

Data Storage World - Tokyo

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SAN Technology Update

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Board of Directors of the following industry associations:

Blade Server Alliance (BSA)

Fibre Channel Industry Association (FCIA)

Storage Networking Industry Association (SNIA)

SCSI Trade Association (STA)

Fiber Channel Update

Fibre Channel Still Dominates SAN

More Than 95% SANs Use FC

More Than 90% Fortune 1000
Companies Use FC SAN

Focus Now On Growth in SMB Markets

Faster, Less Expensive, and More
Flexible than ever!

- Some companies sampling now
- Most companies sampling Q1CY05
- Expect rapid deployment
 - Backward compatible to 1GFC and 2GFC
 - Similar cost to 2GFC (slight premium initially)

■ FCIA Industry Plugfest

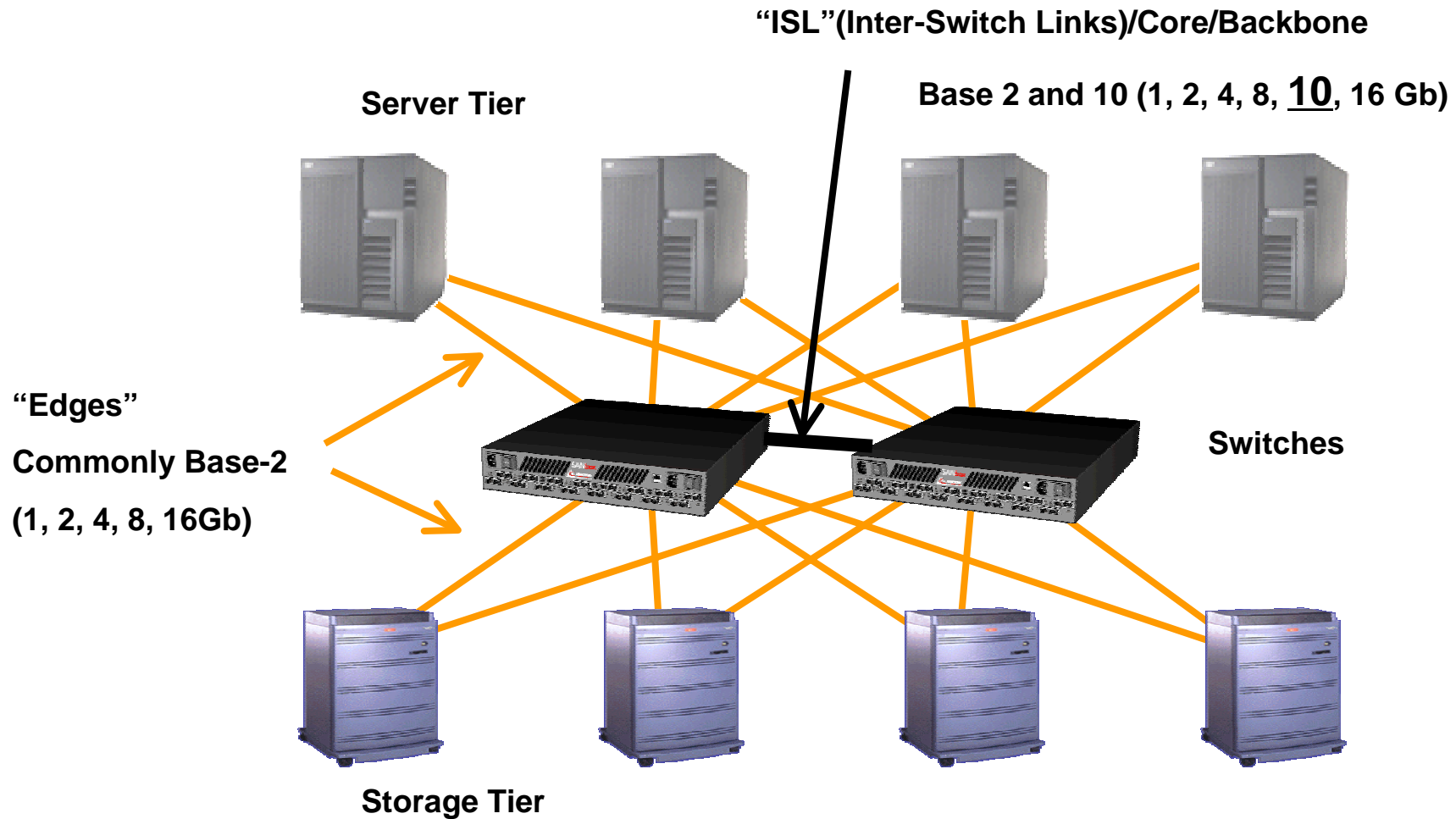
- January 10 – 14, 2005
- UNH (University of New Hampshire)
- First time FC plugfest occurs BEFORE production!
 - Ensures Interoperability BEFORE mass adoption
- Virtually everyone that has 4G will be there!



- **Massive industry support for 8G**
 - Unanimous vote in favor of 8G
- **8G will have same features as 4G**
 - Similar cost to 4GFC
 - Backward compatible to 4G and 2G
- **Intense focus by 8G Standards Body (T11.2)**
 - All other T11.2 projects virtually complete
 - T11.2 free to spend their time on 8G
- **Technical study very positive**
 - No new technology for 8GFC
 - Leverages all 4GFC technology
 - Target date for spec technical stability by end of 2005
- **Anticipate initial fabric sampling 2006/2007**

- Not backward compatible with anything
- Still too expensive for “edge” adoption
- High-speed core backbone ISL is the only niche for 10G
 - ISL application is low volume
 - Small volumes keep 10G price high
- Industry activities underline 10G problems
 - 802.3 voted down 2.5GE proposal
 - Ethernet is stuck with high \$\$, non-backward compatible 10G
 - 802.3 working on CAT6 10G Ethernet copper variants (2007)
- FC already has 10G copper variant, but no demand
 - Enterprise and high-end SMB SAN demand optics, not copper
- FC solved above 10G issues with 4G and 8G
 - 4GFC and 8GFC similar cost to 2GFC
 - 4GFC and 8GFC backward compatible two generations

