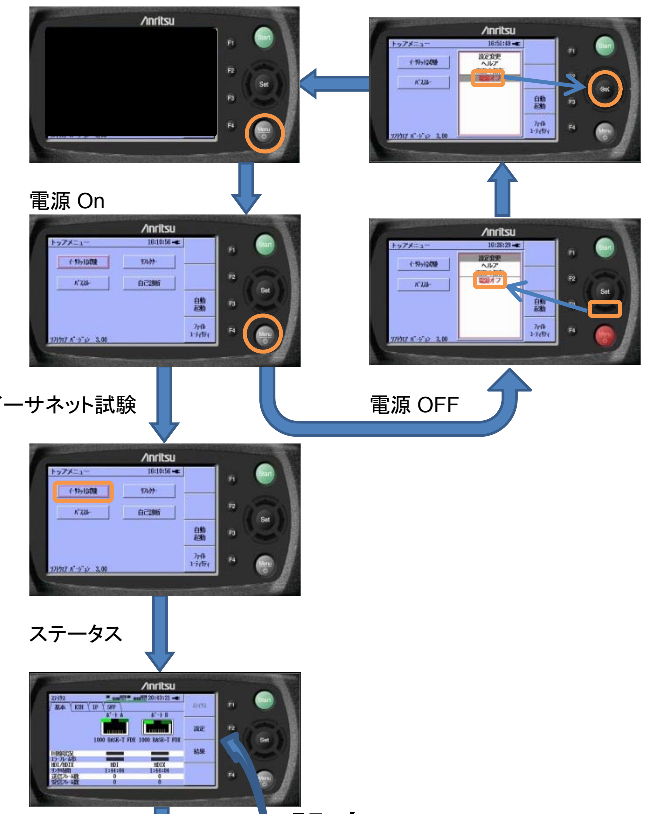
MU909060A GigE 操作例
画面マップ

Network Master

基本操作

基本操作
- 電源 ON/OFF は，"Menu/Power"ボタンで行う。OFF のときはメニューから「電源オフ」を選択する。
- F1～4 または Menu ボタンで操作メニューを開く。
- 上下左右キーで項目を選択して，"Set"でメニューを選択する。
- 開いたメニューをキャンセルするには，開いたときと同じ F1～4,Menu キーをもう1度押す。
- 画面内は上下左右キーで移動し，設定等を行うときは"Set"を押す。
- テスト開始とテスト手動停止は"Start"ボタンで行う。

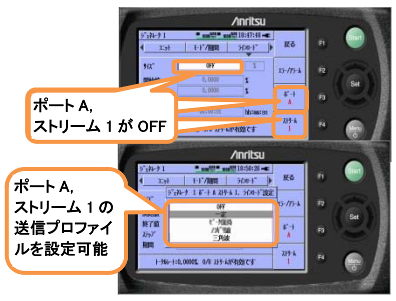


操作上の留意点

操作時の留意点
- テストに使用するポートを ON に，使用しないポートは OFF にする。
  設定/インターフェース/ポートにカーソルを合わせて"Set"で ON/OFF を設定する。
  右下に表示されるポート A/B に注意する。

- 送信元アドレスは，設定/インターフェースで設定する。
- 宛先アドレスは，設定/テストオートメータから，各テスト画面内で行う。
- MU909060A-002 マルチストリームオプションがインストールされているとき，送信元アドレスと宛先アドレスは最大 8 種類まで設定できる。画面右下にストリーム番号が表示される。

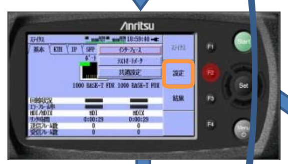
- マルチストリームオプションの各ストリーム送信 ON/OFF は，設定/テストオートメータ/ジェネレータテスト/ラインロードで設定する。



