

# C-1110 Media and Rate Converters

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 [perle.com/products/10-100-1000-media-converter-module.shtml](http://perle.com/products/10-100-1000-media-converter-module.shtml)

## 10/100/1000Base-T to 1000Base-X Conversion

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- 10/100/1000Base-T to 1000Base-X Fiber Media Converters
- Connect 10/100 devices to Gigabit backbone
- Extend network distances up to 160km
- Advanced features - Smart Link Pass-Through, Fiber Fault Alert, Auto-MDIX and Loopback
- High density applications with [Perle Media Converter Chassis](#)



Installed in a high density [Perle Media Converter Chassis](#), Perle's line of feature rich **10/100/1000 Rate Converting Media Converters** transparently connects copper to fiber. Our 10/100/1000 Ethernet to Fiber Converters provide an economical path to extend the distance of an existing network, the life of non-fiber based equipment, or the distance between two devices.

Network Administrators can "see-everything" with Perle's advanced features such as Auto-Negotiation, Auto-MDIX, Link Pass-Through, Fiber Fault Alert, and Loopback. These cost and time saving features, along with a lifetime warranty and free worldwide technical support, make Perle's **10/100/1000 Media Converter Modules** the smart choice for IT professionals.

## 10/100/1000 Rate Converting to Fiber Media Converter Features

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**Auto-Negotiation (802.3u)** The media converter supports auto negotiation. The 1000Base-X fiber interface negotiates according to 802.3 clause 37. The 10/100/1000Base-T negotiates according to 802.3 clause 28 and 40. The 1000Base-X will link up with its partner after the highest common denominator (HCD) is reached and the copper has linked up with its partner. The 1000Base-X will continue to cycle through negotiation transmitting a remote fault of offline (provided this is enabled through the switch setting) until the copper is linked up and the HCDs match.

The media converter supports auto-negotiation of full duplex, half duplex, remote fault, full duplex pause, asymmetric pause and Auto MDI-X.

**Auto-MDIX** Auto-MDIX (automatic medium-dependant interface crossover) detects the signaling on the copper ethernet interface to determine the type of cable connected (straight-through or crossover) and automatically configures the connection when enabled. The media converter can also correct for wires swapped within a pair.

The media converter will adjust for up to 120ns of delay skew between the 1000Base-T pairs.

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Smart <u>Link Pass-Through</u>	When the Link Mode switch is placed into Smart Link Pass-Through mode, the copper ethernet port will reflect the state of the 1000Base-X media converter port. This feature can be used whether fiber auto-negotiation is enabled or disabled.
Fiber Fault Alert	With Fiber Fault Alert the state of the 1000Base-X receiver is passed to the 1000Base-X transmitter. This provides fault notification to the partner device attached to the 1000Base-X interface of the media converter. If the 1000Base-X transmitter is off as a result of this fault it will be turned on periodically to allow the condition to clear should the partner device on the 1000Base-X be using a similar technique. This eliminates the possibility of lockouts that occur with some media converters. Applies only when fiber auto-negotiation is disabled.
Pause (IEEE 802.3xy)	Pause signaling is an IEEE feature that temporarily suspends data transmission between two devices in the event that one of the devices becomes overwhelmed. The media converter supports pause negotiation on the 10/100/1000Base-T connection and 1000Base-X fiber connection.
Duplex	Full and half duplex operation supported.
Jumbo Packets	Transparent to jumbo packets up to 10KB.
VLAN	Transparent to VLAN tagged packets.
Remote Loopback	Capable of performing a loopback on the 1000Base-X fiber interface.

## Indicators

<b>Power / TST</b>	This green LED is turned on when power is applied to the media converter. Otherwise it is off. The LED will blink when in Loopback test mode.
<b>Fiber link on / Receive activity (LKF)</b>	This green LED is operational only when power is applied. The LED is on when the 1000Base-X link is on and flashes with a 50% duty cycle when data is received.
<b>Copper link on / Receive activity (LKC)</b>	This green LED is operational only when power is applied. The LED is on when the 10/100/1000Base-T link is on and flashes with a 50% duty cycle when data is received.
<b>Fiber Duplex (FDF)</b>	This green LED is operational only when power is applied. The LED is on when the 10/100/1000Base-X link is operational in full duplex mode. The LED is off when in half duplex.
<b>Copper Duplex (FDC)</b>	This green LED is operational only when power is applied. The LED is on when the 10/100/1000Base-T link is operational in full duplex mode. The LED is off when in half duplex.

