

MD1230/MP1590Family Option-15

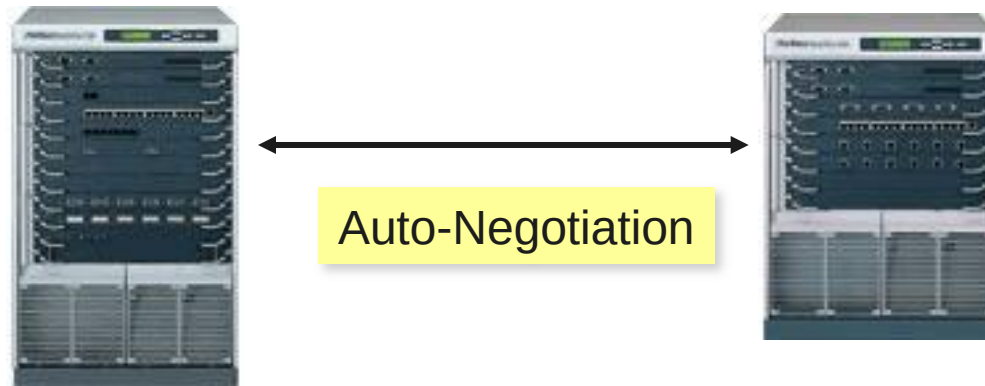
GbE Auto-Negotiation Analysis

MD1230B-15, MP1590B-15

GbE Auto-Negotiation Analysis Product Introduction

Anritsu Corporation

GbE Auto-Negotiation



Before linking at 1 GbE, devices must use auto-negotiation to agree the “duplex mode” and “pause function” used between them.

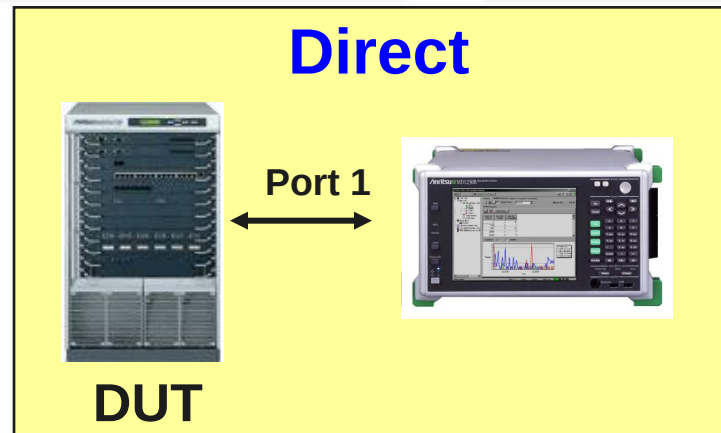
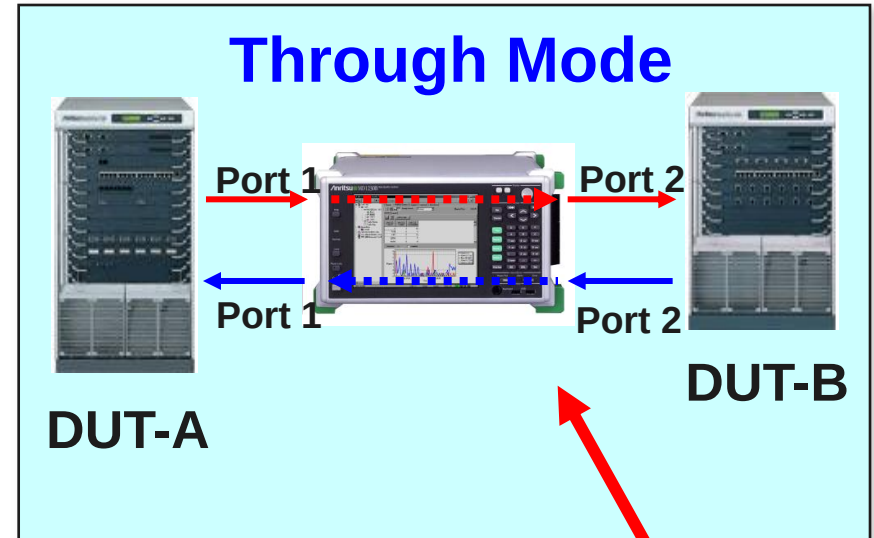
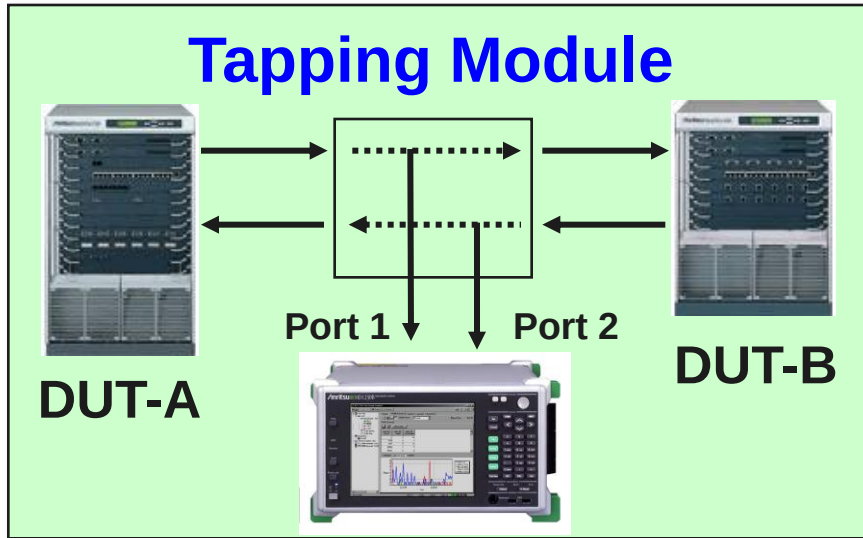
IEEE 802.3 defines the auto-negotiation specification, but this standard is ambiguous. As a result, auto-negotiation compatibility is poor between different vendors.

