Opportunity for Korean Suppliers in North America

KOTRA Presentation

July 2002

Andy Winterbottom, Vice President
iSuppli Corporation

Agenda

- Electronic component market overview (Macro & Micro)
- OEM & EMS Overview
- How to be a supplier to North America
  - **Why outsourcing**
  - **OEM view of purchasing**
  - **OEM analysis of supply base expectation from OEMs**
  - **General OEM and EMS supplier registration Process**
  - **Examples**
    - IBM
    - Hewlett Packard
    - Motorola
    - Nortel
    - Cisco
  - **Suppliers' differentiation strategy and critical factors**
- How is opportunity for Korean suppliers realized?
- Q&A

Electronic Component Market Overview

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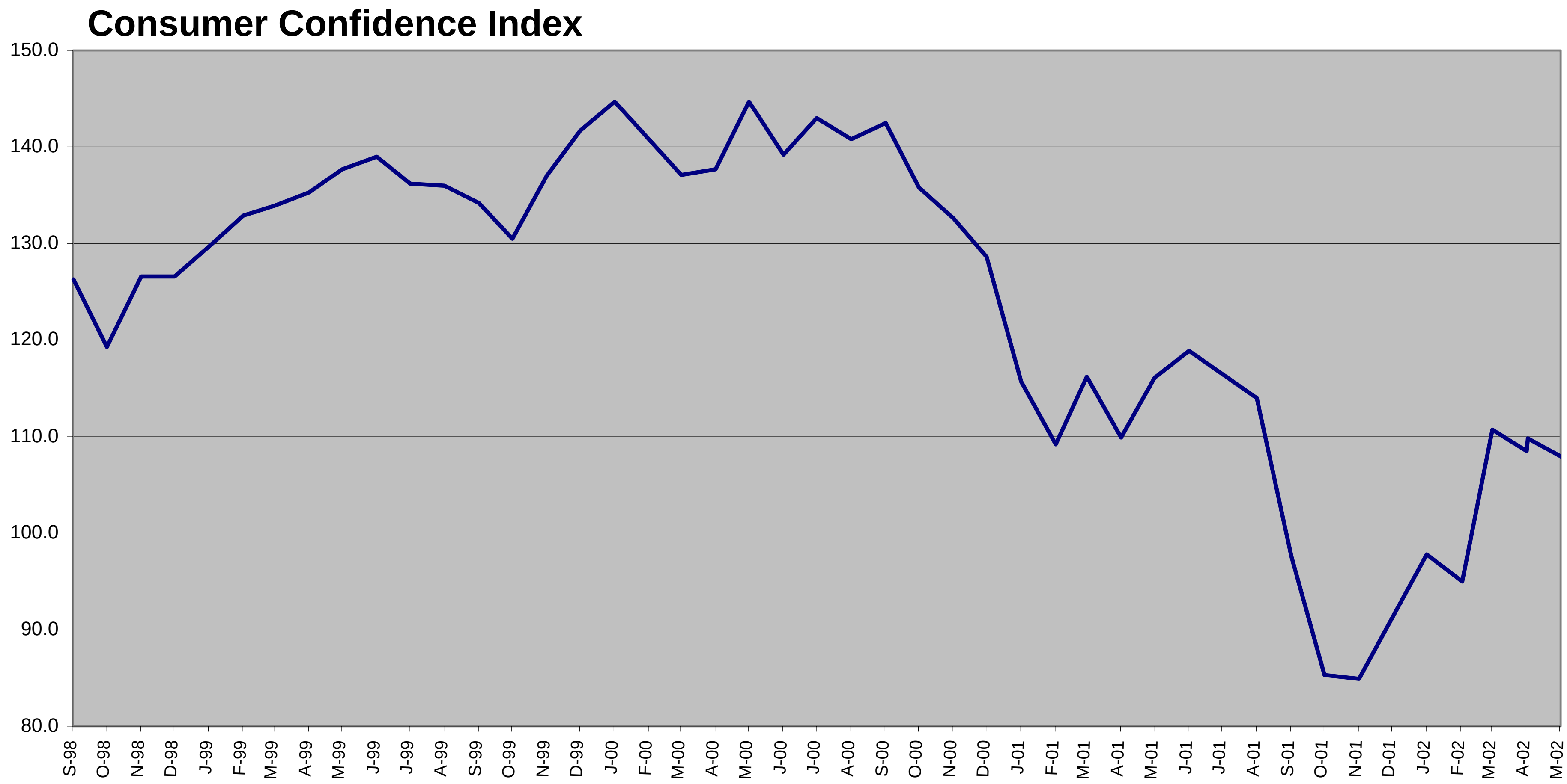
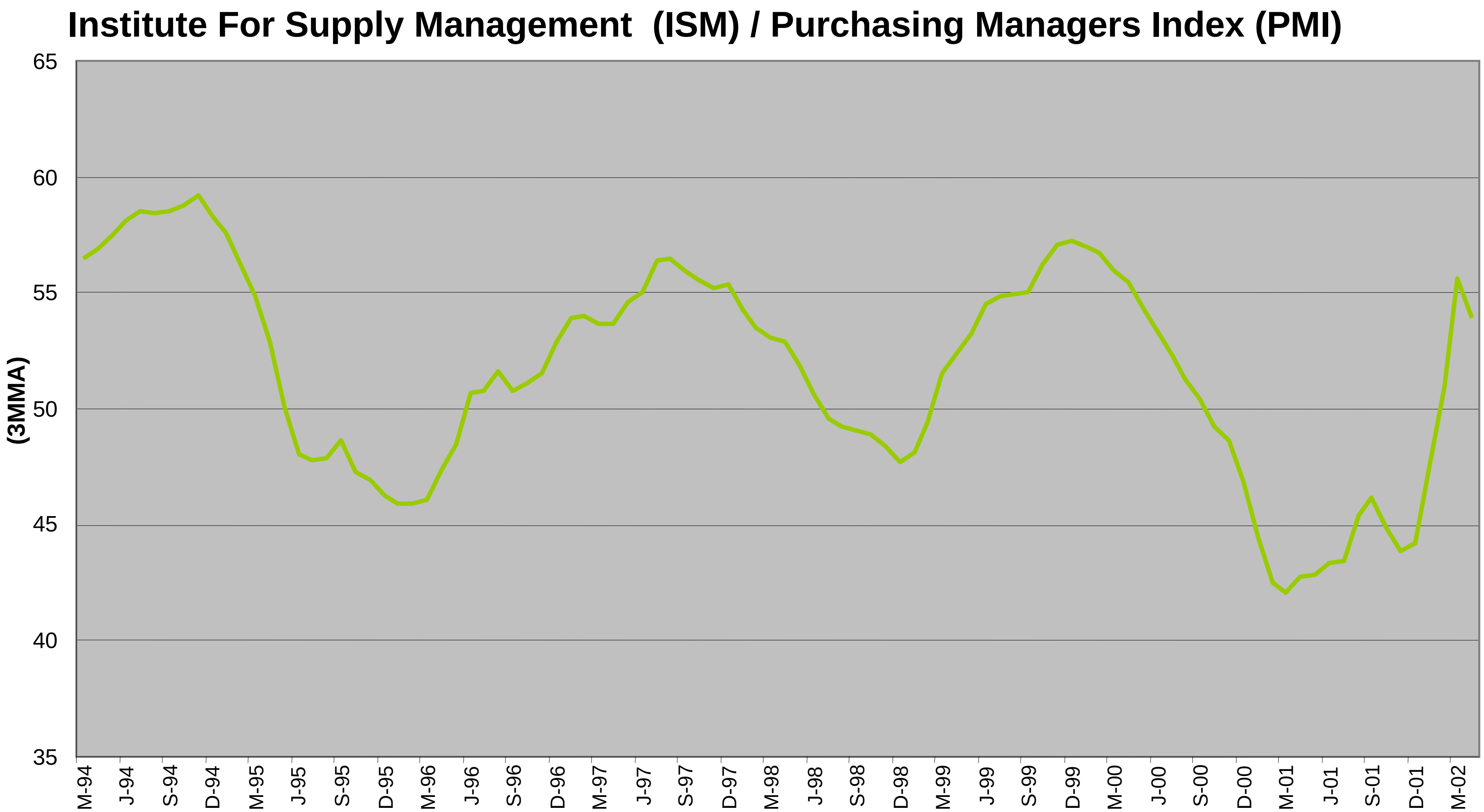
Consumer Confidence is Back to Pre 9/11 Levels…



