

Modular Platforms – Market Trends & Platform Requirements

Presentation for IEEE Backplane Ethernet Study Group Meeting

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Outline

- Market Trends
- Business Case
- Blade Server Architectures and challenges
- Future Requirements
- Summary

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Modular Platform Industry Trends

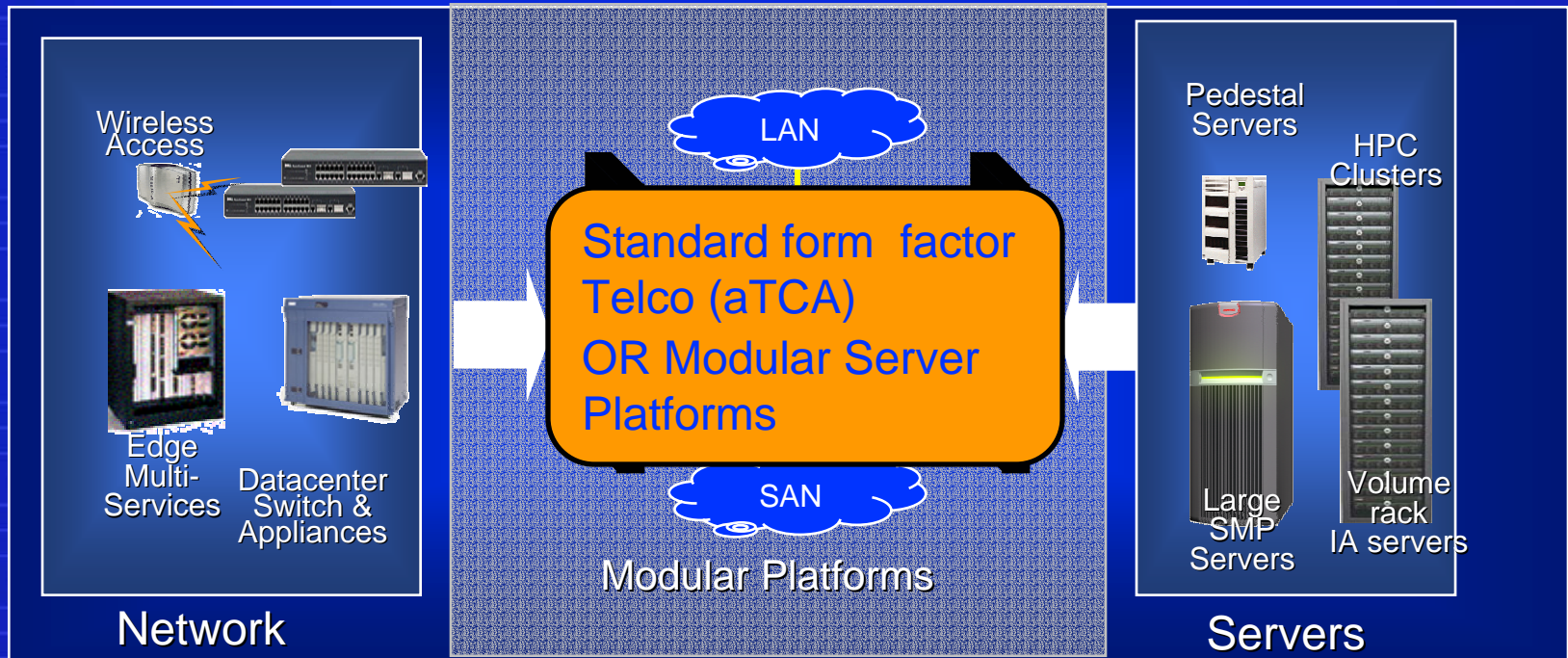
IO Density

Compute Density

Access, Edge & Infrastructure Services

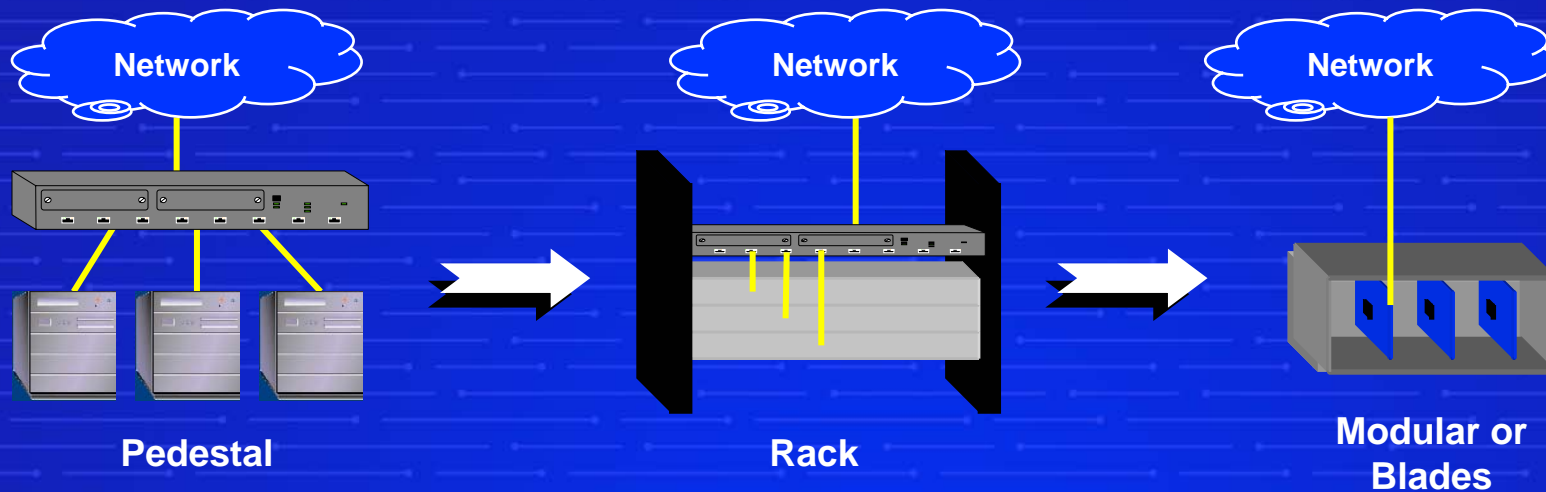
Application and Data Services

Enterprise / Data Center
Carrier (CO-NEBS)



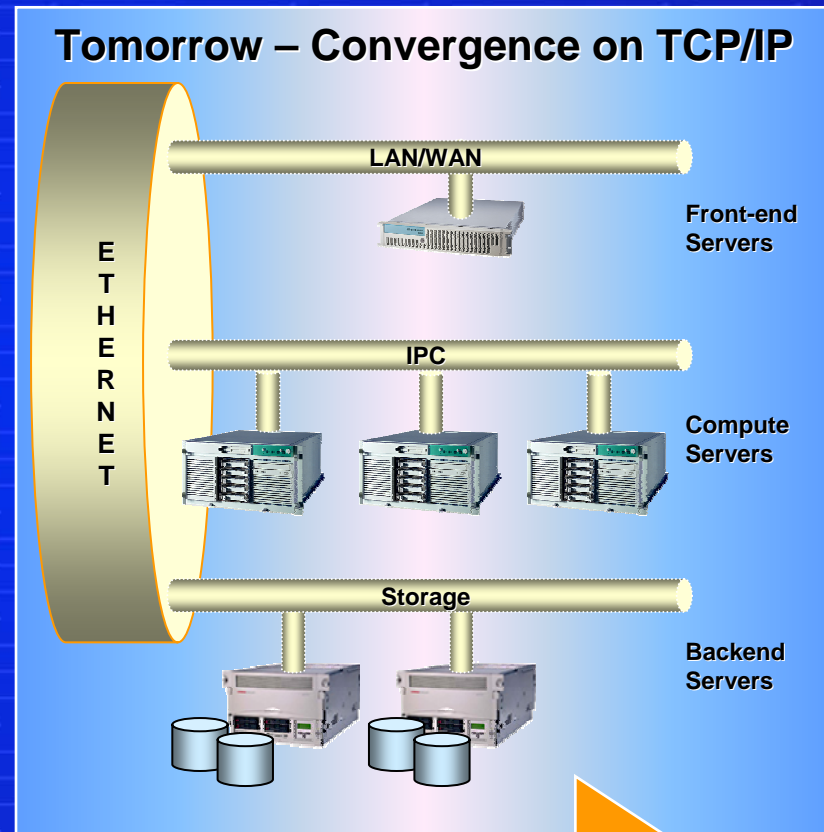
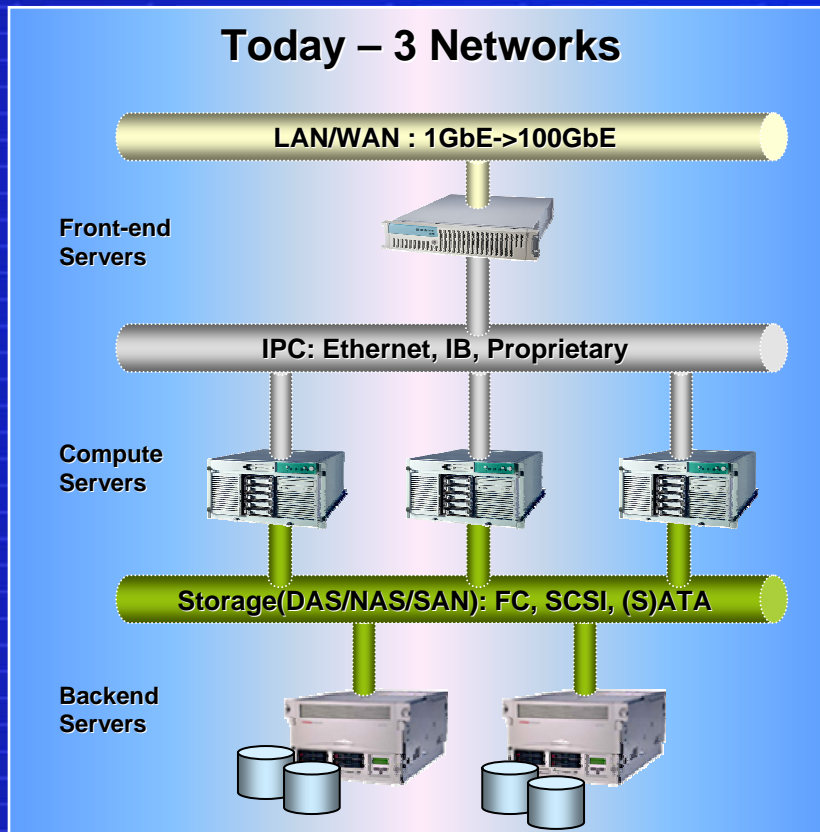
- Ethernet has been the default backplane of choice for modular platforms

