

### 10Gbps BIDI XFP Single-Mode 40km Optical Transceiver

**BLXFP-10G23-40-xx Tx: 1270nm/Rx: 1330nm BIDI XFP Transceiver for 10GbE/10FC**

**BLXFP-10G32-40-xx Tx: 1330nm/Rx: 1270nm BIDI XFP Transceiver for 10GbE/10FC**



#### Features

- Supports 9.95Gb/s to 10.5Gb/s data rates
- Power budget 16dB at least
- Two types:
  - A: 1270nm DFB Transmitter/ 1330nm Receiver
  - B: 1330nm DFB Transmitter/ 1270nm Receiver
- LC Connector
- +3.3V power supply only
- Power dissipation <2W
- Built-in digital diagnostic functions
- Case temperature range:
  - Standard: 0~+70℃
- Complaint with XFP MSA
- Complaint with IEEE 802.3ae 10GBASE-ER/EW
- Complaint with 10GFC 1200-SM-LL-L

#### Applications

- 10GBASE-ER 10G Ethernet at 10.3125Gbps
- 10GBASE-EW 10G Ethernet at 9.953Gbps
- 1200-SM-LL-L 10G Fiber Channel at 10.51875Gbps

#### Description

40km BIDI XFP transceiver comply with XFP MSA, and can support diverse applications for SDH/SONET equipment including FEC (9.95Gb/s to 10.7Gb/s), as well as Ethernet LAN(10.325Gb/s) and WAN(9.95Gb/s) applications. The high performance cooled 1550nm cooled EML transmitter and high sensitivity PIN receiver provide superior performance for SONET /SDH and Ethernet applications at up to 10km links. Digital diagnostics functions are available via a 2-wire serial interface, as specified in the XFP MSA.

#### Specifications

**Table 1 - Absolute Maximum Ratings**

Parameter	Symbol	Min	Typical	Max	Unit
Maximum Supply Voltage	Vcc	-0.5		4.0	V
Storage Temperature	TS	-40		85	℃
Case Operating Temperature	TC,	0		70	℃
	TC,	-10		85	

Note3: Exceeding any one of these values may destroy the device permanently.

**Table 2-Recommend Operating Condition**

Parameter	Symbol	Min	Typical	Max	Unit
Case Operating Temperature	TC,EOLX-BI1696-16ADL	0	-	70	°C
	TC,EOLX-BI1696-16ADIL	-10	-	85	°C
Supply Voltage	V <sub>cc</sub>	3.13	-	3.45	V
Power Supply Current	I <sub>cc</sub>			580	mA

**Table 3-Electrical Characteristics**

(TC = -10 to 85°C, VCC = 3.15V to 3.45V)

Parameter	Symbol	Min	Typical	Max	Unit
<b>Transmitter</b>					
Data Rate		9.95	-	10.52	Gbps
Input Differential Impedance	R <sub>in</sub>	90	100	110	Ω
Differential Data Input Swing	V <sub>in</sub> , pp	120	-	820	mV
Transmit Disable Voltage	V <sub>D</sub>	2.0		V <sub>cc</sub>	V
Transmit Enable Voltage	V <sub>EN</sub>	GND		GND+ 0.8	V
Transmit Disable Assert Time				10	us
<b>Receiver</b>					
Differential Data Output Swing	V <sub>out</sub> , pp	340	650	850	mV
Data Output Rise Time	t <sub>r</sub>	-	-	38	ps
Data Output Fall Time	t <sub>f</sub>	-	-	38	ps
LOS Fault	V <sub>LOS</sub> fault	2.4		V <sub>cc</sub>	V
LOS Normal	V <sub>LOS</sub> norm	GND		GND+0.5	V

\*Note4. Internal AC coupling.

\*Note5. 20 – 80 %.

