

PRODUCT INTRODUCTION

MD1230A-15

MD1231A-15

MU740701A-15

1 GbE Auto-Negotiation Analysis

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1 GbE Auto-Negotiation Analysis

For Advanced Protocol 1 GbE Modules

Product Introduction

MD1230A-15
MD1231A-15
MU740701A-15



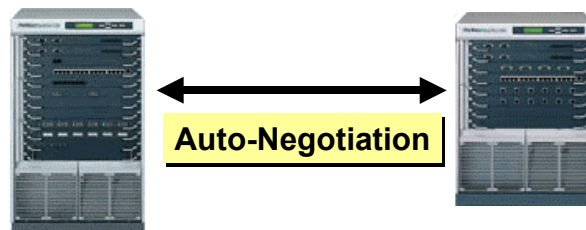
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1 GbE Auto-Negotiation

Overview



Before linking up on 1 GbE, devices must use auto-negotiation to agree on the “duplex mode” and “pause function” between each other.

IEEE 802.3 defined the specification for auto-negotiation but this standard is somewhat ambiguous.

As a result, auto-negotiation **compatibility is not good** between different vendors.

If an auto-negotiation problem happens, you can't measure anything because the link connection hasn't been set up yet.

You need special equipment to solve auto-negotiation problems.



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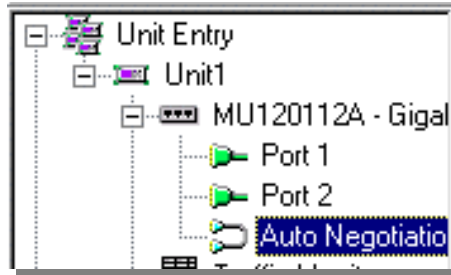
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1 GbE Auto-Negotiation

Interface Support in MD1230A Family

- Supported on Advanced Protocol 1 GbE module (MU120112A)
- Requires fiber GBICs
 - ◆ 1000BASE-SX
 - ◆ 1000BASE-LX
 - ◆ 1000BASE-LH
 - ◆ 1000BASE-ZX



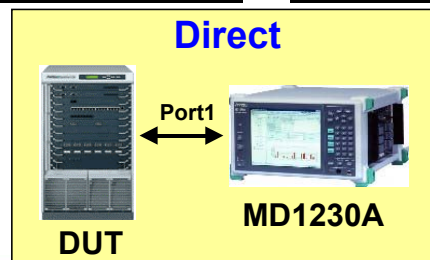
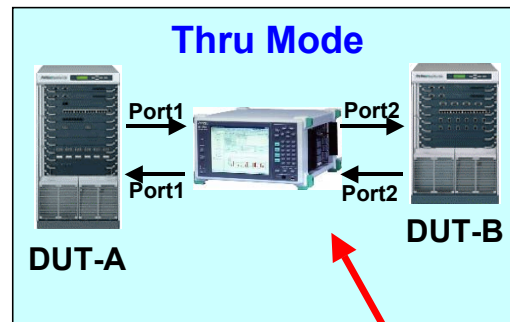
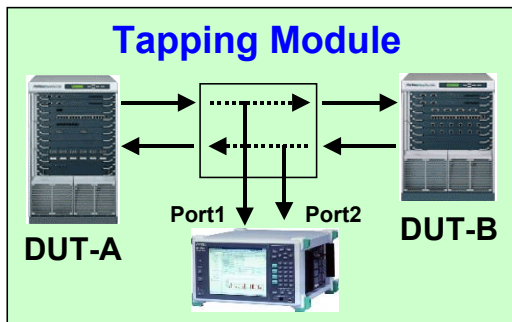
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1 GbE Auto-Negotiation

Supports Three Types of Connections



No separate tapping module required

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1 GbE Applications

Auto-Negotiation Analysis



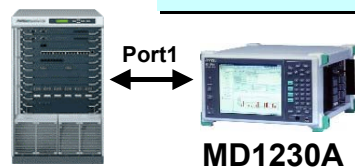
- Check negotiation sequence
- Test interoperability
- Troubleshooting

Code Data Transmitting



- Check negotiation sequence
- Perform abnormal tests

Link Timer Testing



- Check auto-negotiation link timer compatibility

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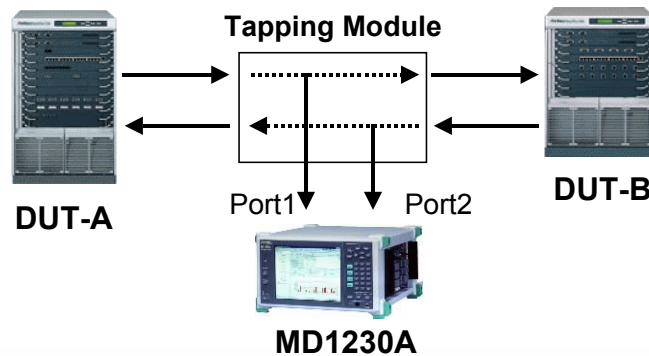
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1 GbE Applications

