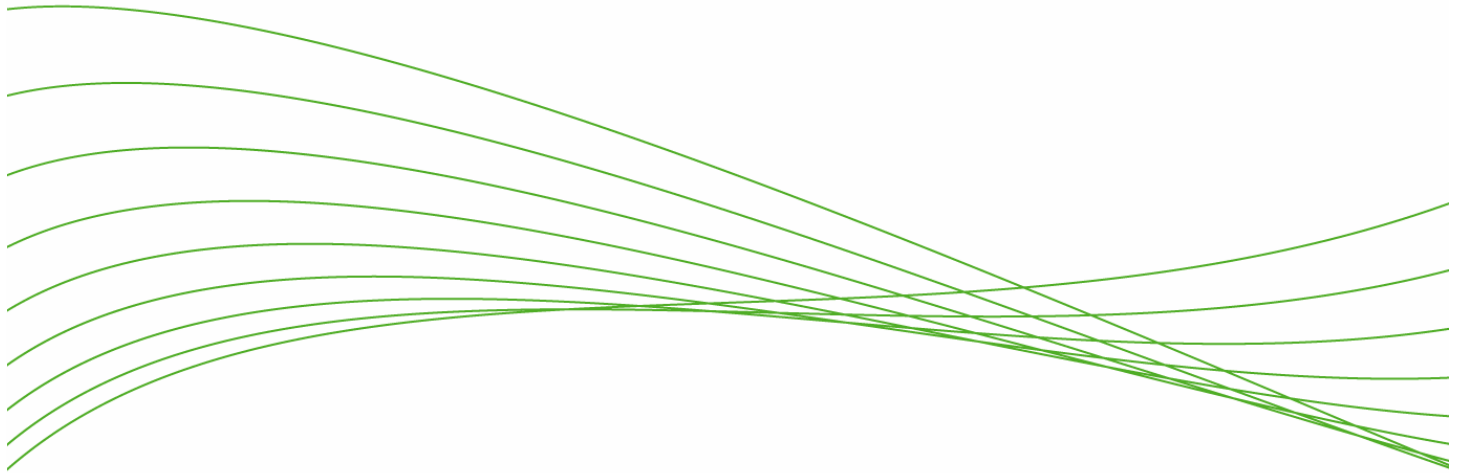


100BASE-FX Technical Brief



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Introduction

New technologies generate great excitement, but sometimes older technologies continue to serve important needs. An example of such a technology is 100BASE-FX.

Although 100BASE-FX was developed in the mid-1990s, it is still in use today, 10 years later, when we also have Gigabit and 10-Gigabit available. Why? One reason is that 100-FX has the longest range over multimode fiberoptic cable of any Ethernet technology. While 100-FX can reach two kilometers using any quality of multimode fiber, the Gigabit maximum range is 550 meters, and 10-Gigabit maximum range is 300 meters on only the highest-quality multimode fiber.

Fiberoptic cabling provides several benefits over copper cabling: noise immunity, no electromagnetic emissions, and it is difficult to tap or eavesdrop, in addition to supporting long distances. There are two types of fiberoptic cabling: multimode and singlemode. Multimode fiberoptic cabling is much less expensive than singlemode, although singlemode fiber provides greater distances. The 100BASE-FX standard specifies multimode fiber as the transmission medium.

Because 100-FX operates over multimode fiber and reaches distances up to two kilometers, there continues to be widespread use of 100-FX as a cost-effective way to extend Ethernet networks. ProCurve Networking by HP supports 100-FX in our new switches, so that our customers can continue to get the most from their old fiber and take advantage of whatever fiber type, distance and speed best serves their needs. By creatively connecting the past with the future, ProCurve offers both investment protection and the flexibility that comes with choice — all of which adds long-term value to ProCurve solutions.

Quick history

Two goals that networking standards bodies struggle to achieve are speed and distance. Ethernet keeps evolving to speeds that are 10 times faster than the previous generation. And fiberoptic cabling allows networks to reach distances far greater than the standard 100 meters supported by copper cabling.

The success of 10-Megabit Ethernet led to the creation of 100-Megabit "Fast" Ethernet in the early 1990s. FDDI was created to provide 100-Megabit connectivity over multimode fiberoptic cabling, with a maximum distance of two kilometers between stations. So when the IEEE developed the 100BASE-FX specification for 100-Megabit Ethernet over fiberoptic cabling, one goal was to allow a maximum distance of two kilometers over multimode fiber, to match FDDI capabilities.

Fiberoptic cable installers were careful to adhere to the FDDI and 100-FX distance specifications, and companies were careful to limit their multimode fiber links to two kilometers or less. This allowed network expansion at 100-Megabit speeds.

Today, many companies are installing singlemode fiberoptic cabling primarily to gain higher speed network links, because singlemode fiber preserves signal integrity and allows extremely long distances and high speeds. But singlemode fiber is more expensive to install than multimode, and the networking components that send signals over singlemode fiber are more expensive than the components that send signals over multimode fiber.