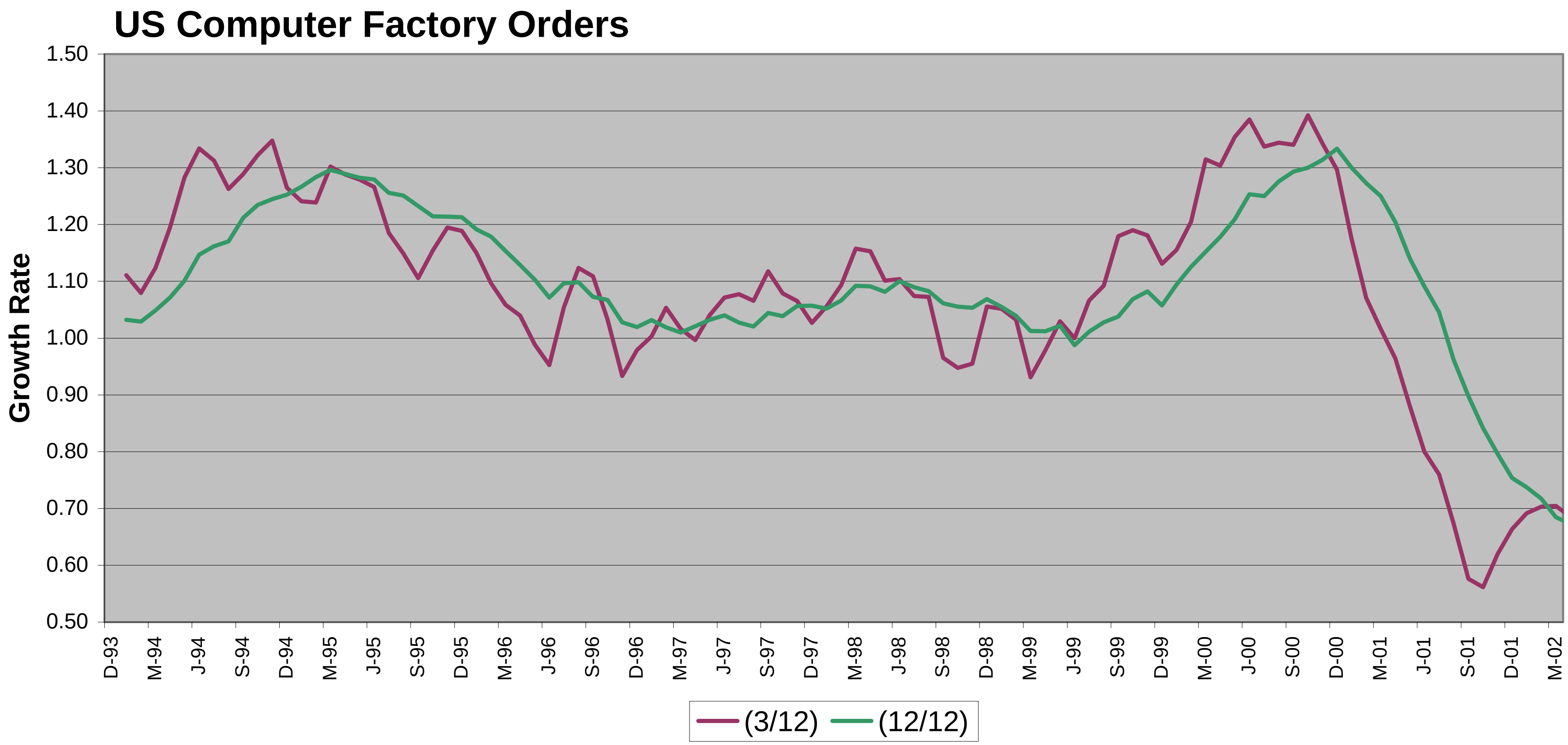
Source – Conference Board

And, Purchasing Expectations are High…



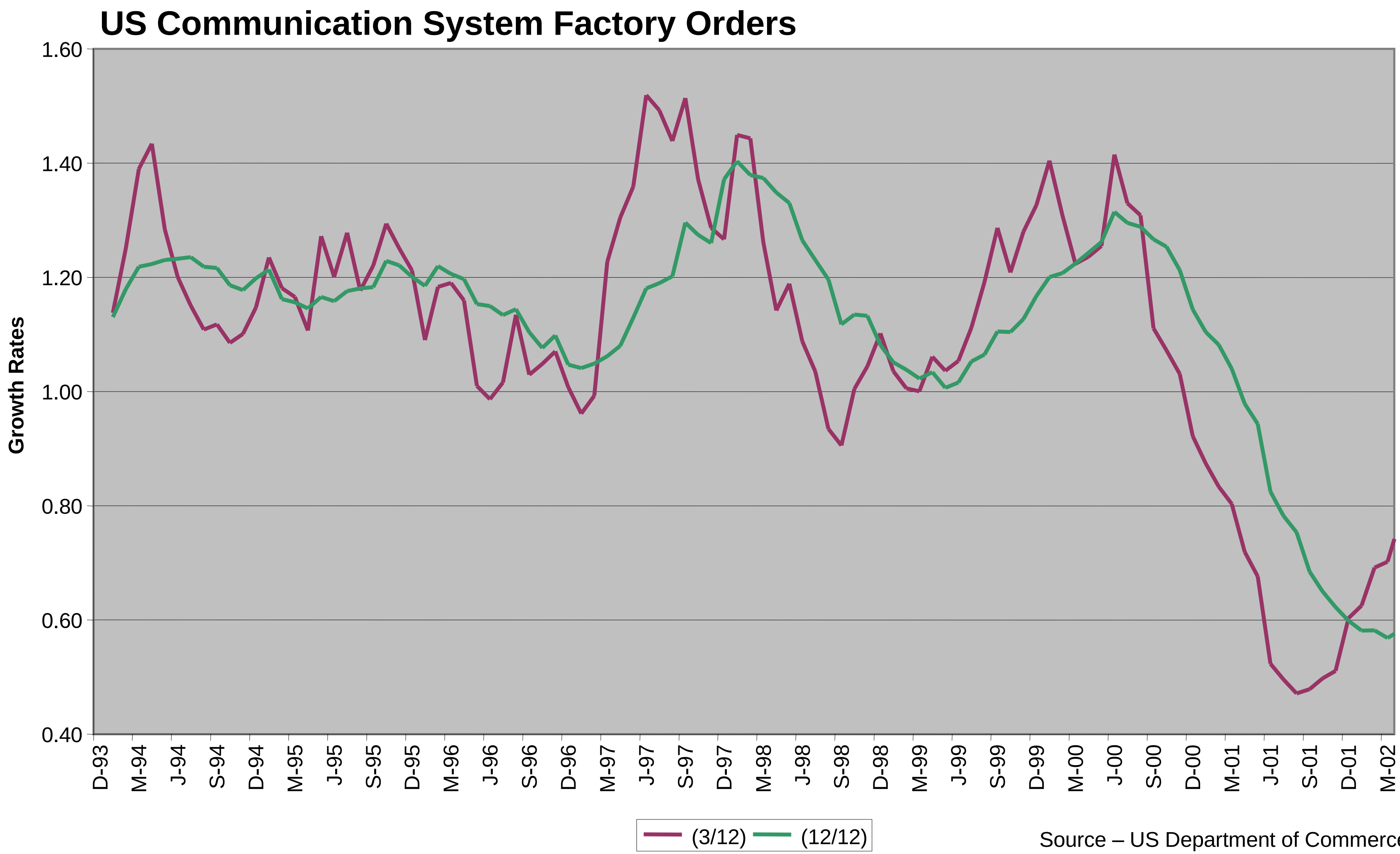
Source – ISM (Formerly NAPM)

