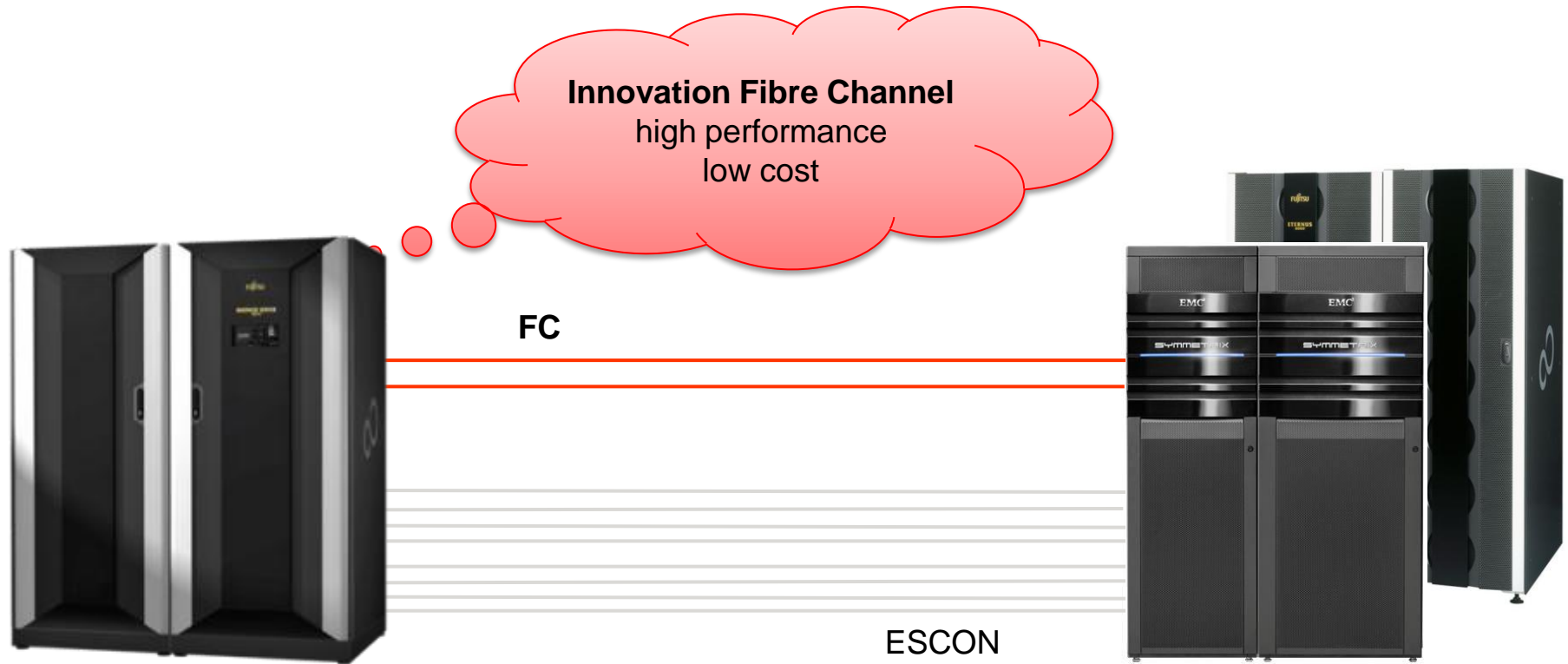


Fibre Channel Connection and SAN Connectivity

Fibre channel on BS2000/OSD s series business servers

The real innovation for BS2000 customers



Every 2-3 years, doubling of server and disk subsystem performance.
Since the transition from Type 2 to Type S, **nothing** has happened in the I/O area!

- Systematic implementation of our open system strategy
Hardware – SAN connection - openness
- High-performance connection
- Fibre Channel on /390 systems is a highlight for the S architecture and a unique selling point
- Real alternative to IBM's FICON
not a “proprietary” connection, but standard technology

Customer benefits:

■ Up to 8 paths to a Device

- Redundancy for failure scenarios
- Dynamic load balance

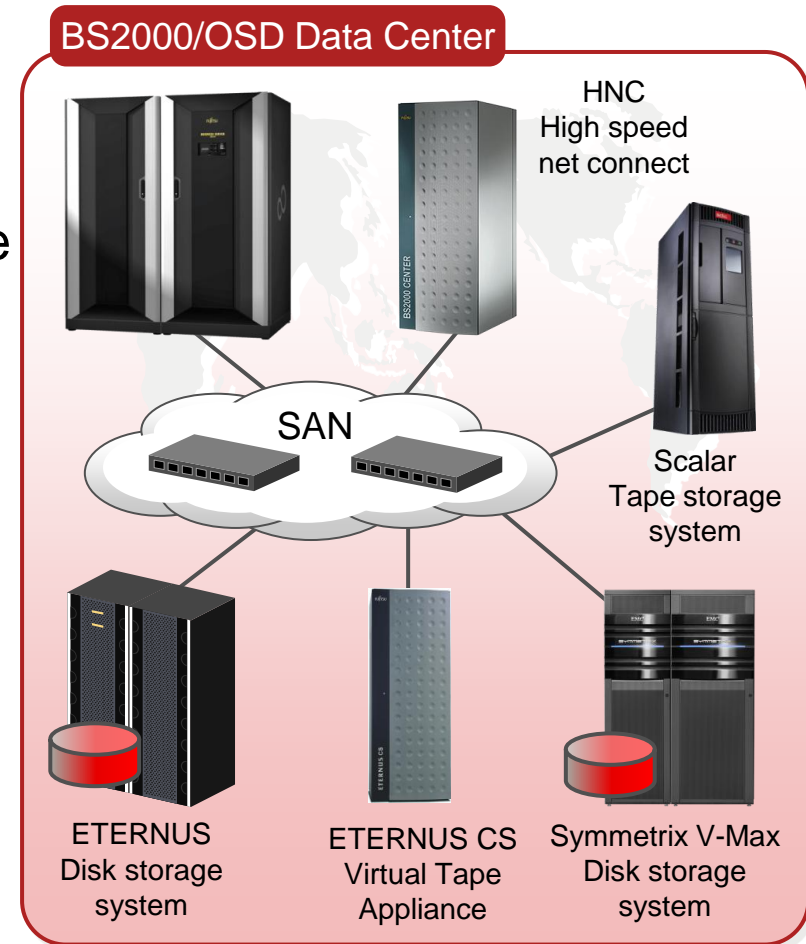
■ One FC connection can be used for several guest systems (VM2000)

- Efficient utilization of the HW resources by server and Storage subsystem

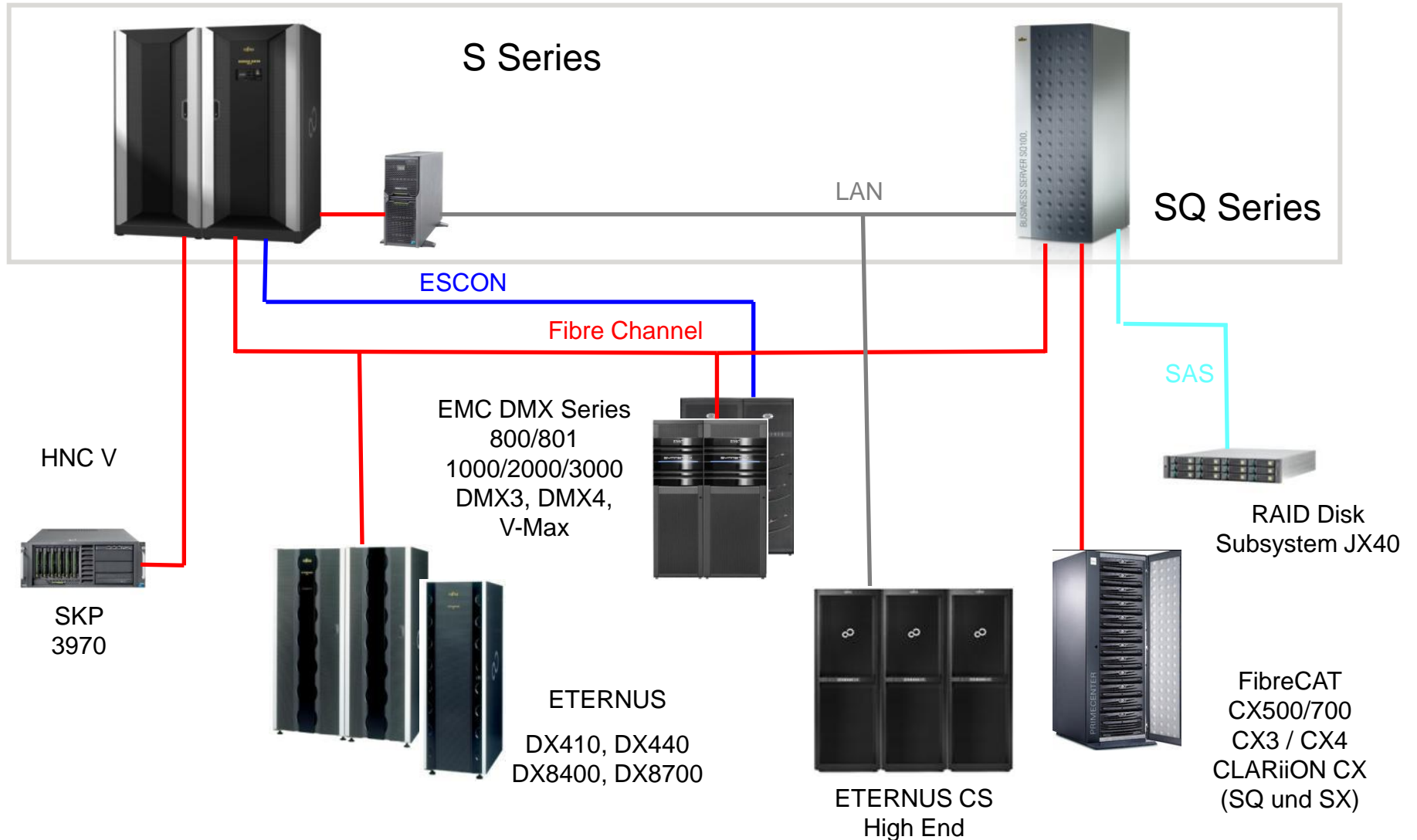
**Such Features are standard for mainframe systems
– in open systems area not available yet**