If an auto-negotiation problem occurs, there is nothing to measure because the link has not been established. Consequently, special equipment is needed to solve auto-negotiation problems.



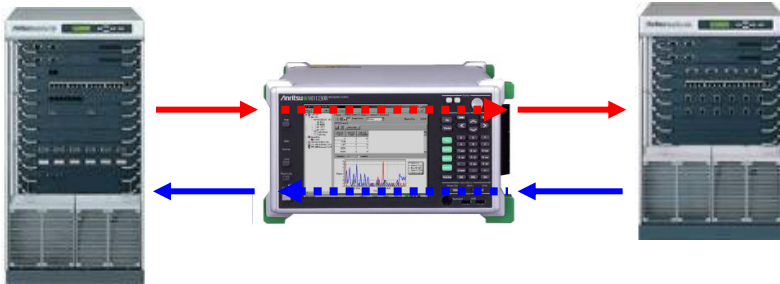
Connection

➤ Supports Three Connection Types



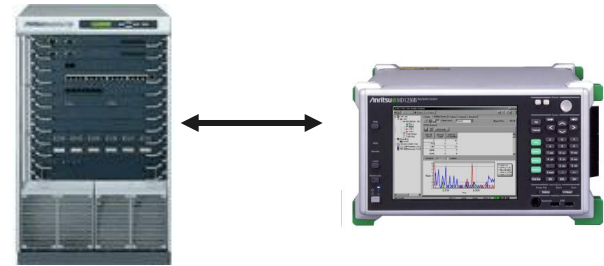
No separate tapping module required

Auto-Negotiation Analysis



- Check negotiation sequence
- Test interoperability
- Troubleshooting

Code Data Transmitting



- Check negotiation sequence
- Perform abnormality tests

Link Timer Testing

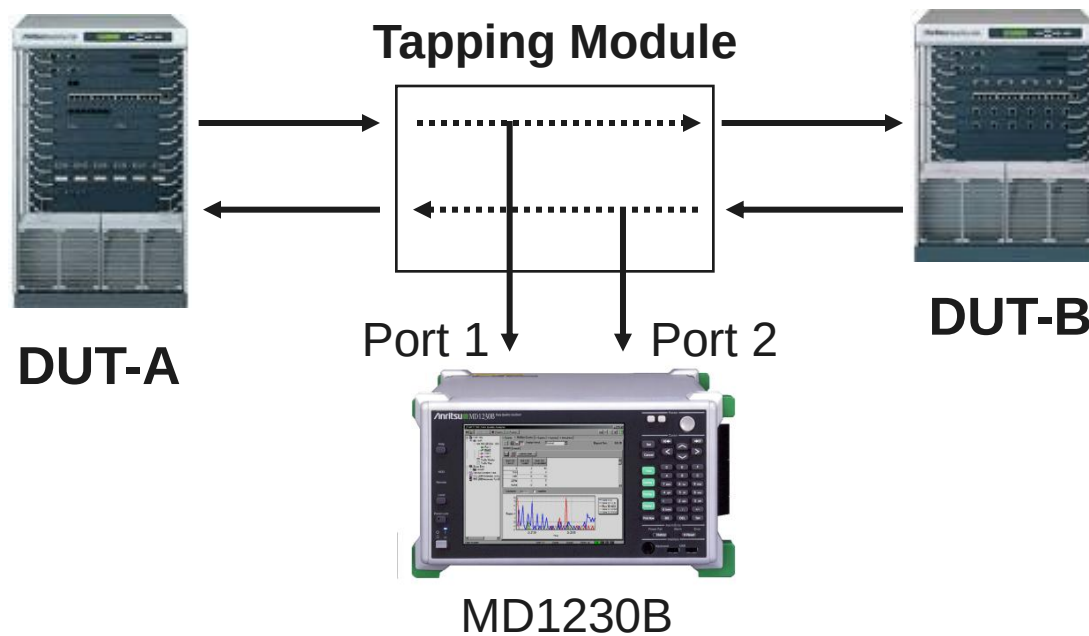


- Check auto-negotiation link timer compatibility

Applications

➤ Auto-Negotiation Analysis

- ✓ Captures and decodes data
- ✓ Determines auto-negotiation states automatically
- ✓ Generates and analyzes IP and Ethernet frames simultaneously
- ✓ Supports both Monitor with External Tapping Module and Through modes



