MU120131A/32A

IP Multicast Measurement

MD1230B/MP1590B

Data Quality Analyzer / Network Performance Tester

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1. Introduction

The rapid spread of broadband networks is leading to a new era of IP-network based services. One of the most important services is IPTV, using IP multicast technology. Anritsu's MD1230B and MP1590B are general-purpose IP testers that also support QoS evaluation of multicast networks.

This guide explains some examples of IP multicast network QoS evaluations using the MD1230B and MP1590B.

1.1. Structure of Guide



Fig. 1 Structure of Guide

* This guide assumes that the MU120131A/132A module (Ver. 7.0 or later) is installed in the MD1230B. When installing MD1230 family software Ver. 7.0, refer to the Version Upgrade procedure on the software CD-ROM.

* Upgrade the firmware according to the version upgrade procedure, check the installation and then connect to the unit.



Note: When the Ver. 7.0 installer is executed. All setting conditions are cleared. When wanting to save the settings of the older version, use the Save settings function before upgrading.

1.2. About Multicast Distribution

With the rapid growth of broadband network environments, subscribers and providers are increasingly demanding and providing rich-content services including graphics, voice, and video. However, because provision of rich content requires transmission of very large data amounts, there is concern about the loads on servers supplying the content and on the distribution networks. In video streaming services typified by IPTV, the increasing numbers of subscribers and rising server loads mean that the old unicasting technology (one stream to one subscriber) is no longer adequate. As a result, more providers are using multicasting technology (one stream to many subscribers) as a way of reducing loads on networks and servers.



Fig. 3 Multicast Distribution



MU120131A/32A IP Multicast Measurement Quck Start Guide

In multicast content distribution, the routers must support the multicast routing protocol. Routers are identified as a group including multiple subscribers using a multicast address to perform routing and distribution. In video services, this multicast address is the equivalent of a broadcast channel.



Fig. 4 IP Multicast Network

Frequent channel switching (Zapping) on IPTV causes extremely high loads on routers and the network. Zapping verification is a very important item in assuring and evaluating the quality of multicast services.

This guide explains channel switching time measurement, transmission delay time measurement and QoS measurement based on the assumptions that Zapping is performed frequently.



2. Shared Basic Operations

This section explains installation of the MD1230B and the power-on and start-up procedures.

2.1. Installing MD1230B

- > Install the MD1230B on a flat and stable surface.
- The MD1230B has a cooling fan in the back panel. Position the MD1230B so that it is at least 10 cm from walls and obstructions to allow sufficient cooling air flows.
- Supply power in the voltage ranges of 100~120 Vac or 200 ~ 240 Vac at a frequency of 50~60 Hz. The power consumption is 600 Vac.



- 2.2. Installing Modules
 - Install one MU120131A unit in Slot 3.
- 2.3. Power-on/off



- (1) At power-on
 - > Plug the power cord into the power socket.
 - > Set the power switch to ON.
- (2) At power-off
 - Shutdown the MD1230B in the same way as a normal PC and set the power switch to OFF.



2.4. Starting

MMD12308 Selec	Welcome to MD1230B	
1N0	Select an application. Main application will shart automatically in 7 seconds.	
	Main application	
1 <u>00</u>	Self test	
Lacel	M Setup utility	
	Tcl/Tk application	
Perul Lask	MS DOS prompt	Rection Bit Dia Sar
8 1	Shut down	Poser Fail Marn Error Fisawy (H Reset
		Reytourd USA

♦ Main start-up

At power-on, the Selector screen shown above is displayed. Click "Main application". The screen changes to the Measurement screen automatically after about 15 seconds.

2.5. Obtaining Ownership

- ♦ Before starting measurement, the ports to be measured must be reserved.
 - Right-click Unit1 and select "Reservation...". The ports of usable modules that can be used are listed as shown below; place checkmarks in the required ports and press the "Check all" button.





3. Evaluation Example 1...Measuring Channel Switching Time

This section explains measurement of channel switching time of a multicast distribution network.

Channel switching time measurement measures the time from when the IGMP/MLD Join message is sent until the traffic flow starts and can be used to monitor a multicast network.





Channel switching time can be monitored using general protocol analysis software, but in this case, it is necessary to provide a contents server broadcasting the multicast stream as well as a host outputting the channel switching request (Join message). Using the MD1230B, both the contents server and host can be emulated, so channel switching time can be measured with no need for this extra equipment.

The channel switching time is measured using the MD1230B Capture function.



Fig. 6 Measuring Channel Switching Time with MD1230B

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3.1. Connecting DUT

(Outline)

Connect an IP multicast network to the MD1230B.

(Contents)

First, provide an IP multicast network environment using a router. (This guide describes an IPv4 network using the IGMP protocol (at host side) and PIM-SM protocol (at network side).

When connected to the MU120131A, Port 1 emulates a server and Port 2 emulates a host. The Port 3–Port 4 Through function is used to issue the channel switch request at the emulated host side (Join message) and to capture the broadcast multicast stream when the request is received.

(Results)

You will learn about connecting the DUT with measuring equipment.

♦ Connecting Multicast Routers

- Connect Port1 of the MU120131A to the server-side router. (In this guide, the server-side network is "192.168.4.0/24".)
- Connect Port2 of the MU120131A via Port3-Port4 (Through Mode) to the host-side router. (In this guide, the host-side network is "192.168.1.0/24".)
 - Connect Port2 of the MU120131A to Port3.
 - Connect Port4 of the MU120131A to the host-side router.



IP Multicast Network

Fig. 7 Connecting DUT



3.2. Setting Measurement Ports

(Outline)

Perform the basic settings for the ports operating as the emulated server and emulated host. *(Contents)*

Set the following port numbers and addresses for the emulated server and host.

In addition, perform settings for ARP and Ping.

[Emulated Server]

Port number: Port1 MAC Address: 00-00-91-01-01-01

IPv4 Address: 192.168.4.10

Netmask: 255.255.255.0

Gateway: 192.168.4.254

[Emulated Host]

Port number: Port2

MAC Address: 00-00-91-01-01-02

IPv4 Address: 192.168.1.10

Netmask: 255.255.255.0

Gateway: 192.168.1.254

Change Port3-Port4 to the Through Mode to capture the broadcast stream when the emulated host issues the channel switching request (Join message).

(Results)

You will learn basic settings for using ports for measurement.

- ♦ Changing Port3-Port4 to Through Mode.
 - > Select Port3 and right-click to select "Port Setting" (opens "Port Setting" window).



- > Set "Mode:" to "Through [Port3–Port4]".
- Remove the checkmarks in "1000 Mbps Half Duplex" and "1000 Mbps Full Duplex" of "Auto Negotiation" (when the router connection port is 100 Mbps Full Duplex).
- Press the "OK" button.
- When the dialog "MII Properties are changed into the default values. Continue?" is displayed, select "Yes".



(1)	Port setting - Unit1:3:3		×	
(1) -	Swipership: Owner	Mapping: Framed	<u>о</u> к	
	Mode: Through [Port3 - Port4]		<u>C</u> ancel	(D)
	MAC Address: 00-00-00-00-00	Auto Negotiation	Ápolu ((3)
	IPv4 IPv6 VLAN Protocols	On Off		
		Capabilities To Be Advertised ☐ 10M bps Half Duplex Restart	Help	
	IPv4 Address: 0.0.0.0	 ✓ 10M bps Full Duplex ✓ 100M bps Half Duplex Timing: Auto 		
	Netmask: 0.0.0.0	100M bps Full Duplex 1000M bps Half Duplex Loude MDL/MDL×		(2)
	Gateway: 0.0.0	1000M bps Full Duplex		
	,	Loopback (1000M Full only)		
	C Not send	Flow Control Receive (Full Duplex only)		
	C Reply to this port ARP request	rt setting		
	C Heply to all AHP request	2) MII Properties are changed into the default values.		
	ICMP Echo (PING) Reply			
	C Reply to this port PING request			
		(4)		
		Maximum Frame Size: 1518 (1518 is recommended)		
		Test Pattern: Single PRBS 9		

- ♦ Setting Port Operating as Emulated Server
 - Select Port1 and right-click to select "Port Setting" (opens "Port Setting" window).



- Set "MAC Address:" to "00-00-91-01-01".
- Set "IPv4 Address:" to "192.168.4.10".
- Set "Netmask:" to "255.255.255.0".
- Set "Gateway:" to "192.168.4.254".
- Select "Reply to this port ARP request".
- Select "Reply to this port PING request".
- Remove the checkmarks in "1000 Mbps Half Duplex" and "1000 Mbps Full Duplex" of "Auto Negotiation" (when the router connection port is 100 Mbps Full Duplex).
- > Press the "OK" button.



	Port setting - Unit1:3:1		×	
(1)	Ownership: Owner	Mapping: Framed	<u>o</u> k	
	Mode: Normal	MII Properties	Cancel	(0)
(2)	MAC Address: 00-00-91-01-01-01	Auto Negotiation	Applu	(0)
(3)	IPv4 IPv6 VLAN Protocols	On Off		
(4)	- This Port	Capabilities To Be Advertised IOM bps Half Duplex Restart	Help	
	IPv#Address: 192.168.4.10	 ✓ 10M bps Full Duplex ✓ 100M bps Half Duplex Timing: Auto ▼ 		
(5)	Netmask: 255.255.255.0	100M bps Full Duplex 1000M bps Half Duplex 1000M bps Half Duplex Vertex Auto MDI/MDIX		(7)
	Gateway: 192.168.4.254			
		Loopback (1000M Full only)		
	AHP Reply	Flow Control Receive (Full Duplex only)		
(6)	Reply to this port ARP request	Multicast Pause Address 01-80-C2-00-00-01		
		Directed Address This Port		
	ICMP Echo (PING) Reply	C User Defined 00-00-00-00-00		
	Reply to this port PING request			
		MII Registers Default		
		Maximum Frame Size: 1518 (1518 is recommended)		
		Preamble		
		Test Pattern: Single PRBS 9		

Check that 100M Full is displayed at the screen bottom right and that the Link LED is green. (Confirm that the connection between the router and instruments is Link Up at "100Mbps Full Duplex".)

100M Full	Link Coll Err Trig

- ♦ Setting Port Operating as Emulated Host
 - Select Port2 and right-click "Port Setting" (opens "Port Setting" window).



- Set "MAC Address:" to "00-00-91-01-01-02".
- Set "IPv4 Address:" to "192.168.1.10".
- Set "Netmask:" to "255.255.255.0".
- Set "Gateway:" to "192.168.1.254".
- Select "Reply to this port ARP request".
- Select "Reply to this port PING request".

- Remove the checkmarks in "1000 Mbps Half Duplex" and "1000 Mbps Full Duplex" of "Auto Negotiation" (when the router connection port is 100 Mbps Full Duplex).
- Press the "OK" button.



Check that 100M Full is displayed at the screen bottom right and that the Link LED is green. (Confirm that the connection between the router and instruments is Link Up at "100Mbps Full Duplex".)

100M Full	Link Coll Err Trig

- ♦ Checking Connection
 - Display the Ping screen for Port1, set the value of "Destination:" to "192.168.1.10" and press the "Ping" button.



MX123001 A Data Quality A	nalyzer Control Software		Alarm Error P.Fai	. m.	
Transmit Unit Entry Unit Entry Port 1 Port 1 Port 3 Port 4 Port 5 Port 6 Port 7 Port 8 Port 7 Port 8 Port 9 Port 10 Port 10 Port 11 Port 12 Traffic Monitor Traffic Monitor Traffic Monitor Traffic Map Service Disruption Time RFC 2889 Automatic Test E	Counter Capture Capture Capture Capture Capture Capture Physical I/F © Error Insertion (3) Version: © IPv4 Port ID: Unit1 [192. Source: 192.168.4: Destination: 192.168.1: 192.168.1: 192.168.1:10 Reply from 192.168.1:10 Rep	Error • Tx Stream • Collision • Co • IPv6 168.1.12]:3:1 10 10	(2) bytes byte	time (ms) 0 0 0 0 0 0 0 0	tion ◀ TTL 254 254 254 254 254
		Unit1:3:1 Owner	100M Full	ink Coll Err	Trig

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Check that "Reply from 192.168.1.10" is displayed in "Result:". (This checks the connection over the router.)



3.3. Setting Tx Stream

(Outline)

Create multicast stream data for operating as emulated server.

(Contents)

Broadcast a multicast stream using the MD1230B Tx Stream generation function.

In this example, two multicast streams are prepared (multicast addresses: "224.1.1.1" / "224.1.1.2"). The traffic for each stream is 5 Mbps.

(Results)

You will learn how to set up an emulated server broadcasting video on two channels each with a bandwidth of 5 Mbps.

- Creating Multicast Stream Data 1 Generated from Port1 at Server Side (Multicast Address: 224.1.1.1)
 - Select Port1 and press "Add" at the Tx Stream screen to add one stream.
 - > With the added stream selected, press "Edit..." to edit the stream.



- Set "Protocol" at [General] of the Frame Setting screen to "UDP/IPv4". (Multicast broadcasts generally use the UDP protocol.)
- Set "Frame Length:" to "Fixed" and a value of "1518". (The maximum length of Ethernet frames is 1518 bytes.)



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- Set "Source Address" at [Ethernet] of the Frame Setting screen to "This port". (When "This port" is selected, the address specified by "Port Setting" is enabled.)
- Set "Destination Address" to "Static" and "Value:" to "01-00-5E-01-01-01". ("01-00-5E-01-01-01" is the MAC address used by multicast address "224.1.1.1".)

Stream Setting - Unit1:3:1 - Stream `			×
Stream Control Frame Setting	-(1)	(4)	1 <u>o</u> k
General Ethernet UPv4 UDP Data	Fields Error Insertion		
Presimble Size: 8 🔿 bytes	Destination Address	ource Address	
(2) Edit Preamble Pattern	Static	This port	+- (3)
SFD: hex D5	Value:	Value:	Mont
-	01-00-5E-01-01-01	00-00-00-00-00	
Lype Auto (bey 0800)	Mask:	Mask: (5)	Help
	FF-FF-FF-FF-FF	FF-FF-FF-FF-FF V	
(hex)	,	,	
ECC: Auto			
PCS. Auto			
			_
Frame Format Frame View			_
Total Length		Part Length	411
V			
	Describle		
	,	• –]
8	SFD		
	DA	6	
14	DA		
**			
	SA	6	
	Table		<u> </u>

- Set "Source Address" at [IPv4] of the Frame Setting screen to "This port". (When "This port" is selected, the address specified at "Port Setting" is enabled.)
- Set "Destination Address" to "Static" and "Value:" to "224.1.1.1".



Stream Setting - Unit1:3:1 - Stream 1	·(1)		X
General Ethelnet IPv4 UDP Data F	Fields Error Insertion		<u><u> </u></u>
Version: 4 HL Auto Type of Service Bit 0-2: 000 - Routine Bit 3: 0 - Normal Delay Bit 4: 0 - Normal Delay Bit 5: 0 - Normal Reliability Bit 6,7: 00 Overwrite Total Length 0 Identification: hex 0000	Flag St. 0. Image: Constraint of the second se	Source Address Type: This Port Address: 127.0.0.1 Mask: 255.255.255 C	<u>Cancel</u> (3) <u>Prev</u> N∈(4) <u>He(</u> 5)
Frame Format Frame View		Part Length	
0 0	Preamble		
	DA	6	
	SA Tone	6	·

- Set the value of "Source Port:" at [UDP] of the Frame Setting screen to "1315". (This specifies the undefined UDP port address.)
- Set the value of "Destination port:" to "5556". (This specifies the undefined UDP port address.)

Stream Set	tting - Unit1:3:1	- Stream 1 (1)			X
Stream Cor			(2)		<u>о</u> к
Source	Port:	1315 Increment Contraction Increment Contraction Increment Incr	t Port Number		<u>C</u> ancel
(2) Destina	tion port:	5556 Source	e Port		Prev
Dve 🗌	erwrite Length	0 Desti	nation Port		Next
	erwrite Checksum	hex 0000			<u>H</u> elp
Frame For	mat Frame View				
	Total Length	n	Part	Length	
		U	10		
		Preamble	8		
	8		SFD		
		DA	6		
	14				
		SA	6		
	20	Tune		-	
					1

- Select "Next Stream" at "Distribution:" on the Stream Control screen.
- Set "Unit" of "Inter Stream Gap:" to "ns" and set the value of "100M" to "1,092,320". (Setting the inter-frame gap to 1,092,320 ns means sending the stream over the 10 Mbps band at a 100M Link speed.) Since two streams are created in this example and are broadcast alternately, the actual output for this setting is 5 Mbps.



After setting "Unit" of "Inter Frame Gap:" to "bit/s" and inputting "10,000,000", return "Unit" to "ns" and confirm that the 10-Mbps equivalent gap time is 1,092,320 ns.

> Press the "OK" button to close the setting screen.

	Jump to ID		- Lount:			1143	Cancel
iter Stream Gap	• (l pit ns	10M 10923200	100M 1092320	1000M 109232	Actual Value 109232ns	<u>Prev</u>
ter Frame Gap: Fixed	Value:	Unit ns	(3) 10M 10923200	100M 1092320	1000M 109232	Actual Value 109232ns	<u>H</u> elp
C Random	Min: Max:	ns ms	✓ 9600✓ 0.0096	960	96	96ns 0.000096ms	
ter Burst Gap:		Unit ns	10M 9600	100M 960	1000M 96	Actual Value 96ns	
rames per Burst ursts per Stream	:	1					
Stream image:							-
	Frame	B	urst		Burst	SG F	

- Creating Multicast Data Stream 2 Generated from Server Side Port1 (Multicast Address: "224.1.1.2")
 - With the stream selected at the Tx Stream screen, press "Copy" and then press "Paste" (to copy one stream).



> With the second stream selected, press "Edit..." to edit the stream.

MX123001A Data Quality	Analyzer Control Software
Transmit V	Counter Capture Error History H.Reset
□ · 禮 Unit Entry	Physical I/F • Error Insertion • Tx Stream • Collision • Counter • Capture • Latency • Ping • Variation
	Elapsed Time: 2:08:06
- Port 1	ID Distribution Length Protocol VLAN Errors
Port 2 Port 3	Image: None Direct 1519 UDP/IPut None Los Image: None Fixed 1519 UDP/IPut None None None
- Der Port 4	Z Next Fixed 1516 UDF/IFV4 None None Edit
Port 5	
Port 7	
Port 9	Сору
Port 10 Port 11	Cut
Port 12	Paste
Traffic Map	Import
Service Disruption Time	
RFC 2544 Automatic Test E	Clear All
mrc 2005 Automatic Test E	Enable All
	Disable All
	C <u>s</u> v -
	Device Type (for Latency)
	Unit1:3:1 Owner 100M Full Link Coll Err Trig

- Set "Source Address" at [Ethernet] of the Frame Setting screen to "This Port". (When "This port" is selected, the address specified at "Port Setting" is enabled.)
- Set "Destination Address" to "Static" and "Value:" to "01-00-5E-01-01-02". ("01-00-5E-01-01-02" is the MAC address used by multicast address "224.1.1.2".)

Stream Setting - Unit1:3:1 - Stream 2	(4)				×
Stream Control Frame Setting	.(1)	(4	.)	(OK	
General Ethernet IPv4 UDP Data F	Fields Error Insertion				4
Prezimble Size: 8 🔿 bytes	Destination Address	Source Addre	225	<u><u>C</u>ancel</u>	
(2) Edit Preamble Pattern	Static	This port	>		
SFD: hex D5	Value:	Value:		Next	1
Туре	01-00-5E-01-01-02	00-00-00-0	0-00-00		
Auto (hex 0800)	Mask:	Mask:	5)		
C Manual 0800 - Internet IP 💌 (hex)		JEF-FE-FE-F			
ECS: Auto				┘ ┃	
Pos. Maio					
Frame Format Frame V/Juni					
Total Length			Part Length		
0		15			
	Preamble		8		
	SFD		<u> </u>		
	DA		6		
			\perp		
	SA		6		
20					
	Тяпе		9		

- Set "Source Address" at [IPv4] of the Frame Setting screen to "This port". (When "This port" is selected, the address specified at "Port Setting" is enabled.)
- Set "Destination Address" to "Static" and "Value:" to "224.1.1.2".



Stream Setting - Unit1:3:1 - Stream 2			X
Stream Control Frame Setting	-(1)		
General Ethenet IPv4 UDP Data	Fields Error Insertion		
(2) Type of Service Bit 0-2: 000 · Routine Bit 3: 0 · Normal Delay	Flag Bit 0: 0 Bit 1: 1 - Don't Fragment Bit 2: 0 - Last Fragment Fragment Offset:	Source Address Type: This Port Address: 127.0.0.1 Mask: 255.255.255 V	Cancel (3) Prev Ne(4)
Bit 4: 0 - Normal Throughput 💌	Time to Live: 64	Destination Address	Helo
Bit 5: 0 - Normal Reliability 💌 Bit 6,7: 00 💌	Protocol: Auto (17) Manual 	Type: Static Address 224.1.1.2	
Overwrite Total Length 0 Identification: hex 0000	Header Checksum: Auto Options (0 byte)	Mask: 255.255.255	
Frame Format Frame View			
Total Length		Part Length	
	Preamble	8	
	SFI	P	
	D≜	6	
20	SA	6	
	Тупе		ᆀ

- Set the value of "Source Port:" at [UDP] of the Frame Setting screen to "1316". (This specifies the undefined UDP port address.)
- Set the value of "Destination port:" to "5557". (This specifies the undefined UDP port address.)

