- Link extenders

Native SW Fibre Channel transmitters feature a maximum distance of 150 meters (492 feet) with 50-micron diameter, multi-mode, optical fiber (at 4 Gbps). Although 62.5-micron, multimode fiber can be used, the larger core diameter has a greater dB loss and maximum distances are shortened to 55 meters (180 feet). Native LW Fibre Channel transmitters have a maximum distance of 10 km (6.2 miles) when used with 9-micron diameter single-mode optical fiber. For more information, see Table 4-12 on page 153.

Link extenders provide a signal boost that can potentially extend distances to up to about 100 km (62 miles). These link extenders act as a large, fast pipe. Data transfer speeds over link extenders depend on the number of buffer credits and efficiency of buffer credit management in the Fibre Channel nodes at either end. Buffer credits are designed into the hardware for each Fibre Channel port. Fibre Channel provides flow control that protects against collisions.

This configuration is important for storage devices, which do not handle dropped or out-of-sequence records. When two Fibre Channel ports begin a conversation, they exchange information about their number of supported buffer credits. A Fibre Channel port sends only the number of buffer frames for which the receiving port has given credit.

This approach avoids overruns and provides a way to maintain performance over distance by filling the pipe with in-flight frames or buffers. The maximum distance that can be achieved at full performance depends on the capabilities of the Fibre Channel node that is attached at either end of the link extenders.

This relationship is vendor-specific. A match must exist between the buffer credit capability of the nodes at either end of the extenders. A host bus adapter (HBA) with a buffer credit of 64 communicating with a switch port with only eight buffer credits can read at full performance over a greater distance than it can write because on the writes, the HBA can send a maximum of only eight buffers to the switch port.

On the reads, the switch can send up to 64 buffers to the HBA. Until recently, a rule existed to allocate one buffer credit for every 2 km (1.24 miles) to maintain full performance.

Buffer credits within the switches and directors play a large part in the distance equation. The buffer credits in the sending and receiving nodes heavily influence the throughput that is attained in the Fibre Channel. Fibre Channel architecture is based on a flow control that ensures a constant stream of data to fill the available pipe. Generally, to maintain acceptable performance, one buffer credit is required for every 2 km (1.24 miles) distance that is covered. For more information, see *IBM SAN Survival Guide*, SG24-6143.

4.1.5 Host attachments

The TS7700 attaches to IBM Z hosts through the FICON adapters on the host (FICON LW or SW) at speeds of 4, 8, or 16 Gbps. Connection speeds of 1 and 2 Gbps are no longer supported by the newest 16 Gb FICON Adapters.

Consider the following points:

- ESCON channel attachment is not supported.
- FICON channel extension and DWDM connection are supported.
- FICON directors and director cascading are supported.