Vast increase of efficiency with modern Fiber Channel Technology for online and near line storage

- Fiber Channel - High-end SAN-Connectivity
 - Unified infrastructure for storage (online and near line) and communication
 - Simplified I/O-network
 - Reduction of physical connections
 - Integration into enterprise-wide SAN concepts
 - High performance



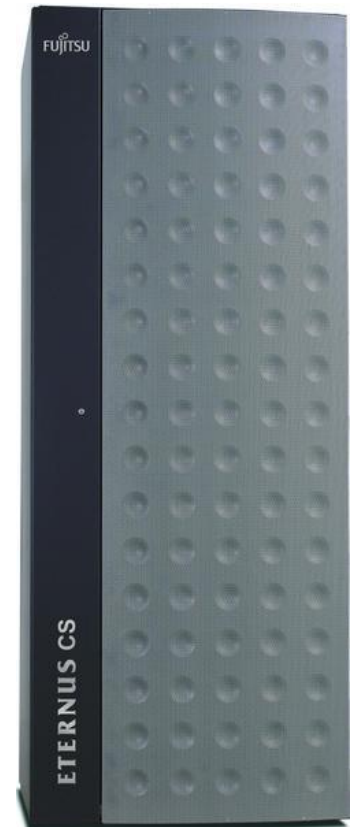
BS2000/OSD V8.0 Online peripherals



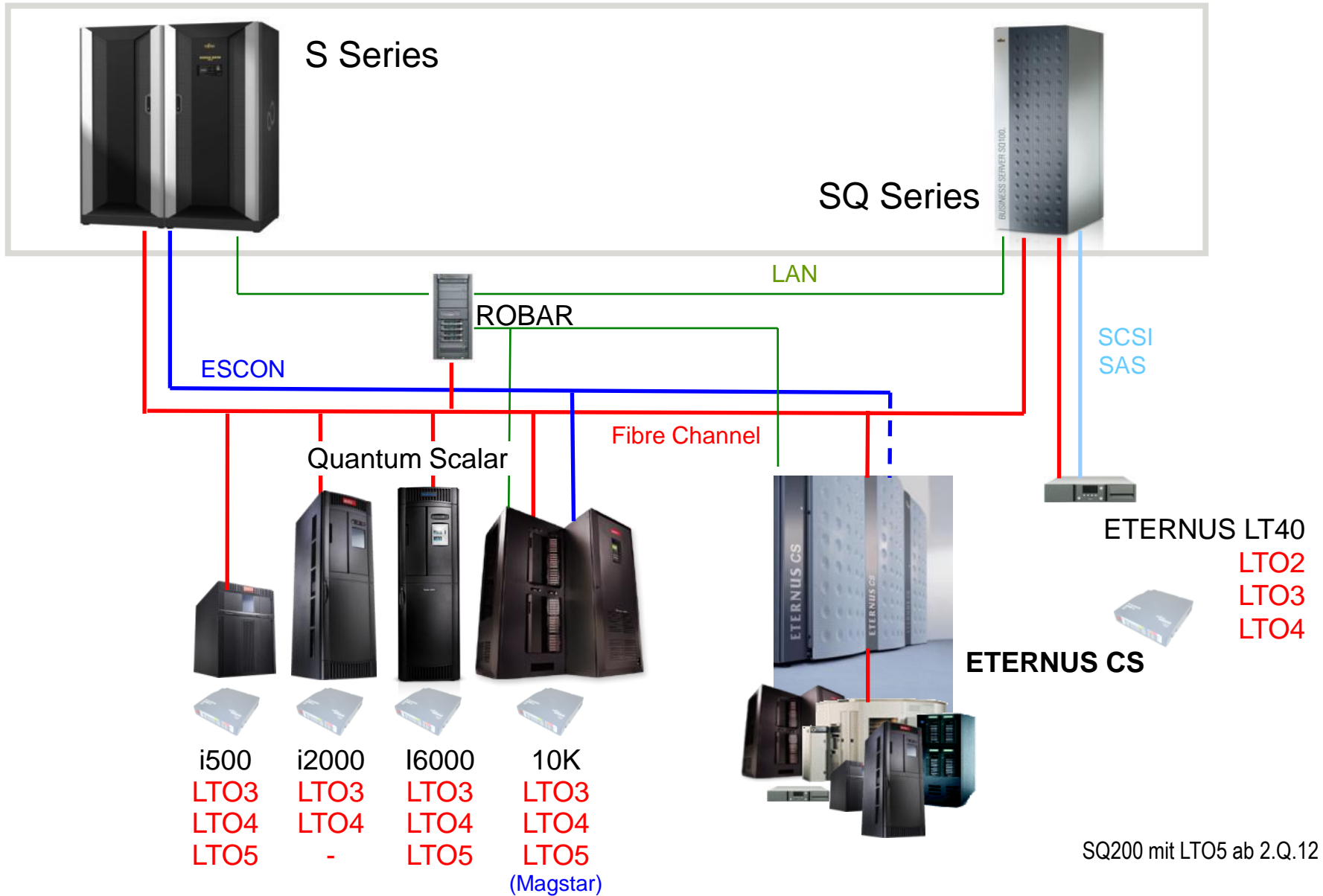
- **BS2000/OSD provide LTO technology with ETERNUS CS Model and directly to the FC channel Scalar archive systems**
 - S-Servers: ... S145/S180, S155/S190, S165/S200, **S175/S210**
 - SX-Servers: ... SX100, ... SX150, SX160
 - SQ-Server: SQ100, **SQ200**

- **Without data migration**
 - Operation of virtual volumes in the ETERNUS CS at Typ S Channel and FC with volume type “TAPE-C4”
 - identical internal volume format

