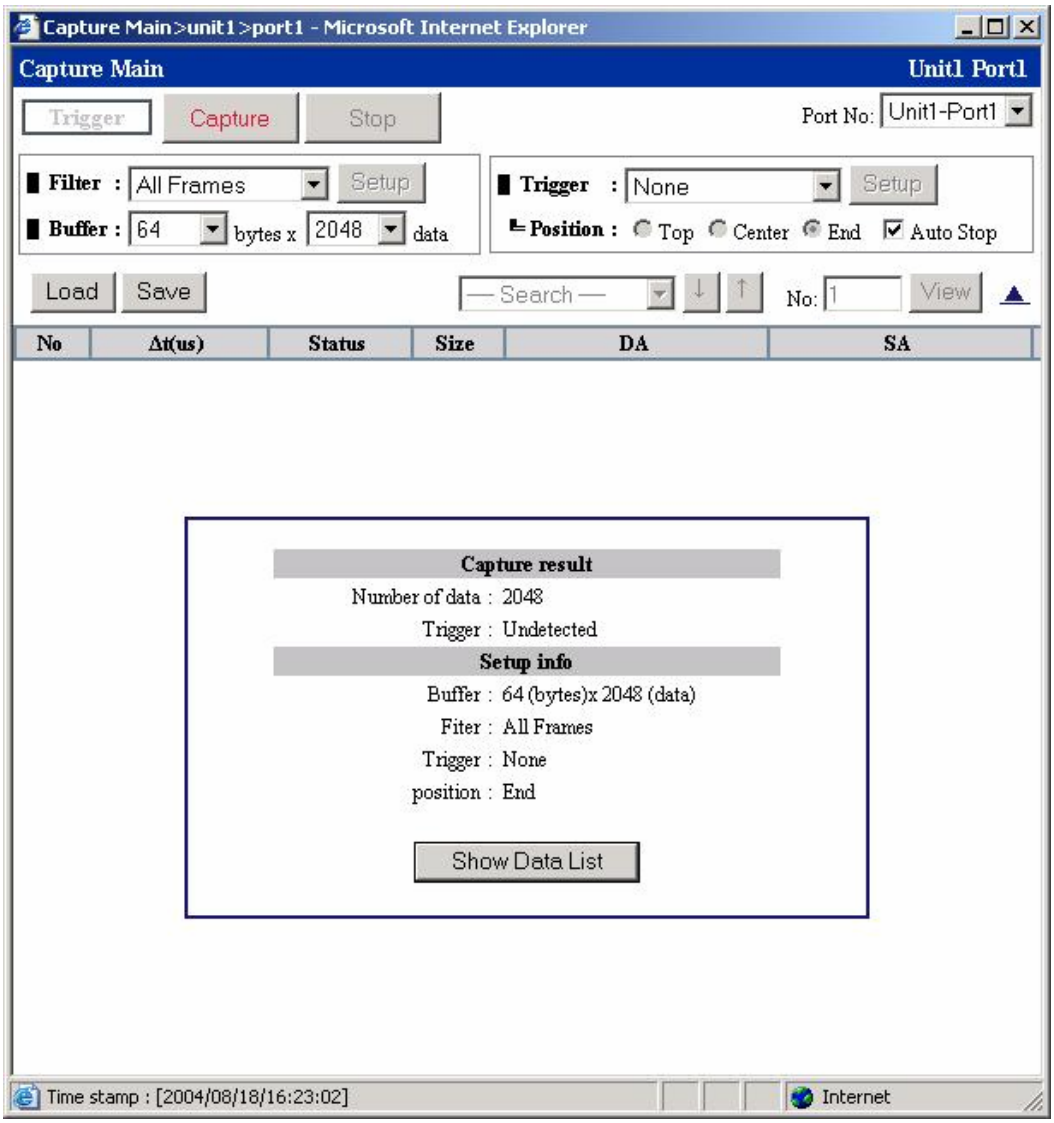


Figure 4.8-6 Data display screen

Click the **Data display** button to display captured data.

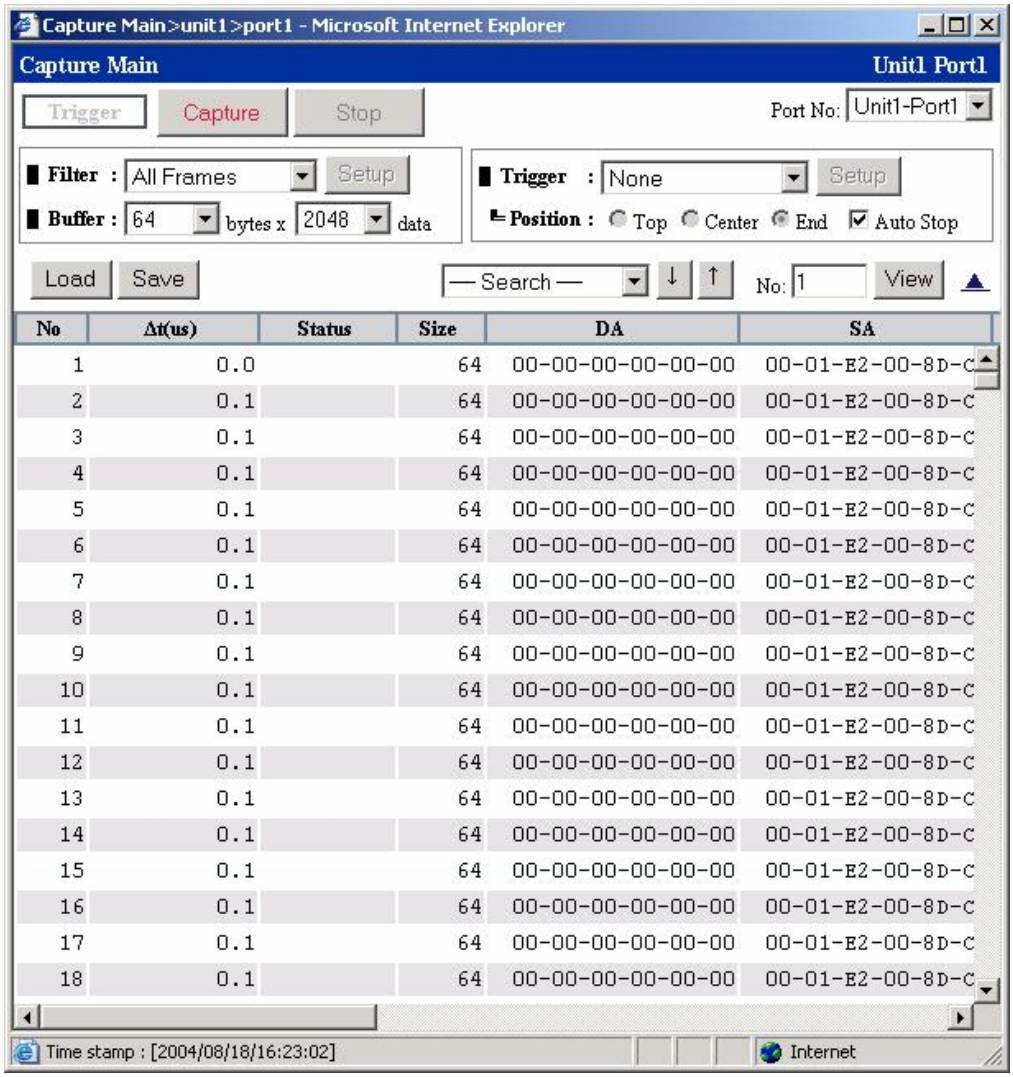


Figure 4.8-7 Captured data display main screen

Figure 4.8-5 Captured data display main screen display items

Item	Description
No	Order of captured data
Δt (us)	Time display from the top of the frame to the top of the next frame. Resolution is 0.1 μs.
Status	Displays the status of received captured data The contents of the display are as follows: Normal data received: Nothing displayed FCS error received: [E: crc] Undersize received: [E: under] Oversize received: [E: over] Symbol error received: [E: symbol] Bit error received: [E: bit] Link up: [up] Link down: [down] LF/RF receive: [lfs] Trigger event: [T]
Size	Displays the length of the received data. For information on Layer 1, "–" is displayed.
DA	Displays the destination MAC address of the received data. For information on Layer 1, "–" is displayed.
SA	Displays the transmission MAC address of the received data. For information on Layer 1, "–" is displayed.
Type	Displays the Ethertype of the received data. For information on Layer 1, "–" is displayed.
Data	Displays the data portion of the received data. For information on Layer 1, "–" is displayed.

(5) Save

You can save captured results to a file.

a. Initial save screen

Clicking the Save button displays the save screen shown below. The available file save formats are original (for TrafficTesterPro), Etherreal compatible, and CSV, and their file names are displayed (these file names can be changed).

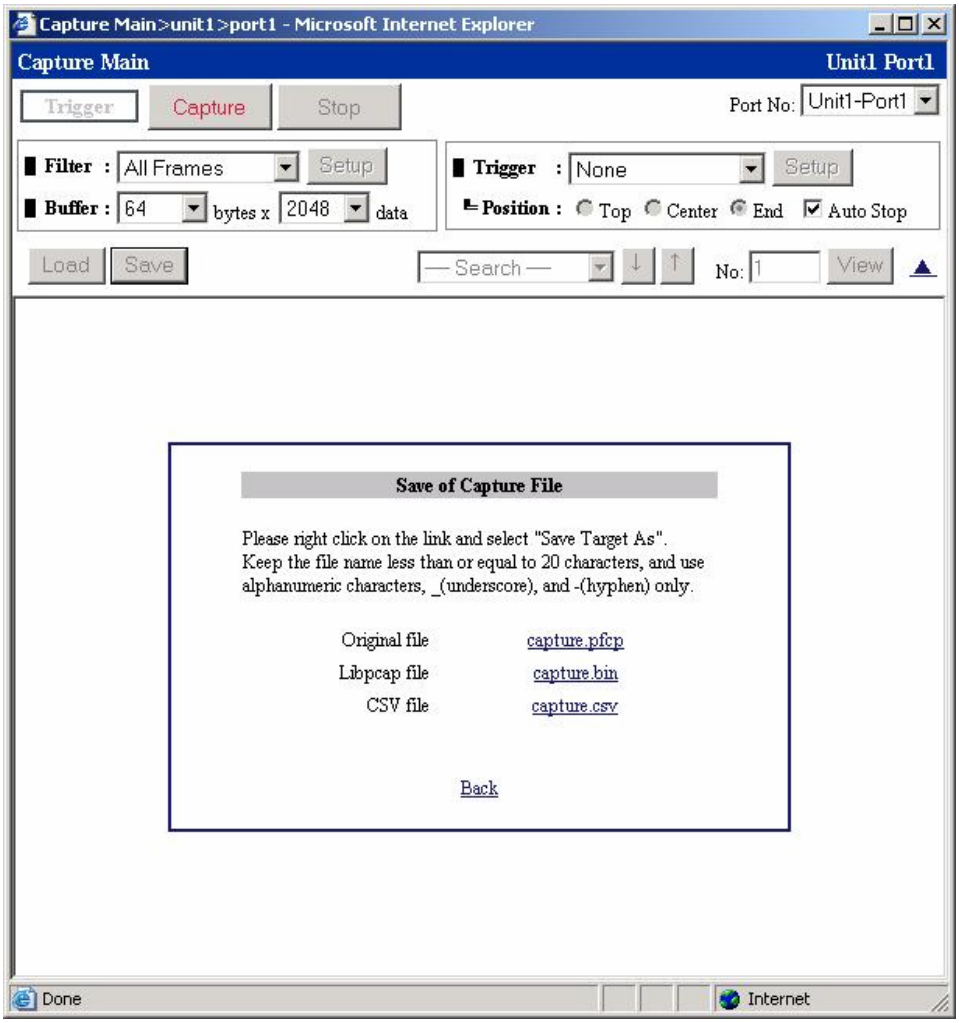


Figure 4.8-8 Capture results save screen

b. Shortcut menu

If you place your cursor over the save file name of the desired format and right-click, a shortcut menu appears as shown in the figure below (original format is selected in the following example).

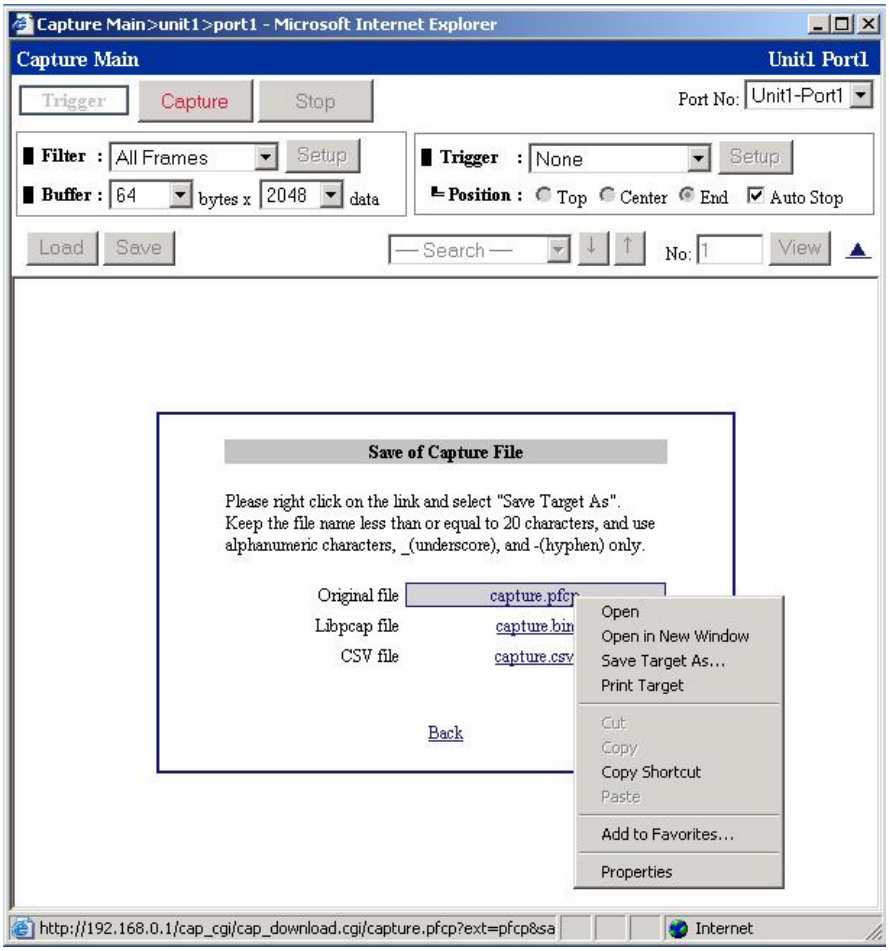


Figure 4.8-9 Shortcut menu

c. Save as dialog box

Select **Save As** to display a dialog box allowing you to specify the save location for the file. You can specify the desired location on the controller PC for the file. The exact operation depends on the Windows environment of the controller PC you are using. For further details, please refer to the documentation for your particular platform. For the file name, specify any file name that satisfies the file naming rules.