Auto-Negotiation Analysis

➤ Captures and Decodes Data

- Decodes captured auto-negotiation data
- Analyzes both *protocol* and *data* levels on one screen to check interoperability

Select capture port

Start/Stop

List of captured data

Decoded data

The screenshot displays the 'Physical Layer Capture' window. The 'Port' dropdown is set to 'Port 1&2'. The 'Data' table lists captured packets with columns for No., Port, Size, Data, Captured Time, and A State. The 'Decode' window shows the decoded data for the selected packet, including fields like 'No Next Page Request', 'No Page Acknowledgement', 'No Error, link OK', 'Reserved', 'No PAUSE', 'Half Duplex Disabled', 'Full Duplex Enabled', and 'Reserved'. The '10Bit Code' table at the bottom provides a detailed breakdown of the data into code groups and commands.

No.	Port	Size	Data	Captured Time	A State
1	Port 1&2	8	K28.5/D16.2/K28.5/D16.2/K28.5/D16.2/K28.5/D16.2	19:07:33.335704920	DISAB_L
2	Port 1	8	K28.5/D16.2/K28.5/D16.2/K28.5/D21.5/D0.0/D0.0	19:07:33.352216584	DISAB_L
3	Port 2	8	K28.5/D2.2/D0.0/D0.0/K28.5/D21.5/D0.0/D0.0	19:07:33.352216648	DISAB_L
4	Port 1	8	K28.5/D2.2/D0.1/D0.0/K28.5/D21.5/D0.1/D0.0	19:07:35.953963640	DISAB_L
5	Port 2	8	K28.5/D2.2/D0.0/D0.0/K28.5/D21.5/D0.1/D0.0	19:07:35.956795080	DISAB_L
6	Port 1	8	K28.5/D2.2/D0.1/D0.0/K28.5/D21.5/D0.1/D0.0	19:07:35.956795144	DISAB_L
7	Port 2	8	K28.5/D2.2/D0.1/D0.0/K28.5/D16.2/K28.5/D16.2	19:07:35.962453880	DISAB_L
8	Port 1	8	K28.5/D16.2/K28.5/D16.2/K28.5/D16.2/K28.5/D16.2	19:07:35.962453944	DISAB_L

Decode:

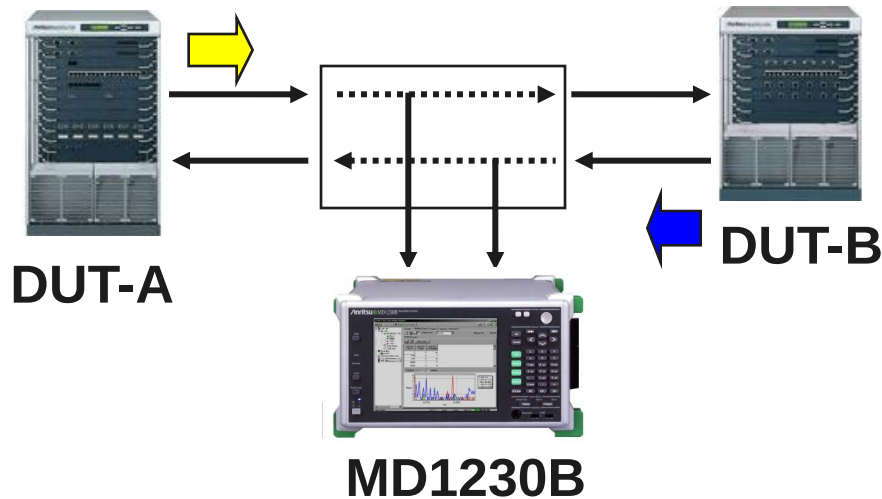
K28.5/D2.2/D0.1/D0.0 : Configuration2 : /C2/

- 0 =No Next Page Request
- 0 =No Page Acknowledgement
- 00 =No Error, link OK
- 000 =Reserved
- 0 0 =No PAUSE
- 0 =Half Duplex Disabled
- 1 =Full Duplex Enabled
- 00000 =Reserved

10Bit Code	Data	Code Group	RD	Command
001111 1010	BC	K28.5	-	
010010 0101	42	D2.2	+	Configuration 2
100111 1001	20	D0.1	-	
100111 0100	00	D0.0	-	
110000 0101	BC	K28.5	+	
101010 1010	B5	D21.5	+	Configuration 1
100111 1001	20	D0.1	-	

