

Cisco Nexus 7000 Series Switches: Long-Distance Connection over Optical Networks Using Media Converters

What You Will Learn

This document provides information about the use of 10-Gigabit media converters to support very long reach optical connectivity in conjunction with Cisco Nexus™ 7000 Series Switches using Small Form-Factor Pluggable Plus (SFP+) short-reach (SR) and LR optics.

The Cisco Nexus 7000 Series 10 Gigabit Ethernet modules use SFP+ optics to provide high port density and low power consumption. SFP+ uses up to 1.5 watts (W) of power, which is significantly less than alternative XENPAK, XFP, and X2 optics, which use from 10 to 3W per optical module. Because of the size and power limitations of SFP+, only SR and LR optics are currently available on the Cisco Nexus 7000 Series. The 10GBASE-LR optic specification of a maximum reach of 10 km limits the maximum distance of a single connection from the Cisco Nexus 7000 Series to 10 km. The use of media converters to enable the use of long-haul optics addresses the requirement to interconnect Cisco Nexus 7000 Series Switches over distances of up to 80 km using a single connection.

Prerequisites

There are no specific requirements for this document.

Components Used

This document assumes the use of the Cisco Nexus 7000 Series and the N7K-M132XP-12 32-port 10 Gigabit Ethernet I/O module with SFP 10-Gigabit SR or LR optics.

Cisco SFP+ Transceiver Modules

Figure 1 shows Cisco® SFP transceiver modules.

Figure 1. Cisco SFP Transceiver Modules



Cisco SFP 10 Gigabit SR

The Cisco 10GBASE-SR module supports a link length of 26m on standard Fiber Distributed Data Interface (FDDI)–grade multimode fiber (MMF). Using 2000 MHz per kilometer MMF (OM3), up to 300m link lengths are possible.

Cisco SFP 10 Gigabit LR

The Cisco 10GBASE-LR module supports a link length of 10 km on standard single-mode fiber (SMF; G.652).

Cisco SFP+ Copper

Cisco SFP+ copper Twinax cables are suitable for very short distances of up to 10m. Twinax cables offer a highly cost-effective way to connect within racks and across adjacent racks.

Cisco Nexus 7000 Series N7K-M132XP-12 I/O Module

The Cisco Nexus 7000 Series N7K-M132XP-12 I/O module is a 32-port 10 Gigabit Ethernet module that supports SFP+ optics. Up to 32 SFP+ optical modules can be used to provide connectivity to hosts or other network devices using either MMF or SMF.

The module is supported in both Cisco Nexus 7000 Series Switches: the Cisco Nexus 7000 10-Slot and 18-Slot Switches.

XFP Optics

XFP 10-Gigabit optical modules are physically larger and support a greater power budget. As a result, a wider variety of 10-Gigabit optics are available in the XFP package.

10GBASE-SR XFP Module for MMF

The 10GBASE-SR XFP supports a link length of 26m on standard FDDI-grade MMF. Up to 300m link lengths are possible when using 2000 MHz per kilometer MMF (OM3).

10GBASE-LR XFP Module for SMF

The 10GBASE-LR XFP supports a link length of up to 10 km over SMF for long-reach applications.

10GBASE-ER XFP Module for SMF

The 10GBASE-ER XFP supports a link length of up to 40 km over SMF for longer-reach intersite applications

10GBASE-ZR XFP Module for SMF

The 10GBASE-ZR XFP supports a link length of up to 80 km over SMF for extended-distance intersite applications.

Net Optics 10 GigaBit Media Converter

The Net Optics® 10 GigaBit Media Converter supports two XFP interfaces, which convert from SR or LR to ER or ZR, supporting connectivity of up to 80 km for site-to-site connection (Figure 2). A media converter provides the benefits of SFP+ for high-density I/O modules while enabling long-distance site-to-site applications for data center and campus interconnection. Media converters are designed to be used to connect dissimilar 10-Gigabit devices, or in pairs at each end of long-distance fiber links.