Fibre Channel SAN



Fibre Channel Speed Roadmap



Base2*

Product Naming	Throughput (MBps)	Line Rate (GBaud)†	T11 Spec Technically Completed (Year)‡	Market Availability (Year)‡
1GFC	200	1.0625	1996	1997
2GFC	400	2.125	2000	2001
4GFC	800	4.25	2003	2005
8GFC	1600	8.5	2006	2008
16GFC	3200	17	2009	2011
32GFC	6400	34	2012	Market Demand
64GFC	12800	68	2016	Market Demand
128GFC	25600	136	2020	Market Demand

Base10**

10GFC	2400	10.52	2003	2004
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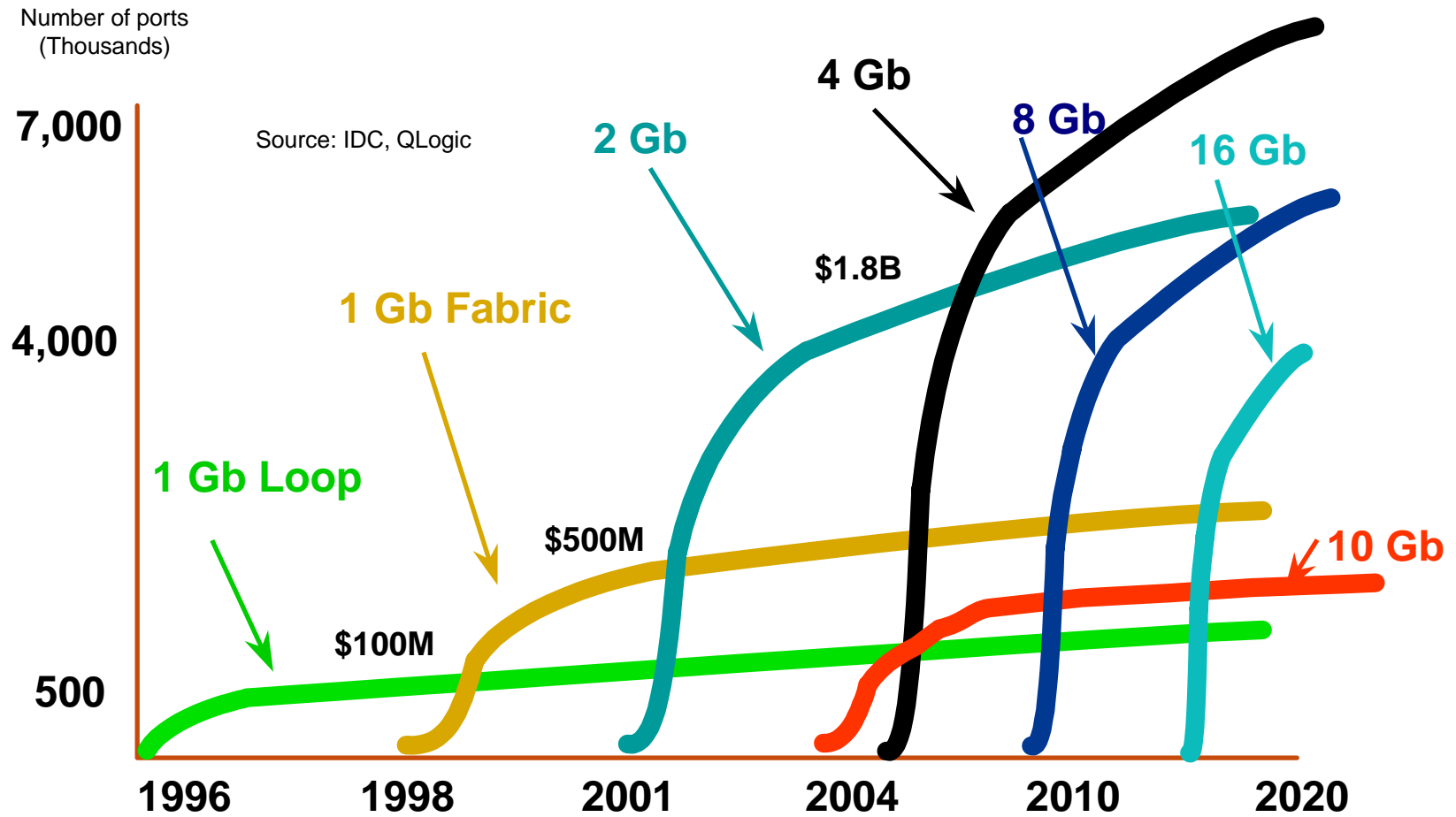
***Base2** used throughout all applications for Fibre Channel infrastructure and devices. Each speed maintains backward compatibility at least two previous generations (I.e., 4GFC backward compatible to 2GFC and 1GFC)