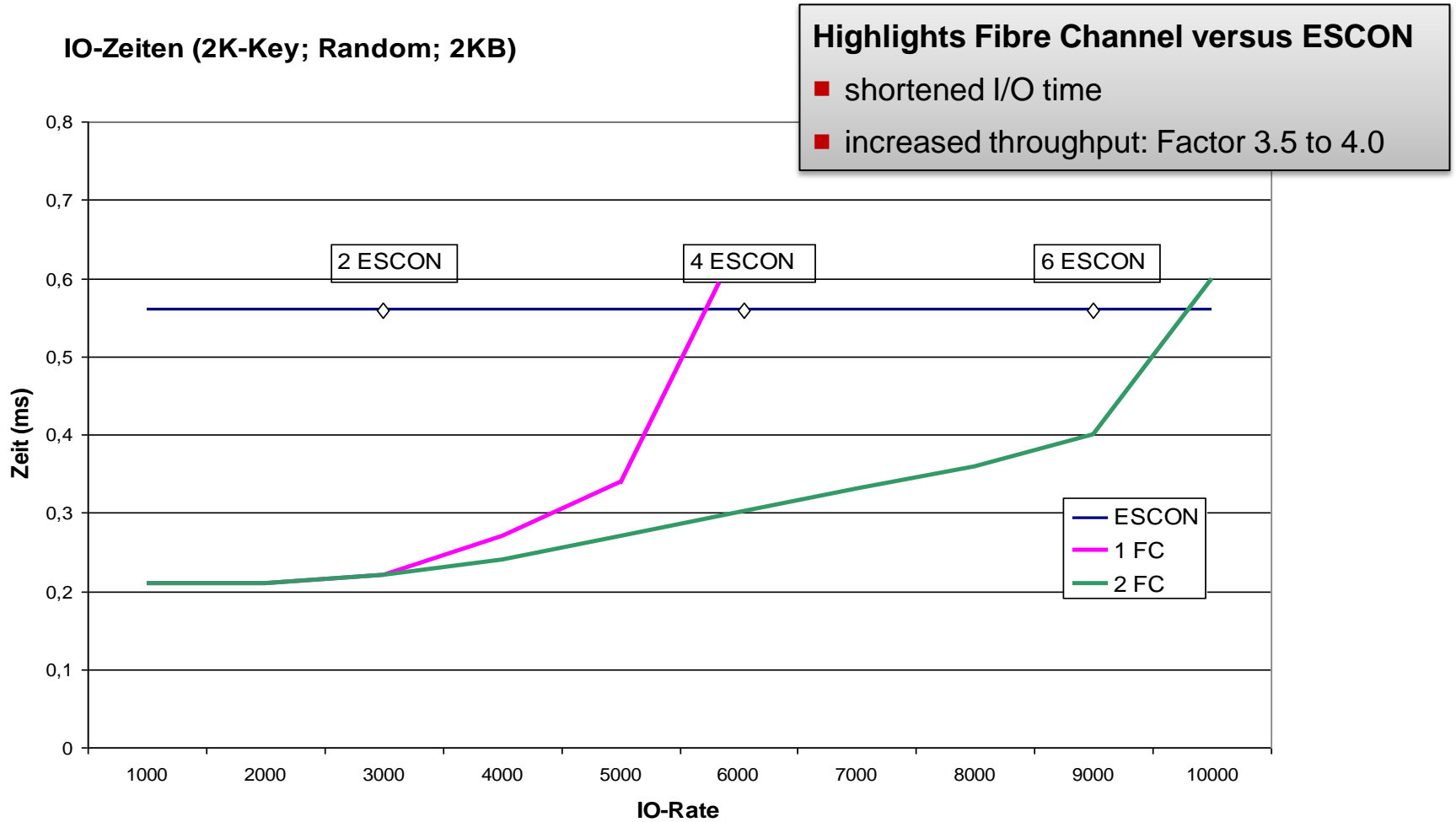
- **Requirement: from BS2000/OSD-BC V5.0C**