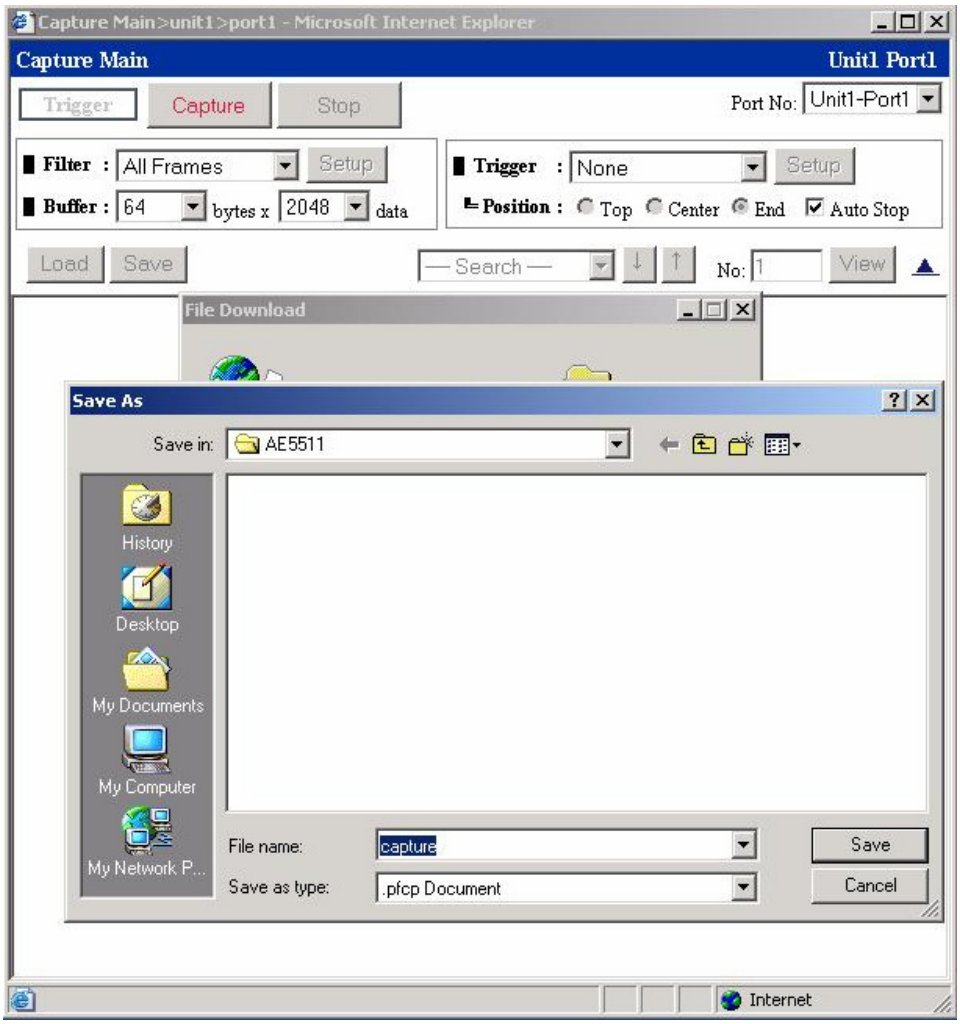


Figure 4.8-10 Save file location specification screen

(6) Load

You can load files saved in original format, and redisplay captured results.

a. Initial load screen

Clicking the Load button displays the Initial load screen shown below. You can specify a file to load by typing its name in directly (full pathname), or by clicking Browse and selecting the desired file on the controller PC.

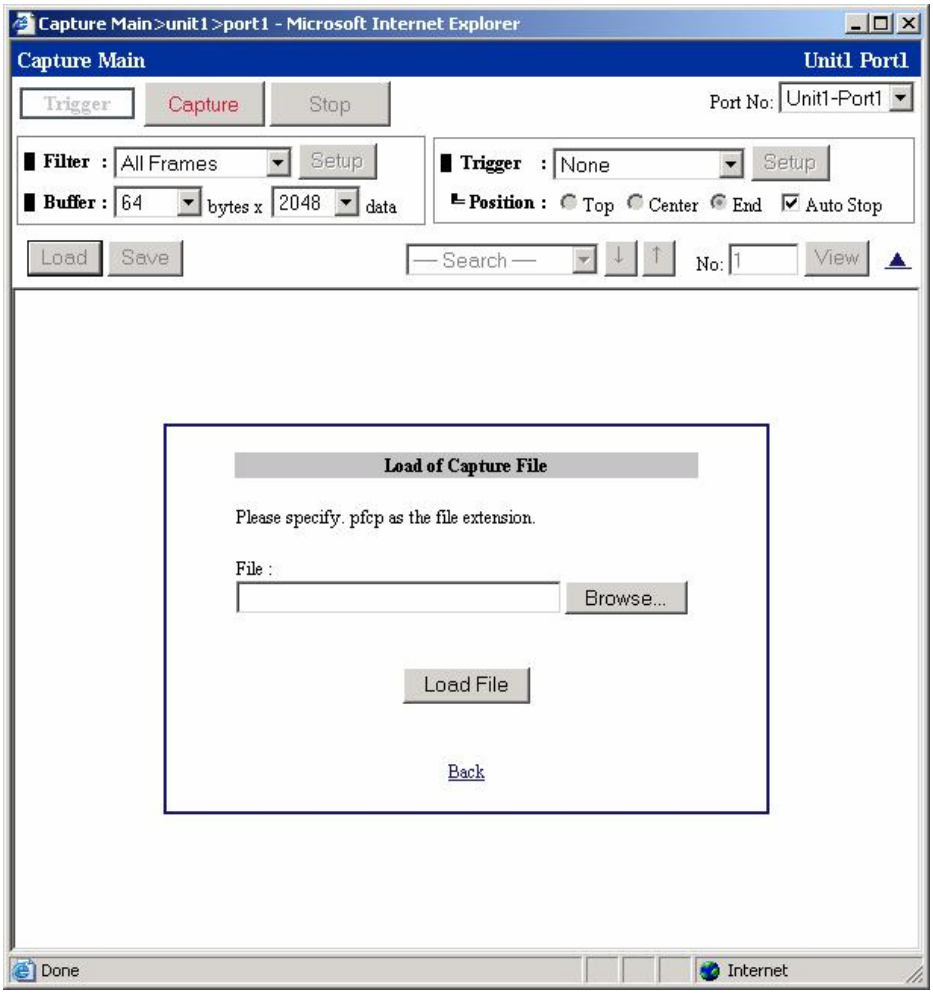


Figure 4.8-11 Capture results file load screen

(7) File selection screen

The following describes the procedure for selecting a file to load from the controller PC. Clicking the Browse button displays the file selection screen shown below. Specify the folder containing the desired file, then select the file.

(In the example below, the *capture.pfcp* file was selected from the *AE5522* folder.)

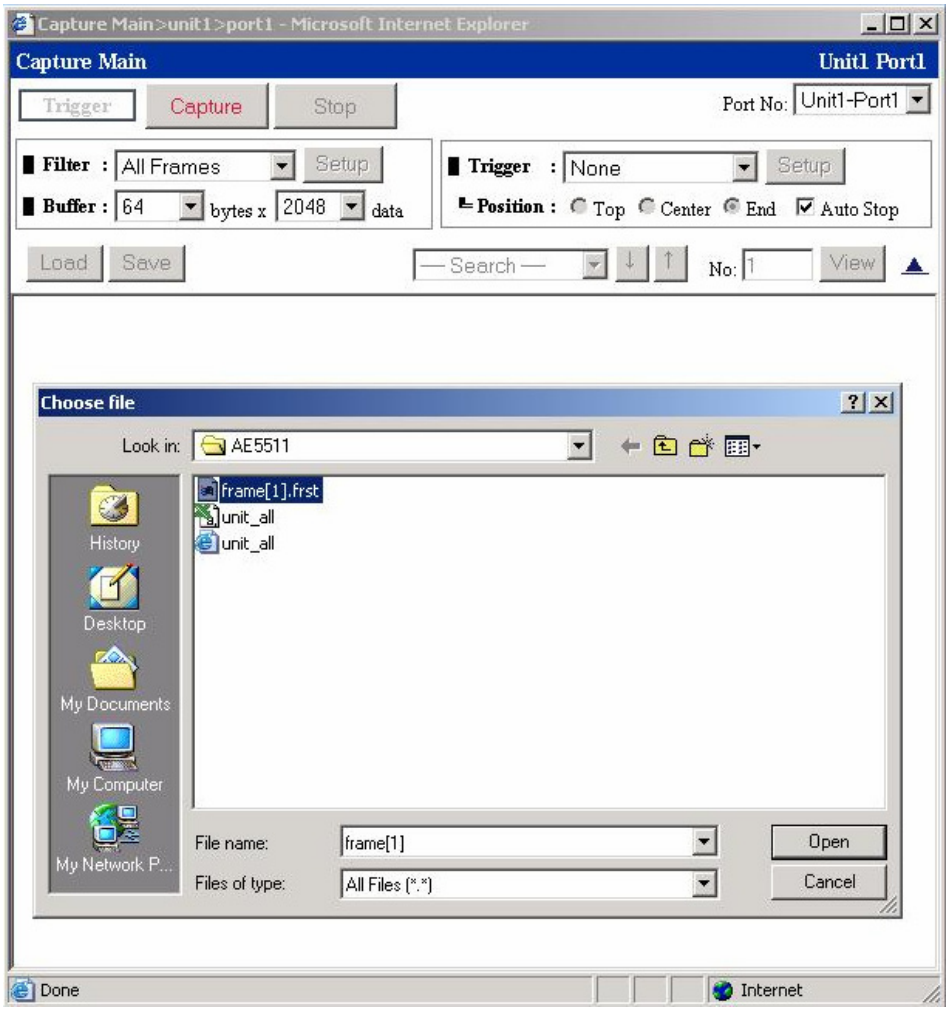


Figure 4.8-12 File selection screen

(8) Load complete screen

Press the **Load** button in the Load file confirmation screen to call up the specified captured results file. If the file is successfully loaded, the capture screen appears. Only files saved on the instrument (those with the pfcp extension) can be loaded.

If you attempt to load a file without the .pfcp extension, the following error message appears. Click **OK**, then try the load again, choosing a file with the correct extension.

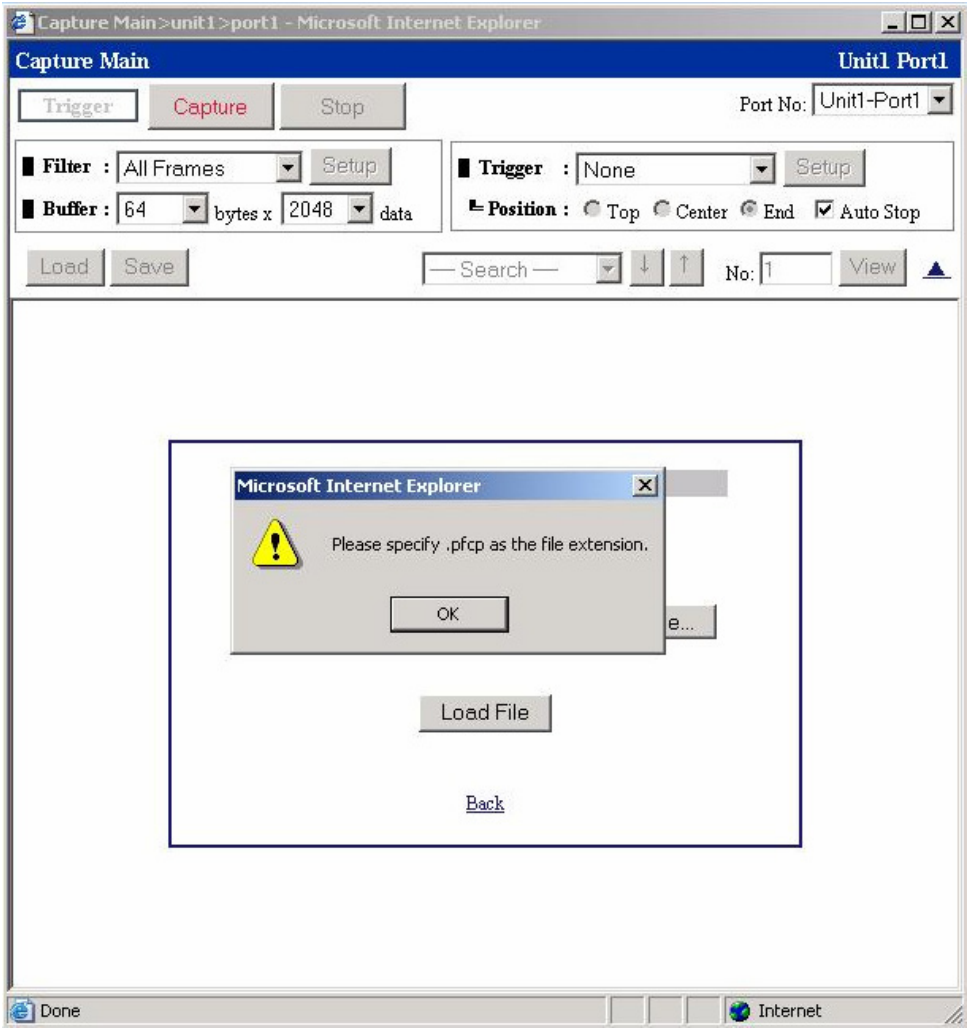


Figure 4.8-13 Load error display screen

Table 4.8.6 Capture details screen display items

Item	Description
Status	Displays the status of received captured data The contents of the display are as follows: Normal data received: Nothing displayed FCS error received: [E: crc] Undersize received: [E: under] Oversize received: [E: over] Symbol error received: [E: symbol] Bit error received: [E: bit] Link up: [up] Link down: [down] LF/RF receive: [lfs] Trigger event: [T]
Size	Displays the length of the received data.
[Frame No.]	The frame number being detail-displayed.
(Data)	Displays the received frames as a hex dump. For details, see (9) Detailed display screen.

Table 4.8.7 Capture details screen button items

Button Item	Description
Save	Saves the frames currently displayed in the detail display screen to frame builder format. If the frame is an error frame, the Save button is disabled. See (10), “Frame Save” or further details.
◀ ▶	You can display the data before and after the currently displayed received captured data.

(9) Detailed display screen

Click the **View** button to display a detailed HEX dump of the selected frame.

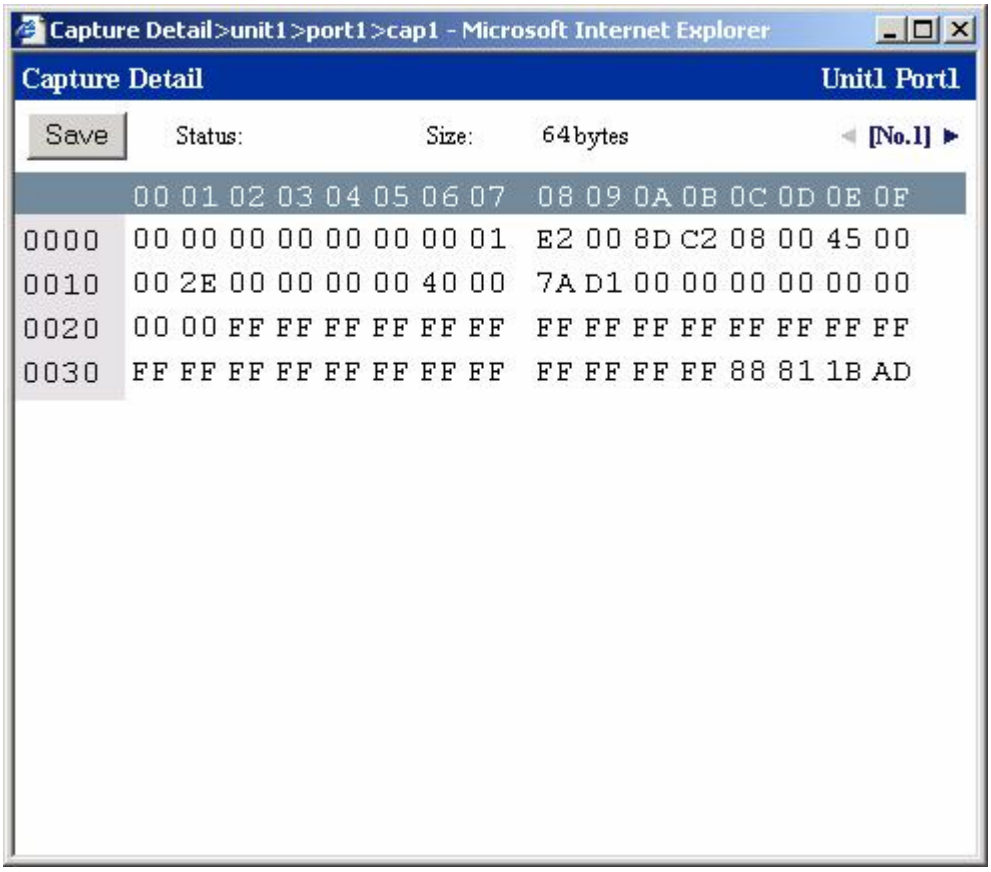


Figure 4.8-14 Capture detail screen

(10) Frame save

You can save captured data as frame information compatible with the AE5511 TrafficTesterPro's frame builder function.

a. Initial save screen

Clicking the Save button displays the Initial save screen shown below. The save file name is displayed in frame builder format.