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<b>10/100/1000 Speed</b>	This multi-color LED is operational only when power is applied. The LED is green when the speed of the copper ethernet port is running at 1000 Mbps. The LED is orange when the speed of the copper Ethernet port is running at 100 Mbps. The LED is off when in 10 Mbps.
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### Switches: On-Board

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<b>Auto-Negotiation (802.3u)</b>	<p><i>Enabled (Default)</i> - The media converter uses 802.3u Auto-negotiation on the 10/100/1000Base-T interface. It is set to advertise full duplex, half duplex, pause and remote fault capabilities.</p> <p><i>Disabled</i> - The media converter sets the port according to the position of the speed and duplex switches.</p>
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<b>Link Mode</b>	<p>Link Mode provides a transparency to the state of the copper link allowing for simplified trouble shooting from the devices connected to the media converter.</p> <p><i>Normal (Default – Up)</i> With Fiber Auto Negotiation enabled when the copper link goes down the 1000Base-X link is brought down. The 1000Base-X link will advertise Remote Fault (Link Fault).</p> <p>With Fiber Auto Negotiation disabled the state of the copper link has no effect on the 1000Base-X link.</p> <p><i>Smart Link Pass Through (Down)</i> With Fiber Auto Negotiation enabled the behavior is as follows. When the copper link goes down the 1000Base-X link is brought down. The 1000Base-X link will advertise Remote Fault (Link Fault). When Remote Fault (Link Fault) is received on the 1000Base-X interface the copper transmitter will be turned off. When the copper receiver is off the 1000Base-X transmitter will be turned off. When the 1000Base-X receiver goes off the copper transmitter will be turned off.</p> <p>With Fiber Auto-Negotiation disabled the behavior is as follows. When the copper receiver is off the 1000Base-X transmitter will be turned off. When the 1000Base-X receiver goes off the copper transmitter will be turned off.</p>
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<b>Fiber Fault Alert</b>	<p>The Fiber Fault Alert switch has meaning when Auto-Negotiation is disabled</p> <p><i>Enabled (Default - Up)</i> When the 1000Base-X receiver is off the 1000Base-X transmitter is turned off. Periodically the 1000Base-X receiver will be turned on for a short period to allow the condition to clear if the 1000Base-X link partner is using a similar feature.</p> <p><i>Disabled (Down)</i></p>
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<b>Remote Loopback</b>	<p>The media converter can perform a loopback on the 1000Base-X fiber interface.</p> <p><i>Disabled (Default - Up)</i></p> <p><i>Enabled</i> - The 1000Base-X receiver is looped to the 1000Base-X transmitter. The copper transmitter is taken off the interface.</p>
<b>Auto-MDIX (Strap)</b>	<p>If Auto-Negotiation (802.3u) is enabled, the media converter determines the current cable pinout to use on the copper interface. If Auto-Negotiation (802.3u) is disabled the Media converter will use the RX Energy method on the copper interface to set the port MDI or MDIX whichever is appropriate.</p> <p><i>Enabled (Default)</i> - Either a straight-through or crossover type cable can be used to connect the media converter to the device on the other end of the cable.</p> <p><i>Disabled</i> - If the partner device on the other end of the cable does not have the Auto-MDIX feature a specific cable, either a straight-through or crossover will be required to ensure that the media converter's transmitter and the partner devices transmitter are connected to the others receiver. The Media converter's 100Base-TX port is configured as MDI-X with this switch setting.</p>
<b>Speed Copper</b>	100 (Default) 10
<b>Duplex Copper</b>	Full (Default) Half
<b>Duplex Fiber</b>	Full (Default) Half
<b>Connectors</b>	
<b>10/100/1000Base-T</b>	RJ45 connector 2 pair CAT5, EIA/TIA 568A/B or better cable for 10/100. 4 pair CAT5 UTP cable for Gigabit.
<b>Magnetic Isolation</b>	1.5kv
<b>Filtering</b>	
<b>Filtering</b>	1024 MAC Addresses
<b>Frame Specifications</b>	
<b>Buffer</b>	1000 Kbits frame buffer memory
<b>Size</b>	Maximum frame size of 10,240 bytes -- Gigabit Maximum frame size of 2048 bytes -- Fast Ethernet
<b>Environmental Specifications</b>	