**Table 4 - Optical Characteristics**

Parameter	Symbol	Min	Typical	Max	Unit
Power Budget		16			dB
Data Rate			9.953/10.3125		Gbps
Centre Wavelength	λ <sub>c</sub>	1260	1270	1280	nm
Spectral Width (-20dB)	Δλ			1	nm
Average Output Power*note6	P <sub>out</sub> , AVG	1		5	dBm
Extinction Ratio	ER	3.5			dB
Side Mode Suppression Ratio	SMSR	30			dB
Transmitter and Dispersion Penalty	TDP			2	dB
Average Power of OFF Transmitter				-30	dBm
Relative Intensity Noise	RIN			-128	dB/Hz

Input Differential Impedance		ZIN	90	100	110	100
TX Disable	Disable		2.0		Vcc+0.3	V
	Enable		0		0.8	
TX Fault	Fault		2.0		Vcc+0.3	V
	Normal		0		0.8	
TX Disable Assert Time		t_off			10	US
<b>Receiver</b>						
Centre Wavelength		$\lambda_c$	1260		1280	nm
Sensitivity*note7		P <sub>IN</sub>			-15	dBm
Receiver Overload		P <sub>MAX</sub>	0.5			dBm
Output Differential Impedance		P <sub>IN</sub>	90	100	110	$\Omega$
LOS De-Assert		LOSD			-17	dBm
LOS Assert		LOSA	-29			dBm
	High		2.0		Vcc+0.3	v
	Low		0		0.8	

**(BIDI XFP , 1270nm DFB & PIN/TIA)**
**(BIDI XFP , 1330nm DFB & PIN/TIA)**

Parameter		Symbol	Min	Typical	Max	Unit
Power Budget			16			dB
Data Rate				9.953/10.3125		Gbps
Centre Wavelength		$\lambda_c$	1320	1330	1340	nm
Spectral Width (-20dB)		$\Delta\lambda$			1	nm
Average Output Power*note6		P <sub>out, AVG</sub>	1		5	dBm
Extinction Ratio		ER	3.5			dB
Side Mode Suppression Ratio		SMSR	30			dB
Transmitter and Dispersion Penalty		TDP			2	dB
Average Power of OFF Transmitter					-30	dBm
Relative Intensity Noise		RIN			-128	dB/Hz
Input Differential Impedance		ZIN	90	100	110	100
TX Disable	Disable		2.0		Vcc+0.3	V
	Enable		0		0.8	
TX Fault	Fault		2.0		Vcc+0.3	V
	Normal		0		0.8	
TX Disable Assert Time		t_off			10	US
<b>Receiver</b>						
Centre Wavelength		$\lambda_c$	1260		1280	nm
Sensitivity*note7		P <sub>IN</sub>			-15	dBm
Receiver Overload		P <sub>MAX</sub>	0.5			dBm
Output Differential Impedance		P <sub>IN</sub>	90	100	110	$\Omega$
LOS De-Assert		LOSD			-17	dBm
LOS Assert		LOSA	-29			dBm

	High		2.0		V <sub>cc</sub> +0.3	V
	Low		0		0.8	

\*Note6. Output is coupled into a 9/125um SMF.

\*Note7: Measured with a PRBS 231-1 test pattern @10.3125Gbps

### Table5-Regulatory Compliance

Feature	Standard	Performance
Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD-883G Method 3015.7	Class 1C (>1000 V)
Electrostatic Discharge to the Enclosure	EN 55024:1998+A1+A2 IEC-61000-4-2 GR-1089-CORE	Compliant with standards
Electromagnetic Interference (EMI)	FCC Part 15 Class B EN55022: 2006 CISPR 22B: 2006 VCCI Class B	Compliant with standards Noise frequency range: 30MHz to 6GHz. Good system EMI design practice required to achieve Class B margins. System margins are dependent on customer host board and chassis design.
Immunity	EN 55024:1998+A1+A2 IEC 61000-4-3	Compliant with standards. 1KHz sine-wave, 80% AM, from 80MHz to 1GHz. No effect on transmitter/receiver performance is detectable between these limits.
Laser Eye Safety	FDA 21CFR 1040.10 and 1040.11 EN (IEC) 60825-1: 2007 EN (IEC) 60825-2: 2004+A1	CDRH compliant and Class I laser product. TüV Certificate No. 50135086
Component Recognition	UL and CUL EN60950-1: 2006	UL file E317337 TüV Certificate No. 50135086 (CB scheme )
RoHS6	2002/95/EC 4.1&4.2 2005/747/EC 5&7&13	Compliant with standards*note3

Note2: For update of the equipments and strict control of raw materials, fiberstore has the ability to supply the customized products since Jan 1st, 2007, which meet the requirements of RoHS6 (Restrictions on use of certain Hazardous Substances) of European Union.