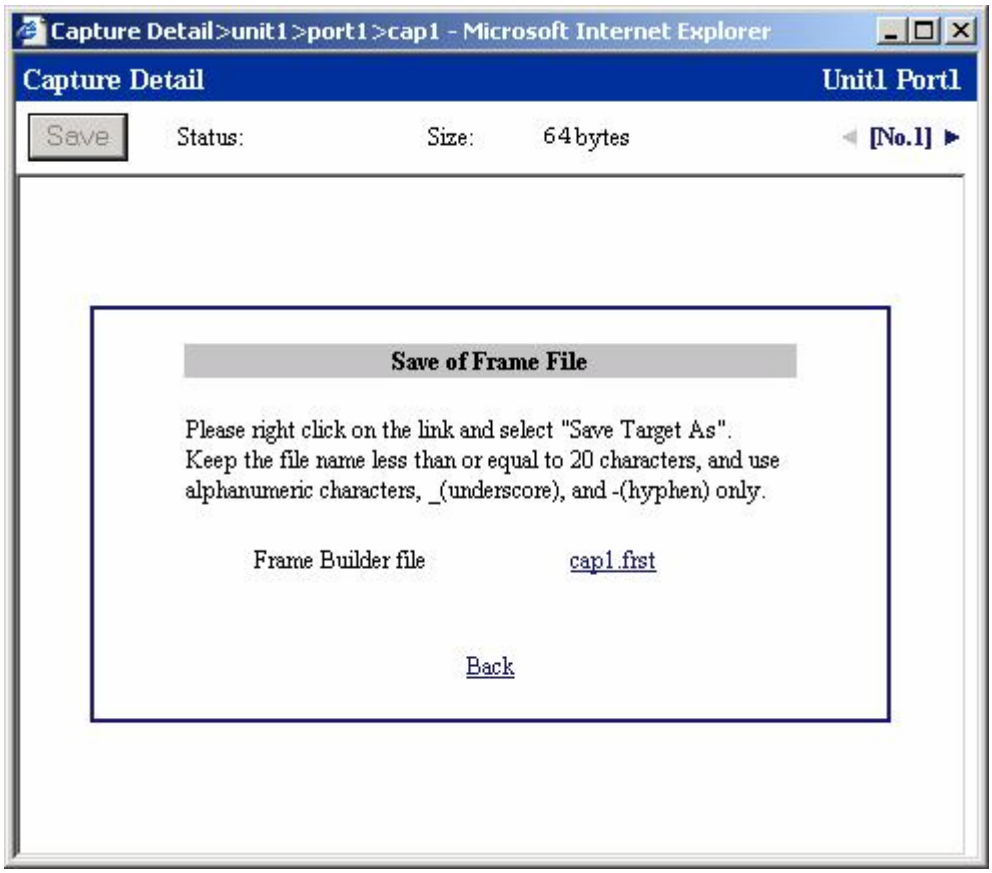


Figure 4.8-15 Frame save screen

b. Shortcut menu

If you place your cursor over the save file name and right-click, a shortcut menu appears as shown in the figure below. Select **Save to file**.

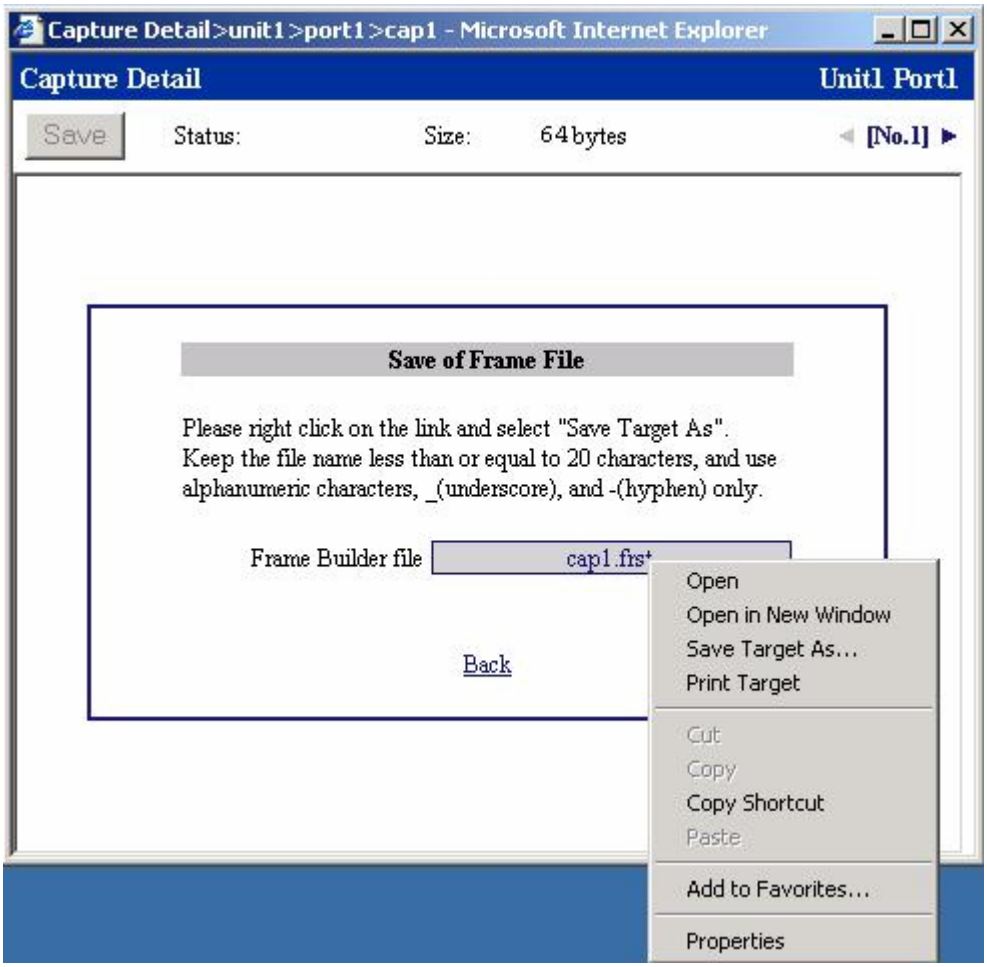


Figure 4.8-16 File save screen

c. Save as dialog box

Select **Save As** to display a dialog box allowing you to specify the save location for the file. You can specify the desired location on the controller PC for the file. The exact operation depends on the Windows environment of the controller PC you are using. For further details, please refer to the documentation for your particular platform. For the file name, specify any file name that satisfies the file naming rules (In the example below, the AE5522 folder of the controller PC was chosen for the save location, and the *capture.frst* was specified for the file name.)

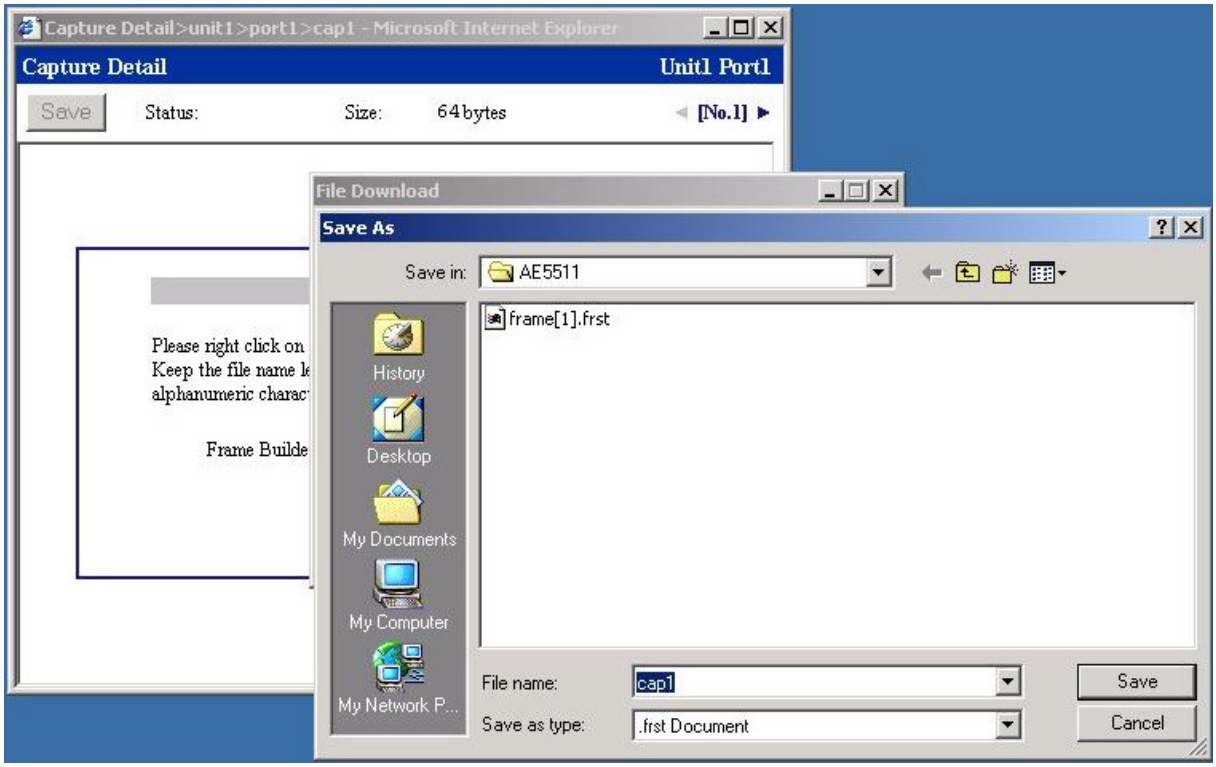


Figure 4.8-17 Save file location specification screen

Specify a save location and file name, then click **Save**. The frame information is saved to a file of the specified name in the specified location.

4.9 Option Screen

This section introduces the option screen. This screen allows you to enter option settings not related to measurement.

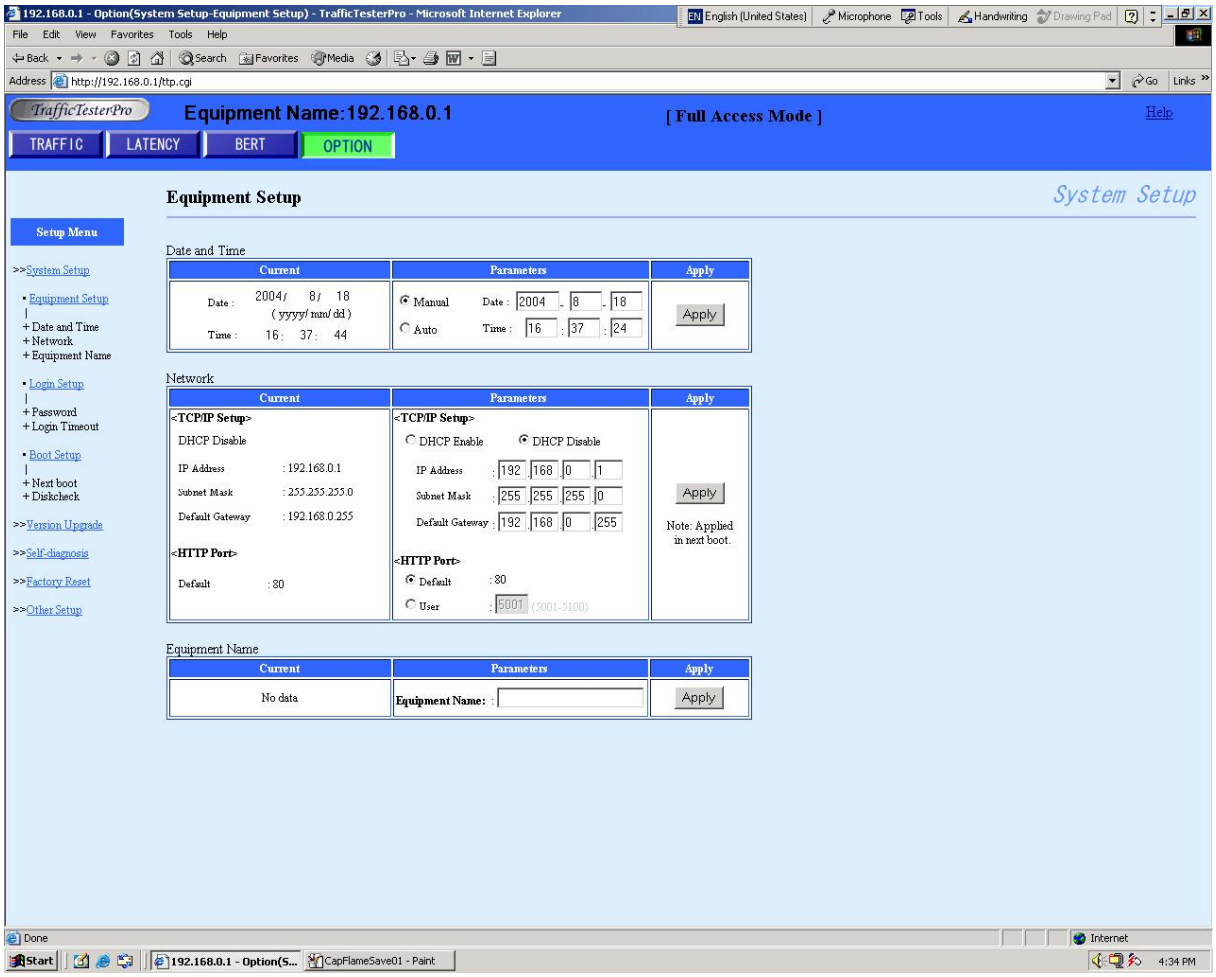


Figure 4.9-1 Option screen

The Option screen allows you to enter the following settings. Each setting item can be selected from the Setting Menu on the left side of the screen.

- System settings
- Main unit settings
- Logon settings
- Startup settings
- Upgrades
- Self Test
- Factory default settings
- Other settings

4.9.1 System Settings

4.9.1.1 Entering Settings on the Main Unit

(1) Date and time settings

You can enter a time setting to be used by the AE5511 TrafficTesterPro internal system. This setting is only available when logged on in Control mode.

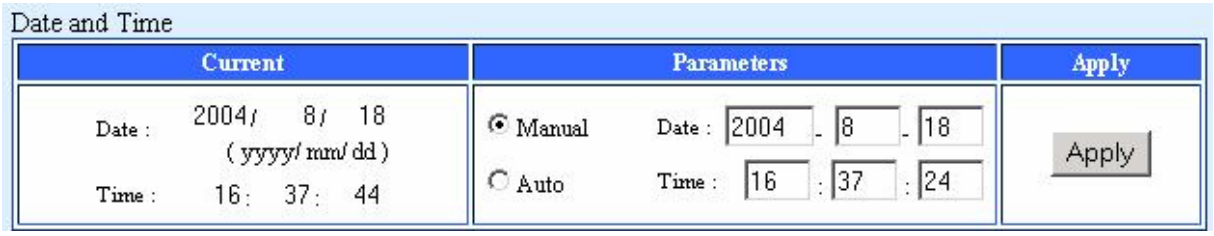


Figure 4.9-2 Date and time setting screen

The following are the items displayed on screen.

a. Current settings

Displays the time currently set on AE5511 TrafficTesterPro. You can update the time display on the browser in units of one second.

b. Settings

Select from Manual or Automatic settings. When Manual is selected, you can enter the date and time manually. When Automatic is selected, the time on the host PC is displayed (this cannot be changed manually).

c. Change settings

Click the **Apply** button to save the date and time setting on the AE5511 TrafficTesterPro. The message shown in figure 4.9-3 appears. Click **OK**.