Auto-Negotiation Analysis

➤ Determines Auto-Negotiation States Automatically

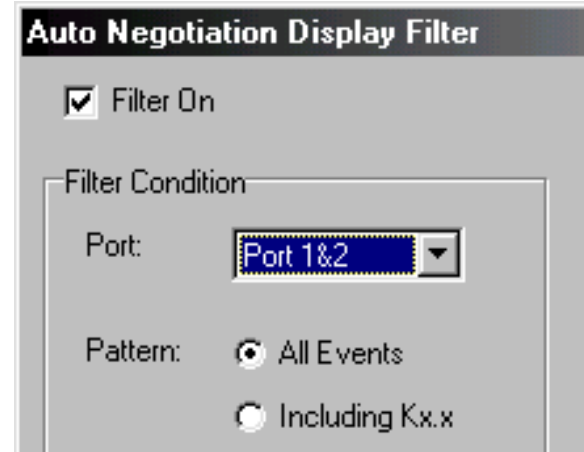
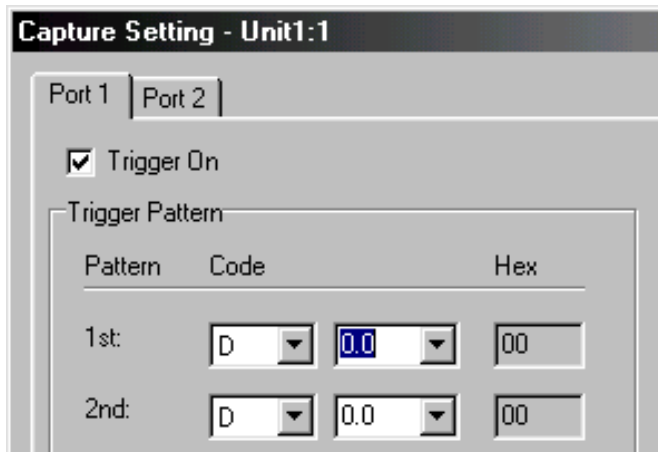
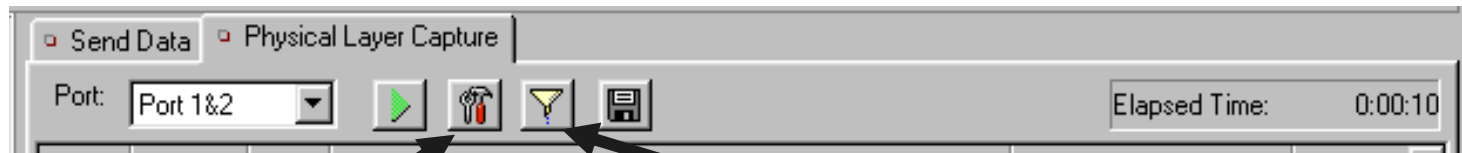


- Determines auto-negotiation state for each device from captured data
- Makes auto-negotiation function checking easy

Data	Captured Time	A State (port 1)	B State (port 2)
D0.5/D1.0/K28.5/D21.5/D0.5/D1.0/K28.5/D2.2	17:31:22.501335172	ENAB / RESTRT / ABTY_DECT	ENAB / RESTRT / ABTY_DECT
D0.0/D0.0/K28.5/D21.5/D0.5/D1.0/K28.5/D2.2	17:31:22.501335388	ENAB / RESTRT / ABTY_DECT	ENAB / RESTRT / ABTY_DECT
D0.5/D1.0/K28.5/D21.5/D0.5/D1.0/K28.5/D2.2	17:31:22.501335456	ENAB / RESTRT / ABTY_DECT	ENAB / RESTRT / ABTY_DECT
D0.5/D1.0/K28.5/D21.5/D0.5/D1.2/K28.5/D2.2	17:31:22.501335704	ACK_DECT / CMP_ACK	ENAB / RESTRT / ABTY_DECT
D0.5/D1.2/K28.5/D21.5/D0.5/D1.2/K28.5/D2.2	17:31:22.501335772	ACK_DECT / CMP_ACK	ENAB / RESTRT / ABTY_DECT
D0.5/D1.0/K28.5/D21.5/D0.5/D1.2/K28.5/D2.2	17:31:22.501337088	ACK_DECT / CMP_ACK	ACK_DECT / CMP_ACK
D0.5/D1.2/K28.5/D21.5/D0.5/D1.2/K28.5/D2.2	17:31:22.501337156	ACK_DECT / CMP_ACK	ACK_DECT / CMP_ACK
D0.5/D1.2/K28.5/D21.5/D0.5/D1.2/K28.5/D5.6	17:31:22.518098556	ACK_DECT / CMP_ACK	ACK_DECT / CMP_ACK
K28.5/D16.2/K28.5/D16.2/K28.5/D16.2/K28.5/D16.2	17:31:22.518098620	ACK_DECT / CMP_ACK	ENAB / IDL_DECT
D0.5/D1.2/K28.5/D5.6/K28.5/D16.2/K28.5/D16.2	17:31:22.518098972	DISAB_LNKOK / LNKOK	ENAB / IDL_DECT
K28.5/D16.2/K28.5/D16.2/K28.5/D16.2/K28.5/D16.2	17:31:22.518099040	DISAB_LNKOK / LNKOK	ENAB / IDL_DECT

Auto-Negotiation Analysis

➤ Efficient Troubleshooting



- Captures only changed auto-negotiation data
- Trigger and filter functions help select only important data
- Solve auto-negotiation problems quickly and efficiently