But, Computer Orders are Stalling…



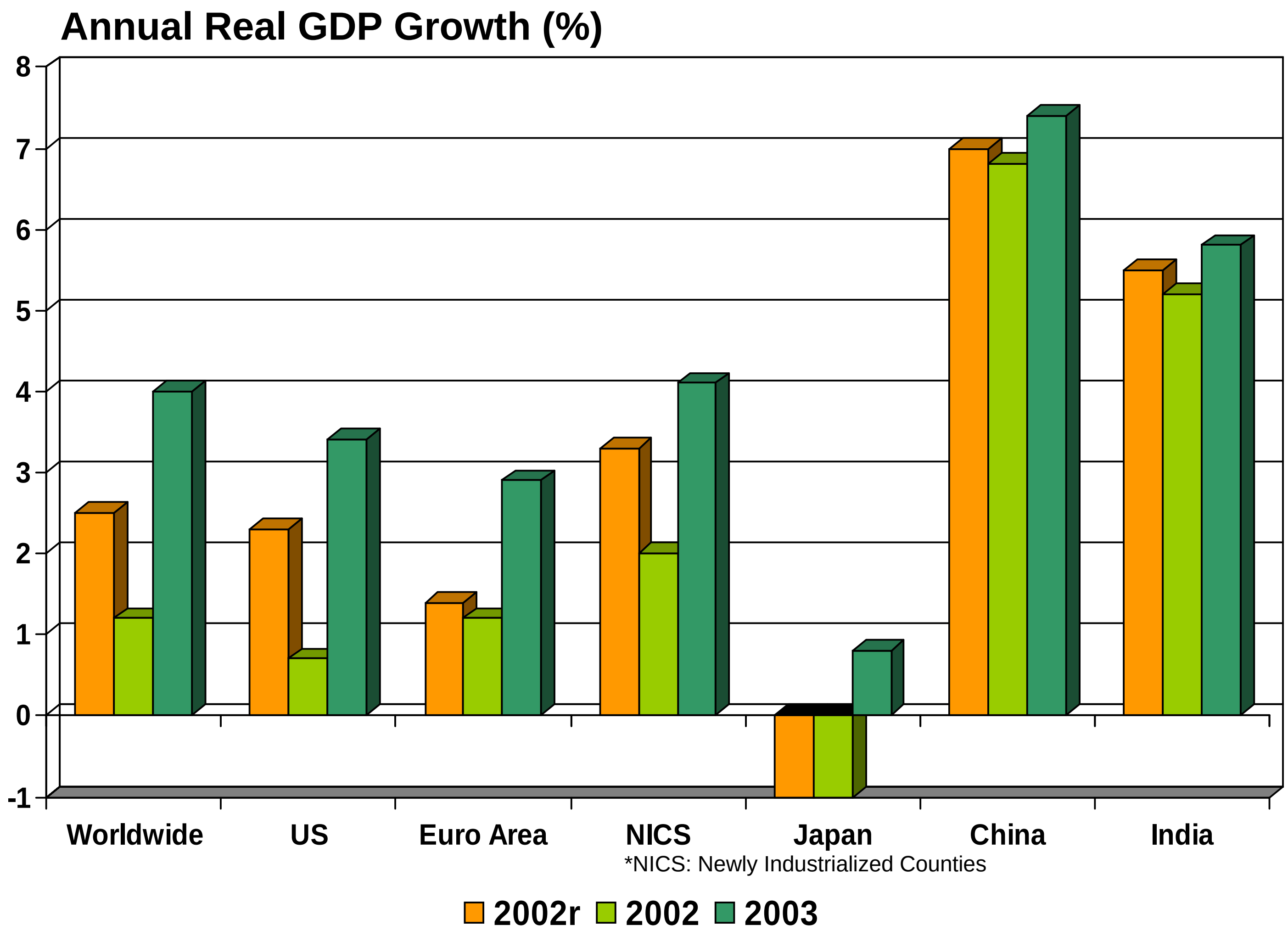
Source – US Department of Commerce

And, Communications Orders Remain Low…



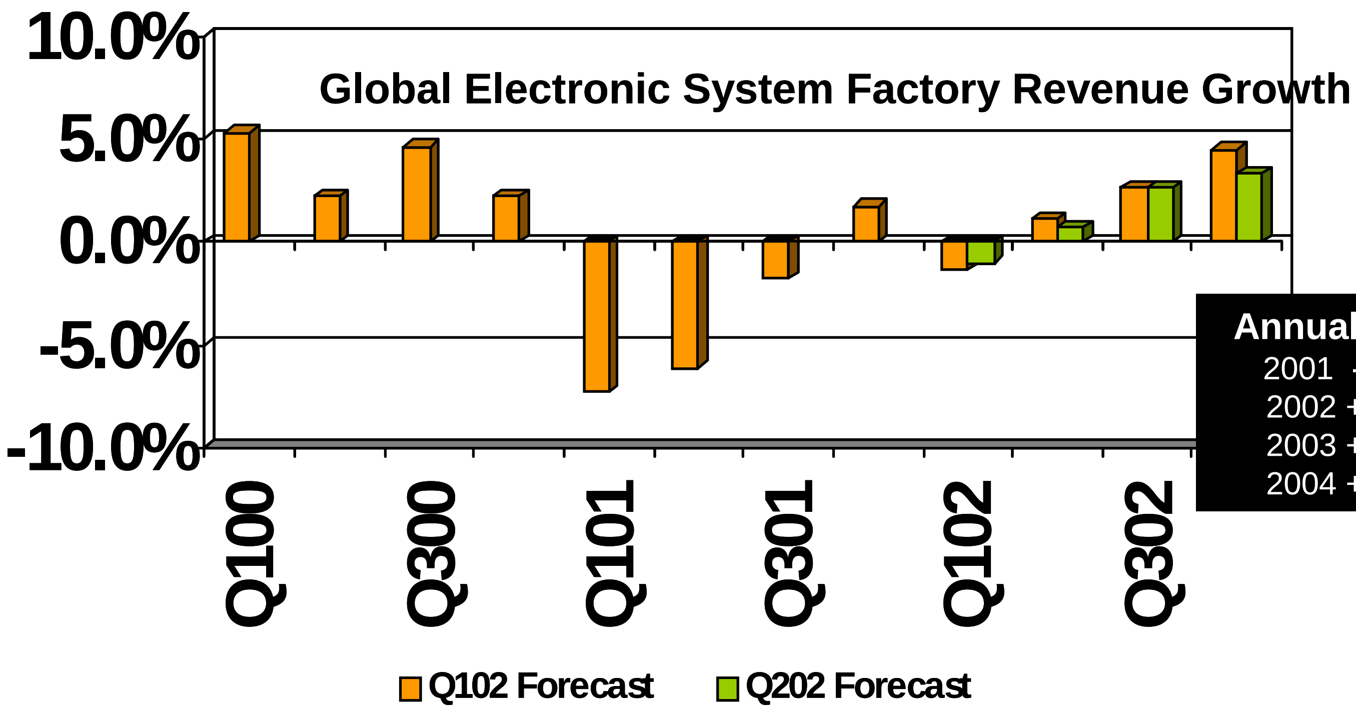
Source – US Department of Commerce

The Global Economic Outlook is Improving…



Source – IMF, April 2002

Electronic Systems Market – Spending to Increase

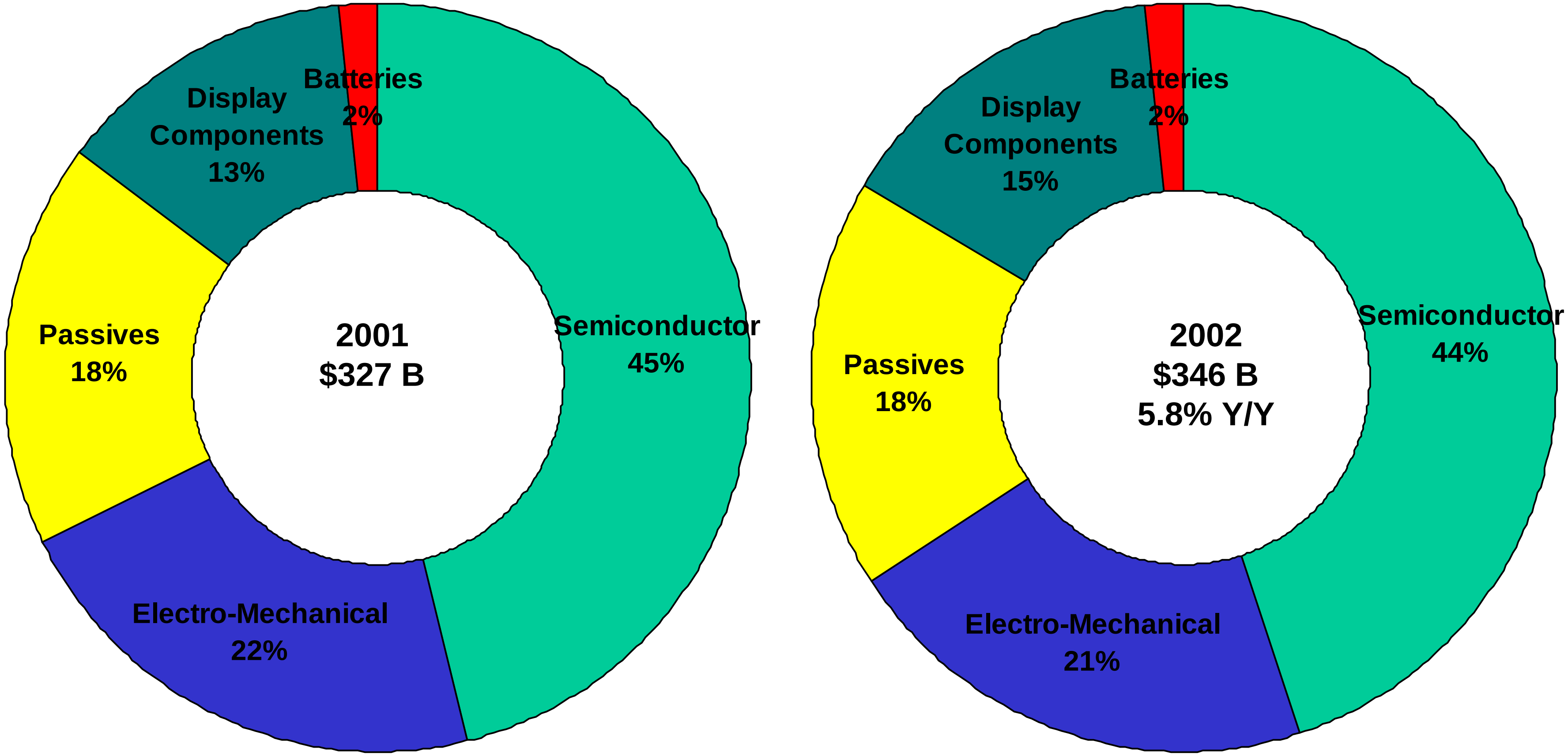


Annual Growth Rate
2001 -12.0%
2002 +0.3% (+1.0%)
2003 +9.0% (+9.3%)
2004 +8.2% (+8.7%)

- **Worsening wired communications decreases forecast**
- **Slowly improving consumer and enterprise spending recovery in second half 2002**
- **2000 levels not achieved again until 2003**