Figure 4.9-3 Settings updated dialog box

(2) Network settings

This function allows you to enter remote port network settings for connecting the AE5511 TrafficTesterPro to a remote network.

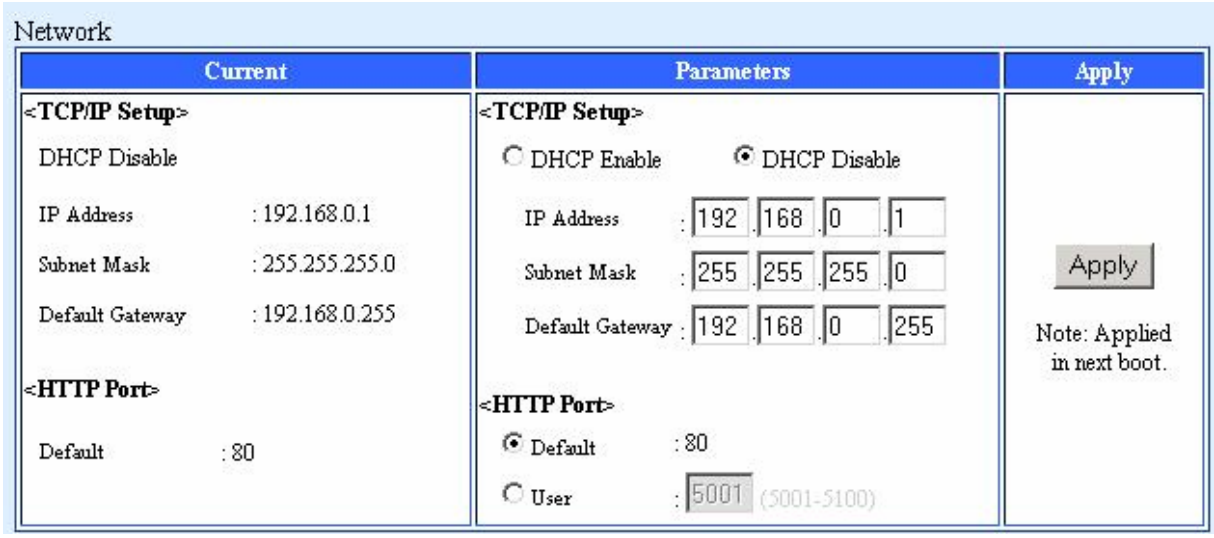


Figure 4.9-4 Network setting screen

a. TCP/IP settings

If you select DHCP enabled, the network settings are automatically obtained from a DHCP server. However, after the settings have been obtained, you must connect to the console to confirm the IP address (see section 3.2.3, “Entering Network Settings on the Instrument”).

Also, if you disable DHCP, you must enter the network settings manually. Note that you cannot enter either of the following IP addresses.

- 0.0.0.0
- 224.0.0.0–255.255.255.255

b. HTTP port number setting

This is the HTTP port number used by the Web browser. Normally this is assigned to the default of 80, but you can enter a user setting from 5001 to 5100. The default value should be used in most cases.

c. Changed settings apply button

By clicking the Apply button, the network settings for the remote port are copied to the instrument. The settings will take effect once the instrument has been restarted. When you click the Apply button, the restart confirmation screen shown in figure 4.9-5 appears, prompting you to reboot the AE5511 TrafficTesterPro system. When the reboot is complete, access the new IP address from the Web browser.

Figure 4.9-5 Reboot confirmation screen

(3) Unit name setting

a. Unit name setting

You can enter the unit name that is displayed in the upper part of the screen. The following are the conditions for the name.

- Numerals 0 through 9
- Lowercase letters a through z.
- Uppercase letters A through Z.
- Symbols: Hyphen (-), underscore (_), and period (.).
- 0 to 15 characters can be used.

b. Changed settings apply button

Click the **Apply** button to enable the settings.

Figure 4.9-6 Unit name setting screen

4.9.1.2 Entering Logon Settings

(1) Password setting

You can enter or edit the password to be used when logging on in Control mode. The password setting can only be entered or modified by a user logged on in Control mode. The following are the conditions for the password.

- Numerals 0 through 9
- Lowercase letters a through z.
- Uppercase letters A through Z.
- Hyphen (-) and underscore (_) symbols
- 0 to 15 characters can be used.

Figure 4.9-7 Password setting screen

a. Enable password

Select the **Enable** check box to activate the password entry boxes. If this box is not selected, a password will not be required when in Control mode.

b. New password/reenter password

Enter a new password into the new password entry box, then retype it in the password confirmation box.

c. Apply button

Click the **Apply** button. The new password is registered in the AE5511 TrafficTesterPro.

(2) Logon timeout setting

This function logs the user off automatically if the AE5511 is not accessed for a certain period of time.

a. Logon timeout time

A timeout time can be selected one of the following.

- 1 min.
- 10 min.
- 60 min.

b. Changed settings apply button

Click the **Apply** button to enable the settings.

Figure 4.9-8 Logon timeout setting screen

4.9.1.3 Entering Startup Settings

(1) Next session settings

By selecting the Carry over unit settings to next start up check box, the next time you start the AE5511 TrafficTesterPro, the current settings are automatically entered the next. Click the **Apply** button to enable the settings.

(2) Disk check settings

By selecting the Perform disk check next time start check box, the AE5511 TrafficTesterPro will perform a hard disk operation check the next time the power is turned ON. If you select Display previous results, the results of the previous disk check are displayed. The results are displayed when logging on in Control mode after startup. The time required for a file check may be long depending on the condition of the disk. The next time you log on, confirm that the STATUS LED on the front panel illuminates green before executing operations. Click the **Apply** button to enable the settings.

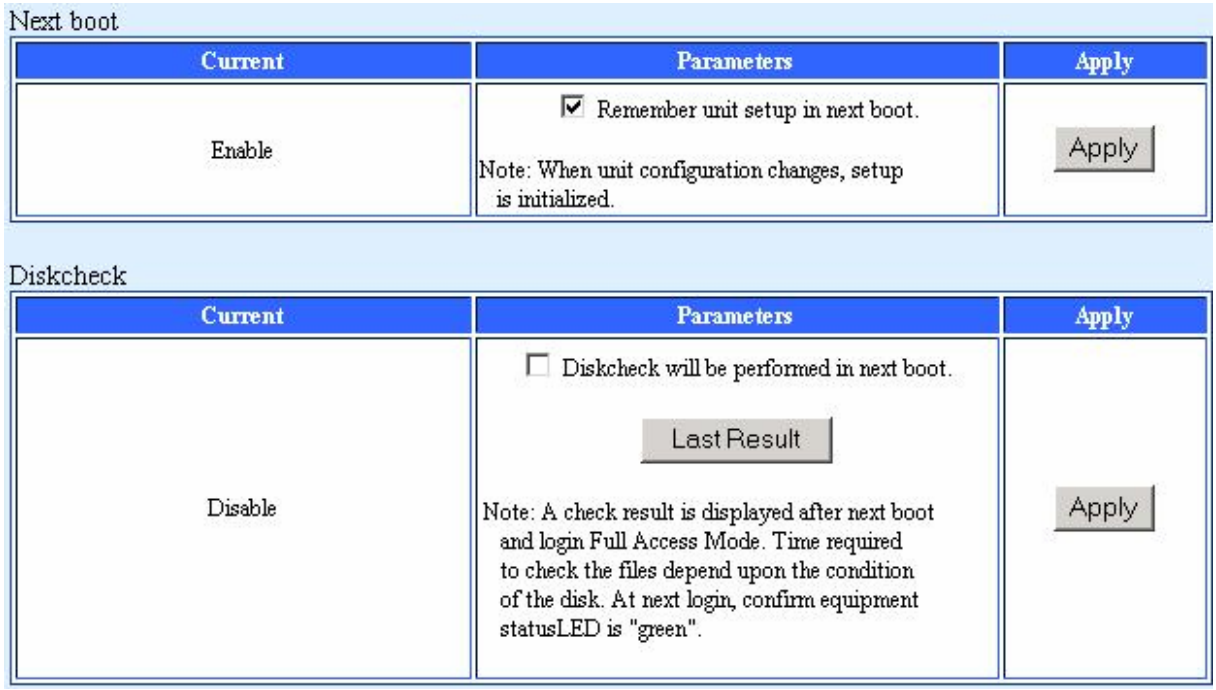


Figure 4.9-9 Start settings

4.9.2 Upgrades

The function described in this section allows you to update the system software of your AE5511 TrafficTesterPro.

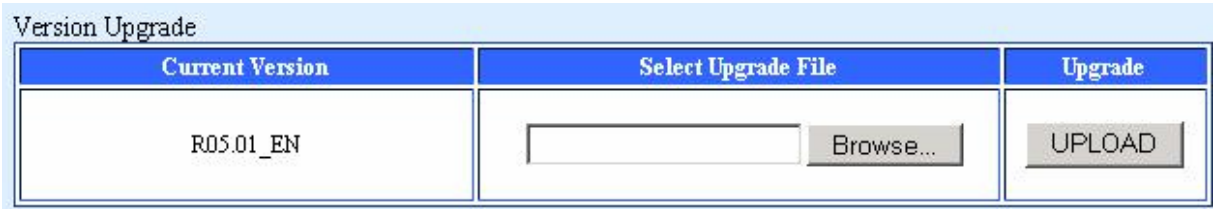


Figure 4.9-10 Version upgrade screen

4.9.2.1 Current Version

This box displays the current version of the system software installed on the AE5511 TrafficTesterPro.

4.9.2.2 New Version

This box allows you to specify the upgrade file for updating AE5511 TrafficTesterPro. For the location of the upgrade file, please visit our Web site at http://www.Yokogawa.co.jp/, or inquire with our sales promotion department.

4.9.2.3 Upload Button

Click the **Upload** button to upgrade the AE5511 TrafficTesterPro system software.

4.9.3 Self Test

You can have the AE5511 TrafficTesterPro perform a self test. The self test also includes a test of any units that may be installed.

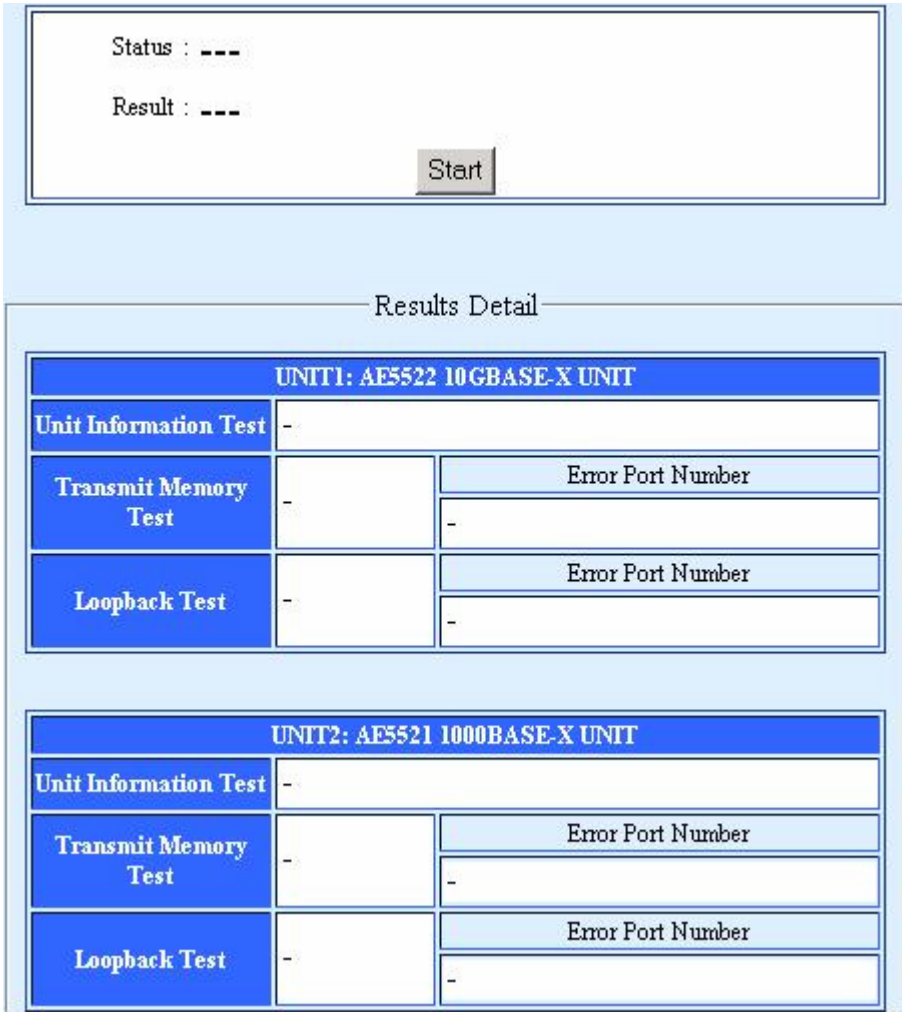


Figure 4.9-11 Self test screen

Click the **Test start** button to start the self test. Do not perform any other operations on the instrument while the test is being performed. The status bar displays “Self test” during the test, and “Self test complete” when the test is finished. When the self test is complete, the results of each test item are displayed. If no problems were found, OK is displayed for the test result in the upper part of the screen. If a problem was found, NG is displayed. In this case, please contact your nearest Yokogawa representative.

4.9.4 Factory Default Settings

This function restores the default settings of the AE5511 TrafficTesterPro.

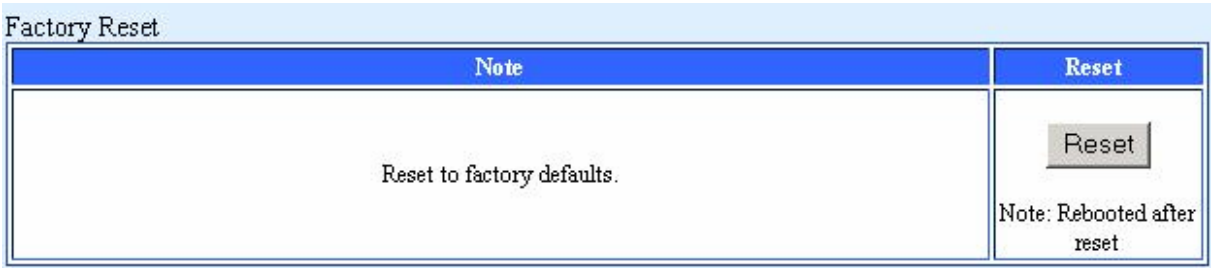


Figure 4.9-12 Factory default settings

For information about the factory default settings, see section 4.10.4.7. Click the **Restore** button to restore the settings to the instrument. The instrument reboots after you click the Restore button.

4.9.5 Other Settings

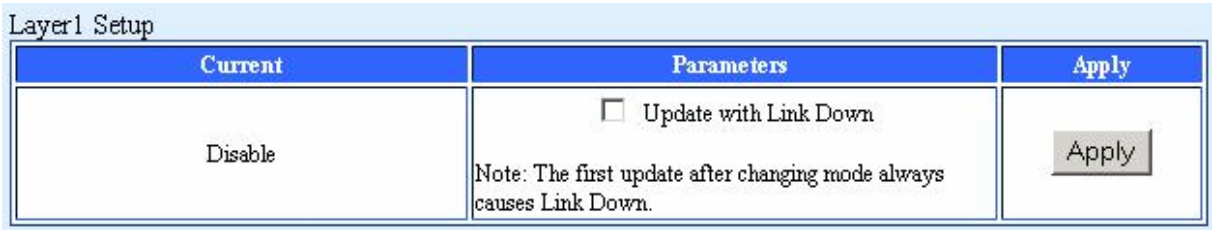
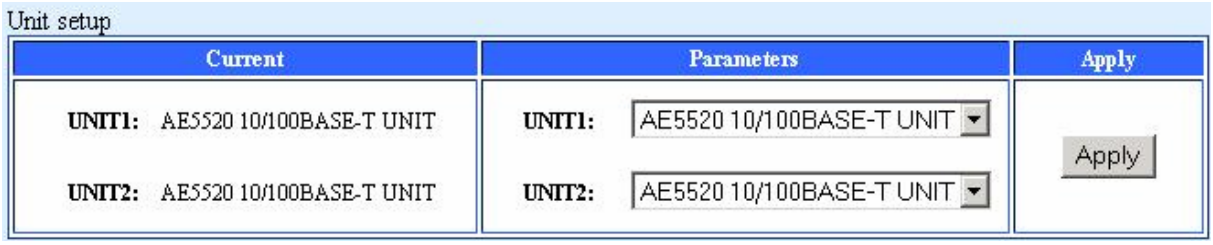


Figure 4.9-13 Other settings

You can specify whether links to each port are shut down or not shut down when implementing setting changes in the various modes.

