U.S. DEPARTMENT OF COMMERCE

MBDA

MINORITY BUSINESS DEVELOPMENT AGENCY

The Telecommunications Industry

STRATEGY AND BUSINESS IMPROVEMENT CONSULTING

Growth Opportunities For Minority-Owned Businesses

MED Week 2001

The Asaba Group

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Minority Business Development Agency

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Content

STRATEGY AND BUSINESS IMPROVEMENT CONSULTING

Project Overview/Introduction	**3-6**
Industry Overview	7-24
Customer Call Center Management	25-31
Contract Electronic Manufacturing	32-39
Network Engineering, Furnish & Installation (EF&I)	40-47
Optical Networking/IP Traffic	48-57

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Project Charter

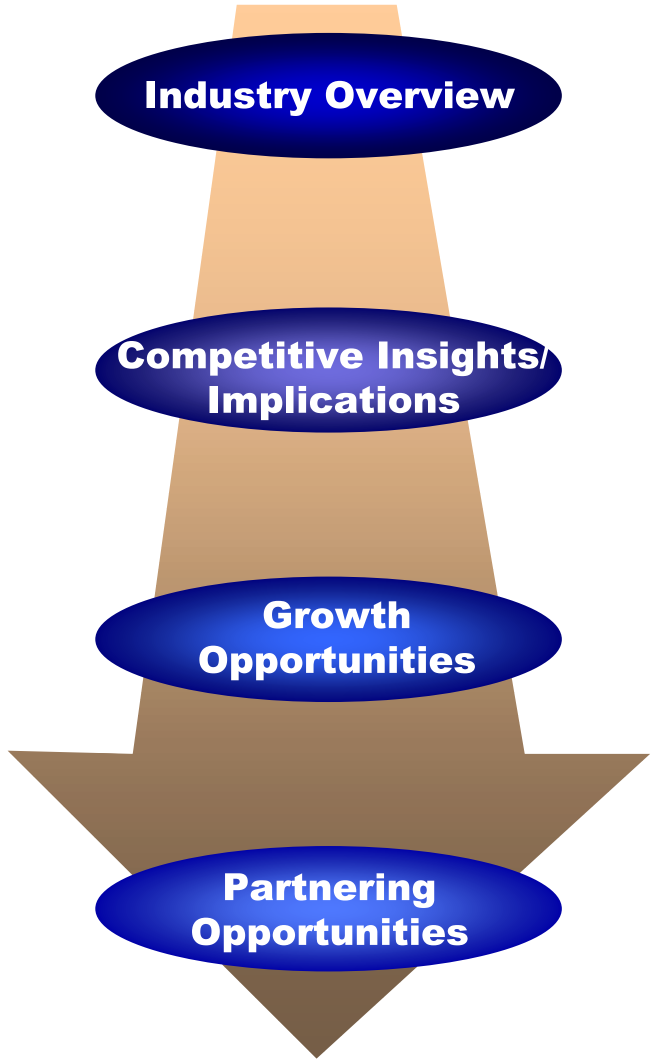
Create An Industry Report Which Identifies the Growth Opportunities For Minority-Owned Businesses In The telecommunication Industry

It should place emphasis on the following:

- Industry trends and issues within the industry
- Identify market opportunities for growth
- Growth strategies and critical success factors
- Identify opportunities for partnership between Minority Businesses and Telecom Companies

The Asaba Group Retained To Identify Growth Opportunities

Project Approach



Executive Summary

Overcapacity and overbuilding coupled with economic slowdown have reduced demand for telecommunication equipment and services

- Significant equipment glut and inventory levels in the supply chain

Capital markets and investors unwilling to fund weak business models

- There has been an increase in the number of companies in financial distress and bankruptcies

However industry fundamentals remain strong

- Wireless, Data and Broadband hold future promise

An evolution of drivers of value creation occurring with the Industry

- Transforming a regulated industry to a technology driven model
- Convergence between cable, telecommunication and wireless

Industry evolution present growth opportunities for Minority-Owned Business

- Engineering & Installation and customer contact management are near term opportunities
- High growth, capital intensive opportunities in contract electronic manufacturing, optical networking and IP applications

Content

STRATEGY AND BUSINESS IMPROVEMENT CONSULTING

Project Overview/Introduction 3-6

Industry Overview 7-24

Customer Call Center Management 25-31

Contract Electronic Manufacturing 32-39

Network Engineering, Furnish & Installation (EF&I) 40-47

Optical Networking/IP Traffic 48-57

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Current Trends In The Telecommunications Industry

Collapse of equipment demand has led to glut of product and high inventory levels along industry supply chain

- Driven by economic slowdown, overcapacity and overbuild in transport network, change in investor sentiments and reduced level of competitors in certain sectors
- “Dot-Com” sector collapsing driving down demand for telecom networking equipment
- Bandwidth pricing dropping due to excess fiber capacity

Industry shakeout occurring in every sector of the industry

- Increased number of bankruptcies, industry exits, and consolidation
- Shakeout has resulted in weakening the competitive intensity in certain sectors

Demand fundamentals remain strong, but underlying characteristics are changing

- Wireless growth strong with future potential in data applications
- Data growth outstripping voice, but voice accounts for significant share of current revenues
- Traffic evolving from “user-to-user” (voice telephony) to “user-to-objects” (ARS) and “object-to-object” (web servers, fax, etc.)

Current Trends In The Telecommunications Industry (cont'd)

Broadband applications seen as platform for future industry growth

- Business sector evolving business processes into e-commerce/e-business
  - Employees adapting to new ways of working with the Internet and increasing productivity
- Residential consumers adapting broadband services slowly
  - Function of slow deployment and absence of mass market applications
- Usage shifting from "fun" to "real world" applications
  - From convenience to enhancing productivity

Intensive performance pressures from investors and capital providers on industry players

- Companies with high levels of debt falling into financial difficulties
  - Strong implications for MBE's' choice of growth capital
- Investors seek quicker returns on Invested Capital and withdrawing Capital from weak business models
  - Weak business models defined as those not earning positive cash flows before expanding infrastructure

Response From Industry Players

Industry players responding to new pressures and dynamics by reducing operating expenses, divesting assets and reducing capital expenditures

- Payback period shortening to 24–36 month time frame
- Greater desire to generate real cash flows from current investments and assets before embarking on new ventures
  - Maximizing returns on deployed/existing technologies

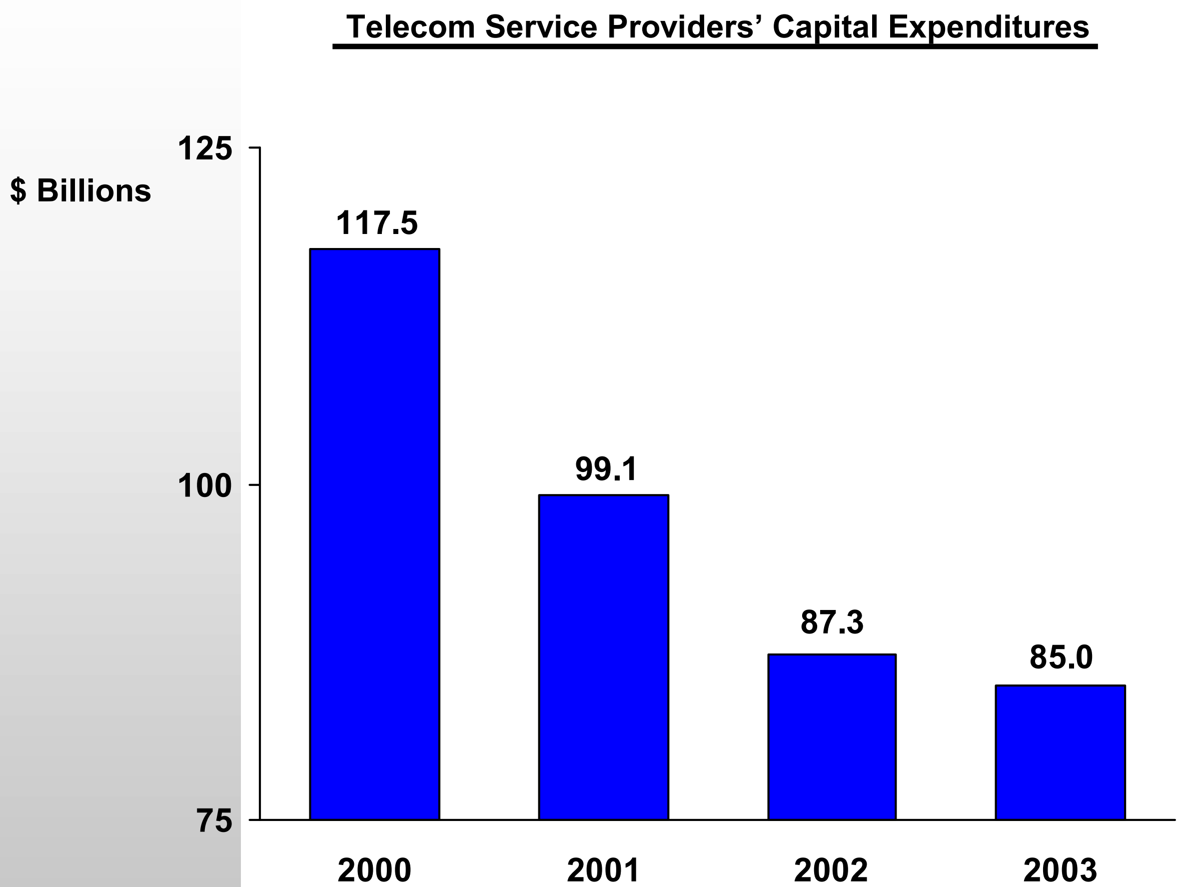
Declines in Capital Expenditures most significant issue in the industry

- Industry analysts forecast continued declines through 2003
- However wireless sector capital expenditures continued to grow
- Industry analysts expect Service Providers' CapEx will return to historical level of expenditures

Players divesting assets to achieve greater focus and competitiveness

- Trimming cost and reducing headcounts
- AT&T separates its consumer, broadband, and wireless businesses
- Lucent spins-off Agere and divests some manufacturing assets

Decline In Capital Expenditures By Service Providers Causing Slowdown Within Supply Chain

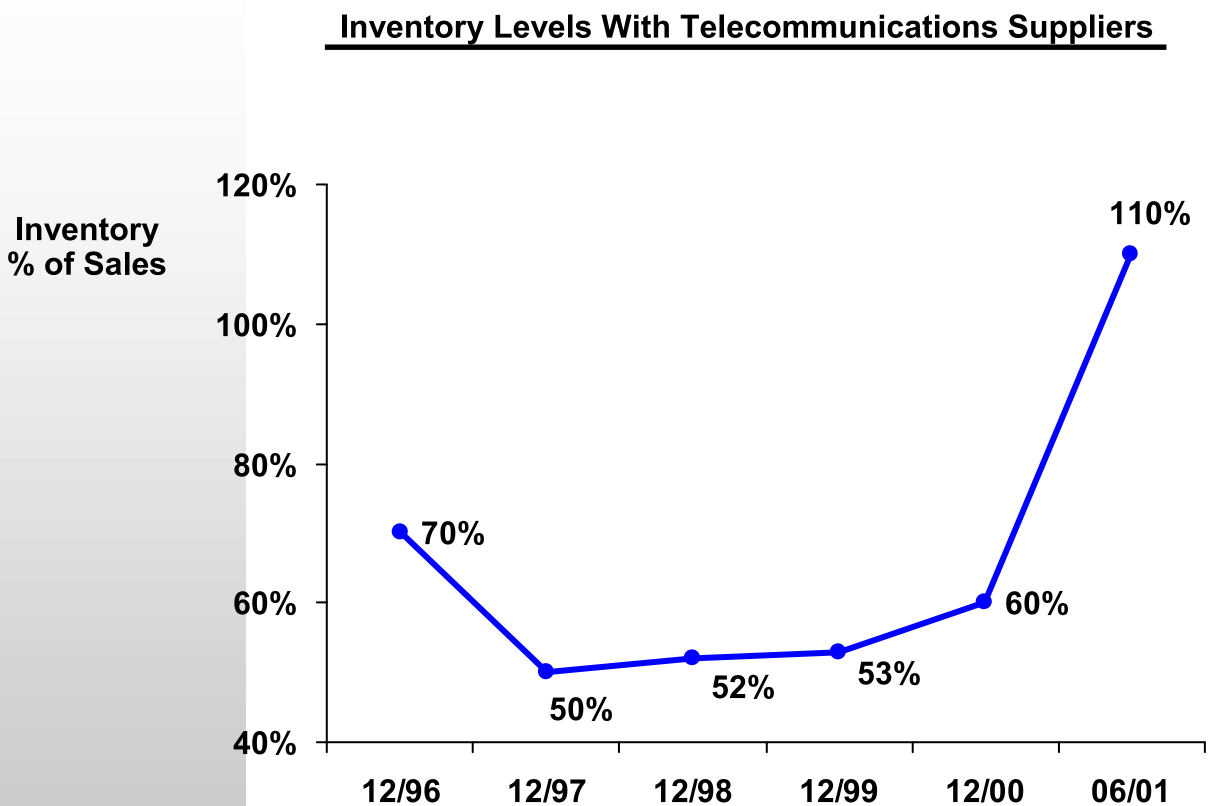


Key Drivers

- Contraction of business plans by newer players due to current capital market environment
- Delay and cancellation of many telecom/Internet infrastructure projects
- Most long-haul transport infrastructure near completion
- Easing of competitive pressure for ILEC's
  - Less aggressive push with CapEx upgrades

SOURCE: Merrill Lynch, Morgan Stanley, Asaba Group analysis

Inventories In The Supply Chain Have Risen

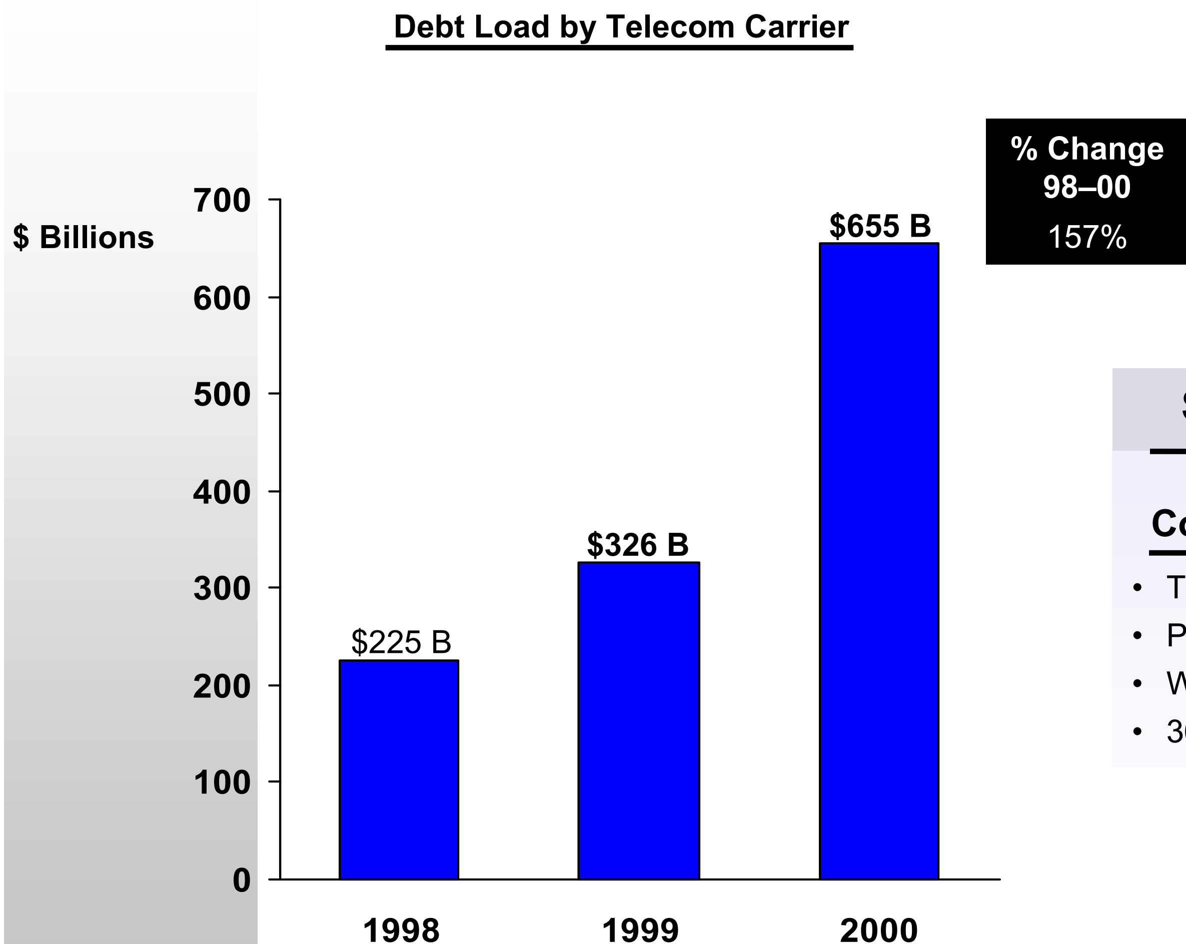


Recent Inventory Losses

• Lucent Technologies	$1.0 B
• Cisco Systems	$2.2 B
• JDS Uniphase	$2.50 MM

SOURCE: Merrill Lynch, Wall Street Journal

Excessive Debt Carried By Some Providers Has Led To Financial Crises



Some Recent Bankruptcy Filings

Company	Total Debt	Qtr Interest	Qtr EBITDA
• Teligent	$1.44 B	$30 MM	($119 MM)
• PSInet	$3.7B	$166 MM	($19 MM)
• Winstar	$4.1B	$103 MM	$20 MM
• 360 Networks	$1.9B	$53 MM	$10 MM

