Purpose

Fibre Channel users will perceive Fibre Channel simply as an extension of their SCSI attachment where other Fibre Channel users will invest in a network infrastructure for data storage and build a Storage Area Network (SAN). Fibre Channel vendors provide a wealth of installation choices that apply to each type of application. This guide is designed to provide the necessary background information to select the proper switch and cables for customized SAN network interconnections.

What is Fibre Channel

Fibre Channel is a 1 or 2 gigabit per second data transfer interface technology that maps several common transport protocols, allowing it to merge high-speed I/O and networking functionality in a single connectivity technology. Fibre Channel is an open standard as defined by ANSI and OSI standards and operates over copper and fiber optic cabling at distances of up to 10 Kilometers. Fibre Channel supports multiple inter-operable topologies including point-to-point, arbitrated-loop and switching. With its large packet sizes, Fibre Channel is ideal for storage, video, graphic and mass data transfer applications.

When combined with choices of physical variants, Fibre Channel offers an unprecedented capability for delivering unmatched performance, tuning the configuration to meet the application's needs.

Fibre not Fiber

Fibre Channel was originally designed to support fiber optic cabling only. When copper support was added to its feature set some years ago, an ISO (International Standards Organization) task force decided to rename the technology. The committee decided to change the spelling of Fiber, to the French spelling Fibre, to reduce the association with fiber optics while maintaining the name recognition of the Fibre Channel technology.

Fibre Channel Arbitrated Loop

Fibre Channel Arbitrated Loop (FC-AL) was developed with peripheral connectivity in mind, and supports 126 nodes and 10KM cabling ranges between nodes.

Fibre Channel Cables

Distance Limitations

Fibre Channel supports the following distances over the respective media types:

Speed	Media	Transmission	Distance	Connectors
1.0625 Gigabit (1Gb)	Copper (Coax/Twinax)	Electrical	24 Meters	DB9 and HSSDC
	Optical 50 Micrometer Multi-mode fiber	Shortwave Laser 850nm	500 Meters	Dual SC
	Optical 62.5 Micrometer Multi-mode fiber	Shortwave Laser 850nm	175Meters	Dual SC
2.1250 Gigabit (2Gb)	Copper (Coax/Twinax)	Electrical	15 Meters	SFP and HSSDC2
	Optical 50 Micrometer Multi-mode fiber	Shortwave Laser 850nm	300 Meters	Dual LC
	Optical 62.5 Micrometer Multi-mode fiber	N/A	N/A	N/A

Table 1 - Cable Distance Limitation

Technical Note: In FC-AL configurations, the distance numbers represents the distance between nodes, not the total distance around the loop. In fabric configurations, the distance numbers represent the distance from the switch to the node, not the distance between nodes.

Fibre Channel Optics

There are two types of Fibre Channel optics, OFC (Optical Fibre Control) and Non-OFC lasers, currently specified for use in Fibre Channel products. OFC optics use a high powered laser that is controlled with a handshake to protect users from eye damage. Non-OFC optics uses a lower powered laser that is safer to the eye. The industry trend is toward eye-safe, non-OFC lasers for local area connection. Optical Cables use Dual SC or LC connectors.

Multimode Cable

Multimode cable is dominant for short distances of 2 Km or less. Multimode has an inner diameter of 62.5 or 50 microns, allowing light to enter the cable in multiple modes, including straight and at different angles. The many light beams tend to lose shape as they move down the cable. This loss of shape is called dispersion and limits the distance

for multimode cable.

Single Mode Cable

Single mode cable is used for long distance of the laser at the transmitter and by the sensitivity of the receiver. Single mode cable has an inner diameter of 7 or 9 microns and only allows a single ray of light to enter the cable. Therefore, with single mode cables there is very little dispersion.