- デフォルト設定では，テスト終了時に結果を自動保存する。自動保存 OFF は，[設定/共通設定]で設定する。これにより，テスト時間を削減できる。

設定

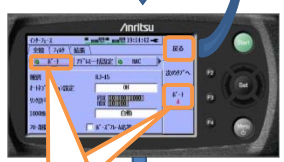
設定



設定/インターフェース

[戻る] でステータス画面へ戻る

設定/テストオートメータ



使用するポート A/B または両方を選択して，[ポート]を Set
緑色にライトが点灯して，ポートが有効化

を Set で新しいテストを追加

ジェネレータを選択

設定/テストオートメータ/ジェネレータ

詳細設定

インタフェース
- 全般タブ
  - 送信元アドレス，IP アドレス
  - VLAN ID，MPLS ラベル(オプション)等
- フィルタタブ
  - 受信フレームのフィルタ処理
- 拡張タブ
  - その他の詳細設定

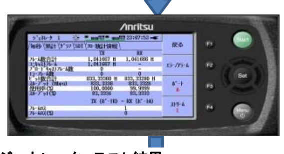
送信元アドレス：設定/インタフェース
宛先アドレス：設定/テストオートメータ/各テキスト内

ジェネレータ
- ユニットタブ
  - ポートの接続方法
    - ポート A/B 対向，同一ポート折り返し 等
- モード/期間タブ（ポート A/B 設定あり）
  - 送受信/受信のみ，連続送信/時間送信
- ラインロードタブ（ポート A/B，ストリーム番号設定あり）
  - 送信 ON/OFF，ラインロード
- サイズタブ（ポート A/B，ストリーム番号設定あり）
  - フレームサイズ，ペイロードパターン
- アドレス一括設定タブ（ポート A/B 設定あり）
  - 全ストリームアドレス一括設定
- 宛先タブ（ポート A/B，ストリーム番号設定あり）
  - 宛先 MAC アドレス，IP アドレス，ARP，DNS
- 判定条件（ポート A/B，ストリーム番号設定あり）
  - テスト結果の合格/不合格　判定値
- SDT タブ（ポート A/B，ストリーム番号設定あり）
  - サービス断時間閾値
- フロー統計情報タブ（ポート A/B 設定あり）（オプション）
  - フロー別統計情報設定

テスト結果

Start

テスト開始

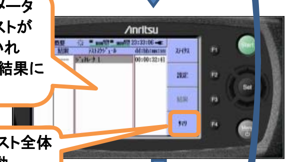


ジェネレータ　テスト結果
- 毎秒タブ（ポート A/B，ストリーム番号設定あり）
  - 秒単位のテスト結果
- 累積タブ（ポート A/B，ストリーム番号設定あり）
  - スタートから現在までのテスト累計結果
- グラフタブ（ポート A/B，ストリーム番号設定あり）
  - テスト結果のグラフ表示
- SDT タブ（ポート A/B，ストリーム番号設定あり）
  - サービス断時間表示
- フロー統計情報タブ（ポート A/B 設定あり）（オプション）
  - フロー別統計情報テスト結果

テスト概要画面へ移動

[戻る]でテスト結果概要に移動

テスト結果概要

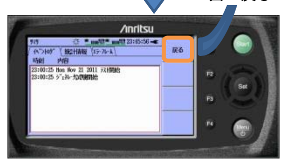


テストオートメータに複数のテストが定義されていれば，ここで各結果に移動できる

[サマリ]でテスト全体の概要に移動

サマリ

[戻る] でテスト結果概要画面へ戻る



サマリ
- イベントログタブ
  - テスト開始からのイベント情報
- 統計情報タブ
  - 受信フレームの種類と数
- エラーフレームタブ
  - エラーの種類と数

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Ethernet

Although Ethernet DIX and IEEE 802.3 are quite similar in many respects, certain service differences distinguish the two specifications. Ethernet DIX provides services corresponding to Layers 1 and 2 of the OSI reference model, and IEEE 802.3 specifies the physical layer (Layer 1) and the channel-access portion of the link layer(Layer 2). In addition, IEEE 802.3 does not define a logical link-control protocol but does specify several different physical layers, whereas Ethernet defines only one. The Frame Length except for Preamble is from 64 to 1518bytes in both Ethernet DIX and 802.3.