Recent Bankruptcies May Provide Cheap Entry Into Industry

SOURCE: Wall Street Journal, Lehman Brothers, Nortel Networks

Industry Slowdown Leading To A Shakeout Among Competitors

Evidence By Bankruptcies In Every Segment Of The Supply Chain

Internet Service Providers	• Adaptive Broadband • Metricom
DSL Providers	• Covad • Rhythms Net Connections • Northpoint Communications
Service Providers (CLEC's)	• PSI Net • Winstar Communications • Pacific Gateway Exchange
Network Builders/ Providers	• Viatel Inc. • Teligent Inc. • RSL Communications • 360º Network
Contract Manufacturers	• MCMS

Have Reduced Competitive Intensity In Some Segments

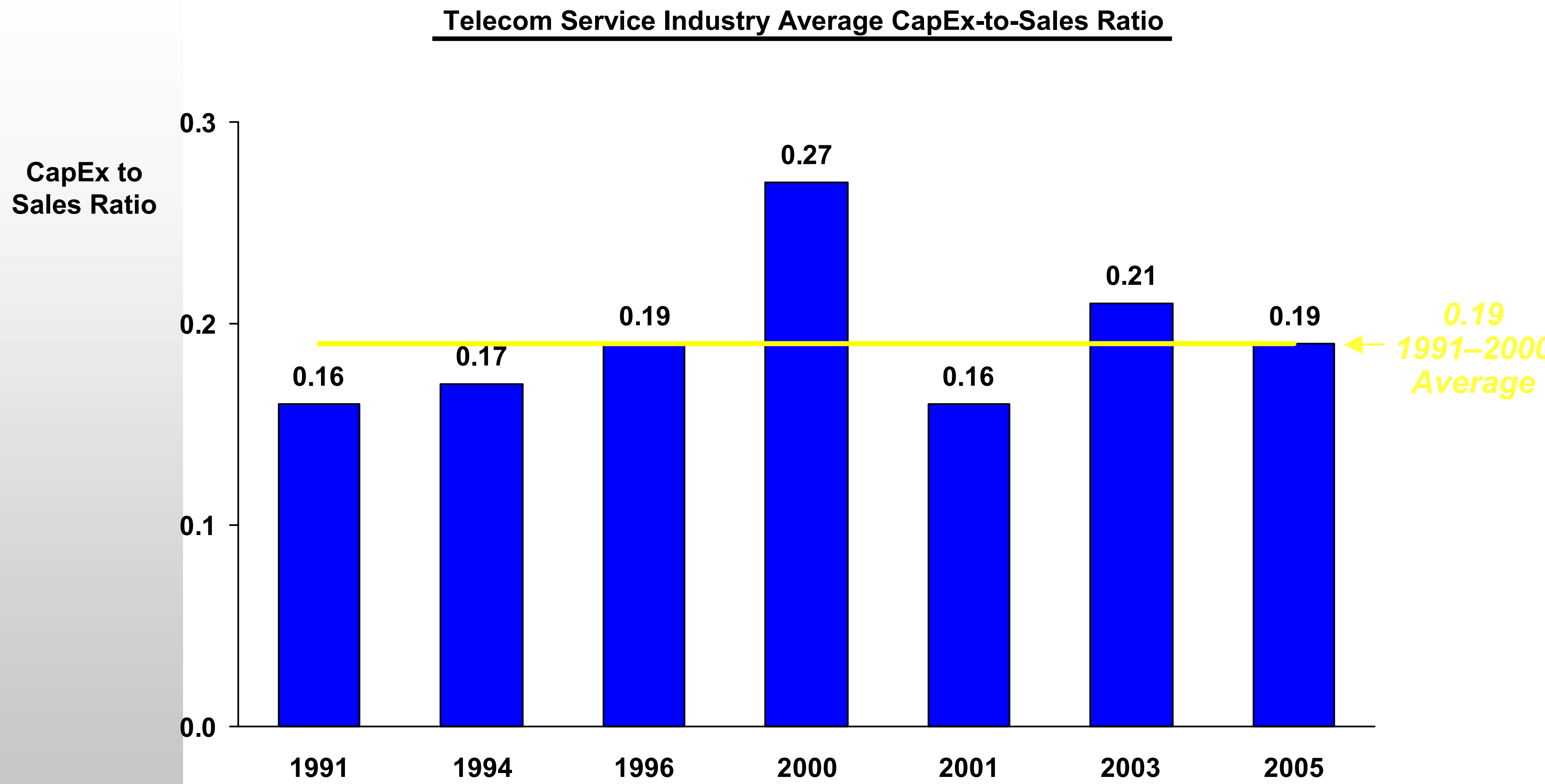
Surviving Players Trimming Cost Structures To Adapt Current Industry Demand

Most Efforts Focused On Layoffs And Asset Divestitures

Segment	Company	Announced Layoffs
Contract Manufacturers	Selectron Celestica	20,000 2,900
Component Manufacturers	PMC — Sierra Vitesse Semiconductor	230 153
Network Suppliers	Cisco JDS Uniphase Alcatel	8,500 15,000 25,300
Equipment Manufacturer	ADC Telecom Lucent Technologies Nortel Network Tellabs	7,000 30,500 30,000 1,000
Service Providers	Verizon Communications McLeod USA	10,000 525

SOURCE: Financial Times, Wall Street Journal

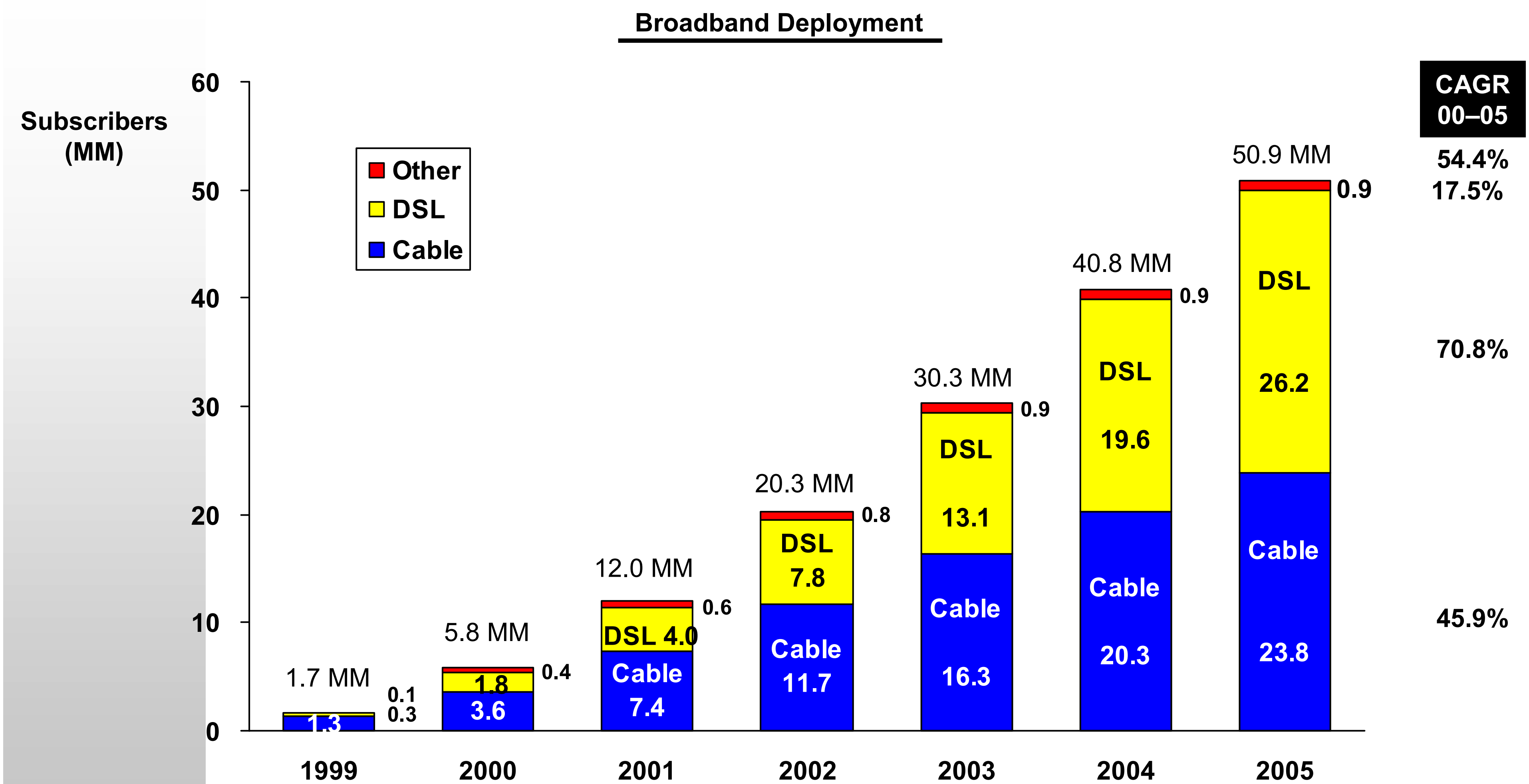
Analysts Believe Service Providers Will Maintain Historical Level Of Capital Expenditures



1. Includes AT&T, BellSouth, Quest, SBC, Verizon, Worldcom, CenturyTel
Source: Morgan Stanley Dean Witter, Financial Times

Demand For Data Services Expected To Remain Strong

Broadband Experiencing Strong Growth

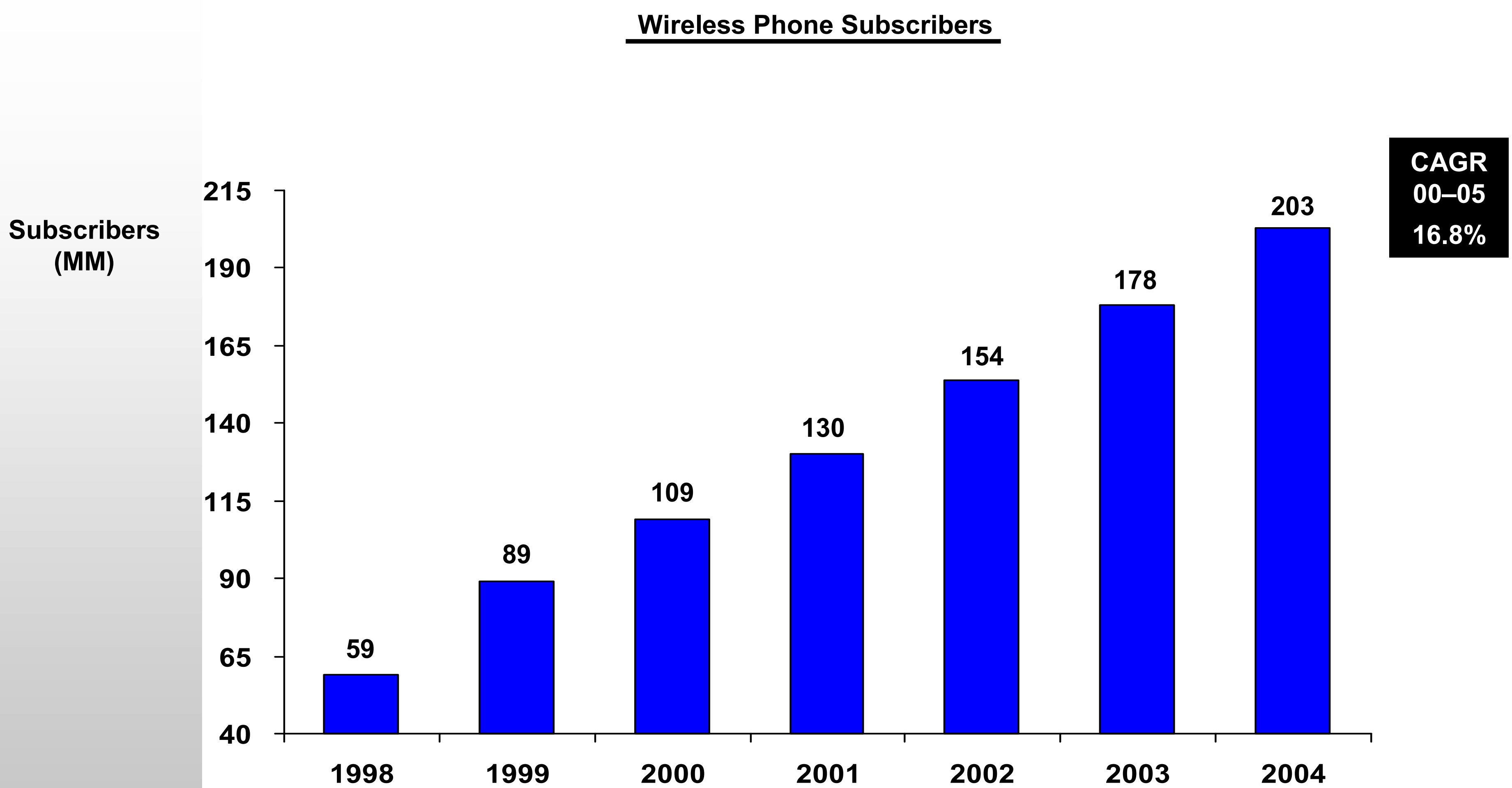


Expect Continued Investments In Broadband Infrastructure

SOURCE: Merrill Lynch, Asaba Group analysis

Future Demand For Wireless Services Remains Strong

Predominantly Voice; Explosive Potential Exists With Data-based Applications



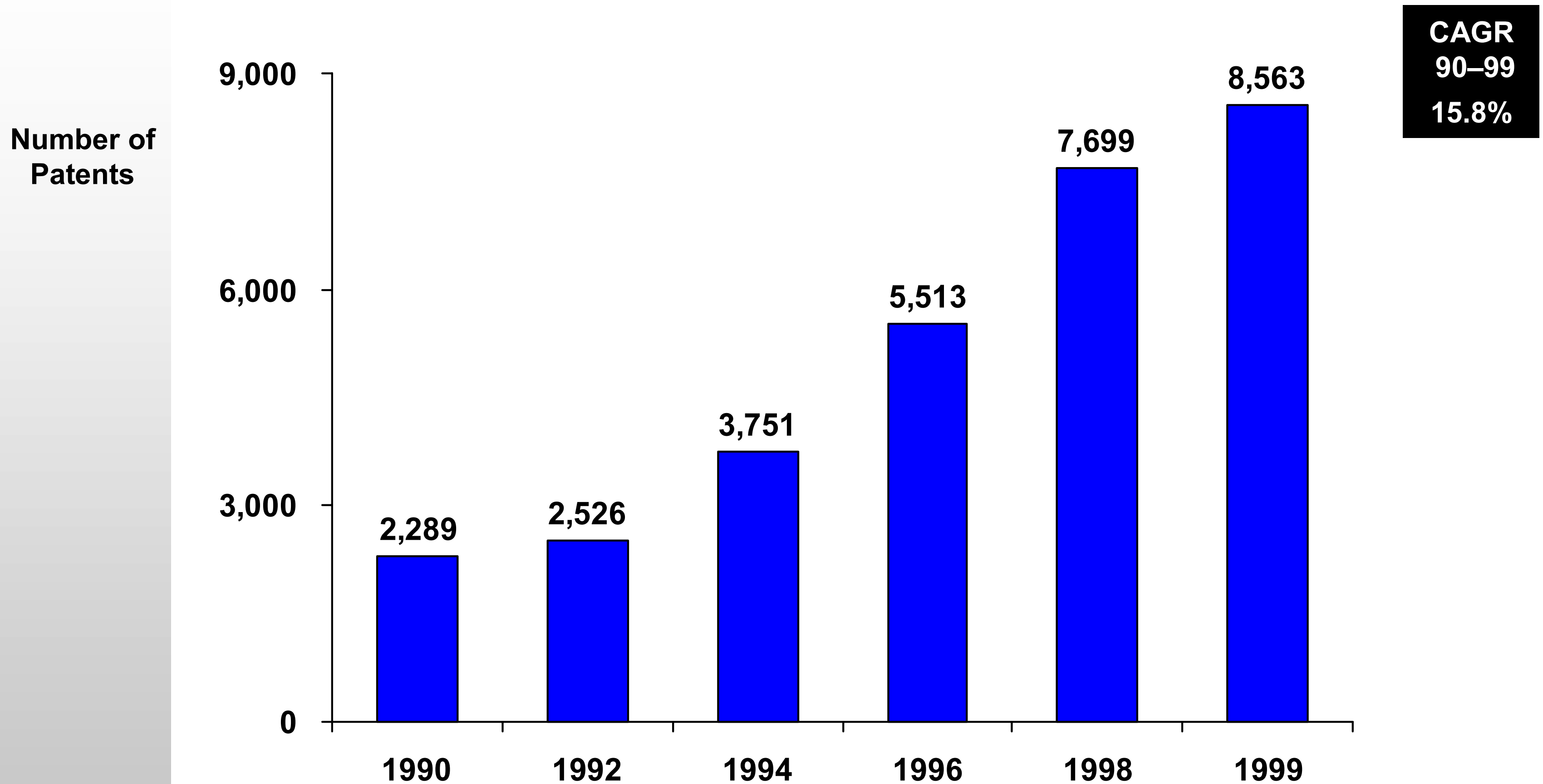
Expect More Investments Focused On Full Service Mobility