****Base10** commonly used for ISLs, core connections, and other high speed applications demanding maximum bandwidth

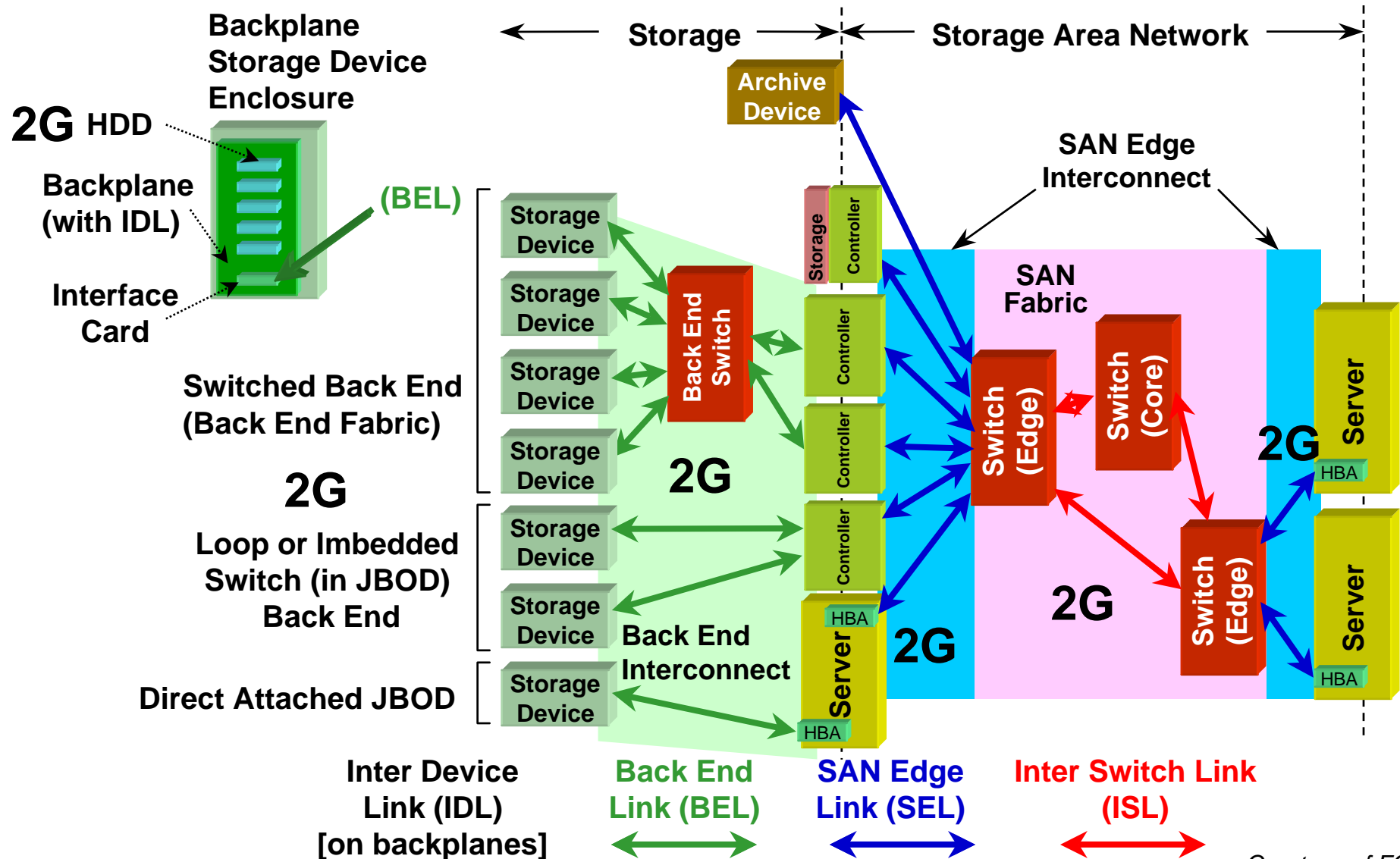
†**Line Rate**: All speeds are single-lane serial stream