Stream Settine Stream Contro General Ethe Source port Destination Overwrit	s - Unit1:3:1 Frame Setting ernet IPV port: the Length the Checksum	- Stream 2 (1) JDP D ta Fields Error Insertion (3) 1316 55571 Source Port Destination Port hex 0000			□K □Ancel □Prev Next Help
Frame Format	Frame View		Dart Longth		
1		15		i A	
	8	Preamble SFD	8		
		D&	6		
	20	SA	6		
		Tone	<u> </u>	_	

- > Select "Jump to Stream" at "Distribution:" of the Stream Control screen.
- Set the value "Jump to ID" to "1" (sets jump stream destination to stream 1).
- > Press "OK" to close the setting screen.



MU120131A/32A IF	D	Multicast	Measurement	Quck	Start	Guide
------------------	---	-----------	-------------	------	-------	-------

)istribution:	Name Set	ing to Stream	n			FD	tal Time (1000M): 121.44us				
	Jump to IE		1	Count:						ancel	
nter Stream Gap):	Unit ns	•	10M 10923200	3) ₁	00M 1092320	1000M 109232	Actual Value 109232ns		<u>P</u> rev <u>N</u> ext	
nter Frame Gap:										Help	
 Fixed 	Value:	Unit ns	-	10M 10923200	1	00M 1092320	1000M 109232	Actual Value 109232ns			
○ Random	Min:	ns	-	9600		960	96	96ns			
	Max:	ms	Ψ.	0.0096		0.00096	0.000096	0.000096ms			
nter Burst Gap:		Unit ns	•	10M 9600	1	00M 960	1000M 96	Actual Value 96ns			
rames per Burst	:	1		_							
Bursts per Strear	n:	1									
Stream image:							D		-		
	Frame	IEG	ourst		IBG 📕	IEG	IFG III ISG !				
		< <u></u> →		<u>←</u>	< <u></u> →	→					



3.4. Setting Host Emulation

(Outline)

Create an IGMP protocol sequence for operation as an emulated host.

(Contents)

Use the MD1230B protocol emulation function to assemble a Join/Leave sequence for the multicast group.

In this example, two multicast groups (multicast address: "224.1.1.1" / "224.1.1.2") are created using the IGMP-v2 switching sequence.

(Results)

You will learn how to switch 2-channel video data and how to construct an emulated host sequence.

- ♦ Setting Port2 as Emulated Host Supporting IGMP
 - Select Port2 and place a checkmark in the first "Entry Information" at [IGMP] in the Protocol screen. Press "Edit..." to edit the IGMP protocol sequence.

	/1 MX123001 A Data Quality /	Analyzer Control Software	;		
	🖫 Tool 🛛 🕨 Transmit 👂	Counter 🌗 Capture 🌗	Error	Alarm His	Error P.Fail Log 🖥 🖶 🔋 🕅
ĺ	P 🖉 Unit Entry	Tx Stream Collision	Counter 🛛 😐 Capture 🗍 😐 L	atency 🛛 🖻 Ping 🗋 🔍 Varia	ide • Protocols
	i⊇ 📼 Unit1		MLDA		(2)
	Pert 1				
	Port 2	Entry Information			
(1)]		No. Model # d	of Host/CH Host Addre	ess (from)	Group Address (from)
	- Port 5	I Inc/Dec Host 1/ [™]	1 20.1.0.1		224.1.1.1
	Port 6	Inc/Dec Host 1/	1 20.1.0.1		224.1.1.1
	Port 8	3 Inc/Dec Host 1/	1 20.2.0.1		224.1.1.1
	De Port 9	4 Inc/Dec Host 1/	1 20.3.0.1		224.1.1.1
	(> Port 10				
	- Der Port 11	Edit <u>C</u> op	y <u>P</u> aste	<u>Save L</u> oad.	
	Traffic Monitor		(5)		
	Traffic Map	State Monitor - Entry I	(J) Host:	#1-#25 <u>R P</u>	
	Group Entry				
	BEC 2544 Automatic Test E				
	RFC 2889 Automatic Test E				
	-				
		· · ·		· · · ·	
		<u>p</u>			
		Counter			
		Received General Query (ver	ision 3)	U	
		Received General Query (vers	sion 2)	0	
		Beceived Group Specific Que	ery (version 3) eru (version 2)	0	
		Received Group and Source	Specific Query	0	
	↓			1	
ŕ			Unit1:3:2 Owner	100	M Full Link Coll Err Trig

At [Step1] on the IGMP Host Emulation screen, set "IGMP Version:" to "2" and "Emulation Model:" to "Change Channels" (supports IGMP-v2 channel switching).





> At [Step2] of the IGMP Host Emulation screen, set "Change Interval:" to "8s" and set "LEAVE-JOIN Interval:" to "7s". (This holds an 8-s interval after the channel is switched, and a 7-s interval after cutoff, and then repeats the operation.)



Set the value of "Host Address:" at [Step3] of the IGMP Host Emulation screen to "192.168.1.10".

22

- Set the value of "Number of Host:" to "1".
- Set the value of "Group Address:" to "224.1.1.1".



Set the value of "Number of Group:" to "2".

> Press "OK" to close the setting screen.

This setting performs switching alternately between "224.1.1.1" and "224.1.1.2". There is one emulated host (on "192.168.1.10").

IGMP Host	Emulation - Unit1:3:2 - No. 1				×
Navigation:	STEP 3: Address Setting	I			
STEP 1 STEP 2 STEP 3	Host Address: from 192.168. Channels: Increment C Group Address: from 224.1.1	1.10 Num List 1 Num tate 1 224.1.1.1	ber of Hosts:	(3) (5) State 2 [52 224.1.1.2	Cancel Prev. Entry Next Entry
(1)	Host 1	Address between Ho	osts	Export Address Lis	
	G1 Host 1	224.1.1.1	State Change	<u>62 224.1.1.2</u>	
	<< <u>P</u> rev			<u>N</u> e)	t>>
IGMP version	2 Model 3: Change CH	Resource (Host):	1/200	Resource (Process):	1/ 200

- ♦ Enabling IGMP Protocol at Port2
 - > Select Port2 and right-click to select "Port Setting" (opens "Port Setting" window).



- Place a checkmark in "IGMP" of "Protocol Filter:" at [Protocol] of the Port Setting screen.
- Press the "OK" button.



Port setting - Unit1:3:2		×	
(1) Ownership: Owner	Mapping: Framed	ок	
Mode: Normal	MII Properties	<u>Cancel</u>	3)
	On Off	Apply	
Protocol Filter:	Capabilities To Be Advertised ♥ 10M bps Half Duplex ♥ 100M bps Full Duplex ♥ 100M bps Full Duplex ■ 1000M bps Full Duplex ■ 1000M bps Full Duplex ■ 1000M bps Full Duplex ■ 0000M bps Full Duplex	Help	
	Loopback (1000M Full only)		
	Multicast Pause Address 01.80.02.00.00.01		
	Directed Address This Port User Defined		
	MII Registers Default		
	Maximum Frame Size: 1518 (1518 is recommended)		
	Preamble		
	Test Pattern: Single PRBS 9 💌		



3.5. Setting Capture Filter

(Outline)

Perform capture settings for measuring channel switching time.

(Contents)

The MD1230B has functions for capturing and analyzing received packets. This part shows how to set filters for capturing the Join message (Port3) and the resultant received multicast stream (Port4) to measure the channel switching time.

(Results)

You will learn how to set triggers for performing synchronized capture at two ports.

- ♦ Connecting and Synchronizing Port3 and Port4 Capture
 - Use a BNC cable to connect "Output Trigger" and "Input Trigger" on the back panel of the main frame.

By using this external trigger, capture of Port4 can be started automatically using the timing of the Join message detected at Port3.



Fig. 8 MD1230B Back Panel

- ♦ Setting Filter for Detecting Join Message at Port3
 - Select Port3 and press the "Filter" button at the Capture screen to open the Capture Setting" screen.



	N N	(123001A Data Qua	lity A	nalyzer Co	ntrol Soft	ware						<u>_ ×</u>
	oT 📲	ol 📄 📄 Transmit) 🔶 C	ounter 🗼	Capture		^ (2)		Alarm Error History H	P.Fail Reset	Log 🖥 📑	? 🛃
		a Unit Entry		Physical I/F	Counter	Capture D Later	ncy 📔 🔍 Variation	n				
	E	⊷≔ unit1	ом (M X	8 F	N & W V	j0 8↓			Elap	sed Time:	0:00:00
		- Port 1										
		Port 3	5	No.	Туре	VLAN ID	SA		DA			L
		Port 4			(3)							
		Port 6			(0)							
(1		Port 7 Port 8										
		Port 9										
		Port 10										
		- Port 12										
		Traffic Monitor										
		Group Entry										
		BFC 2544 Automatic T	est E									
	"	j° RFC 2889 Automatic T	est E									
				•								
	•		D	Raw Frame	Decode							
						Unit1:3:3	Owner		100M Full	Lin	k Coll Err	Trig //

- Place a checkmark in "On" at [Trigger] of the Capture Setting screen and set "Pattern1" of "Condition" to "Match".
- > Press "Edit..." to open the "Filter/Trigger/Counter Condition" screen.

Capture Setting - Unit1:3:3		×
Filter Trigger (1)	Filter/Trigger/Counter Conditions	ок 1
(2) (3)	(<u>Edit</u>) (4)	
Londition	Pattern T	
Pattern 1: Match	Base Position: Top of Frame 🔽 Offset: 0 🚍	<u>H</u> elp
Pattern 2: don't care 💌	Pattern: 0000 0000 0000 0000 0000 0000 0000 0	
Pattern 3: don't care 💌	Mask: 0000 0000 0000 0000 0000 0000 0000 0	
Pattern 4: don't care 💌	Pattern 2	
Error: don't care 💌	Base Position: Top of Frame 🔽 Offset: 0 🚔	
External Trigger	Pattern: 0000 0000 0000 0000 0000 0000 0000 0	
Traffic is out of range	Mask: 0000 0000 0000 0000 0000 0000 0000 0	
over 90 🐳 %	Pattern 3	
Latency is out of range	Base Position: lop of Frame Uttset: U	
over 100 ms 💌	Mask: Josep peop peop peop peop peop peop	
Trigger Position	Pattern 4 Rase Position: Tap of France	
○ Top ○ Middle ○ Bottom		
	Error Type: Good Frame	
	, C 0r	

Select "IPv4 Destination Address" from "Preset Pattern" at Pattern1 of the Filter/Trigger/Counter Condition Setting screen.



MU120131A/32A IP Multicast Measurement Quck Start Guide Filter/Trigger/Counter Condition Setting - Unit1:3:3 × Pattern 1-<u>0</u>K Base Position: Top of Frame Offset: -Pattern: 0000 0000 0000 0000 0000 0000 0000 0000 <u>C</u>ancel Mask: 0000 0000 0000 0000 0000 0000 0000 0000 Format:
 Hex
 IPv4
 IPv6
 Preset Pattern <u>H</u>elp MAC DA Pattern 2 MAC SA Base Position: Top of Frame (1) • Ether Type MPCP 802.3 OAM Mask: 0000 0000 0000 0000 0000 0000 0000 00 Any IPv4 Packet (2) Format:
 Hex C IPv4 C IPv6 IPv4 Destination Address Pattern 3 IPv4 TOS/DS Base Position: Top of Frame • IPv4 TTL 0000 0000 0000 0000 0000 0000 0000 0000 0C Pattern: Any IPv6 Packet IPv6 Source Address Mask: 0000 0000 0000 0000 0000 0000 0000 0000 IPv6 Destination Address Format:
 Hex C IPv4 C IPv6 IPv6 Next Header IP∨6 Hop Limit Pattern 4 Any UDP Packet Base Position: Top of Frame • UDP Source Port UDP Destination Port Any TCP Packet Mask: 0000 0000 0000 0000 0000 0000 0000 0000 TCP Source Port TCP Destination Port Format:
 Hex
 IPv4
 IPv6 Combination And Or Error Error Type: Good Frame •

- Set the value of "Pattern:" at Pattern1 on the Filter/Trigger/Counter Condition Setting screen to "224.1.1.1".
- Press the "OK" button to close the screen. \geq

ilter/Trigger	/Counter Condition :	Setting – Uni	it1:3:3				X		
Pattern 1								-	1
Base Position:	Top of IPv4 Header	•	Offset: 16	\$	\mathbf{C}	<u>0</u> K			•
Pattern: 🤇	224.1.1.1			5		Canool			
Mask:	0.0.0.0			-			-		
Format:	C Hex ⊙ IPv4	C IPv6	Preset Pattern	-		<u>H</u> elp			
Pattern 2									
Base Position:	Top of Frame	•	Offset: 0	\$		(4)			
Pattern:	0000 0000 0000 0000 00	0 0000 0000 00	000			(1)			
Mask:	0000 0000 0000 0000 000	0 0000 0000 00)00	_					
Format:	● Hex ○ IPv4	C IPv6	Preset Pattern	-					
Pattern 3					L L				
Base Position:	Top of Frame	•	Offset: 0	\$					
Pattern:	0000 0000 0000 0000 000	0 0000 0000 00)00	_					
Mask:	0000 0000 0000 0000 00	00 0000 0000 00)00	_					
Format:		C IPv6	Preset Pattern	-					
Pattern 4]				
Base Position:	Top of Frame	-	Offset: 0	\$					
Pattern:	0000 0000 0000 0000 000	00 0000 0000 00)00						
Mask:	0000 0000 0000 0000 00	0000 0000 00	000						
Format:	⊙ Hex C IPv4	C IPv6	Preset Pattern	-					
Error Error Type:	Good Frame	•	Combination						

- Setting External Trigger at Port3 \diamond
 - Select Unit and right-click to select "Unit Setting" (opens "Unit Setting" screen).



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- > Press the "Ownership" button at the Unit Setting screen to obtain setting rights.
- > Set "Port" of "Trigger Output" to "Port3" of "Module3 (10/100/1000M Ethernet)".

MX123001A Da	Unit Setting - Unit1		×	
	Ownership: Owner	(1)		
E-SE Unit Entry	Clear Ownership		Canad	
⊡=== (3) 10. ≥= Pc	Date/Time	GPS		
@ Po @ Po	21:28:58 5 25, 2007 Reload	GPS Status:	Help	
D= Pc D= Pc	Adjust Adjust date and time of the unit.	Satellite Level		
- D = P(Sync Set the same date and time as	(none)		
- Pr				
- Pr	DCS Input			
	Frequency: 2MHz (Unbalanced)			
Traffic	Trigger Output			
Group Entry	Port: (none)	Reload		
BFC 2544 Aut	Type: Module 3 (10/100/1000M	Ethernet) > Port 1		
	(none)	Port 3	(2)	
-		Port 4		
		Port 6		
		Port 7		
		Port 9		
	-	Port 10 Port 11		
		Der Port 12		

Press the "OK" button to close the screen.

Dwnership: □wner □Ate/Time □k □Ate/Time □ancel □Ate/Time □k □Ate/Time <	Unit Setting -	- Unit1		×
Type. [copute trigget] .	Ownership: Date/Time 21:28:58 5 2 Adjust Sync DCS Input Frequency Trigger Outp Port: Type:	Owner Clear Ownership 25, 2007 Reload Adjust date and time of the unit. Set the same date and time as the unit to GUI. 2007	GPS GPS Enable GPS GPS Status: Satellite Level (none) Reload	<u>Q</u> K <u>C</u> ancel <u>H</u> elp



♦ Setting External Trigger at Port4

Select Port4 and press "Filter" button at the Capture screen to open the "Capture Setting" screen.

	<mark>∕1</mark> M	IX123001A Data Quality	Analyzer Co	ntrol Soft	ware							_ 🗆 🗙
	먥	Tool 📄 Transmit	Counter 🏼 🗼	Capture			^ (2)		Alarm Error History H.I	P.Fail Reset	Log 🔒 📑	? 🖪
		Unit Entry	Physical I/F	🖣 🔍 Counter	 Capti 	ure o Later	ncy 📔 🔍 Variat	ion				
			<u> </u>	Q F	AS 49	∇	1 <u>8</u> ▶⊚			Elap	sed Time:	0:00:00
		Port 1 Port 2					,					
		Port 3	No.	Type	\ \	/LAN ID	SA		DA			<u> </u>
		P= Port3		`(3)								
(1)		📁 Port 6										
		(p= Port 8 (p= Port 9										
		ip- Port 10 ip- Port 11										
		Port 12 ■ Traffic Monitor										
		Traffic Map										
		Service Disruption Time	•									F
		BFC 2544 Automatic Test E RFC 2889 Automatic Test E										
		_										
			Baw Frame	Decede								
				Decode		hit1:3:4	Owner		100M Eull	Lin	Coll Frr	Trig

- > Place a checkmark in "On" at [Trigger] of the Capture Setting screen.
- Place a checkmark in "External Trigger".
- > Press the "OK" button to close the screen.

Capture Setting - Unit1:3:4		×
Filter Trigger (1)	Filter/Trigger/Counter Conditions	OK (2)
(2)	<u>E</u> dit	
Condition	Pattern 1	
Pattern 1: don't care 💌	Base Position: Top of Frame 🔽 Offset: 0 🛫	Help
Pattern 2: don't care 💌	Pattern: 0000 0000 0000 0000 0000 0000 0000 0	
Pattern 3: don't care 💌	Mask: 0000 0000 0000 0000 0000 0000 0000 0	
Pattern 4: don't care	Pattern 2	
Error: don't care	Base Position: Top of Frame Offset: 0 🚽	
External Trigger	Pattern: 10000 0000 0000 0000 0000 0000 0000 0	
Traffic is out of range (3)		
over 90 🛒 %	Pattern 3	
Latency is out of range		
over 100 ms 💌		
	Pattern 4	
Trigger Position	Base Position: Top of Frame Offset: 0	
• Top • Middle • Bottom	Pattern: 0000 0000 0000 0000 0000 0000 0000	
	Mask: 0000 0000 0000 0000 0000 0000 0000 0	
	Error	
	Error Type: Good Frame Good Frame	



3.6. Measuring Channel Switching Time

(Outline)

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Run the emulated server and host and measure the channel switching time using the capture function.

(Contents)

Send multicast streams from Port1 and perform Join/Leave operation at Port2. In this status, capture packets in both directions at Port2 side (emulated host side) using Port3 or Port4. *(Results)*

You will learn how to perform measurement operations to measure channel switching times at multicast distribution.

♦ Sending Multicast Streams from Port1 (Starting Output from Emulated Server)



Select Port1 and press the "Transmit" button at the screen top.

- Starting Capture Operation for Port3 and Port4
 - Select Port3 and press the "Capture" button at the screen top. (This condition is waiting for trigger input. Data is actually captured after the Join message is detected.)



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Select Port4 and press the "Capture" button at the screen top. (This condition is waiting for trigger input. Data is actually captured after the Join message is detected.)

	1	MX1	23001 A	Data Q	Juality	Analy	zer Cor	trol Sof	tware							_ [Ľ
	8	Tool		🕨 Transn	nit 🕨	Counte	er 🚺	Capture	\mathbf{D}				Alarm Ern History	or P.Fail H.Reset	Log 📕	2	R
		建 1	Jnit Entry	,		Phy:	sical I/F	Counte	r 🕨 Ca	apture 🕒 Late	ncy 🗍 🍳 Varia	ation					
		Ē…]	≡⊈Unit1 ≐⊡eee (3	3) 10/100.	/1000M	Ť		0. 7		\$ \$ \$	jg ⊧⊚	■ ◎		Elaj	osed Time:	0:0	0:04
			 	Port 1													_
				Port 2						Len Status		Captured Ti	ime	Relative T	ime	Latend	сy
				Port 4	$\mathbf{>}$						`						
			1	Port 6						(2)						
(1)			- 🦻	Port 7													
				Port 8													
				Port 10)												
				Port 12	2												
			T	raffic Mor	nitor												
	ŀ		Group En	tanic map try	,												
		واا و العصور	🖶 Group Service D	o 1 Vistuntion 1	Time												
		- <mark>1</mark>	RFC 2544	4 Automat	ic Test E												
		- <mark>(1</mark>)	RFC 2889	3 Automat	ic Test E												
																	ъI
				1		Ra	w Frame	Decode									_
		,		-						Unit1:3:4	Owner	Group1	100M F	ull <mark>Lir</mark>	k Coll Er	r Trig	

- ♦ Starting Join/Leave Operation at Port2 (Starting Emulated Host Operation)
 - Select Port2 and press the IGMP Start button at [IGMP] at the Protocol screen. (This starts repeated Join/Leave operation.)