<b>Operating Temperature</b>	0 C to 50 C (32 F to 122 F)
<b>Storage Temperature</b>	minimum range of -25 C to 70 C (-13 F to 158 F)
<b>Operating Humidity</b>	5% to 90% non-condensing
<b>Storage Humidity</b>	5% to 95% non-condensing
<b>Operating Altitude</b>	Up to 3,048 meters (10,000 feet)
<b>Heat Output (BTU/HR)</b>	7.2
<b>Maximum Power Consumption (Watts)</b>	2.1
<b>MTBF (Hours)</b>	598,000 Calculation model based on MIL-HDBK-217-FN2 @ 30 °C
<b>Mechanical - Hot Swapping Card</b>	
<b>Edge Connector</b>	32 pin DIN 41612 / IEC 60603-2 Type B/2 Male. First make, last break for ground and power
<b>Card insertion and removal</b>	Captive thumb screws enable fast insertion and removal. Can be further tighten with a screwdriver.
<b>Product Weight</b>	
<b>Weight</b>	0.15 kg, 0.33 lbs
<b>Packaging</b>	
<b>Shipping Weight</b>	0.33 kg, .73 lbs
<b>Shipping Dimensions</b>	203 x 38 x 152 mm, 8 x 1.5 x 6 inches
<b>Regulatory Approvals</b>	
	FCC Part 15 Class A, EN55022 Class A
	CISPR 22 Class A CISPR 32:2015/EN 55032:2015 (Class A) CISPR 24:2010/EN 55024:2010
<b>Emissions</b>	EN61000-3-2
<b>Immunity</b>	EN55024

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UL/EN/IEC 62368-1  
CAN/CSA C22.2 No. 62368-1

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UL 60950-1  
IEC 60950-1(ed 2); am1, am2  
EN 60950-1:2006+A11:2009+A1:2010+A12:2011+A2:2013

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**Electrical Safety** CE

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EN 60825-1:2007

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**Laser Safety** Fiber optic transmitters on this device meet Class 1 Laser safety requirements per IEC-60825 FDA/CDRH standards and comply with 21CFR1040.10 and 21CFR1040.11.

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**Environmental** Reach, RoHS and WEEE Compliant

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ECCN: 5A991

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HTSUS Number: 8517.62.0020

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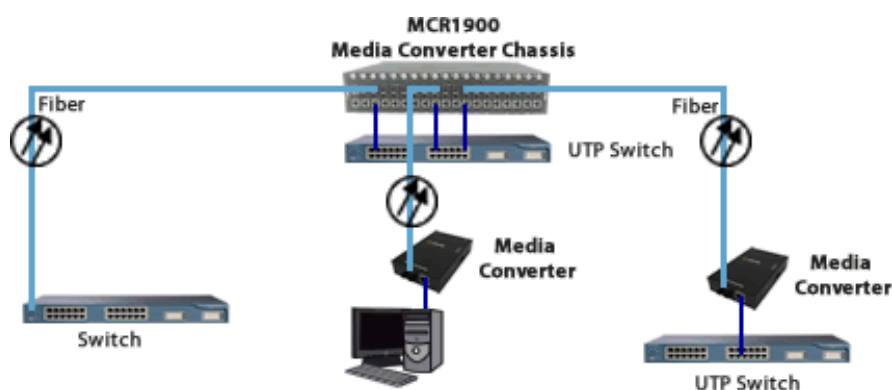
**Other** Perle Limited Lifetime Warranty

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### High Density Fiber Distribution from UTP Switch Equipment at Corporate Headquarters

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In this enterprise campus application, up to 19 Perle C-1110 10/100/1000 Media Converters are installed in the MCR1900 Media Converter Chassis. A remote fiber enabled Ethernet switch is connected directly to the central MCR1900 Chassis. A standalone S-1110 Media Converter converts the fiber to Ethernet in a fiber-to-desktop application. Another S-1110 Fiber Media Converter is connected to a remote office Ethernet switch. In all cases, multimode or single-mode fiber can be used. Fiber links can be extended up to 120km using single-mode fiber.