Server Trends: Consolidation



- Well suited for Application and Web servers
- Key Drivers: Lower TCO
 - Reliability, availability, serviceability and manageability
 - Optimization of cost, density and cabling plant
 - Integrated and simplified management
 - Manage varying power requirements of compute, storage and network

IP Convergence in the Data Centers



Evolving Ethernet price-performance erodes advantages of other interconnect solutions



Modular Data Center -- Product Positioning

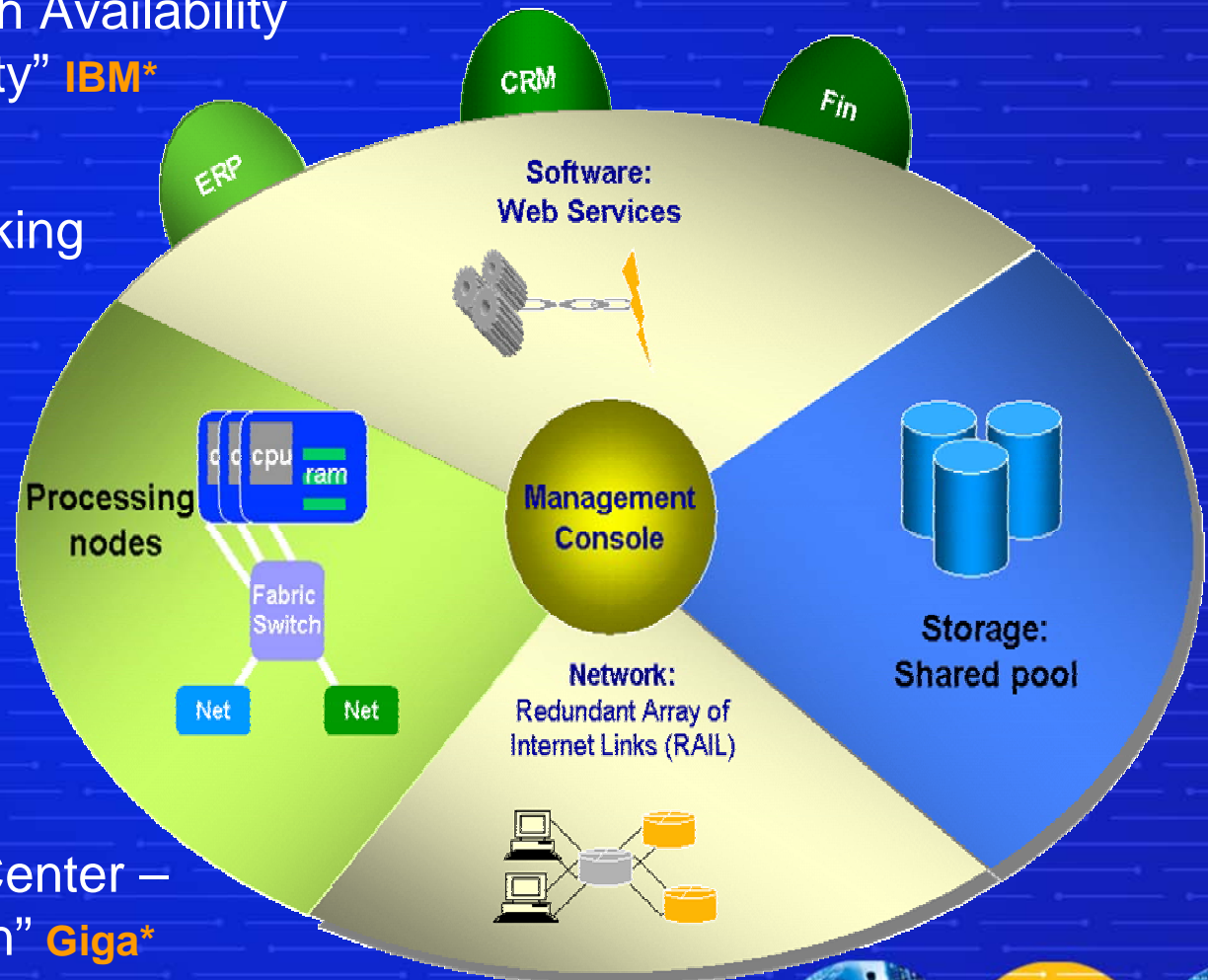
“Modular Scalability, High Availability and Ease of Serviceability” **IBM***