Ethernet DIX

Preamble	DA	SA	**Type**	DATA	FCS

Preamble (64bits) : AA AA AA AA AA AA AA AB
DA (48bits) : Destination MAC Address
SA (48bits) : Source MAC Address
Type (16bits) : The value identifies the protocol encapsulated in the DATA field of the frame.
It's sure to be more than 0x0600.The principal type is assigned as follows.

0x0800 :IPv4 — 0x86DD :IPv6
0x0806 :ARP — 0x880B :PPP
0x8035 :Reverse ARP — 0x8847 :MPLS Unicast
0x809B :Appletalk — 0x8848 :MPLS Multicast
0x8137-8138 :Novell,Inc

FCS(32bits) : Frame Check Sequence

802.3

Preamble	DA	SA	**Length**	DATA	FCS

Length (16bits) : The length indicates the number of bytes of data that follows this field.

VLAN Tag

Using VLAN tagging, the following tagging frame is inserted between SA and Type field in Ethernet frame.

TPID	QoS	CFI	VID

TPID (16bits) : Tag Protocol Identifier, 0x8100 fixed
QoS (3bits) : Quality of Service
CFI (1bit) : Canonical Format Indicator. If set to 1,it indicates the presence of the Source-Routing Information(RIF) field after Length/Type field.
VID (12bits) : 0x000,0x001 and 0xFFF are reserved.

10Mbps

	IEEE 802.3			
	10BASE5	10BASE2	10BASE-T	10BASE-FL
Encoding	Manchester			
Maximum Segment Length	500m	185m	100m	2000m
Cable	Coaxial Cable 50Ω (ϕ12 mm)	Coaxial Cable 50Ω (ϕ5 mm)	UTP (Category 3)	MMF 62.5/125μm
wavelength of light	-			850 nm

100Mbps

	IEEE 802.3u		
	100BASE-T4	100BASE-TX	100BASE-FX
Encoding	8B6T	4B5B	
Maximum Segment Length	100 m		2000 m
Cable	UTP (Category 3,4,5)	UTP (Category 5) or STP (IBM Type1,2)	MMF 62.5/125 μm
wavelength of light	-		1310 nm

1Gbps

	IEEE 802.3z				IEEE 802.3ab	
	1000BASE-CX	1000BASE-SX	1000BASE-LX	1000BASE-LH	1000BASE-T	1000BASE-ZX
Encoding	8B110B					
Maximum Segment Length	25 m	550 m	5000 m (SMF) 550 m (MMF)	10 km	100 m	80 km
Cable	150 ohm Shield balanced Cable	MMF 50/125μm MMF 62.5/125μm	MMF 50/125μm MMF 62.5/125μm SMF 10 μm	SMF 10 μm	UTP (Category 5)	
wavelength of light	-	850 nm	1310 nm	1310 nm	-	1550 nm

IPv4 (Internet Protocol version4)

Version (4bits) : 4

IHL (4bits) : Internet Header Length is the length of the internet header in 32 bit words, and thus points to the beginning of the data. Note that the minimum value for a correct header is 5.

Version	IHL	Type of Service	Total Length	
Identification		Flags	Fragment Offset	
Time of Live	Protocol		Header Checksum	
Source Address				
Destination Address				
Options				Padding

Type of Service (4bits) : The Type of Service provides an indication of the abstract parameters of the quality of service desired. These parameters are to be used to guide the selection of the actual service parameters when transmitting a datagram through a particular network.