4.9.6 Unit Settings

The Unit specification screen is displayed when Edit mode is selected in the logon screen described in section 4.2. This allows you to specify units for Edit mode. Figure 4.9-14 shows the unit specification screen.



x

Figure 4.9-14 Unit specificaiton screen

4.9.6.1 Viewing the Current Settings

This box displays the current Edit mode units.

4.9.6.2 Specifying Units

These boxes allow you to select the installed units for Edit mode. With UNIT1/UNIT2, you can select the AE5520 10/100BASE-T UNIT, AE5521 1000BASE-X UNIT, AE5522 10GBASE-X UNIT, or Unused.

4.9.6.3 Enabling Settings

Click the **Apply** button to enable the settings.

4.10 Console Setting Screen

This section introduces the console setting screen. The AE5511 TrafficTesterPro has a function that allows you to perform console control in the following situations.

- The remote network lines become unusable for some reason.
- The Web browser cannot access the AE5511 even though it is started and there do not appear to be any problems with the remote access line.
- It becomes necessary to change the factory default IP address.

In these cases, connect the accessory console connection cable to the controller PC, then use terminal software on the controller PC to perform console control.

4.10.1 Connecting the Cable

Connect the CONSOLE connection cable that came with the instrument from the COM port on the controller PC to the CONSOLE port on the AE5511 TrafficTesterPro.

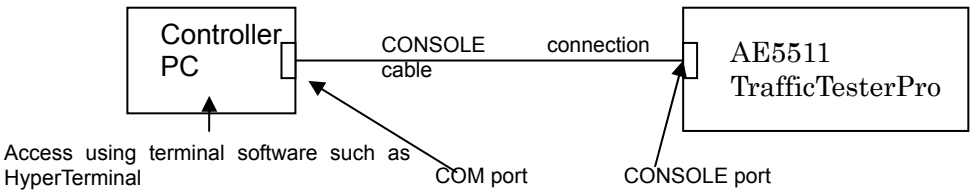


Figure 4.10-1 Connections with the CONSOLE connection cable

4.10.2 Terminal Software Settings

To perform control, you can use the Windows HyperTerminal utility or another terminal software program. The following is an example of how to set up HyperTerminal.

4.10.2.1 Starting the Terminal Software

On most Windows systems you can choose Start > Accessories > Communication > HyperTerminal to start the HyperTerminal program. If you cannot find the program using the above procedure, search for the Hypertrm.exe file, and execute it.

Figure 4.10-2 HyperTerminal start screen

4.10.2.2 Specifying a Setting Name

When you start HyperTerminal, a screen appears allowing you to specify a name for the settings you are about to enter. For now, try entering **AE5511** (though you can any name you desire).

Figure 4.10-3 Setting name specification screen

4.10.2.3 Entering Connection Settings

You can specify the physical port to be used by the terminal software for communication. Specify the port to which the CONSOLE connection cable that came with the controller PC is connected (normally this is the COM port).

Figure 4.10-4 Connection setting screen

4.10.2.4 Entering COM Port Properties

You can enter communication settings for the COM port. Enter the settings as shown in the figure below. It is not necessary to enter detailed settings.

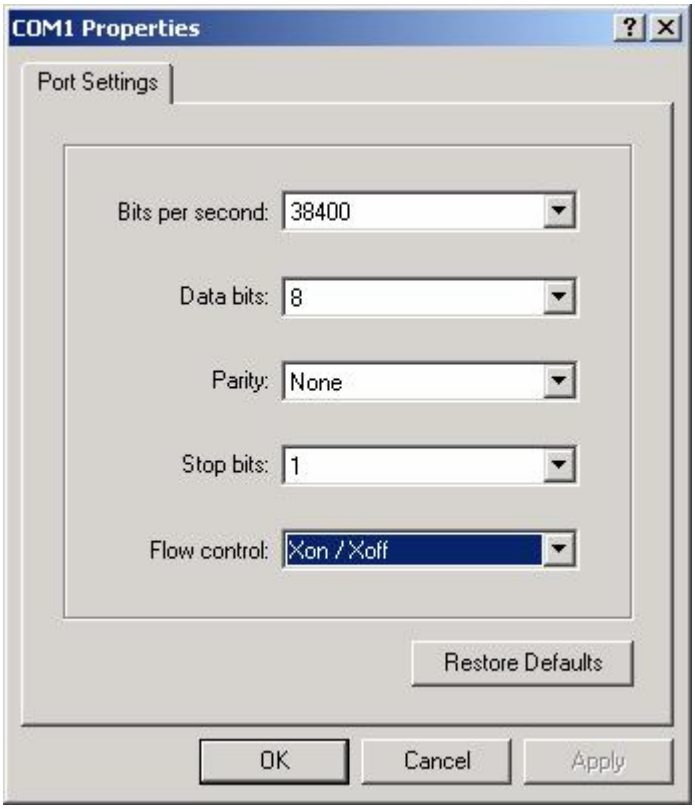


Figure 4.10-5 COM port settings

4.10.3 Terminal Control Items

The items that can be controlled from the terminal are as follows.

Table 4.10.1 List of terminal control items

Control Items	Description
NETWORK SETTING	A function allowing entry of network settings when connected remotely. Network settings can be automatically obtained via DHCP server, or manually set to fixed values.
HTTP SERVER SETTING	This function allows entry of the HTTP port number used for access by the Web browser.
PASSWORD SETTING	This function allows entry of the password used when logging on using the Web browser.
SELF TEST	Has the AE5511 TrafficTesterPro perform an operational self test.
SET DEFAULT	This function restores all factory default settings.

4.10.4 Screens

The following is an explanation of the screens used for each function of the instrument.

4.10.4.1 Logon Screen

The screen below appears when connected to the console using the terminal software. Type `logon`, then press **ENTER** to advance to the main menu.

Or, type `auto` then press **ENTER** to advance to the automatic test measurement mode screen. For details about auto test, see the manual, “Auto Test Supplement.”

Note:
The auto test supplement is in a separate folder.

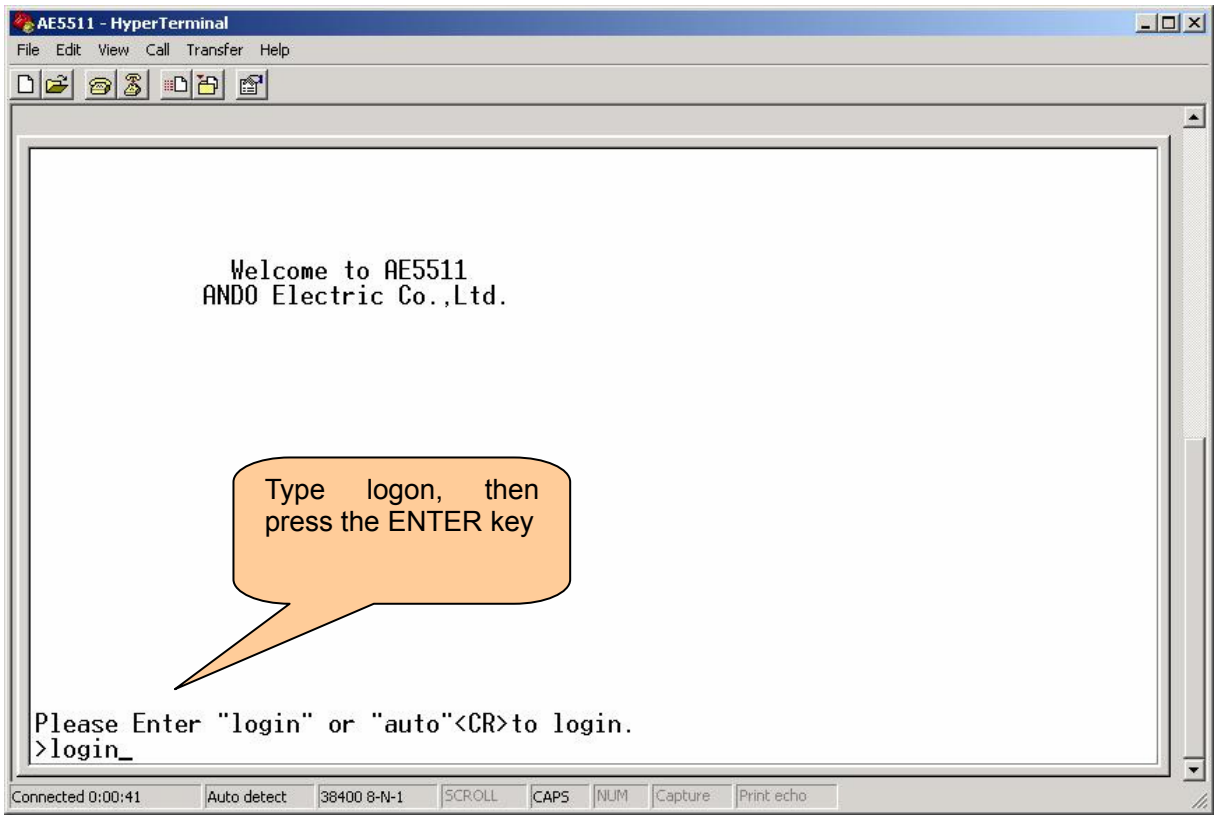


Figure 4.10-6 Logon screen

4.10.4.2 Main Screen

The terminal control items are displayed as shown in the figure below. Enter the number of the desired function, then press the **ENTER** key.

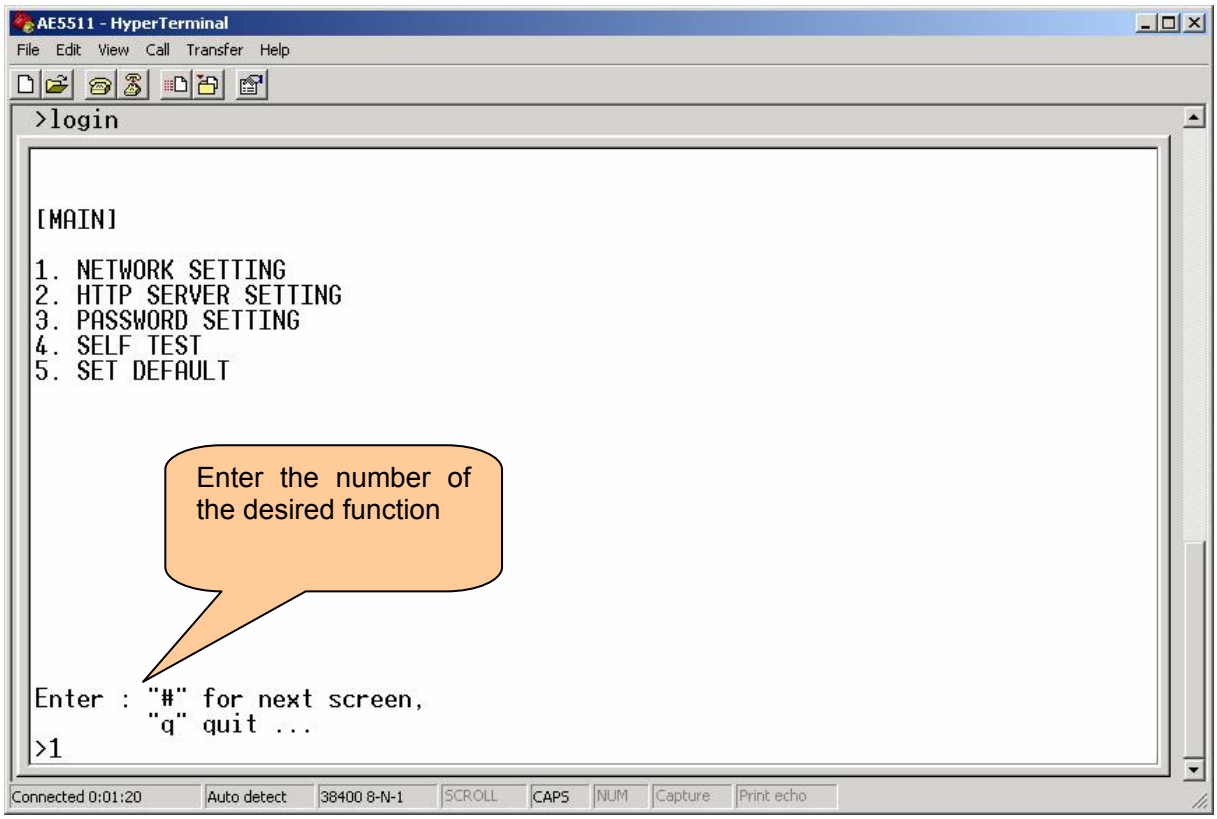


Figure 4.10-7 Main menu

4.10.4.3 Network Setting Screen

The network setting screen consists of two parts: automatic network settings via DHCP, and manual entry of fixed settings.

> **Note**
> You must restart the instrument after changing network settings in order for those settings to take effect. Especially when entering settings manually, you must restart after entering IP address, subnet mask, or default gateway settings. See section 3.2.11(1), “Shutting Down by Using the Power Switch on the Front Panel,” for turning OFF the power, and section 3.2.2, “Turning ON the Power” for turning the power back ON again.

(1) DHCP

Selects automatic settings via DHCP, or manual fixed settings.

a. DISABLE

Displayed when manual settings is selected. When DHCP is disabled, you can enter settings for the next three items, IP ADDRESS, NET MASK, and DEFAULT GATEWAY.

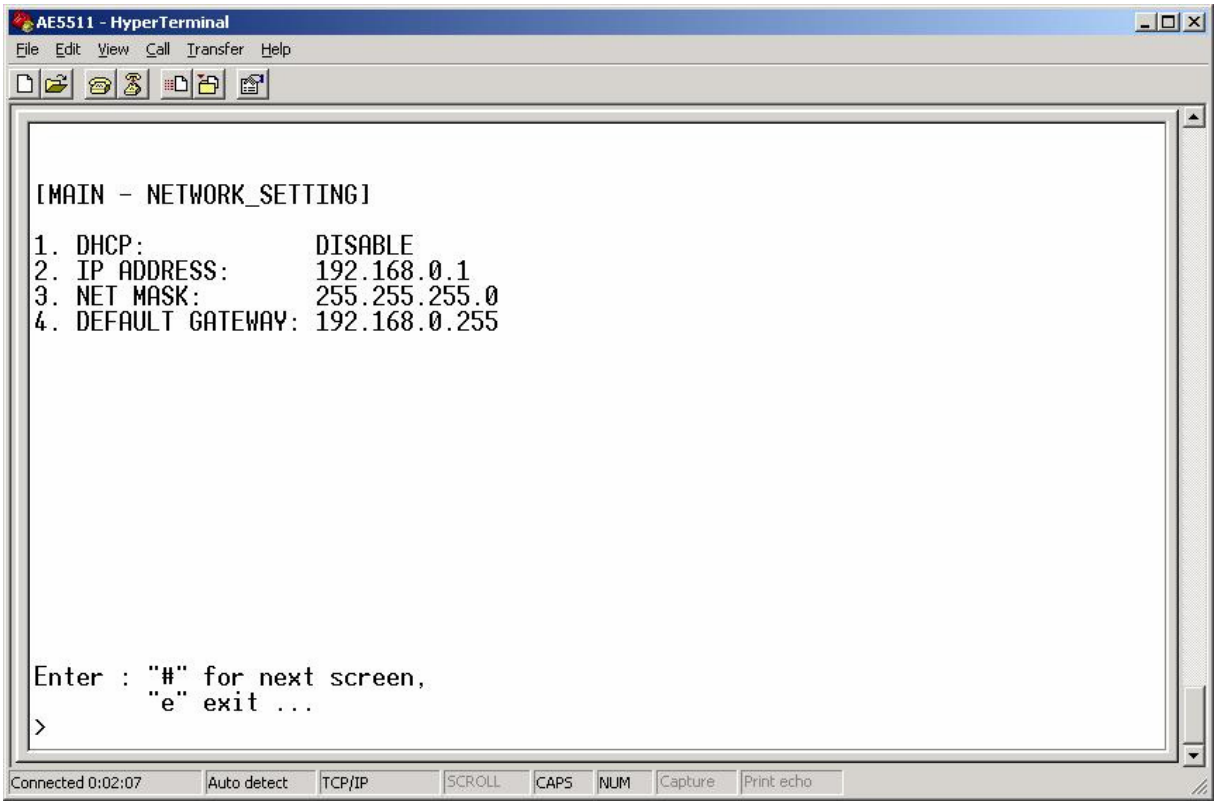


Figure 4.10-8 Network setting menu (fixed settings)

b. ENABLE

Selected when settings are entered automatically via DHCP. When DHCP is enabled, you cannot enter the IP address, net mask, and default gateway settings. In this case, the setting values are obtained automatically, and displayed.