Auto-Negotiation Analysis

- Auto-negotiation data capture and decode
- Determines auto-negotiation states automatically
- Generate and analyze IP and Ethernet frames simultaneously
- Supports both external tapping and through mode



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Auto-Negotiation Analysis

Capture and Decode

Start / Stop

Select capture port

List of captured data

Shows the decoded data in these fields

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

No.	Port	Data	Captured Time	A State
1	Port 1	K28.5/D16.2/K28.5/D16.2/K28.5/D16.2/K28.5/D16.2	19:07:33.335704920	DISAB_L
2	Port 2	K28.5/D16.2/K28.5/D16.2/K28.5/D21.5/D0.0/D0.0	19:07:33.352216584	DISAB_L
3	2	K28.5/D2.2/D0.0/D0.0/K28.5/D21.5/D0.0/D0.0	19:07:33.352216648	DISAB_L
4	1	K28.5/D2.2/D0.1/D0.0/K28.5/D21.5/D0.1/D0.0	19:07:35.956563640	DISAB_L
5	2	K28.5/D2.2/D0.0/D0.0/K28.5/D21.5/D0.1/D0.0	19:07:35.956795080	DISAB_L
6	2	K28.5/D2.2/D0.1/D0.0/K28.5/D21.5/D0.1/D0.0	19:07:35.956795144	DISAB_L
7	1	K28.5/D2.2/D0.1/D0.0/K28.5/D16.2/K28.5/D16.2	19:07:35.962453880	DISAB_L
8	1	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
000
=No Error, link OK
0000
=Reserved
0 0
=No PAUSE
0
=Half Duplex Disabled
1
=Full Duplex Enabled
00000
=Reserved
    