SOURCE: Cellular Telecommunications Industry Association, Internet World

Pace Of Innovation Has Accelerated With The Industry

Driving Significant Levels Of Price/Performance Improvements

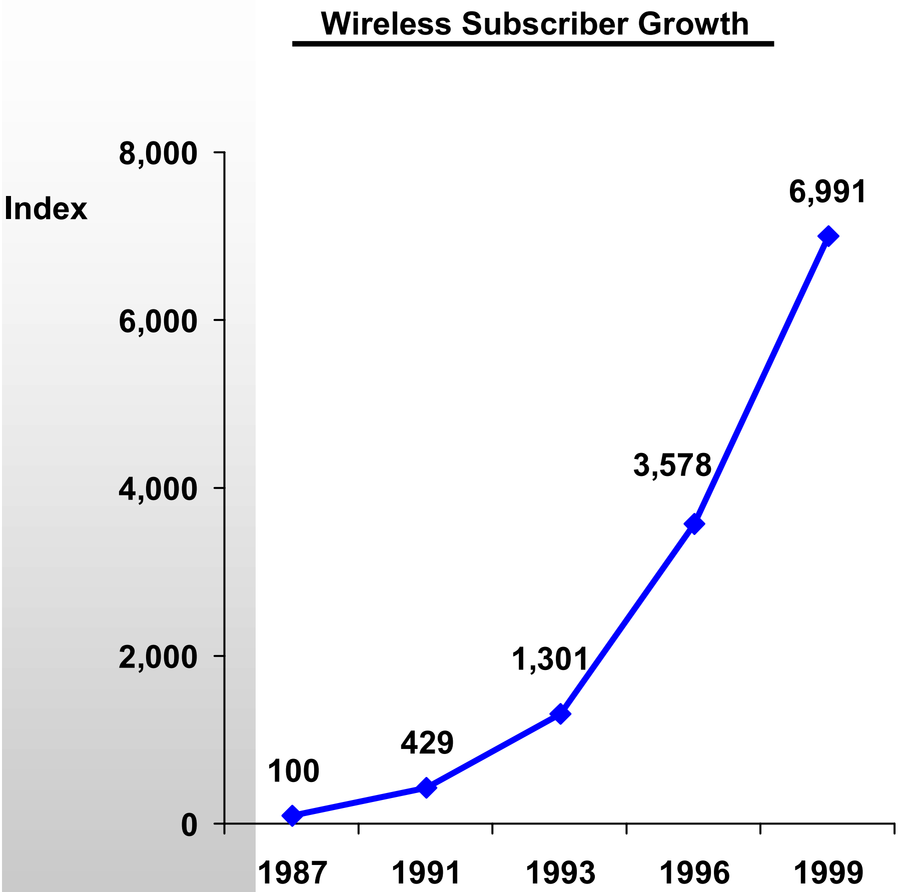
Telecom Industry Patents*

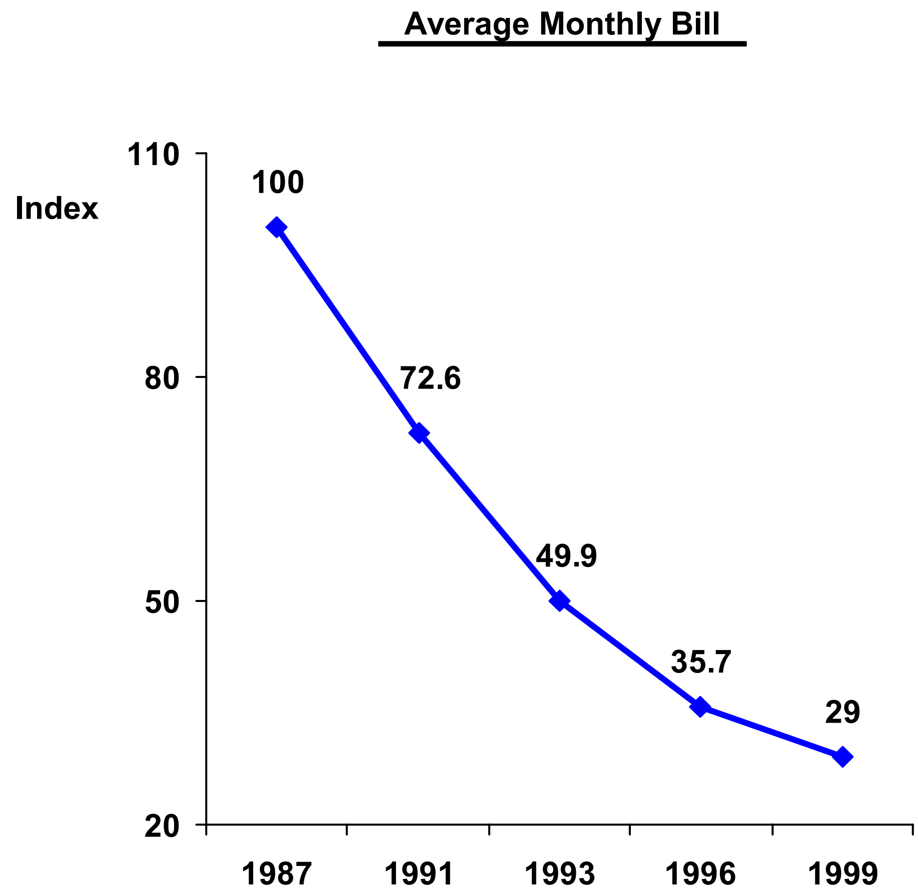


Price/Performance Improvement Has Accelerated Demand

* Patent filings as a proxy for innovation
SOURCE: Federal Communications Commission (FCC)

Wireless Subscriber Growth Provides Insights Into Industry Price And Demand Relationships



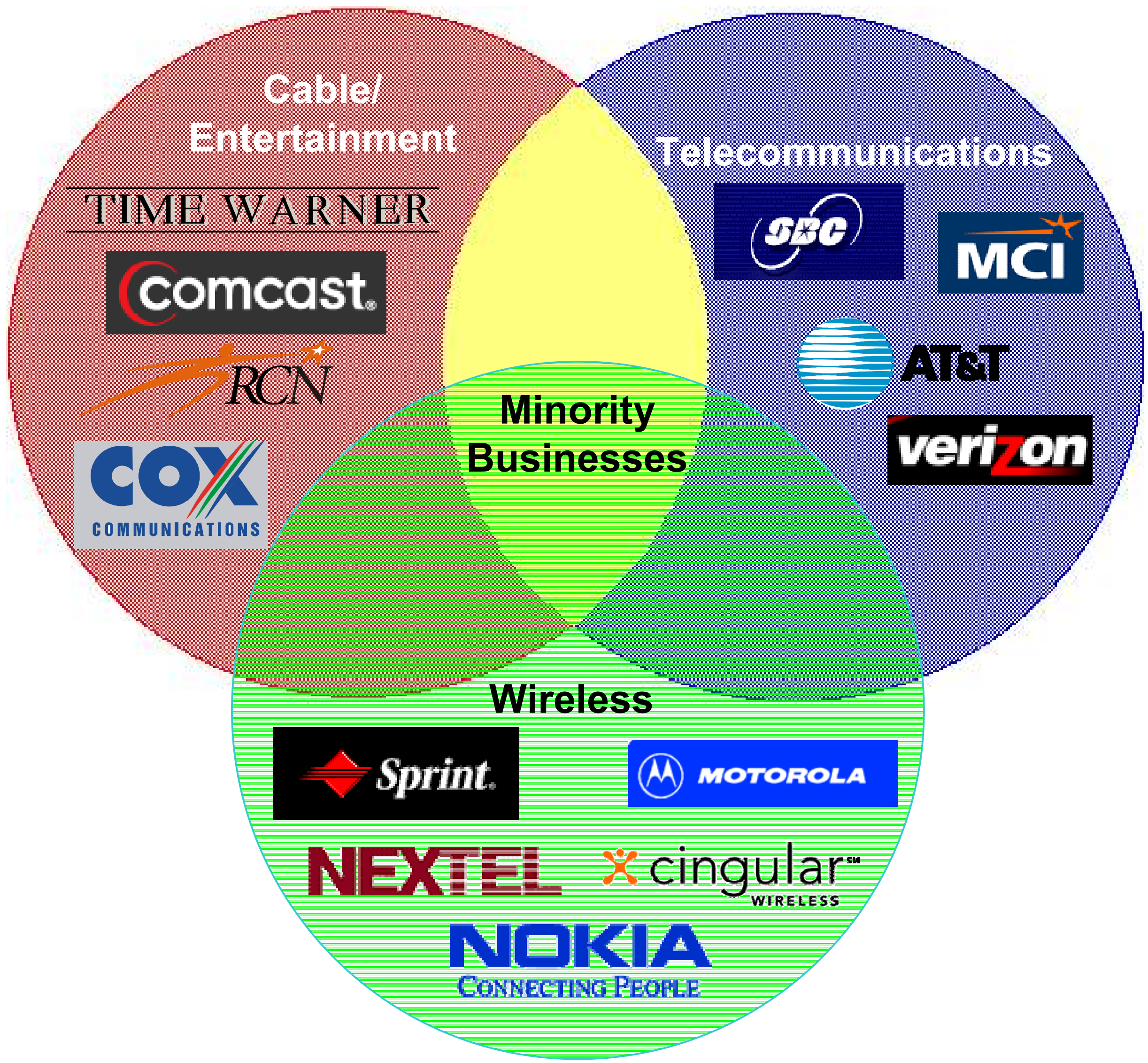


Price/Performance Improvements Drive Subscriber/Penetration Growth

Source: Federal Communications Commission (FCC), Asaba Group analysis

Landscape And Industry Boundaries Are Changing And Blurring

Converging Industries Create Growth Opportunities For Minority-Owned Businesses



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Business Opportunities Typically Present Themselves As Capability Gaps Along Value Chain

Telecom Industry Value Chain

Technology/ Component Supplier → Contract Manufacturers → Network Equipment Manufacturers → Network Transports/ Installation → Service Providers → Customer Care → Billing/ Collections

ASIC Provider
- Intel
- Motorola

Optical Technology
- Ciena
- JDS Uniphase

Software
- Microsoft
- 3Com

CEMS
- Celestica
- Jabil

EMS
- Solectron
- Flextronics

System Integrators
- Lucent
- Nortel Network

Equipment Vendors
- Tellabs
- ADC

Switches/ Routers
- Cisco

Transport
- Level 3
- Quest
- Global

Hosting
- Exodus
- Globix

Local
- RBOCs

Wireless
- Cingular
- Nextel

Long Distance
- AT&T
- MCI
- Sprint

CDN/ASP
- Akamai

Cable
- AOL/ TimeWarner

EFI
- MasTec Inc.
- Turf Vendors

Call Centers

Customer Premise

Fulfillment

Invoicing

Collections

Mostly by Service Providers

Opportunities For MBE's Everywhere Along Chain

Key Takeaways And Strategic Implications

Industry evolving into a technology-driven model

- Value creation is driven by rapid price/performance improvement and high price elasticity of demand for product/services
- Similar to industry dynamic observed in the computing sector
- Expect industry to rapidly depreciate assets and drive for shorter asset lives
  - Faster deployment and faster obsolescence

Emerging evolution would require different business models and vendor relationships

- New models and interaction must capitalize on rate of technology innovations and rapid deployment
- Procurement cycles will be in sync with technology development cycles
  - Vendor relationships will evolve to supply chain partnering to reduce operating risks
- Customer relationship management will be essential to success with service providers
  - Repair, provisioning, installation (deployment), billing must be customer-adaptive
  - Quality and reliability will become a key differentiator

Industry players will drive for increased focus on core competencies and build new capabilities which enhance competitive positions

- Will seek partnerships and relationships with suppliers to complement operations

MBE's Must Define Focus and Value Propositions to Be Successful

Identified High Growth Opportunities For Minority-Owned Businesses

- Customer Call Center Management
- Contract Electronic Manufacturing
- Network Installation
- Optical Networking

Content

STRATEGY AND BUSINESS IMPROVEMENT CONSULTING

Project Overview/Introduction	3-6
Industry Overview	7-24
Customer Call Center Management	**25-31**
Contract Electronic Manufacturing	32-39
Network Engineering, Furnish & Installation (EF&I)	40-47
Optical Networking/IP Traffic	48-57

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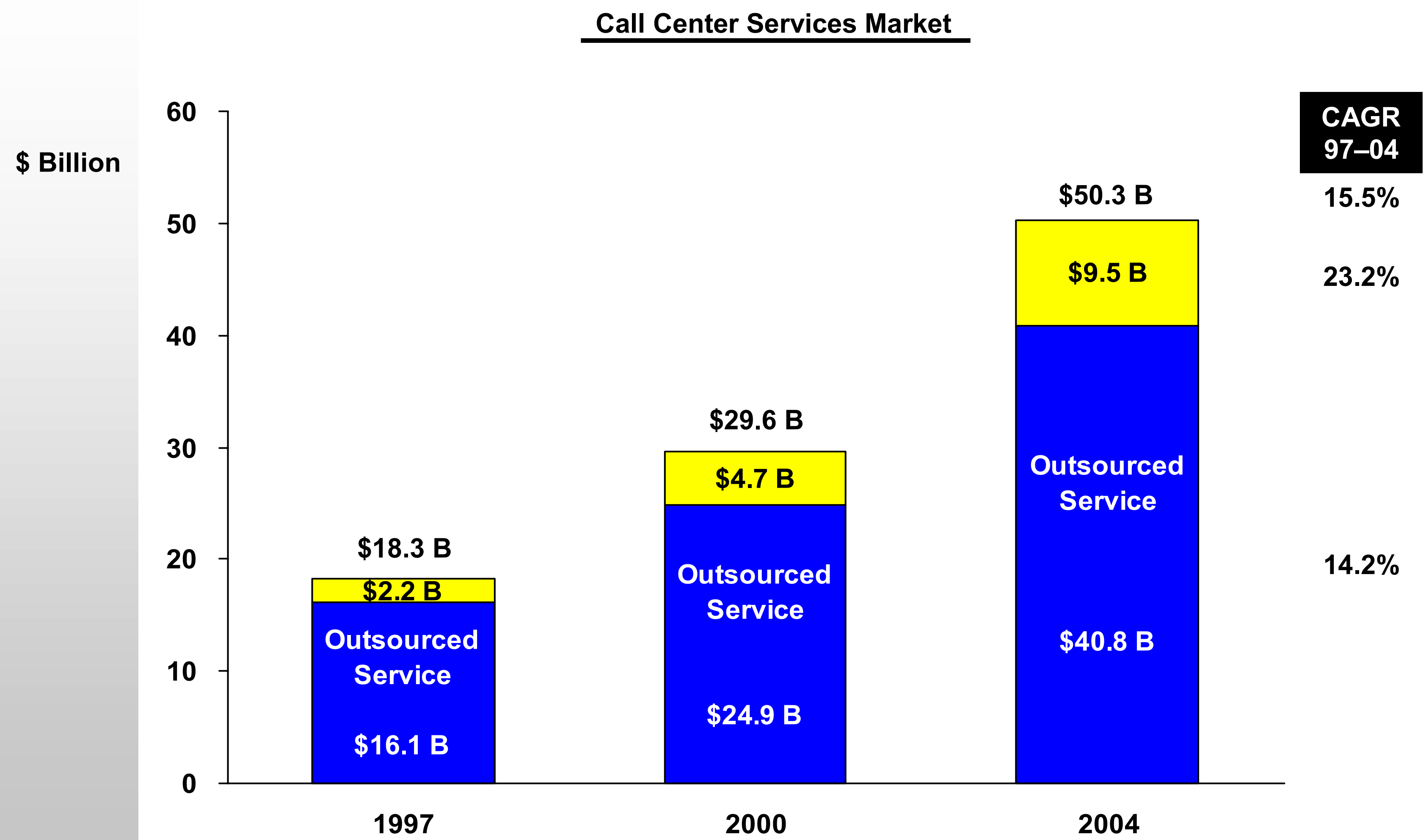
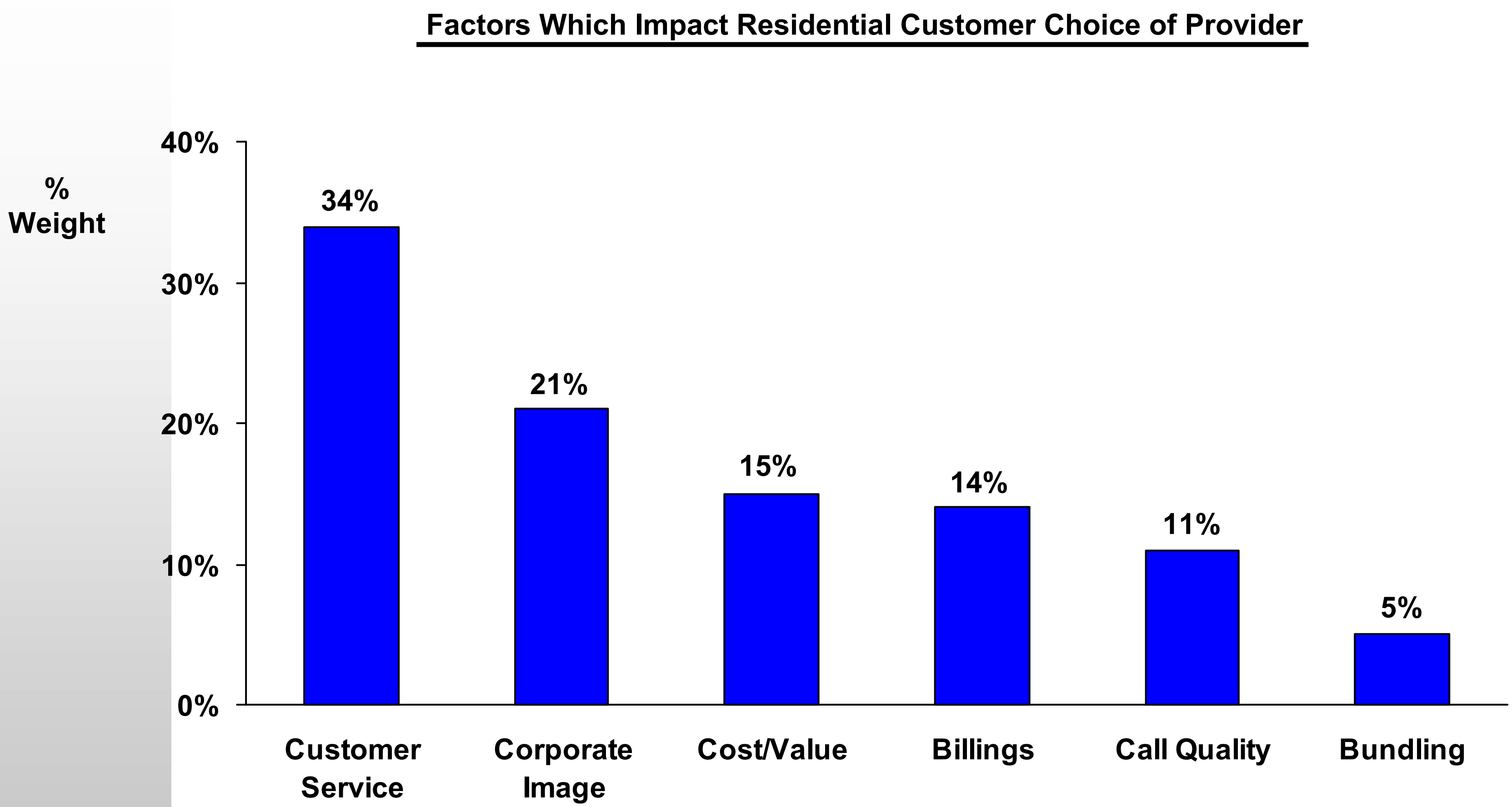
The Call Center Services Market Has Grown Steadily

Outsourced Service Expected To Grow To $40 Billion



SOURCE: Frost & Sullivan

Customer Service And Corporate Image Impact Consumer Choice Of Service Providers



Minority Business Involvement In Customer Contact Processes Adds Value

SOURCE: Industry Survey and Research for long distance provider

Types Of Call Center Outsourcing

Infrastructure Outsourcing

- Client outsource management of voice and data infrastructures while maintaining the operation of the call center.