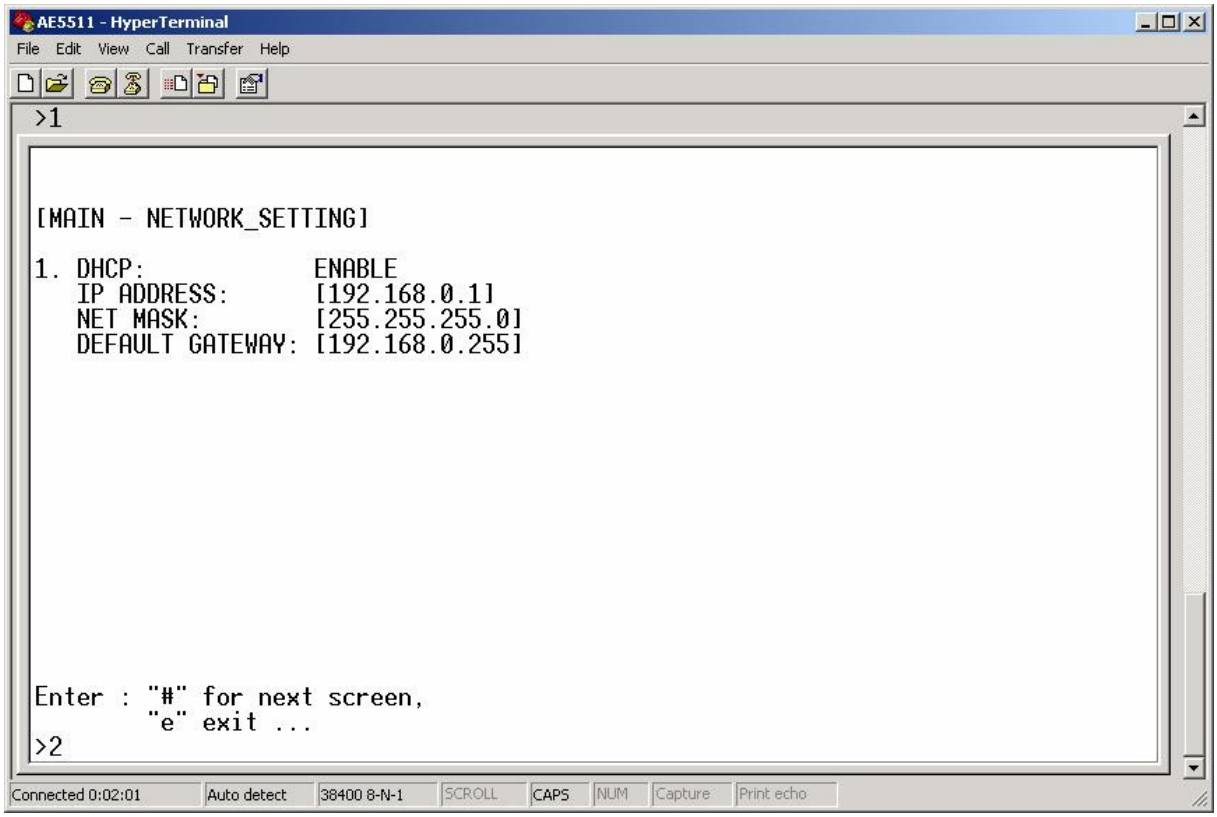


Figure 4.10-9 Network setting menu (automatic settings via DHCP)

If automatic settings via DHCP were not obtained successfully, an asterisk (*) is displayed. This may indicate a problem with the remote line or an abnormality on the DHCP server.

(2) IP ADDRESS

Specifies the IP address of AE5511 TrafficTesterPro. Enter an address using the following format.

[XXX.XXX.XXX.XXX] (XXX is a decimal from 0 to 255)

Note that you cannot enter either of the following IP addresses.

- 0.0.0.0
- 244.0.0.0–255.255.255.255 (244–255.XXX.XXX.XXX)

(3) NET MASK

Specifies the net mask for the AE5511 TrafficTesterPro. Enter an address using the following format.

[YYY.YYY.YYY.YYY] (where YYY is 0, 128, 192, 224, 240, 248, 252, 254, or 255)

(4) DEFAULT GATEWAY

Specifies the default gateway for the AE5511 TrafficTesterPro. Enter an address using the following format.

[XXX.XXX.XXX.XXX] (XXX is a decimal from 0 to 255)

The default gateway must set to a valid address on the same network as the IP address.

4.10.4.4 Entering HTTP Server Settings

This function allows you to change the HTTP port number used for access to the controller PC from the Web browser. Normally, the HTTP port number used is 80 (the Well Known Port). Therefore, the default setting on the instrument is also number 80.

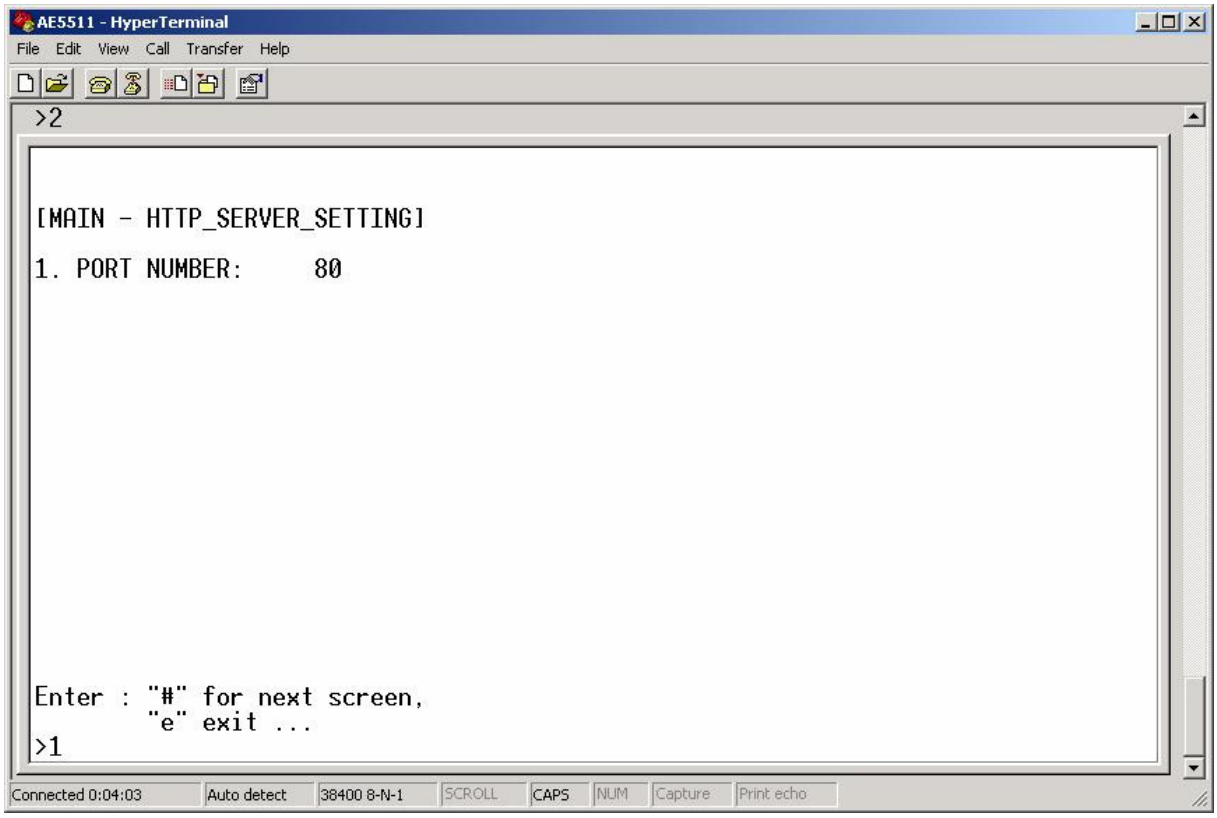


Figure 4.10-10 Currently set port number display

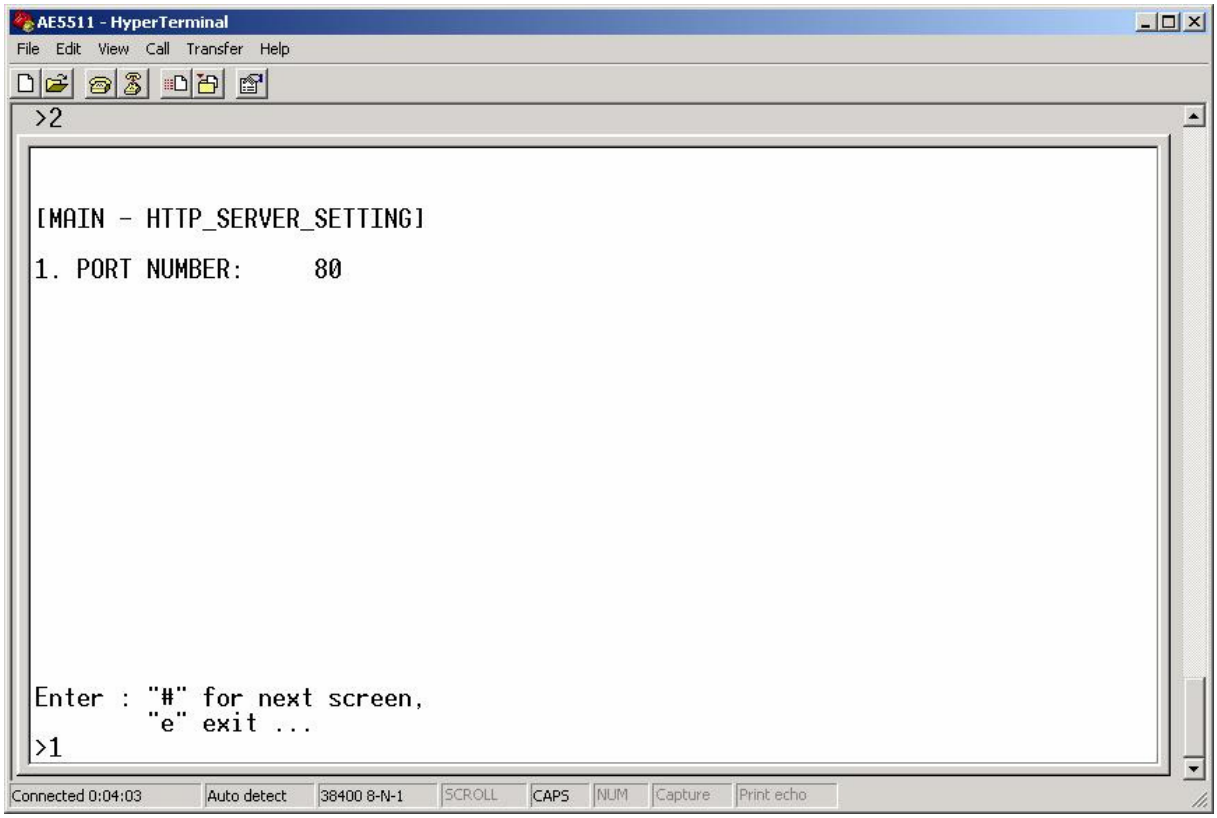


Figure 4.10-11 HTTP port number editing screen

You can change the HTTP port number to 80 or to a number from 5001 through 5100.

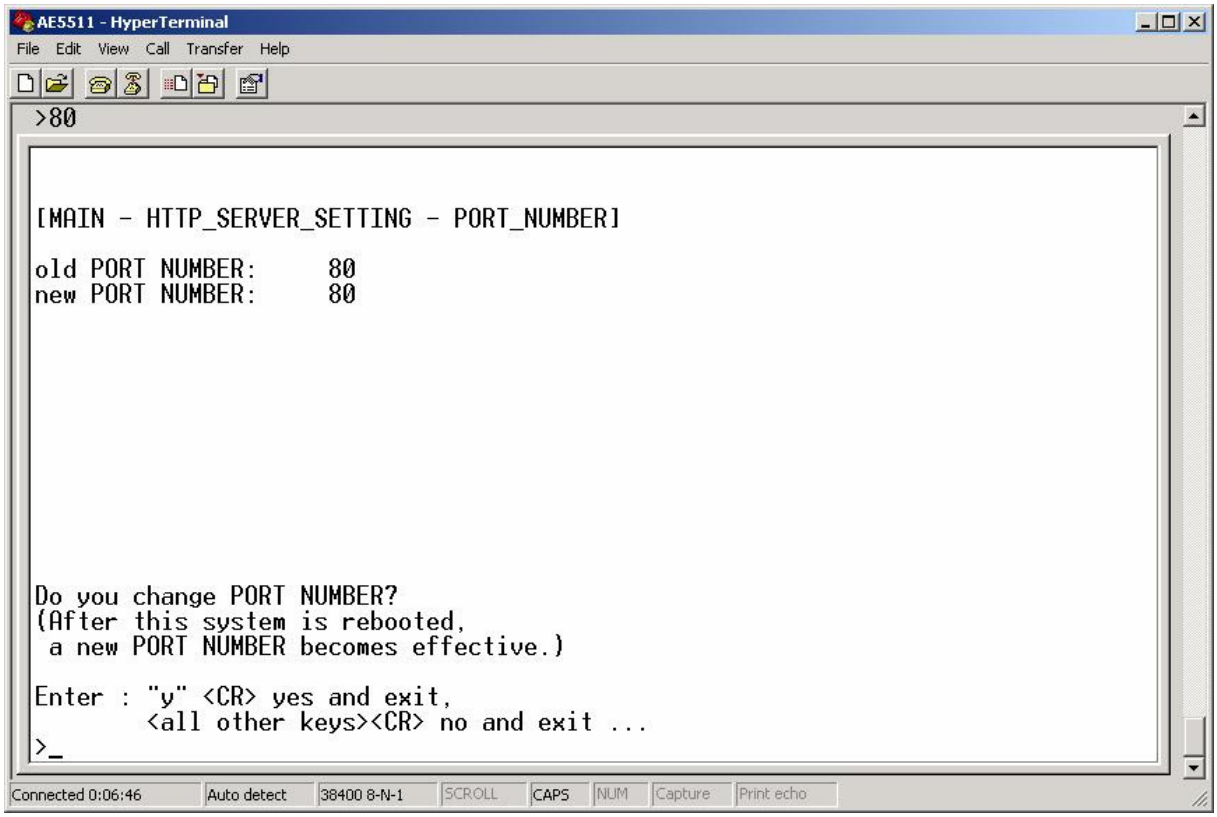


Figure 4.10-12 HTTP port number change confirmation

The port number before and after the change is displayed. To accept the change, type y. Press any other key to reject the change and cancel the operation.

