Channel Model Requirements for Ethernet Backplanes in Blade Servers

Backplane Ethernet Task Force
IEEE P802.3ap

Long Beach, CA

May 24 – 27, 2004

Co-Sponsors

Nitish Amin	Vitesse
Uri Elzur	Broadcom
Gopal Hegde	Intel
Ganga Ilango	Intel
David Koenen	HP
David Kruse	Broadcom
Jeff Lynch	IBM
Lee Sendelbach	IBM
Nick van Bavel	Vitesse

Outline

1. Current 802.3ap Objectives
2. General Blade Server Requirements
3. Blade Server Market Projections
4. Typical Blade Server Architectural Configuration
5. Trace Scenario with Daughter Card
   - 3 Connectors, 33” of improved FR-4
6. Proposed Worst Case Backplane Channel Model
7. Recommendation

Current IEEE 802.3ap Objectives

- Preserve the 802.3/Ethernet frame format at the MAC Client service interface
- Preserve min. and max. frame size of current 802.3 Std.
- Support existing media independent interfaces
- Support operation over a single lane across 2 connectors over copper traces on improved FR-4 for links consistent with lengths up to at least 1m
  - Define a 1 Gb/s PHY
  - Define a 10 Gb/s PHY
- Consider Auto-negotiation
- Support BER of 10^-12 or better
- Meet CISPR/FCC Class A

[Last Updated March 22, 2004]

General Blade Server Requirements

1. A “standard” to allow system integration of Blade Server Components (Server, Backplanes, Switches) from different vendors.

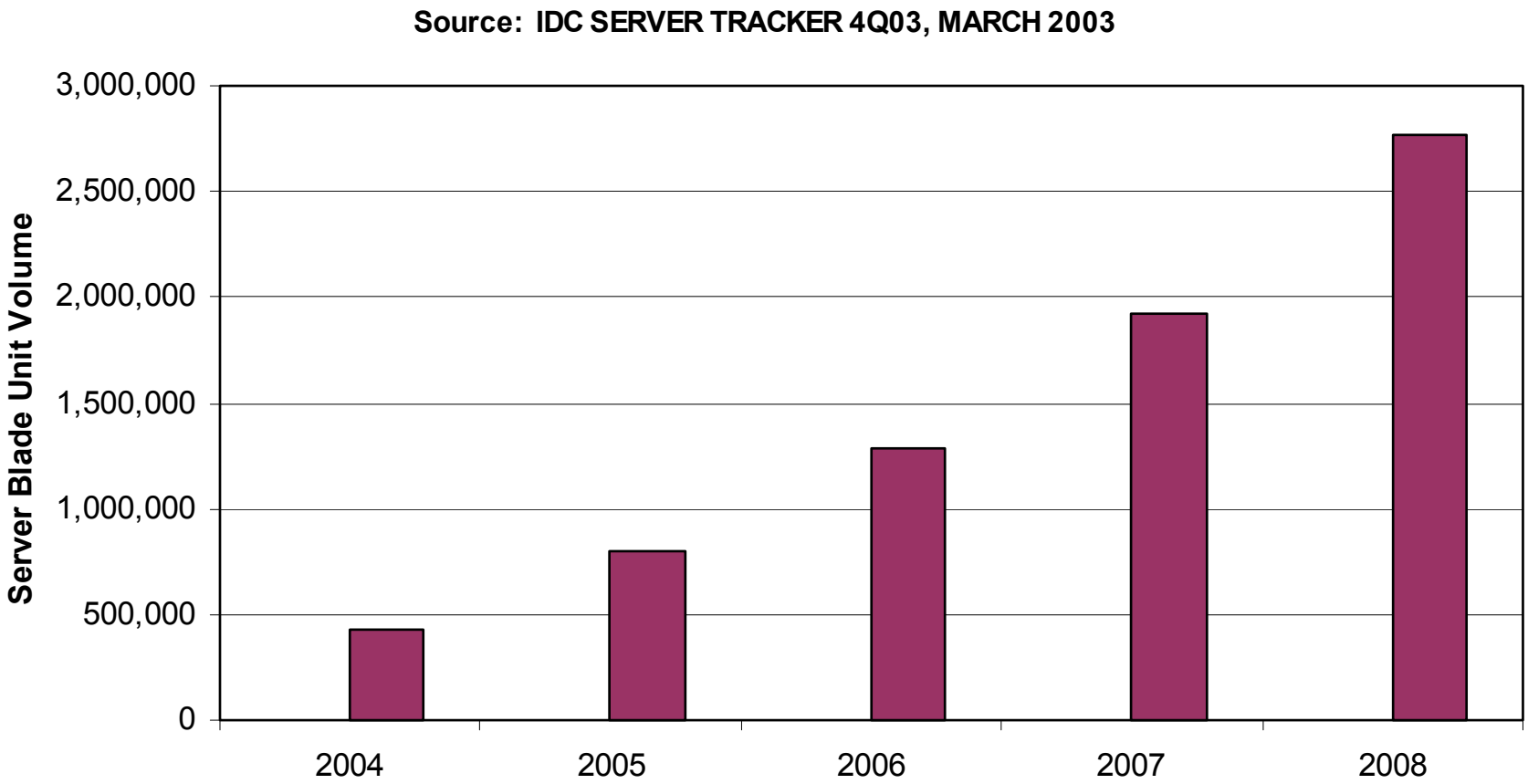
2. Long life cycles for infrastructure components: Chassis, Backplane, and Switches.