Auto-Negotiation Analysis

➤ Changing MII Registers During Capture

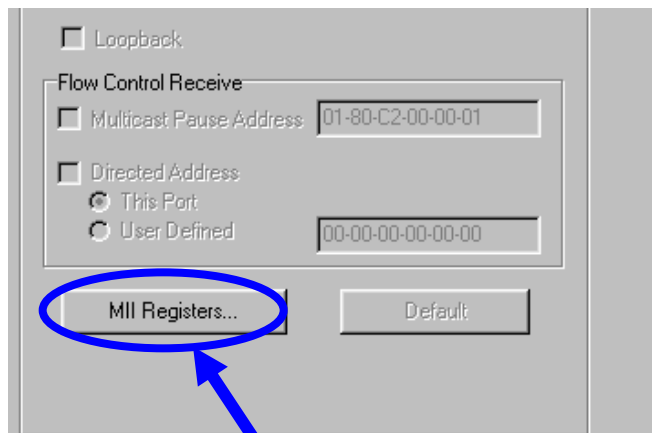


DUT

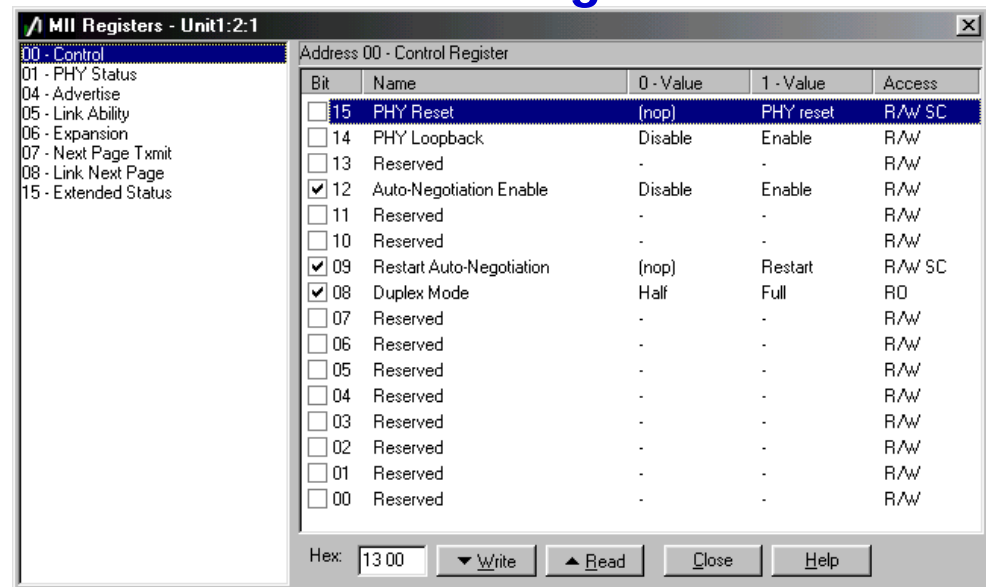


MD1230B

- Change MII Registers during capture
- Control registers such as *PHY Reset* and *Restart Auto-Negotiation* without removing fibers

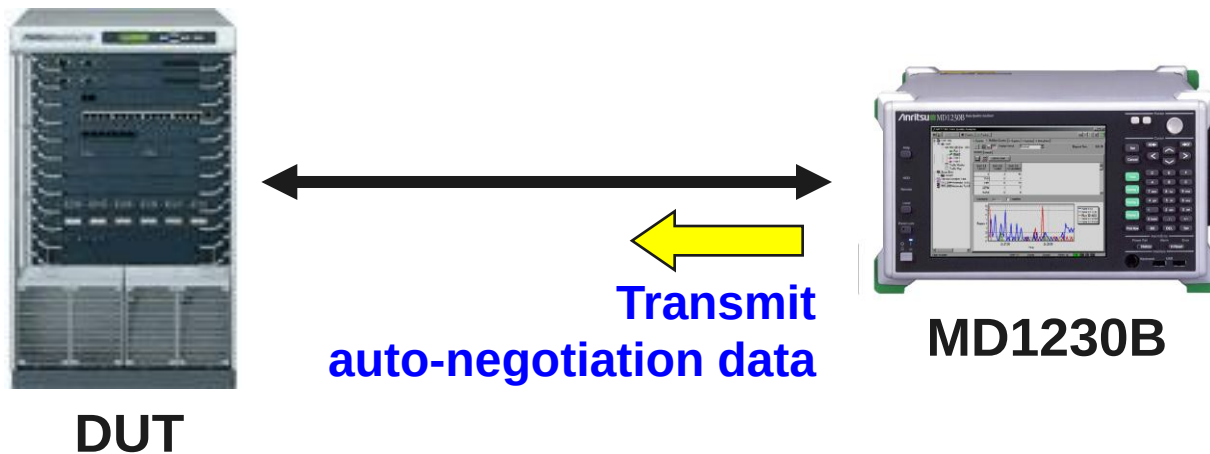


MII Register Control



Code Data Transmitting

- **Auto-Negotiation Sequence Generator**
 - ✓ Generate auto-negotiation code data
 - ✓ Create sequences of up to 256 patterns
 - ✓ Capture and analyze auto-negotiation data simultaneously
 - ✓ Perform abnormal data tests