	MU120131A/32A IP Multicast Measurement Quck Start	t (
MX123001A Data Qu	ality Analyzer Control Software	
🔁 Tool 🗦 Transmit	Counter Capture Error Alarm Error P.Fail Log 🖫 🚭 🖓 🕅	
🖃 🏭 Unit Entry	Ix Stream Collision Counter Conture Capture Capture Capture Prince Variation Protocols	
📄 📼 Unit1		
⊡ - === (3) 10/100/1		
Port 2		
CAR Port 3		
Port 4	No. Model CH Host/CH Host Address (Irom) Group Address (Irom)	
- Dort 6	224.1.1.1	
Der Port 7	3 Inc/Dec Host 1/1 20.2.0.1 224.1.1.1	
Port 8	4 Inc/Dec Host 1/1 20.3.0.1 (4) 224.1.1.1	
Port 10		
- Dert 11	View Copy Paste Save Load	
Traffic Monito		
🖉 Traffic Map	State Monitor - Entry 1 Host: #1-#25 K	
Group Entry	#1 Change	
Service Disruption Ti	ne	
BFC 2544 Automatic	Test E	
🛛 🔤 🖫 📅 RFC 2889 Automatic	Test E	
	Changing: 1 / Ready: 0	
	Counter	
	Received General Query (version 3) 0	
	Received General Query (version 2) 0	
	Received Group Specific Query (version 3) 0	
	Received Group Specific Query (version 2) 0	
	Received Group and Source Specific Query 0	

- ♦ Checking Capture Triggering
 - Select Port4 and confirm that the "Trig" LED at the screen bottom right is yellow. (This means that when a trigger is detected at Port4, Port3 also outputs a trigger.)

	💋 MX123001A Data Quality A	nalyzer C	ontrol Soft	ware					<u>- 🗆 ×</u>
	🔁 Tool 🛛 🔊 Transmit 👂 C	Counter 🧃	Capture				Alarm Error History H	Reset Log	22 🕅
Ī	Unit Entry	Physical I/I	F 🕒 Counter	Capture Later	icy 🗍 🍳 Variation]			
	ianter en la contra en la cont	<u> </u>	<u> </u>	N & W V	j° ₽			Elapsed Time:	0:00:15
	p≆ Port 1 p≊ Port 2	Na	T		L C A		104		
	Port 3	NO.	Туре	VLANID	3A		UA		
(1) -	Port 5								
`	- Dert 7								
	- Port 9								
	- Port 10								
	Traffic Monitor								
	Group Entry	L.							
	Group1								
	RFC 2544 Automatic Test E								
								(2)	
		Raw Fram	e Decode			-			
				JUnit1:3:4	Owner	Group1	J100M Full	Link Coll Er	Trig /

- ♦ Stopping Port3 and Port4 Capture Operation
 - Select Port3 and press the "Capture" button at the screen top to stop the Capture operation. (When the button icon is green, capture is stopped automatically, so do not press the "Capture" button. When a trigger is set, capture stops automatically when



the capture memory become full.)



Select Port4 and press the "Capture" button at the screen top to stop the Capture operation. (When the button icon is green, capture is stopped automatically, so do not press the "Capture" button. When a trigger is set, capture stops automatically when the capture memory become full.)



- Obtaining Data Captured at Port3 and Port4
 - Select Port3 and press the "Capture View" button at the Capture screen.



- Set the value of "Start Frame No.:" to the same value as "Triggered Frame No.:" to obtain the header of the triggered frame and after it. (Screen example: "Start Frame No.:" = "2")
- Press the "OK" button to close the screen.



- > Select Port4 and press "Capture View" button at the Capture screen.
- Set the value of "Start Frame No.:" to the same value as "Triggered Frame No.:" to obtain the header of the triggered frame and after it. (Screen example: "Start Frame No.:" = "1")
- > Press the "OK" button to close the screen.





- Checking Data Captured at Port3 and Port 4
 - > Select Port3 to display the Capture screen.
 - Search for the Frame triggered at Port3 (trigger point indicated by *). This frame is displayed when Type is IGMP and is the Frame including the Join message (Membership Report).

	/1 м	X123001A Data Quality	Analyze	r Control Soft	ware							l	- 🗆 ×
	۲ <u>ما</u>	Dool 🛛 🗼 Transmit 🗼	Counter	Capture			_	(\mathbf{a})	Alarm His	Error tory H	P.Fail I.Reset	Log 🖪 블	? 🛃
	P - 1	불 Unit Entry	Physic	al I/F 🗍 🍳 Counter	😐 Captu	re u Late	ency 🔍 🔍 Varia	tion					
	-	⊡⊐=⊂ Unit1 È=== (3) 10/100/1000M I	1	K 🛞 ቹ	M *	* 7	18 🔊	₩ ©			Elaps	ed Time:	0:01:04
		Port 1	Recei	ved total 10 Frame	es (Capture	d Frames:	17)						
		Port 3	No.	Туре		VID S	A	DA	Len	Status	Capture	d Time	Relativ
		- Port4	*2	IGMP		1	92.168.1.10	224.1.1.1	64 C4	Good	16:17:0	5.675 515 594	0.0001
.		Port 5	3	IGMP		1	92.168.1.10	224.1.1.1 224.0.0.2	64 64	Good	16:17:0	5.132 136 346 3.675 138 162	7 482
1)		Port 6	5	IGMP		i	92.168.1.10	224.0.0.2	64	Good	16:17:2	0.674 803 946	6.9991
		Port 7	6	IGMP		1	92.168.1.10	224.1.1.2	64	Good	16:17:2	0.674 966 494	0.0001
		Port 8	7	IGMP		1	92.168.1.10	224.1.1.2	64	Good	16:17:2	8.674 429 846	7.999 (
		Port 9	8	IGMP	•	1	92.168.1.10	224.0.0.2	64	Good	16:17:2	8.674 593 210	0.0001
		Port 10	9	IGMP	•	1	92.168.1.10	224.0.0.2	64	Good	16:17:3	3.307 542 610	4.632
		Port 11	10	IGMP	•	1	92.168.1.10	224.1.1.1	64 C4	Good	16:17:3	5.674 114 078	2.366 1
		Port 12		IGMP	•	1	32.168.1.10	224.1.1.1	64	G000	16:17:4	2.797 116 634	7.0831
		Traffic Map											
	÷	🚆 Group Entry											
		🔤 Group1	•										
		🚆 Service Disruption Time											
		🔓 RFC 2544 Automatic Test E	IP :	Source Addr	ess			= CO A8	01 OA	(192.	168.1.1	0)	
	<mark>1</mark>	🔓 RFC 2889 Automatic Test E	TP :	Destination	Addres:	3		= EU UI	01 01	(224.	1.1.1)		
	-	_	IGMP	: IGMP	Header ·			- 94 04	00 00				
			IGMP	: Type	= ,	16 (Vers	sion 2 Mem	bership Re	eport)				
			IGMP	: Max Resp	Time =	00 (0)							
			IGMP	: Checksum	=	08 FD (0	correct)				a		
			Inkn	: Group Add	ress = 1 known -	50 UI UI	. 01 (224.	1.1.1 : 51	Muiti	lcast	eroups)		
			Unkn	own : data =	00 00 1	00 00 00	00 00 00	- 00 00 0	0 00 0	00 00			
			Ethe	rnet : E	thernet	Trailer							
			Ethe	rnet : FCS =	AO 28 A	AD 02 (o	correct)						_
			•										
	•	Þ	Rawf	rame Decode									
Í					Ur	nit1:3:3	Owner	Group1	100)M Full	Link	Coll Err	Trie //
									,		,		

- > Select Port4 to display the Capture screen.
- > Search for the Frame triggered at Port4 (indicated by *). This Frame is displayed

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when Type is UDP and is the Header Frame of the multicast stream transferred when the Join message (Membership Report) is received.

	MX123001A Data Quality A	nalyzei	r Control Softwa	are				PFail 1 - 1 1	
	⊾ Tool 🛛 🗼 Transmit 🕨 C	Counter	Capture	\frown		(2)	History H	Reset Log 🖬 🖺	
F	Unit Entry	Physica	al I/F 🛛 😐 Counter	🖻 Capture 🗖	.atency 🕒 Varia	tion			
	⊡	1	~ 🖉 🕖	14 th th	7 👪 💌	<u>₩</u> @		Elapsed Time:	0:00:41
	Port 1	Recei	ved total 10 Frames	(Captured Fram	es: 11,059)				
	Poit 9	No.	Туре	VLAN ID	SA	DA	Len Status	Captured Time	Relativ
	Port 4	×1	UDP		192.168.4.10	224.1.1.1	1518 Good	16:17:05.679 595 34	6 0.000
	Port 5	2	UDP		192.168.4.10	224.1.1.1	1518 Good 1518 Good	16:17:05.680 525 27	8 U.UUU 6 0.002
. 1/	Port 6	4	UDP		192.168.4.10	224.1.1.1	1518 Good	16:17:05.685 382 56	2 0.002
)	Port 7	5	UDP		192.168.4.10	224.1.1.1	1518 Good	16:17:05.687 811 69	4 0.002
	Port 8	6	UDP		192.168.4.10	224.1.1.1	1518 Good	16:17:05.690 240 67	8 0.002
	Port 9	8	UDP		192.168.4.10	224.1.1.1	1518 Good	16:17:05.692.669.33	0 0.002
	Port 11	9	UDP		192.168.4.10	224.1.1.1	1518 Good	16:17:05.697 527 44	6 0.002
	Port 12	10	UDP		192.168.4.10	224.1.1.1	1518 Good	16:17:05.699 956 09	4 0.002
	Traffic Monitor								
	Traffic Map								
Ē	Group Entry							1	
	Group1								<u> </u>
	Service Disruption Line	Ether	rnet : Etr	ernet Head	er				
	BEC 2889 Automatic Test E	Ether	net : Destina	tion Addre:	ss = 01 00 5	E 01 01 0.	1		
		Ether	net : Source	Address	= 00 00 8	7 E8 A8 9 Internet	4 TD (TD:::4))		
		IP :	IP Header		- 00 00 (incernet .	IF (IFV4))		
		IP :	Version/IHL			= 45			
		TP :	Version THL			= (4) = (5: 2)	0 octets)		
		IP :	Type of Servi	.ce		= 00	,		
		IP :	×××	Precedence		= (000:	Routine)		
		IP :	x	Throughput		= (0: N)	ormal)		_
		•							
•	<u> </u>	Raw F	rame Decode						
				Unit1:3:4	Owner	Group1	100M Full	Link Coll Err	Trig

The time difference between the above two triggered Frames is the channel switching time of the IP multicast network.

(Screen example: "16:17:05.679595346" - "16:17:05.675515594" = "0.004079752" (seconds))

No.	Туре	VLAN ID	SA	DA	Len	Status	Captured Time	Relativ
*2	IGMP		192.168.1.10	224.1.1.1	64	Good	16:17:05.675 515 594	0.000 (
l n	ICHD		100.100.1.10	224111	C.4	C		0.510 ill

No.	Туре	VLAN ID	SA	DA	Len	Status	Captured Time	Relativ
×1	UDP		192.168.4.10	224.1.1.1	1518	Good	16:17:05.679 595 346	0.000 (
1.5	LIDD		100 100 4 10	224111	1510	C	- 12.17.85 008-535 970-	lo ooo ill

♦ Using Ethereal to Check Channel Switching Time

By using the MD1230B Ethereal Function, the time difference between two Frames can be calculated automatically.

However, in this case, the time resolution is lower.

To use the Ethereal function, the customer must install Ethereal in the MD1230B. For details, see the MX123001A Operation Manual.

- > Select Port4 to display the Capture screen.
- > Press the Ethereal button to start Ethereal.



- 🗆 🗵 MX123001A Data Quality Analyzer Control Software Alarm Error P.Fail History <u>H.Reset</u> Tool Log 🖩 📑 🔋 🕅 Counter Capture Latency | Variation 🚈 Unit Entry Physical I/F Elapsed Time: 🗄 📼 Unit1 F 👬 🕈 🕈 🏹 📢 🚺 🙆 1 🛛 🖉 0:00:41 🗄 🚥 (3) 10/100/1000M I ip≌ Port 1 ip⊑ Port 2 Received total 10 Frames (Captured Frames: 11,059) Туре VLAN ID SA No. DA Len Status Captured Time Relativ 🔎 Port 4 ×1 UDP 192.168.4.10 224.1.1.1 1518 Good 16:17:05.679 595 346 0.000 (192.168.4.10 192.168.4.10 192.168.4.10 192.168.4.10 224.1.1.1 224.1.1.1 224.1.1.1 16:17:05.680 525 278 16:17:05.682 953 926 16:17:05.685 382 562 0.000 LIDP 1518 Good 234567 UDP 1518 Good Der Port 6 1518 Good 0.002 (1) Port 7 LIDP 192.168.4.10 224.1.1.1 1518 Good 16:17:05.687 811 694 0.002 224.1.1.1 224.1.1.1 224.1.1.1 1518 1518 16:17:05.690 240 678 16:17:05.692 669 330 Dort 8 두 UDP 192.168.4.10 Good 0.002 Der Port 9 192.168.4.10 0.002 UDP Good 8 9 10 224.1.1.1 224.1.1.1 224.1.1.1 1518 1518 1518 16:17:05.695 098 310 16:17:05.697 527 446 16:17:05.699 956 094 Port 10 UDP UDP 192.168.4.10 192.168.4.10 Good Good 0.002 Dirt 11 🗭 UDP 192.168.4.10 Good 0.002 Port 12 Traffic Monitor 🖉 Traffic Map 🚟 Group Entry 🔜 Group1 F Ethernet : --- Ethernet Header --Ethernet : Destination Address = Ethernet : Source Address = Ethernet : Type = = IP : --- IP Header ---IP : Version IHL IP : Version IP : IHL IP : Type of Service IP : Precedence IP :X... Delay IP :X... Throughput Service Disruption Time BEC 2544 Automatic Test F = 01 00 5E 01 01 01 = 00 00 87 E8 A8 94 = 08 00 (Internet IP RFC 2889 Automatic Test E (IPv4)) 45 (4) (5: 20 octets) 00 = = (000: Routine) (0: Normal) (0: Normal) -Raw Frame Decode F Unit1:3:4 100M Full Link Coll Err Group1 Owner

> The captured data is saved by Ethereal (file name: Port4.cap).

🕐 md1230a.pcap – Ethereal					
<u>File Edit View Go Capture Analyze Statistic</u>	s <u>H</u> elp				
	🙆 Ethereal: Save Capture File As		<u>_ ×</u>		. •••
<u>F</u> ilter:	<u>N</u> ame: Port4.cap				
No Time Source	Save in <u>f</u> older: 🗁 Test				<u></u>
$\begin{array}{ccccc} 1 & 0.000000 & 192.168.4.10 \\ 2 & 0.000930 & 192.168.4.10 \\ 3 & 0.003358 & 192.168.4.10 \\ 4 & 0.005787 & 192.168.4.10 \end{array}$	⊞ Browse for other folders rPacket Range			tination tination tination tination	port port port port
5 0.008216 192.168.4.10 6 0.010645 192.168.4.10		Captured	Displayed	tination tination	port
7 0.013074 192.168.4.10 8 0.015503 192.168.4.10	All packets	10	10	tination	port
9 0.017932 192.168.4.10	Selected packet only	1	1	tination	port
10 0.020361 192.168.4.10	Marked packets only	0	0	tination	port
	C From first to last marked packet	0			
	C Specify a packet <u>r</u> ange:	0			
		ĺ			
	File type: libpcap (topdump, Ethereal, et	tc)	[•]		-
•				μ –	►
0000 01 00 5e 01 01 00 00 87 e8 0010 05 dc 00 00 40 00 3f 11 90 5c 0020 01 01 05 23 15 b4 05 c8 33 d2 0030 00 <t< td=""><td></td><td>Save</td><td><u>C</u>ancel</td><td></td><td>A</td></t<>		Save	<u>C</u> ancel		A
File: "C:¥Program Files¥An ∫P: 10 D: 10 M: 0					

- Select Port3 to display the Capture screen.
- Press the Ethereal button to start Ethereal.

MU120131A/32A IP Multicast Measurement Quck Start Guide _ 🗆 🗵 💋 MX123001A Data Quality Analyzer Control Software Alarm Error P.Fail History <u>H.Reset</u> Tool Log 🖩 📑 🔋 🕅 > Counter Capture Latency 9 Variation 🚈 Unit Entry Physical I/F Elapsed Time: . Teat Ilnit1 Ė 🗿 🏨 🗞 💱 🖉 🐗 💏 ¥ 0:01:04 1 🔍 🖉 🗭 Port 1 Received total 10 Frames (Captured Frames: 17) VLAN ID SA Port 3 No. Туре DA Len Status Captured Time Relativ 192.168.1.10 ×2 IGMP 224.1.1.1 64 Good 16:17:05.675 515 594 0.000 (192.168.1.10 192.168.1.10 192.168.1.10 224.1.1.1 224.0.0.2 224.0.0.2 16:17:06.192 156 546 16:17:13.675 138 162 16:17:20.674 803 946 Good Good 0.516 7.482 IGME 64 345 678 Der Fort 5 IGMP 64 64 64 64 64 64 64 64 (1) Der Port 6 IGME Good 6.999 Port 7 224.1.1.2 224.1.1.2 224.0.0.2 IGMP 192.168.1.10 Good 16:17:20.674 966 494 0.000 16:17:28.674 429 846 16:17:28.674 593 210 Dort 8 두 IGMP 192.168.1.10 Good 7.999 Der Port 9 192.168.1.10 0.000 IGMP Good 9 10 11 224.0.0.2 224.1.1.1 224.1.1.1 4.632 2.366 7.083 Port 10 IGMP IGMP 192.168.1.10 192.168.1.10 Good Good 16:17:33.307 542 610 16:17:35.674 114 078 Dirt 11 🗭 16:17:42.757 116 694 IGMP 192.168.1.10 Good Port 12 Traffic Monitor 🖉 Traffic Map 🚟 Group Entry 🔜 Group1 ۲ IP: Source Address = C0 A8 01 0A (192.168.1.1) IP: Destination Address = E0 01 01 01 (224.1.1.1) IP: Options/Padding = 94 04 00 00 IGHP: ---- TOHP Header --- IGMP Second Se Service Disruption Time CO A8 01 0A (192.168.1.10) E0 01 01 01 (224.1.1.1) 94 04 00 00 BEC 2544 Automatic Test F RFC 2889 Automatic Test E -• ٢ſ Raw Frame Decode

The capture data is saved by Ethereal (File name: Port3.cap) ≻

Unit1:3:3

Owner

Group1

🕐 md1230a.pcap - Ethereal			
<u>File Edit View Go Capture Analyze</u> Statistics Help			
El Ethereal: Save Capture File As		<u>_ ×</u>	
Name: Port3cap			
<u>F</u> ilter:			
No Time Source Save in <u>f</u> older: Est		•	<u> </u>
1 0.000000 192.168.1.10 2 0.516641 102.168.1.10 ⊞ Browse for other folders			port
3 7.999623 192.168.1.10			
4 14.999288 192.168.1.1(5 14.999281 192.168.1.1)			port
6 22,998914 192,168,1.10	<u>Captured</u>	<u>D</u> isplayed	port
7 22.999078 192.168.1.10 💽 <u>A</u> ll packets	10	10	
8 27.632027 192.168.1.10 O Selected packet only	1	1	
10 37.081601 192.168.1.10 C Marked packets only			port
C From first to last marked packet			
O Specify a packet <u>r</u> ange:	0		
File type: libpcap (topdump, Ethereal,	etc)	[+]	
•			• • •
	Save	<u>C</u> ancel	≜
0030 00 00 00 00 00 00 00 00 00 00 00 00		(<u> </u>
∫File: "C¥Program Files¥An ∫P:10 D:10 M:0			

Merge the file saved previously by Ethereal (Port4.cap). ≻

Link Coll Err Trig

100M Full



🎯 Port3.cap – Etl	hereal					
<u>File E</u> dit <u>V</u> iew	<u>G</u> o <u>C</u> apture <u>A</u>	<u>A</u> nalyze <u>S</u> tatist	ics <u>H</u> elp			
Den Open Becent	Ctrl+O ▶	> 🔏 🗙	ê 📙 🟟	4 4 4 C	₮ ⊻ 🗏 🖳 🔍 (ə, 🔍 🎹
Merge	Ctrl+W		1	Expression	<u>C</u> lear <u>A</u> pply	
Save	Ctrl+S		Destination	Protocol	Info	<u></u>
🖁 Save <u>A</u> s	Shift+Ctrl+S	$\frac{8.1.10}{8.1.10}$	224.1.1.1 224.1.1.1	IGMP IGMP	V2 Membership Report V2 Membership Report	
File Set	•	$\frac{8.1.10}{8.1.10}$	224.0.0.2	IGMP TGMP	V2 Leave Group	
<u>Export</u>	•	8.1.10	224.1.1.2	IGMP	V2 Membership Report	
困 Print	Ctrl+P	$\frac{8.1.10}{8.1.10}$	224.1.1.2	IGMP IGMP	V2 Membership Report V2 Leave Group	
		8.1.10	224.0.0.2	IGMP	V2 Leave Group	
🛃 <u>Q</u> uit	Ctrl+Q	$\frac{8.1.10}{8.1.10}$	224.1.1.1	IGMP TGMP	V2 Membership Report	
						*
•						Þ
0000 01 00 5 0010 00 20 0 0020 01 01 9 0030 00 00 0	e 01 01 01 0 1 96 00 00 0 4 04 00 00 1 0 00 00 00 0	0 00 91 0 1 02 80 8 6 00 08 fi 0 00 00 0	L 02 01 08 00 4 d c0 a8 01 0a e d e0 01 01 01 0 D 00 00 a0 28 a	6 00 0 01 0 00 d 02	· ·····F. · ······	
File: "D:¥Test¥Port3	3.cap" 8 P: 10 D: 1	10 M: 0				

Press the Time button to sort the data. (Sorting displays the two data by capture time.)