In light of item 5 in RoHS exemption list of RoHS Directive 2002/95/EC, Item 5: Lead in glass of cathode ray tubes, electronic components and fluorescent tubes.

In light of item 13 in RoHS exemption list of RoHS Directive 2005/747/EC, Item 13: Lead and cadmium in optical and filter glass. The three exemptions are being concerned for fiberstore's transceivers, because fiberstore's transceivers use glass, which may contain Pb, for components such as lenses, solators, and other components.

**Table6 – Pin Descriptions**

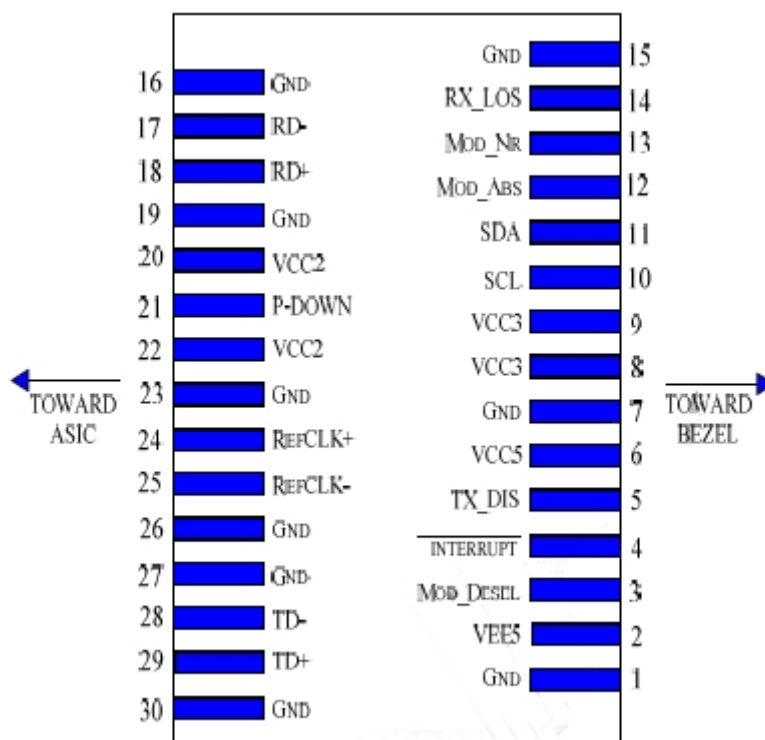
Pin	Logic	Symbol	Name/Description	Notes
1		GND	Module Ground	1
2		VEE5	Optional –5.2 Power Supply – Not Required	
3	LVTTL-I	Mod-Desel	Module De-select; When held low allows the module to respond to 2-wire serial interface commands	
4	LVTTL-O	/Interrupt	/Interrupt; Indicates presence of an important condition which can be read over the serial 2-wire interface	2
5	LVTTL-I	TX_DIS	Transmitter Disable; Transmitter laser source turned off	
6		VCC5	+5 Power Supply - Not Required	
7		GND	Module Ground	1
8		VCC3	+3.3V Power Supply	
9		VCC3	+3.3V Power Supply	
10	LVTTL-I	SCL	Serial 2-wire interface clock	2
11	LVTTLI/O	SDA	Serial 2-wire interface data line	2
12	LVTTL-O	Mod_Abs	Module Absent; Indicates module is not present. Grounded in the module.	2
13	LVTTL-O	Mod_NR	Module Not Ready;	2
14	LVTTL-O	RX_LOS	Receiver Loss of Signal indicator	2
15		GND	Module Ground	1
16		GND	Module Ground	1
17	CML-O	RD-	Receiver inverted data output	
18	CML-O	RD+	Receiver non-inverted data output	
19		GND	Module Ground	1
20		VCC2	+1.8V Power Supply – Not required	
21	LVTTL-I	P_Down/RST	Power Down; When high, places the module in the low power stand-by mode and on the falling edge of P_Down initiates a module reset	
			Reset; The falling edge initiates a complete reset of the module including the 2-wire serial interface, equivalent to a power cycle.	
22		VCC2	+1.8V Power Supply – Not required	
23		GND	Module Ground	1
24	PECL-I	Ref CLK+	Reference Clock non-inverted input, AC coupled on the host board – Not required	3

25	PECL-I	Ref CLK	Reference Clock inverted input, AC coupled on the host board – Not required	3
26		GND	Module Ground	1
27		GND	Module Ground	1
28	CML-I	TD-	Transmitter inverted data input	
29	CML-I	TD+	Transmitter non-inverted data input	
30		GND	Module Ground	1

### Notes:

1. Module circuit ground is isolated from module chassis ground within the module.
2. Open connect should be pulled up with 4.7k – 10k ohm on host board to a voltage between 3.15V and 3.6V.
3. A Reference Clock input is not required.