```

10Bit Code	Data	Code Group	RD	Command
011111 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	-	

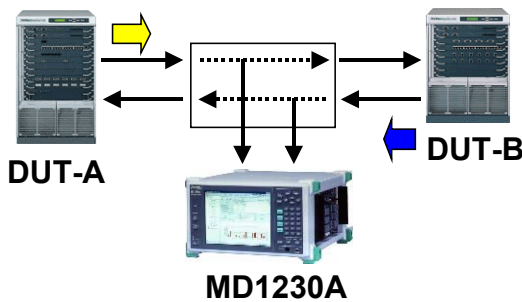
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Auto-Negotiation Analysis

Determines Negotiation States Automatically



- Determines the auto-negotiation state for each device from the captured data
- Makes checking the auto-negotiation function 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 / RESTR / ABTY_DECT	ENAB / RESTR / ABTY_DECT
D0.0/D0.0/K28.5/D21.5/D0.5/D1.0/K28.5/D2.2	17:31:22.501335388	ENAB / RESTR / ABTY_DECT	ENAB / RESTR / ABTY_DECT
D0.5/D1.0/K28.5/D21.5/D0.5/D1.0/K28.5/D2.2	17:31:22.501335456	ENAB / RESTR / ABTY_DECT	ENAB / RESTR / 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 / RESTR / 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 / RESTR / 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	17:31:22.518098892	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

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Auto-Negotiation Analysis

Efficient Troubleshooting

The screenshot shows the top control panel of a network analyzer. It includes a 'Port' dropdown menu set to 'Port 1&2', a green play button, a red stop button, a yellow filter icon, and a save icon. Below this, two windows are open: 'Capture Setting - Unit1:1' and 'Auto Negotiation Display Filter'. The 'Capture Setting' window shows 'Trigger On' checked and a 'Trigger Pattern' table with two rows. The 'Auto Negotiation Display Filter' window shows 'Filter On' checked and 'Filter Condition' set to 'Port: Port 1&2'.

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

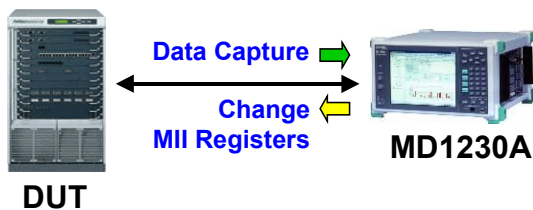
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Auto-Negotiation Analysis

Changing MII Registers During Capture



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

The screenshot shows a control window with 'Flow Control Receive' options. A blue circle highlights the 'MII Registers...' button, with a blue arrow pointing to it from the text 'MII Register Control' below.

MII Register Control

The screenshot shows the 'MII Registers - Unit1:2:1' window. It displays a table of registers with columns for Bit, Name, 0-Value, 1-Value, and Access. The 'PHY Reset' and 'Restart Auto-Negotiation' registers are highlighted.

Bit	Name	0-Value	1-Value	Access
15	PHY Reset	(nop)	PHY reset	R/W/SC
14	PHY Loopback	Disable	Enable	R/W
13	Reserved	-	-	R/W
12	Auto-Negotiation Enable	Disable	Enable	R/W
11	Reserved	-	-	R/W
10	Reserved	-	-	R/W
09	Restart Auto-Negotiation	(nop)	Restart	R/W/SC
08	Duplex Mode	Half	Full	RO
07	Reserved	-	-	R/W
06	Reserved	-	-	R/W
05	Reserved	-	-	R/W
04	Reserved	-	-	R/W
03	Reserved	-	-	R/W
02	Reserved	-	-	R/W
01	Reserved	-	-	R/W
00	Reserved	-	-	R/W

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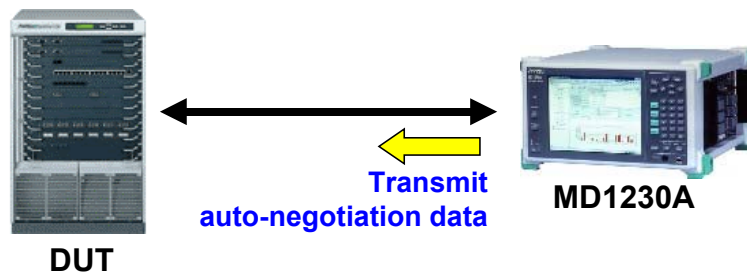
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Code Data Transmitting

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



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Code Data Transmitting

Edit Auto-Negotiation Sequence Code Data

Transmitting On/Off

Choose the 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: ID 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

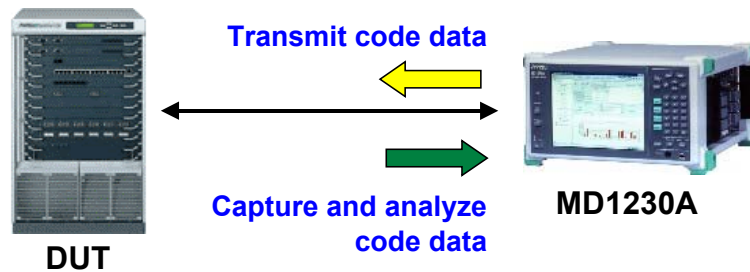
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Code Data Transmitting

Example



- Transmit your auto-negotiation test sequence
 - ➡ Check the response sequence
- Transmit an abnormal sequence of auto-negotiation
 - ➡ Check the response under an abnormal condition

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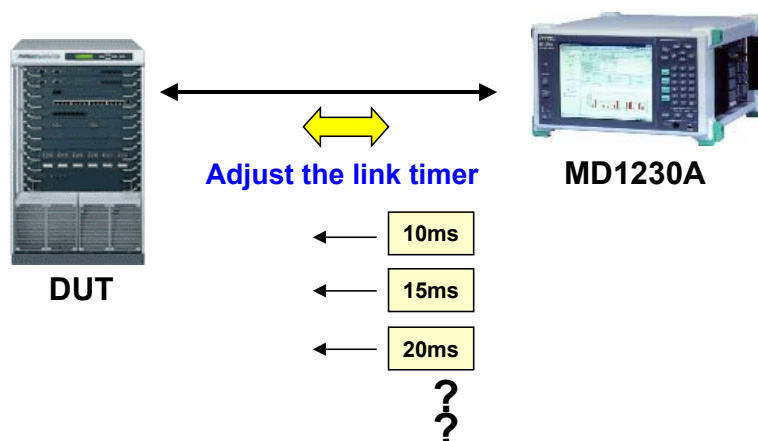
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Link Timer Testing

Link Time Adjustments

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



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Other Negotiation Tests

Switch Functions

- Switch between “**Auto-Negotiation Analysis**” and “**Default Function**” modes
- Default Function mode provides full functionality of MD1230A on the same module
 - ◆ Traffic monitor and Traffic map
 - ◆ Arrival time variation
 - ◆ Protocol emulation



Choose a mode for GbE module in this pull down menu

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Thank You!

1 GbE Auto-Negotiation Analysis

For Advanced Protocol 1 GbE Modules

Product Introduction

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Specifications are subject to change without notice.

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