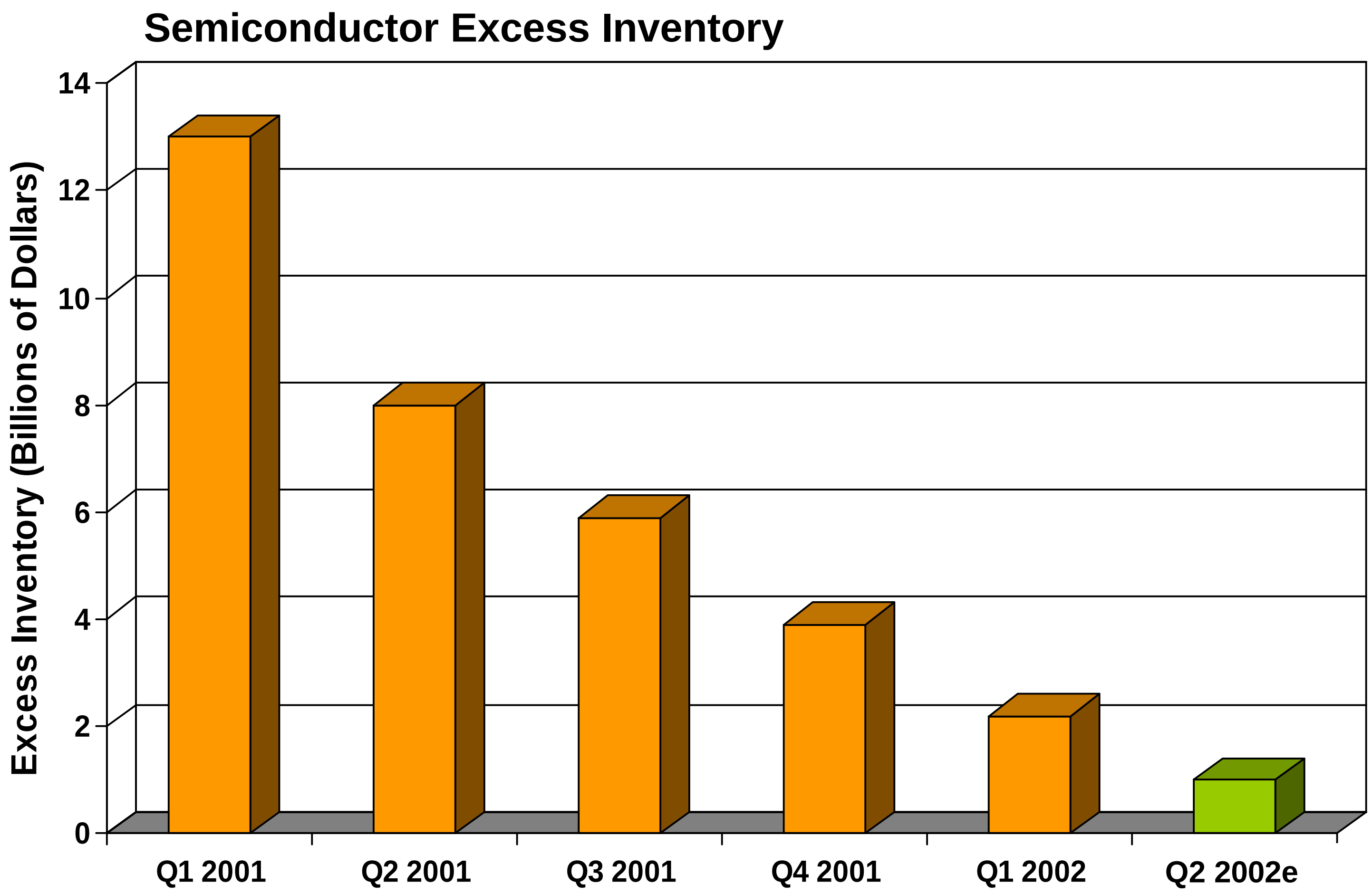
Source – iSuppli Corporation, May 2002

Global Components Market Improves



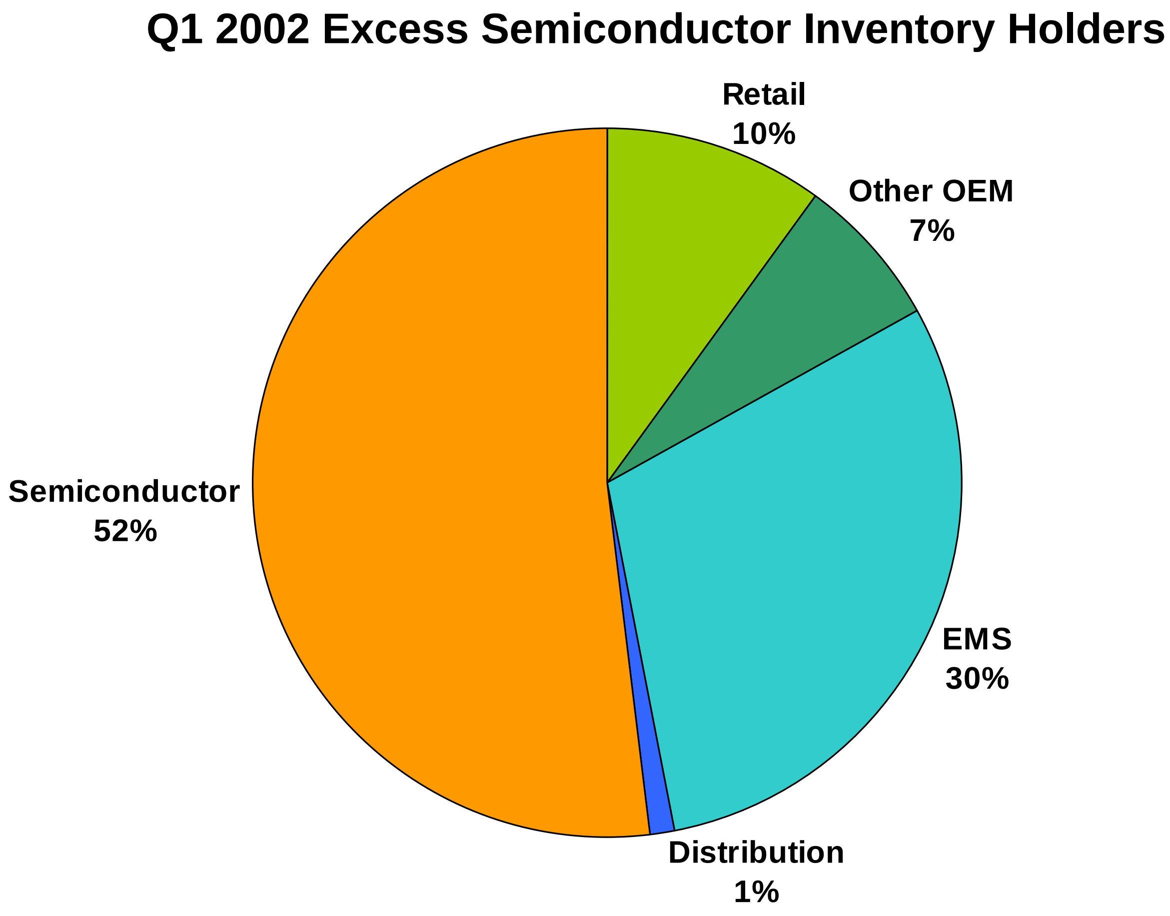
Source – iSuppli Corporation, May 2002

Semiconductor Excess Inventory – Reduced



Source – iSuppli Corporation, May 2002

Buyer's Market Leaves Suppliers With Price Challenge



Source – iSuppli Corporation, May 2002

Summary

- 1H 2002 semiconductor unit growth driven by stable but modest demand improvement and some inventory replenishment
- Moderate downward price pressure will continue to exist across most categories as several quarters worth of over -capacity is worked off
- By 2H 2002 system demand will build momentum as driven by a strengthening recovery in IT spending helped by an improved corporate profit picture
- Although PCs and mobile phones continue to be large consumers of electronic components, digital consumer, automotive, certain industrial applications and emerging countries will be larger growth contributors
- Moderate under investment in capital will lead to a moderate tightening of supply availability in 2003 and upward price pressure

OEM & EMS Overview

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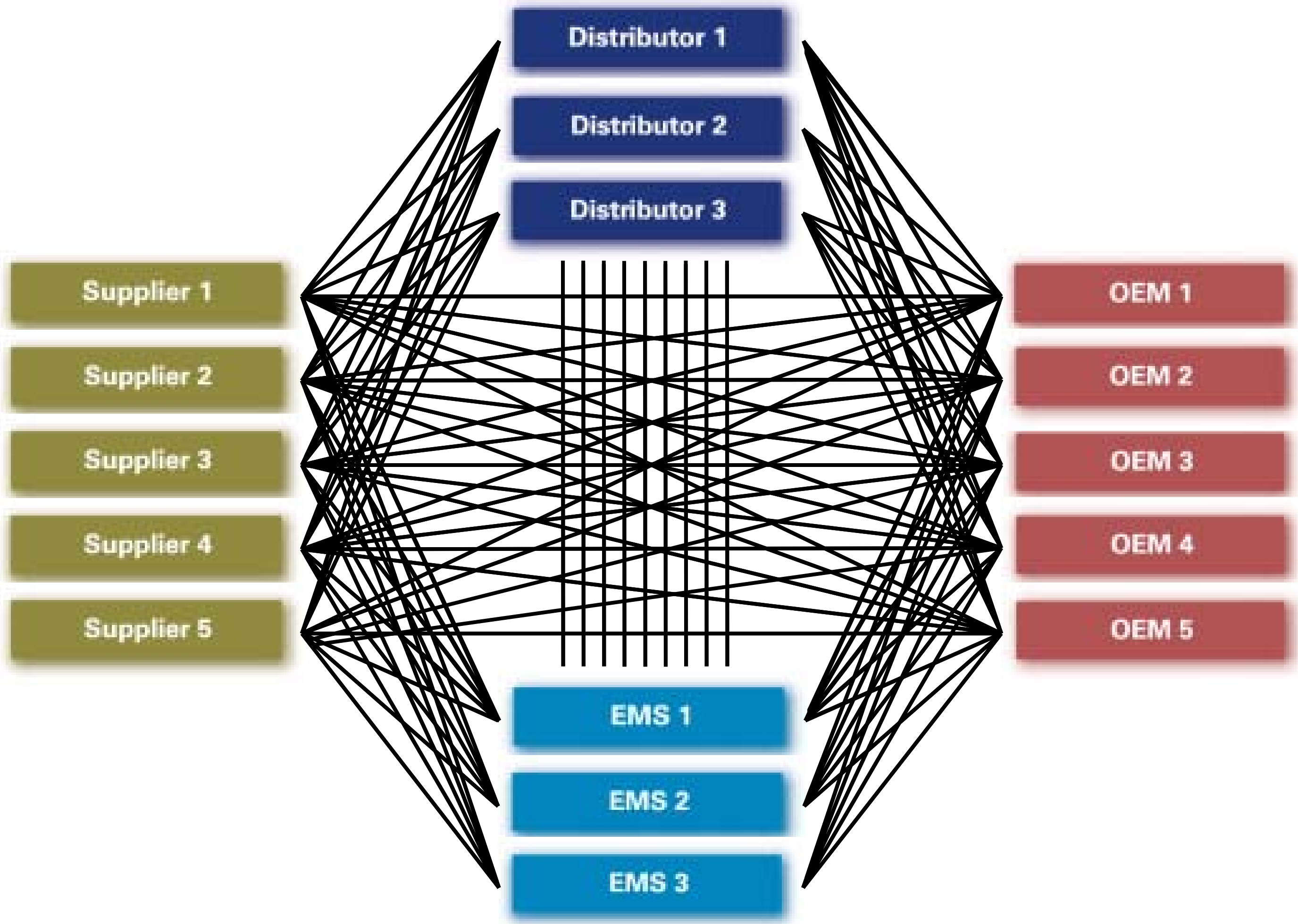
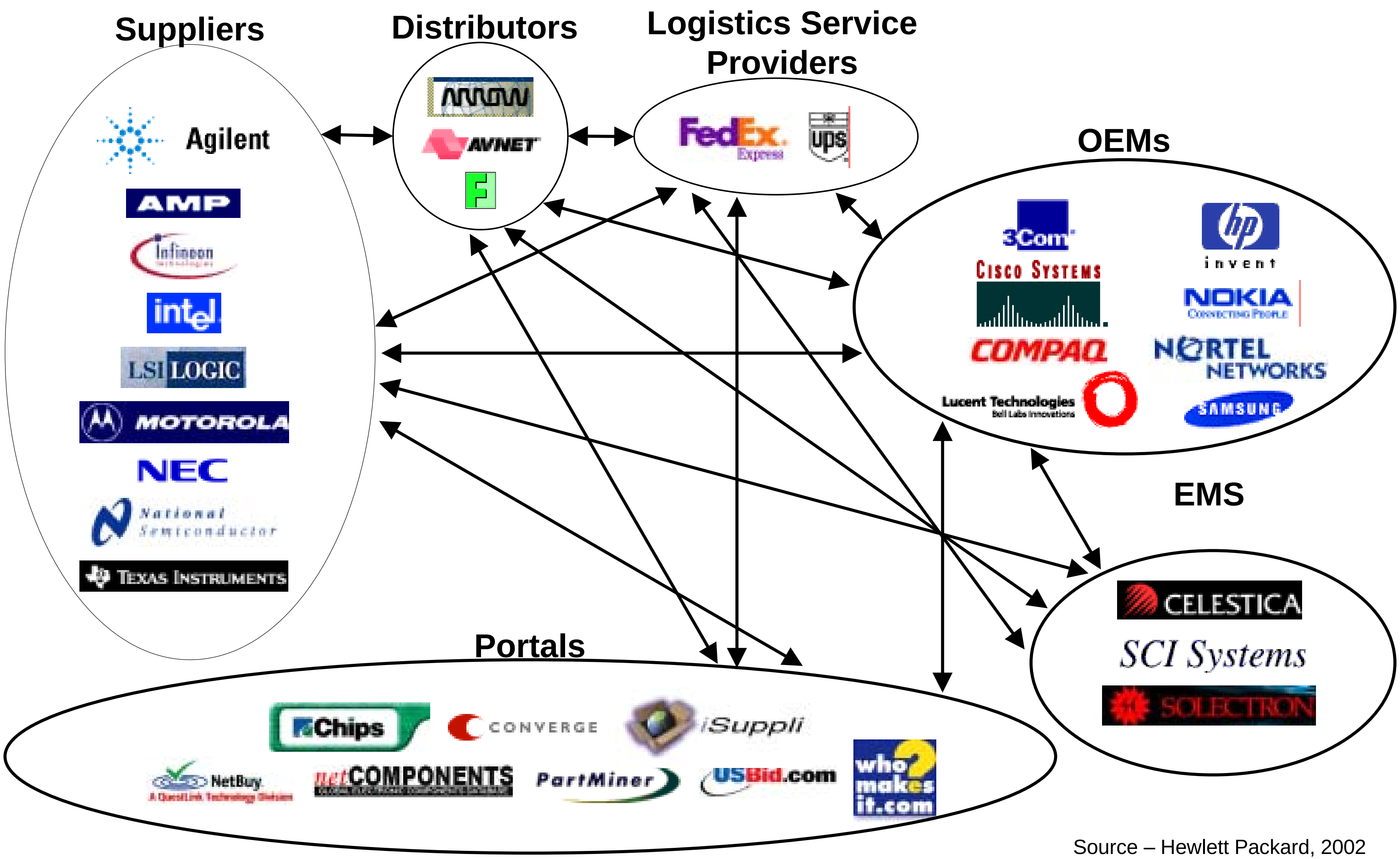
Complexity



Distributor 1
Distributor 2
Distributor 3
Supplier 1
Supplier 2
Supplier 3
Supplier 4
Supplier 5
OEM 1
OEM 2
OEM 3
OEM 4
OEM 5
EMS 1
EMS 2
EMS 3



Source – Hewlett Packard, 2002

- **After a decade of rapid growth, the EMS industry suffered its first major slowdown in 2001**
  - Downturn revealed EMS inefficiencies that were masked by rapid growth
  - Massive layoffs and plant closures
  - Continuing to use up excess inventory
  - Struggling to find new growth opportunities
- **New competitors from Asia gaining market share**
- **EMS has become a major consumer of electronic components with 20-25% of total purchases**
- **Mid-tier getting squeezed but small players are in a better position**
- **While current conditions are challenging, long-term industry prospects are still very strong**

EMS Growth / Survival Strategies

- **Reducing dependency on telecom/computer– diversifying into consumer, automotive, medical, industrial sectors**
- **Expand services – full box build, fulfillment, repair and service**
- **More selective acquisitions and mergers**
  - 97 acquisitions in 1999, 111 in 2000
  - Fewer OEM asset purchases with more guaranteed contracts
- **Migration of production to low-cost labor regions**
  - 30% total production currently in low cost labor regions, target is 60-70% by 2004
- **Vertically integrate mechanical components (sheet metal, cables) for design and full box build**
- **Improve supply chain management capabilities and processes**