4.10.4.5 Entering Password Settings

You can set the password to be used when logging on to the AE5511 TrafficTesterPro.

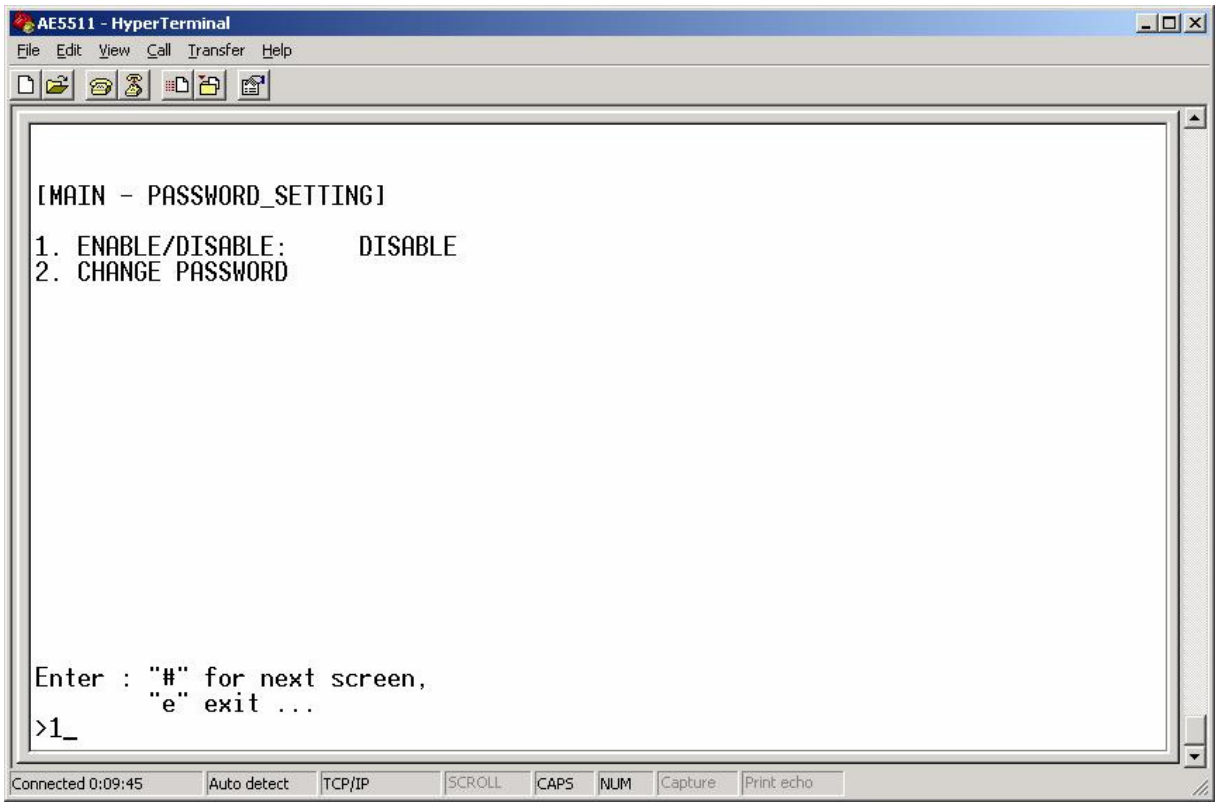


Figure 4.10-13 Password setting screen

(1) ENABLE/DISABLE

Specifies whether a password is required when logging on.

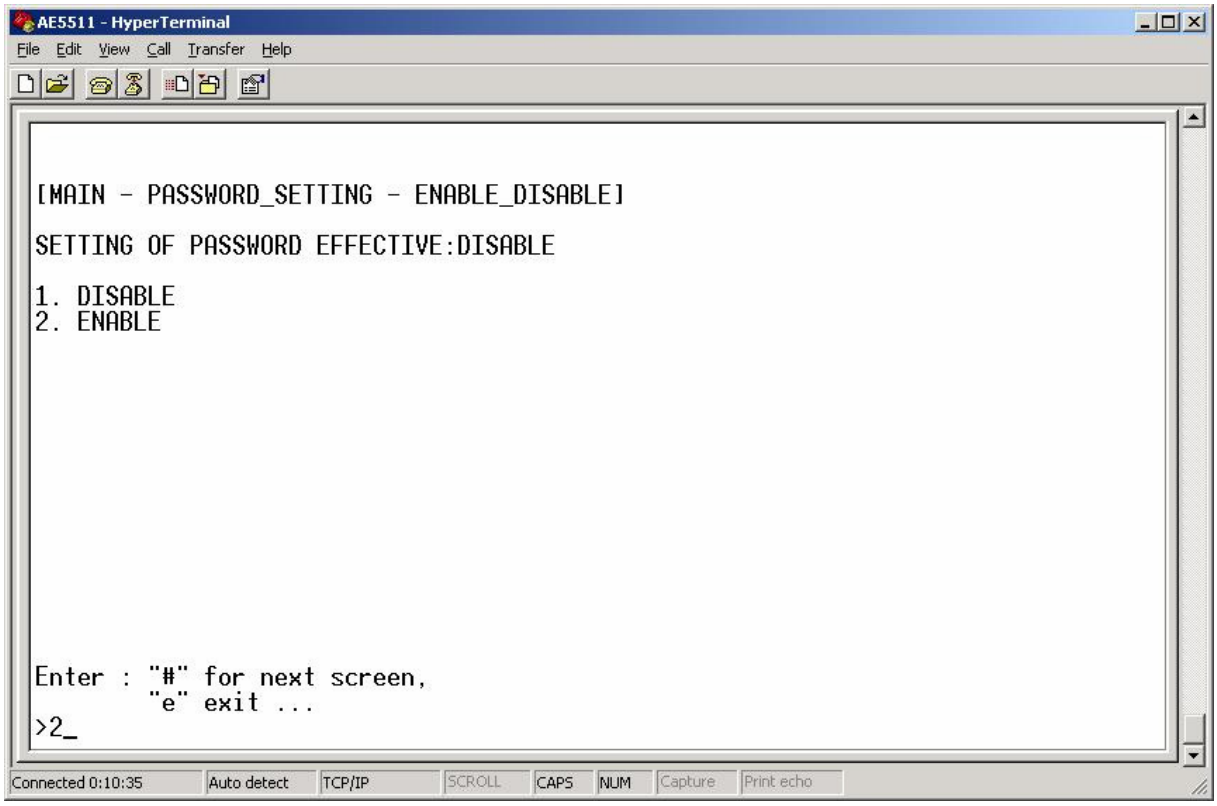


Figure 4.10-14 Password requirement setting screen

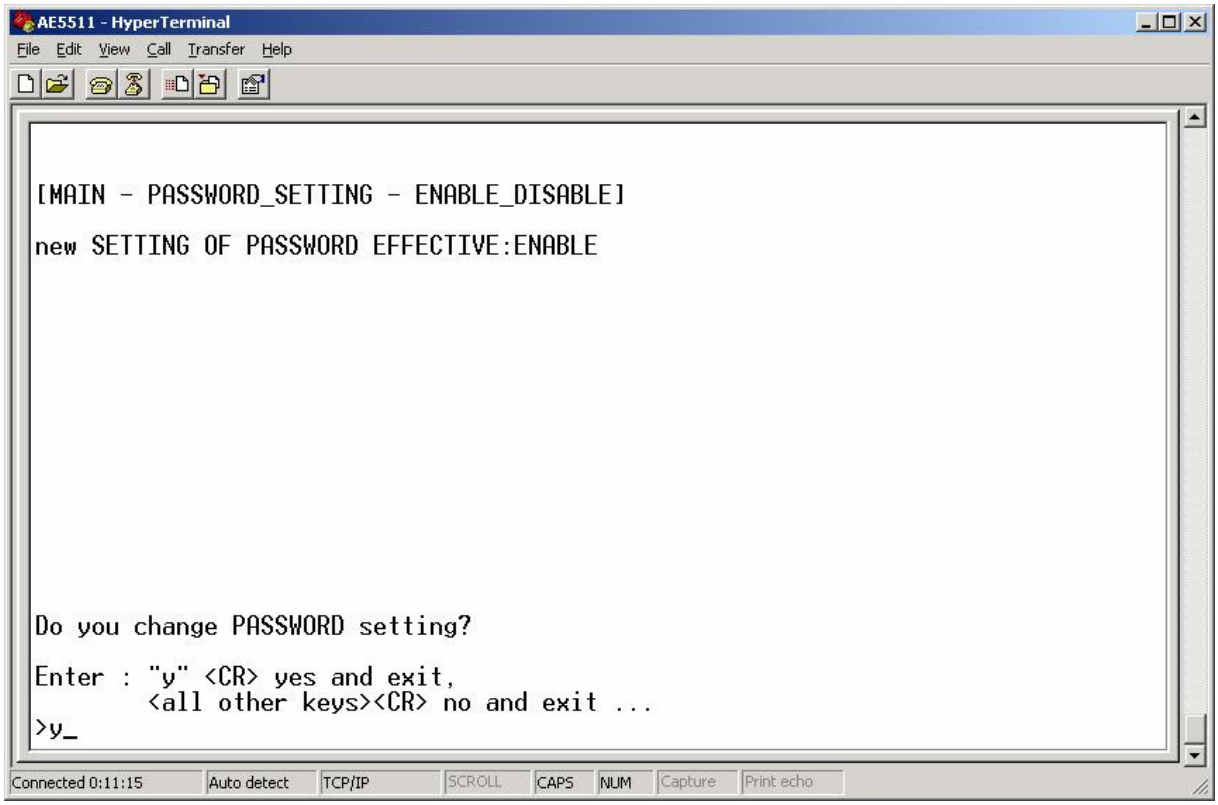


Figure 4.10-15 Change confirmation screen

To accept the change, type y. Type any other key to reject the change and cancel the operation.

(2) CHANGE PASSWORD

Sets the new password. The only characters that can be used for the password are alphanumeric characters, the hyphen (-), and the underscore (_). The password must consist of no more than fifteen characters total.

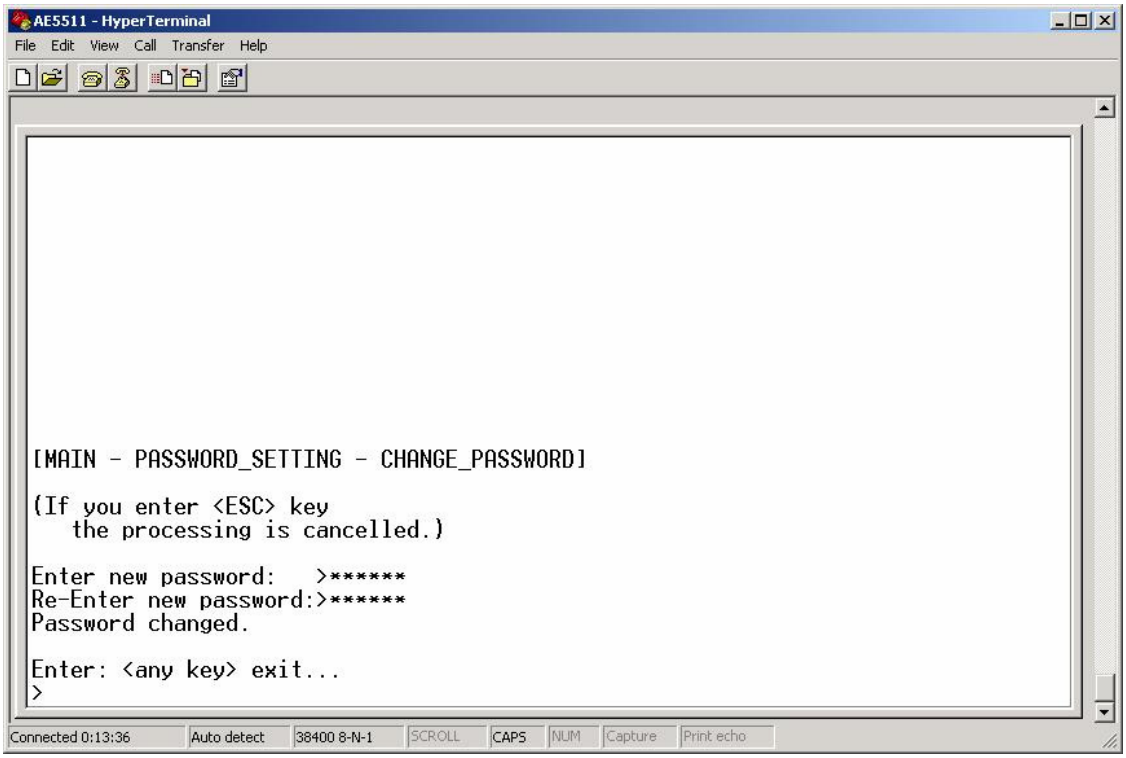


Figure 4.10-16 Password change screen

4.10.4.6 Executing the Self Test

This function causes the AE5511 TrafficTesterPro to perform an operational self test.

