INSCAPE DATA CORPORATION

SFP vs. SFP+: What is the Difference and How to Use?

Overview

An SFP, Small form-factor pluggable, is a compact and hot-swappable transceiver used to connect a switch or other network device to copper or fiber cable. SFP replaces the formerly common gigabit interface converter (GBIC), and SFP is also called Mini-GBIC. The SFP ports on a switch and SFP modules enable the switch to connect to fiber and Ethernet cables of different types and speeds. The small form-factor pluggable, SFP, specification is based on IEEE802.3 and SFF-8472. Almost all enterprise-class switches include two or more SFP ports, enabling them to become part of a ring- or star-based network topology spread among different buildings, floors or areas, connected via fiber optic cabling.

The SFP+ standard was released in 2006 with a further update in 2011. SFP+ modules support rates up to 16 Gbps. Like the earlier SFP model, they support both fiber and copper, but copper interconnects are limited to 10 meters at 10 Gbps. The SFP+ specification supports single-mode fiber interconnects to 40 km, but some vendors support up to 80 km distances. SFP+ also supports WAN connections based on Optical Transport Network specification OTU2.

SFP vs. SFP+

SFP supports 10/1000Mbps Ethernet speed, SFP+ is an updated version that supports higher speeds up to 10Gbps and this is the primary difference between SFP and SFP+. Du to the differerent data rate, the applications and transmission distance is also different. SFP+ typically has a longer transmission distance. SFP+ specifications are based on SFF-8431. In terms of SFP vs. SFP+ compatibility, SFP+ ports often accept SFP optics but at a reduced speed of 1Gbps. However, be aware, you cannot plug an SFP+ transceiver into an SFP port because SFP+ does not support speeds less than 1Gbps. SFP+ module becomes the most popular 10 Gigabit Ethernet module in the market.

The following is a table of comparison between SFP and SFP+:

Module	SFP (Small Form-factor Pluggable)	SFP+ Small Form-factor Pluggable plus (standard form)
Data rate (M-Mbps, G-Gbps)	155M/622M/	6G/8.5G/10G
	1.25G/	
	2.5G/3G/	
	4.25G	
Type, Modulation	Dual fiber	Dual fiber
	Single Fiber/WDM	Single Fiber/WDM
	CWDM	CWDM
	DWDM	DWDM
Distance / Wavelengths	500m/2km/	220m/300m/
	10km/15km/	2km/10km/
	20km/40km/	20km/40km/
	60km/80km/	60km/80km
	100km/120km/	
	150km	220m/300m/
	850nm/1310nm/1550nm	2km/10km/
	1310nm/1490nm/1550nm	20km/40km/
	1270nm-1610nm	60km/80km/120km
	ITU17~ITU61	1270 nm to 1610
		1270 nm and 1330 nm (BiDi SFP+)

SFP and SFP+ have the same size and appearance. From the price, SFP+ is usually more expensive than SFP. The main difference between SFP and SFP+ is that the SFP+ is used in Gigabit Ethernet applications while SFP is for 100Bse or 1000Base applications. SFP doesn't support 10G transmission data rate, which means they can't be used in the same network. SFP+ transceivers use the same dimensions of pluggable transceivers in the 10Gbs Ethernet and 8.5Gbs fiber channel with SFP. SFP comply with standards of IEEE802.3 and SFF-8472 while SFP+ is based on SFF-8431.

SFP types and updates

Industries have continued to update SFP specifications to support higher rates and additional interconnect types. SFP28 supports 25 Gbps over both multimode and single-mode fiber. BiDi SFPs support bidirectional communication over a single fiber. While other SFP types require two fibers -- one

to send and one to receive -- BiDi SFPs use different wavelengths with one wavelength for sending data and the other for receiving.

Compact SFPs support two bidirectional links using the same interface module -- two fibers are used with each carrying bidirectional traffic. Quad SFP (QSFP) modules support four fibers carrying Ethernet, FC or InfiniBand. Most available QSFP modules can support up to 200 Gbps. Both octal SFP and QSPF double density have recently become available and extend data rates to 400 Gbps.

Summary

Currently, 400 Gbps is the highest rate available in commercially available products, although work is underway to develop standards and products that support 800 Gbps. SFP technology has demonstrated the ability to evolve as demands increase and will likely continue to evolve to support higher rates. Small form factor pluggable specifications are published in the SFP Multi-Source Agreement, which enables you to mix and match components from different vendors. However, some IT equipment manufacturers sell network devices that support only vendor specific SFPs. To ensure compatibility, review the vendor's optics testing report or ask your vendor to provide compatibility information.

Which SFP transceiver you choose depends on the cable type and application and required optical range for the network and the desired data transmission rate.

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