### Pin Arrangement



**Diagram of Host Board Connector Block Pin Numbers and Name**

### Digital Diagnostic Functions

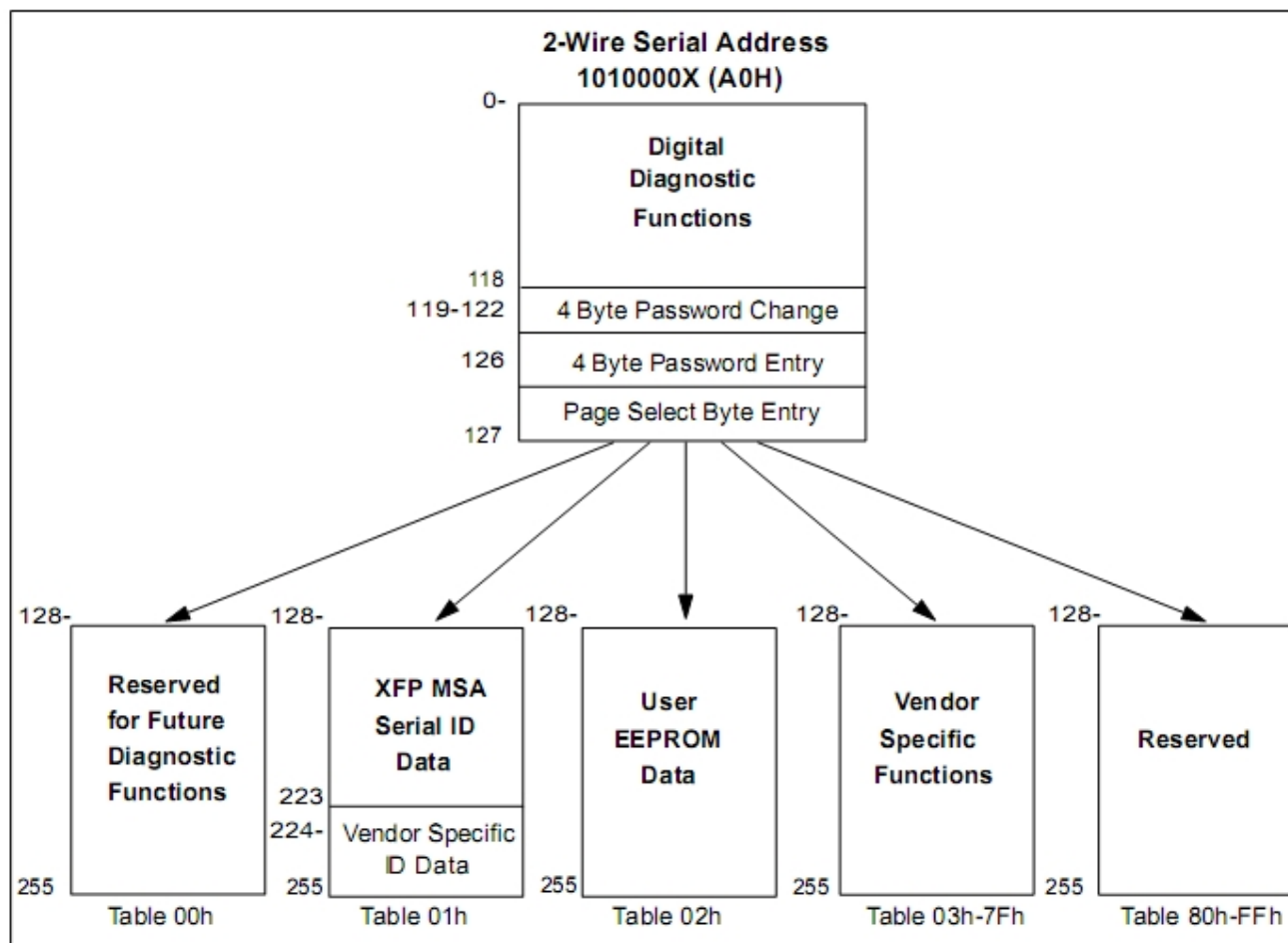
FiberStore's **BIDI XFP** Small Form Factor 10Gb/s (XFP) transceivers are compliant with the current XFP Multi-Source Agreement (MSA) Specification Rev 4.5.