Facilities Management

- Very similar to traditional data center facilities management. Outsourcing firms becomes the site manager of the facility, equipment, and personnel.

Remote Call Outsourcing

- Outsourcing firm is responsible for handling all interactions with customer and is integrated into the client's business process

Trends Which Favor Continued Outsourcing By Telecom Industry

Companies choosing to focus on other competencies where they can build differentiation

- Focusing on innovation and deployment rather than customer support
- Added benefit of achieving better asset utilization

Outsourcing firms provide 10% to 30% cost reduction because of better economies of scale

- Firms can be leveraged as incremental capacity driving overflow situations

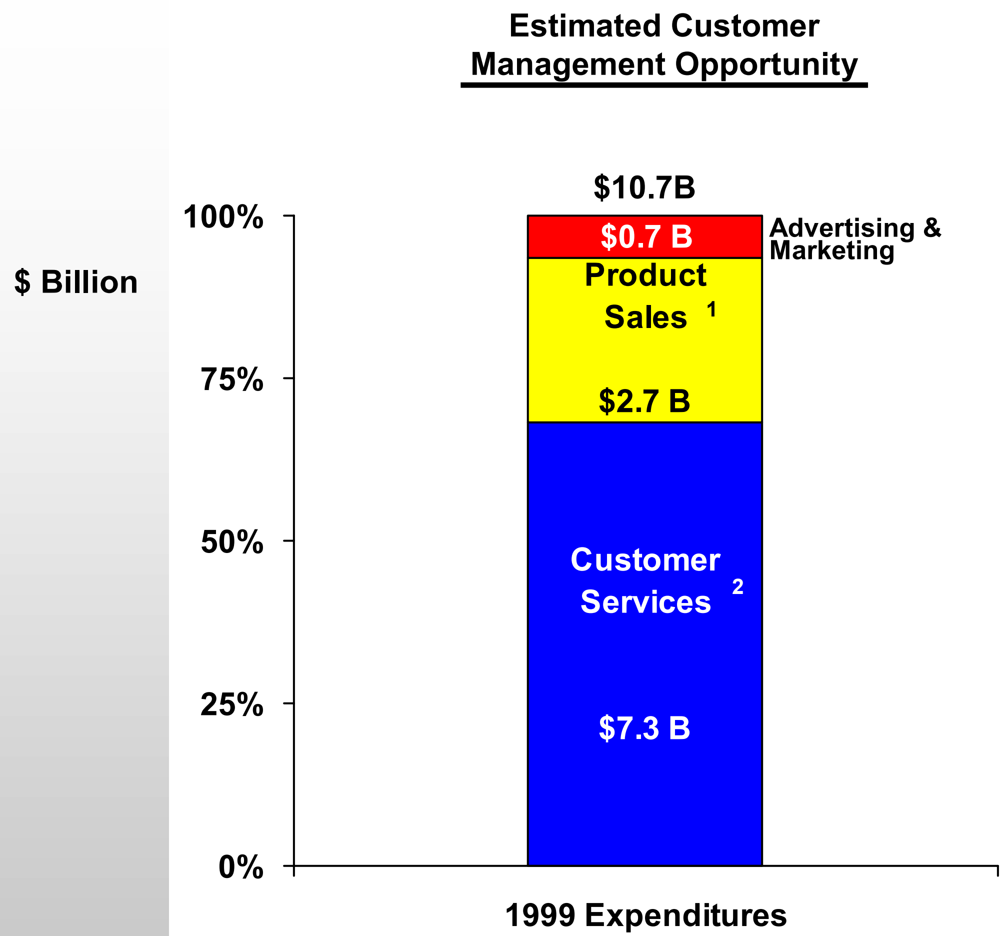
High cost associated with employee turnover and training

Changing customer demographics requires new set of skills and capabilities to interface with multicultural consumers

- Focused firms, particularly MBE's, more suited to provide these services

With deployment of new technical innovative services, customer support function is key in building loyalty

Call Center-Related Expenditures In Telecom Estimated At $7.3 Billion



Key Trends

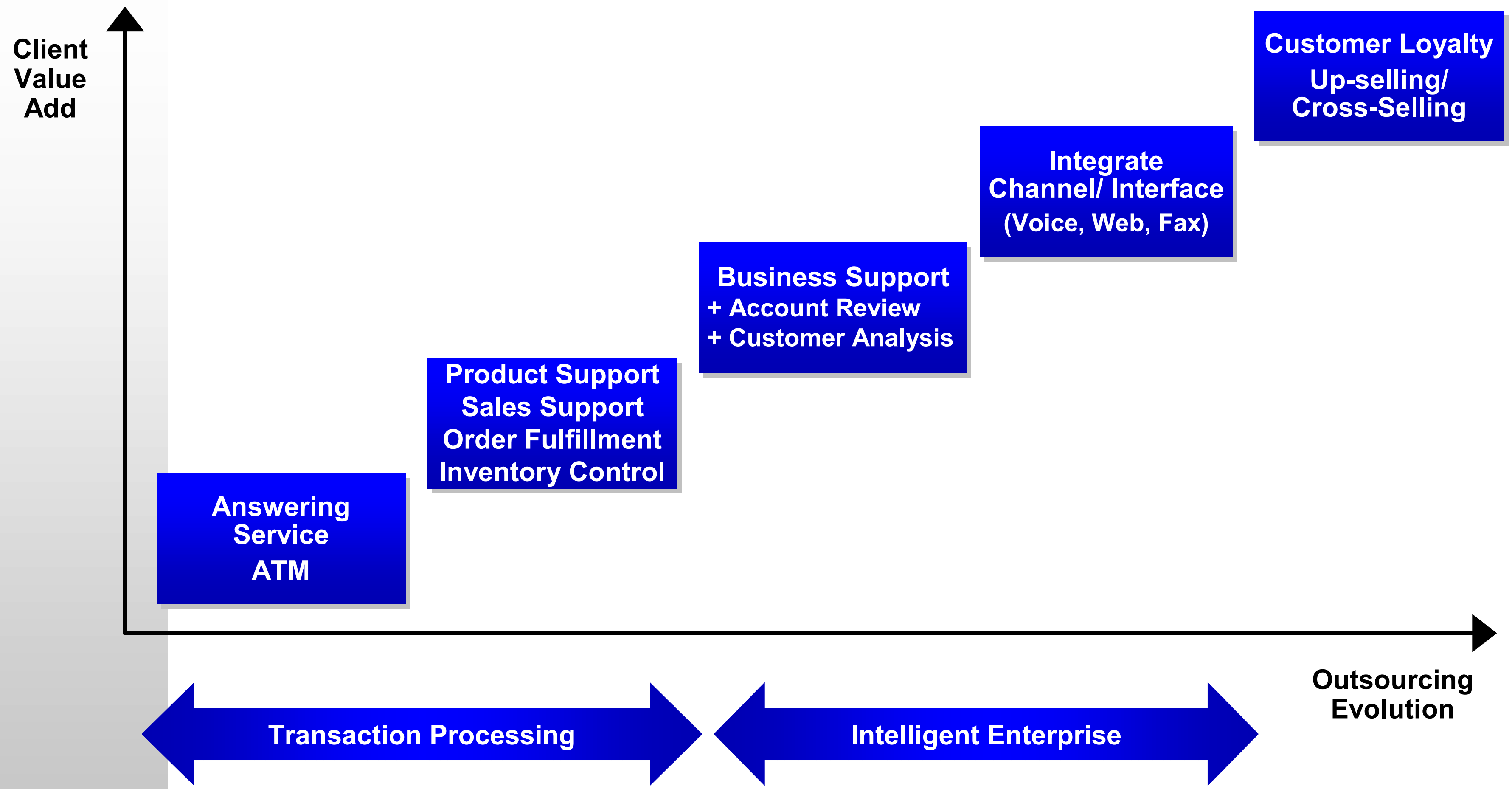
- With industry focused on building new competencies, expect certain customer care functions to be outsourced
- Growth largely driven by cost reduction and assets
  - May be focused on lower-end functions (e.g., support, order-taking)
- Lucent Technologies announces intent to sell its Customer Care and Billing Division

$7.3 Billion Relevant Market For Call Center Services

1. Based on major ILEC aggregated expenditures
2. Includes Call Center Operations

SOURCE: Federal Communications Commission (FCC)

Evolution In Call Center Roles To Service Providers



Significant Opportunities For MBE's To Provide These Services

Content

STRATEGY AND BUSINESS IMPROVEMENT CONSULTING

Project Overview/Introduction	4-6
Industry Overview	7-24
Customer Call Center Management	25-31
Contract Electronic Manufacturing	**32-39**
Network Engineering, Furnish & Installation (EF&I)	40-47
Optical Networking/IP Traffic	48-57

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Trends In Contract Electronic Manufacturing (CEM)

Industry sector currently in a downturn due to economic slowdown following a decade of 20% to 25% growth

- High levels of inventory among CEM suppliers
- Reduced revenues and earnings forecast by major manufacturers

Slowdown has increased level of consolidation among industry players

- Selectron agreed to buy C-Mac Industries for $2.4 Billion
- Sanmina acquires SCI Systems for $4.5 Billion
- Top five competitors control 50% of industry revenues

Telecommunications industry has increased outsourcing to contract manufacturers

- Lucent Technologies sells facility to Celestica and enters into a $10 Billion outsourcing revenue opportunity
- Nortel Network sells 9 facilities to Selectron with a $10 Billion revenue opportunity

Telecom industry moving to a technology industry model, similar to computing

- Outsourcing trend likely to continue into the future

Why Telecom Players Outsource Manufacturing

Allows to focus on mainstream business

- Core competency
- R&D, Innovation
- Marketing

Provides access to vertically integrated leading-edge global manufacturing

- Innovation
- Full solution providers from product design and procurement to repair and technical support
  - Economies of scope

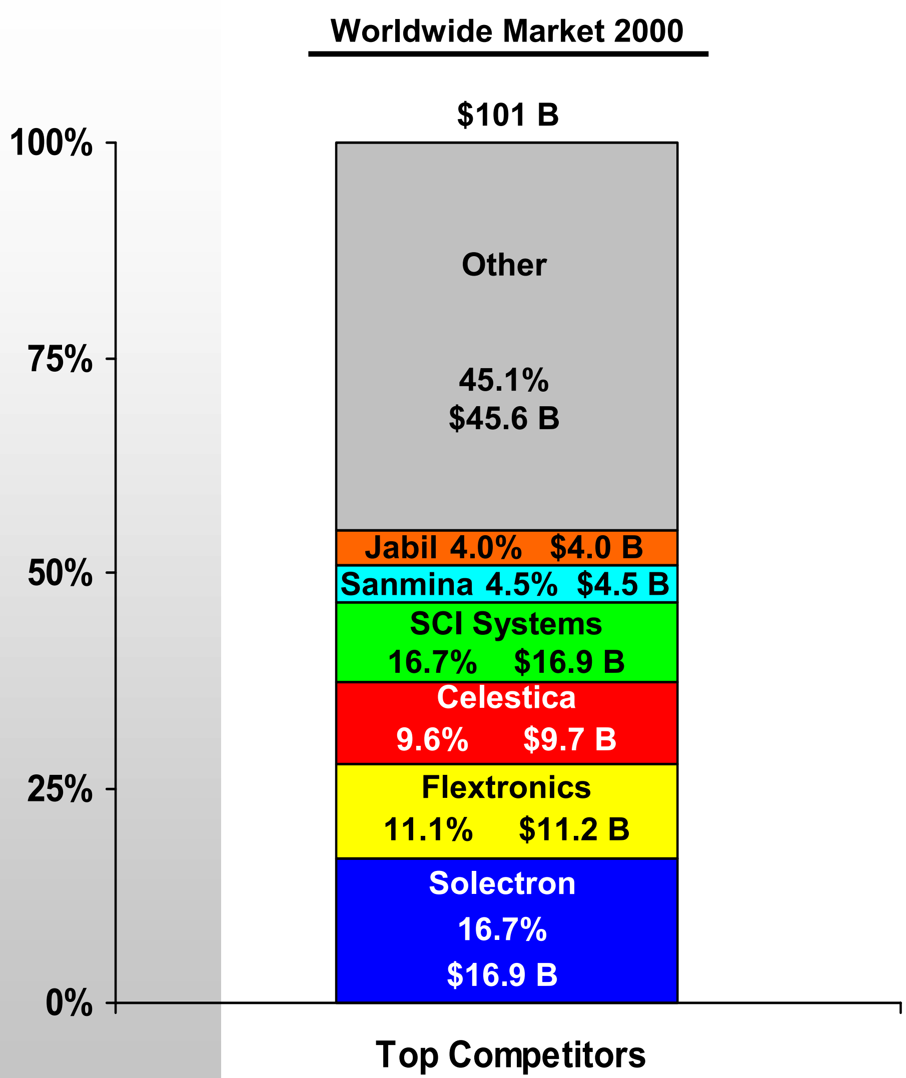
Provides for faster time to market

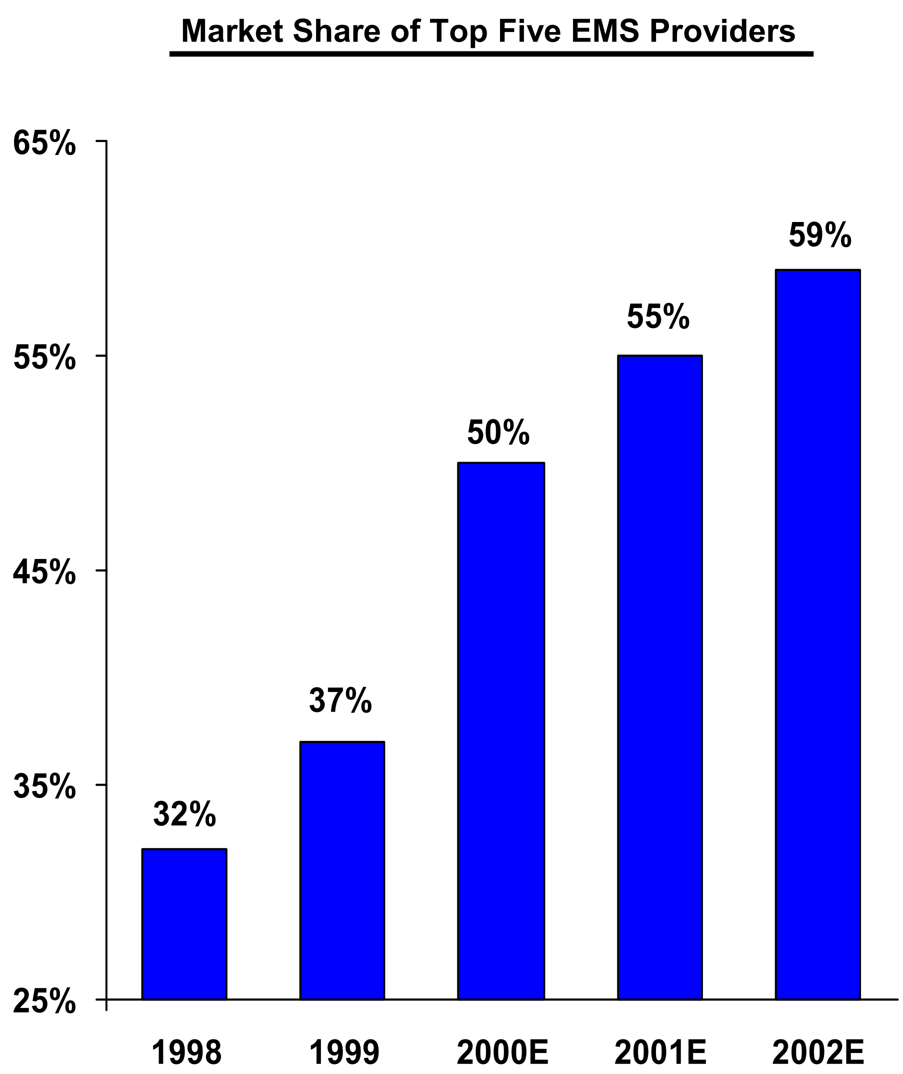
- Shortening the lifecycle between order and delivery
- Flextronics' "Industrial Park" model reduces time associated with manufacturing and supply chain coordination
  - Complete on-site production

