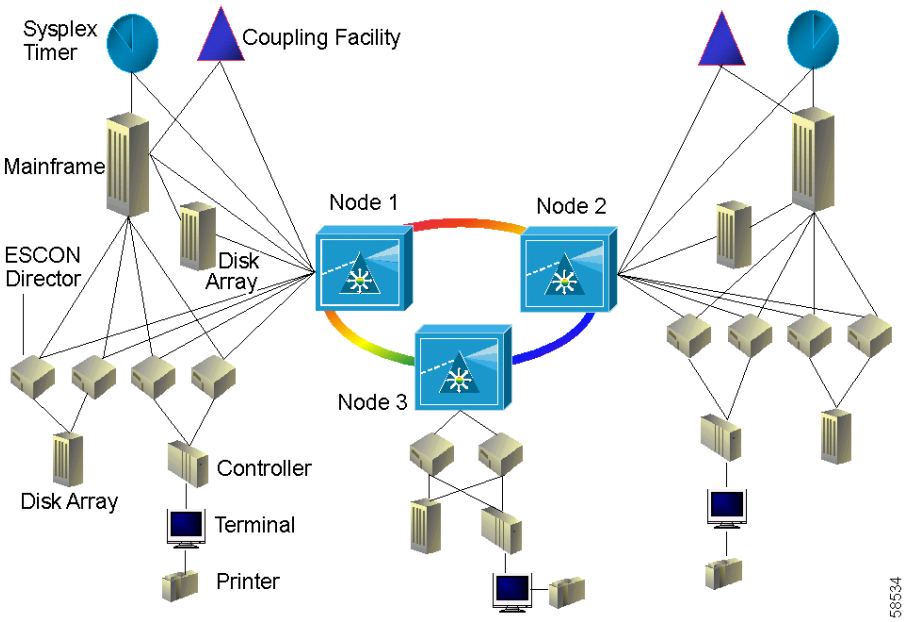
IBM Storage Protocol Support

This appendix provides descriptions and design considerations for protocols used in an IBM storage environment. This appendix contains the following major sections:

IBM Storage Environment

Figure A-1 shows an IBM storage environment application with GDPS (Geographically Dispersed Parallel Sysplex). SANs (storage area networks) are attached to node 1 and node 2, and a LAN is attached to node 3.

Figure A-1 IBM Storage Environment with GDPS and DWDM



Supported Protocols

The Cisco ONS 15540 ESPx can provide the transport layer for the following IBM storage related protocols:

- ESCON
- FICON
- Coupling Facility
- Sysplex Timer links

The Cisco ONS 15540 ESPx can also be used to help implement the high availability features for the following applications:

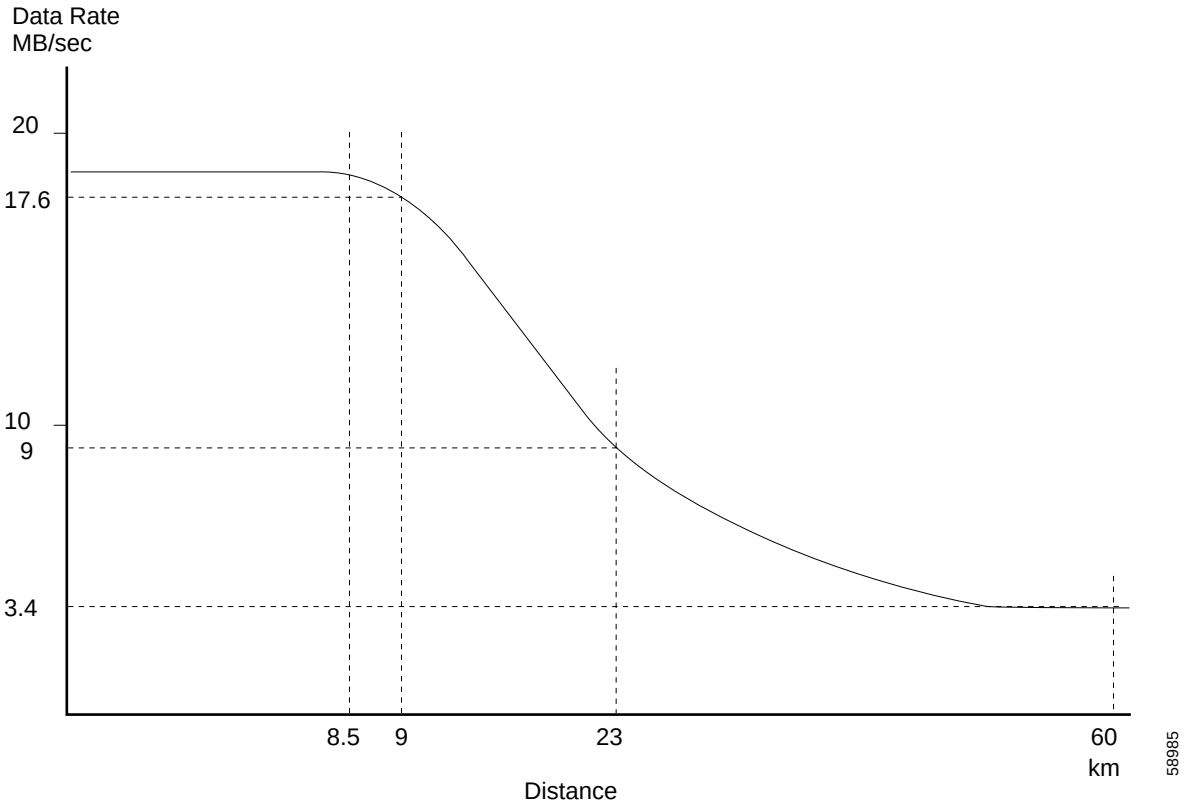
- PPRC
- XRC
- GDPS

ESCON

ESCON (Enterprise System Connection) is a 200-Mbps unidirectional serial bit transmission protocol used to dynamically connect mainframes with their various control units. ESCON provides nonblocking access through either point-to-point connections or high speed switches, called ESCON Directors. In the Parallel Sysplex or GDPS environment, ESCON performance is seriously affected if the distance spanned is greater than approximately 8 km. For instance, measurements have shown that ESCON performance at 20 km is roughly 50 percent of maximum performance. Performance degradation continues as distance is further increased.

Figure A-2 shows an estimate of how the effective data rate decreases as the path length increases. At a distance of 9 km, performance begins to decrease precipitously. This data point is referred to as the *distance data rate droop point*.

Figure A-2 ESCON Data Rate as a Function of Distance



FICON

FICON (Fiber Connection) is the next generation bidirectional channel protocol used to connect mainframes directly with control units or ESCON aggregation switches (ESCON Directors with a bridge card). FICON runs over Fibre Channel at a data rate of 1.062 Gbps. One of the main advantages of FICON is the lack of performance degradation over distance that is seen with ESCON. FICON can reach a distance of 100 km before experiencing any significant drop in data throughput.

Coupling Facility

Coupling Facility (CF) links, also known as ISC (InterSystem Channel) links, are used to connect mainframes to a CF. The CF is used by multiple mainframes to share data in a sysplex or Parallel Sysplex environment. This data sharing capability is key to the high availability features of a GDPS. Coupling links run over Fibre Channel at data rates of 1.0625 Gbps (called ISC1 or ISC compatibility) and 2.1 Gbps (called ISC peer).

Sysplex Timer

Sysplex Timer links are the links used to provide the clock synchronization between the mainframes in a Parallel Sysplex. There are two types of links used. The first is the link between each mainframe and the Sysplex Timer, known as the ETR (external throughout rate) links. The second is the link between redundant Sysplex Timers, referred to as the CLO (control link oscillator) links. In a high availability GDPS environment, redundant Sysplex Timers are connected to each mainframe over ETR links, while the timers are connected to each other over the CLO links. This protocol operates at 16 Mbps.

PPRC

PPRC (peer-to-peer remote copy) is a facility used in certain IBM disk controllers that allows synchronous mirroring of data.

XRC

XRC (extended remote copy) is a facility used with certain IBM disk controllers that allows asynchronous mirroring of data.

GDPS

GDPS (Geographically Dispersed Parallel Sysplex) is a multisite parallel sysplex with sites up to 40 km apart. It uses custom automation to manage mirroring of critical data and to balance workload for regular use or for disaster recovery.

Client Optical Power Budget and Attenuation Requirements

Table A-1 shows the client optical power budget and attenuation requirements for the IBM storage protocols and the IBM implementation of other common protocols with high-end IBM servers that support ESCON, FICON, and Fibre Channel. For each protocol, the table shows the transmit power and receiver sensitivity ranges on the IBM server interface, the transponder type that supports this protocol on the Cisco ONS 15540 ESPx, the resulting client loss budget, and what attenuation is required at 0 km. For the transmit powers and receiver sensitive ranges of the Cisco ONS 15540 ESPx transponder interfaces, refer to the *Cisco ONS 15540 ESPx Hardware Installation Guide*.

Table A-1 Optical Power Budget and Attenuation Requirements with High-End IBM Servers

Protocol	IBM Server Transmit (dBm)	IBM Server Receive (dBm)	Cisco ONS 15540 ESPx Transponder Type	Cisco ONS 15540 ESPx Client Loss Budget/Minimum Attenuation at 0 km
ESCON, SM	–3 to –8	–3 to –28	SM	Rx: 11 to 16 dB/none Tx: 23 to 28 dB/–3 dB
ESCON, MM ETR/CLO, MM	–15 to –20.5	–14 to –29	MM	Rx: 4.5 to 10 dB/none Tx: 24 to 29 dB/–14 dB
FICON, SM/LX	–4 to –8.5	–3 to –22	SM	Rx: 11.5 to 15 dB/none Tx: 17 to 22 dB/–3 dB
ATM 155, SM	–8 to –15	–8 to –32.5	SM	Rx: 4 to 11 dB/none Tx: 27.5 to 32.5 dB/–8 dB
ATM 155, MM	–14 to –19	–14 to –30	MM	Rx: 6 to 11 dB/none Tx: 25 to 30 dB/–14 dB
FDDI, MM	–14 to –19	–14 to –31.8	MM	Rx: 6 to 11 dB/none Tx: 26.8 to 31.8 dB/–14 dB
ISC, 1Gbps	–3 to –11	–3 to –20	SM	Rx: 8 to 16 dB/none Tx: 15 to 20 dB/–3 dB