BS2000/OSD V8.0 Nearline peripherals



Scaling with 2 KB

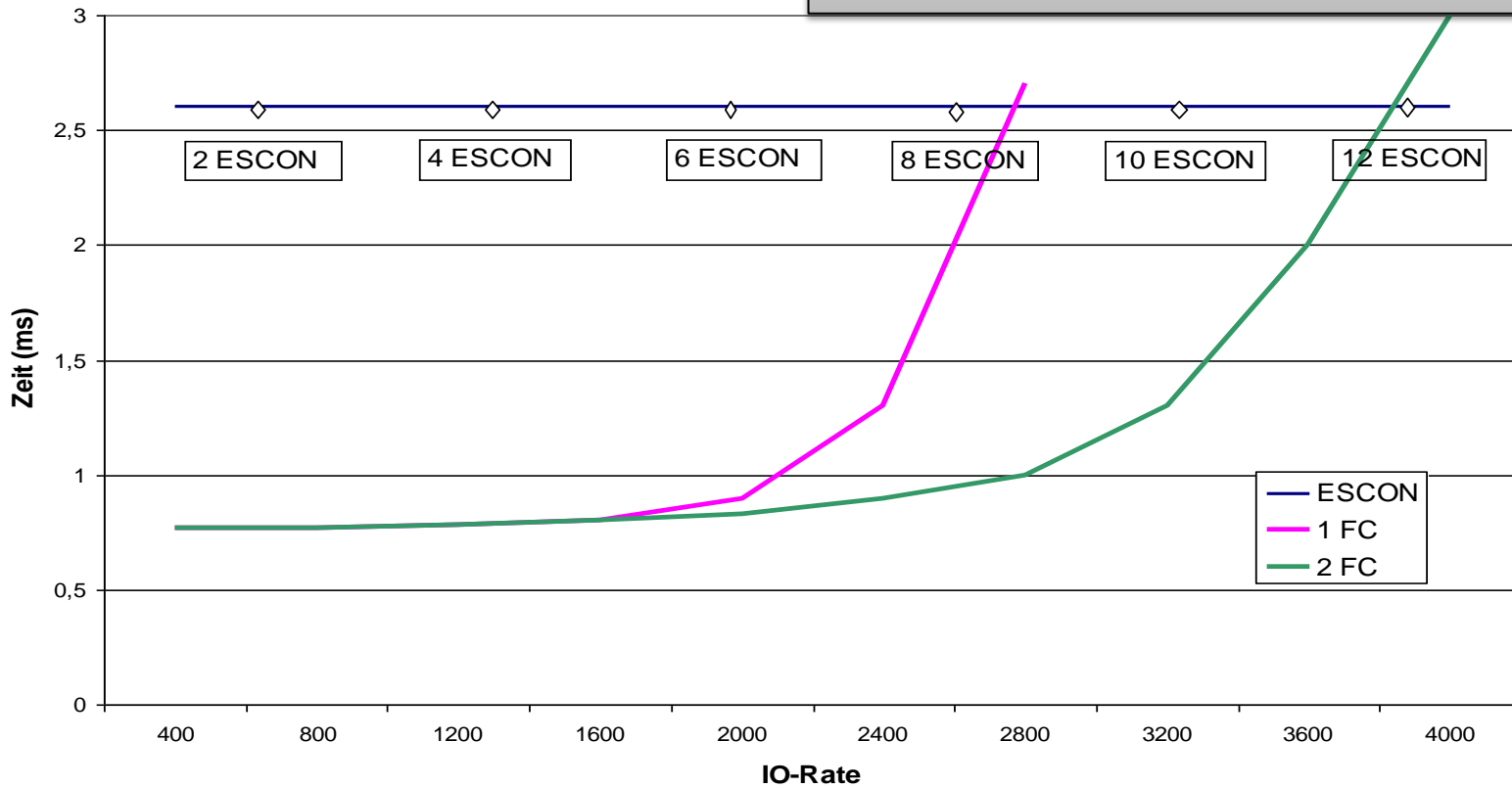


Scaling with 32 KB