‡**Dates**: Future dates estimated

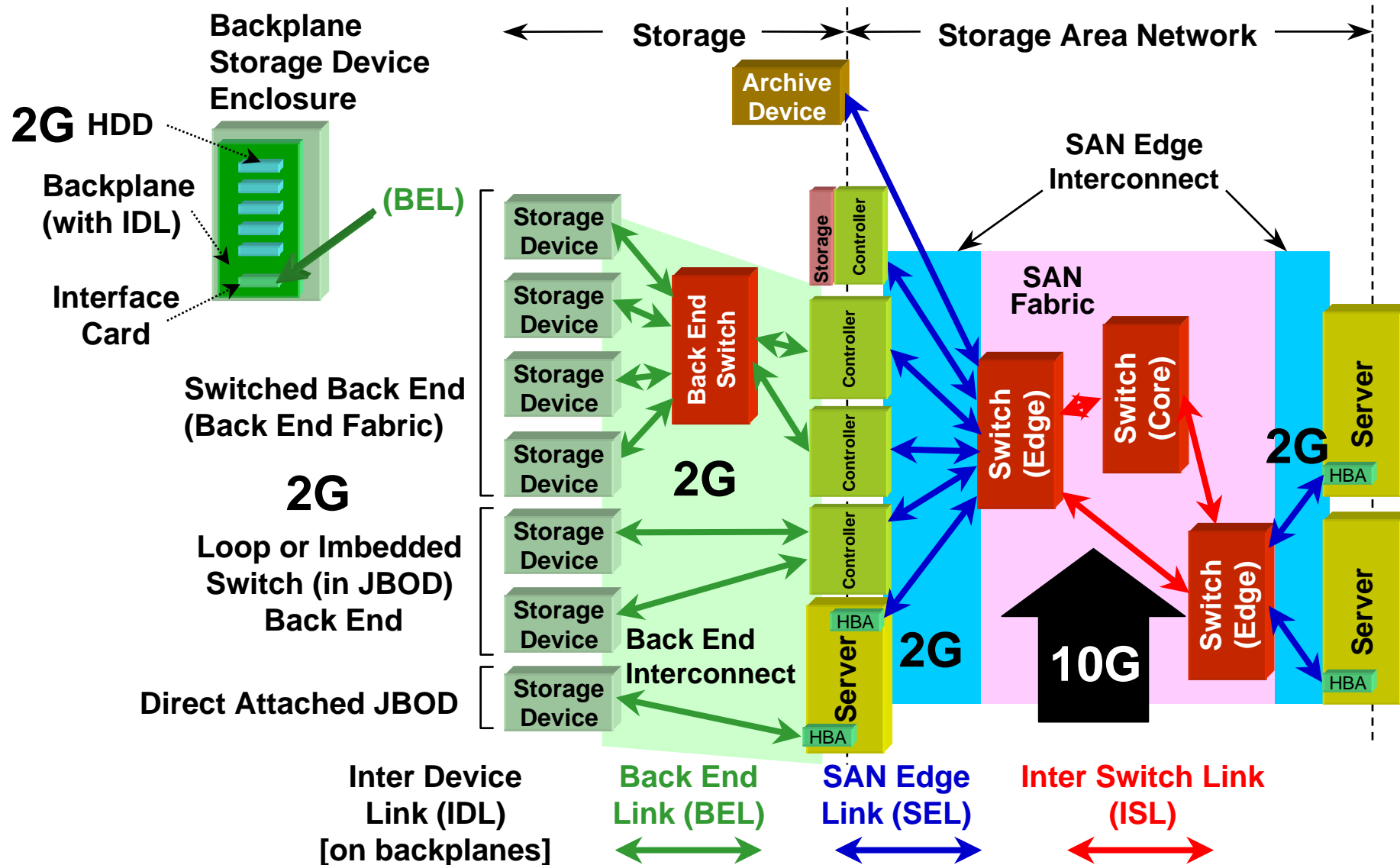
Fibre Channel Technology Waves



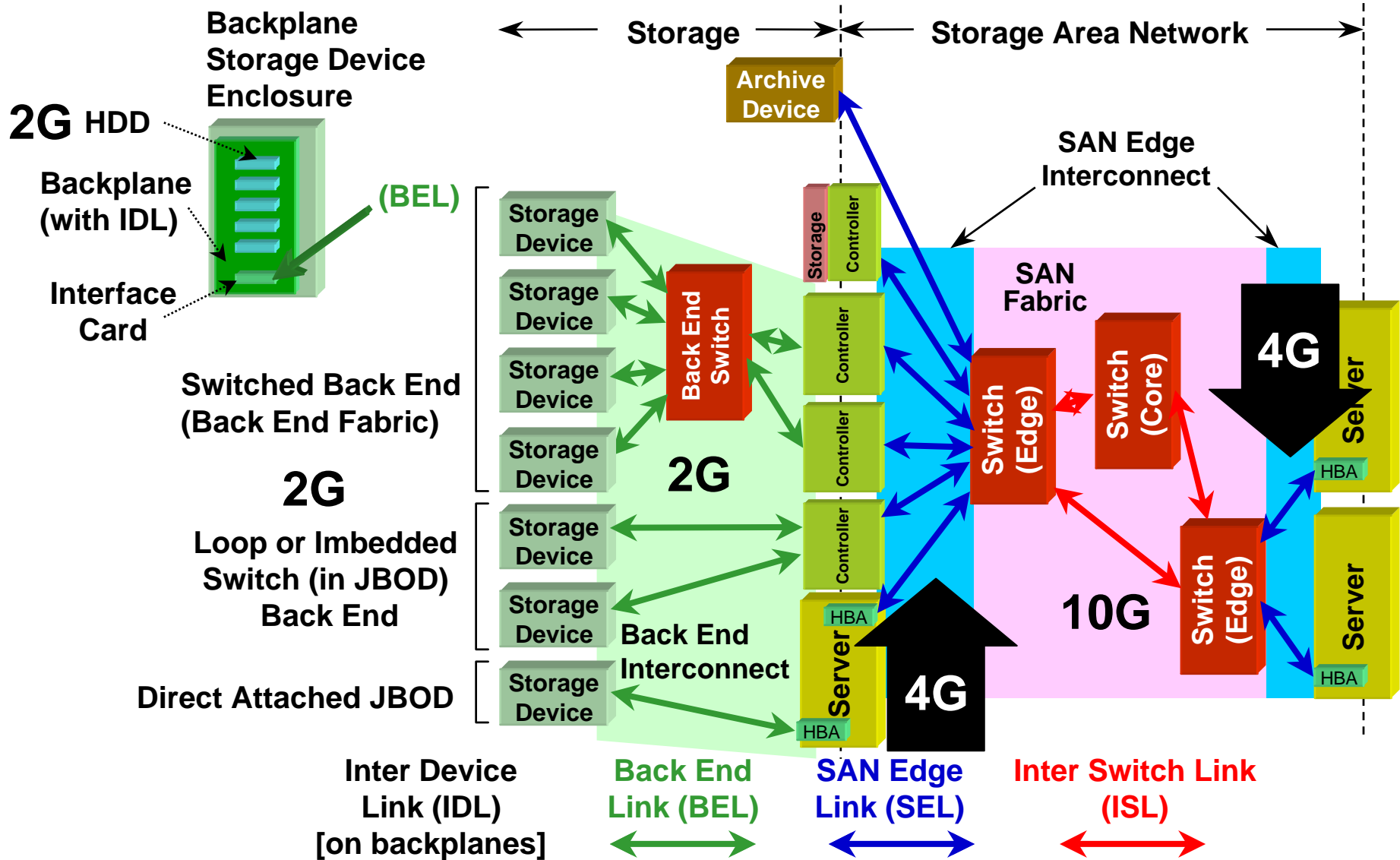
Speed Migration Example



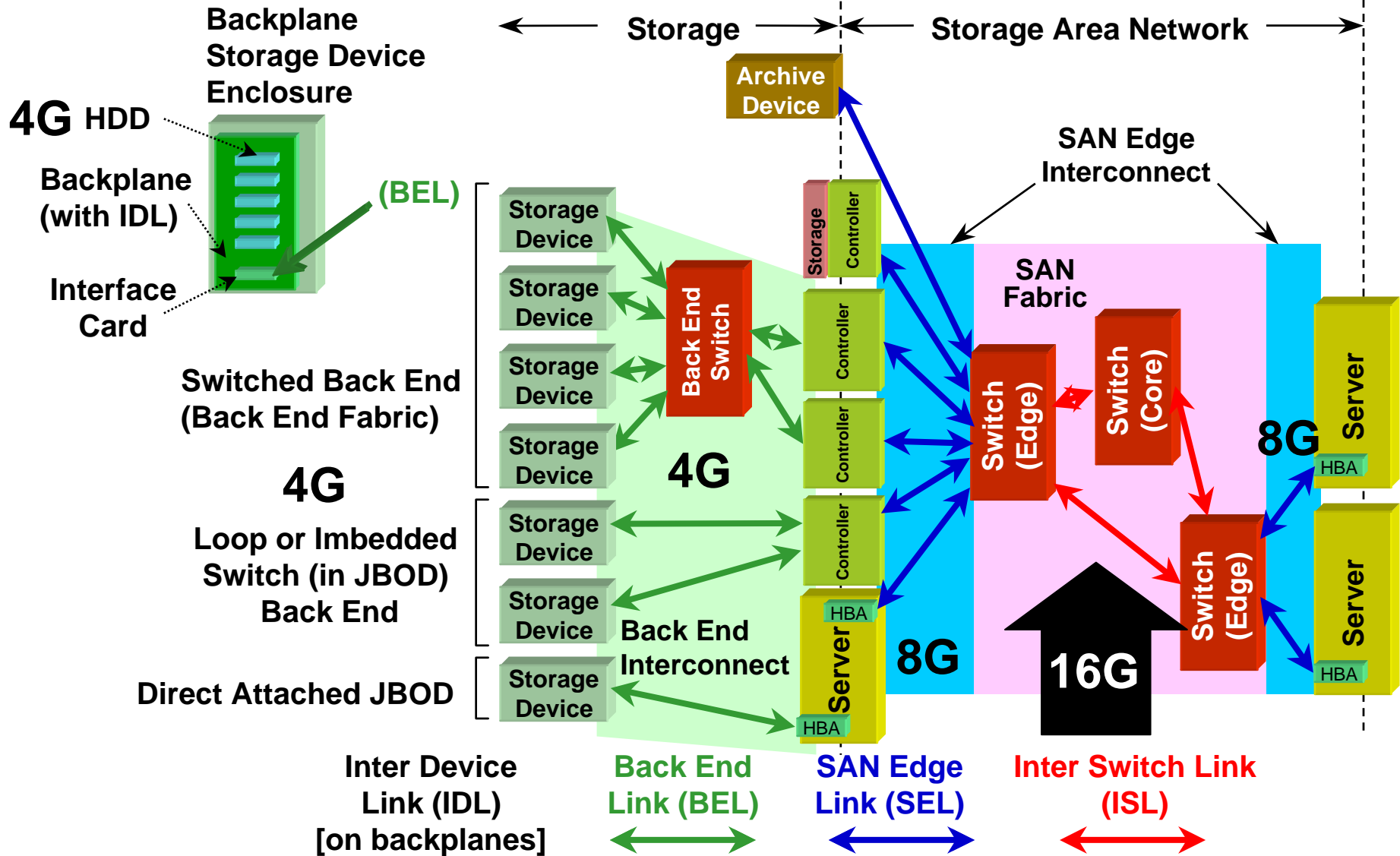
Speed Migration Example



Speed Migration Example



Speed Migration Example