“Blade servers market taking off like a rocket” **HP***

“N1 Virtualization” **Sun***

“Distributed Systems Initiative” **Microsoft***

“The Future of the Data Center – Modularity & Virtualization” **Giga***



Forrester Organic Model, 2002



Intel in Communications

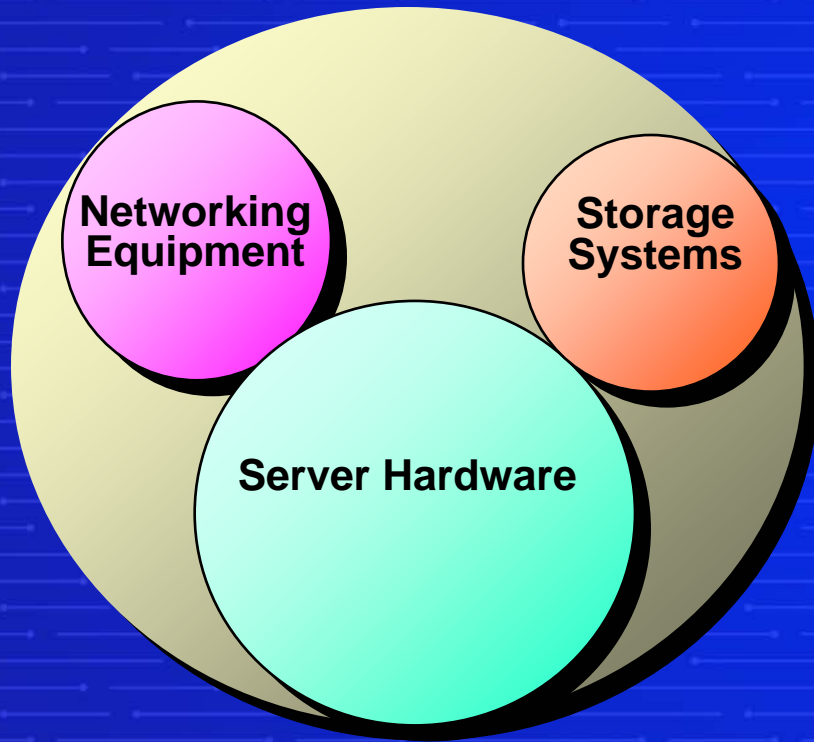
* Other names and brands may be claimed as the property of others

Outline

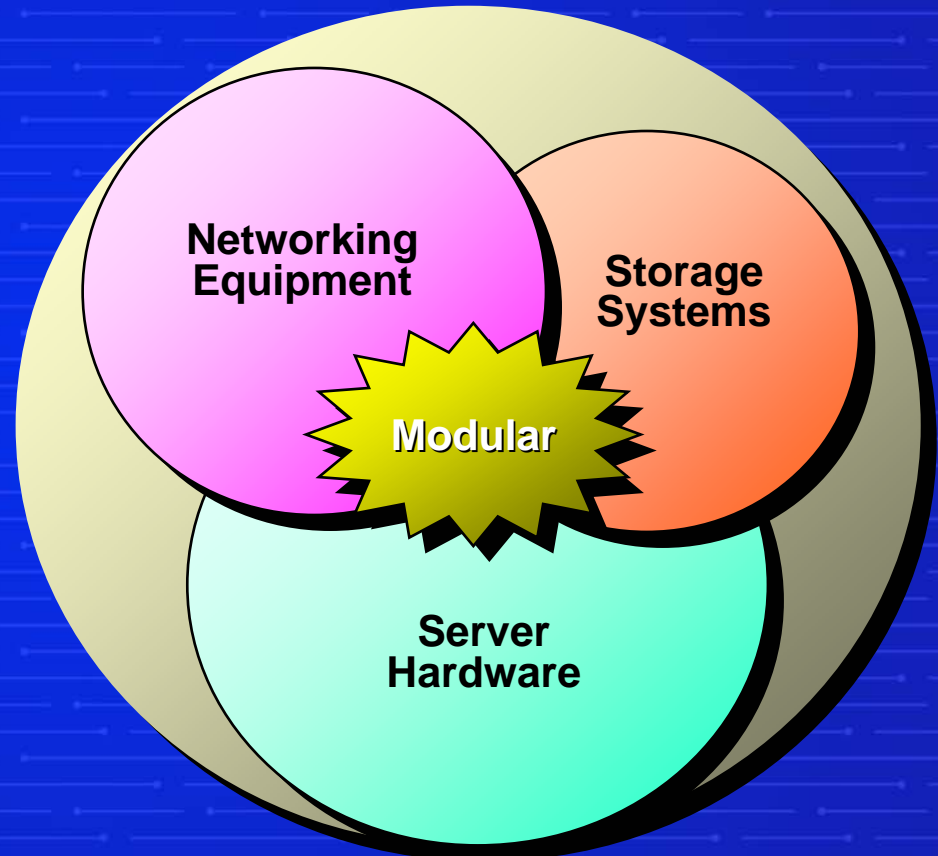
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The “New Enterprise”