3. Need to future proof blade infrastructure (backplane & switches) to support next Speed bump/technology.

4. Minimize Ethernet infrastructure costs of Server Blade Enclosures, Switches and Servers

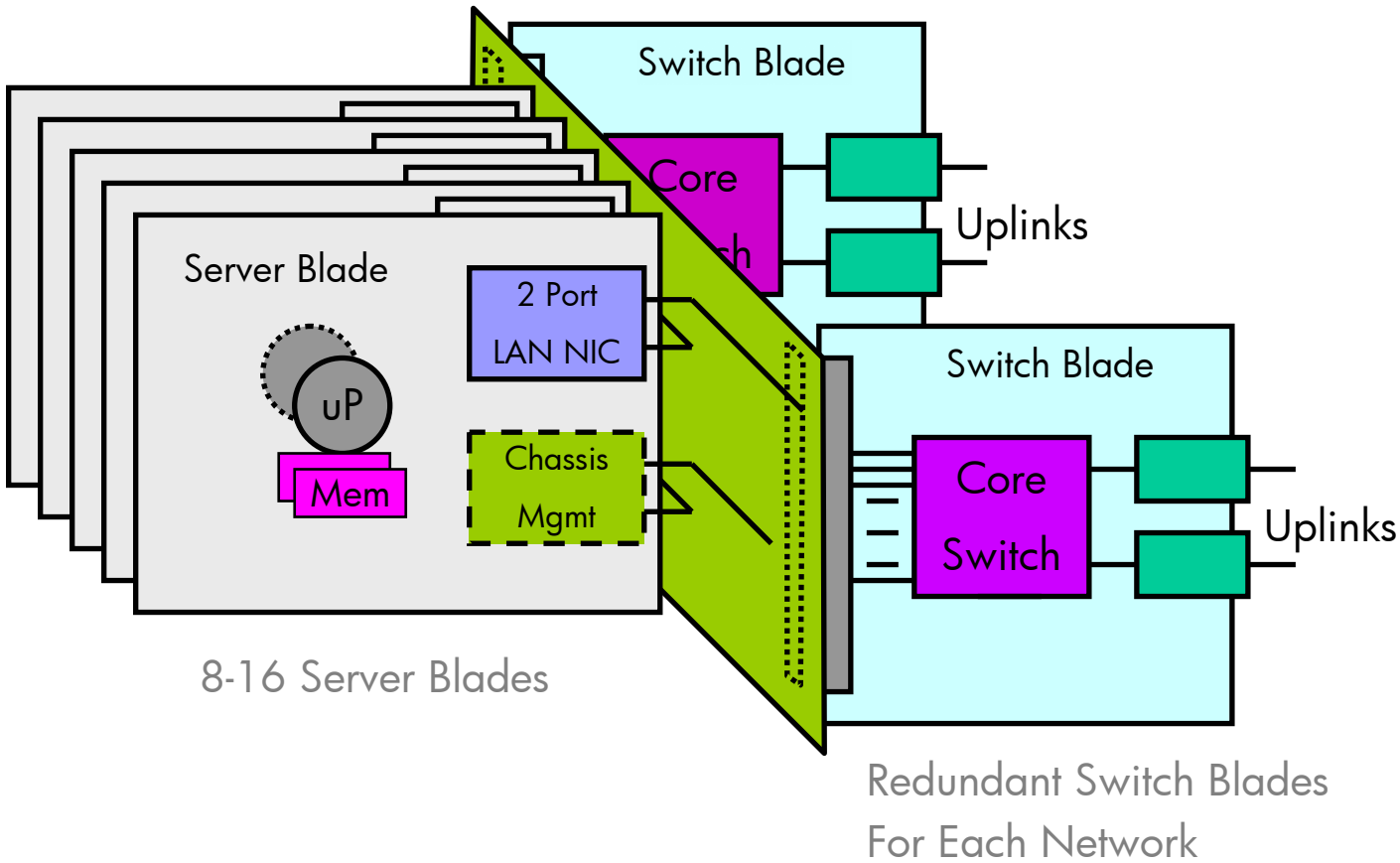
5. Provide Server Blade NIC upgrade option to match customer’s Cost / Performance needs for I/O Bandwidth demands.