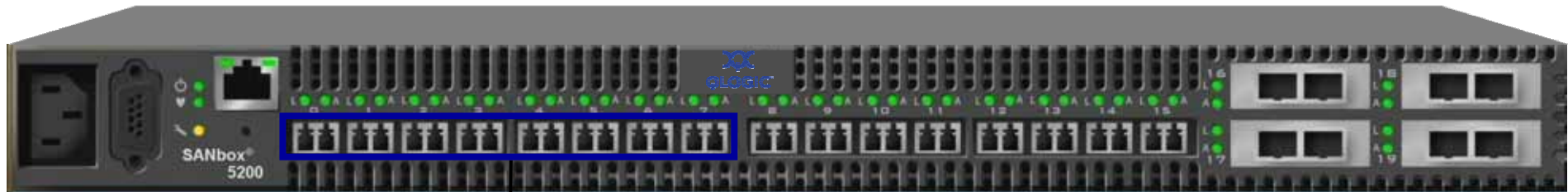


Courtesy of FCIA

Speed Migration Product Example

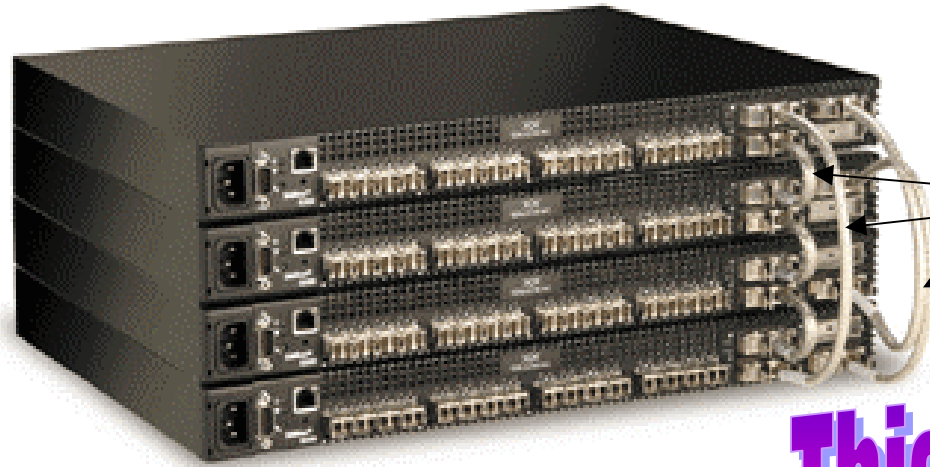


This is in use TODAY



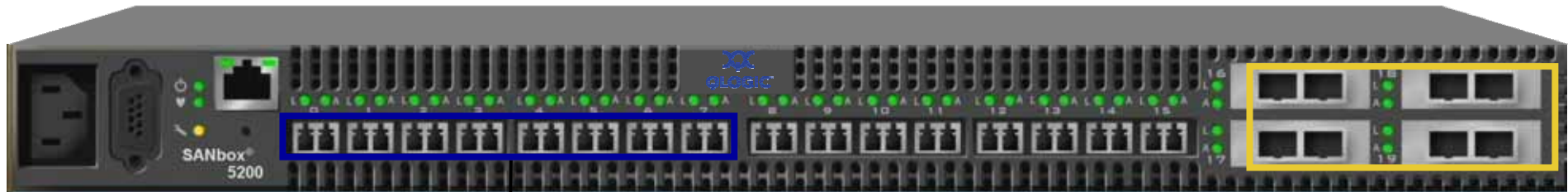
Initial 8 2Gb ports

Speed Migration Product Example



10Gb ISLs

This is in use TODAY!