Bits 0-2 : Precedence.
Bit 3 : 0 = Normal Delay, 1 = Low Delay.
Bit 4 : 0 = Normal Throughput,1 = High Throughput.
Bits 5 : 0 = Normal Reliability, 1 = High Reliability.
Bit 6-7 : Reserved for Future Use.

0	1	2	3	4	5	6	7
Precedence			D	T	R	0	0

Precedence

111 - Network Control — 110 - Internetwork Control
101 - CRITIC/ECP — 100 - Flash Override
011 - Flash — 010 - Immediate
001 - Priority — 000 – Routine

Total Length (16bits) : Total Length is the length of the datagram, measured in octets, including internet header and data.
Identification (16bits) : An identifying value assigned by the sender to aid in assembling the fragments of a datagram.
Flags (3bits) : Various Control Flags.
Bit 0: reserved, must be zero
Bit 1: (DF) 0 = May Fragment, 1 = Don't Fragment.
Bit 2: (MF) 0 = Last Fragment, 1 = More Fragments.

0	1	2
0	DF	MF

Fragment Offset (13bits) : This field indicates where in the datagram this fragment belongs.
The fragment offset is measured in units of 8 octets (64 bits). The first fragment has offset zero.
Time to Live (8bits) : This field indicates the maximum time the datagram is allowed to remain in the internet system.
Protocol (8bits) : This field indicates the next level protocol used in the data portion of the internet datagram.
1-ICMP 2-IGMP 6-TCP 17-UDP
Header Checksum (16bits) : A checksum on the header only. Since some header fields change (e.g.,time to live), this is recomputed and verified at each point that the internet header is processed. The checksum field is the 16 bit one's complement of the one's complement sum of all 16 bit words in the header. For purposes of computing the checksum, the value of the checksum field is zero.

IPv6 (Internet Protocol version6)

Version (4bits) : 6
Traffic Class (8bits) :
Similar to ToS field in IPv4.
Flow Label (20bits) : Flow label is used by a source to label sequences of packets for which it requests special handling by the IPv6 routers, such as non-default quality of service or "real-time" service.

Version	Traffic Class	Flow Label	
Payload Length		Next Header	Hop Limit
Source Address			
Destination Address			

Payload Length (16bits) : Length of the IPv6 payload, i.e., the rest of the packet following this IPv6 header, in octets. (Note that any extension headers present are considered part of the payload, i.e., included in the length count.)
Next Header (8bits) : Identifies the type of header immediately following the IPv6 header. Uses the same values as the IPv4 Protocol field.
Hop Limit (8bits) : Decremented by 1 by each node that forwards the packet. Equal to TTL field in IPv4.
Source Address (128bits) : Address of the originator of the packet.
Destination Address (128bits) : Address of the intended recipient of the packet.

In IPv6, optional internet-layer information is encoded in separate headers that may be placed between the IPv6 header and the upper-layer header in a packet. There are a small number of such extension headers, each identified by a distinct Next Header value. As illustrated in these examples, an IPv6 packet may carry zero, one, or more extension headers, each identified by the Next Header field of the preceding header:

Ex 1)

IPv6 Header Next Header = TCP	**TCP Header & DATA**

Ex 2)

IPv6 Header Next Header = Routing	**Routing Header** Next Header = Fragment	**Fragment Header** Next Header = TCP	**Fragment of TCP Header & DATA**

The IPv6 aggregatable global unicast address format is as follows(Total 128bits):

FP	TLA ID	RES	NLD ID	SLD ID	Interface ID

FP (3bits) : Format Prefix,001 fixed. For Aggregatable Global Unicast Addresses.
TLA ID (13bits) : Top-Level Aggregation Identifier
RES (8bits) : Reserved for future use
NLA ID (24bits) : Next-Level Aggregation Identifier
SLA ID (16bits) : Site-Level Aggregation Identifier
INTERFACE ID (64bits) : Interface Identifier

TCP (Transmission Control Protocol)

Version (4bits) : 4

Sequence Number (32bits) :
The sequence number of the first data octet in this segment (except when SYN is present). If SYN is present the sequence number is the initial sequence number (ISN) and the first data octet is ISN+1.