Reduces Cost

- Worldwide low-cost factory locations
- Better Leverage of Economies of Scale that enable Moore's Law price/performance
  - Better logistics
  - Ability to procure materials cheaper
- Reduces factory/capital investments
  - Higher Return on Invested Capital

Top 5 Players Accounted For 50% Of The $101 Billion Industry In 2000

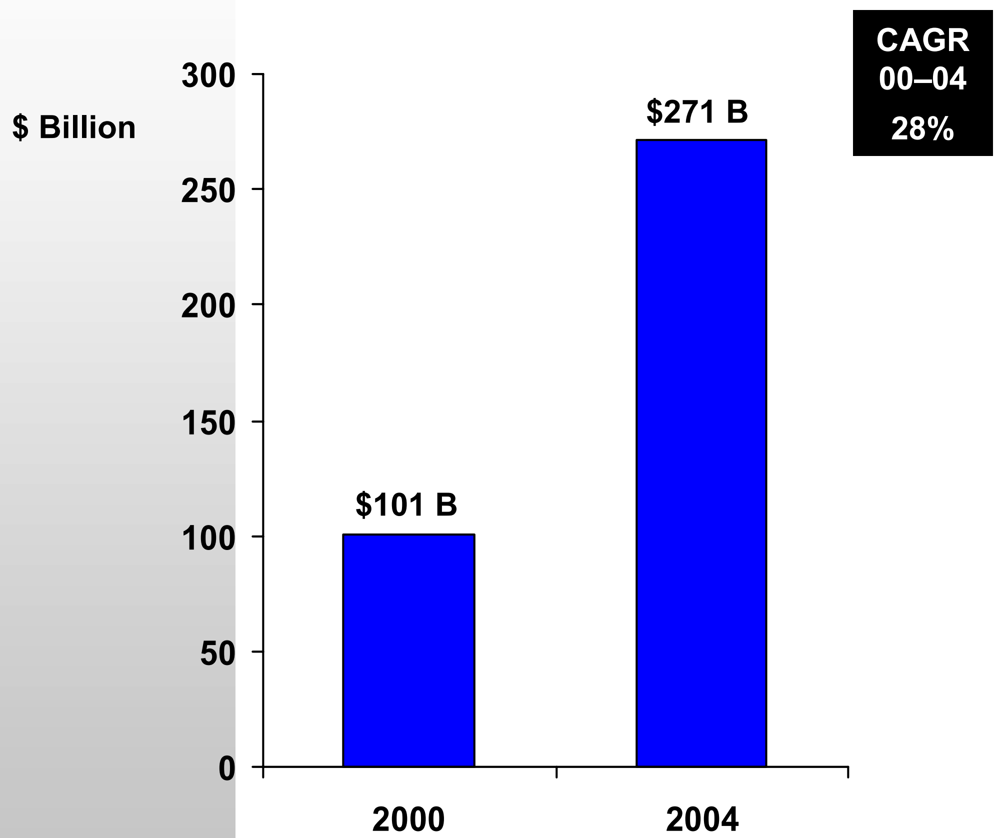




1. Acquired by Sanmina July 2000
SOURCE: Wall Street Journal, Financial Times, Upside Today

Industry Expected To Experience Tremendous Growth Over Next Four Years

Contract Electronic Manufacturing Growth



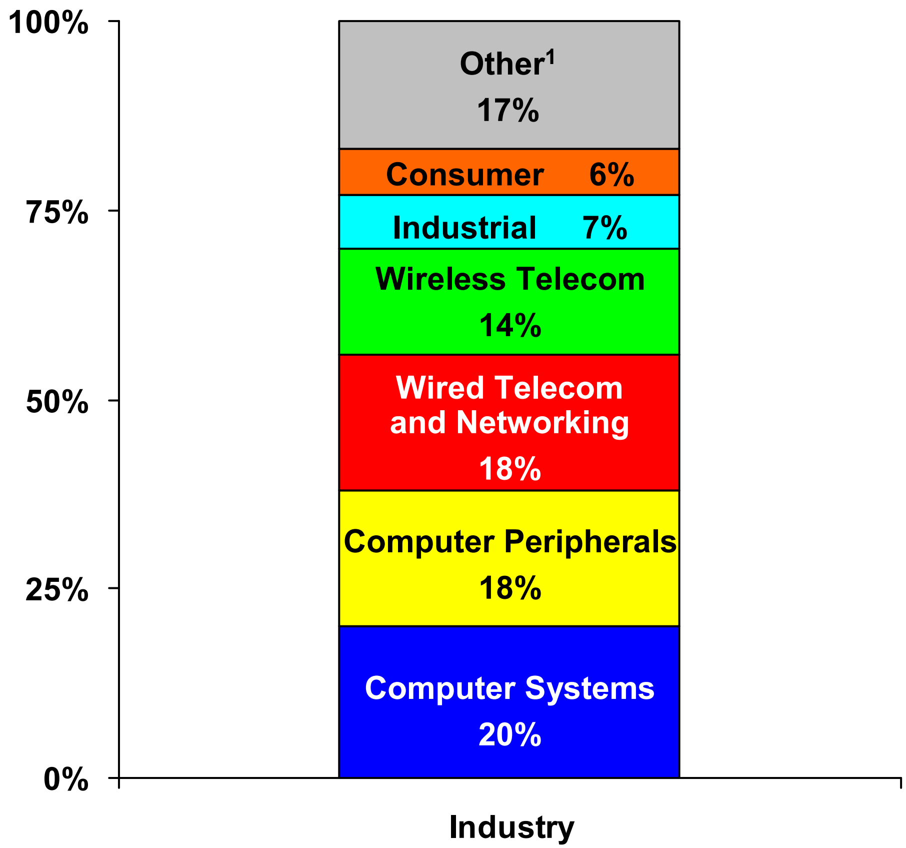
Key Trends

- Balance sheet optimization and cash flow improvement
- Achieve flexible, variable cost structures
  - Reduce operating risks
- Better leverage of Economies of Scale and innovation
- Achieve better focus on core competencies
- Industry convergence of cable, telecom, and wireless

Source: Merrill Lynch

Client/Industry Diversity Is A Key Survival Tool In A Downturn

EMS Market Breakdown By Industry



Wide Selection Of Clients Smoothes Out Peaks And Valleys Of End-User Demand

1. Includes Instrumentation, Medical Instrumentation, Military/Aerospace (4% each); Automotive (3%), and Other (2%)

SOURCE: Upside Today, Asaba Group Analysis

Critical Success Factors For Contract Manufacturers

Size and Scale

- Must be able to achieve economies of scale
- PCB assembly and testing comprises roughly 67% of most CEMs' revenue but has a gross margin of only 8 to 9%. Huge volume is necessary to survive in the business

Global Presence/Footprint

- Must be where your customer is to control logistics cost
- Must be able to enjoy cheap labor rates – Far East, Mexico and Africa
- Must be able to provide round-the-clock services
  - Code writing and product development

Ability to make products in one place

- Keeps costs down
- Faster production means faster time to market
  - Flextronics' "Industrial Park" model

Ability to provide complete service solutions (vertical model) or diversify across industries (horizontal model) or both

Opportunities For Minority-Owned Businesses

The EMS Industry being shaped in economy slowdown

- Missing out today means losing market share tomorrow
- Telecom companies making outsourcing decisions

Opportunities exist in the Repair, Warranty, Optical Components, Modules, and Subassembly segments

- The $100 Billion Repair, Re-manufacturing and Warranty market is only 1% penetrated

Acquisitions expected in areas of design, technical solutions and support services

- Must strategically position the company today for tomorrow's growth
- Adopt the horizontal model and stick to it
  - Size required for vertical model
  - Horizontal model allows concentration on core competency
  - Greater diversity necessary to survive demand slowdowns can be achieved
  - Allows the company to become best in its niche and grow from there

Joint Ventures and Alliances are necessary to achieve stability and size

- Locate geographically near partner's or client's facility
- Recruit top talent to drive innovation
- Perform better, faster, cheaper in your niche and force an alliance or joint venture

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Content

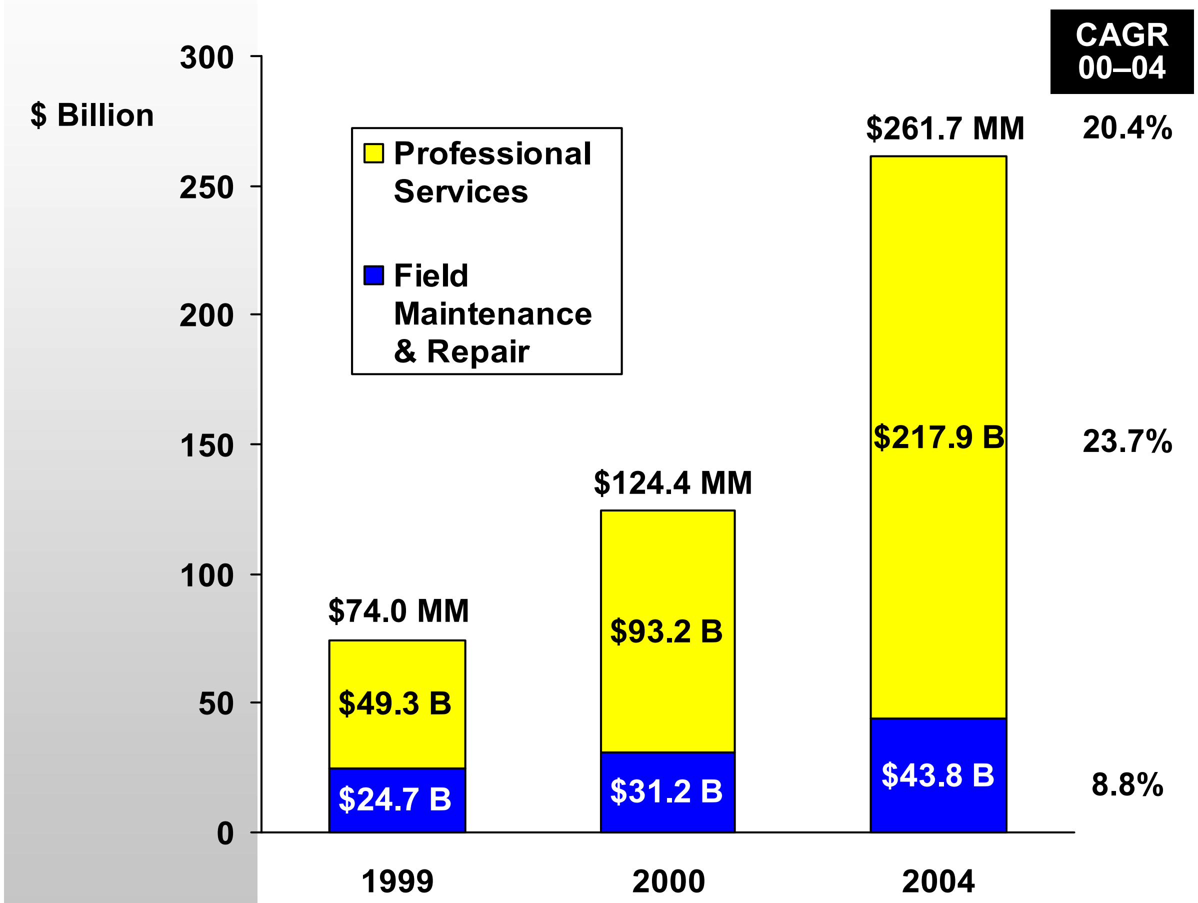
STRATEGY AND BUSINESS IMPROVEMENT CONSULTING

Project Overview/Introduction	3-6
Industry Overview	7-24
Customer Call Center Management	25-31
Contract Electronic Manufacturing	32-39
Network Engineering, Furnish & Installation (EF&I)	**40-47**
Optical Networking/IP Traffic	48-57

Telecommunications Engineering, Furnish And Installation Expected To Grow

Currently Estimated Spending Is $124 Billion

Telecommunications EF&I Spending



Key Trends

- Field maintenance and repairs experience slow growth
  - Technology improvements increasing time between repairs
  - Software replacing functions traditionally done by hardware
- Professional services is high-growth segment
  - Network integration and support, installation
  - Software support
  - Planning, design and deployment

SOURCE: MultiMedia Telecommunications Association, d.f. Blumberg & Associates

Network Installation and Construction Shifting From Long Haul To Metro/CPE Environment

Prior investments focused on building long-haul networks

- Network builders and telephone companies spent $90 billion over least four years on fiber optic network
  - An estimated 39 million miles of glass fiber exists
- Analysts estimate less than 5% is used today
- Expect minimal investments in installation expenditures focused on long haul fiber networks

Fiber optics under-utilization is a function of an absence of local high-speed networks

- Local networks unable to handle large volumes of traffic

As new innovative applications come to market, service providers will be compelled to invest in "last mile" upgrades

- Financial investment will be closely tied to growth and profitability of new services

MBE's Can Expect Long-Term Opportunities From Upgrades In Local Networks

Telecom Industry Dynamics Which Favor Network Installation Services

Telecommunications networks require ongoing maintenance and upgrades

- Service providers seek “Five Nines” (99.999%) reliability and installation integrity
- Industry players continue to downsize and seek partners to outsource installation and deployment services

Constantly changing and new innovative technologies require rapid deployment

- Broadband (cable and DSL) deployment growing
  - Central offices, fiber optics, and cable upgrades
- Convergence of the network to incorporate optically networking
- Opening the bottlenecks associated with metro networks

Equipment Suppliers and System Integrators desire to partner with strong reliable EF&I firms

- Strong regional footprint desired

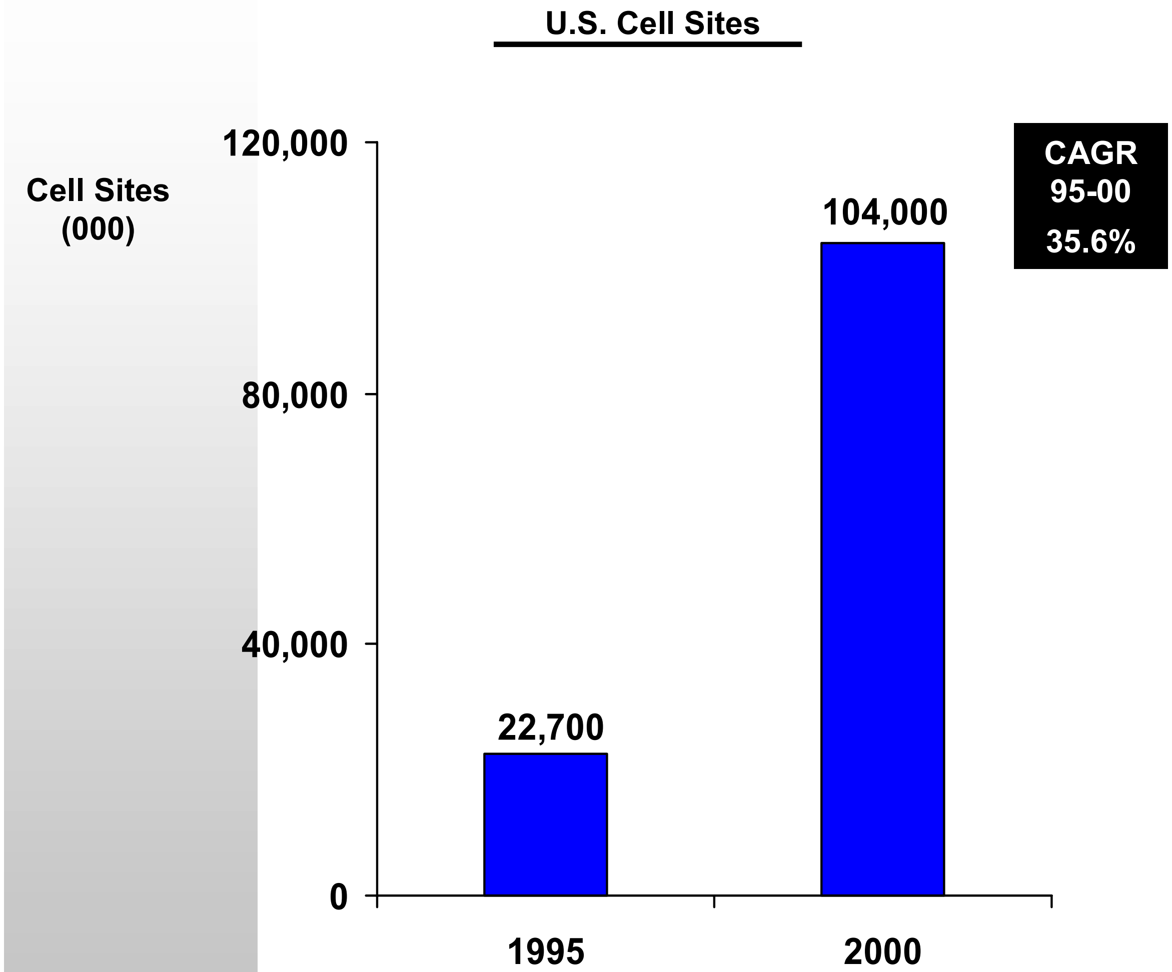
Consolidation by Telecom carriers driving need for network integration