@ (U	Intitled) - Ethe	real			
<u>F</u> ile	<u>E</u> dit <u>V</u> iew (<u>ào C</u> apture <u>A</u> nalyze <u>S</u>	tatistics <u>H</u> elp		
	ä 9 () 🖗 🗁 🔚	× 🖗 📇 🖻 🤄	🕽 🔿 🛠 🛠 🗐 📑 🛛	9, 9, 10, 🏧
<u>F</u> ilter	r:			Expression Clear Apply	
No.	Time .	Gource	Destination	Protocol Info	<u> </u>
	11 -0.0040	30 192.168.1.10	224.1.1.1	IGMP V2 Membership Report	
	1 0.00000	0 192.168.4.10	224.1.1.1	UDP Source port: 1315 D	Destination port
	2 0.00093	0 192.168.4.10	224.1.1.1	UDP Source port: 1315 [Destination port
	3 0.00335	8 192.168.4.10	224.1.1.1	UDP Source port: 1315 [Destination port
	4 0.00578	7 192.168.4.10	224.1.1.1	UDP Source port: 1315 [Destination port
	5 0.00821	6 192.168.4.10	224.1.1.1	UDP Source port: 1315 [Destination port
	6 0.01064	5 192.168.4.10	224.1.1.1	UDP Source port: 1315 D	Destination port
	7 0.01307	4 192.168.4.10	224.1.1.1	UDP Source port: 1315 D	Destination port
	8 0.01550	3 192.168.4.10	224.1.1.1	UDP Source port: 1315 [Destination port
	9 0.01793	2 192.168.4.10	224.1.1.1	UDP Source port: 1315 [Destination port
	10 0.02036	1 192.168.4.10	224.1.1.1	UDP Source port: 1315 [Destination port
	12 0.51256	1 192.168.1.10	224.1.1.1	IGMP V2 Membership Report	
	13 7.99554	3 192.168.1.10	224.0.0.2	IGMP V2 Leave Group	
	14 14.9952	08 192.168.1.10	224.0.0.2	IGMP V2 Leave Group	
	15 14.9953	71 192.168.1.10	224.1.1.2	IGMP V2 Membership Report	
	16 22.9948	34 192.168.1.10	224.1.1.2	IGMP V2 Membership Report	
	17 22.9949	98 192.168.1.10	224.0.0.2	IGMP V2 Leave Group	
4					
				A A	
0000) UL 00 5e	OT OT OT OO OO 93		UU	_
0010	00 20 01	96 UU UU UI UZ 8	2 60 CU 48 UI U4 EU 2 60 60 61 61 61 60	00	
0020				00	
0030	,		5 00 00 ao 28 au	ve	<u> </u>
File: '	"C:¥DOCUME"1¥	a118' P: 20 D: 20 M: 0			

The first Time column is the IP multicast network channel switching time (0.004080 (sec) in this example).

No.	Time -	Source	Destination
11	-0.004080	192.168.1.10	224.1.1.1
1	0.000000	192.168.4.10	224.1.1.1
2	0.000930	192.168.4.10	224.1.1.1
3	0.003358	192.168.4.10	224.1.1.1



3.7. Analysing Measurement Results

(Outline)

Analyze channel switching time measurement results for multicast distribution.

(Contents)

Refer to the measurement results in the screen example.

(Results)

You will learn how to measure and perform basic evaluation of channel switching results for multicast distribution.

The channel switching time result in the screen example is about 4 ms (0.004079752 s).

This shows the time required for the host (subscriber) to switch channels on a video streaming network typically used by IPTV. However, the actually perceived speed can sometimes feel longer. In a simple network environment (with one router), the cause does not include the low performance of the STB (set top box) and terminal used to view the content. In an actual more complex network with a number of multicast routers of varying performance and varying numbers of subscribers and contents, the switching time can vary too. When monitoring the overall service, it is very important to remember that all users impact the network performance.

The purpose of this measurement is evaluation of network performance. Evaluating network performance in advance can help prevent problems before they occur and plan future network development.



Fig. 9 Network Channel Switching Time



4. Evaluation Example 2...Measuring Transmission Delay Time

4.1. Connecting DUT

(Outline)

Connect an IP multicast network to the MD1230B.

(Contents)

First, provide an IP multicast network environment using a router. (This guide describes an IPv4 network using the IGMP protocol (at host side) and PIM-SM protocol (at network side).

When connected to the MU120131A, Port 1 emulates a server and Port 2 emulates a host. *(Results)*

You will learn about connecting the DUT with measuring equipment.

♦ Connecting Multicast Routers

- Connect Port1 of the MU120131A to the server-side router. (In this guide, the server-side network is "192.168.4.0/24".)
- Connect Port2 of the MU120131A to the host-side router. (In this guide, the host-side network is "192.168.1.0/24".)



Fig. 10 Connecting DUT



4.2. Setting Measurement Ports

(Outline)

Perform the basic settings for the ports operating as the emulated server and emulated host. *(Contents)*

Set the following port numbers and addresses for the emulated server and host. In addition, perform settings for ARP and Ping.

[Emulated Server]

Port number: Port1
MAC Address: 00-00-91-01-01-01
IPv4 Address: 192.168.4.10
Netmask: 255.255.255.0
Gateway: 192.168.4.254
[Emulated Host]
Port number: Port2
MAC Address: 00-00-91-01-01-02
IPv4 Address: 192.168.1.10
Netmask: 255.255.255.0
Gateway: 192.168.1.254
(Results)
You will learn basic settings for using ports for measurement.

Setting Port Operating as Emulated Server

> Select Port1 and right-click to select "Port Setting" (opens "Port Setting" window).



- > Set "MAC Address:" to "00-00-91-01-01".
- Set "IPv4 Address:" to "192.168.4.10".
- Set "Netmask:" to "255.255.255.0".
- Set "Gateway:" to "192.168.4.254".
- Select "Reply to this port ARP request".
- Select "Reply to this port PING request".
- Remove the checkmarks in "1000 Mbps Half Duplex" and "1000 Mbps Full Duplex" of "Auto Negotiation" (when the router connection port is 100 Mbps Full Duplex).
- Press the "OK" button.



	Port setting - Unit1:3:1		×	
(1)	Ownership: Owner	Mapping: Framed	<u>o</u> k	
	Mode: Normal	MII Properties	Cancel	(0)
(2)	MAC Address: 00-00-91-01-01-01	Auto Negotiation	Applu	(0)
(3)	IPv4 IPv6 VLAN Protocols	On Off		
(4)	- This Port	Capabilities To Be Advertised IOM bps Half Duplex Restart	Help	
	IPv#Address: 192.168.4.10	 ✓ 10M bps Full Duplex ✓ 100M bps Half Duplex Timing: Auto ▼ 		
(5)	Netmask: 255.255.255.0	100M bps Full Duplex 1000M bps Half Duplex 1000M bps Half Duplex Vertex Auto MDI/MDIX		(7)
	Gateway: 192.168.4.254			
		Loopback (1000M Full only)		
	AHP Reply	Flow Control Receive (Full Duplex only)		
(6)	Reply to this port ARP request	Multicast Pause Address 01-80-C2-00-00-01		
		Directed Address This Port		
	ICMP Echo (PING) Reply	C User Defined 00-00-00-00-00		
	Reply to this port PING request			
		MII Registers Default		
		Maximum Frame Size: 1518 (1518 is recommended)		
		Preamble		
		Test Pattern: Single PRBS 9		

Check that 100M Full is displayed at the screen bottom right and that the Link LED is green. (Confirm that the connection between the router and instruments is Link Up at "100Mbps Full Duplex".)

100M Full	Link Coll Err Trig

- ♦ Setting Port Operating as Emulated Host
 - Select Port2 and right-click "Port Setting" (opens "Port Setting" window).



- Set "MAC Address:" to "00-00-91-01-01-02".
- Set "IPv4 Address:" to "192.168.1.10".
- Set "Netmask:" to "255.255.255.0".
- Set "Gateway:" to "192.168.1.254".
- Select "Reply to this port ARP request".
- Select "Reply to this port PING request".

- Remove the checkmarks in "1000 Mbps Half Duplex" and "1000 Mbps Full Duplex" of "Auto Negotiation" (when the router connection port is 100 Mbps Full Duplex).
- Press the "OK" button.

	Port setting - Unit1:3:2		×
(1)	Ownership: Owner	Mapping: Framed	<u>o</u> k
	Mode: Normal	MII Properties	Cancel (9)
(2)	MAC Address: 000-00-91-01-01-02	Auto Negotiation	Annlu
(3)	IPv4 IPv6 VLAN Protocols	Un Ult	
(4)	This Port	IOM bps Half Duplex Restart	
	IPv4Address: 192.168.1.10	IOM bps Full Duplex IOM bps Full Duplex IOM bps Full Duplex IOM bps Full Dupley	
(5)	Netmask: 255.255.255.0	1000M bps Half Duplex 1000M bps Half Duplex 1000M bps Full Duplex Xuto MDI/MDIX	(7)
\sim	Gateway: 192.168.1.254		
		Loopback (1000M Full only)	
$\langle 0 \rangle$	Not send	Flow Control Receive (Full Duplex only)	
(6)	Reply to this port ARP request	Multicast Pause Address 01-80-C2-00-00-01	
		Directed Address	
	CICMP Echo (PING) Reply	C User Defined	
	Not send		
	Reply to this port PING request	MII Registers Default	
		Mavimum Frame Size: 1519 (1519 is recommended)	
		Preamble	
		Test Pattern: Cinale DDDC 9	

Check that 100M Full is displayed at the screen bottom right and that the Link LED is green. (Confirm that the connection between the router and instruments is Link Up at "100Mbps Full Duplex".)



- ♦ Checking Connection
 - Display the Ping screen for Port1, set the value of "Destination:" to "192.168.1.10" and press the "Ping" button.



MX123001 A Data Quality A	nalyzer Control Software		Alarm Error P.Fai	. m.	
Transmit Unit Entry Unit Entry Port 1 Port 1 Port 3 Port 4 Port 5 Port 6 Port 7 Port 8 Port 7 Port 8 Port 9 Port 10 Port 10 Port 11 Port 12 Traffic Monitor Traffic Monitor Traffic Monitor Traffic Map Service Disruption Time RFC 2889 Automatic Test E	Counter Capture Capture Capture Capture Capture Capture Physical I/F © Error Insertion (3) Version: © IPv4 Port ID: Unit1 [192. Source: 192.168.4: Destination: 192.168.1: 192.168.1: 192.168.1:10 Reply from 192.168.1:10 Rep	Error • Tx Stream • Collision • Co • IPv6 168.1.12]:3:1 10 10	(2) bytes byte	time (ms) 0 0 0 0 0 0 0 0	tion ◀ TTL 254 254 254 254 254
		Unit1:3:1 Owner	100M Full	ink Coll Err	Trig

ANRITSU CORPORA

Check that "Reply from 192.168.1.10" is displayed in "Result:". (This checks the connection over the router.)



4.3. Setting Tx Stream

(Outline)

Create multicast stream data for operating as emulated server.

(Contents)

Broadcast a multicast stream using the MD1230B Tx Stream generation function.

In this example, three multicast streams are prepared (multicast addresses: "224.1.1.1" / "224.1.1.2" / "224.1.1.3"). The traffic for each stream is 5 Mbps. To measure the delay time, a timestamp is buried in the stream with multicast address "224.1.1.1".

(Results)

You will learn how to set up an emulated server broadcasting video on three channels each with a bandwidth of 5 Mbps. (One channel will have a timestamp.)

- Creating Multicast Stream Data 1 Generated from Port1 at Server Side (Multicast Address: 224.1.1.1)
 - Select Port1 and press "Add" at the Tx Stream screen to add one stream.
 - > With the added stream selected, press "Edit..." to edit the stream.



- Set "Protocol" at [General] of the Frame Setting screen to "UDP/IPv4". (Multicast broadcasts generally use the UDP protocol.)
- Set "Frame Length:" to "Fixed" and a value of "1518". (The maximum length of Ethernet frames is 1518 bytes.)





- Set "Source Address" at [Ethernet] of the Frame Setting screen to "This port". (When "This port" is selected, the address specified by "Port Setting" is enabled.)
- Set "Destination Address" to "Static" and "Value:" to "01-00-5E-01-01-01". ("01-00-5E-01-01-01" is the MAC address used by multicast address "224.1.1.1".)

Stream Setting - Unit1:3:1 - Stream `			×
Stream Control Frame Setting	-(1)	(4)	1 <u>o</u> k
General Ethernet UPv4 UDP Data	Fields Error Insertion		
Presimble Size: 8 🔿 bytes	Destination Address	ource Address	
(2) Edit Preamble Pattern	Static	This port	+- (3)
SFD: hex D5	Value:	Value:	Mont
-	01-00-5E-01-01-01	00-00-00-00-00	
Lype Auto (bey 0800)	Mask:	Mask: (5)	Help
	FF-FF-FF-FF-FF	FF-FF-FF-FF-FF V	
(hex)	,	,	
ECC: Auto			
PCS. Auto			
			_
Frame Format Frame View			_
Total Length		Part Length	411
V			
	Describle		
	,	• –]
8	SFD		
	DA	6	
14	DA		
**			
	SA	6	
20			
	Table		<u> </u>

- Set "Source Address" at [IPv4] of the Frame Setting screen to "This port". (When "This port" is selected, the address specified at "Port Setting" is enabled.)
- > Set "Destination Address" to "Static" and "Value:" to "224.1.1.1".



Stream Setting - Unit1:3:1 - Stream			×
Stream Control Frame Setting General Ethernet IPv4 UDP Da	ta Fields Error Insertion		<u><u> </u></u>
Version: 4 H Auto Type of Service Bit 0-2: 000 - Routine Bit 3: 0 - Normal Delay Bit 4: 0 - Normal Throughput Bit 5: 0 - Normal Reliability Bit 6,7: 0 Overwrite Total Length 0 Identification: hex	Flag Bit 0: 0 Bit 1: 1 Don't Fragment Image: Comparison of the second	Source Address Type: This Port Address: 127.0.0.1 Mask: 255.255.255 Destination Address Type: Static Address: 224.1.1.1 Mask: 255.255.255 K	Cancel (3) Erev Ne(4) He(5)
Total Length		Part Length	-
8	Preamble SFD	8	
14	DA	6	
	SA Trane	6	-
Identification: hex 0000 Frame Format Frame View Total Length 000	Options (0 byte) Preamble SFD DA SA Twne	Part Length	

- Set the value of "Source Port:" at [UDP] of the Frame Setting screen to "1315". (This specifies the undefined UDP port address.)
- Set the value of "Destination port:" to "5556". (This specifies the undefined UDP port address.)

Stream Set	tting - Unit1:3:1	- Stream 1 (1)			X
Stream Cor			(2)		<u>о</u> к
Source	Port:	1315 Increment Contract Periods Enfort Insertion	t Port Number		<u>C</u> ancel
(2) Destina	tion port:	5556 Source	e Port		Prev
Dve 🗌	erwrite Length	0 Desti	nation Port		Next
	erwrite Checksum	hex 0000			<u>H</u> elp
Frame For	mat Frame View				
	Total Length	n	Part	Length	
		U	10		
		Preamble	8		
	8		SFD		
		DA	6		
	14				
		SA	6		
	20	Tune		-	
					1

- Select "Next Stream" at "Distribution:" on the Stream Control screen.
- Set "Unit" of "Inter Stream Gap:" to "ns" and set the value of "100M" to "687,520". (Setting the inter-frame gap to 687,520 ns means sending the stream over the 15 Mbps band at a 100M Link speed.) Since three streams are created in this example and are broadcast sequentially, the actual output for this setting is 5 Mbps.



After setting "Unit" of "Inter Frame Gap:" to "bit/s" and inputting "15,000,000", return "Unit" to "ns" and confirm that the 15-Mbps equivalent gap time is 687,520 ns.

> Press the "OK" button to close the setting screen.

Jum	np to ID	1	Count	1 🛨			Cancel	
ter Stream Gap:	Ċ	sites and the	10M 6875200	100M 687520	1000M 68752	Actual Value 68752ns	<u>Prev</u>	
iter Frame Gap:			(3)		(4)		Help	
Fixed Value	alue: n	nit s 💌	10M 6875200	100M 687520	68752	Actual Value 68752ns		
🔿 Random 🛛 Mi	in: n	s 🔻	9600	960	96	96ns		
М	ax: m	IS 🔻	0.0096	0.00096	0.000096	0.000096ms		
ter Burst Gap:	Ui n	nit s 💌	10M 9600	100M 960	1000M 96	Actual Value 96ns		
ames per Burst:	1							
ursts per Stream:	1							
Stream image:							-	

- Creating Multicast Stream Data 2 and Multicast Stream Data 3 from Server-side Port1 (Multicast address: "224.1.1.2"/"224.1.1.3")
 - With the stream select at the Tx Stream screen, press "Copy" and then press "Paste" two times (makes two copies of stream).



With the second stream selected, press "Edit..." to edit the stream.

MX123001A Data Quality	Analyzer Control Softwar	e				
🔁 Tool 🛛 🕨 Transmit 👂	Counter 👂 Capture 🏾 📗	> Error		Alarm Error P.Fail	Log 🖩 😂 ? 🕅	
🖃 🏭 Unit Entry	Physical I/F	n 🍳 Tx Stream 🗅	Collision 🛛 😐 Counter 🛛	🍳 Capture 🛛 º Latency 🗍 º	Ping 🔍 Variation 📕 🕨	
⊡				Ela	psed Time: 1:21:11	
Port 1	ID Distribution	Length	Protocol	VLAN Errors	bbA	, (2)
		Fixed 1519		None None		
Port 4	V V 3 Next	Fixed 1518	UDP/IPv4	None None		
Port 5					Delete	
Port 7	(1)					
Port 8					Сору	
- Dert 11						
Traffic Monitor					Paste	
Traffic Map					Import	
Service Disruption Time						
RFC 2544 Automatic Test E					Clear All	
HFC 2889 Automatic Test E					Enable All	
					Disable All	
	Device Type (for Latency)					
▲	C Store and Forward		 Bit For 	orwarding (Cut Through)		
		Unit1:3:1	Owner	100M Full	K Coll Err Trig	

- Set "Source Address" at [Ethernet] of the Frame Setting screen to "This Port". (When "This port" is selected, the address specified at "Port Setting" is enabled.)
- Set "Destination Address" to "Static" and "Value:" to "01-00-5E-01-01-02". ("01-00-5E-01-01-02" is the MAC address used by multicast address "224.1.1.2".)

tream Setting - Unit1:3:1	– Stream 2							
Stream Control Frame Setting		•(1)		.(4)			
General Ethernet	UDP Data F	Fields Error Insertion	1					<u> <u> </u></u>
Prezuble Size:	bytes	Destination Addres:		CSource Ad	dress			<u>C</u> ancel
•		D cound on Piddroot			4,000			-(3)
Edit Preamble Pattern	·	Static	•0	This por	t			Prev
SFD: hex D	5	Value:	00	Value:	00.00.00			<u>N</u> ext
Туре		U1-00-5E-01-01-		00-00-00	0-00-00-00			
Auto (hex 0800)	ŋ	Mask:		Mask:	(5)			<u>H</u> elp
C Manual 0800 - In	ternet IP 🔻	FF-FF-FF-FF-FF-	FF 🔽 🗹	FF-FF-FI	F-FF-FF-FF	7		
(hex)								
FCS: Auto								
FCS: Auto								
FCS: Auto								
FCS: Auto Frame Format Frame View								
FCS: Auto	version		1 ype of Ser	¥1Ce	+,			
FCS: Auto	Yersion	I IIIL Total I Identif	iype or ser .ength ication	¥ice	2			
FCS: Auto	version Flags	IIIL Total I Identif Fra	lype of Ser ength ication gment Offset	¥1Ce	22			
FCS: Auto Frame Format Frame View Frame View	version Flags Tim	IIIL Total I Identif Fra e to Live	type of Ser ength ication gment Offset Protocol	¥100				
FCS: Auto	Version Flags Tim	HL Total I Identif Fra e to Live Header C	iype or Ser ength ication gment Offset Protocol hecksum	¥1Ce				
FCS: Auto	Version Flags Tim	HiL Total I Identif Fra e to Live Header C Source	ype or Ser ength ication gment Offset Protocol hecksum Address	¥1Ce				
FCS: Auto Frame Format Frame View 24 26 28 30 32 34 38	Version Flags Tim	Int. Total I Identif Fra e to Live Header C Source /	iype of Ser ength ication gment Offset Protocol hecksum Address	¥1Ce		1518	 •	
FCS: Auto Frame Format Frame View 74 24 24 24 24 28 30 32 34 38 29 24 24 24 24 24 28 30 32 34 34 38 29 38 38 38 38 38 38 38 3	Version Flags	Int. Total I Identif Fra e to Live Header C Source a Destinatio	lype of Ser ength ication gment Offset Protocol hecksum Address n Address	¥ICe		1518		
FCS: Auto Frame Format Frame View 24 24 26 28 30 32 34 34 38 42 42 44	Version Flags Tim	Int. Total I Identifia e to Live Header C Source a Destinatio	lype of Ser ength istation gment Offset Protocol hecksum Address n Address a Port	VICE		1518		
FCS: Auto Frame Format Frame View 24 28 28 30 32 34 42 44 45	Version Flags Tim	IHL Total I Identif Fra e to Live Header C Source a Destinatio	I ype of Ser .ength ication yment Offset Protocol hecksum Address n Address e Port			1518		

- Set "Source Address" at [IPv4] of the Frame Setting screen to "This port". (When "This port" is selected, the address specified at "Port Setting" is enabled.)
- Set "Destination Address" to "Static" and "Value:" to "224.1.1.2".