2000

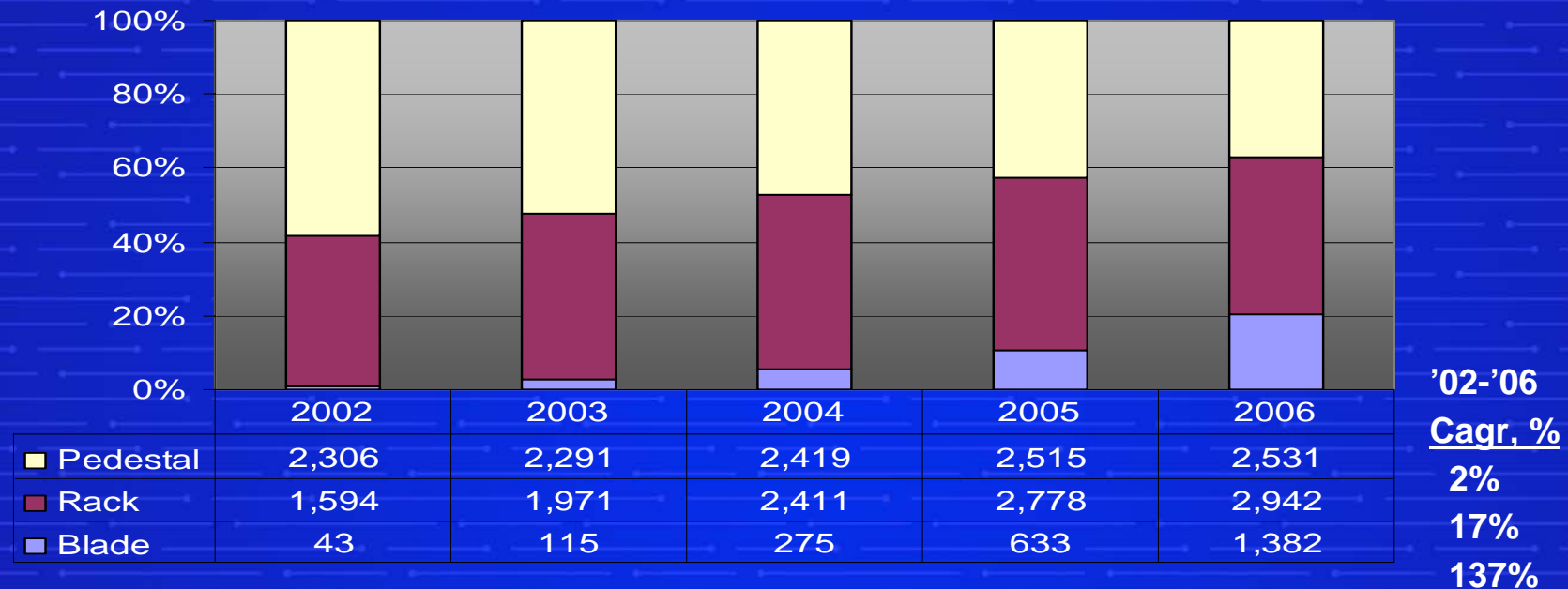


2006:20% converged:



Source: IDC Dec 2002

Modular Servers -- Market Opportunity

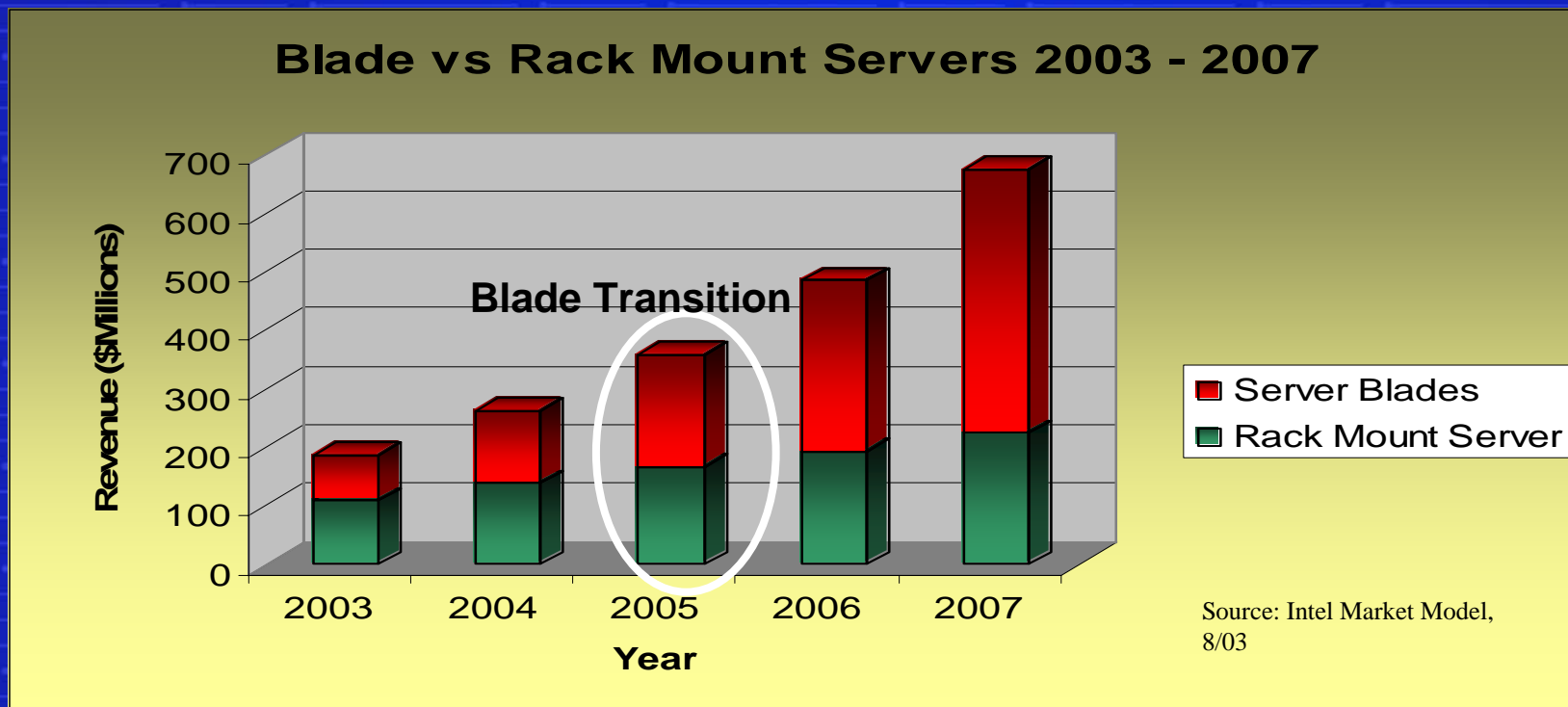


Source: IDC, Dec 12 2002

- Modular Servers: 20% Enterprise Server TAM in '06, CAGR > 100% -- IDC
- "The WW market for blades will explode to \$3.78B by 2006" – Yankee Group



Telco Servers – Market Opportunity



- Key Telco Server Application Segments: Converged networks, Management and IN, Wireless Infrastructure, Broadband Networks & Metro networks

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Three Emerging Blade Server Categories

1. 'Ultra Dense'

- Focus on CPUs/in³
- 3-4U High
- 16-20 Blades
- LV CPUs



Performance Dense

2. 'Performance Dense'

- Focus on MIPS/in³
- 6-12U High
- 8-14 Blades



Modular

3. 'Modular'

- Focus on Virtualization
- Scale-Out of SW, CPU, Storage, I/O

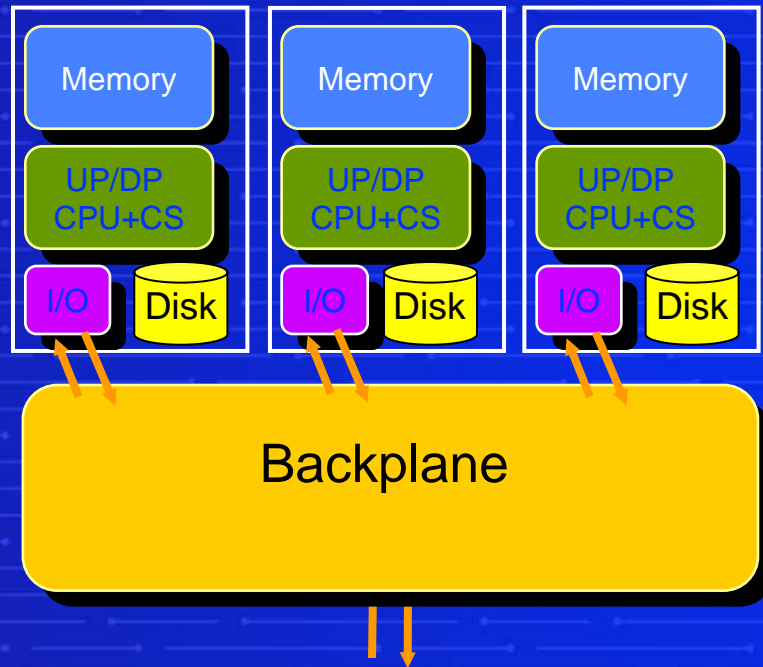


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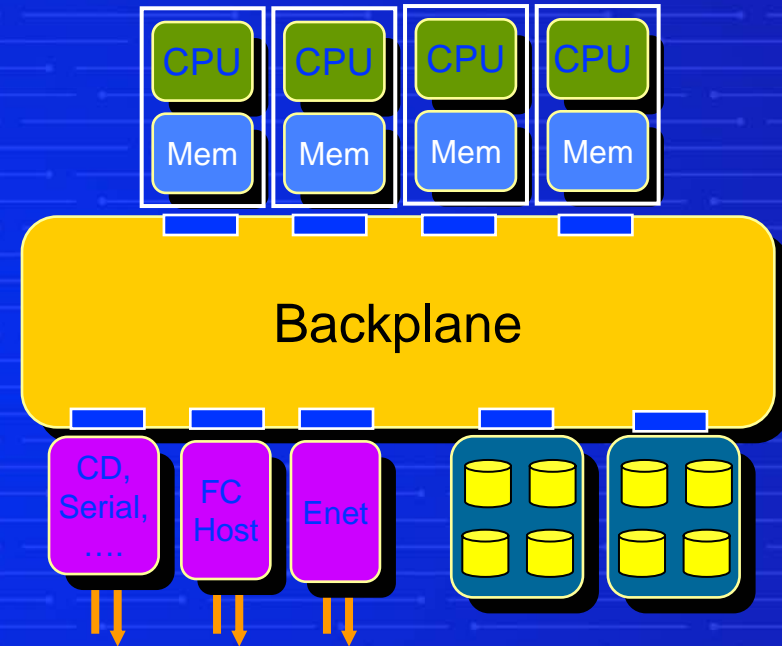
Two Primary Blade Server Architectures