Source Port									Destination Port	
Source Address										
Destination Address										
Data Offset	Reserved	URG	ACK	PSH	PST	SYN	FIN	Header Checksum		
Checksum								Urgent Pointer		
Options										Padding

Acknowledgment Number(32bits) : If the ACK control bit is set this field contains the value of the next sequence number the sender of the segment is expecting to receive. Once a connection is established this is always sent.
Data Offset (4bits) : The number of 32 bit words in the TCP Header. This indicates where the data begins. The TCP header (even one including options) is an integral number of 32 bits long.
Reserved (6bits) : Reserved for future use. Must be zero.
Control Bits (6bits) :
URG : Urgent Pointer field significant — ACK : Acknowledgment field significant
PSH : Push Function — RST : Reset the connection
SYN : Synchronize sequence numbers — FIN : No more data from sender
Window (16bits) : The number of data octets beginning with the one indicated in the acknowledgment field which the sender of this segment is willing to accept.
Checksum (16bits) : The checksum also covers a 96 bit pseudo header conceptually prefixed to the TCP header. This pseudo header contains the Source Address, the Destination Address, the Protocol, and TCP length. This gives the TCP protection against misrouted segments. This information is carried in the Internet Protocol and is transferred across the TCP/Network interface in the arguments or results of calls by the TCP on the IP.

Source Address		
Destination Address		
Zero	PTCL	TCP Length

Urgent Pointer (16bits) : This field communicates the current value of the urgent pointer as a positive offset from the sequence number in this segment. The urgent pointer points to the sequence number of the octet following the urgent data.

UDP (User Datagram Protocol)

Length (16bits) : This field is the length in octets of this user datagram including this header and the data. (This means the minimum value of the length is eight.)
Checksum (16bits) : The pseudo header conceptually prefixed to the UDP header contains the source address, the destination address, the protocol, and the UDP length. This information gives protection against misrouted datagrams. This checksum procedure is the same as is used in TCP.

0 — 15 — 31

Source Port	Destination Port
Length	Checksum

0 — 15 — 31

Source Address		
Destination Address		
Zero	PTCL	UDP Length

MPLS (MultiProtocol Label Switching)

Label	Exp	S	TTL

Label (20bit) : Label Value. This field carries the actual value of the Label.
A value of 0 represents the "IPv4 Explicit NULL Label".
A value of 1 represents the "Router Alert Label".
A value of 2 represents the "IPv6 Explicit NULL Label".
A value of 3 represents the "Implicit NULL Label".
Values 4-15 are reserved.

S (1bit) : Bottom of Stack. This bit is set to one for the last entry in the label stack
TTL (8bit) : Time to Live. When an IP packet is first labeled the TTL field of the label stack entry is set to the value of the IP TTL field. When a label is popped, the TTL field needs to be decremented.
Exp (3bit) : Experimental Use. This three-bit field is reserved for experimental use.

The Particular protocol of MPLS Label value determination.

RSVP (Resource reSerVation Protocol)

The RSVP protocol is used by a host to request specific qualities of service from the network for particular application data streams or flows. RSVP is also used by routers to deliver quality-of-service (QoS) requests to all nodes along the path(s) of the flows and to establish and maintain state to provide the requested service. RSVP requests will generally result in resources being reserved in each node along the data path.

LDP (Label Distribution Protocol)

The LDP protocol is the set of procedures and messages by which Label Switched Routers (LSRs) establish Label Switched Paths (LSPs) through a network by mapping network- layer routing information directly to data-link layer switched paths. These LSPs may have an endpoint at a directly attached neighbor (comparable to IP hop-by hop forwarding), or may have an endpoint at a network egress node, enabling switching via all intermediary nodes.