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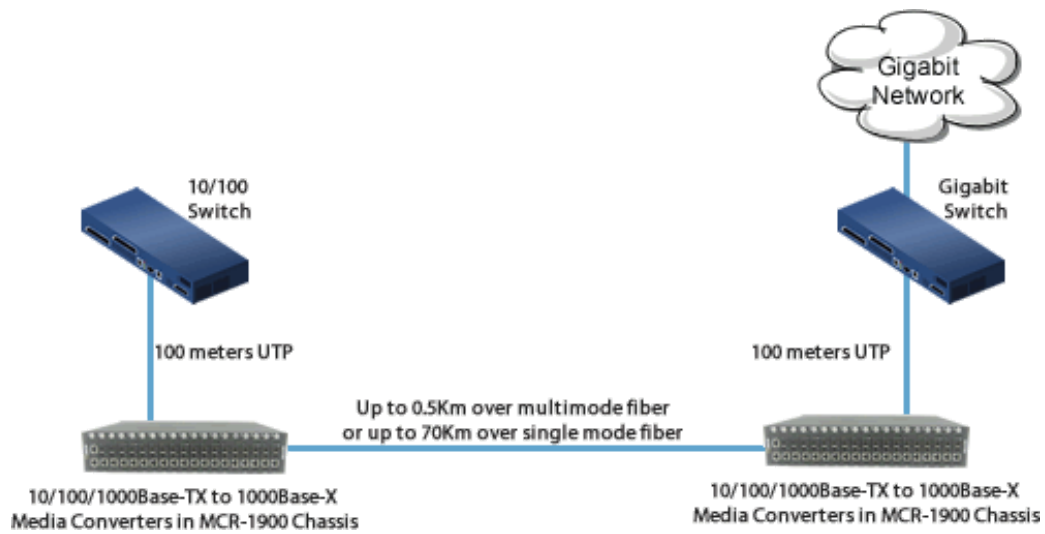
### Bridge 10/100 Devices to gigabit Backbone

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## Connect 10/100 devices to Gigabit Backbone

Devices on a 10/100 ethernet switch can be connected to a Gigabit backbone through the use of rate converting 10/100/1000 Media Converters.



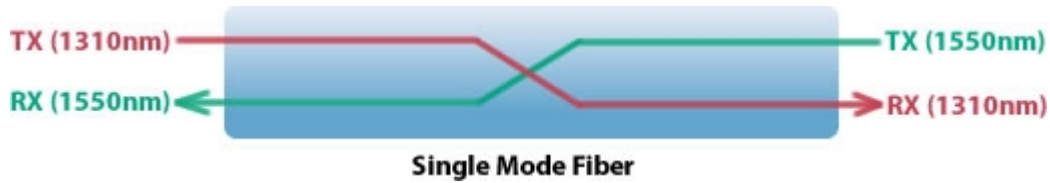
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## Single Mode / Single Fiber

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## Connect copper ports over a single fiber strand ( also referred to as “Bi-Directional” BiDi )

When Single Strand fiber is used, a pair of Single Fiber Media Converters is needed for the copper to fiber conversion. Perle Single Fiber Media Converters are also referred to as “Up/Down” models. For example the C-1110-S1SC10 **U** (“Up”) and C-1110-S1SC10 **D** (“Down”), shown below, must be used in pairs. An “Up” must be matched with a “Down” peer to deal with transmit and receive frequencies separately.



### C-1110-S1SC10UC-1110-S1SC10D

The majority of installations for single mode fiber media converters are of the “dual connector” or “dual fiber” type where one fiber connection is used for transmit, the other for receive. These are physically “crossed” to match up the Transmit/Receive links.

However, to reduce costs, or where there are limits on available fiber, WDM technology may be utilized. WDM uses separate transmit and receive frequencies to communicate on a single fiber strand. WDM technology relies on the fact that optical fibers can carry many wavelengths of light simultaneously without interaction between each wavelength. Thus, a single fiber can carry many separate wavelength signals or channels simultaneously.

So remember, if Single Strand fiber is used, you will need an “Up” Media Converter on one side and a “Down” Media Converter on the other for copper to fiber conversion.

Perle offers a wide variety of Single Fiber (“Up/Down”) Media Converters to connect 10BaseT, Fast Ethernet and Gigabit to single fiber. Whether you need Managed or Unmanaged, Standalone or Modular Chassis Based, 20km or 120km, Perle has the right model to meet your fiber conversion requirement.