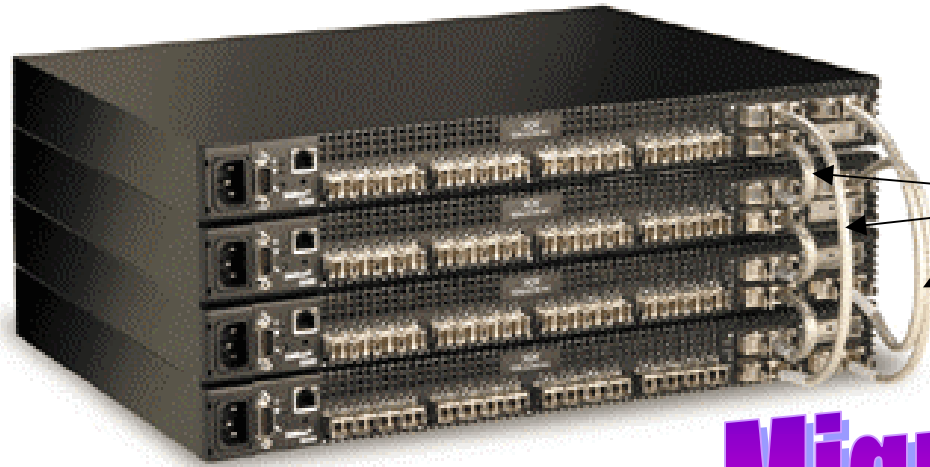


Initial 8 2Gb ports

Four 10Gb ports

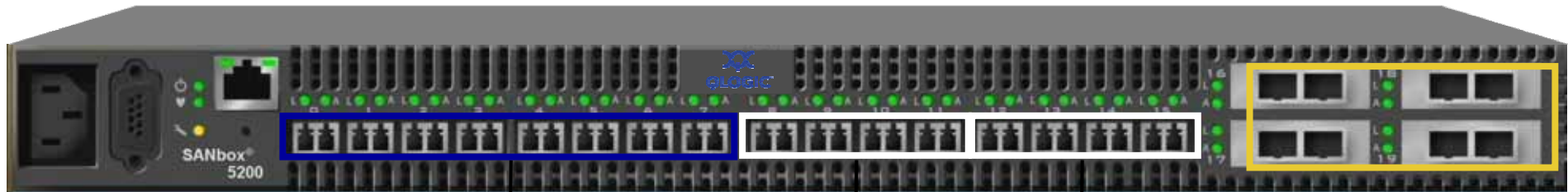


Speed Migration Product Example



10Gb ISLs

Migrates to 4Gb/s

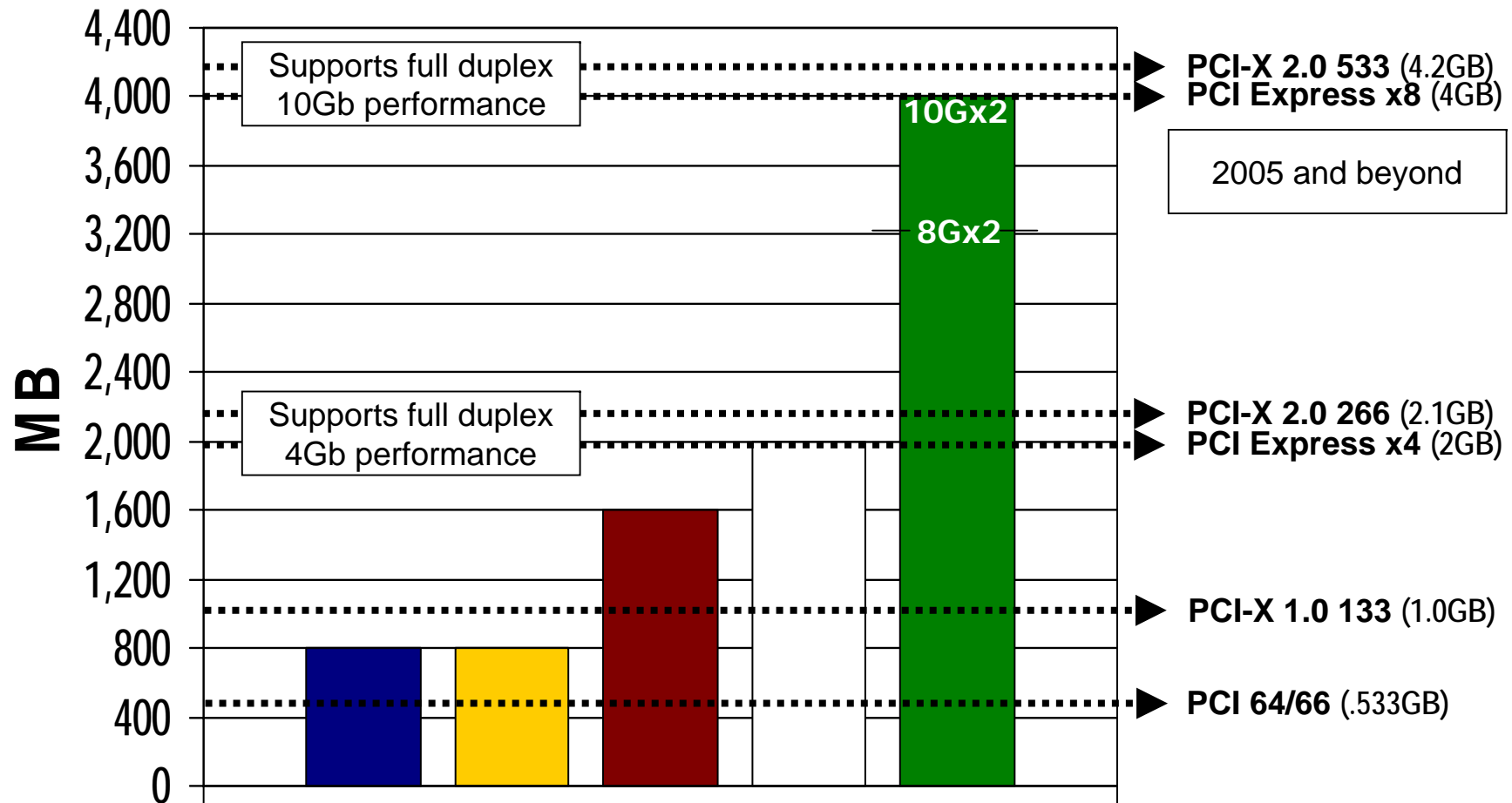


Initial 8 2Gb ports

8 4Gb port upgrades

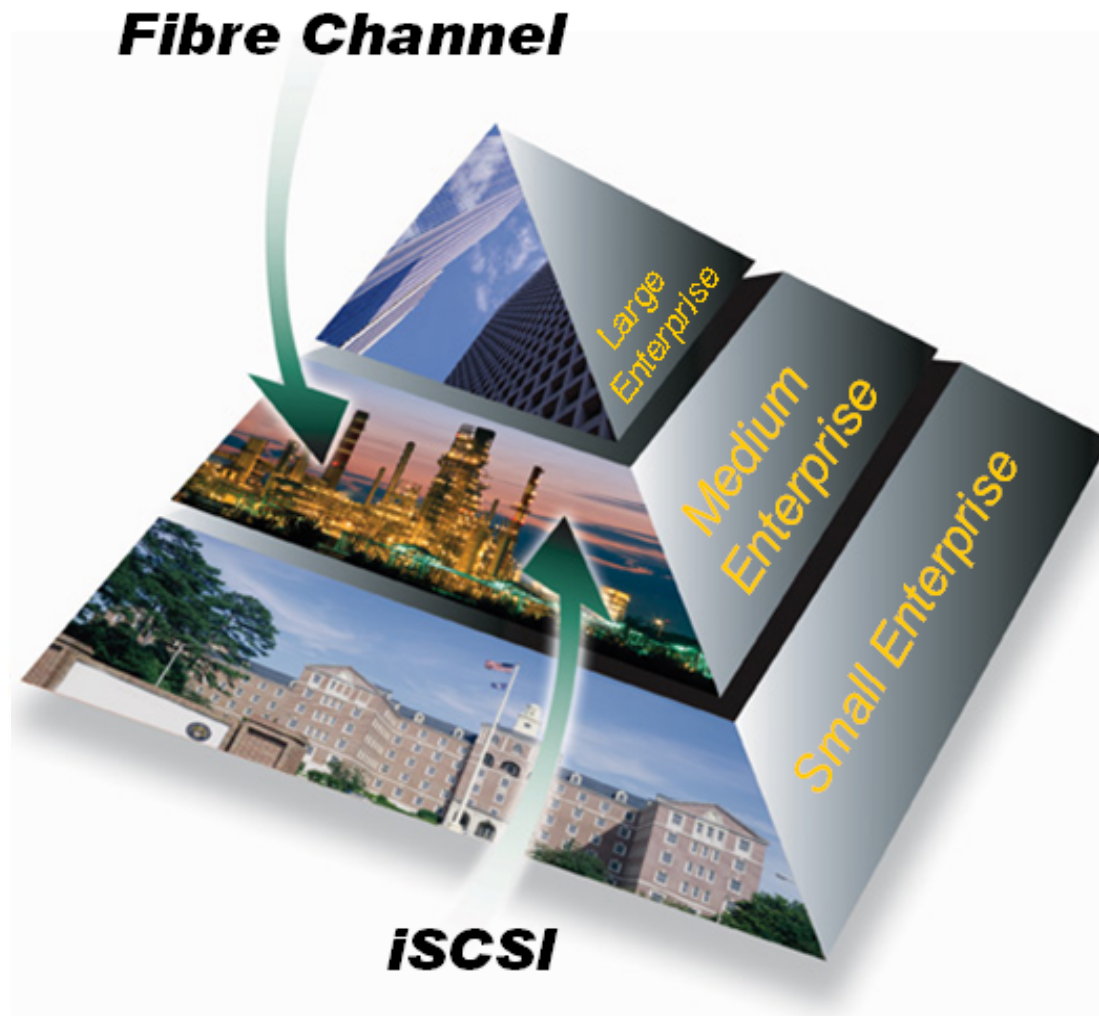
Four 10Gb ports

FC Speed and Server Bus Adoption



Full Duplex FC Interfaces