Code Data Transmitting

➤ Edit Auto-Negotiation Sequence Code Data

Transmitting
On/Off

Choose
transmitting
pattern

ID	Distribution	Code	Hex
☒ 1	Next	D7.0	07
☒ 2	Next	D14.0	0E
☒ 3	Next	D21.3	75
☒ 4	Next	K28.0	1C
☒ 5	Next	D21.3	75
☒ 6	Jump to #1	D0.0	00
☐ 7	Stop	K28.0	1C
☐ 8	Next	D14.0	0E
☐ 9	Jump to #1	K30.7	FE
☐ 10	Next	D0.0	00
☐ 11	Next	D0.0	00
☐ 12	Next	D0.0	00
☐ 13	Next	D0.0	00

Send Data Setting - Unit1:1:1 - 10

Control

☐ Enabled

Distribution: Next

Jump to ID: 1

Loop Time: 1 ms

Data

Code: D 0.0

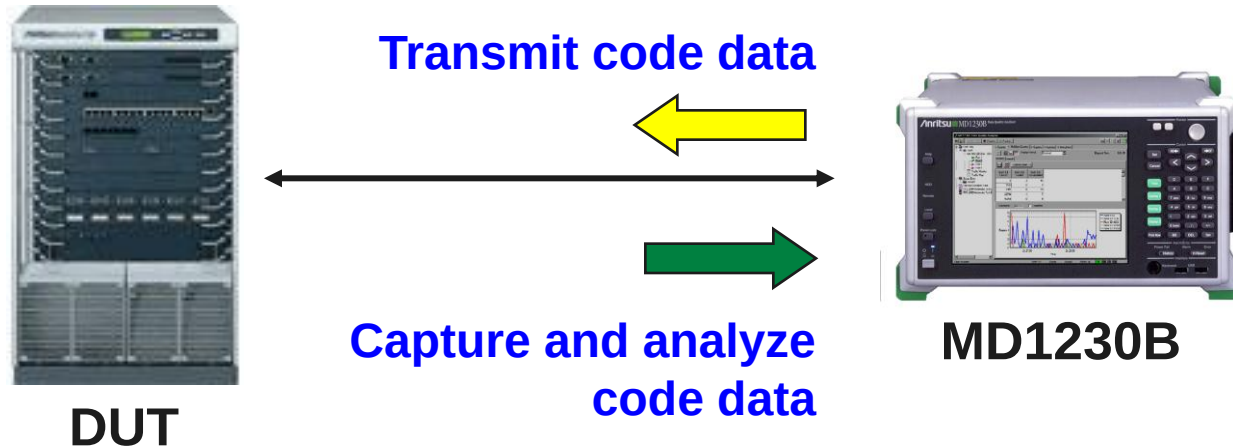
hex 00

- Next
- Stop
- Jump to ID
- Jump to ID for Time

- Transmit up to 256 code data patterns
- Select “Code Data” from pull-down menu in Send Data edit screen
- Create code data sequences quickly and easily