Stream Setting - Unit1:3:1 - Stream 2 Stream Control Frame Setting General Etheliet IPv4 UDP Data 1 Version: HL Auto Type of Service Bit 0-2: Bit 3: 0 - Normal Delay Bit 4: 0 - Normal Reliability Bit 5: 0 - Normal Reliability Bit 6,7: 00 Overwrite Total Length 0 Identification: best 0000	-(1) Fields Error Insertion Bit 0: 0 Bit 1: 1: Don't Fragment Image: Source Address Bit 2: 0: Dot Last Fragment Image: Source Address Fragment Offset: 0 Time to Live: 64 Protocol: Auto Manual Image: Source Address Type: Image: Source Address Type: Image: Source Address Type: Image: Source Address Protocol: Auto Options Options	⊻ Cancel (3) Prev Mr(4) He(5)
Frame Format Frame View 24 Version 26 28 30 Flags 32 Tim 34 38 42 44 46 48	IIIL 1 ype of Service Total Length 2 Identification 2 Fragment Offset 2 Identification 2 Be to Live Protocol Header Checksum 2 Source Address 4 Source Port 2 Destination Address 4 Lenoth 2	

- Set the value of "Source Port:" at [UDP] of the Frame Setting screen to "1316". (This specifies the undefined UDP port address.)
- Set the value of "Destination port:" to "5557". (This specifies the undefined UDP port address.)
- > Press "Next" to open Stream3 setting screen.

S	tream Settin	ng - Unit1:3:	1 - Stream 2	×	
	Stream Contro	Frame Settin		пк	
	General Eth	nernet IPv	UDP Dita Fields Error Insertion (3)		
	Source por	t i	1316 Increment Port Number	<u>C</u> ancel	
(2)	Destination	n port:	5557 Source Port	Elev	(5)
	🗖 Overwr	rite Length	C Destination Port	Next	(0)
	C Overwr	rite Checksum	hex 0000		
				<u>H</u> elp	
	Eromo Format	He v			
	riane ronnau	Total Lengt	Part I ength		
			Preamble 8		
		8	SFD		
			DA 6		
		14			
			54		
		20			
			Tone 9		

- Set the value of "Source Port:" at [UDP] of the Frame Setting screen to "1317". (This specifies the undefined UDP port address.)
- Set the value of "Destination port:" to "5558". (This specifies the undefined UDP port address.)



St	ream Setting - Un	it1:3:1	- Stream 3				×
	Stream Control Frame	Setting					
	General Ethernet If	Pv I	JDP Data Fields Error Insertion (3)				
	Source port		1317 Increment Port Numl	ber			<u>C</u> ancel
(2)	Destination port:		5558 Source Port				<u>P</u> rev
	🔲 Overwrite Lengtl	h	0 C Destination Port				Next
	Overwrite Check	ksum	hex 0000				Help
Ŧ	Frame Format	Mourl					
	Total Le	ength			Part Length		
			l	15			
			Preamble		8		
		8	SFD		<u> </u>		
			DA		6		
		14					
					T		
		20	SA		6		
			Tone		+, :	-	

- Set "Source Address" at [IPv4] of the Frame Setting screen to "This port". (When "This port" is selected, the address specified at "Port Setting" is enabled.)
- > Set "Destination Address" to "Static" and "Value:" to "224.1.1.3".

Stream Setting - Unit1:3:1 - Stream 3			×
Stream Control Frame Setting	-(1)		
General Ethenet IPv4 UDP Data	Fields Error Insertion		
Version: 4	Flag	Source Address	Cancel
IHI Auto	Bit 0: 0 💌	Type: This Port	(3)
(2) Type of Service	Bit I: 1 - Don't Fragment	Address: 127.0.0.1	<u>Prev</u>
Bit 0-2: 000 - Routine	Bit 2: 0 - Last Fragment	Mark: 255 255 255 755	<u>Ne(4)</u>
Bit 3: 0 - Normal Delay 💌	Fragment Offset: 0	Mdsk. 200.200.200 C KP	(5)
Bit 4: 0 - Normal Throughput 💌	Time to Live: 64	Destination Address	Heine
Bit 5: U - Normal Reliability	Protocol: Auto (17)	Type: Static	
		Address 224.1.1.3	
Overwrite Total Length	Header Checksum: Auto	Mask: 255.255.255 🔽 🗶 🖂	
Identification: hex 0000	Options (0 byte)		
Frame Format Frame View			_
Total Length		Part Length	40
0			
	Preamble	8	
	CED.		ᅫ
8	, SFD		
	D∆	6	
14			
	SA	6	
20			
	Tane		<u></u>

- Set "Source Address" at [Ethernet] of the Frame Setting screen to "This Port". (When "This port" is selected, the address specified at "Port Setting" is enabled.)
- Set "Destination Address" to "Static" and "Value:" to "01-00-5E-01-01-03". ("01-00-5E-01-01-03" is the MAC address used by multicast address "224.1.1.3".)



Stream Setting - L	Unit1:3:1 - Stream 3	(1)	(4)			
General Ethernet	v4 UDP Data Fi	elds Error Insertion	(+)			
Preamble Size:	8 🔹 bytes	Destination Address	Source Addres	5		ncel
(2) Edit Preamble	e Pattern	Static	This port		(3 <u>)</u>	ev
SFD:	hex D5	Value:	Value:	00-00	N	ext
Type Auto Manual (hex)	(hex 0800) 0800 - Internet IP 💌	Mask: FF-FF-FF-FF-FF-FF 🔽 💶	Mask: (5) .FF.FF <u>V</u> <u>V</u> <u>V</u>	<u><u> </u></u>	qlp
FCS:	Auto					
Total	Length			Part Length		
	8	Preamble SFD		8		
		DA		6		
	20	SA		6	-	
		Imp				

- > Select "Jump to Stream" at "Distribution:" of the Stream Control screen.
- > Set the value "Jump to ID" to "1" (sets jump stream destination to stream 1).
- > Press "OK" to close the setting screen.

Stream Setting - Un Stream Control Prame	it1:3:1 - St	ream 3		.(2)		×	(4)
Distribution:	ump to Stream	n	-D	otal Time (1000M): 80.96ms			((-)
Jump	to ID	1 Count:				Prev	
Inter Stream Gap:	Unit ns	10M 6875200	(3) 100M 687520	1000M 68752	Actual Value 68752ns	Next	
Inter Frame Gap:						<u>H</u> elp	
Fixed Value	ue: Unit	10M • 6875200	100M 687520	1000M 68752	Actual Value 68752ns		
C Random Min:	ns	9600	960	96	96ns		
Max	c ms	0.0096	0.00096	0.000096	0.000096ms		
Inter Burst Gap:	Unit ns	10M 9600	100M 960	1000M 96	Actual Value 96ns		
Frames per Burst:	1000						
Bursts per Stream:	1						
Stream image:						-	
Fra	ame	Burst		Burst			
		, ira					
			Stream				

- Burying Timestamp in Multicast Stream Data Generated at Server-side Port1 (Multicast address: "224.1.1.1")
 - > With the first stream selected, press the "Edit..." button to edit the stream.



MX123001A Data Quality /	Analyzer Control Softwar	B			
📴 Tool 🛛 🕨 Transmit	Counter 👂 Capture 🏾 📗	Error		Alarm Error P.Fail	Log 🖩 🖶 ? 🕅
🖃 🏭 Unit Entry	Tx Stream Collision	Counter 🛛 🍳 Captur	e 🛛 🔍 Latency 🗍 🔍 Ping	g 🔍 Variation 🔍 Protoco	ls 📕
⊡				EI	apsed Time: 0:07:12
Port 1	ID Distribution	Longth	Protocol	VLAN Errors	
	V V 1 Next	Fixed 1518	UDP/IPv4	None None	
Dert 4		Fixed 1518	UDP/IPv4	None None	
Der Port 6					Delete
- Dert 7	(1)				
- Port 9					<u>С</u> ору
Port 10					Cut
					Paste
Traffic Monitor					
Group Entry					Import
Service Disruption Time					Clear All
RFC 2544 Automatic Test E					
m 2003 Adiomatic Test E					
					Disable All
	Device Type (for Latency)				
	C Store and Forward		Bit Ferrore	orwarding (Cut Through)	
		Unit1:3:1	Owner	100M Full	nk Coll Err Trig

- Place a checkmark in "Data Field 1" of [Data Fields] at the Frame Setting screen and set "Pattern:" to "Test Frame".
- > Press "OK" to close the setting screen.

ANRITSU CORPORAT

×
(4)
<u>C</u> ancel
↓ Iopil Length: 1472 bytes
Erev
<u>N</u> ext
Value:
Part Length
6
6



4.4. Setting Host Emulation

(Outline)

RITSU CORPO

Create an IGMP protocol sequence for operation as an emulated host.

(Contents)

Use the MD1230B protocol emulation function to assemble a Join/Leave sequence for the multicast group.

In this example, the following three multicast groups are created.

- ✓ Sequence 1: Join multicast address "224.1.1.1" and hold this status for "100,000" seconds. (This is the multicast stream for measuring transmission delay time.)
- Sequence 2: Join multicast address "224.1.1.2" and perform repeated "connect for 8 seconds/Disconnect for 7 seconds" operations.
- ✓ Sequence 3: Join multicast address "224.1.1.3" and perform repeated "connect for 8 seconds/Disconnect for 7 seconds" operations.

Sequences 2 and 3 are for emulating Channel Zapping by performing repeated channel switching operations.

(Results)

You will learn how to continuously receive video data for one channel in the Channel Zapping condition and how to configure the emulated host sequence.

♦ Setting Port2 as Emulated Host Supporting IGMP (Sequence 1)

Select Port2 and place a checkmark in the first "Entry Information" at [IGMP] in the Protocol screen. Press "Edit..." to edit the IGMP protocol sequence.

💋 MX123001A Data Quality /	nalyzer Control Software	
🔁 Tool 🛛 🕨 Transmit	Counter Capture Error Alarm	tory H.Reset Log 🖩 🖶 🔋 🕅
- 🚝 Unit Entry	Ix Stream Collision Counter Counter Capture Capture Print Collision Counter Counter Capture	tide • Protocols
⊡-=== Unit1		(2)
Port 2	✓ (3)	
(1) Port 3	No Model # of Host/CH Host Address (from)	Group Address (from)
- D- Port 5	Incode Incode <thincode< th=""> <thincode< th=""> <thincode< t<="" th=""><th>224.1.1.1</th></thincode<></thincode<></thincode<>	224.1.1.1
🕞 Port 6	Lanc/Dec Host 1/1 20.1.0.1	224.1.1.1
Port 7	3 Inc/Dec Host 1/1 20.2.0.1	224.1.1.1
Port 8(4)	4 Inc/Dec Host 1/1 20.3.0.1	224.1.1.1
- Port 10		
Port 11	Edit Copy Paste Save Load	
Port 12		
Traffic Map	State Monitor - Entry 1 (3) Host: #1-#25	
Group Entry		
Service Disruption Line		
BFC 2889 Automatic Test E		
	Country Country	
	Received General Query (version 3)	
	Received General Query (version 2) 0	
	Received Group Specific Query (version 3) 0	
	Received Group Specific Query (version 2) 0	
	Received Group and Source Specific Query 0	
▲ ▶	J	
	Unit1:3:2 Owner 100	JM Full Link Coll Err Trig //

> At [Step1] on the IGMP Host Emulation screen, set "IGMP Version:" to "2" and "Emulation Model:" to "Increase/Decrease Channel" (supports IGMP-v2 channel





At [Step2] of the IGMP Host Emulation screen, set "Join Wait:" to "100000s" and "LEAVE Wait:" to "1s". (This holds the connection for 100,000 s after joining the channel.)



- Set the value of "Host Address:" at [Step3] of the IGMP Host Emulation screen to "192.168.1.10".
- Set the value of "Number of Host:" to "1".



- Set the value of "Group Address:" to "224.1.1.1".
- Set the value of "Number of Group:" to "1".
- > Press "OK" to close the setting screen.

This setting performs the Join/Leave to multicast address "224.1.1.1" with one emulated host ("192.168.1.10").



- ♦ Setting Port2 as Emulated Host Supporting IGMP (Sequence 2)
 - Select Port2 and place a checkmark in the second "Entry Information" at [IGMP] in the Protocol screen. Press "Edit..." to edit the IGMP protocol sequence.

	💋 MX123001 A Data Quality A	Analyzer Control Software			_ 🗆 🗵
]= Tool 🛛 👂 Transmit 👂 (Counter 👂 Capture 🌗	Error	Alarm Error P.Fai	69 🖩 🖶 ? 🕅
	⊡ 🦉 Unit Entry ⊡ 📼 Unit1 ⊡ ஊ (3) 10/100/1000M	■ Tx Stream ■ Collision ■ (■ IGMP ■ JGAP ■ MLD	Counter 📔 o Capture 🗍 o Later o MLDA 🛛	ncy 🕒 Ping 🗐 Variation 🔍 Protoco	
	Port 1 Port 2 Port 3	Entry Information			
(1)	Port 4	No. Model # o	f Host/CH Host Address	(from) Group Addres	s (from)
	Port 5	📇 Inc/Dec CH 1/1	192.168.1.10	224.1.1.1	
	Port 6	2 Inc/Dec Host 1/1	20.3.0.1	224.1.1.1	
	Port 8	Inc/Dec Host 1/1	20.3.0.1	224.1.1.1	
	- Port 9(4)	4 Inc/Dec Host 1/1	20.3.0.1	224.1.1.1	
	🕞 Port 10				
	🗭 Port 11	Edit Copy	Paste	Save Load	
	Traffic Map	State Monitor - Entry 3	5) Host:	#1-#25 र 🗵	
	Group Entry				
	Group1				
	Service Disruption Time				
	RFC 2544 Automatic Test E				
	HFC 2889 Automatic Test E				
		Country .			
		Received General Query (vers	vion 3)	0	
		Beceived General Query (vers	sion 2)		
		Beceived Group Specific Que	ru (version 3)	0	
		Received Group Specific Que	ry (version 2)	0	
		Received Group and Source S	Specific Query	0	
	الغ	<u>, </u>	Unit1:3:2 Owner	100M Full	ink Coll Err Trig

At [Step1] on the IGMP Host Emulation screen, set "IGMP Version:" to "2" and "Emulation Model:" to "Increase/Decrease Channel" (supports IGMP-v2 channel joining).



At [Step2] of the <u>IGMP Host Emulation</u> screen, set "Join Wait:" to "8s", and "LEAVE Wait:" to "7s". (After joining the channel, this performs repeated "Connect for 8 seconds/Disconnect for 7 seconds" operations.)



Set the value of "Host Address:" at [Step3] of the IGMP Host Emulation screen to "192.168.1.10".



- > Set the value of "Number of Host:" to "1".
- Set the value of "Group Address:" to "224.1.1.2".
- Set the value of "Number of Group:" to "1".
- > Press "OK" to close the setting screen.

This setting performs repeated Join/Leave operations to multicast address "224.1.1.2" with one emulated host at "192.168.1.10".

IGMP Host I	Emulation - Unit1:3:2 - No. STEP 3: Address Settir	2 Ig			×
STEP 1 STEP 2	Host Address: from 192.16 Group Address: from 224.1.1	2 Numbe	r of Hosts:	(3) (5)	QK Cancel Prev. Entry
STEP 3	G1 Host 1	224.1.1.2		G1 224.1.1.2	Next Entry
	↓ Change the Group G1 Host 1	Address between Hosts	State Change	Export Address Lis	st
IGMP version	< <prev 2="" 2:="" ch<="" dec="" inc="" model="" td=""><td>Resource (Host):</td><td>3/ 200</td><td>Resource (Process):</td><td>xt>> 3/ 200</td></prev>	Resource (Host):	3/ 200	Resource (Process):	xt>> 3/ 200

- ♦ Setting Port2 as Emulated Host Supporting IGMP (Sequence 3)
 - Select Port2 and place a checkmark in the third "Entry Information" at [IGMP] in the Protocol screen. Press "Edit..." to edit the IGMP protocol sequence.

	💋 MX123001A Data Quality A	alyzer Control Software	
	🔁 Tool 🛛 🕨 Transmit 🗼 C	aunter Capture Error Alarm	tory H.Reset Log 🖩 🖶 👔 🕅
	🕞 🊝 Unit Entry	• Tx Stream ● Collision ● Counter ● Capture ● Latency ● Ping ● Varia	tice Protocols
	(3) 10/100/1000M	• IGMP • IGAP • MLD • MLDA	(2)
	Port 2		
(1)1	D= Port 3 D= Port 4	No. Model # of Host/CH Host Address (from)	Group Address (from)
	- Der Port 5	☑ 1 Inc/Dec CH 1/1 192.168.1.10	224.1.1.1
	- Port 7	Inc/Dec UH 1/1 192.158.1.10 ☑ 3 Inc/Dec Host 1/1 20.3.0.1	224.1.1.2
	D= Port 8 D= Port 9	4 Inc/Dec Host 1/1 20.3.0.1	224.1.1.1
	- Der Port 1		
	Port 12	Ldit Lopy Paste Save Load	···
	Traffic Monitor	State Monitor - Entry 3 (5) Host: #1-#25	
	Group Entry		
	BFC 2544 Automatic Test E		
		Counter	
		Received General Query (version 3) 0	
		Received Group Specific Query (version 3) 0	
		Received Group Specific Query (version 2) 0	
		neceived and police specific query U	
	[Unit1:3:2 Owner 100	M Full Link Coll Err Trig



At [Step1] on the IGMP Host Emulation screen, set "IGMP Version:" to "2" and "Emulation Model:" to "Increase/Decrease Channel" (supports IGMP-v2 channel joining).



At [Step2] of the IGMP Host Emulation screen, set "Join Wait:" to "8s", and "LEAVE Wait:" to "7s". (After joining the channel, this performs repeated "Connect for 8 seconds/Disconnect for 7 seconds" operations.)





- Set the value of "Host Address:" at [Step3] of the IGMP Host Emulation screen to "192.168.1.10".
- Set the value of "Number of Host:" to "1".
- > Set the value of "Group Address:" to "224.1.1.3".
- Set the value of "Number of Group:" to "1".
- > Press "OK" to close the setting screen.

This setting performs repeated Join/Leave operations to multicast address "224.1.1.3" with one emulated host at "192.168.1.10".



- ♦ Enabling IGMP Protocol at Port2
 - > Select Port2 and right-click to select "Port Setting" (opens "Port Setting" window).



- Place a checkmark in "IGMP" of "Protocol Filter:" at [Protocol] of the Port Setting screen.
- Press the "OK" button.