Highlights Fibre Channel versus ESCON

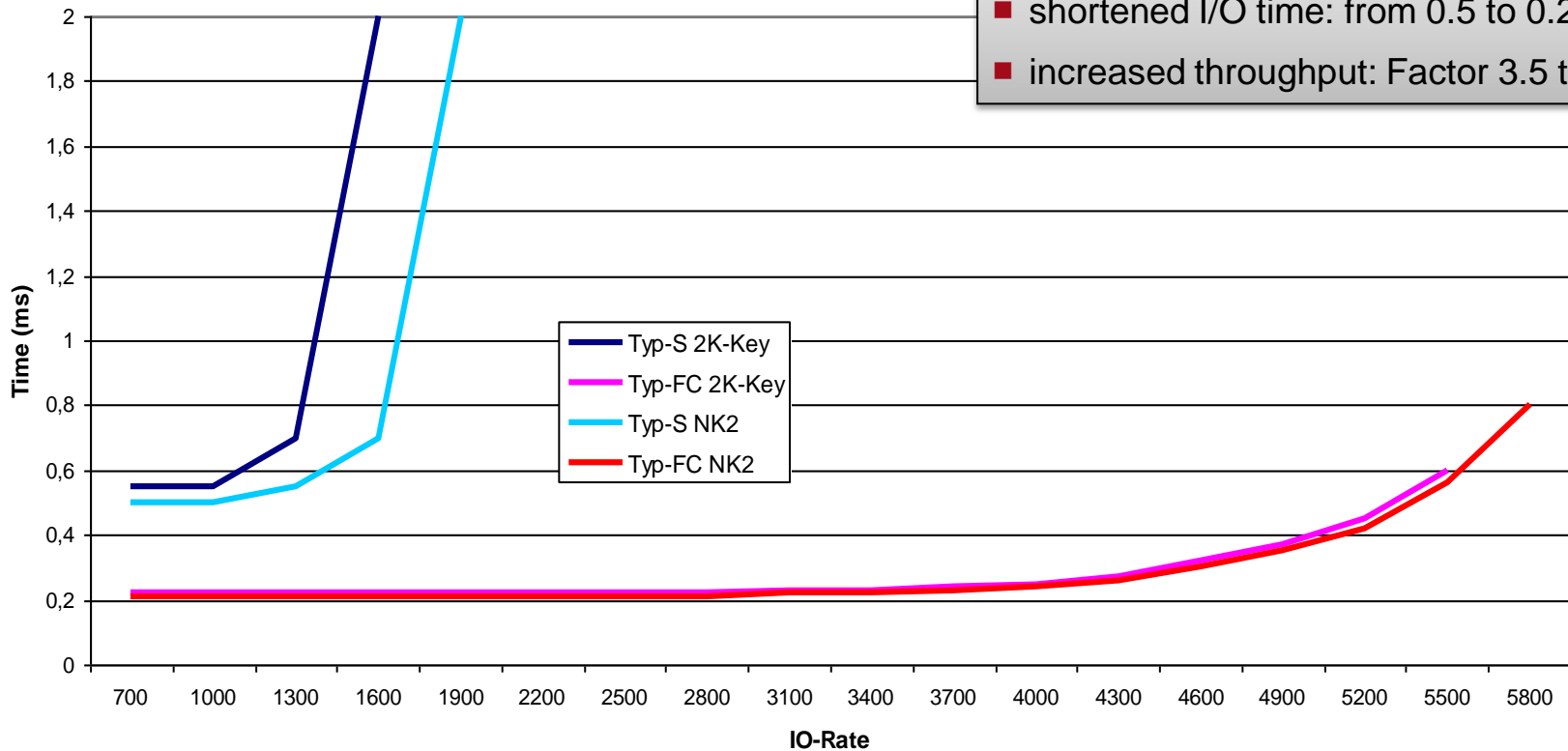
- shortened I/O time
- increased throughput: Factor 6 to 8, up to 96 MB/s