As defined by the XFP MSA, FiberStore XFP transceivers provide digital diagnostic functions via a 2-wire serial interface, which allows real-time access to the following operating parameters:

- A. Transceiver temperature
- B. Laser bias current
- C. Transmitted optical power
- D. Received optical power

### E. Transceiver supply voltage

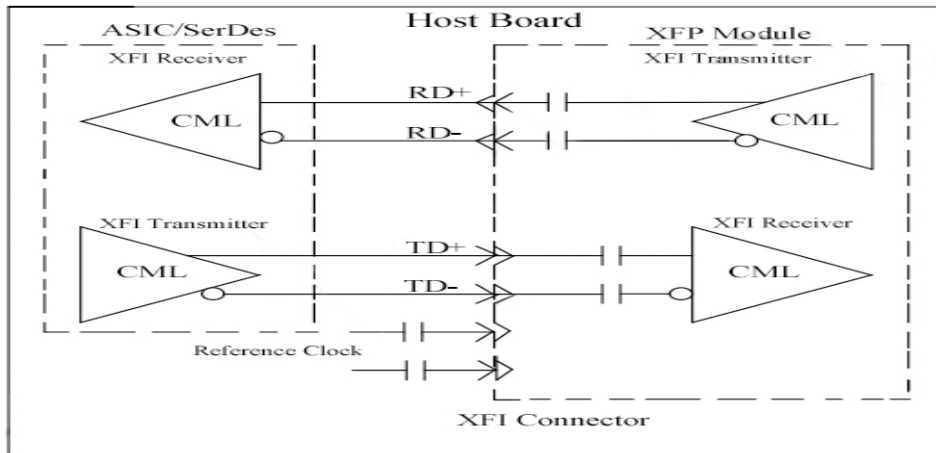
The structure of the memory map is shown in the following figure, which is accessible over a 2-wire serial interface at the 8-bit address 1010000X (A0h). The normal 256 byte I2C address space is divided into low and upper blocks of 128 Bytes. The lower block of 128 Bytes is always directly available and is used for the diagnostics and control function. Multiple blocks of memories are available in the upper 128 Bytes of the address space. These are individually addressed through a table select Byte which the user enters into a location in the lower address space. Thus, there is a total available address space of  $128 \times 256 = 32$  Kbytes in this upper memory space. The contents of Table 01h are listed in following table. Please refer SFFINF-8077i (Revision 4.5) for detailed information.