Method – Interviewed and surveyed senior supply chain executives from a cross-section of OEMs and EMS providers

- **OEMs remain accountable for their supply chain performance**
- **Effective OEM / EMS / component-supplier triangle is critical to industry health, but leadership is unclear**
- **Significant perception gap exists between OEM and EMS view of supply chain management performance**
- **Lack of clear rules of engagement between OEMs and EMS in the supply chain area has caused this problem**

OEM Demands

- Global service providers
- End-to-end service
- Inventory risk management
- Cost management
- Fewer suppliers

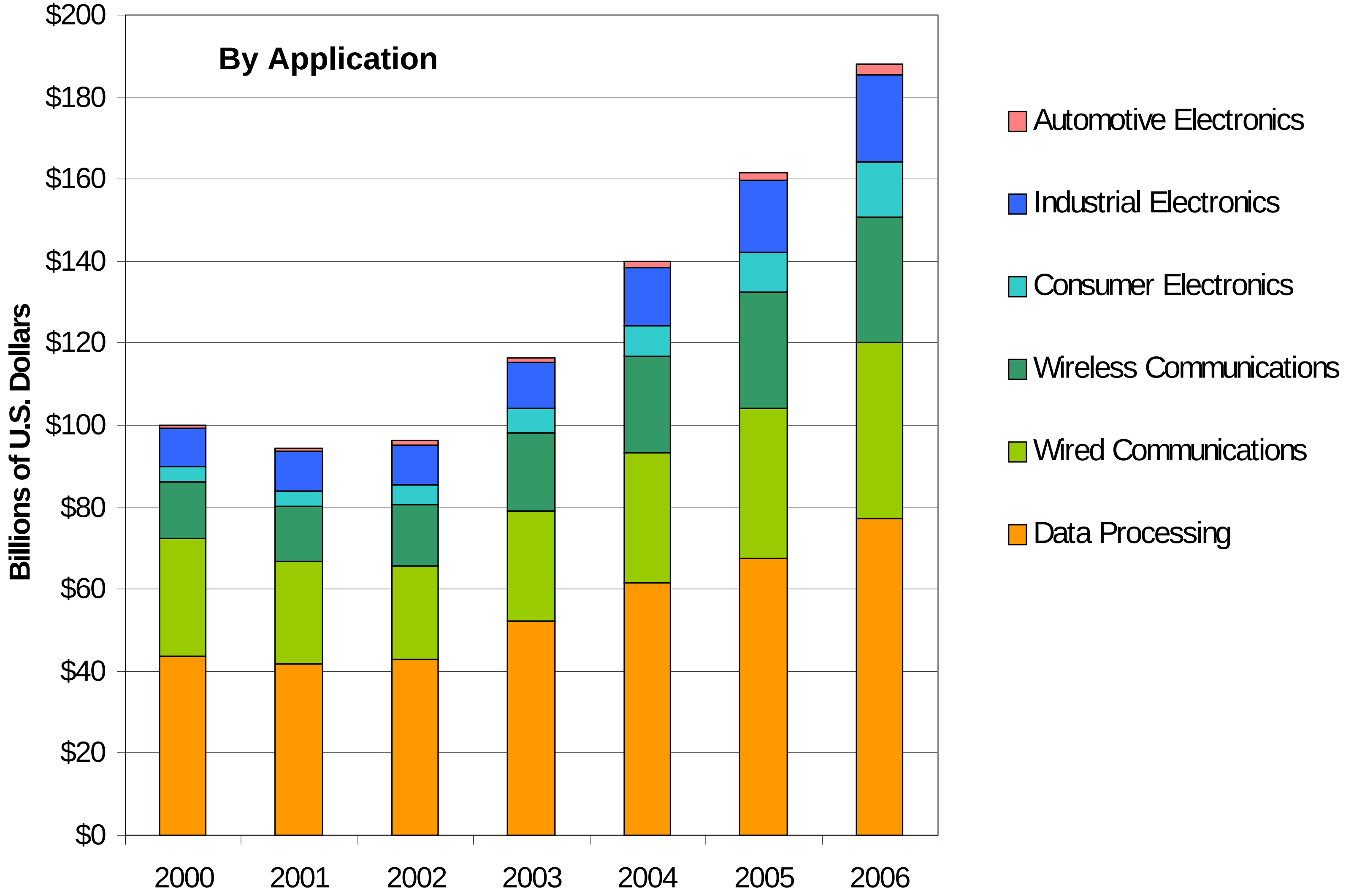
Perception Gap Between OEM and EMS

Topic	How OEMs View EMS Firms	How EMS Firms View Themselves
Shortage Management	EMS firms escalate to me after the first problem. EMS needs to manage the basics before I delegate more to them.	Shortages are the result of poor customer forecasts and my cost model does not account for constant shortage management.
Design Services	OEMs plan to keep most design-related work in-house.	We offer design services that provide value to our customers.
Supply Base Management	EMS Supply Base Management does not have strategic relationships with suppliers and is not global.	We have world-class Supply Base Management and OEMs are not optimizing our value.
IT Systems	Disjointed IT systems prevent efficient management of inventory and other supply chain issues.	Global ERP implementation is difficult due to acquisitions; bolt-on IT tools add value.
Cost Reduction	EMS firms do not pass on price decreases as effectively as price increases.	Low-margin business requires some retention of cost savings and no absorption of cost increases.
Cost of Acquisition	Believe EMS firms need to become more efficient and further reduce material mark-up.	OEMs keep asking for more services, but are unwilling to pay.
Global Footprint	EMS firms have a global presence, but do not act as a truly integrated global company.	Our global customer teams have responsibility on a global basis.
Trust	Pricing methods have created a sense of distrust.	We are open and honest with our customers.

Other findings of interest…

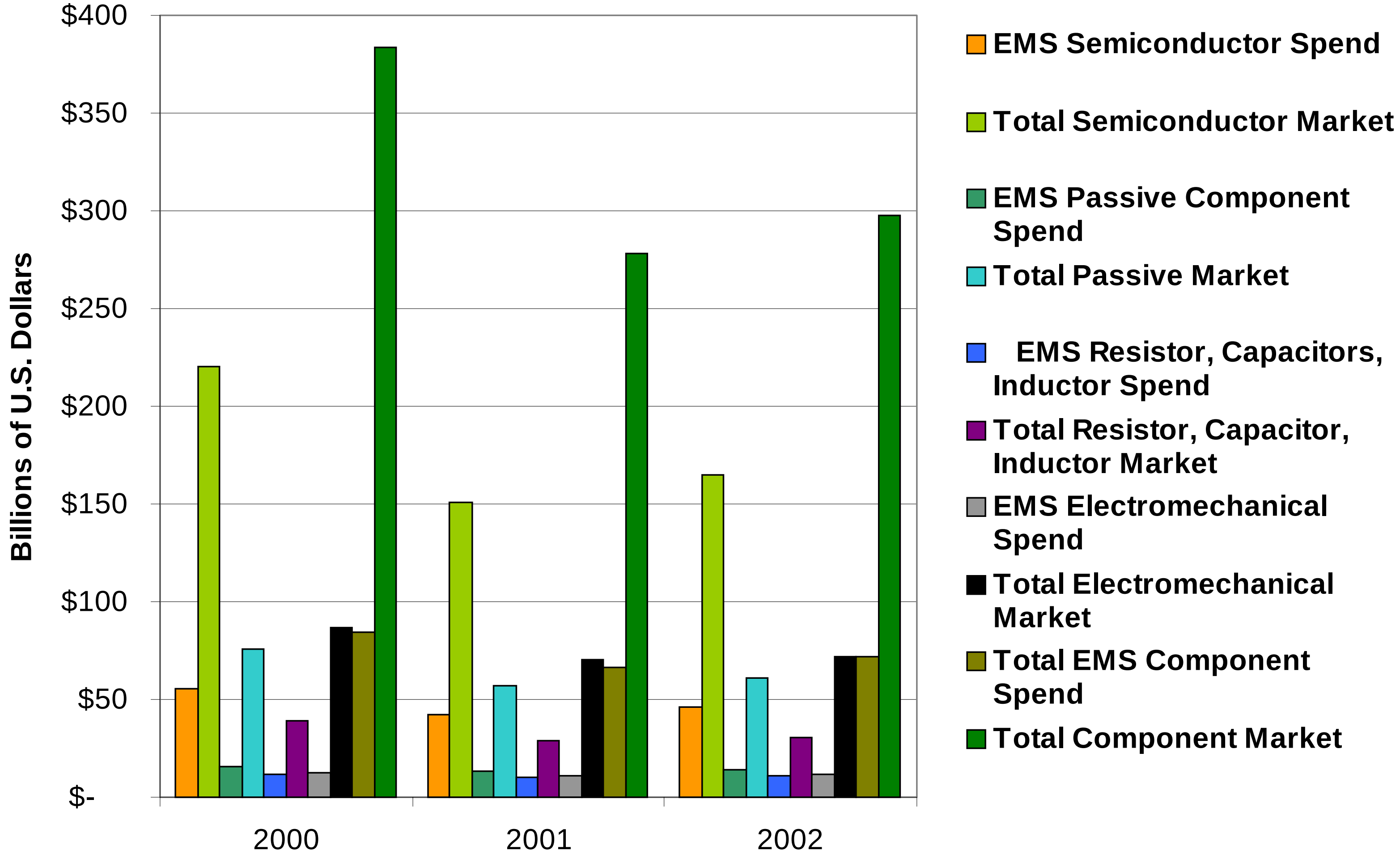
- EMS becoming major force in component supply chain but OEMs plan to retain control of design and high value parts
- EMS will manage most commodity components and strongly influence Approved Vendor List (AVL) selection
- OEMs are liable for excess inventory unless the EMS acts on their own
- Vendor Managed Inventory (VMI) has been a key EMS initiative for several years, but implementation has been slow
- Distribution now shipping close to 50% of North American dollars to EMS industry