Port setting - Unit1:3:2		×	
(1) Ownership: Owner	Mapping: Framed	ок	
Mode: Normal	MII Properties	<u>Cancel</u>	3)
	On Off	Apply	
Protocol Filter:	Capabilities To Be Advertised ♥ 10M bps Half Duplex ♥ 100M bps Full Duplex ♥ 100M bps Full Duplex ■ 1000M bps Full Duplex ■ 1000M bps Full Duplex ■ 1000M bps Full Duplex ■ 0000M bps Full Duplex	Help	
	Loopback (1000M Full only)		
	Multicast Pause Address 01.80.02.00.00.01		
	Directed Address This Port User Defined		
	MII Registers Default		
	Maximum Frame Size: 1518 (1518 is recommended)		
	Preamble		
	Test Pattern: Single PRBS 9 💌		



4.5. Monitoring Transmission Delay Time 1

(Outline)

Operate the emulated server and hosts and use the Multi Flow Counter function to monitor chronological changes in the transmission delay time.

(Contents)

Send the multicast stream from Port1 and perform Join/Leave operations (Channel Zapping) at Port2. In this condition, monitor the transmission delay time for multicast address "224.1.1.1". (*Results*)

You will learn how to monitor the transmission delay time of a multicast stream in the Channel Zapping condition and display the results as a chronological graph.

- Sending Multicast Stream from Port1 (Starting Output of Emulated Host)
 - > Select Port1 and press the "Transmit" button at the top of the screen.



- Starting Join/Leave Operation at Port2 (Starting Emulated Host Operation)
 - Select Port2 and press the "IGMP" button at [IGMP] of the Protocol screen (starts repeated Join/Leave operation).



	MX123001 A Data Quality A	nalyzer Control Software	Alam	Error P.Fail Log 🖬 🚭 🖓 🕅
		■ Tx Stream Olision Collision Counter O GMP IGAP MLD MLD MLD MLD	pture 🔍 utatency 🔍 Ping 🔍 Var	iation Protocols (2)
(1)	Port 2 Port 2 Port 2 Port 3 Port 4 Port 5 Port 6 Port 7 Port 7 Port 8 Port 9 Port 9 Port 10	(3) Entry Information No. Model ♥ 1 Inc/Dec CH 1/1 ♥ 2 Inc/Dec CH 1/1 ♥ 3 Inc/Dec CH 1/1 ♥ 4 Inc/Dec CH 1/1	Host Address (from) 192.168.1.10 192.168.1.10 192.168.1.10 20.3.0.1 (4)	Group Address (from) 224.1.1.1 224.1.1.2 224.1.1.3 224.1.1.1
	Port 11 Port 12 Traffic Monitor Traffic Map Group Entry Group 1 Frez Service Disruption Time FrC 2849 Automatic Test E FrC 2889 Automatic Test E	Edit Copy Pa	te Save Loa Host: #1-#25	
		Counter Received General Query (version 3) Received General Query (version 2) Received Group Specific Query (version 3) Received Group Specific Query (version 2) Received Group and Source Specific Query		
		Unit1:3:2	Owner 1	DOM Full Link Coll Err Trig

- Setting Filters for Multi Flow Counter at Port2 (Enables Latency Count for Flow at Multicast Address "224.1.1.1")
 - Select Port2 and press the "Counter Setting" button at the Counter screen to open the "Setting" screen.

MX123001A Data Quality A	analyzer Control Softwar	-				
	Counter	Error		Alarm Error F	R.Fail I I I I I	গু নি
			-	History H.R.	eset war	
🖃 🚝 Unit Entry	Physical I/F	n 🕒 Tx Stream 🔤	 Collision Collision 	unter 🔍 apture 🔍 Later	ncy 🔍 Ping 🔍 Variati	on 💶 🕨
⊡		📱 🗾 Add to C	hart 🔹 🔍 💼] / Default2 💌	Elapsed Time:	0:06:29
Port 2	Name	Unit1:3:2 Swrrent	Unit1:3:2 Accumulated	(1)	
Port 4	🗆 Received Rate (%)	91.17%	74.62%	-	-	
Port 5	💷 Link Failed	0				
Port 7	Max Latency (us) 1	-	6,871.036us	(2)		
- Port 8	Max Latency (us) Other	-		()		
Port 9	G Min Latency (us) 1	· ·	163.508us			
- Port 11	Min Latency (us) Other	· · ·	· .			
- Port 12	Current Latency (us) 1	163.820us	· .			•
Traffic Monitor	Resolution: 1s	▼ □ Lo	garithm (Lines)	🔲 Logarithm (Bars)		
Group Entry	100					
Service Disruption Time	140					
📲 📅 RFC 2544 Automatic Test E	120					
🔤 🔤 🛗 RFC 2889 Automatic Test E	Time 100					
	1, 2, 3 80					
	60 +					
	401					
			22:18:30		22:19:00	
				Time		
	1: Current Lat	ency (us) 1 [us] -	— 2: Max Latency	y (us) 1 [us] 🕂 3: Min	Latency (us) 1 [us]	
Counter setting		Unit1:3:2	Owner	100M Full	Link Coll Err	Trie

- > Set "Tx/Rx" at "Flow Counter" of the Counter Setting screen to "Rx".
- Set "Mode:" to "Monitor".
- Press the "Add..." button to open the "Field Setting" screen.



Place a checkmark in "IPv4 Destination Address [32bit]" at the Field Setting screen and press the "OK" to close the window.



- Select "IPv4 Destination Address" at Flow Counter of the Counter Setting screen and press the "Edit…" button to open the "IPv4 Destination Address" input window.
- Input "224.1.1.1" at the "IPv4 Destination Address" input window and press the "OK" button.
- Press the "OK" button to close the Counter Setting screen.



Select Port2 and press the "Counter Display Option" button at the Counter screen to open the "Counter Display Option" screen.



MX123001 A Data Quality A	analyzer Control Software					
Tool 🛛 👌 Transmit	Counter 🗼 Capture 📗	> Error		History H.	Reset Log 🔓	2
🖃 🏭 Unit Entry	Physical I/F	n 🖣 😐 Tx Stream 🗍	Collision Ocu	nter 💿 apture 🔍 Lat	ency 🛛 🔍 Ping 🗋 🔍 Va	riation 🔳 🕨
⊡		📱 📜 Add to C	hart 🗸 🛈 🛅	E Default2	 Elapsed Time: 	0:06:29
Port 2	Name	Unit1:3:2 Current	Unit1:3:2 Accumulated		(1)	
Port 4	Received Rate (%)	91.17%	74.62%		. ,	
Port 5	🗉 Link Failed	0	0			
Port 7	Max Latency (us) 1		6,871.036us	`(2)		
- Port 8	Max Latency (us) Other		-			
Port 9	Min Latency (us) 1	•	163.508us			
- 🕞 Port 11	Min Latency (us) Uther Current Latency (us) 1	-	•			
Port 12		103.02008				•
Traffic Map	Resolution: 1s	▼ □ Lo	garithm (Lines)	🔲 Logarithm (Bars)		
Group Entry	160			· · · · · · · · · · · · · · · · · · ·		
Service Disruption Time	140					
RFC 2889 Automatic Test E	120					
	Line 100					
	60					
	40					
	20					
	0		22:18:30		22:19:00	
				Time		
	1: Current Lat	ency (us) 1 [us] 🗕	— 2: Max Latency	(us) 1 [us] 🚽 3: M	lin Latency (us) 1 [us]	
	<u></u>	16341-9-9	Owner	100M-5	Link Call For	Tria
joounter setting		junitra:2	owner	JIOOM Full	JEN BOIL JEN	ing /

- Press the "Clear All" at the Counter Display Option screen to clear all the displayed counts at once.
- > Select "Flow" of "Category" and place checkmarks in the following items.
 - ✓ "Max Latency (us) [Flow]"
 - ✓ "Min Latency (us) [Flow]"
 - ✓ "Current Latency (us) [Flow]"
 - ✓ "Ave. Latency (us) [Flow]"
- > Press the "OK" button to close the screen.



Select Port2 and press the "Counter" button at the top of the screen to start measurement.



Select "Current Latency (us) 1" of the counter items and right-click "Line 1" from the menu.

A MV100001 & Data Quality A	and and Control Software				
	manyzer Control Software	- 1		Alarm Error P.Fail	
	Capture	> Error		History H.Reset	
📮 🏭 Unit Entry	Physical I/F	n 🕒 Tx Stream 🛛	Collision	inter 🕒 Capture 🕒 Latency 🔍 Ping 🔍 \	/ariation 🔳 🕨
i ⊡~≔ Unit1 i⊡~= (3) 10/100/1000N I		📱 💢 Add to I	Chart 🔹 🔍 💼	Default1 💌 Elapsed Time:	0:00:12
Port 1	Name	Unit1:3:2 Current	Unit1:3:2 Accumulated		_
- Port 4 (1)	Max Latency (us) 1		167.028us		
- Port 5	Max Latency (us) Other	-		<(2)	
Port 6	Min Latency (us) 1		163.496us	(2)	
Port 8	💷 Min Latency (us) Other				
- Port 9	Current Latency (us) 1	163,934	Line 1	5	
Port 10	Current Latency (us) Other				
Port 12	Avg Latency (us) 1	•			-
Traffic Monitor	Resolution:			Logarithm (Bars)	
Group Entru					
Group1			Line 6		
Service Disruption Time			Line 7		
HFC 2544 Automatic Test E			Bar 1		
		-			
			Сору		
			0 Time		
	·	Unit1:3:2	Owner	100M Full Link Coll I	Err Trig /
,				, , , , , , , , , , , , , , , , , , , ,	

> The transmission delay time changes over time as shown below, and can be monitored on the graph.

💋 MX123001A Data Quality Analyzer Control Software						
🚰 Tool 🌔 Transmit 🔳 Counter 🌔 Capture 📄 Error						
🕞 🏭 Unit Entry	Physical I/F	n 📮 Tx Stream 🗍	🛚 Collision 🕨 Cou	unter Capture Catency Ping Variation		
	1 00 1 Add to Chart V					
Port 1	Name	Unit1:3:2 Current	Unit1:3:2 Accumulated			
- Port 4	Max Latency (us) 1		167.676us			
Port 5	🗆 Max Latency (us) Other					
Port 7	Min Latency (us) 1	-	163.496us			
	Min Latency (us) Other	-				
	Current Latency (us) 1	164.160us	•			
- Port 11	Current Latency (us) Other	-	•			
- Port 12	Avg Latency (us) 1	•	163.961us			
Traffic Monitor	Resolution: 1s	🔽 🗆 Lo	ogarithm (Lines)	🗖 Logarithm (Bars)		
Group Entry Group1 Service Disruption Time RFC 2544 Automatic Test E RFC 2889 Automatic Test E	160 140 120 Line 1 80 60 40 20 00:56:00		0 T 	0:56:30 ime nt Latency (us) 1 [us]		
	<u>,</u>	Unit1:3:2	Owner	100M Full Link Coll Err Trig		



4.6. Monitoring Transmission Delay Time 2

(Outline)

COR

Operate the emulated server and host and monitor the dispersion (Packet Jitter) of the transmission delay time using the Variation function.

(Contents)

Send a multicast stream from Port1 and perform Join/Leave (Zapping) at Port2. In this condition, monitor the transmission delay time. The dispersion in the transmission delay time of multicast address "224.1.1.1" is monitored.

(Results)

You will learn how to measure packet jitter of a multicast stream under Channel Zapping conditions.

- ♦ Sending Multicast Stream from Port1 (Starting Output of Emulated Host)
 - Select Port1 and press the "Transmit" button at the top of the screen.



- Starting Join/Leave Operation at Port2 (Starting Emulated Host Operation)
 - Select Port2 and press the "IGMP" button at [IGMP] of the Protocol screen (starts repeated Join/Leave operation).



	MX123001 A Data Quality A	nalyzer Control Software		Alarm Error P.Fail	×□_ <u>}</u>
	□- 續 Unit Entry ⊡ ≔ Unit1	 ■ Ix Stream ■ Collision ■ Counter ■ IGMP ■ IGAP ■ MLD ■ MLDA 	Capture 🛛 😐 Latency 🗍 😐 Pin	g 🕒 Variation 😐 Protocols	(2)
(1)-	S ² Pert 1 Port 2 Port 3 Port 4 Port 5 Port 6 Port 7	(3) Entry Information No. Model #tof Host/CH ✓ 1 Inc/Dec CH 1/1 ✓ 2 Inc/Dec CH 1/1 ✓ 3 Inc/Dec CH 1/1	Host Address (from) 192.168.1.10 192.488.1.10 192.168.1.10	Group Address (from 224.1.1.1 224.1.1.2 224.1.1.3	n)
	Port 8 → Port 9 → Port 10 → Port 11 → Port 12 → Traffic Map	4 Inc/Dec Host 1/1 Edit Copy State Monitor - Entry 3	20.3.0.1 (4) <u>Paste Save</u> Host: #1-#25	224.1.1.1	
	Group Entry Group1 Service Disruption Time RFC 2544 Automatic Test E RFC 2889 Automatic Test E				
		Counter Received General Query (version 3) Received General Query (version 2)	0		
		Received Group Specific Query (version 3 Received Group Specific Query (version 2 Received Group and Source Specific Que	i) 0 :) 0 sry 0		
		Unit1:3:2	Owner	100M Full	Coll Err Trig

- Set the Variation filter at Port2. (This monitors the Latency dispersion of the flow for multicast address "224.1.1.1".)
 - Select Port2 and select "Latency" at the Variation screen. Press the "Latency Setting" button to open the "Latency Setting" screen.



- Place a checkmark in "On" at the Latency Setting screen and set "Pattern1" of "Conditions" to "Match".
- Press "Edit..." to open the "Filter/Trigger/Counter Condition" screen.



Latercy
Pattern 4 Base Position: Top of Frame Pattern: 0000 0000 0000 0000 0000 0000 0000 Mask: 0000 0000 0000 0000 0000 0000 0000 Error Error Type: Good Frame Combination Corr Or

- Select "IPv4 Destination Address" from "Preset Pattern" at Pattern1 of the Filter/Trigger/Counter Condition Setting screen.
- Set the value of "Pattern:" at Pattern1 to "224.1.1.1".
- > Press the "OK" button to close the screen.

ANRITSU CORPO

0	Filter/Trigger/Counter Condition Setting - Unit	1:3:2
	Pattern 1	
	Base Position: Top of IPv4 Header	Offset: 16 🜩 🚺 🖳 🕅
	Pattern: 224.1.1.1	
	Mask: Anno	
	Format C How C IPut C IPut	Help
	Politide. O Hex So IFV4 O IFV0	Heset Hattein (4)
(3)	Pattern 2	MAC SA
• •	Base Position: Top of Frame	Ether Type
	Pattern: 0000 0000 0000 0000 0000 0000 0000 0	MPCP (1)
	Mask: 0000 0000 0000 0000 0000 0000 0000 0	8023 OAM
	Format: Hev. C IPv4 C IPv6	IPv4 Source Address
		IPv4 Destination Address
	Pattern 3	IPv4 Protocol
	Base Position: Top of Frame	
	Pattern: 0000 0000 0000 0000 0000 0000 0000 0	Any IPv6 Packet
	Mask: 0000 0000 0000 0000 0000 0000 0000 0	IPv6 Source Address
	Format: Hex C IPv4 C IPv6	IPv6 Destination Address
		IPVO Next Header
	Pattern 4	Any UDP Packet
	Base Position: Top of Frame	UDP Source Port
	Pattern: 0000 0000 0000 0000 0000 0000 0000 0	UDP Destination Port
	Mask: 0000 0000 0000 0000 0000 0000 0000 0	TCP Source Port
	Format: Hex C IPv4 C IPv6	TCP Destination Port
	- Firer	
	Error Type: Good Frame	And
		C Or

- > Select Port2 and press the "Auto Scale" button at the Variation screen.
- > Press the "Variation" start button to start monitoring Packet Jitter.
- The Packet Jitter changes over time as shown below, and can be monitored on the graph.





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MU120131A/32A IP Multicast Measurement Quck Start Guide


4.7. Analysing Measurement Results

(Outline) Analyze the multicast stream transmission delay results. (Contents) Examine the measurement results on the sample screen. (Results) You will learn how to evaluate the multicast stream transmission delay measurement results.

The transmission delay times displayed on the example screen range from 163.496 to 167.676 us.

This shows the packet arrival time when hosts (subscribers) are performing Channel Zapping on a video streaming service using multicast streaming typically used by IPTV. Since multicast communications require real-timeness, transmission delay and dispersion are important factors in network QoS. The actual transmission varies with the number of routers and their performance on the multicast streaming network as well as with the subscriber behavior (Channel Zapping conditions) and rich content (network load). When monitoring the overall service, it is very important to remember that the network performance is impacted by all the users.

The purpose of this measurement is evaluation of network performance. Evaluating network performance in advance can help prevent problems before they occur and plan future network development.



Fig. 11 Transmission Delay Time due to Network



5. Evaluation Example 3...QoS Measurement

5.1. Connecting DUT

(Outline)

Connect an IP multicast network to the MD1230B.

(Contents)

First, provide an IP multicast network environment using a router. (This guide describes an IPv4 network using the IGMP protocol (at host side) and PIM-SM protocol (at network side).

When connected to the MU120131A, Port 1 emulates a server and Port 2 emulates a host. *(Results)*

You will learn about connecting the DUT with measuring equipment.

♦ Connecting Multicast Routers

- Connect Port1 of the MU120131A to the server-side router. (In this guide, the server-side network is "192.168.4.0/24".)
- Connect Port2 of the MU120131A to the host-side router. (In this guide, the host-side network is "192.168.1.0/24".)



Fig. 12 Connecting DUT



5.2. Setting Measurement Ports

(Outline)

Perform the basic settings for the ports operating as the emulated server and emulated host. *(Contents)*

Set the following port numbers and addresses for the emulated server and host.

In addition, perform settings for ARP and Ping.

[Emulated Server]

Port number: Port1 MAC Address: 00-00-91-01-01-01

IPv4 Address: 192.168.4.10

- Netmask: 255.255.255.0
- Gateway: 192.168.4.254

[Emulated Host]

Port number: Port2

MAC Address: 00-00-91-01-01-02

IPv4 Address: 192.168.1.10

Netmask: 255.255.255.0

Gateway: 192.168.1.254

(Results)

You will learn basic settings for using ports for measurement.

♦ Setting Port Operating as Emulated Server

Select Port1 and right-click to select "Port Setting" (opens "Port Setting" window).



- Set "MAC Address:" to "00-00-91-01-01".
- Set "IPv4 Address:" to "192.168.4.10".
- Set "Netmask:" to "255.255.255.0".
- Set "Gateway:" to "192.168.4.254".
- Select "Reply to this port ARP request".
- Select "Reply to this port PING request".
- Remove the checkmarks in "1000 Mbps Half Duplex" and "1000 Mbps Full Duplex" of "Auto Negotiation" (when the router connection port is 100 Mbps Full Duplex).
- Press the "OK" button.



	Port setting - Unit1:3:1		×	
(1)	Ownership: Owner	Mapping: Framed	<u>o</u> k	
	Mode: Normal	MII Properties	Cancel	(0)
(2)	MAC Address: 00-00-91-01-01-01	Auto Negotiation	Applu	(0)
(3)	IPv4 IPv6 VLAN Protocols	On Off		
(4)	- This Port	Capabilities To Be Advertised IOM bps Half Duplex Restart	Help	
	IPv#Address: 192.168.4.10	 ✓ 10M bps Full Duplex ✓ 100M bps Half Duplex Timing: Auto ▼ 		
(5)	Netmask: 255.255.255.0	100M bps Full Duplex 1000M bps Half Duplex 1000M bps Half Duplex Vertex Auto MDI/MDIX		(7)
	Gateway: 192.168.4.254			
		Loopback (1000M Full only)		
	AHP Reply	Flow Control Receive (Full Duplex only)		
(6)	Reply to this port ARP request	Multicast Pause Address 01-80-C2-00-00-01		
		Directed Address This Port		
	ICMP Echo (PING) Reply	C User Defined 00-00-00-00-00		
	Reply to this port PING request			
		MII Registers Default		
		Maximum Frame Size: 1518 (1518 is recommended)		
		Preamble		
		Test Pattern: Single PRBS 9		

Check that 100M Full is displayed at the screen bottom right and that the Link LED is green. (Confirm that the connection between the router and instruments is Link Up at "100Mbps Full Duplex".)

100M Full	Link Coll Err Trig

- ♦ Setting Port Operating as Emulated Host
 - Select Port2 and right-click Port Setting (opens "Port Setting" window).



- Set "MAC Address:" to "00-00-91-01-01-02".
- Set "IPv4 Address:" to "192.168.1.10".
- Set "Netmask:" to "255.255.255.0".
- Set "Gateway:" to "192.168.1.254".
- Select "Reply to this port ARP request".
- Select "Reply to this port PING request".