IO-Zeiten (NK2; Random; 32KB)



Scaling with 2 KB

Typ-FC vs Typ-S: 2 KB blocksize, 100 % Read Hit

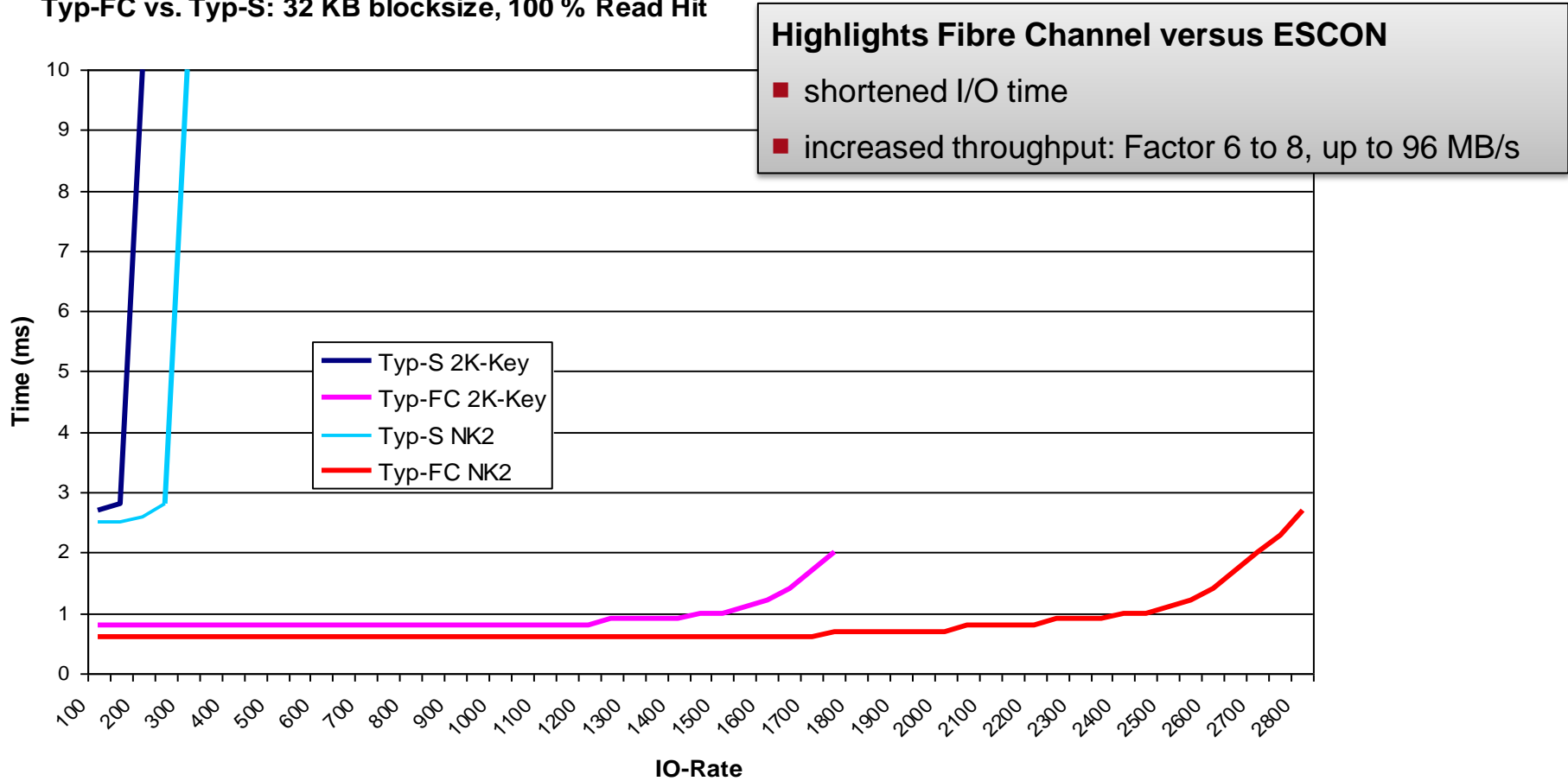


Highlights Fibre Channel versus ESCON

- shortened I/O time: from 0.5 to 0.2 ms
- increased throughput: Factor 3.5 to 4.0

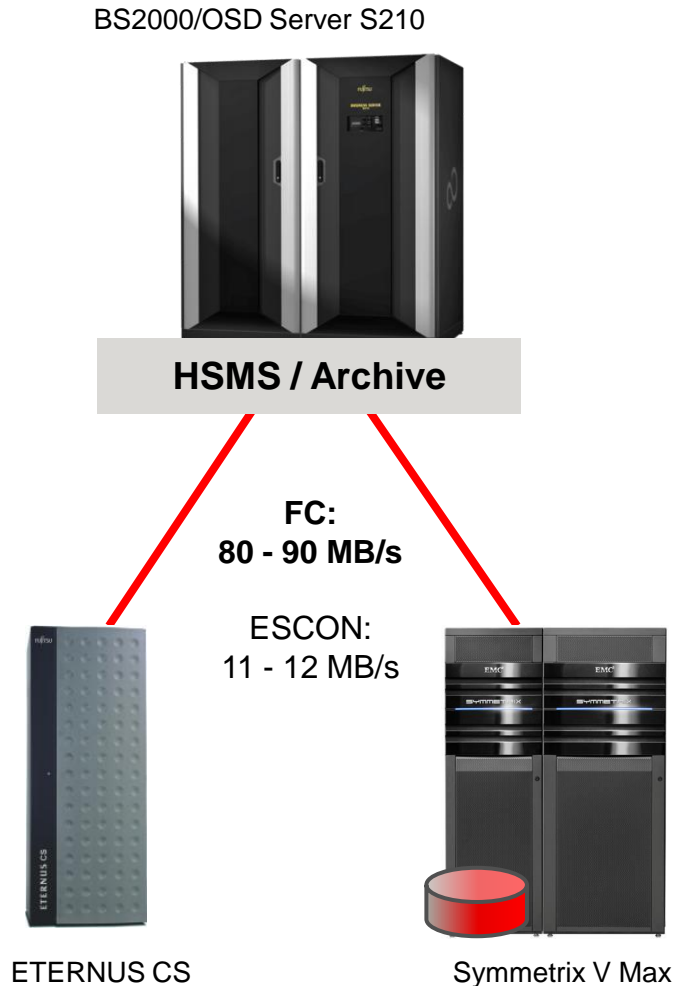
Scaling with 32 KB

Typ-FC vs. Typ-S: 32 KB blocksize, 100 % Read Hit




Value added of Fibre Channel technology

- For high volumes of data and tight backup times
 - Balanced system: Online / Nearline
 - For data backup, archiving and restore
- Benefit against ESCON
 - TP mode: up to factor 4
 - Restore / backup time: up to factor 7
- More performance with
 - Tuning measures in HSMS
 - Use of new LTO tape technology
 - Requests to use faster disk systems, the use of PAV (Parallel Access Volume)



Customer benefits:

- Integration into SAN environment and for SAN consolidation
 - Integration into existing installations - Mainframe, Unix system, Win
 - Distance up to 10 km (up to 100 km with repeaters)
- Improved performance and throughput for batch, OLTP and data backup
 - Large I/O bandwidth: measured data throughput up to 96 MB/s
 - Shorter disc storage I/O times: up to factor 3
 - Reduction backup time: up to factor 7
- Cost saving: fewer connections in the server and disk storage subsystem
 - one FC connection replaces approx. four ESCON connections
 - FBA saves up to 30% capacity in the disk storage subsystem compared to CKD



FUJITSU