Worldwide EMS Industry Revenue Forecast



Source – iSuppli Corporation, May 2002

Estimated 2002 EMS Electronic Component Spend



Source – iSuppli Corporation, May 2002

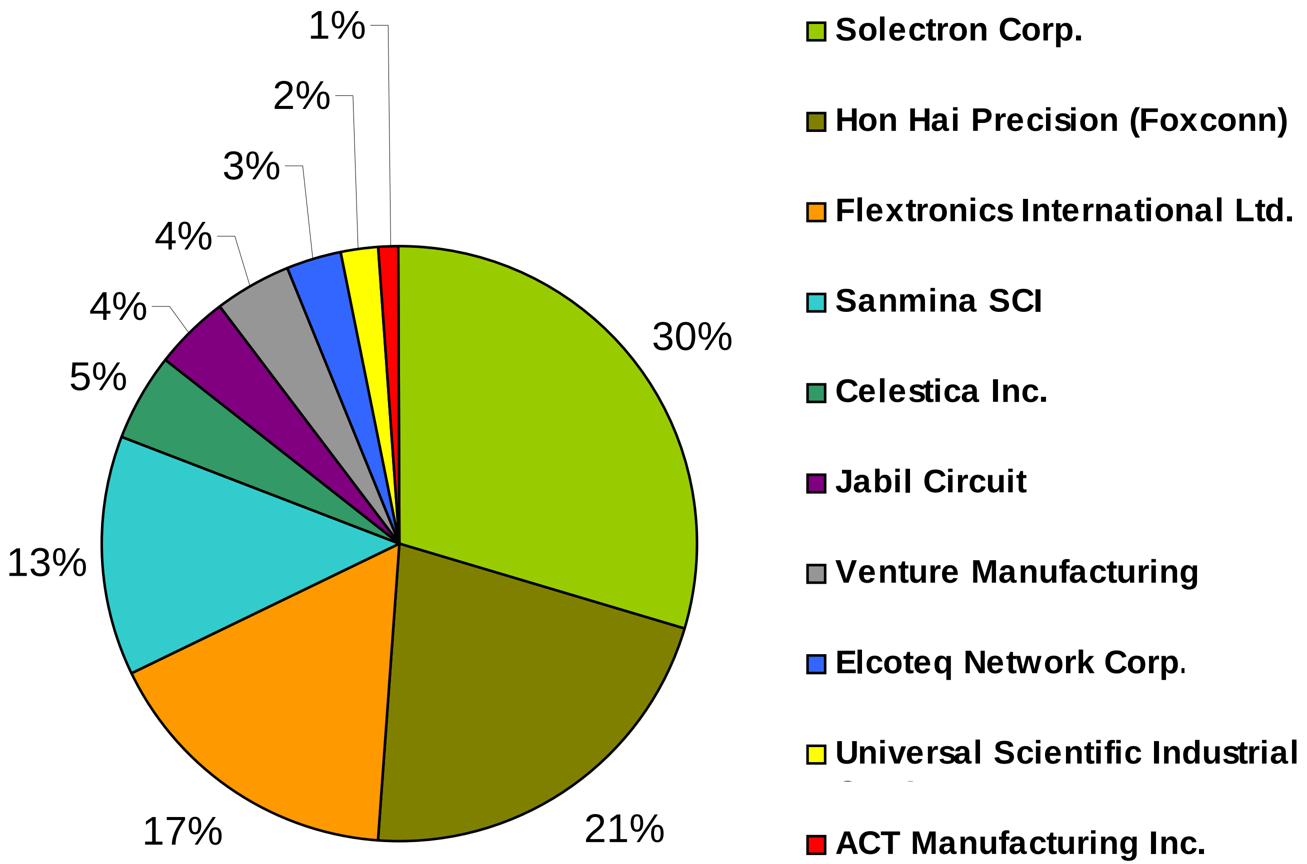
Top 20 EMS Firms

Rank	EMS Firm	HQ	2001 Revenue (Millions of U.S. Dollars)
1	Solectron Corp.	CA, USA	$16,149
2	Flextronics International	CA, USA	$12,923
3	Sanmina-SCI	CA, USA	$10,830
4	Celestica, Inc.	Canada	$10,004
5	Jabil Circuit	FL, USA	$4,086
6	Hon Hai Precision (Foxconn)	Taiwan	$3,562
7	Elcoteq Network Corp.	Finland	$1,667
8	SYNNEX	CA, USA	$1,620
9	Manufacturers' Services LTD	MA, USA	$1,522
10	Benchmark Electronics	TX, USA	$1,277

Rank	EMS Firm	HQ	2001 Revenue (Millions of U.S. Dollars)
11	Viasystems	VA, USA	$1,206
12	ACT Manufacturing, Inc.	MA, USA	$1,200
13	APW	WI, USA	$1,128
14	Universal Scientific Industrial Co.	Taiwan	$1,017
15	Plexus Corp.	WI, USA	$991
16	Venture Manufacturing	Singapore	$700
17	Pemstar, Inc.	MN, USA	$696
18	SMTC Corp.	Canada	$612
19	Finmek	Italy	$462
20	Saturn Electronics & Engineering	MI, USA	$430

Top 10 EMS Firms Operating in Asia-Pacific Region

Based on Regional Revenue



Source – iSuppli Corporation, May 2002

Summary

- **EMS industry is facing many challenges, but long-term prospects are good**
- **Asia – particularly China – becoming major battleground for production and market share**
- **Component suppliers will experience some decline in North American spending from EMS in 2002 and low growth from 2003**
- **Resolution of supply chain management perception gap between OEMs and EMS firms is critical for health of electronic component industry**

How to be a Supplier to North America

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Why OEMs outsource manufacturing to EMS?

- OEM’s no longer believe manufacturing is a core competency
- OEM’s are focused on capturing competitive advantage through intellectual property (hardware & software)
- OEM’s realized the financial benefits of moving manufacturing facilities and equipment off their balance sheets
- EMS companies have become so large with purchasing leverage that they are negotiating more aggressive prices for common commodity components
- Many EMS companies have global presence. Certain regional OEMs gain access (EMS) to less expensive labor in Asian regions

OEMs View of "Purchasing"

- **OEMs Purchase 75-80% of manufacturing cost**
- **Suppliers are our allies**
- **Buyers operate in corporate teams**
- **Global Focus**
- **Benchmark – Apply best practices**
- **Strategic Focus: Sometimes**

" 69% of U.S. purchasing organizations are actively pursuing e-procurement" - *New Purchasing Study*

Source – R. Gene Richter
Former CPO, IBM Corp

OEMs analysis of supply base:

- Each supplier's current business share and trend
- Supplier Price history, current price pressure
- Supplier rankings – quality, delivery, technology, price, and responsiveness
- Determine most efficient producer

Why should an OEM qualify a new supplier?

- **To reduce purchase prices**
- **To solve an existing supply chain problem: poor delivery or poor quality from existing suppliers**
- **To find local suppliers who are located close to one of the OEMs regional manufacturing sites**
- **To obtain a special component or technology that is not available from the OEMs existing suppliers**
- **To take advantage of more favorable purchasing terms:**
  - Longer payment terms
  - VMI programs
  - Reduced cost for freight and duty
  - Improved local support: dedicated sales, applications & quality engineering, customer service, warehousing and kitting
  - Product return and/or stock rotation privileges
- **To find a second source for a primary supplier**

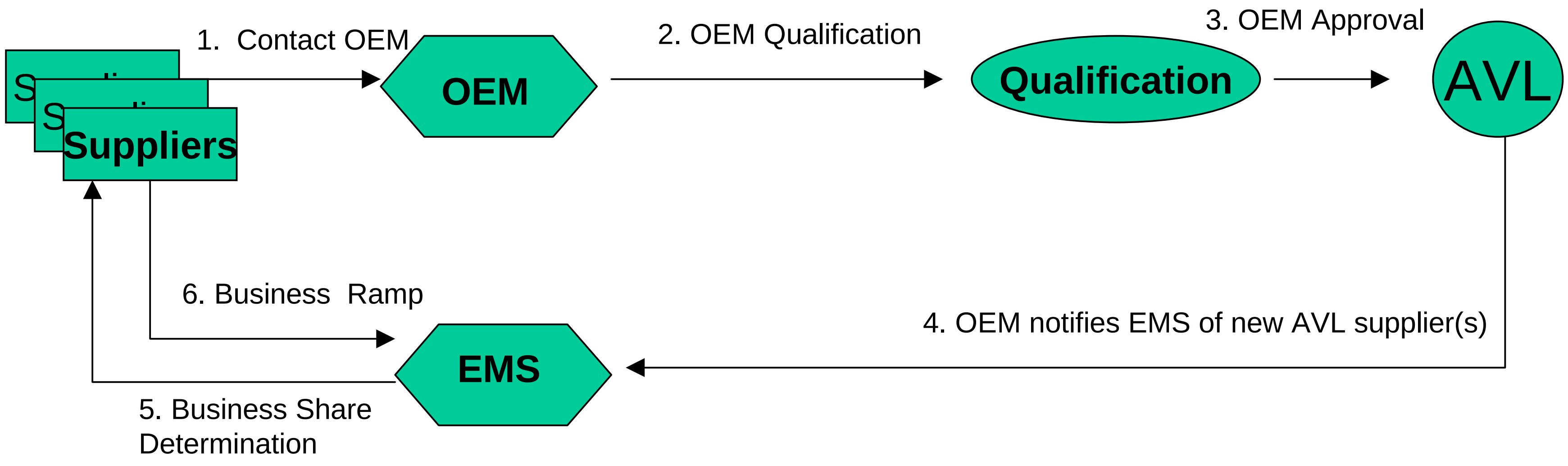
OEM / EMS Supplier Registration Procedure

- OEMs still control most of the component Approved Vendor List (AVL).
- The EMS can usually determine business share for each supplier; however, they seldom have AVL authorization.
- For proprietary type commodities, the EMS does not have control. Suppliers should work with OEMs; OEMs control AVL and business share.
- For commodity products, suppliers should work with OEM and EMS. OEM qualifies products and EMS awards business share to each supplier within guidelines.

There are generally 4 approaches to supplier registration:

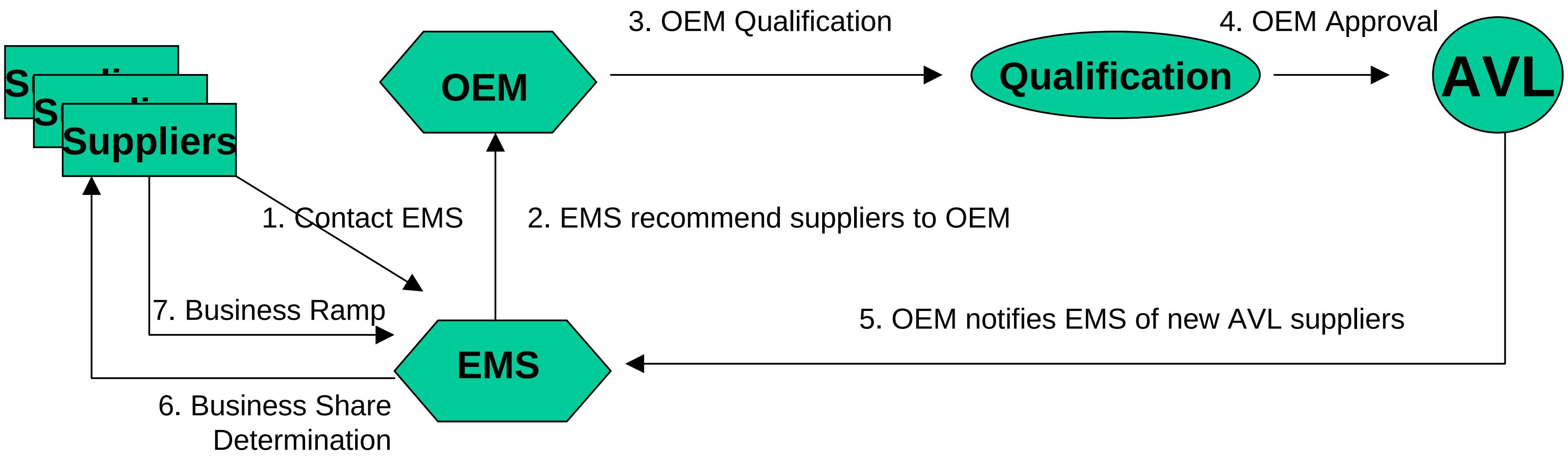
- Direct through OEM and OEM qualifies
- Indirect through EMS where OEM qualifies
- Direct through OEM where EMS qualifies
- Indirect through EMS and EMS qualifies