Code Data Transmitting

➤ Example

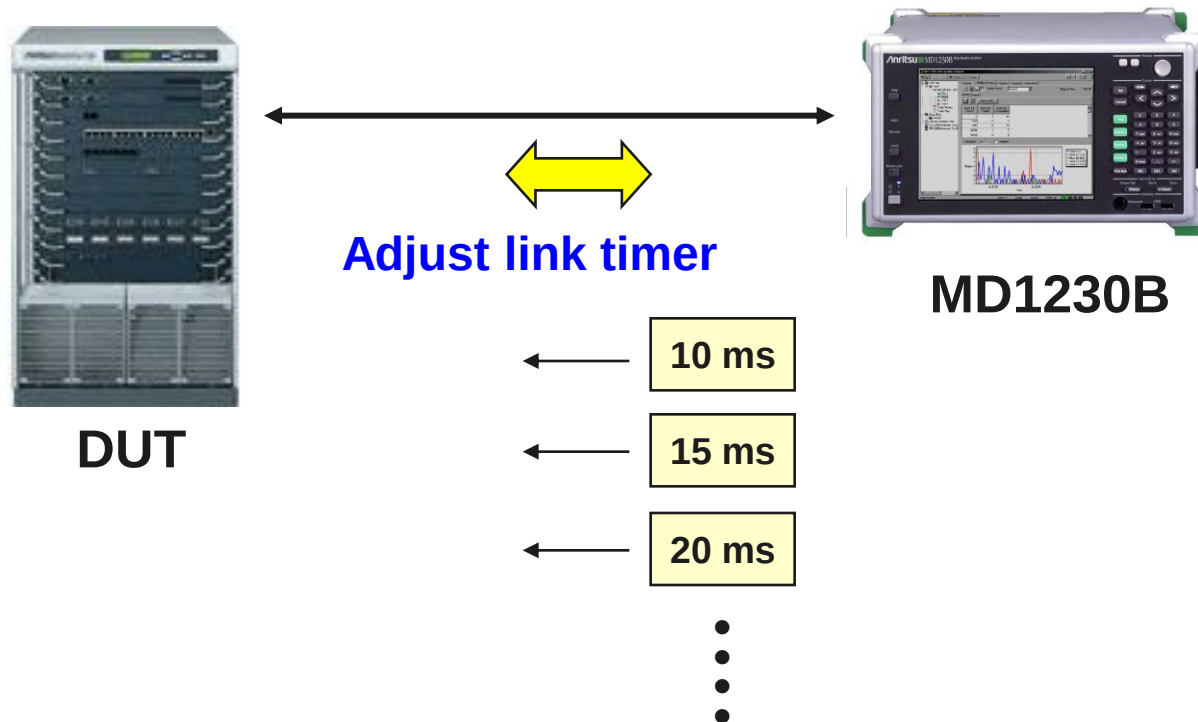


- Transmit auto-negotiation test sequence
 - ➡ Check response sequence
- Transmit abnormal auto-negotiation sequence
 - ➡ Check response under abnormal conditions

Link Timer Testing

➤ Link Timer Adjustments

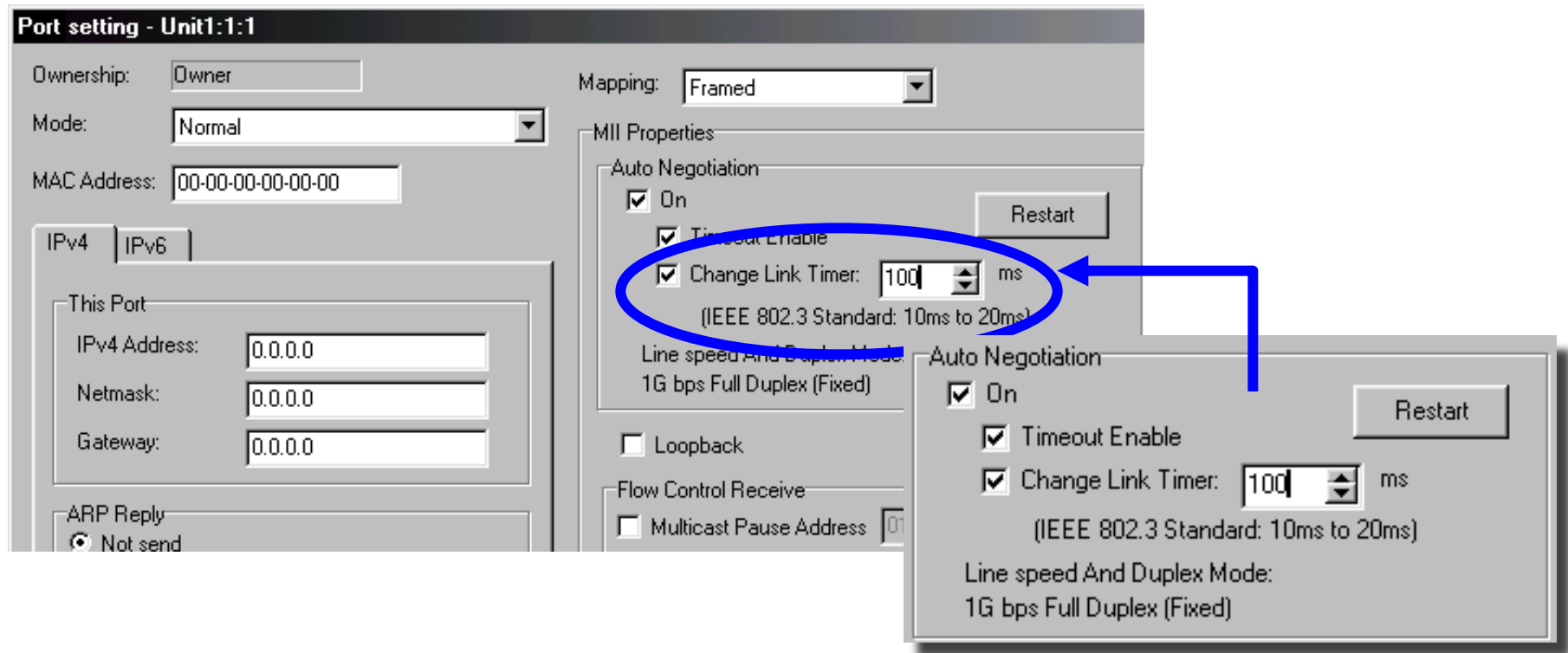
- ✓ Change Link Timer values to check auto-negotiation compatibility