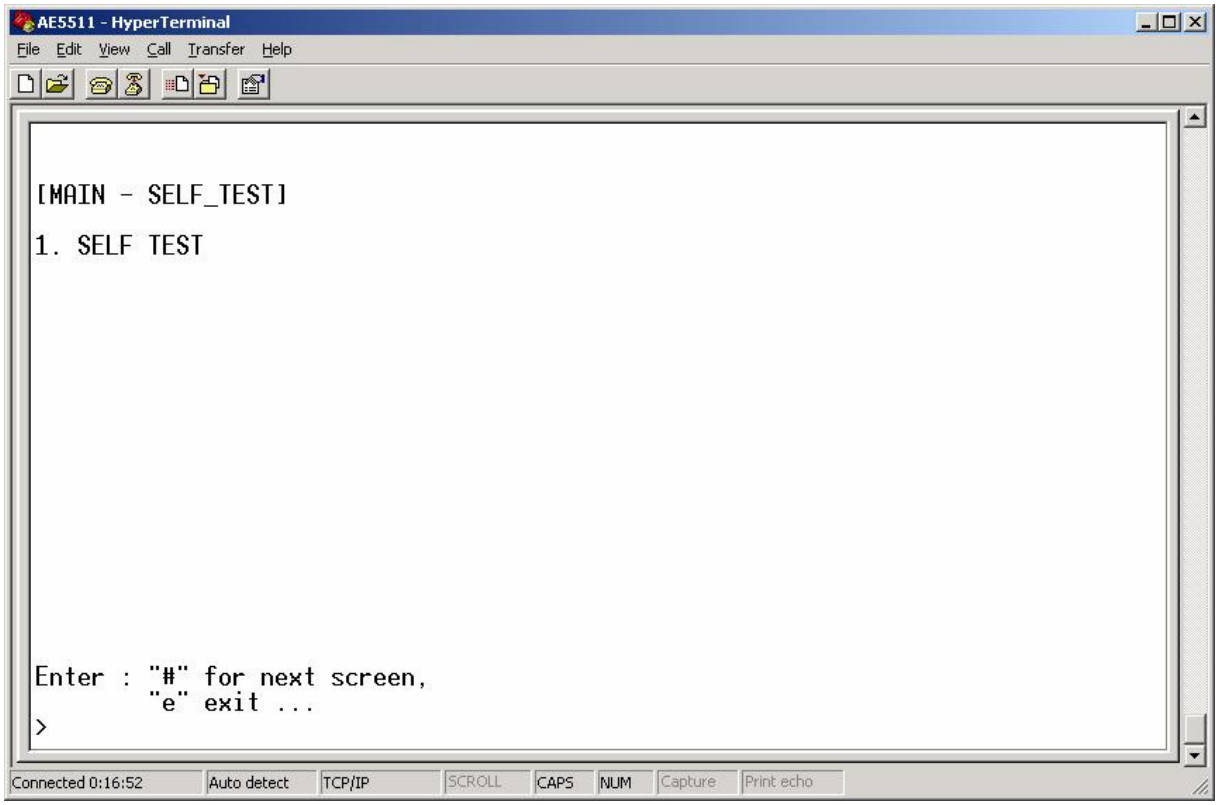


Figure 4.10-17 Self test screen

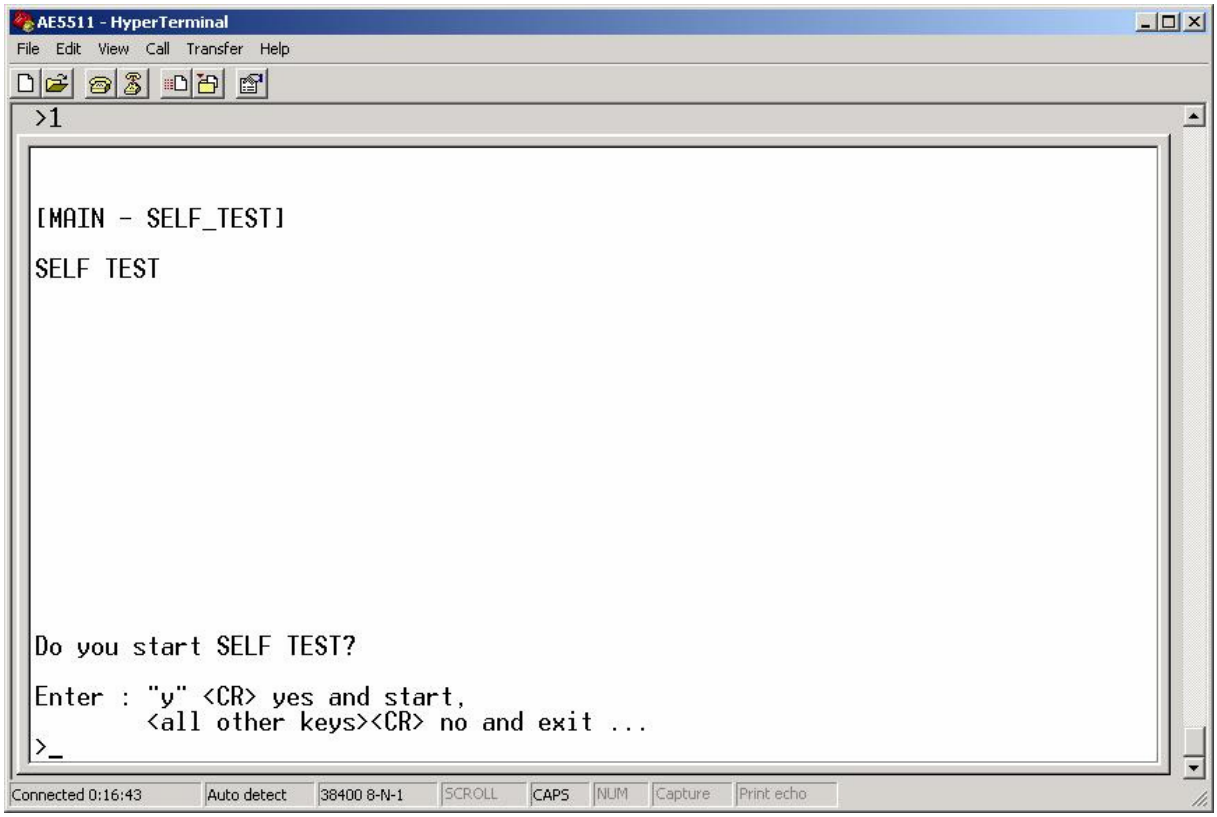


Figure 4.10-18 Self test start setting screen

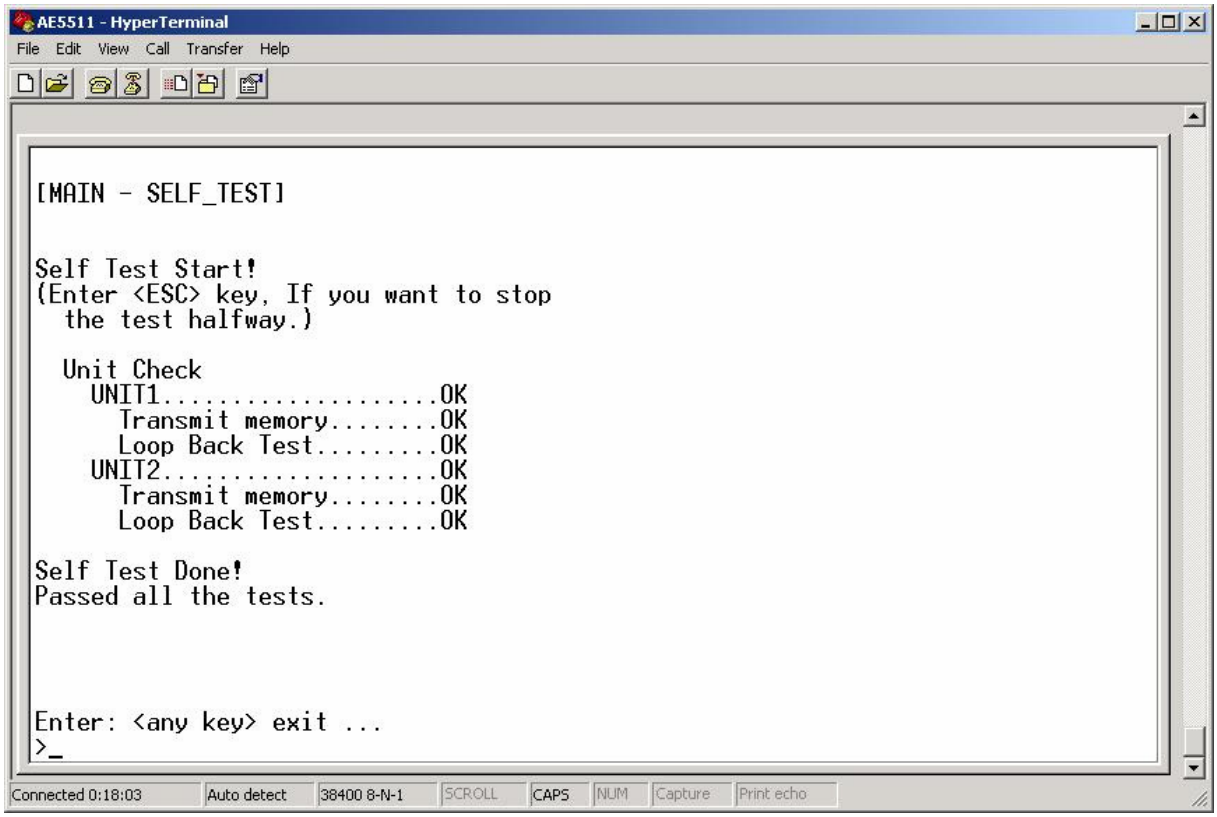


Figure 4.10-19

The measurement results (OK or NG) are displayed for each item. If NG is displayed, this indicates a malfunction. Please contact your nearest Yokogawa representative.

4.10.4.7 Restoring Default Settings

This function restores all of the default settings of the AE5511 TrafficTesterPro. The following are the specific default settings that are restored.

IP Address: 192.168.0.1
Subnet mask: 255.255.255.0
Default gateway: 192.168.0.255

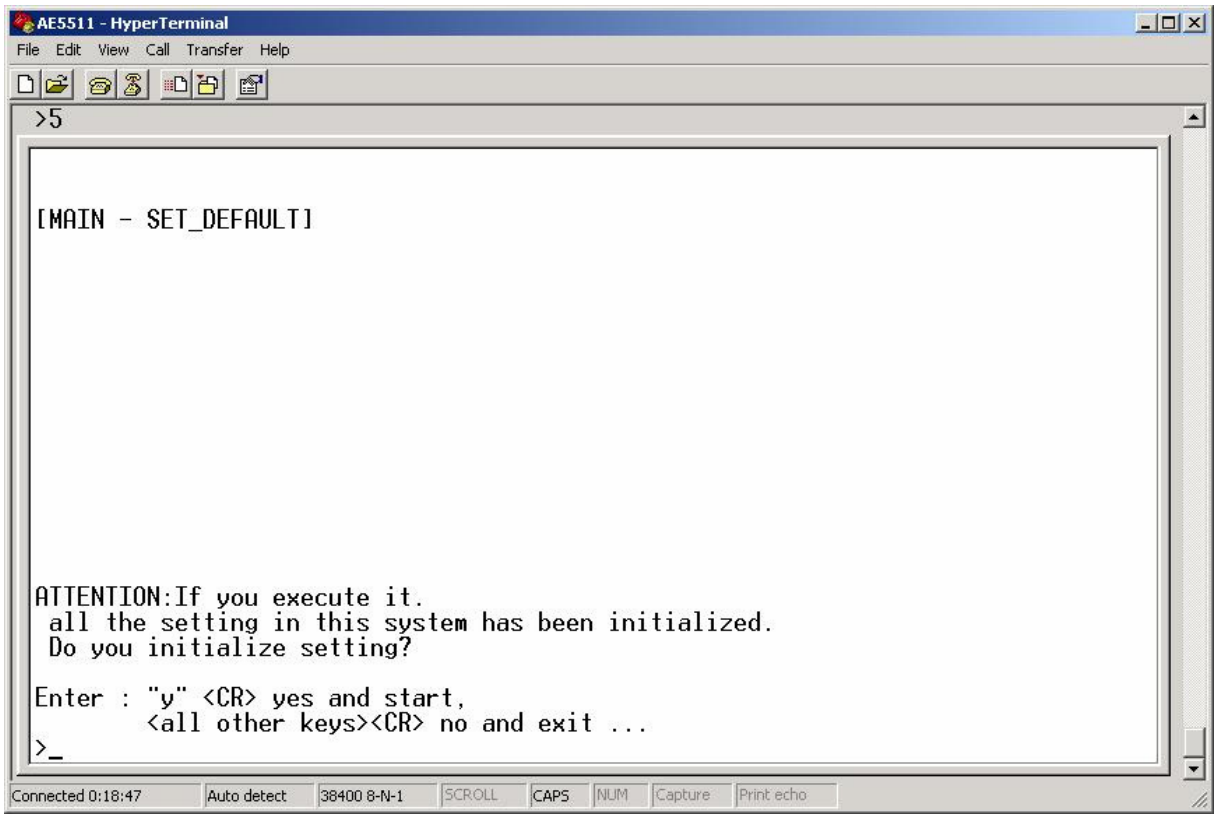


Figure 4.10-20 Default setting start screen

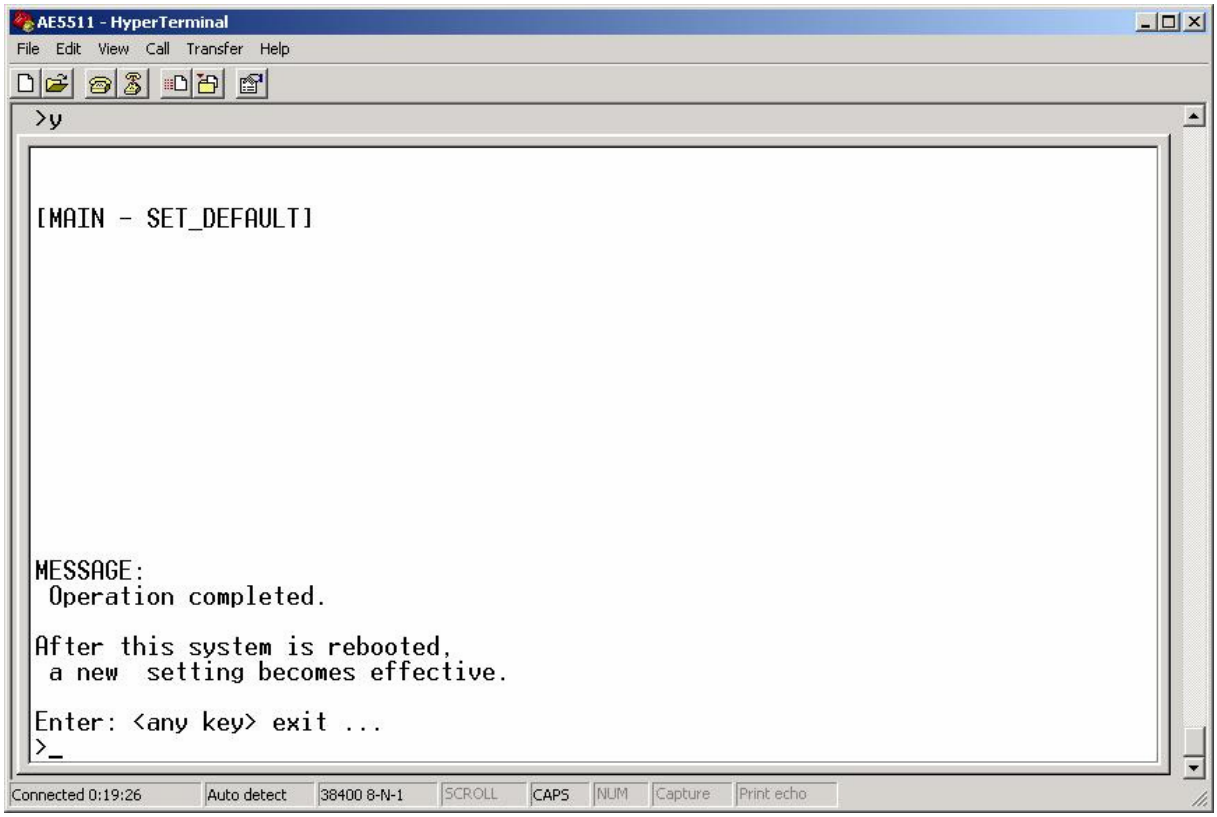


Figure 4.10-21 Default complete screen

Chapter 5 Maintenance

This chapter provides an explanation of testing and maintenance issues.

5.1 External and Mechanical Inspection

Perform a visual inspection of the instrument, and check its mechanical operation. Check for any visible damage or deformities, whether any tabs or levers (on the units) are loose, and whether the power switch can be operated smoothly.

5.2 Simple Operations Test

For a simple diagnostic test of the instrument's operation, execute the self test as described in section 4.8.3. The self test also includes a test of any units that may be installed. For details, see section 4.8.3.

5.3 If You Suspect a Malfunction

Before sending the instrument in for repair, please check the following.

Device Status	Possible Cause	Corrective Action
STANDBY lamp does not illuminate	The instrument is not receiving power.	Check whether the accessory power cord is securely connected to the AC power inlet on the back of the instrument. Check that the MAIN POWER switch on the rear panel is turned ON.
The STANDBY lamp illuminates but the POWER lamp does not.	An area inside the instrument is not receiving power.	Press the POWER switch on the front panel again.
The "beep" does not sound when the POWER switch is turned ON.	The instrument is not functioning properly.	Hold the POWER switch down for 1 sec. or longer to turn OFF the power, then turn the power back ON.
The STATUS lamp does not illuminate when the POWER switch is turned ON.	The instrument is not functioning properly.	Hold the POWER switch down for 1 sec. or longer to turn OFF the power, then turn the power back ON.

Device Status	Possible Cause	Corrective Action
The STATUS lamp turns red.	The instrument is not functioning properly.	Hold the POWER switch down for 1 sec. or longer to turn OFF the power, then turn the power back ON.
After pressing the POWER switch on the front panel, the STATUS lamp blinks continuously for 5 minutes or more.	The instrument is not functioning properly.	Hold the POWER switch down for 1 sec. or longer to turn OFF the power, then turn the power back ON.
The STATUS1 or STATUS2 lamp turns red.	The instrument is not functioning properly. The lamp turns red when an error occurs during the self check.	Hold the POWER switch down for 1 sec. or longer to turn OFF the power, then turn the power back ON.
The fan alarm activates.	The instrument fan is stopped.	Hold the POWER switch down for 1 sec. or longer to turn OFF the power, then contact your nearest YOKOGAWA representative.
A XENPAK malfunction occurred.	A malfunction occurred with XENPAK installed in the AE5522 10GBASE-X Unit	Shut down the instrument be holding down the POWER switch for 1 second or longer. Next, check the condition of the installed XENPAKs (whether the units are not inserted fully, or at all).

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