Approach 1: Direct through OEM and OEM makes qualification decision (most common)



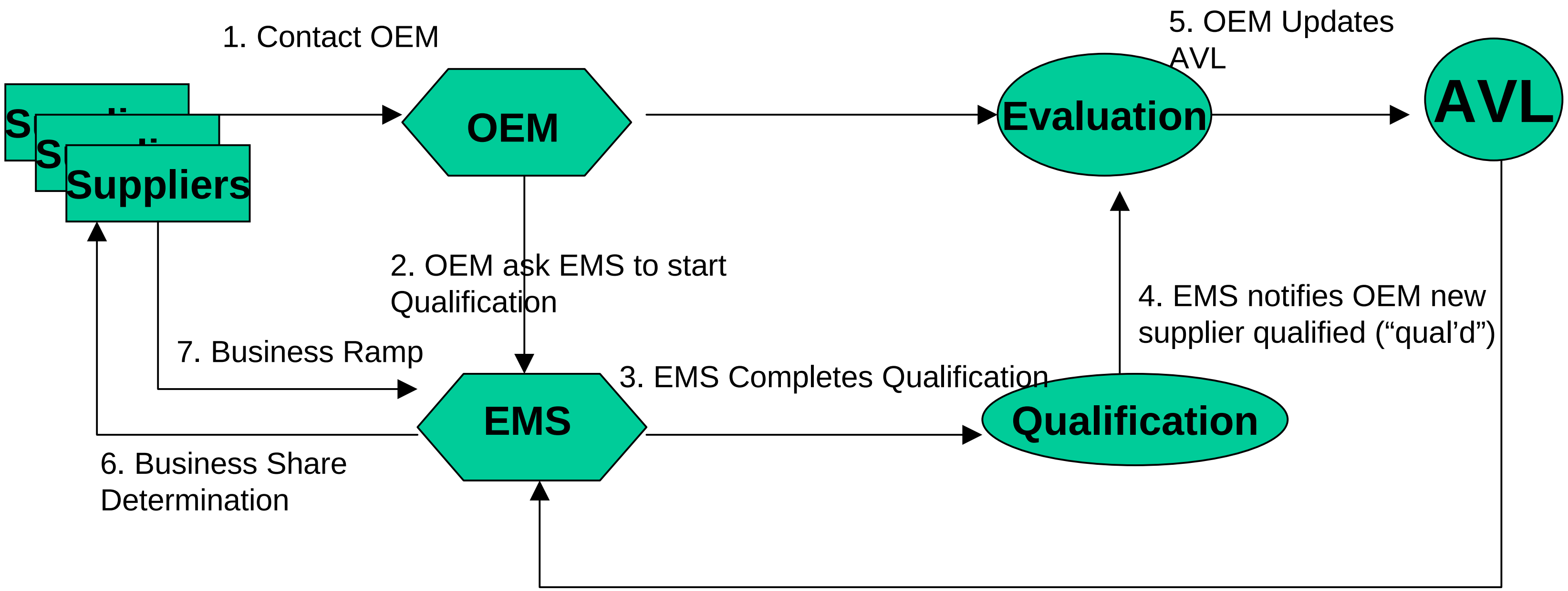
- **For proprietary products, OEM determines business share**
- **Although OEM approves suppliers, suppliers should work with EMS for integration into supply base**
- **Business award determination involves EMS**

Approach 2: Indirect through EMS where OEM makes qualification decision



- **For commodity products such as resistors, capacitors, inductors,oscillators…**
- **Recommend using EMS Asian IPO for Business Development**
- **Most EMS firms do not have a standard process for AVL registration**
- **Documentation needed such as: technology roadmap, financial statement, manufacturing site locations and capacity, quality system processes, etc…**
- **Although OEM qualifies suppliers, suppliers should integrate with EMS**
- **Business award share determination involves EMS**

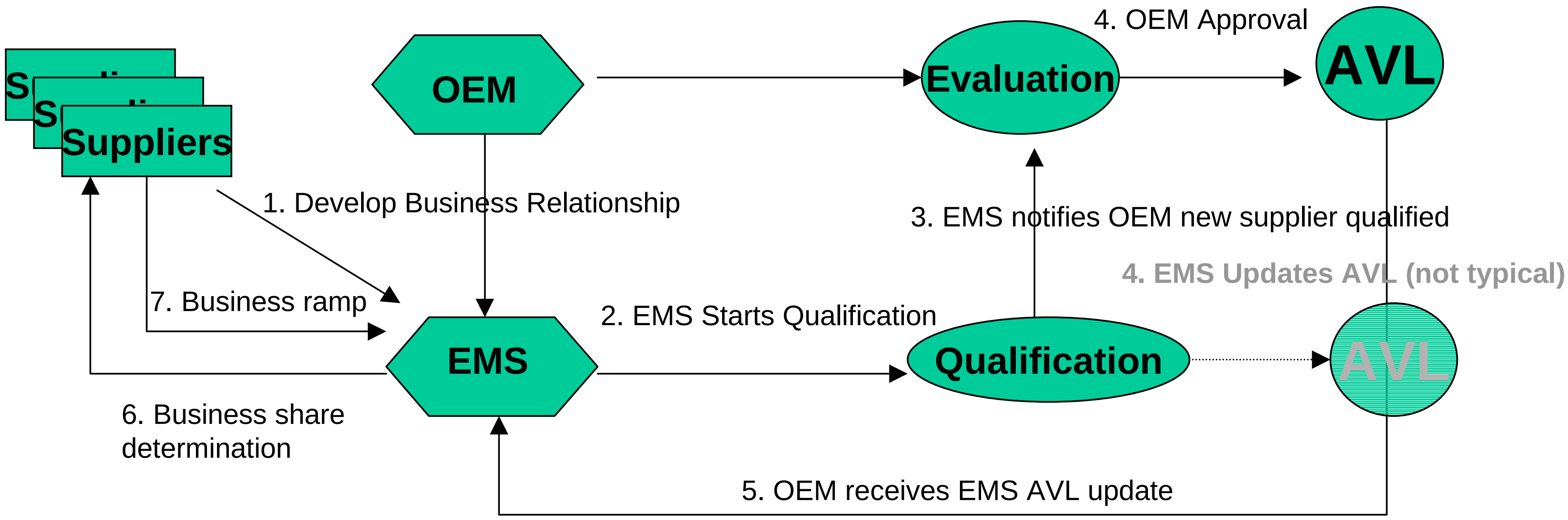
Approach 3: Direct through OEM where EMS makes qualification decision (OEM determines AVL)



- **Although OEM approves new suppliers, suppliers should work with EMS to integrate into the supply base**
- **Business share determination involves EMS**

Approach 4: Indirect through EMS and EMS makes qualification decision

(OEM approves AVL – least common approach)



- **This is not the usual way. The very large EMS use this method for certain low-end commodities such as basic printed circuit boards (PCBs)**

OEM Specific Supplier Registration Process: IBM

- Supplier Sends Overview Documentation to OEM
  - Supplier sends IBM company overview, covering: (a) component technologies and manufacturing processes, (b) business history, (c) customer list, (e) financial statements, etc…
  - Supplier should target relevant commodity chairman
  - Suppler should contact and work with International Procurement Office (IPO)
- IBM Considers
  - IBM evaluates documents and rationale for additional supplier
- IBM Request for Information (RFI)
  - If IBM decides to investigates the supplier, an RFI is sent *(does not necessarily imply intention to buy)*
- Supplier Submits Response Timely Response
- IBM Evaluates RFI Response
  - IBM reviews supplier's competitiveness and supporting rationale for inclusion into the supply base

OEM Specific Supplier Registration Process: IBM (cont'd)

- IBM performs analysis of supplier candidate
  - **Review of (a) supplier's financials and credit, (b) research on quality/systems standards, (c) ISO qualifications (d) component technology & manufacturing process (e) potential for diversification, and (f) history of supply to other customers**

If supplier passes this step…

- IBM tenders contract, purchase order terms/conditions and negotiates price and delivery logistic requirements
- Supplier negotiates to agreement with IBM
- IBM Sends RFP
  - **Includes IBM's expectations outlined as "Trilogy Specifications"** (e.g., date code, package specifications, etc…)
- IBM requires Supplier contact information (5 – 7 pages)
- IBM notifies Supplier of component number forecast & delivery
- IBM distributes supplier information to relevant site buyer and/or EMS

IBM Global Procurement Organization

John Paterson

John Paterson (acting)
- Global Procurement

TBD
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- Global Procurement Strategy

Mike Polcari
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- Supplier Diversity
- Skills Development
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Source – IBM

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OEM Specific Supplier Registration Process: The *New* Hewlett Packard

- *Materials and parts are purchased only from HP suppliers approved by HP divisions through Materials/Procurement Engineering Departments. Suppliers must meet quality and reliability levels specified by the new HP.*
- *Suppliers should always use the regional IPO to help develop and drive the prospective business relationship with HP.*
- **HP evaluates suppliers in the following areas:**
  - **(a) Technology, (b) Quality, (c) Responsiveness, (d) Delivery, (e) Cost, (f) Environment, (g) Business ("TQRDC-EB")**
    - HP conducts Supplier performance survey
    - HP audits manufacturing technology of Supplier
    - HP evaluates Supplier's investment in R & D
- **HP's Approval Criteria**
  - **Supplier must be leader in respective fields of design and manufacturing**
  - **Supplier is expected to participate in mutual engineering throughout HP's products' life cycles**
  - **HP must be convinced that there's a benefit to adding Supplier**

OEM Specific Supplier Registration Process: The *New* Hewlett Packard (cont'd)

- HP performs technical evaluations
  - **Part qualification and test analysis**
  - **Process qualification audits**
- HP performs business evaluations
  - **Financial stability**
  - **Order processing system**
  - **Future business direction**
  - **Business ethics**

Once requirements are satisfied:

- HP Divisional evaluation of product
  - **If found acceptable**
    - Will design into an HP product
    - Will recommend acceptance of Supplier's components to other HP using divisions

HP Supplier Evaluation Criteria

Technology musts

- Proactive improvement, proactive mutual engineering

Quality musts

- Document statistical process and quality control programs

Responsiveness musts / effective service and support

- 24hour acknowledgement of orders
- < 3 days response to routine inquires
- 24 hours resolution of problem reports
- Same day response to emergency inquiries

Delivery musts

- On-time delivery
- Packaging confirmation (labeling, documentation, slips,etc)
- World class JIT Program
- Disaster Contingency Plans

Environment musts

- Environmentally Responsible
- No Ozone depleting substances, no heavy metal usage