- Demanding System Integrators and equipment suppliers to deliver “turned-up” working system
- Opportunities for EF& I vendors to serve contiguous areas
- Shrinking lifecycle of technology equipment

Industry convergence with wireless, cable, and telecommunications increasing network installation complexity

Potential Opportunities For MBE's To Grow In This Sector

Wireless Industry Growth Provides Opportunities In Cell Site Construction And Network Support



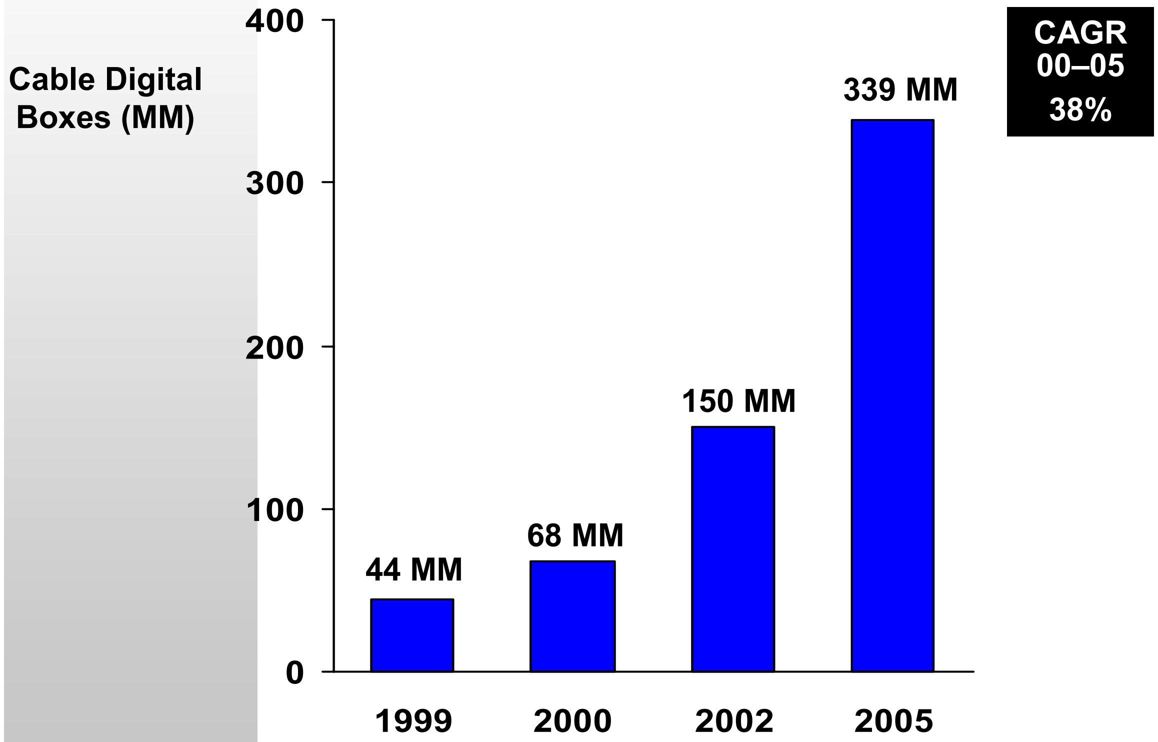
Key Trends

- Completion of nationwide build-out by wireless service providers
- Regional players and broadcast also building out territories
  - Bring on additional capacity or fill-in sites
- 2.5G and 3G services driving network upgrades
- New auctioned spectrums will increase need for more cell sites

SOURCE: Cellular Telecommunications Industry Association, Wall Street Journal

Cable Providers Also Increasing Expenditures In Network Upgrades And Installation

Worldwide Installed Base Cable Digital Boxes

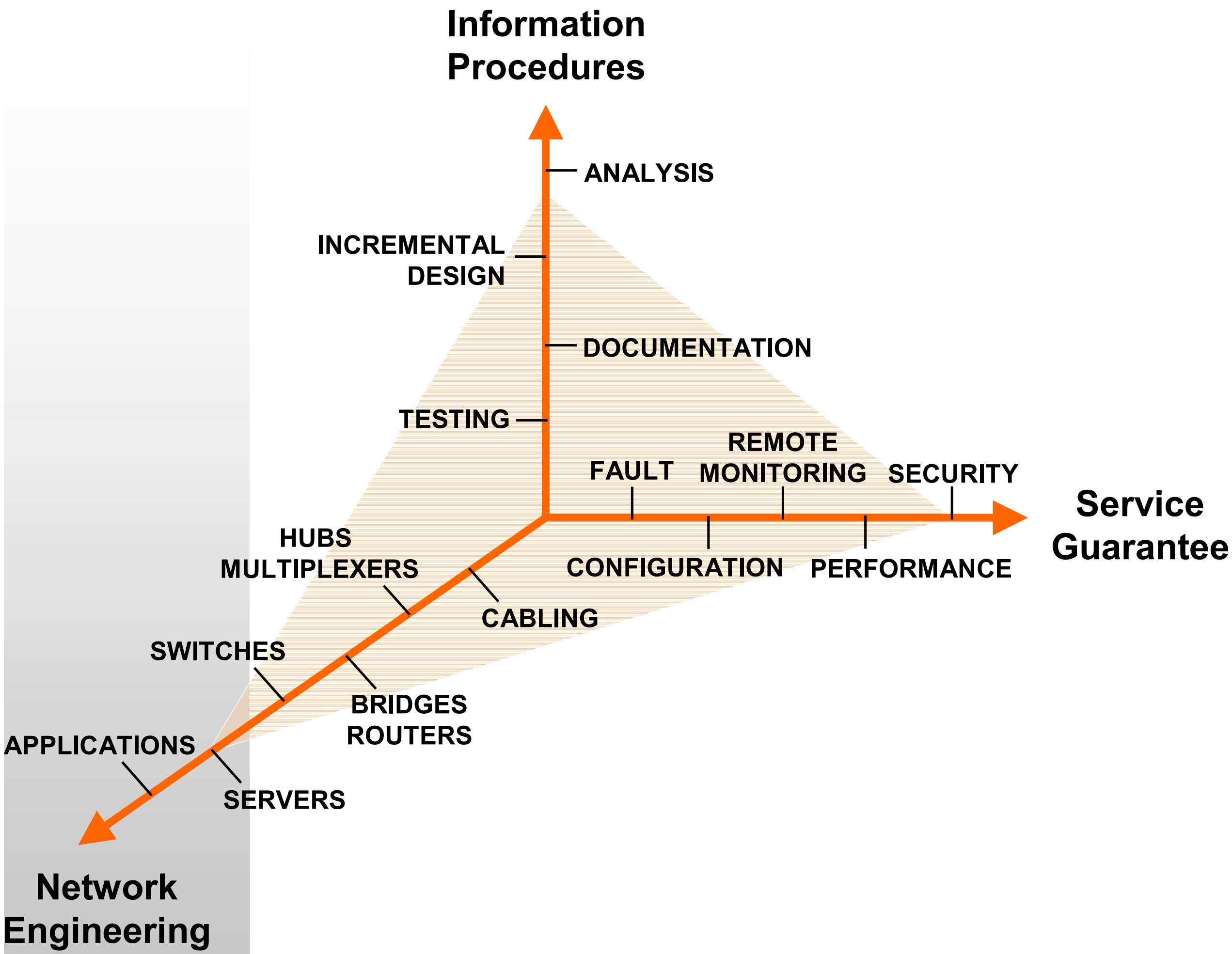


Key Trends

- Cable companies replacing coaxial cable with fiber options
  - "Last mile" upgrades
- Cable companies providing new bundled services
  - Video, telephony, broadband
  - Interactive entertainment

SOURCE: Allied Business Intelligence, Master Company Reports, Wall Street Journal

Successful MBE's Will Develop Capabilities In The Following Three Areas

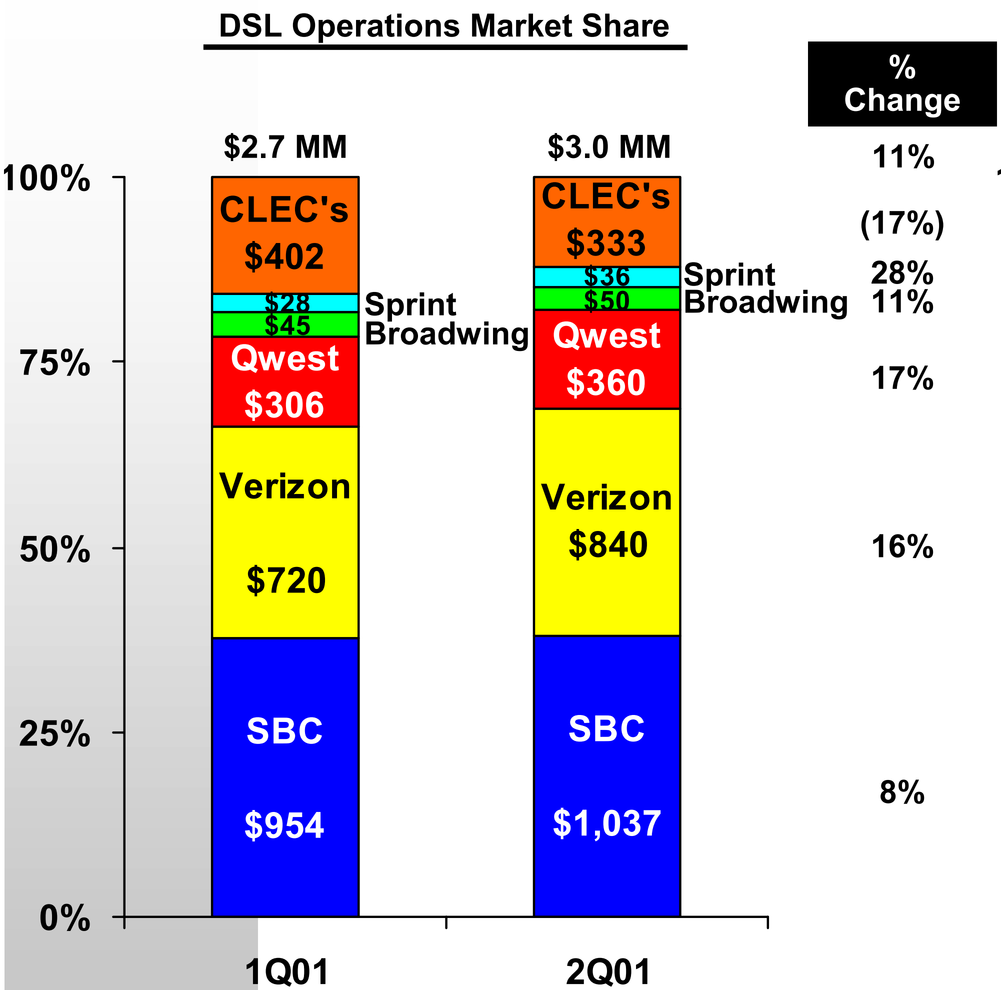


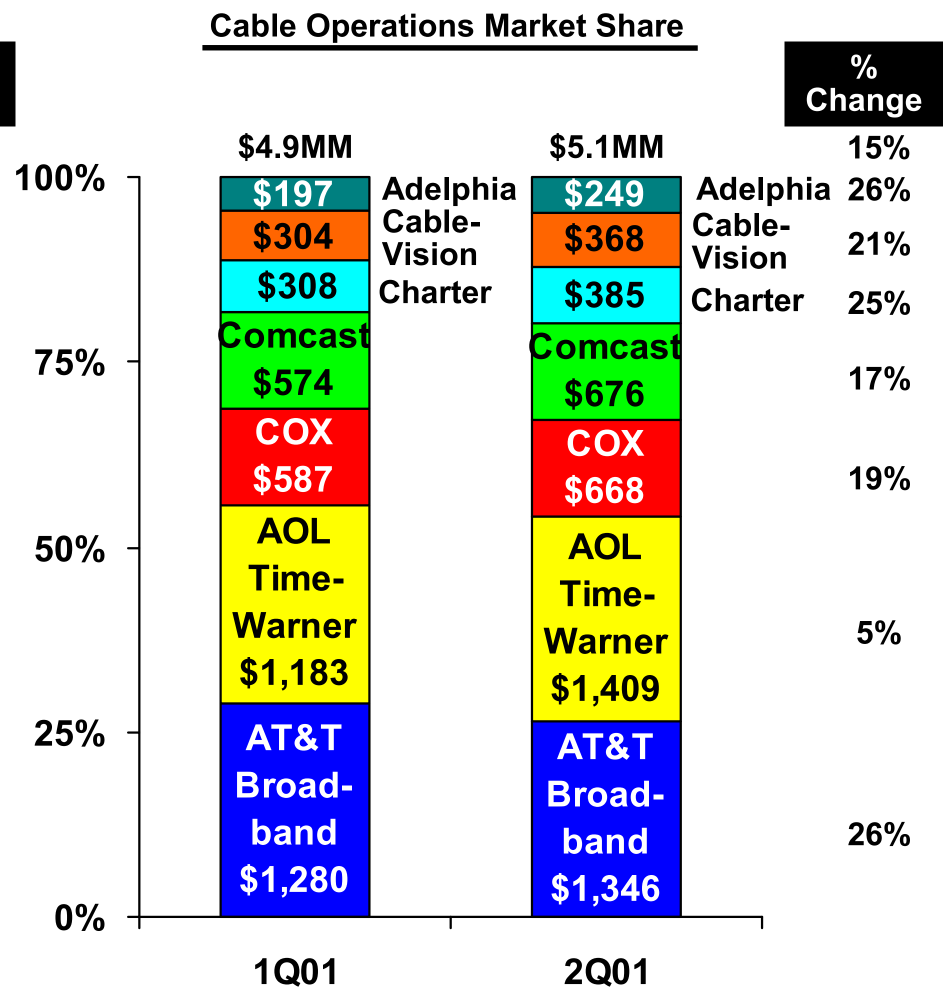
Key Success Factors

- Strong regional scope
  - Ability to service large regions
  - "Turf vendors"
- Run multiple jobs simultaneously
- Pull multiple disciplines together to generate customer solutions
- Tightly integrated into OEM and service provider operations

Essential In Building Winning Value Propositions

MBE's Should Target The Top Tier Players In The Industry





Leading Players Will Most Likely Continue EF&I Investments

SOURCE: Merrill Lynch

Content

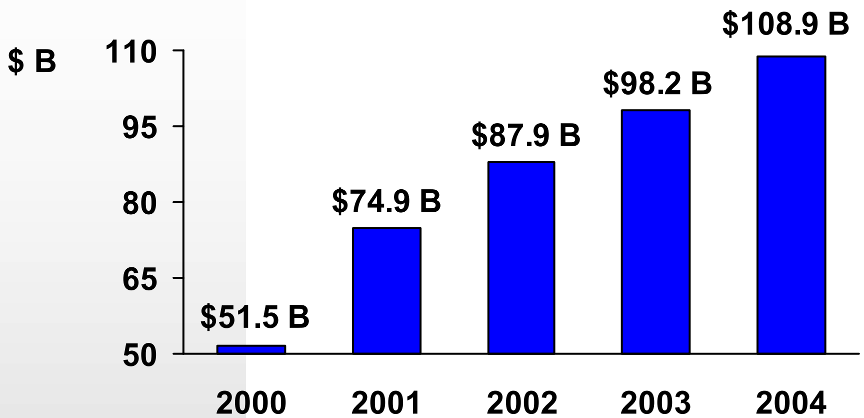
STRATEGY AND BUSINESS IMPROVEMENT CONSULTING

Project Overview/Introduction	3-6
Industry Overview	7-24
Customer Call Center Management	25-31
Contract Electronic Manufacturing	32-39
Network Engineering, Furnish & Installation (EF&I)	40-47
Optical Networking/IP Traffic	**48-57**