- Remove the checkmarks in "1000 Mbps Half Duplex" and "1000 Mbps Full Duplex" of "Auto Negotiation" (when the router connection port is 100 Mbps Full Duplex).
- Press the "OK" button.



Check that 100M Full is displayed at the screen bottom right and that the Link LED is green. (Confirm that the connection between the router and instruments is Link Up at "100Mbps Full Duplex".)

100M Full	Link Coll Err Trig

- ♦ Checking Connection
 - Display the Ping screen for Port1, set the value of "Destination:" to "192.168.1.10" and press the "Ping" button.



월 Tool 🛛 🜔 Transmit 👂	Counter Capture	m Error P.Fa		
		History H.Reset		
	Physical I/F © Error Insertion © Tx Stream © Collision © Counter © Cap (3) (3) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (3) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (3) (2)<	bytes bytes	• Ping • Var	ation ◀ TTL 254 254 254 254
Find the map F				
	Unit1:3:1 Owner	100M Full	Link Coll Err	Trig

Check that "Reply from 192.168.1.10" is displayed in "Result:". (This checks the connection over the router.)



5.3. Setting Tx Stream

(Outline)

Create multicast stream data for operating as emulated server.

(Contents)

Broadcast a multicast stream using the MD1230B Tx Stream generation function.

In this example, three multicast streams are prepared (multicast addresses: "224.1.1.1" / "224.1.1.2" / "224.1.1.3"). The traffic for each stream is 5 Mbps. To measure the delay time, a timestamp is buried in the stream with multicast address "224.1.1.1".

(Results)

You will learn how to set up an emulated server broadcasting video on three channels each with a bandwidth of 5 Mbps. (One channel will have a timestamp.)

- Creating Multicast Stream Data 1 Generated from Port1 at Server Side (Multicast Address: 224.1.1.1)
 - Select Port1 and press "Add" at the Tx Stream screen to add one stream.
 - > With the added stream selected, press "Edit..." to edit the stream.



- Set "Protocol" at [General] of the Frame Setting screen to "UDP/IPv4". (Multicast broadcasts generally use the UDP protocol.)
- Set "Frame Length:" to "Fixed" and a value of "1518". (The maximum length of Ethernet frames is 1518 bytes.)





- Set "Source Address" at [Ethernet] of the Frame Setting screen to "This port". (When "This port" is selected, the address specified by "Port Setting" is enabled.)
- Set "Destination Address" to "Static" and "Value:" to "01-00-5E-01-01-01". ("01-00-5E-01-01-01" is the MAC address used by multicast address "224.1.1.1".)

Stream Setting - Unit1:3:1 - Stream `			×
Stream Control Frame Setting	-(1)	(4)	1 <u>o</u> k
General Ethernet UPv4 UDP Data	Fields Error Insertion		
Presimble Size: 8 🔿 bytes	Destination Address	ource Address	
(2) Edit Preamble Pattern	Static	This port	+- (3)
SFD: hex D5	Value:	Value:	Mont
-	01-00-5E-01-01-01	00-00-00-00-00	
Lype Auto (bey 0800)	Mask:	Mask: (5)	Help
	FF-FF-FF-FF-FF	FF-FF-FF-FF-FF V	
(hex)	,	,	
ECC: Auto			
PCS. Auto			
			_
Frame Format Frame View			_
Total Length		Part Length	411
V			
	Describle		
	,	• –]
8	SFD		
	DA	6	
14	DA		
**			
	SA	6	
20			
	Table		<u> </u>

- Set "Source Address" at [IPv4] of the Frame Setting screen to "This port". (When "This port" is selected, the address specified at "Port Setting" is enabled.)
- > Set "Destination Address" to "Static" and "Value:" to "224.1.1.1".



Stream Setting - Unit1:3:1 - Stream 1	-(1)		×
Stream Control Frame Setting General Ethernet IPv4 UDP Data	Fields Error Insertion		<u><u> </u></u>
(2) Type of Service Bit 0-2: 000 · Routine Bit 3: 0 · Normal Delay Bit 4: 0 · Normal Throughput Bit 5: 0 · Normal Reliability Bit 6.7: 00 Overwrite Total Length 0 Identification: hex 0000	Flag Bit 0: Dit 1: 1 · Don't Fragment Bit 2: 0 · Last Fragment Fragment Offset: 0 Time to Live: 64 Protocol: • Auto 0 Header Checksum: Auto Options (0 byte)	Source Address Type: This Port Address: 127.0.0.1 Mask: 255.255.255 Y K Destination Address Type: Static Address 224.1.1.1 Mask: 255.255.255 Y K	Cancel (3) Prev N∈(4) He(5)
Frame Format Frame View Total Length		Part Length	
u	Preamble	8	
	DA	6	
20	SA	6	
	Twne	9	

- Set the value of "Source Port:" at [UDP] of the Frame Setting screen to "1315". (This specifies the undefined UDP port address.)
- Set the value of "Destination port:" to "5556". (This specifies the undefined UDP port address.)

Strea Str Gr (2)	am Settine eam Contro eneral Ethe Source port Destination (Destination (Overwrite Overwrite	rame Setting met IPv port: e Length e Checksum	- Stream 1 JDP Dita Fields Error Insertion 1315 5556 0 hex 0000	rement Port Number Norte (4) Source Port Destination Port			<u>DK</u> <u>Cancel</u> <u>Piev</u> <u>Next</u> <u>Help</u>
Fr	ame Format	Frame View					
	т	otal Length)	15	Part Length	-	
		8	Preamble	SFD	8		
		14	DA		6		
		20	SA		6	_	
			Tyme		→		

- Select "Next Stream" at "Distribution:" on the Stream Control screen.
- Set "Unit" of "Inter Stream Gap:" to "ns" and set the value of "100M" to "687,520". (Setting the inter-frame gap to 687,520 ns means sending the stream over the 15 Mbps band at a 100M Link speed.) Since three streams are created in this example and are broadcast sequentially, the actual output for this setting is 5 Mbps.



After setting "Unit" of "Inter Frame Gap:" to "bit/s" and inputting "15,000,000", return "Unit" to "ns" and confirm that the 15-Mbps equivalent gap time is 687,520 ns.

Press the "OK" button to close the setting screen.

Jump to	D 1	Counc 1	4				
nter Stream Gap:	ns 💌	10M 6875200	100M 687520	1000M 68752	Actual Value 68752ns	<u>Prev</u>	
nter Frame Gap:		$\gamma_{(3)}$		(4)		Help	
Fixed Value:	Unit ns 💌	10M 6875200	100M 687520	1000M	Actual Value 68752ns		
C Random Min:	ns 💌	9600	960	96	96ns		
Max:	ms 🔻	0.0096	0.00096	0.000096	0.000096ms		
nter Burst Gap:	Unit ns 💌	10M 9600	100M 960	1000M 96	Actual Value 96ns		
rames per Burst:	1						
ursts per Stream:	1						
Stream image:						_	

- Creating Multicast Stream Data 2 and Multicast Stream Data 3 from Server-side Port1 (Multicast address: "224.1.1.2"/"224.1.1.3")
 - With the stream select at the Tx Stream screen, press "Copy" and then press "Paste" two times (makes two copies of stream).



With the second stream selected, press "Edit..." to edit the stream.

MX123001A Data Quality	Analyzer Control Softwar	e				
🔁 Tool 🛛 🕨 Transmit 👂	Counter 👂 Capture 🏾 📗	> Error		Alarm Error P.Fail	Log 🖩 😂 ? 🕅	
🖃 🏭 Unit Entry	Physical I/F	n 🍳 Tx Stream 🗅	Collision 🛛 😐 Counter 🛛	🍳 Capture 🛛 º Latency 🗍 º	Ping 🔍 Variation 📕 🕨	
⊡				Ela	psed Time: 1:21:11	
Port 1	ID Distribution	Length	Protocol	VLAN Errors	bbA	, (2)
		Fixed 1519		None None		
Port 4	V V 3 Next	Fixed 1518	UDP/IPv4	None None		
Port 5					Delete	
Port 7	(1)					
Port 8					Сору	
- Dert 11						
Traffic Monitor					Paste	
Traffic Map					Import	
Service Disruption Time						
RFC 2544 Automatic Test E					Clear All	
HFC 2889 Automatic Test E					Enable All	
					Disable All	
	Device Type (for Latency)					
∢ ►	C Store and Forward		Bit Fo	orwarding (Cut Through)		
		Unit1:3:1	Owner	100M Full	K Coll Err Trig	

- Set "Source Address" at [Ethernet] of the Frame Setting screen to "This Port". (When "This port" is selected, the address specified at "Port Setting" is enabled.)
- Set "Destination Address" to "Static" and "Value:" to "01-00-5E-01-01-02". ("01-00-5E-01-01-02" is the MAC address used by multicast address "224.1.1.2".)

tream Setting - Unit1:3:1	– Stream 2							
Stream Control Frame Setting		•(1)		.(4)			
General Ethernet 10-v4	UDP Data F	Fields Error Insertion	1					<u> <u> </u></u>
Prezuble Size:	bytes	Destination Addres:		CSource Ad	dress			<u>C</u> ancel
•		D cound on Piddroot			4,000			-(3)
Edit Preamble Pattern	·	Static	•0	This por	t			Prev
SFD: hex D	5	Value:	00	Value:	00.00.00			<u>N</u> ext
Туре		U1-00-5E-01-01-		00-00-00	0-00-00-00			
Auto (hex 0800)	ŋ	Mask:		Mask:	(5)			<u>H</u> elp
C Manual 0800 - In	ternet IP 🔻	FF-FF-FF-FF-FF-	FF 🔽 🗹	FF-FF-FI	F-FF-FF-FF	7		
(hex)								
FCS: Auto								
FCS: Auto								
FCS: Auto								
FCS: Auto Frame Format Frame View								
FCS: Auto	version		1 ype of Ser	¥1Ce	+,			
FCS: Auto	Yersion	I IIIL Total I Identif	iype or ser .ength ication	¥ice	2			
FCS: Auto	version Flags	IIIL Total I Identif Fra	lype of Ser ength ication gment Offset	¥1Ce	22			
FCS: Auto Frame Format Frame View Frame View	version Flags Tim	IIIL Total I Identif Fra e to Live	type of Ser ength ication gment Offset Protocol	¥100				
FCS: Auto	Version Flags Tim	HL Total I Identif Fra e to Live Header C	iype of Ser ength ication gment Offset Protocol hecksum	¥1Ce				
FCS: Auto	Version Flags Tim	HiL Total I Identif Fra e to Live Header C Source	ype or Ser ength ication gment Offset Protocol hecksum Address	¥1Ce				
FCS: Auto Frame Format Frame View 24 26 28 30 32 34 38	Version Flags Tim	Int. Total I Identif Fra e to Live Header C Source /	iype of Ser ength ication gment Offset Protocol hecksum Address	¥1Ce		1518	 •	
FCS: Auto Frame Format Frame View 74 24 24 24 24 28 30 32 34 38 29 24 24 24 24 24 28 30 32 34 34 38 29 38 38 38 38 38 38 38 3	Version Flags	Int. Total I Identif Fra e to Live Header C Source a Destinatio	lype of Ser ength ication gment Offset Protocol hecksum Address n Address	¥ICe		1518		
FCS: Auto Frame Format Frame View 24 24 26 28 30 32 34 34 38 42 42 44	Version Flags Tim	Int. Total I Identifia e to Live Header C Source a Destinatio	lype of Ser ength isation gment Offset Protocol hecksum Address n Address a Port	VICE		1518		
FCS: Auto Frame Format Frame View 74 74 74 74 74 74 74 7	Version Flags Tim	IHL Total I Identif Fra e to Live Header C Source a Destinatio	I ype of Ser .ength ication yment Offset Protocol hecksum Address n Address e Port			1518		

- Set "Source Address" at [IPv4] of the Frame Setting screen to "This port". (When "This port" is selected, the address specified at "Port Setting" is enabled.)
- Set "Destination Address" to "Static" and "Value:" to "224.1.1.2".



Stream Setting - Unit1:3:1 - Stream 2 Stream Control Frame Setting General Etheliet IPv4 UDP Data 1 Version: HL Auto Type of Service Bit 0-2: Bit 3: 0 - Normal Delay Bit 4: 0 - Normal Reliability Bit 5: 0 - Normal Reliability Bit 6,7: 00 Overwrite Total Length 0 Identification: best 0000	-(1) Fields Error Insertion Bit 0: 0 Bit 1: 1: Don't Fragment Image: Source Address Bit 2: 0: Dot Last Fragment Image: Source Address Fragment Offset: 0 Time to Live: 64 Protocol: Auto Manual Image: Source Address Type: Image: Source Address Type: Image: Source Address Type: Image: Source Address Protocol: Auto Options Options	⊻ Cancel (3) Prev Mr(4) He(5)
Frame Format Frame View 24 Version 26 28 30 Flags 32 Tim 34 38 42 44 46 48	IIIL 1 ype of Service Total Length 2 Identification 2 Fragment Offset 2 Identification 2 Be to Live Protocol Header Checksum 2 Source Address 4 Source Port 2 Destination Address 4 Lenoth 2	

- Set the value of "Source Port:" at [UDP] of the Frame Setting screen to "1316". (This specifies the undefined UDP port address.)
- Set the value of "Destination port:" to "5557". (This specifies the undefined UDP port address.)
- > Press "Next" to open Stream3 setting screen.

S	tream Settin	ng - Unit1:3:	1 - Stream 2	×	
	Stream Contro	Frame Settin		пк	
	General Eth	nernet IPv	UDP Dita Fields Error Insertion (3)		
	Source por	t i	1316 Increment Port Number	<u>C</u> ancel	
(2)	Destination	n port:	5557 Source Port	Elev	(5)
1	🗖 Overwr	rite Length	C Destination Port	Next	(0)
	C Overwr	rite Checksum	hex 0000		
				<u>H</u> elp	
	Eromo Format	He v			
	riane ronnau	Total Lengt	Part I ength		
			Preamble 8		
		8	SFD		
			DA 6		
		14			
			54		
		20			
			Tone 9		

- Set the value of "Source Port:" at [UDP] of the Frame Setting screen to "1317". (This specifies the undefined UDP port address.)
- Set the value of "Destination port:" to "5558". (This specifies the undefined UDP port address.)



St	ream Setting - Un	it1:3:1	- Stream 3				×
	Stream Control Frame	Setting					
	General Ethernet If	Pv I	JDP Data Fields Error Insertion (3)				
	Source port		1317 Increment Port Numl	ber			<u>C</u> ancel
(2)	Destination port:		5558 Source Port				<u>P</u> rev
	🔲 Overwrite Lengtl	h	0 C Destination Port				Next
	Overwrite Check	ksum	hex 0000				Help
Ŧ	Frame Format	Mourl					
	Total Le	ength			Part Length		
			l	15			
			Preamble		8		
		8	SFD		<u> </u>		
			DA		6		
		14					
					T		
		20	SA		6		
			Tone		+, :	-	

- Set "Source Address" at [IPv4] of the Frame Setting screen to "This port". (When "This port" is selected, the address specified at "Port Setting" is enabled.)
- > Set "Destination Address" to "Static" and "Value:" to "224.1.1.3".

Stream Setting - Unit1:3:1 - Stream 3	3		×
Stream Control Frame Setting	-(1)		
General Ethenet IPv4 UDP Data	Fields Error Insertion		<u><u> </u></u>
Version: 4	Flag	Source Address	Cancel
Auto	Bit 0: 0 💌	Type: This Port	(3)
(Z) Type of Service	Bit 1: 1 - Don't Fragment	Address: 127.0.0.1	Prev
Bit U-2: UUU - Houtine	Bit 2: 0 - Last Pragment	Mask: 255 255 255 255	
Dit 3. U - Normal Delay	Fragment Offset: 0		н. (5)
Bit 5: 0 - Normal Peliability	Time to Live: 64	Destination Address	
Bit 6 7: 00 V	Protocol: Auto (17)	Type: Static	T
	Header Checkeum: Auto	Address 224.1.1.3	
Uverwrite Total Length	Options	Mask: 255.255.255.255 🗹 <	
hex 0000	(0 byte)		_
Frame Format Frame View			
Total Length 0		Part Length	-111
	Preamble	8	
8	SFD		1
	D∆	6	
	SA	6	
	Trac	+	
	. 2012		긘

- Set "Source Address" at [Ethernet] of the Frame Setting screen to "This Port". (When "This port" is selected, the address specified at "Port Setting" is enabled.)
- Set "Destination Address" to "Static" and "Value:" to "01-00-5E-01-01-03". ("01-00-5E-01-01-03" is the MAC address used by multicast address "224.1.1.3".)



Stream Setting - L	Unit1:3:1 - Stream 3	(1)	(4)			× (6)
General Ethernet	v4 UDP Data Fi	elds Error Insertion	(+)			
Preamble Size:	8 🔹 bytes	Destination Address	Source Addres	5		ncel
(2) Edit Preamble	e Pattern	Static	This port		(3 <u>)</u>	ev
SFD:	hex D5	Value:	Value:	00-00	N	ext
Type Auto Manual (hex)	(hex 0800) 0800 - Internet IP 💌	Mask: FF-FF-FF-FF-FF-FF 🔽 💶	Mask: (5) .FF.FF <u>V</u> <u>V</u> <u>V</u>	<u><u> </u></u>	qlp
FCS:	Auto					
Total	Length			Part Length		
	8	Preamble SFD		8		
		DA		6		
	20	SA		6	-	
		Imp				

- > Select "Jump to Stream" at "Distribution:" of the Stream Control screen.
- > Set the value "Jump to ID" to "1" (sets jump stream destination to stream 1).
- > Press "OK" to close the setting screen.

Distribution: Jump to Stream Jump to Jteam Jump to Jteam	stream Control	- Unit1:	1 - St - (1)	ream	3			(2)		Х	
Inter Stream Gap: Unit (B875200 100(M (B875200 Actual Value (B87520 Prev (B87520 Inter Frame Gap: Unit (B875200 100M (B87520 1000M (B87520 Actual Value (B87520 Mext. Help Image: Unit (B875200 100M (B87520 1000M (B87520 Actual Value (B87520 Actual Value (B87520 Help Image: Value: Image: 100M (B875200 1000M (B87520 Actual Value (B87520 Actual Value (B87520 Image: I	Distribution:	L Jump Jump to ID	to Stream	n 1	Count	1	•	tal Time (1000M): 80.96m	\$		
Help Image: Frame Gap: Unit 10M 100M Actual Value E87520 E87520 </th <th>inter Stream Gap</th> <th>:</th> <th>Unit ns</th> <th>•</th> <th>10M 6875200</th> <th>~(3)</th> <th>100M 687520</th> <th>1000M 68752</th> <th>Actual Value 68752ns</th> <th>Prev</th> <th></th>	inter Stream Gap	:	Unit ns	•	10M 6875200	~(3)	100M 687520	1000M 68752	Actual Value 68752ns	Prev	
Fixed Value: ns ns 687520 68752 68752 68752 68752 68752 68752 68752 68752 68752 68752 96ns 96ns 96ns 96ns 0.00096 0.00096 0.00096 0.00096 0.00096 0.00096 0.000096 0.000096 0.000096 96 96	Inter Frame Gap:		Unit		10M		100M	1000M	Actual Value	<u>H</u> elp	
Max Ins Ins <th> Fixed C Bandom </th> <th>Value: Min:</th> <th>ns</th> <th>•</th> <th>6875200</th> <th></th> <th>687520</th> <th>68752</th> <th>68752ns 96ns</th> <th></th> <th></th>	 Fixed C Bandom 	Value: Min:	ns	•	6875200		687520	68752	68752ns 96ns		
Unit 10M 100M Actual Value Ins 9600 960 960 960 Frames per Burst: 1000 1000 1000 Bursts per Stream: 1 1		Max:	ms	~	0.0096		0.00096	0.000096	0.000096ms		
Frames per Burst: 1000 Bursts per Stream: 1	Inter Burst Gap:		Unit ns	•	10M 9600		100M 960	1000M 96	Actual Value 96ns		
Bursts per Stream: 1	Frames per Burst	:	1000								
	Bursts per Stream	n:	1								
					←IFG	IBG Strea	→ (IFG		G→[
	<u> </u>										

- Burying Sequence number in Multicast Stream Data Generated at Server-side Port1 (Multicast address: "224.1.1.1")
 - > With the first stream selected, press the "Edit..." button to edit the stream.