Blade Server Market Projections



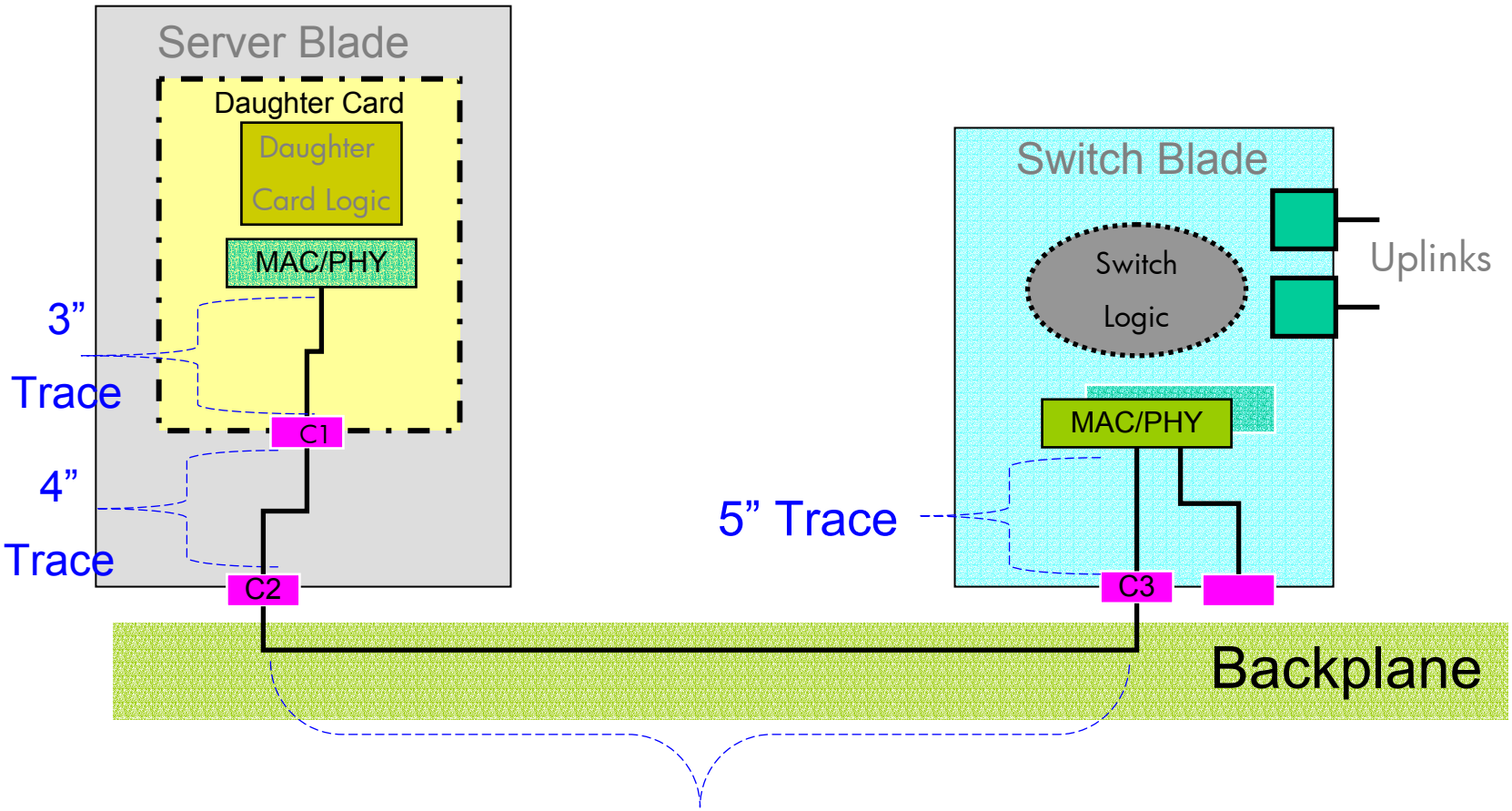
Assume 2 NIC ports and 2 Switch ports per Server Blade.