■ 2Gb x2 ■ 4Gb x1 ■ 4Gb x2 & 8Gb x1 □ 10Gb x1 ■ 8 & 10Gb x2



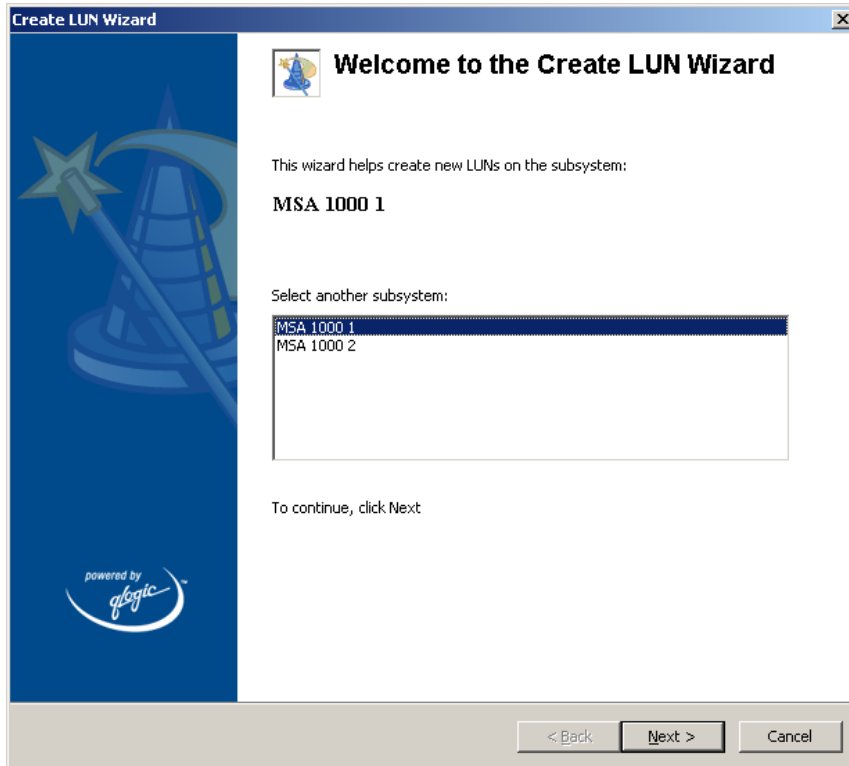
- Fibre Channel
- Faster FC Speeds
 - 10GFC Inter-Switch Links (ISL)
 - 4GFC 2005 fabric and disk
 - 8GFC 2006/7 fabric
- Faster PCI
 - PCI-X 2.0 (2.1GB/s) 2005
 - PCI-E 2005 (500MB/s per lane)
- Higher IOPS
- More Features
 - Virtualization, SMI, FAIS
 - Increased RAS, HA failover, FC-SP
 - Maintenance, alarms
 - Diagnostics