Benefits of 100BASE-FX

After a decade of existence, there are still good reasons to use 100-FX. There are many applications where higher speed is not needed and where there is existing multimode fiber in place. When 100 Megabits/sec is adequate, there are several benefits of 100-FX:

- can extend the network to greater distances than copper cabling can support
- noise immunity (fiber is immune to external interference)
- security (fiber is difficult, though not impossible, to tap)
- electrical immunity (there are no grounding issues with fiber)

Factories can be difficult environments for computer networks due to many sources of external interference that can affect the signal on copper cabling. For factories, fiber-based networks are often the only option.

In large campus environments, fiberoptic cabling is required to reach the distances between buildings. Because of the FDDI legacy, many of those fiberoptic links are constructed of multimode fiber with distances no greater than two kilometers. When 100-Megabit communication is adequate, this campus example is a perfect fit for 100-FX.

Department stores and grocery chains are other examples where 100-Megabit communication is adequate, but the challenges are long distances from the computer room to the point-of-sale devices and cash registers. Again, 100-FX is ideal for such a network.

Military and other high-security networks often standardize on fiberoptic networking because of its inherent security: signals do not "leak" from the cables, and the cables are very difficult to tap without being detected.

Finally, cost is a big benefit of 100-FX, because 100-FX typically uses LEDs instead of higher-cost lasers. With less expensive transceivers at each end of the link, the overall system cost is lower. Existing multimode fiber segments further reduce the cost by allowing customers to re-use that fiber instead of installing new fiber.

Conclusion

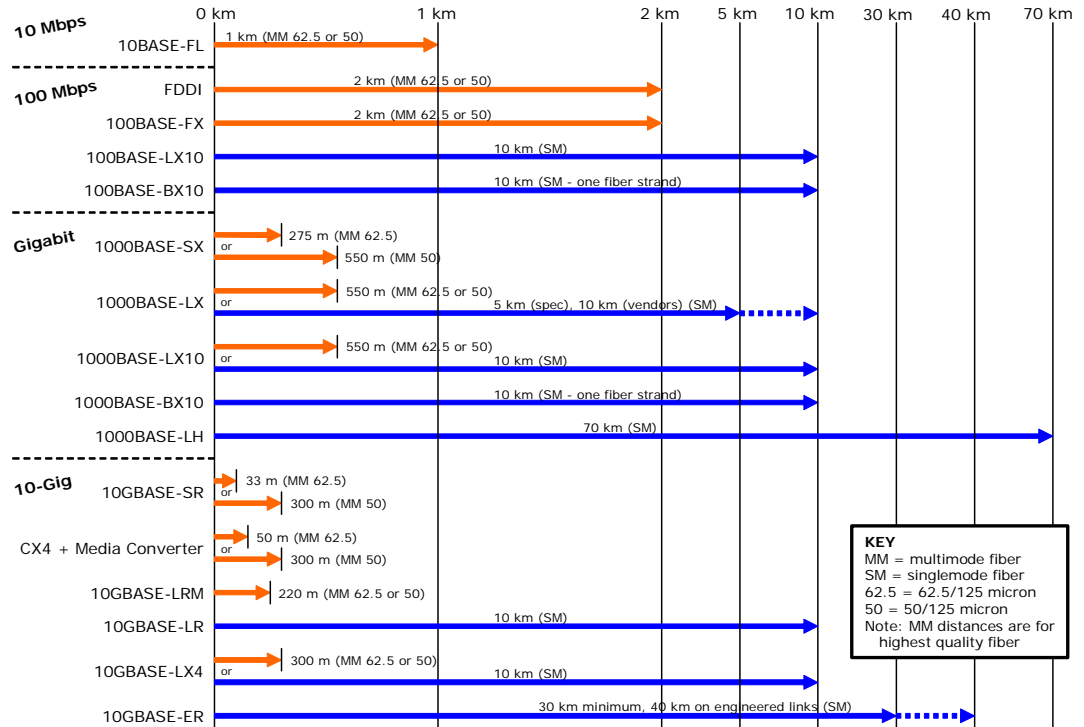
Even 10 years after its creation, 100-FX is a viable technology with compelling reasons for its use. There are many situations where existing multimode fiber is available, and that fiber can be used to extend the network with 100-FX links. Also, the long range of 100-FX allows connectivity over multimode fiber where Gigabit does not reach. Some proprietary equipment is designed for 100-FX, and those legacy solutions are still in use today. And military installations that prefer fiberoptic connectivity for security reasons still benefit from the long distances 100-FX supports over multimode fiberoptic cabling.

For reasons of low cost components, ability to re-use existing multimode fiber and support for long distances, 100-FX will be in use for many years to come — and ProCurve will continue to support this proven technology even as we bring new switches to market.

Appendix

Distances Supported on Fiberoptic Cabling for Different Technologies.

Fiberoptic distance vs technology



To find out more about
ProCurve Networking
products and solutions,
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www.procurve.com



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