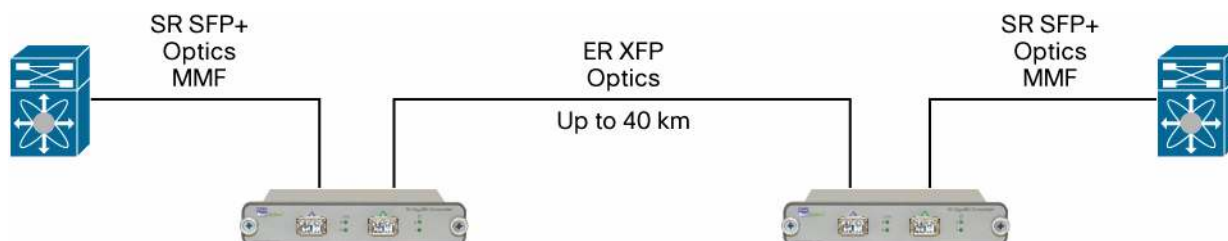
Figure 2. Net Optics Media Converter



Applications

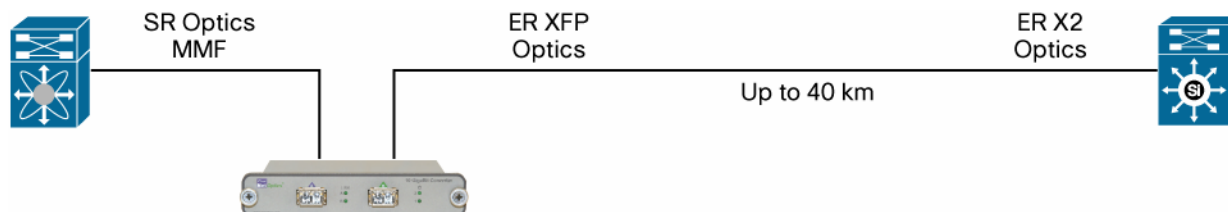
To support a connection between two Cisco Nexus 7000 Series Switches over SMF at a distance of up to 40 km, a pair of media converters is used to connect between the Cisco Nexus 7000 Series Switches (Figure 3). SR optics are used on the Cisco Nexus 7000 Series Switch with a MMF (OM3) connection of up to 300m connecting to Port A on the media converter, which has XFP SR installed. Port B has ER XFP and is connected to the remote media converter over the SMF. The same connections are provided at the remote site, using ER XFP in Port B, SR XFP in Port A, and SR SFP+ in the Cisco Nexus 7000.

Figure 3. Cisco Nexus 7000 Series Switch Connected to Cisco Nexus 7000 Series Switch over a Distance of 40 km



A similar solution is used to connect a Cisco Nexus 7000 Series Switch to network devices that support ER optics directly, but in this case just one media converter is required at the Cisco Nexus 7000 Series end of the connection. Figure 4 shows a Cisco Nexus 7000 Series Switch connecting through one media converter to a Cisco Catalyst® 6500 Series Switch with ER X2 optics.

Figure 4. Cisco Nexus 7000 Series Switch Connected to Cisco Catalyst 6500 Series Switch over a Distance of 40 km



Extended distances of up to 80 km are possible using ZR XFP optics in the media converter for extra-long-distance applications.

Cisco has verified the operation of the Net Optics media converter referred to here. Many equivalent media converters are available. Any media converter that provides a transparent IEEE 802.3ae 10 Gigabit Ethernet service can be used.

Cisco does not certify or warrant the use of any particular model of media converter but has verified that the techniques described in this technical note operate as described.

For More Information

For more information about the Cisco Nexus 7000 Series, visit: <http://www.cisco.com/go/nexus7000>

For more information about Cisco transceiver modules, visit:

http://www.cisco.com/en/US/products/hw/modules/ps5455/prod_module_series_home.html



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