### Select a Model to obtain a Part Number - Unmanaged Media Converter Chassis Modules - 10/100/1000 to Fiber

Model	Connector	Type	Transmit (dBm)		Receive (dBm)		Power Budget (dBm)	Wavelength (nm)	Fiber Type	Core Size (um)	Modal Bandwidth (MHz* Km)	Operating Distance
			Min	Max	Min	Max						
<u>C-1110-M2SC05</u>	Dual SC	1000Base-SX	-9.5	-4.0	-17.0	-3.0	7.5	850	MMF	62.5	160	220 m (722 ft)
			62.5	200	275 m (902 ft)							
			50	400	500 m (1,640 ft)							
			50	500	550 m (1,804 ft)							
			50	2000	1000 m (3281 ft)							
<u>C-1110-M2LC05</u>	Dual LC	1000Base-SX	-9.5	-4.0	-17.0	-3.0	7.5	850	MMF	62.5	160	220 m (722 ft)
			62.5	200	275 m (902 ft)							
			50	400	500 m (1,640 ft)							



											50	500	550 m (1,804 ft)
											50	2000	1000 m (3281 ft)
<u>C-1110-M2ST05</u>	Dual ST	1000Base-SX	-9.5	-4.0	-17.0	-3.0	7.5	850	MMF	62.5	160	220 m (722 ft)	
											62.5	200	275 m (902 ft)
											50	400	500 m (1,640 ft)
											50	500	550 m (1,804 ft)
											50	2000	1000 m (3281 ft)
<u>C-1110-M2SC2</u>	Dual SC	1000Base-LX	-6.0	0.0	-17.0	-0.0	11	1310	MMF	62.5	160	2 km (1.2 mi)	
											50	500	1000m (3280ft)
<u>C-1110-M2ST2</u>	Dual ST	1000Base-LX	-6.0	0.0	-17.0	-0.0	11	1310	MMF	62.5	160	2 km (1.2 mi)	
											50	500	1000m (3280ft)
<u>C-1110-M2LC2</u>	Dual LC	1000Base-LX	-9.0	-1.0	-19.0	-1.0	10	1310	MMF	62.5	160	2 km (1.2 mi)	
											50	500	1000m (3280ft)
<u>C-1110-S2SC10</u>	Dual SC	1000Base-LX/LH	-9.5	-3.0	-20.0	-3.0	10.5	1310	MMF*	62.5	500	550 m (1,804 ft)	
											50	400	550 m (1,804 ft)
											50	400	550 m (1,804 ft)
									SMF	**	-	10 km (6.2 mi)	
<u>C-1110-S2LC10</u>	Dual LC	1000Base-LX/LH	-9.5	-3.0	-20.0	-3.0	10.5	1310	MMF*	62.5	500	550 m (1,804 ft)	
											50	400	550 m (1,804 ft)
											50	400	550 m (1,804 ft)
									SMF	**	-	10 km (6.2 mi)	
<u>C-1110-S2ST10</u>	Dual ST	1000Base-LX/LH	-9.5	-3.0	-20.0	-3.0	10.5	1310	MMF*	62.5	500	550 m (1,804 ft)	
											50	400	550 m (1,804 ft)
											50	400	550 m (1,804 ft)
									SMF	**	-	10 km (6.2 mi)	
<u>C-1110-S2SC40</u>	Dual SC	1000Base-EX	-2.0	2.0	-23.0	-3.0	21.0	1310	SMF	**	-	40 km (25 mi)	
<u>C-1110-S2LC40</u>	Dual LC	1000Base-EX	-3.0	2.0	-23.0	-3.0	20.0	1310	SMF	**	-	40 km (25 mi)	
<u>C-1110-S2ST40</u>	Dual ST	1000Base-EX	-2.0	2.0	-23.0	-3.0	21.0	1310	SMF	**	-	40 km (25 mi)	
<u>C-1110-S2SC70</u>	Dual SC	1000Base-ZX	-2.0	5.0	-23.0	-3.0	21.0	1550	SMF	-	-	70 km (43 mi)	
<u>C-1110-S2LC70</u>	Dual LC	1000Base-ZX	0.0	5.0	-23.0	-3.0	23.0	1550	SMF	-	-	70 km (43 mi)	
<u>C-1110-S2ST70</u>	Dual ST	1000Base-ZX	-2.0	5.0	-23.0	-3.0	21.0	1550	SMF	-	-	70 km (43 mi)	
<u>C-1110-S2SC120</u>	Dual SC	1000Base-ZX	0.0	5.0	-32.0	-9.0	32	1550	SMF	-	-	120 km (75 mi)	