Server Blade & Switch Architecture



Typical configuration includes a daughter card on the Server Blades

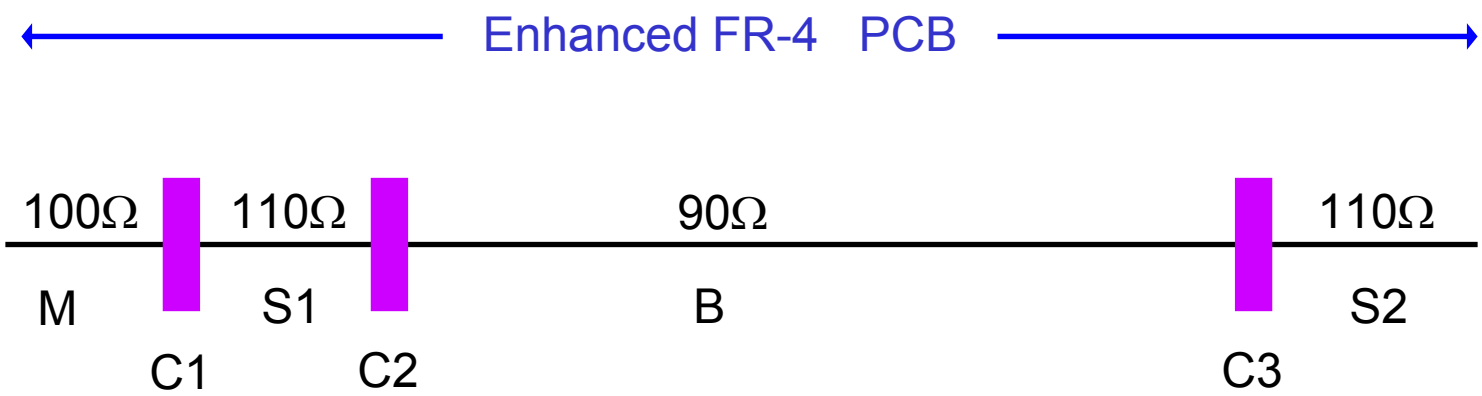
Trace Scenario with Daughter Card



Total Trace Length with 3 connectors = 33"

Proposed Worst Case Channel Model

PCB Differential Signal Trace Impedance = 100Ω +/- 10%



M = 3″
S1 = 4″
B = 21″
S2 = 5″

C2 & C3 = Thru-hole Backplane Connector

Recommendation

- Modify the existing objectives to support 3 connectors
  - Support operation over a single lane across **3** connectors over copper traces on improved FR-4 for links consistent with lengths up to at least 33”