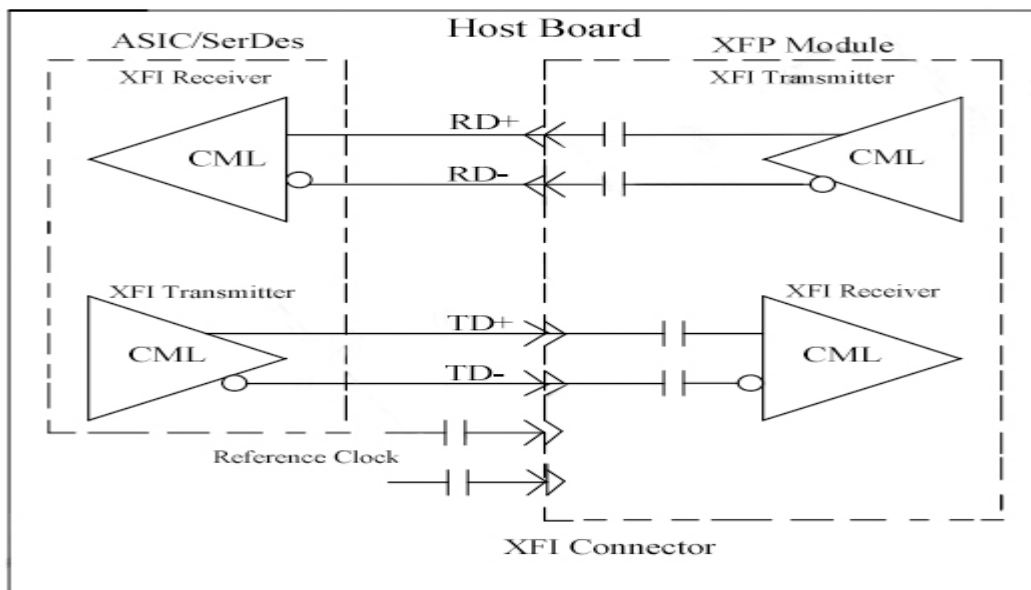
### Mechanical Specifications

Data Address	Parameter	Accuracy
96 ~ 97	Temperature	± 3°C
98 ~ 99	Reserved	
100~101	Tx Bias	±10%
102~103	Tx Power	±2dB
104~105	Rx Power	± 2dB
106~107	VCC3	± 3%

## Recommended Host Board Power Supply Circuit



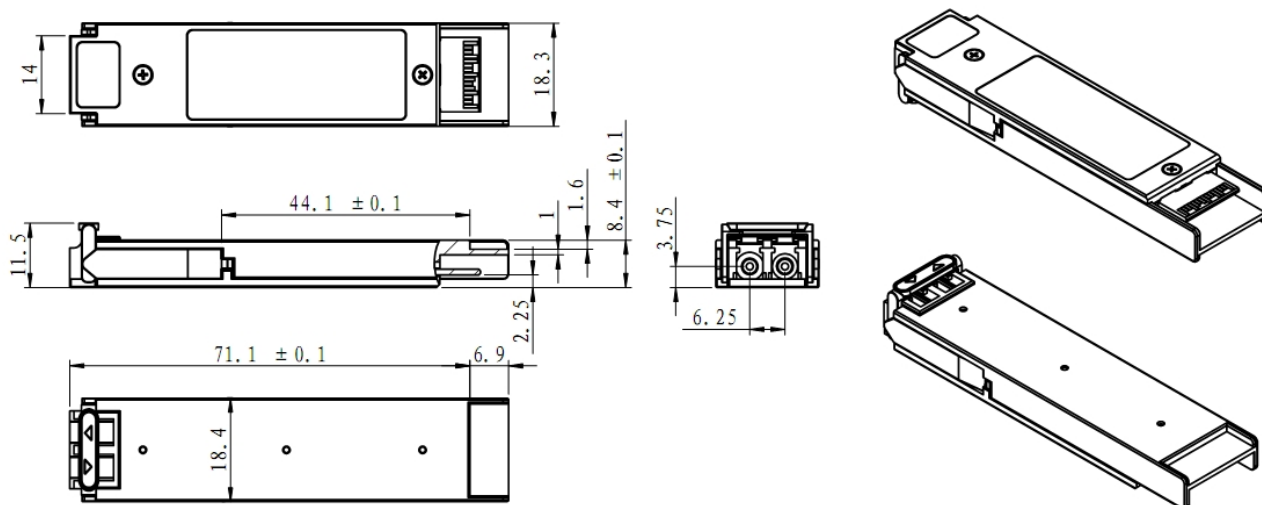
## Recommended High-speed Interface Circuit



## Mechanical Specifications

Fiberstore's XFP transceivers are compliant with the dimensions defined by the XFP Multi-Sourcing Agreement (MSA).





### Eye Safety

This single-mode transceiver is a Class 1 laser product. It complies with IEC-60825 and FDA 21 CFR 1040.10 and 1040.11. The transceiver must be operated within the specified temperature and voltage limits. The optical ports of the module shall be terminated with an optical connector or with a dust plug.

### Ordering Information

Part No.	Data Rate (Gbps)	Wavelength (nm)	Connector Type	Transmission Distance (km)	Operating case temperature (°C)	Digital Diagnostics
BLXFP-10G23-40-xx	10	1270 / 1330	LC	40	0 to +70	Yes
BLXFP-10G32-40-xx	10	1330 / 1270	LC	40	0 to +70	Yes

### Notes:

xx means compatible brand. (For example: CO= Cisco, JU=Juniper, FD=Foundry, EX=Extreme, NE=Netgear.)

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