MX123001A Data Quality /	Analyzer Control Softwar	B			
📴 Tool 🛛 🕨 Transmit	Counter 👂 Capture 🏾 📗	Error		Alarm Error P.Fail	Log 🖩 🖶 ? 🕅
🖃 🏭 Unit Entry	Tx Stream Collision	Counter 🛛 🍳 Captur	e 🛛 🔍 Latency 🗍 🔍 Ping	g 🔍 Variation 🔍 Protoco	ls 📕
⊡				EI	apsed Time: 0:07:12
Port 1	ID Distribution	Longth	Protocol	VLAN Errors	
	V V 1 Next	Fixed 1518	UDP/IPv4	None None	
Dert 4		Fixed 1518	UDP/IPv4	None None	
Der Port 6					Delete
- Dert 7	(1)				
- Port 9					<u>С</u> ору
Port 10					Cut
					Paste
Traffic Monitor					
Group Entry					Import
Service Disruption Time					Clear All
RFC 2544 Automatic Test E					
m 2003 Adiomatic Test E					
					Disable All
	Device Type (for Latency)				
	C Store and Forward		Bit Ferrore	orwarding (Cut Through)	
		Unit1:3:1	Owner	100M Full	nk Coll Err Trig

- Place a checkmark in "Data Field 1" of [Data Fields] at the Frame Setting screen and set "Pattern:" to "Test Frame".
- > Press "OK" to close the setting screen.

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Stream Setting - Unit1:3:1	– Stream 1		×
Stream Control, Frame Setting	(1)	(4)	
General Ethernet IPv4	UDP Data Fields Drror Insertion		
Fields:	Data Field 1 Data		Cancel
🔽 Data Field 1 🔶 🛶	Pattern: Test Frame	▼ TopI Length: 1472 bytes	s
Data Field 2 Data Field 3	Officet	(72) AL butes	Erev
Data Field 4 (2)		4/2 Jyles	Next
	Type: O PRBS	Flow ID 🛛 🚽	
		,	
Programmable Header Patt	tern		
Edit Programmable He	ader Pattern		
(0)	Offset: 0	Initial Value: 0	
(U byte)	<u>-</u>		
Frame Format Frame View			
Total Length	L	Part Length	
	0	15	
	Preamble	8	
8	SFI	D	
14	DX	6	
		+ !	
	SA	6	
90			
20			



5.4. Setting Host Emulation

(Outline)

Create an IGMP protocol sequence for operation as an emulated host.

(Contents)

Use the MD1230B protocol emulation function to assemble a Join/Leave sequence for the multicast group.

In this example, the following three multicast groups are created.

- ✓ Sequence 1: Join multicast address "224.1.1.1" and hold this status for "100,000" seconds. (This is the multicast stream for measuring QoS.)
- ✓ Sequence 2: Join multicast address "224.1.1.2" and perform repeated "connect for 8 seconds/Disconnect for 7 seconds" operations.
- ✓ Sequence 3: Join multicast address "224.1.1.3" and" perform repeated "connect for 8 seconds/Disconnect for 7 seconds" operations.

Sequences 2 and 3 are for emulating Channel Zapping by performing repeated channel switching operations.

(Results)

You will learn how to continuously receive video data for one channel in the Channel Zapping condition and how to configure the emulated host sequence.

♦ Setting Port2 as Emulated Host Supporting IGMP (Sequence 1)

Select Port2 and place a checkmark in the first "Entry Information" at [IGMP] in the Protocol screen. Press "Edit..." to edit the IGMP protocol sequence.

	💋 MX123001 A Data Quality /	Analyzer Control Software	×
	🎦 Tool 🛛 🕨 Transmit 👂	Counter Capture Error Alarm Error P.Fail Log 🖩 🚭 🔋	Æ
	🖃 🏭 Unit Entry	💁 Tx Stream 🔍 Collision 🔍 Counter 🔍 Capture 🔍 Latency 🔍 Ping 🔍 Variation 🔍 Protocols 🕽 📃 💽	Þ
	init1		
	⊡		
	Port 2	2 (3)	
$(1)^{7}$	D- Port 3	Entry information Entry information No Model th of Host/CH Host Address (from) Group Address (from)	-
(.)	De Port 5	Inc/Dec Host 1/1 201.0.1 224.1.1	1
	- 🕞 Port 6	Inc/Dec Host 1/1 20.1.0.1 224.1.1.1	
	- Port 7	3 Inc/Dec Host 1/1 20.2.0.1 224.1.1.1	
	Port 9	4 Inc/Dec Host 1/1 20.3.0.1 224.1.1.1	
	🗭 Port 10		
	- Dert 11	Edit <u>L</u> opy <u>P</u> aste <u>S</u> ave <u>L</u> oad	
	Traffic Monitor		
	Traffic Map	State Monitor - Entry I V Host: #1-#25	.
	Group Entry		Ш
	BFC 2544 Automatic Test E		Ш
	🖳 📅 RFC 2889 Automatic Test E		Ш
			Ш
		Counter	
		Received General Query (version 3) 0	-1
		Received General Query (version 2) 0	
		Received Group Specific Query (version 3) 0	
		Received Group Specific Query (Version 2) U	
		Lighti-22 Owner 100M Full Link Coll Fre Trie	╝
			//

> At [Step1] on the IGMP Host Emulation screen, set "IGMP Version:" to "2" and "Emulation Model:" to "Increase/Decrease Channel" (supports IGMP-v2 channel





At [Step2] of the IGMP Host Emulation screen, set "Join Wait:" to "100000s" and "LEAVE Wait:" to "1s". (This holds the connection for 100,000 s after joining the channel.)



- Set the value of "Host Address:" at [Step3] of the IGMP Host Emulation screen to "192.168.1.10".
- Set the value of "Number of Host:" to "1".



- Set the value of "Group Address:" to "224.1.1.1".
- Set the value of "Number of Group:" to "1".
- > Press "OK" to close the setting screen.

This setting performs the Join/Leave to multicast address "224.1.1.1" with one emulated host ("192.168.1.10").



- ♦ Setting Port2 as Emulated Host Supporting IGMP (Sequence 2)
 - Select Port2 and place a checkmark in the second "Entry Information" at [IGMP] in the Protocol screen. Press "Edit..." to edit the IGMP protocol sequence.

	💋 MX123001 A Data Quality A	inalyzer Control Software			
	🔁 Tool 🛛 🕨 Transmit 🗼 (Counter 👂 Capture 🌗	Error	Alarm Error P.Fail	Log 🖩 🖶 ? 🕅
	🖃 🦉 Unit Entry	□ Tx Stream □ Collision □ (Counter 📔 Capture 🗐 🗉 Latenc	y 🕒 Ping 🗖 🔍 Variation 🔍 Protoco	
	□ □-=== Unit1 □-=== (3) 10/100/1000M	• IGMP • IGAP • MLD	MLDA		(2)
	Port 1				
	Port 2	Entry Information			
(1)	🗭 – Port 4	No. Model # o	f Host/CH Host Address (fr	om) Group Addres	s (from)
	Der Port 5	Inc/Dec CH 1/1	192.168.1.10	224.1.1.1	
	Port 6	2 Inc/Dec Host 1/1	20.3.0.1	224.1.1.1	
	- D- Port 8	4 Inc/Dec Host 1/1	20.3.0.1	224.1.1.1 224.1.1.1	
			20.0.0.1		
	Port IU				
	- Port 12			ave	
	Traffic Monitor	State Monitor - Entry 3	5) Host:	#1-#25	
	Frattic Map				
	Group1				
	Service Disruption Time				
	BEC 2889 Automatic Test E				
	The 2003 Automatic Test E				
		Counter			
		Received General Query (vers	ion 3) C)	
		Received General Query (vers	ion 2) C)	
		Received Group Specific Que	ry (version 3)	1	
		Received Group and Source S	Decific Query 0	,)	
			Unit1:3:2 Owner	100M Full	ink Coll Err Trig



At [Step1] on the IGMP Host Emulation screen, set "IGMP Version:" to "2" and "Emulation Model:" to "Increase/Decrease Channel" (supports IGMP-v2 channel joining).



At [Step2] of the <u>IGMP Host Emulation</u> screen, set "Join Wait:" to "8s", and "LEAVE Wait:" to "7s". (After joining the channel, this performs repeated "Connect for 8 seconds/Disconnect for 7 seconds" operations.)



- Set the value of "Host Address:" at [Step3] of the IGMP Host Emulation screen to "192.168.1.10".
- Set the value of "Number of Host:" to "1".



- Set the value of "Group Address:" to "224.1.1.2".
- Set the value of "Number of Group:" to "1".
- > Press "OK" to close the setting screen.

This setting performs repeated Join/Leave operations to multicast address "224.1.1.2" with one emulated host at "192.168.1.10".

	IGMP Host En Navigation: STEP 1	nulation - Unit1 STEP 3: Addre Host Address: Group Address:	:3:2 - No. 2 ass Setting from 192.168.1.10 Num from 224.1.1.2 Num	iber of Hosts:			(6)
(STEP 2 STEP 3	Host 1	State 1 G1 224.1.1.2	(4) State Change	(5) State 1 <u>61</u> 224.1.1.2	Prev. Entry Next Entry	
(1)		Host 1	ige the Group Address between Ho G1 224.1.1.2	State Change	Export Address List		
	IGMP version 2	<< <u>P</u> rev	ec CH Resource (Host):	3/ 200	NexD>		

- ♦ Setting Port2 as Emulated Host Supporting IGMP (Sequence 3)
 - Select Port2 and place a checkmark in the third "Entry Information" at [IGMP] in the Protocol screen. Press "Edit..." to edit the IGMP protocol sequence.

	💋 MX123001 A Data Quality /	inalyzer Control Software			<u> </u>
	팀 Tool 🛛 🕨 Transmit	Counter 👂 Capture 🌓 Error		Alarm Error P.Fail	
	📮 🏭 Unit Entry	■ Tx Stream	er 🕒 😐 Capture 🗋 🔍 Latency 🗋 🔍 Pi	ng 🔍 Variation 🔍 Protocols	۱
	□ □ ··□ Unit1 □ □ ··□ (3) 10/100/1000M	• IGMP • GAP • MLD • ML	DA		(2)
	Pert 1				
	Port 2	Entry Information			
(1)]		No. Model # of Host	/CH Host Address (from)	Group Address (from))
` '	- Dort 5	☑ 1 Inc/Dec CH 1/1	192.168.1.10	224.1.1.1	
	Port 6	Inc/Dec CH 1/1	192.168.1.10	224.1.1.2	
	Port 8	Inc/Dec Host 1/1	20.3.0.1	224.1.1.1	
	- Port 9	4 Inc/Dec Host 1/1	20.3.0.1	224.1.1.1	
	- Port 1(4)			1	
	Port 12	Edit Copy	Paste Save	<u>L</u> oad	
	🕂 🗮 Traffic Monitor	State Monitor - Entru 3 (5)	Host #1.#2	5 25	
	Traffic Map				
	Group1				
	- 🚟 Service Disruption Time				
	RFC 2544 Automatic Test E				
	HFL 2889 Automatic Test E				
		Counter			
		Received General Query (version 3)	0		
		Received General Query (version 2)	0		
		Received Group Specific Query (ver	sion 3) 0		
		Received Group Specific Query (ver Received Group and Source Specific	sion 2) U		
		The conversion of a source specific			
		<u></u>	1-3-2 Owner	100M Full	Soll Fre Trig



At [Step1] on the IGMP Host Emulation screen, set "IGMP Version:" to "2" and "Emulation Model:" to "Increase/Decrease Channel" (supports IGMP-v2 channel joining).



At [Step2] of the IGMP Host Emulation screen, set "Join Wait:" to "8s", and "LEAVE Wait:" to "7s". (After joining the channel, this performs repeated "Connect for 8 seconds/Disconnect for 7 seconds" operations.")





- Set the value of "Host Address:" at [Step3] of the IGMP Host Emulation screen to "192.168.1.10".
- Set the value of "Number of Host:" to "1".
- Set the value of "Group Address:" to "224.1.1.3".
- > Set the value of "Number of Group:" to "1".
- > Press "OK" to close the setting screen.

This setting performs repeated Join/Leave operations to multicast address "224.1.1.3" with one emulated host at "192.168.1.10".



- ♦ Enabling IGMP Protocol at Port2
 - Select Port2 and right-click to select "Port Setting" (opens "Port Setting" window).



- Place a checkmark in "IGMP" of "Protocol Filter:" at [Protocol] of the Port Setting screen.
- Press the "OK" button.



Port setting - Unit1:3:2		×	
(1) Ownership: Owner	Mapping: Framed	<u>о</u> к	
Node: Normal	MII Properties	<u>C</u> ancel	(3)
MAC Address: 00-00-91-01-01-02	Auto Negotiation	Apply	(5)
IPv4 IPv6 VLA Protocols	On Ult Capabilities To Be Advertised Restart 10M bps Half Duplex Timing: Auto Y 100M bps Half Duplex Timing: Auto Y 1000M bps Half Duplex Auto MDI/MDI-X 1000M bps Full Duplex Auto MDI/MDI-X 1000M bps Full Duplex Auto MDI/MDI-X Intervention For Control Receive (Full Duplex only) Multicast Pause Address 01-80-02-00-00-01 Directed Address 00-00-00-00-00-00 Mil Registers Default Maximum Frame Size: 1518 (1518 is recommended) Preamble Preamble	<u>Heb</u>	
	Test Pattern: Single PRBS 9		



5.5. Monitoring Packet Loss

(Outline)

Run the emulated server and hosts and use the Multi Flow Counter function to monitor the traffic of each multicast stream and packet loss.

(Contents)

Send the multicast stream from Port1 and perform Join/Leave (Zapping) operations at Port2. In this condition, monitor the traffic of each multicast stream and packet loss for multicast address "224.1.1.1".

(Results)

You will learn how to perform QoS measurement of a multicast stream in the Channel Zapping condition.

♦ Send a multicast stream from Port1. (Start the emulated server.)

Select Port1 and press the "Transmit" button at the top of the screen.



- Start the Join/Leave operations at Port2. (Start the emulated host operation.)
 - Select Port2 and press the IGMP start button at [IGMP] of the Protocol screen. (This starts the repeated Join/Leave operation.)



	MX123001A Data Quality A	nalyzer Control Software		Alarm Error P.Fail, Impletor
			Γ	History HReset Log E E 1
	E-∰ Unit Entry	Ix Stream Collision Counter	P Capture P Latency P Ping ™	Variation Protocols
	(3) 10/100/1000	• IGMP • IGAP • MLD • MLDA		(2)
	Port 1	()_ (3)		
(1)-	Port 3	Entry Information		
(1)	Port 4	No. Model tt of Host/CH	Host Address (from)	Group Address (from)
	Port 5	1 Inc/Dec CH 1/1	192.168.1.10	224.1.1.1
	Port 6	2 Inc/Dec CH 1/1	192,168,1.10	224.1.1.2
	Port 8	■ 3 Inc/Dec CH 1/1	192.168.1.10 (4)	224.1.1.3
	- Port 9	4 Inc/Dec Host 1/1	20.3.0.1	224.1.1.1
	Port 10	1	1	
	Port 11	<u>E</u> dit <u>C</u> opy	Paste Save	Load
	Traffic Monitor	State Monitor - Entru 3	Host: #1.#25	2 M
	Traffic Map		#1:#23	
	Group Entry			
	Service Disruption Time			
	RFC 2544 Automatic Test E			
	🔚 🚟 RFC 2889 Automatic Test E			
		-		
		Counter	d	
		Received General Query (version 3)	0	
		Beceived Group Specific Query (version 2)	3 0	
		Beceived Group Specific Query (version	21 0	
		Received Group and Source Specific Q	uery 0	
		Unit1:3	2 Owner	100M Full Link Coll Err Trig

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- Set the Multi Flow Counter filter at Port2. (This enables Latency counting for the flow at multicast address "224.1.1.1".)
 - Select Port2 and press the "Counter Setting" button at the Counter screen to open the "Counter Setting" screen.



- Set "Tx/Rx" at "Flow Counter" of the Counter Setting screen to "Rx".
- Set "Mode:" to "Monitor".
- Press the "Add..." button to open the "Field Setting" screen.



Place a checkmark in "IPv4 Destination Address [32bit]" at the Field Setting screen and press the "OK" button to close the window.

- > Input "3" at "Number of Flow ID" at "Flow Counter" of the Counter Setting screen.
- Select "IPv4 Destination Address No.1" and press the "Edit..." button to open the "IPv4 Destination Address" input window.
- Input "224.1.1.1" at the "IPv4 Destination Address" input window and press the OK button.
- > Press the "OK" button to close the Counter Setting screen.



> Drag from "IPv4 Destination Address No.1" to "IPv4 Destination Address No.3" and



right-click to select "Increment" from the menu. (This automatically inserts the incremented value from "224.1.1.1".)

> Press the "OK" button to close the Counter Setting screen.



Select Port2 and press the "Counter Display Option" button at the Counter screen to open the "Counter Display Option" screen.





- Press "Clear All" at the Counter Display Option screen to clear all the displayed counter items at once.
- Select "Flow" of "Category" and place checkmarks in the following items (so that each multicast flow traffic can be seen individually.)
 - 🖊 Counter Display Option × ltem Order <u>0</u>K Order Category: Counters Cancel Transmitted Bit Rate (Mbit/s) (Flow) ŧ ⊡ · All Test Frame Transmitted Rate (%) (Flow) Transmitted Byte (Flow) Apply User Defined Transmitted Frame (Flow) Transmitted Frame (Flow) Transmitted Frame (fps) (Flow) Received Bit Rate (Mbit/s) (Flow) OoS Default Capture <u>H</u>elp IP/UDP/TCP Received Bute (Flow) ARP/ICMP Received Byte (Flow) Received Frame (Flow) Received Frame (fps) (Flow) Max Latency (us) (Flow) Check All Ethernet/PPP/GFP Ethernet Clear All PPP Min Latency (us) (Flow GFP Preset Current Latency (us) (Flow) Avg Latency (us) (Flow) SDH/SONET Bulk Oefault1 SDH/SONET VCAT Error O Default2 SDH/SONET VCAT Alarm (1) SDH/SONET Justification O Default3 SDH/SONET Error SDH/SONET Alarm Default Flow (3) -Counter C Current C Accumulated The Flow Counter (2) Both is displayed up to 512 counters.
 - ✓ "Received Bit Rate (Mbit/s) [Flow]"

- Select "Ethernet/PPP/GFP" of "Category" and place checkmarks in the following items (so that the total traffic received at Port2 can be seen).
 - ✓ "Received Bit Rate (bit/s)"





- Select "Test Frame" of "Category" and place checkmarks in the following items (so that the packet loss for multicast address 224.1.1.1 can be seen).
 - ✓ "Sequence Error"
- > Press the "OK" button to close the screen.



- Select Port2 and press the "Counter" button at the top of the screen to start measurement.
- Choose "Received Bit Rate (Mbit/s) 1" of the counter items and select "Line1" from the menu by right-clicking.
- Similarly, set "Line2", "Line3", "Line7" and "Bar 1" for "Received Bit Rate (Mbit/s) 2", "Received Bit Rate (Mbit/s) 3", "Received Bit Rate (bit/s) ", and "Sequence Error", respectively.





The transmission delay time varies with time as shown below and can be monitored on the graph. (If the graph is hard to see, place a checkmark in "Logarithm".)







5.6. Analysing Measurement Results

(Outline) Analyze the multicast stream QoS measurement results. (Contents) Analyze the measurement results displayed on the screen. (Results) You will learn how to perform evaluation of multicast stream QoS measurement results.

The displayed QoS measurement results (packet loss) are the packet loss that occurs when a multicast stream is broadcast with Channel Zapping.

This shows the QoS when hosts (subscribers) are performing Channel Zapping on a video streaming service using multicast streaming typical used by IPTV. QoS control is commonly used because multicast communications require real-timeness. If packet loss occurs, it is important reconsider the design of the network including monitoring routers performing QoS control and the content bandwidth. Actual networks are complex and QoS varies with the number of routers and their performance on the multicast streaming network as well as with the subscriber behavior (Channel Zapping conditions) and rich content (network load). When monitoring the overall service, it is very important to remember that the network performance is impacted by all the users.

The purpose of this measurement is evaluation of network performance. Evaluating network performance in advance can help prevent problems before they occur and plan future network development.



Fig. 13 QoS (Frame Loss) due to Network



6. Summary

The MD1230B and MP1590B simulate a server and connected hosts to verify and evaluate the multicast network before the start of service. Testing that previously required large amounts of test equipment and personnel can now be done quickly and at low cost, offering providers the ideal solution for assuring multicast QoS.

Product Features

- ✓ Supports IPv4/IPv6 multicasting
- ✓ Supports IGMPv3/MLDv2 protocol
- ✓ Multiple virtual host operation supporting verification without previous need for large number of terminals, cutting costs
- ✓ Automated virtual host increase/decrease and channel changing for easy creation of high load conditions that are hard to create intentionally on an in-service network

Composition	Mainframe:
	MD1230B, MP1590B
	Pulugin Module:
	MU120131A or MU120132A
	Software version:
	Ver. 7.0 or later
Protocols	IPv4: IGMPv2, IGMPv3
	IPv6: MLDv1, MLDv2
	Note: Support for IPv6 requires the IPv6 expansion option.
Host Emulation	No. of Virtual Hosts:
	Up to 2000 (IGMPv2/MLDv1)
	Up to 200 (IGMPv3/MLDv2)

Note

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