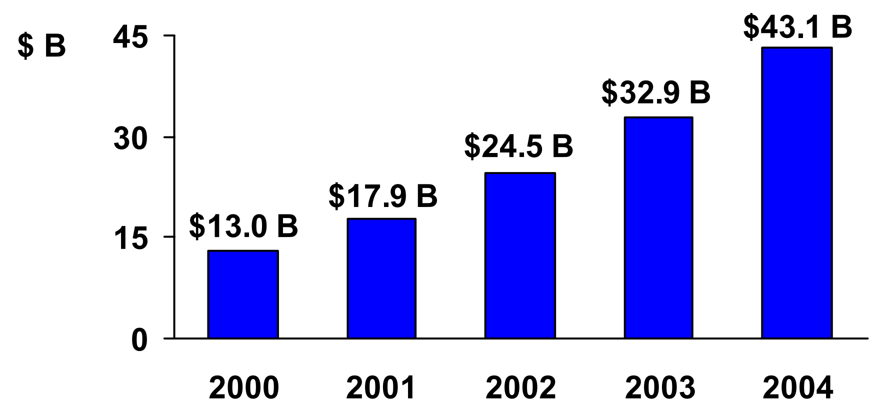
The Asaba Group

Wireless, Broadband, And IP Applications Are Areas Of Future Growth

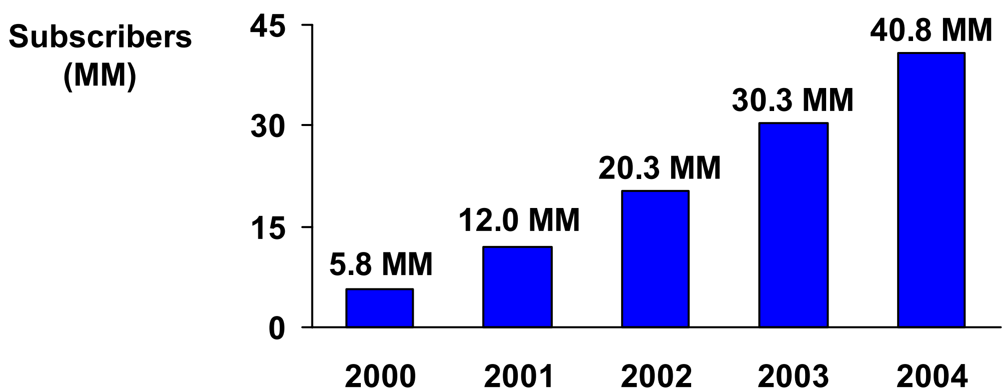
Wireless Services Revenue Forecast



IP Revenue Forecast



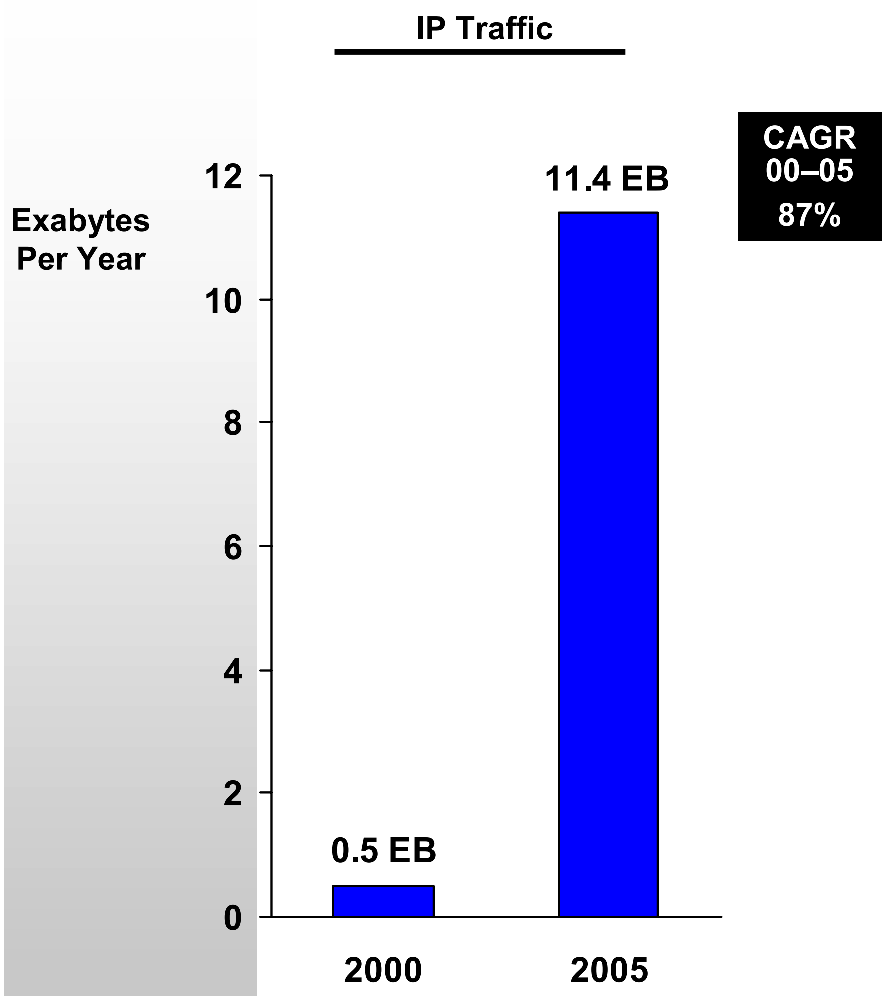
Broadband Subscriber Forecast

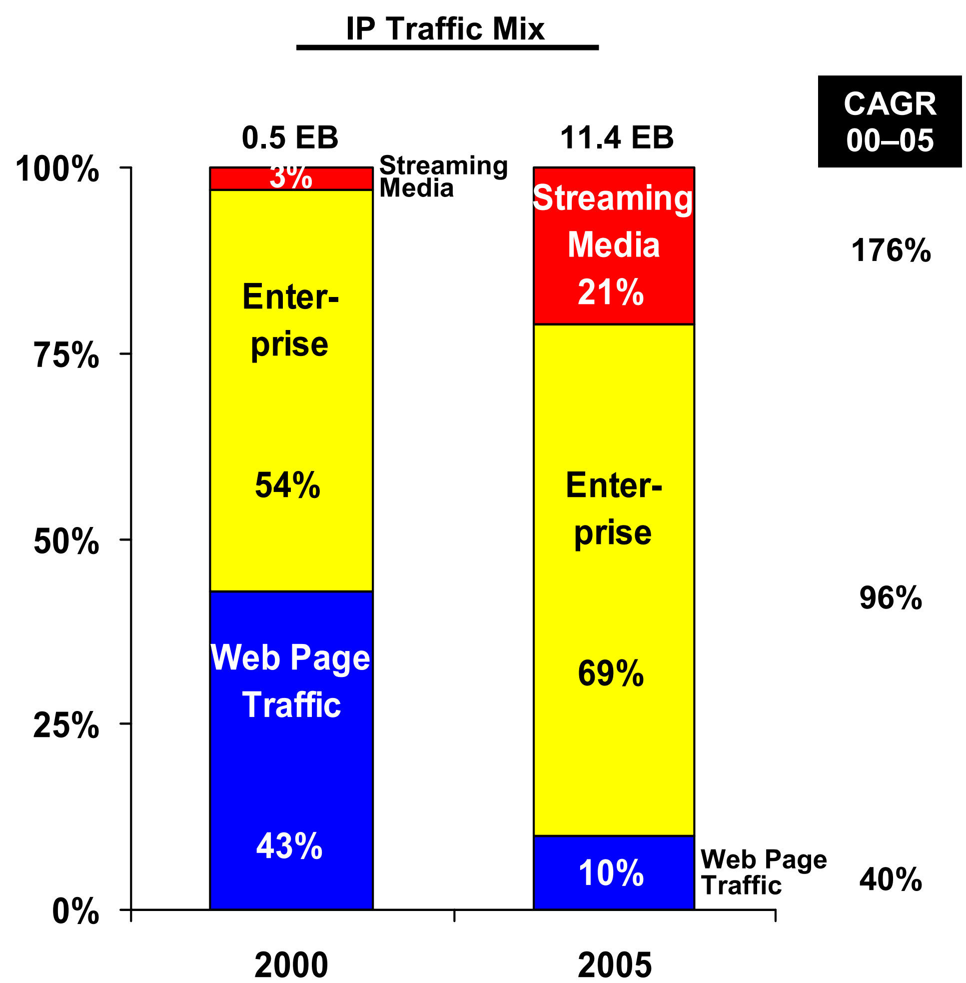


SOURCE: Merrill Lynch, JP Morgan, McKinsey & Company, MultiMedia Telecommunications Association, Asaba Group analysis

IP-Related Traffic Will Experience Tremendous Growth In Next 5 Years

Mix Of Traffic Is Expected To Shift To Enterprise And Streaming Media



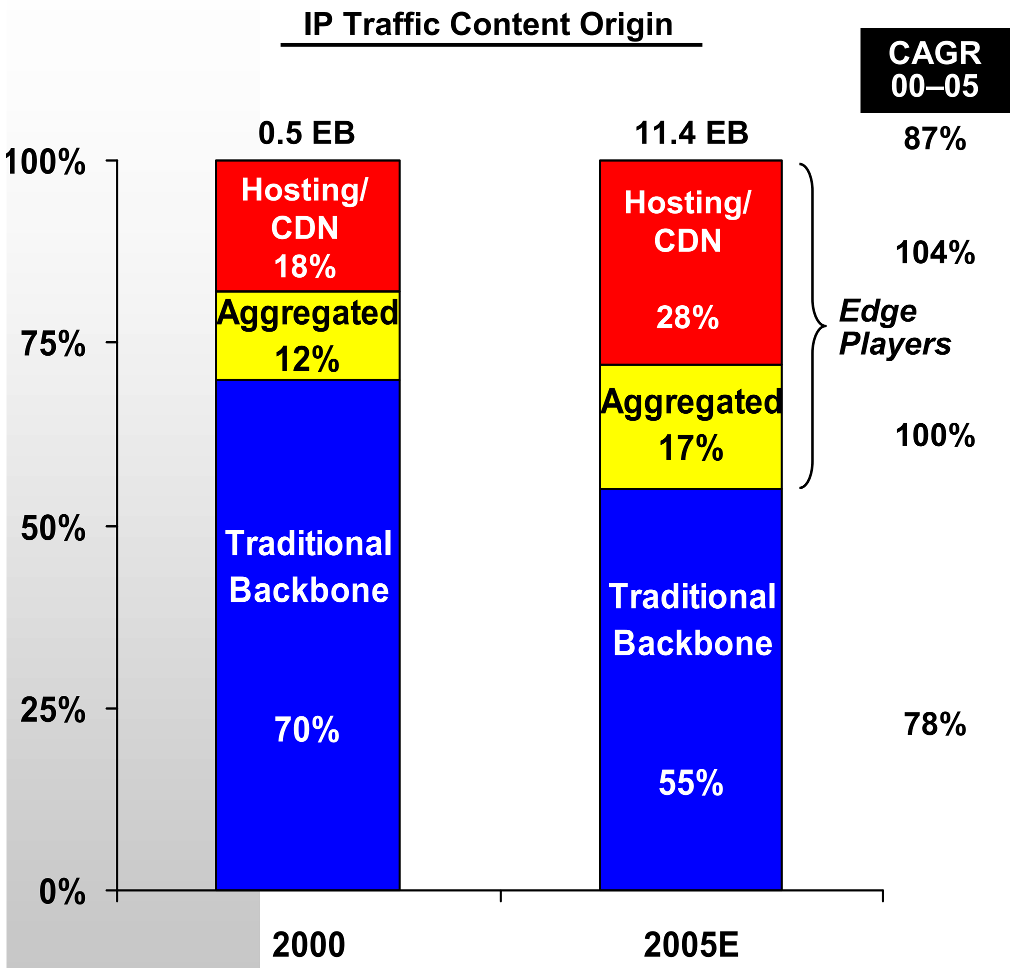


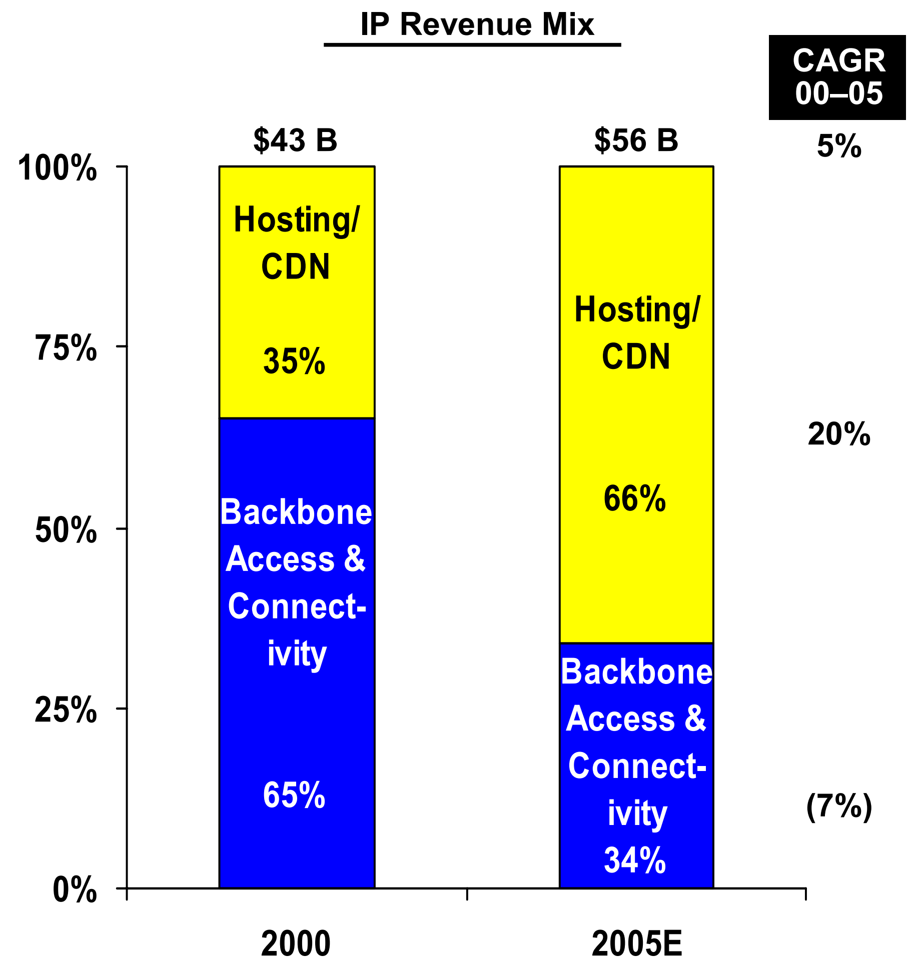
How Can MBE's Partake In This Opportunity?

SOURCE: Merrill Lynch

Opportunities Exist For MBE's As "Edge Players" Or Aggregators

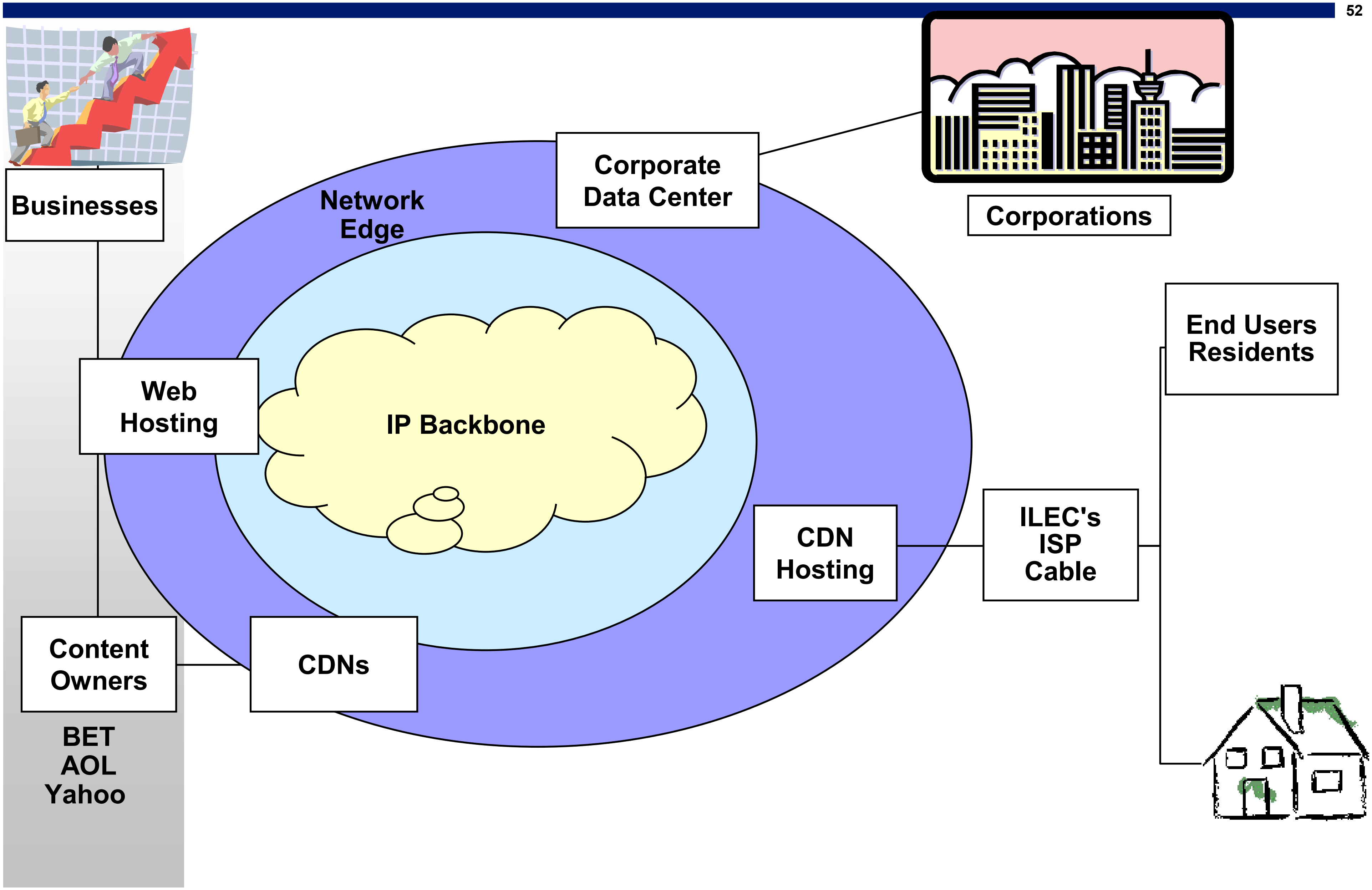
Hosting, Data Centers* Support And CDN Are Potential Value Capture Services