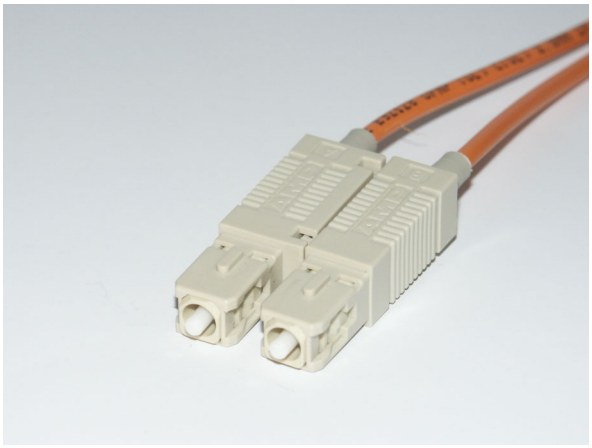


Figure 1 - Dual SC Optical Fibre Channel Connector

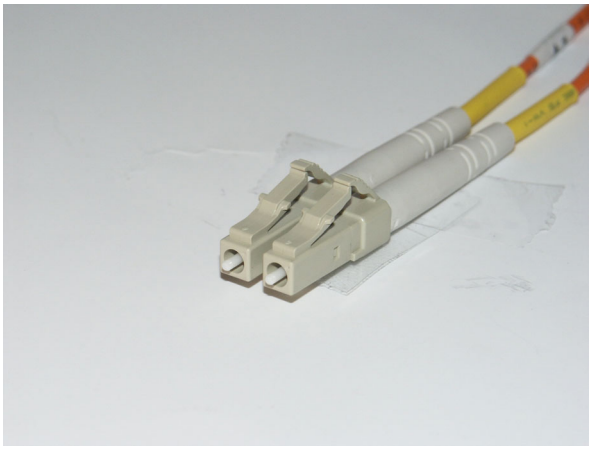


Figure 1 - Dual LC Optical Fibre Channel Connector

Copper Cables

Four kinds of copper cable are defined in the Fibre Channel standard. The most popular implementations are twin-ax using DB-9 or HSSDC connectors.



Figure 3 - DB9 Copper Fibre Channel Connector

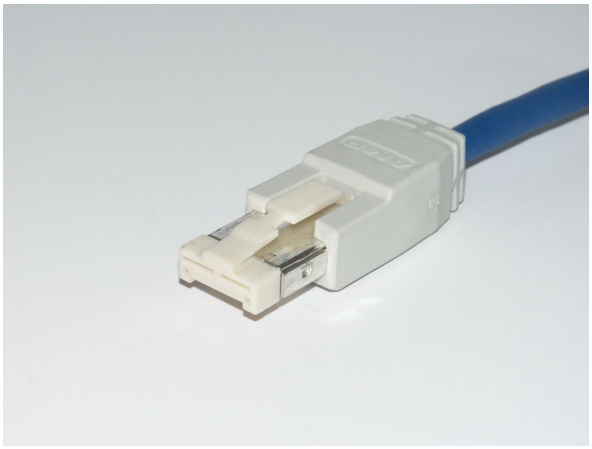


Figure 4 - HSSDC Copper Fibre Channel Connector



Figure 5 – HSSDC2 Copper Fibre Channel Connector

Fibre Channel Networking Components
Gigabit Interface Converters

Cable runs in a data center are most often supported with twin-ax copper circuits and, therefore, hubs, disks, and many host bus adapters come standard with a copper interface. Gigabit Interface Converters (GBIC) and media interface converters plug into the copper interface and convert it to an optical or copper interface.



Figure 6 – 1Gb Gigabit Interface Converter (GBIC) with dual SC optical interface.



Figure 7 - 1Gb Gigabit Interface Converter (GBIC) with DB9 copper interface.



Figure 8 - 1Gb Gigabit Interface Converter (GBIC) with HSSDC copper interface.



Figure 9 - 1Gb Copper-to-Optical Media Interface Adapter (MIA)

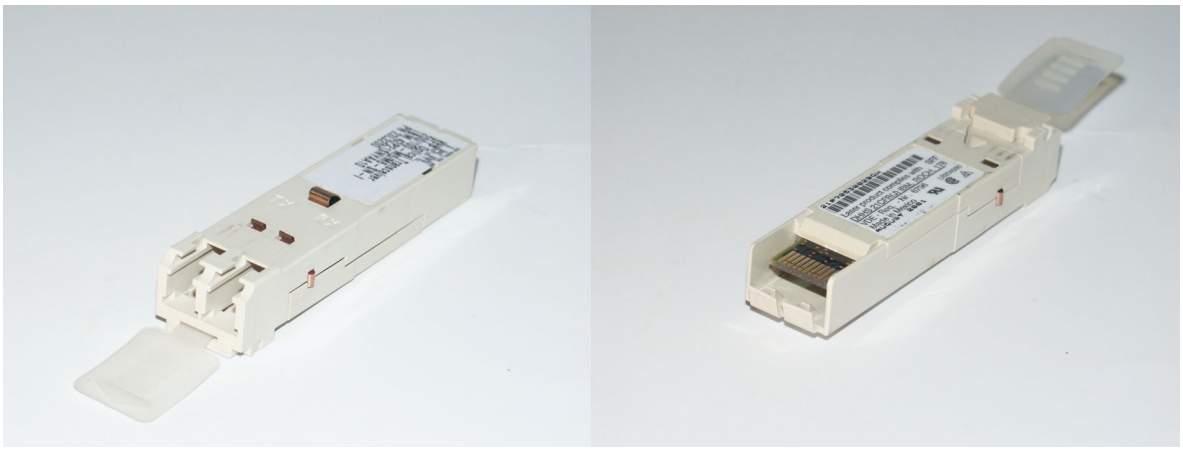


Figure 8 - 2Gb SFP (Small Format Pluggable) GBIC with dual LC optical interface