'Ultra & Performance Dense' Blades



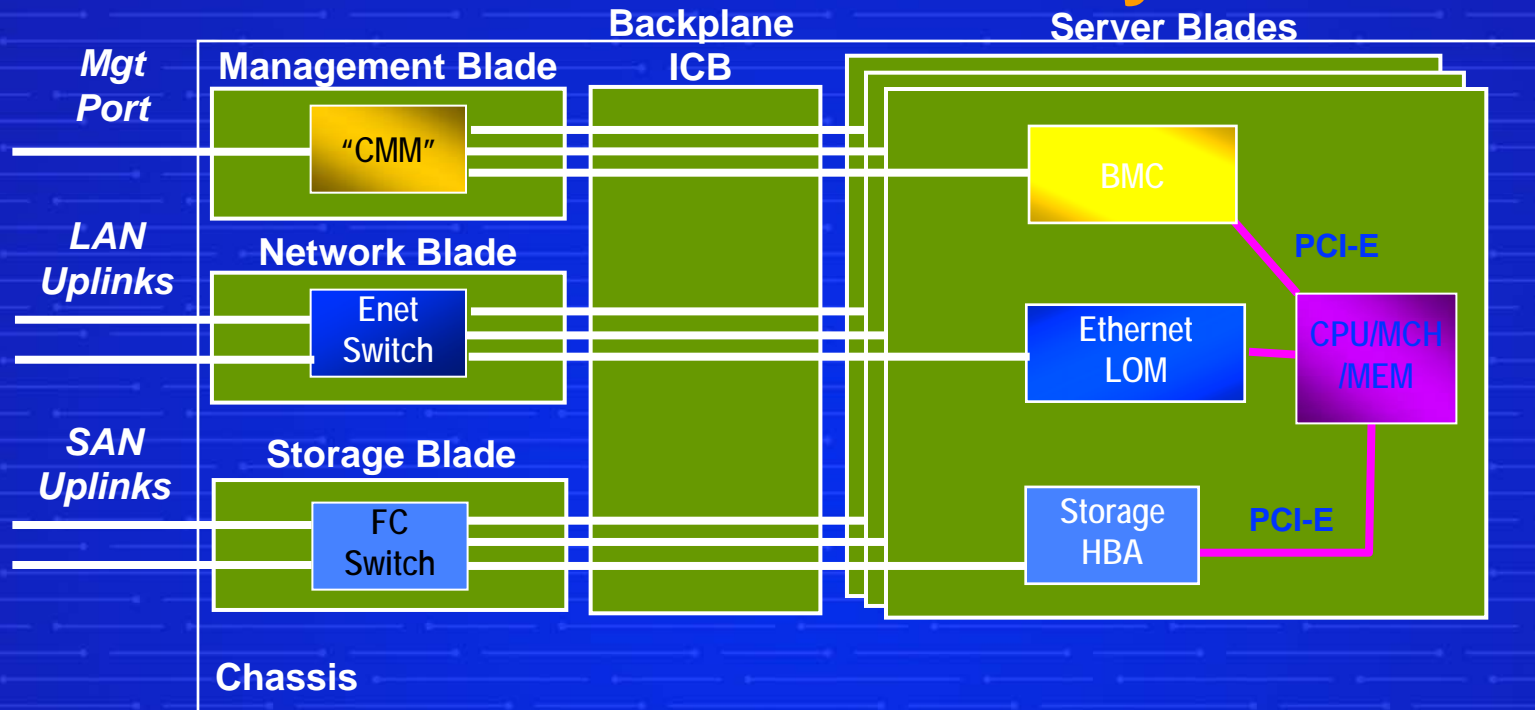
- Evolutionary model
- Multiple low cost servers connected via backplane fabric in a common chassis

'Modular' Platforms



- Revolutionary model
- Virtualized compute, I/O, and storage resources that independently scale