CDN = Content Distribution Networks
* Corporate Internal Data Centers
SOURCE: JP Morgan H&Q, McKinsey & Company

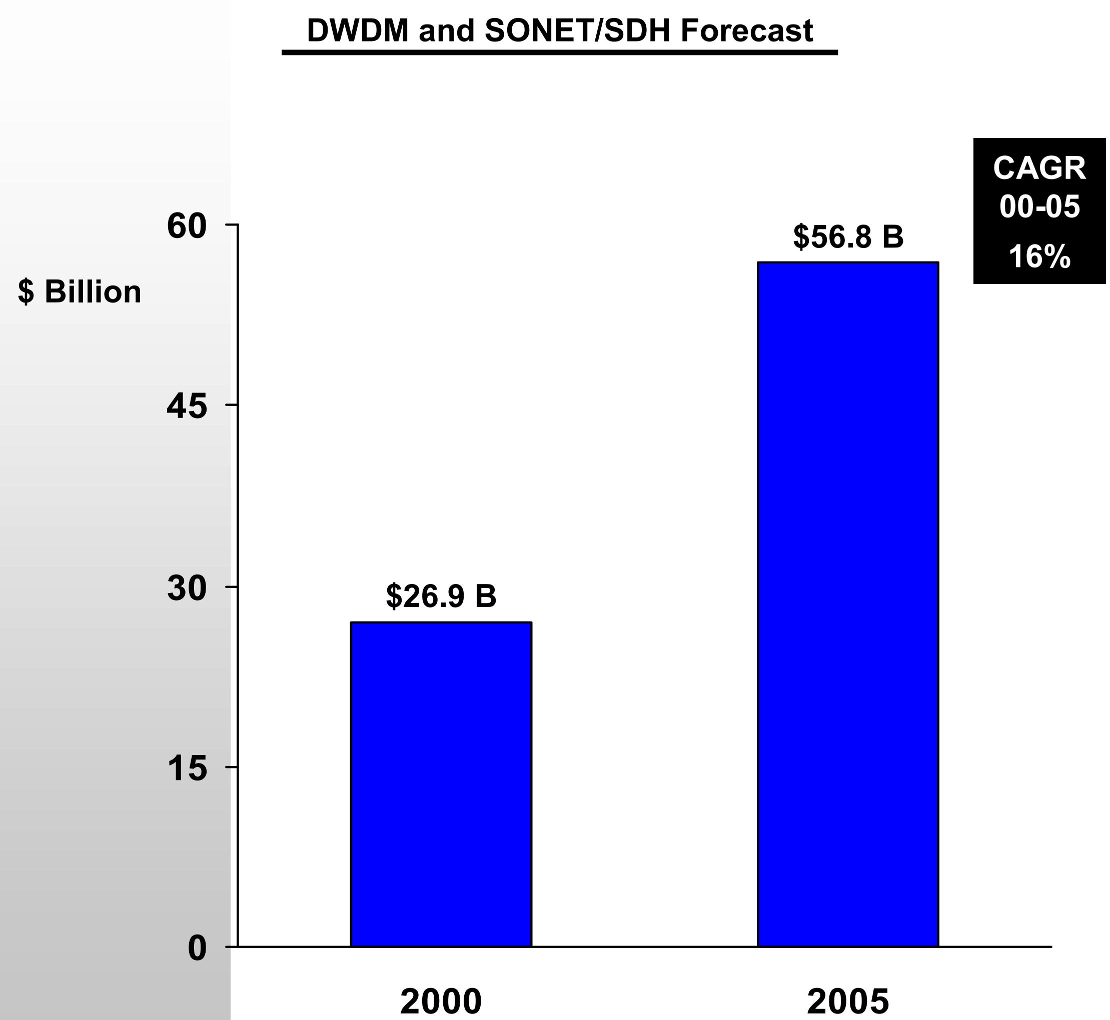
MBE's Should Target ILEC's, Content Owners And Corporate Data Centers



Focus And Excellent Execution Will Be Essential For Success

Potential Opportunity	Value Propositions	Potential Partners/ Customers
Hosting Services	• Strong network and system management expertise • Fully-managed services – Rack rental, connectivity, security and storage • Strong niche experience	• ILEC's/RBOCs • Small- to medium-size businesses • Education
Corporate Data Center Support	• Managing data centers • Quality of service guarantees • Extended enterprise relationship • Security	• Fortune 500 corporations • Government IT centers • Traditional IT outsourcing firms
Content Distributors	• Strong nice experience – Concentrated with dominant players • Download time with streaming media applications – Broad range of access speeds • Enhance experience with real time and interactive broadband applications	• Education establishments • Government entities • Content owners (developers) • Cable companies

Demand For Broadband And Full Service Mobility Create Growth Opportunities



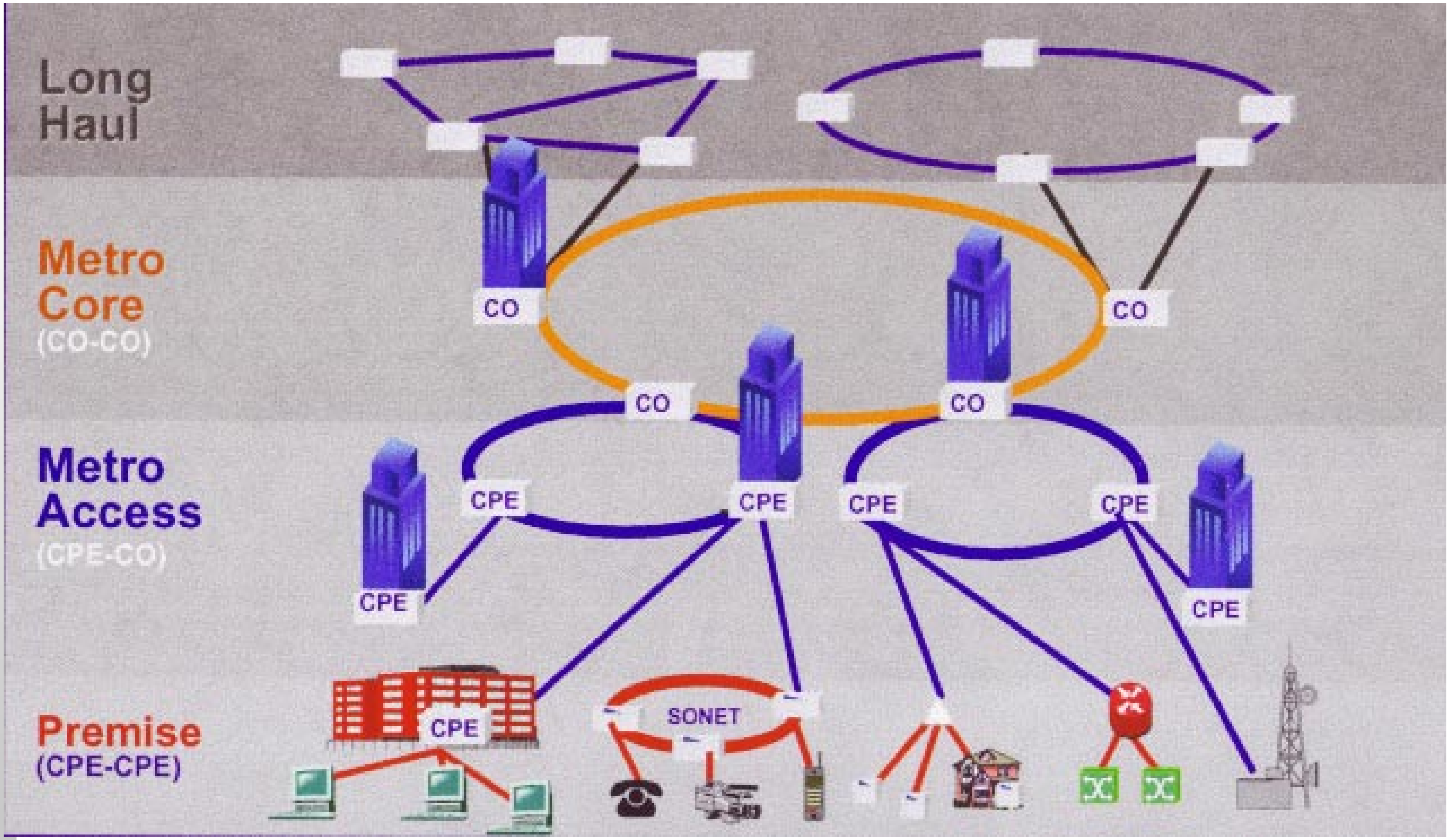
Key Trends

- Need to remove "Last Mile" bottlenecks for broadband connectivity
- Large businesses demand superfast 2Mbps access for e-services applications
- Dense Wave Division Multiplexing technology is yet to be deployed in metro areas (bottlenecks)
- DWDM will enable better cost savings and efficiency improvements

SOURCE: Industry Standard, June 2001

Optical Networking Technology Will Impact The Metro Bottlenecks

Service Providers Will Integrate Optical Technology Within Legacy Networks



xDSL
Cable Modem

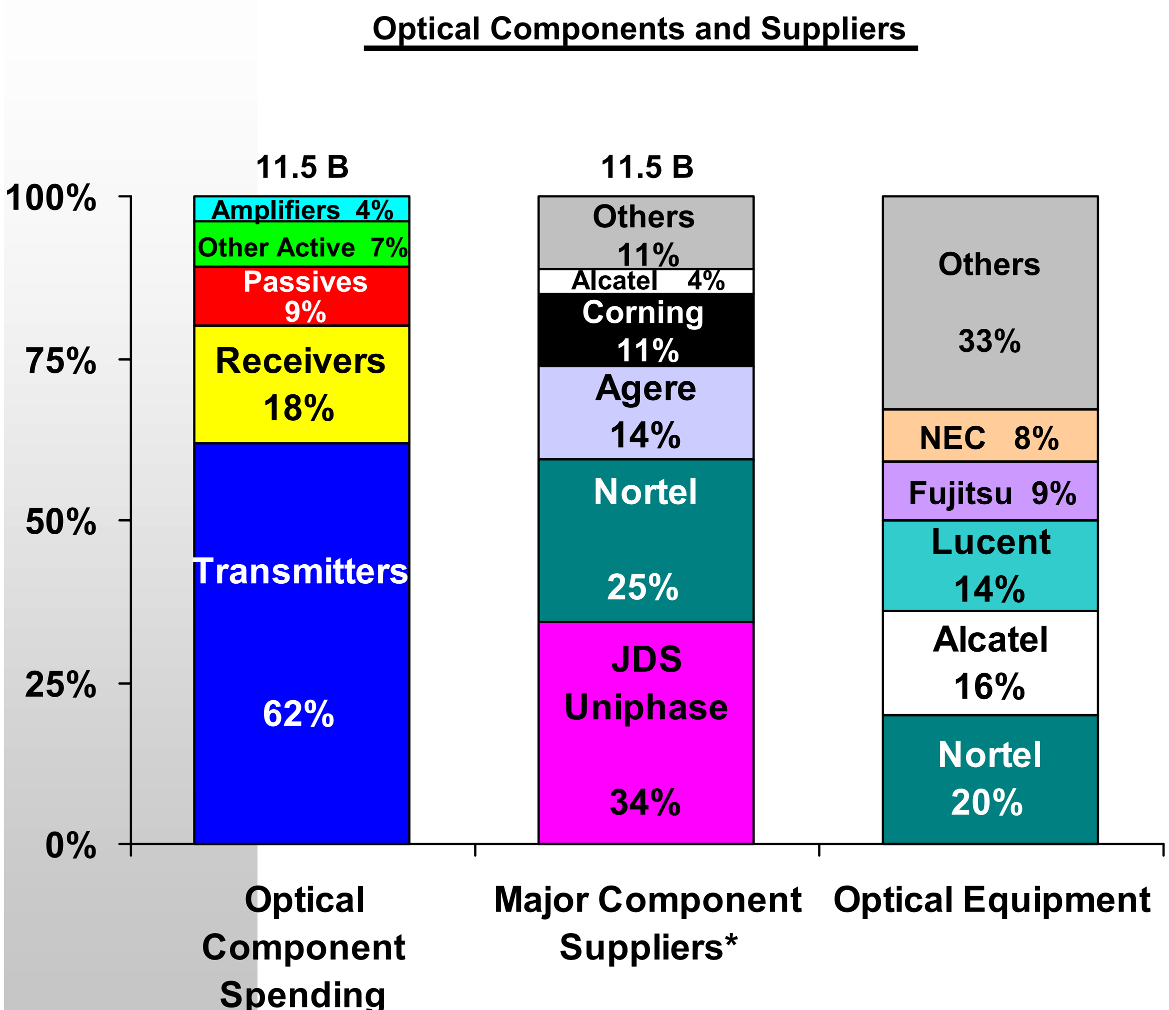
PSTN
Cellular

Fiber
Passive
Optical

Ethernet

Wireless

Significant Opportunities For MBE's In Optical Networking From Component Suppliers To Application Development

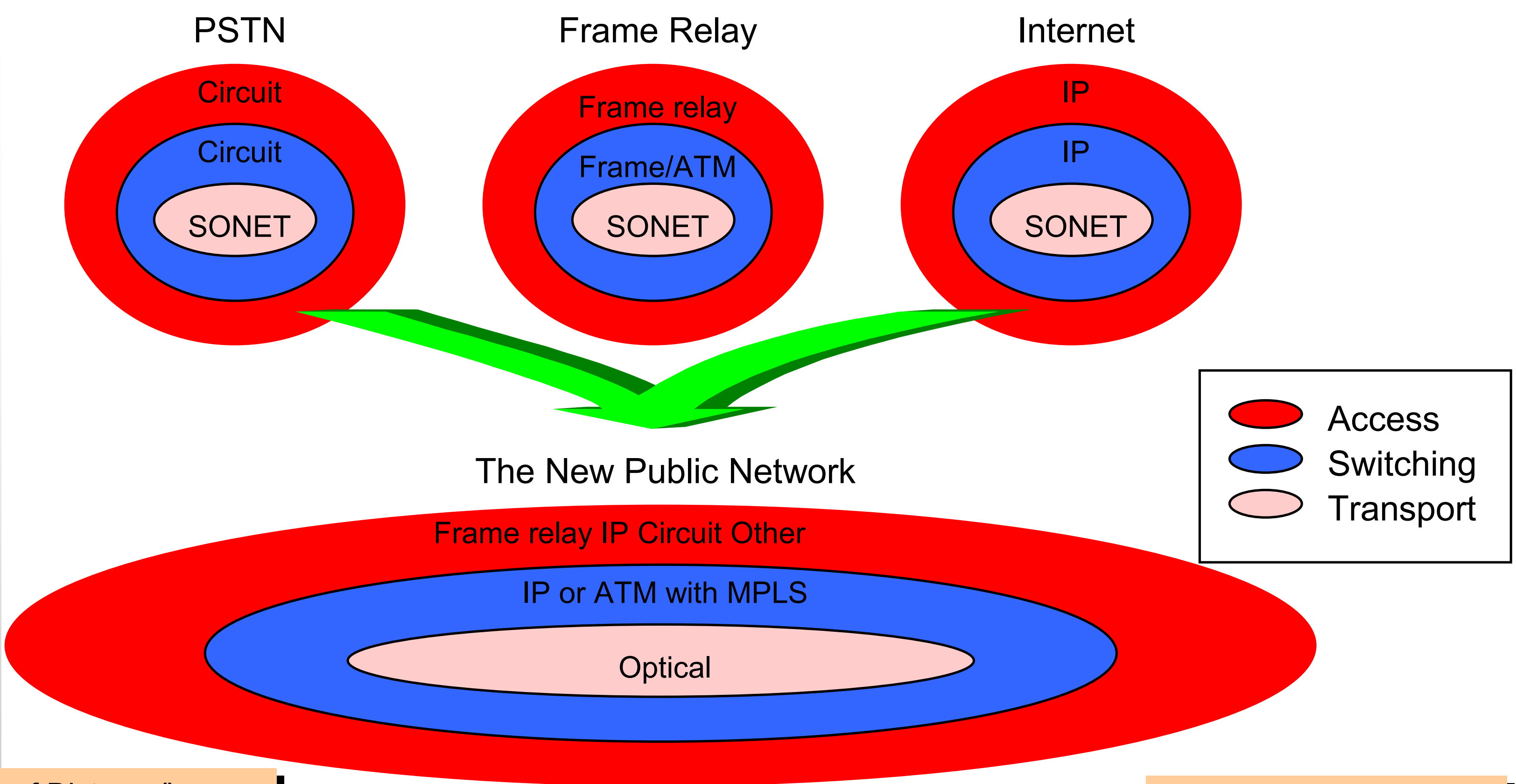


Opportunities

- Service providers will seek partners with "Turf Vendors"
  - Manage complexity
  - Quality and manageability
- Customization of equipment and deployment with OEMS
  - Rapid deployment and tune-up
- Component and technology providers to optical component suppliers
  - Software development and testing
  - Passive and active component supply
- Application development
  - Rich feature sets comparable to PC-based applications

* 2000 Market Share
SOURCE: Industry Standard, Insight Corporation, Dell Oro Group, Wall Street Journal, Merrill Lynch

Optical Networking Growth Will Lead to Network Convergence



"Death of Distance"
Anytime, any-to-any connectivity

Old infrastructure does not disappear

Network optimized for IP

Intelligence at the edge of the network

Carriers must merge billing and provisioning systems

SOURCE: "The New Public Network," Forrester Research

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