- Fibre Channel and iSCSI
 - FC at mid to high-end SMB
 - iSCSI at low to midrange SMB
- Plug and play ease of use
- Lower cost
- Reduce complexity
- Simplified software
- Windows Server 2003
- Blade servers
- sATA, FATA



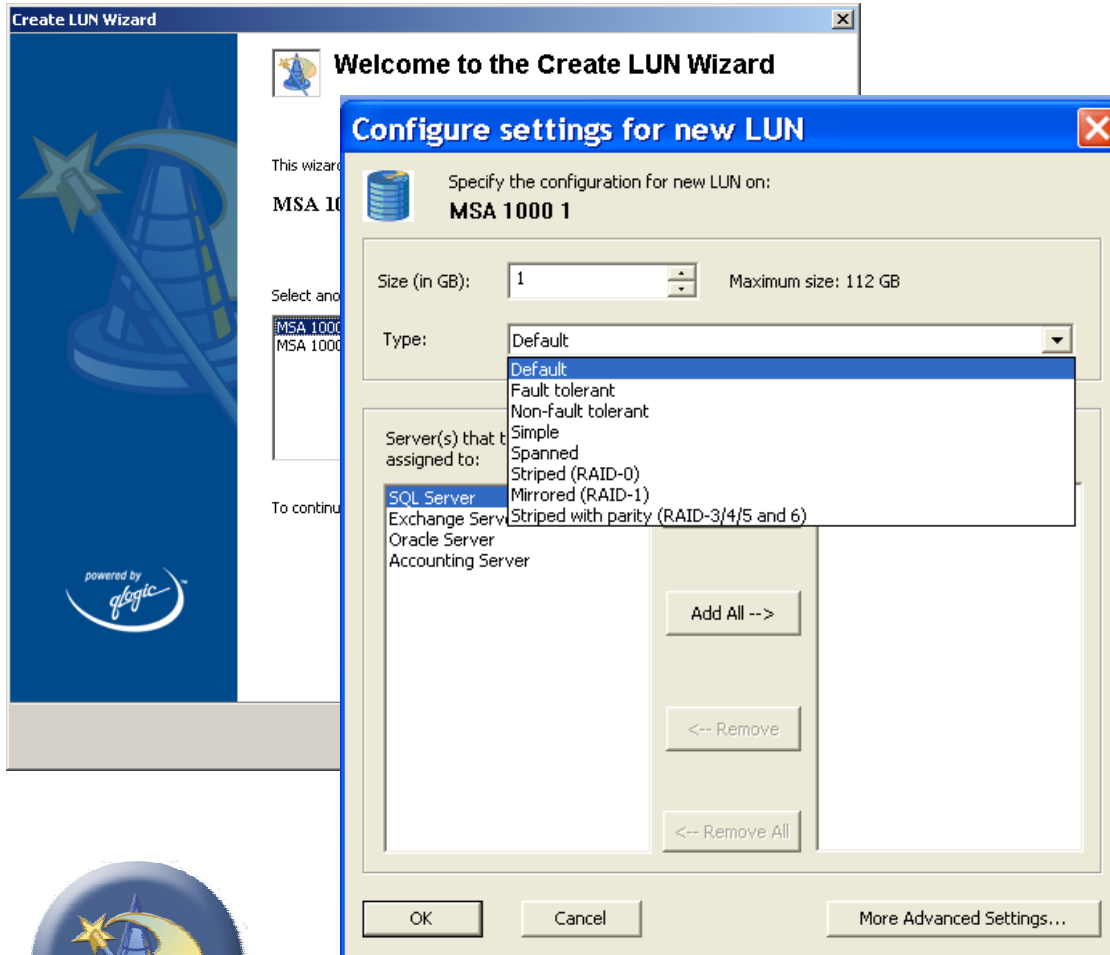
Four Easy Steps for SMB SAN!



1. Select the storage system



Four Easy Steps for SMB SAN!



2. Select the attributes



Four Easy Steps for SMB SAN!



3. Assign to a server



Four Easy Steps for SMB SAN!



The screenshot displays the 'Create LUN Wizard' software interface with four overlapping windows:

- Welcome to the Create LUN Wizard:** The main window showing the wizard's progress and a list of servers to be assigned to the LUN.
- Configure settings for new LUN (top):** Shows configuration for 'MSA 1000 1' with a size of 1 GB and a type of 'Default'. The 'Server(s) that the LUN is assigned to:' list includes SQL Server, Exchange Server, Oracle Server, and Accounting Server.
- Configure settings for new LUN (middle):** Shows configuration for 'MSA 1000 1' with a size of 7 GB and a type of 'Striped (RAID-0)'. The 'Server(s) that the LUN is assigned to:' list includes SQL Server, Oracle Server, and Accounting Server.
- Completing the Create LUN Wizard:** Shows the final summary for 'MSA 1000 1' with a size of 7 GB and a type of 'Striped (RAID-0)'. It includes a warning: 'WARNING: LUN creation may take a long time'.

The 'Completing the Create LUN Wizard' window features a table with the following data:

Size	Type
7 GB	Striped (RAID-0)

4. Click Finish - Done!

Closing Thoughts



- **SMB Fibre Channel SAN activity**
- **4Gb Fibre Channel ramps 2005**
- **8Gb Fibre Channel standards 2005**
- **10G available now for high-speed ISL cores**
- **PCI Express, PCI-X 2.0 2005**
- **It's all about software – SANsurfer®**



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