<u>C-1110-S2LC120</u>	Dual LC	1000Base-ZX	0.0	5.0	-32.0	-9.0	32	1550	SMF	-	-	120 km (75 mi)
<u>C-1110-S2ST120</u>	Dual ST	1000Base-ZX	0.0	5.0	-32.0	-9.0	32	1550	SMF	-	-	120 km (75 mi)
<u>C-1110-S2SC160</u>	Dual SC	1000Base-ZX	2.0	5.0	-34.0	-9.0	36.0	1550	SMF	-	-	160 km (100 mi)
<u>C-1110-S2LC160</u>	Dual LC	1000Base-ZX	2.0	5.0	-34.0	-9.0	36.0	1550	SMF	-	-	160 km (100 mi)
<u>C-1110-S2ST160</u>	Dual ST	1000Base-ZX	2.0	5.0	-34.0	-9.0	36.0	1550	SMF	-	-	160 km (100 mi)

## Single Fiber Models Recommended use in pairs

Model	Connector	Type	Transmit (dBm)		Receive (dBm)		Power Budget (dBm)	Wavelength (nm)	Fiber Type	Core Size (um)	Modal Bandwidth (MHz* Km)	Operating Distance
			Min	Max	Min	Max						
<u>C-1110-M1SC05U</u>	Single SC	1000Base-BX-U	-10.0	-4.0	-17.0	-3.0	7.0	1310 / 1550	MMF	62.5	500	500 m (1,640 ft)
										50	500	500 m (1,640 ft)
<u>C-1110-M1SC05D</u>	Single SC	1000Base-BX-D	-10.0	-4.0	-17.0	-3.0	7.0	1550 / 1310	MMF	62.5	500	500 m (1,640 ft)
										50	500	500 m (1,640 ft)
<u>C-1110-S1SC10U</u>	Single SC	1000Base-BX-U	-9.0	-3.0	-20.0	-3.0	11.0	1310 / 1490	SMF	**	-	10 km (6.2 mi)
<u>C-1110-S1SC10D</u>	Single SC	1000Base-BX-D	-9.0	-3.0	-20.0	-3.0	11.0	1490 / 1310	SMF	**	-	10 km (6.2 mi)
<u>C-1110-S1SC20U</u>	Single SC	1000Base-BX-U	-8.0	-3.0	-22.0	-3.0	14.0	1310 / 1490	SMF	**	-	20 km (12.4 mi)
<u>C-1110-S1SC20D</u>	Single SC	1000Base-BX-D	-8.0	-3.0	-22.0	-3.0	14.0	1490 / 1310	SMF	**	-	20 km (12.4 mi)
<u>C-1110-S1SC40U</u>	Single SC	1000Base-BX-U	-3.0	2.0	-23.0	-3.0	20.0	1310 / 1490	SMF	**	-	40 km (25 mi)
<u>C-1110-S1SC40D</u>	Single SC	1000Base-BX-D	-3.0	2.0	-23.0	-3.0	20.0	1490 / 1310	SMF	**	-	40 km (25 mi)
<u>C-1110-S1SC80U</u>	Single SC	1000Base-BX-U	-2.0	3.0	-26.0	-3.0	24.0	1510 / 1590	SMF	-	-	80 km (50 mi)
<u>C-1110-S1SC80D</u>	Single SC	1000Base-BX-D	-2.0	3.0	-26.0	-3.0	24.0	1590 / 1510	SMF	-	-	80 km (50 mi)
<u>C-1110-S1SC120U</u>	Single SC	1000Base-BX-U	-3.0	2.0	-34.0	-9.0	31	1510 / 1590	SMF	-	-	120 km (75 mi)
<u>C-1110-S1SC120D</u>	Single SC	1000Base-BX-D	-3.0	2.0	-34.0	-9.0	31	1590 / 1510	SMF	-	-	120 km (75 mi)

The minimum fiber cable distance for all converters listed is 2 meters.

\*A mode-conditioning adapter as specified by the IEEE standard, is required regardless of the span length. Note how the mode conditioning adapter for 62.5-um fibers has a different specification from the mode-conditioning adapter for 50-um fibers.

\*\*ITU-T G.652 SMF as specified by the IEEE 802.3z standard.

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