Typical Modular Server Backplane Architecture Today



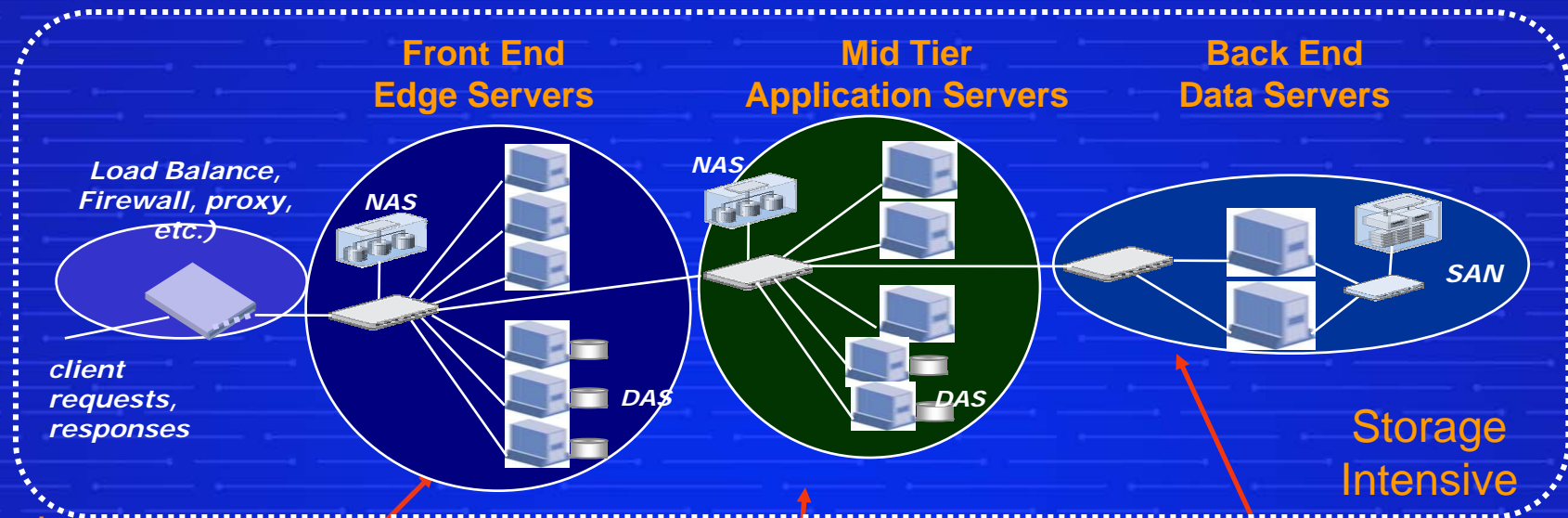
- Today's blade servers have multiple buses and fabrics
 - Network – Ethernet; Storage – Fibre Channel; IPC – Infiniband, Myrinet*, Proprietary or Ethernet
 - Expensive and complicated
- Future: Converging all the traffic onto Ethernet backplane ?

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Server Types & Applications

The 3-Tier Enterprise Model



Network
Intensive

Front-End Applications

- Web Serving
- Network Edge Applications
- Collaboration/Messaging
- Workgroup/IT Infrastructure
- Terminal Serving

Processor
Intensive

Mid Tier Applications

- Business Applications
- ERP
- Business Logic
- Decision Support
- High-Performance Clustering (HPC)

Back-End Applications

- Database
- Decision Support
- Backend for CRM, ERP
- OLTP



I/O Characteristics by Server Type

- **Front End Servers**

- Goal: Serve as many *connections* as possible
- High CPU utilization from large connections
- Some storage access, almost no IPC
- **Outbound client network bandwidth important**

- **Mid Tier Servers**

- Goal: serve as many *transactions* as possible
- Some storage access (DAS → NAS)
- Traffic toward FE is smaller load-balanced packets
- Traffic toward BE is IPC or data requests

- **Back End Servers**

- Goal: Retrieve, update, & manipulate *more data faster*
- Large number of concurrent DB transactions
- **Storage intensive**
- **Low-latency** intra-tier IPC crucial for scalability

'06 I/O Requirements by Server Type

Server Type	Number of Connections	Network Traffic	Storage Traffic	IPC Traffic
Front End (FE)	Large (15k-30k)	Heavy (5-10Gbps)	Intermediate (1.5-4Gbps)	None
Mid-Tier Application (MT)	Small (4k-8k)	Intermediate (200-500Mbps)	Low (<100Mbps)	Heavy
Back End (BE)	Small (4k-8k)	Low (<200Mbps)	Heavy (3-6Gbps)	Heavy (2-4Gbps)

Source: '06 IA Server I/O Analysis, Intel Corporation 2003



Blade Adoption Challenges

Key IT Concern	Industry Responses
High upfront acquisition costs vs racks	<ul style="list-style-type: none"> • Creative Pricing models • Lower cost, standardized backplane architectures • Scalable backplanes supporting variety of performance needs
Single point failures	HA expectations from SW, OS and component vendors
Poor management capabilities	<ul style="list-style-type: none"> • Better management tools and initiatives • Standardization efforts in DMTF
Proprietary chassis	<ul style="list-style-type: none"> • Alliances & partnerships that provide a wide variety of interface choices to end customers • Backplane & Switch Standardizations



Source: Intel IT & other customer visits

Standardization will help



Blade Adoption Challenges (Continued)

Key IT Concern	Industry Responses
Cooling challenges	<ul style="list-style-type: none"> •New chassis architectures •Right mix of power / performance for blades
Who is going to manage them – server admins vs NW admins ?	<ul style="list-style-type: none"> •Alliance with major NW vendors for Switch blades
Will they have the same performance as racks ?	Density vs performance trade offs
How do I get a single server view vs bunch of servers	<ul style="list-style-type: none"> •Push for virtualizations •Look for alternatives that promise enabling this (Infiniband)
Backplane scalability	<ul style="list-style-type: none"> •Drive towards 10G backplanes •Explore lower speeds if 10G is more expensive



Source: Intel IT & other customer visits

Standardization will help



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Summary

- Modular platforms is a fast growing industry segment
 - Ethernet is a popular fabric of choice
- However Usage not standardized
- Need to look at both Layer 1 & Layer 2 enhancements to make Ethernet a converged fabric and eliminate need for multiple interconnect types
 - Single interconnect simplifies platform architectures & reduces costs
- Ethernet standard for modular platform interconnect will enhance interoperability and ease the adoption of modular platforms