Link Timer Testing

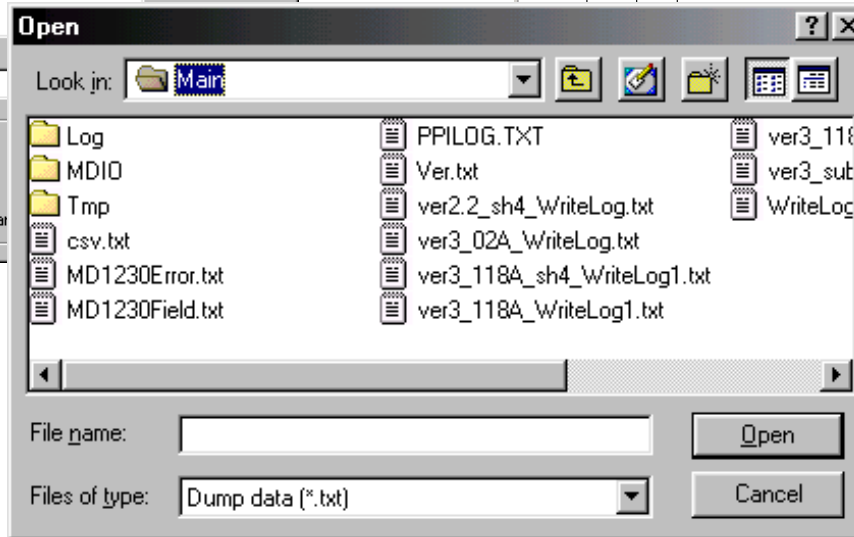
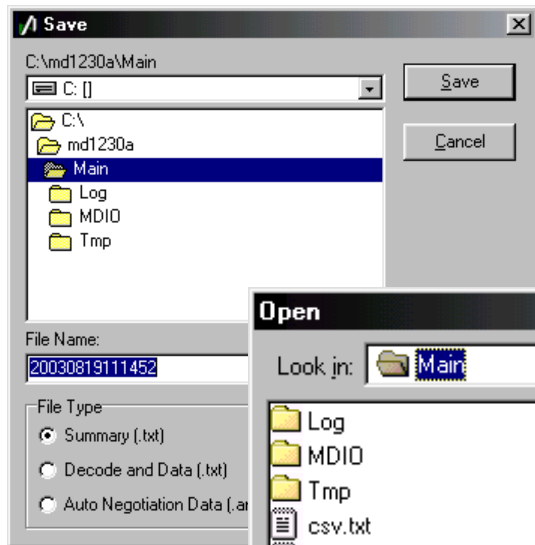
➤ Setting Link Timer Values

- ✓ Range: 0 to 100 ms
- ✓ Resolution: 1 ms
- ✓ IEEE 802.3 recommended value: 10 to 20 ms



➤ Save and Load

- ✓ “Capture Summary” saved as .csv file
- ✓ Easy import into Excel for reports



Sample Excel analysis

No.	Port	Len	Data	Captured Time	A State (port 1)	B State
1181	1	8	K28.5/D16.2/K28.5/D16.2/K28.5/D16.4/K28.7/D16.7	16:10.3	DISAB LNKOK / LNKOK	DISA
1182	1	8	K28.5/D16.2/K28.5/D16.2/K28.5/D16.2/K28.5/D16.2	16:10.3	DISAB LNKOK / LNKOK	DISA
1183	1	8	K28.5/D16.2/K28.7/D13.2/K28.7/D16.2/K28.0/D16.2	16:10.3	DISAB LNKOK / LNKOK	DISA
1184	1	8	K28.5/D16.2/K28.5/D16.2/K28.5/D16.2/K28.5/D16.2	16:10.3	DISAB LNKOK / LNKOK	DISA
1185	1	8	K28.5/D16.2/K28.5/D16.2/K28.5/D16.2/K28.5/D16.2	16:10.3	DISAB LNKOK / LNKOK	DISA
1186	1	8	K28.5/D16.2/K28.5/D16.2/K28.5/D16.2/K28.5/D16.2	16:10.3	DISAB LNKOK / LNKOK	DISA
			K28.5/D16.2/K28.5/D16.2	16:10.3	DISAB LNKOK / LNKOK	DISA
			K28.5/D16.2/K28.5/D27.2	16:10.3	DISAB LNKOK / LNKOK	DISA
			K28.5/D16.2/K28.5/D27.2	16:10.3	DISAB LNKOK / LNKOK	DISA
			K28.5/D16.2/K28.5/D16.2	16:10.3	DISAB LNKOK / LNKOK	DISA
			K28.5/K16.7/K28.7/D16.2	16:10.3	DISAB LNKOK / LNKOK	DISA
			K28.5/K16.7/K28.7/D16.2	16:10.3	DISAB LNKOK / LNKOK	DISA
			K28.5/D16.2/K28.5/D16.2	16:10.3	DISAB LNKOK / LNKOK	DISA
			K28.5/D16.2/K28.5/D16.2	16:10.3	DISAB LNKOK / LNKOK	DISA
			K28.5/D16.2/K28.5/D21.5	16:10.3	ENAB / RESTRT / ABTY DECT	DISA
			0.0/D0.0/K28.5/D21.5	16:10.3	ENAB / RESTRT / ABTY DECT	DISA
			0.5/D1.0/K28.5/D21.5	16:10.3	ACK DECT / CMP ACK	DISA
			0.5/D1.2/K28.5/D21.5	16:10.3	ACK DECT / CMP ACK	DISA
			K28.5/D16.2/K28.5/D16.2	16:10.4	ENAB / IDL DECT	DISA
			K28.5/D16.2/K28.5/D16.2	16:10.4	ENAB / IDL DECT	DISA

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