HP Supplier Evaluation Criteria (cont'd)

Cost musts

- **Price Competitiveness (>10% below average)**

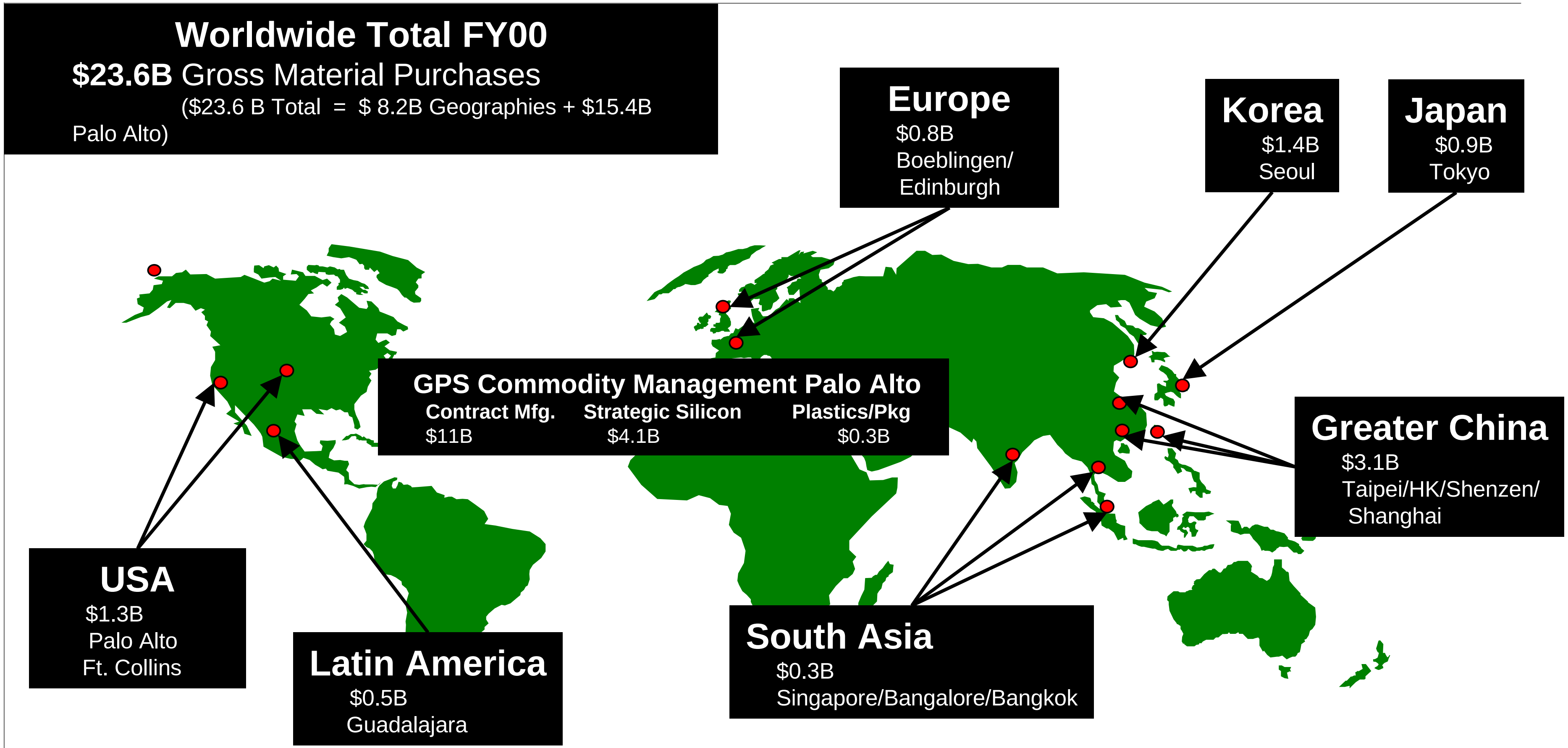
Business musts

- **HP as a percent of total sales (<40%)**

Weighted Strength toward ranking:

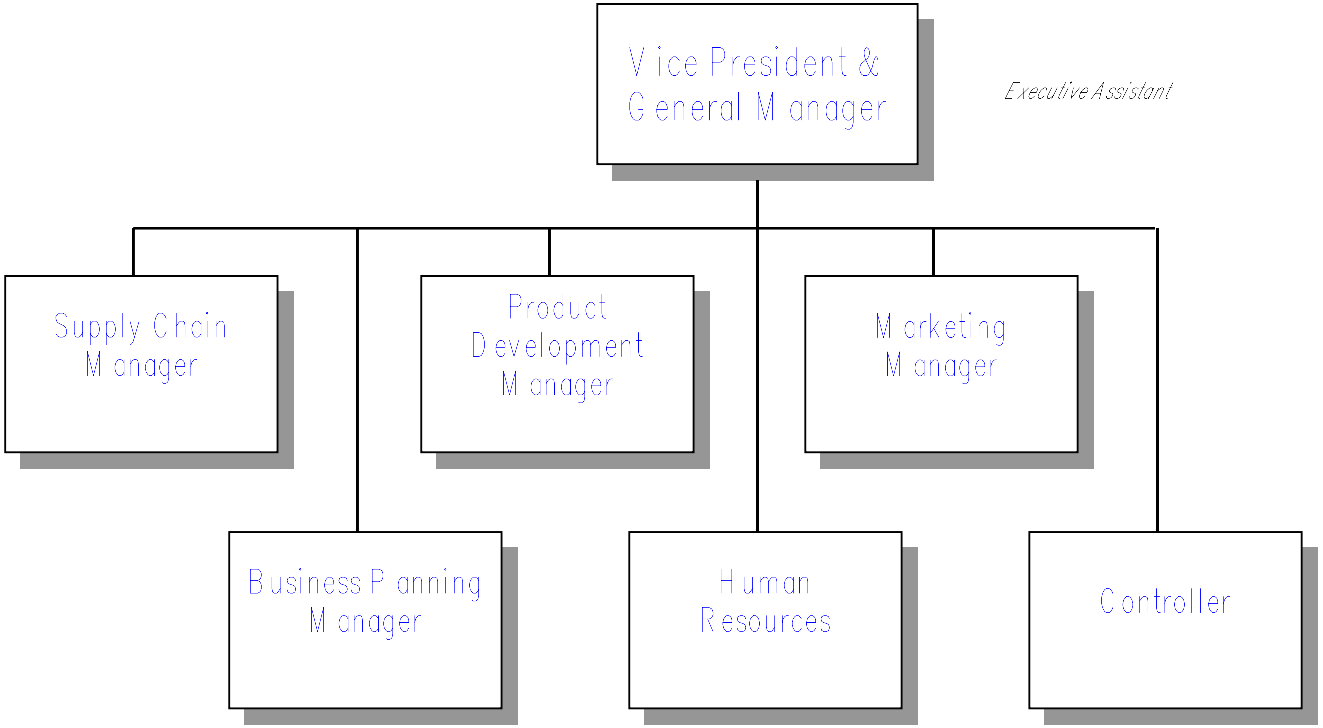
Technology	10%
Quality	25%
Responsiveness	15%
Delivery	15%
Cost	15%
Environment	5%
Business	15%
Total	**100%**

HP Global Procurement Solutions



Access >$23B in sourcing from the most competitive global locations

Example: HP Division Organization



Source – Hewlett Packard

OEM Specific Supplier Registration Process: Motorola

Motorola sources components from supplier's who are on their "Approved Supplier List" (ASL) and who will provide the best capabilities (technology, quality, cost and capacity) for a new product program. New supplier's may be added to the ASL by way of the "Supplier Selection Process."

- **Motorola has a team to evaluate potential suppliers**
  - **Members include Development, Quality, Strategic Sourcing and the Sector / Group Commodity Manager.**
- **The Evaluation Team collects Financial and Quality information**
  - **Financial data (from internal and external sources) is requested.**
  - **Motorola requests copies of the Supplier's (a) Quality Manual, (b) Technology Roadmap, (c) Outgoing Quality Statistics, (d) Organization Chart, (e) Customer Satisfaction Survey results and (f) other reports.**
  - **Motorola requests supplier program information, such as (a) Cost reduction program, (b) Cycle time reduction program, (c) programs of continuous improvement. Also, ISO or other applicable certifications.**
  - **Supplier completes "self-assessment" worksheet.**

OEM Specific Supplier Registration Process: Motorola (cont'd)

- Evaluation Team reviews data
  - **Motorola will look at a "Commodity Requirements Roadmap," which consists of (a) technology, (b) cycle time, (c) cost trends, (d) demand and (e) area of coverage information.**
  - **Motorola's desired supplier qualities include:**
    - Supplier has high ethics
    - Supplier offers a technological or service advantage over competitors
    - Innovative delivery of goods or services (utilizing e-commerce, EDI, etc)
    - Competitive in price to industry
- The evaluation team will review Supplier's data to determine if Motorola would like to have on-site interviews.
  - **The final decision is generally handled by a Platform Commodity Management Team.**
  - **Successful suppliers are eventually given a Green color code denoting them as "Approved."**

OEM Specific Supplier Registration Process: Nortel

Nortel's goal is to work with preferred suppliers in ways that help speed the company's time-to-market by enabling their designers to make the right technology and supplier choices.

- **Nortel is interested in working with suppliers who excel in developing new forms of supply management relationships**
- **Nortel Networks operates with a limited supplier base and looks for new technologies and overall best total value**
- **Suppliers shall meet specific business and performance selection criteria to be approved**
- **There are 3 levels of approved suppliers:**
  - Value Managed Relationship (VMR) Supplier
  - Preferred Supplier
  - Niche Supplier

iSuppli

OEM Specific Supplier Registration Process: Nortel (cont'd)

- Supplier logs on to Nortel's "Supplier Self Help" Web site
- Supplier creates an account
  - **Nortel provides password via email**
- Supplier completes 3-part "Supplier Self-Profile" questionnaire
  - **Supplier Profile**
    - Provides general overview of Supplier *(required to proceed to next section*)
  - **Business Profile**
    - Determines general business suitability of Supplier's product(s)/service(s) for Nortel Networks applications *(required to proceed to next section*)
  - **Technical Profile**
    - Reviews technical aspects of Supplier's product(s) and technologies

OEM Specific Supplier Registration Process: Cisco

- Supplier mails line card and other part number materials to the attention of the Global Supply Management
- Supplier's information is forwarded to a Cisco Buyer
- Cisco reviews supplier information and may invite the supplier to complete Supplier Enrollment Forms, which consist of:
  - **Supplier Profile questionnaire**
  - **Enrollment for electronic payment (domestic and international)**
  - **Request for supplier tax information**
  - **Request for supplier's certifications, e.g., ISO 9001 and 9002 are required**
  - **Cisco Supplier Code of Ethics for supplier's review**
- Supplier completes forms and returns to Cisco Buyer
  - **Cisco does not accept unsolicited forms, supplier must be pre-authorized by Cisco Procurement**
- Supplier added to Cisco supplier database upon approval

Critical Success Factors for Suppliers

- Technology equivalency and progressive roadmap
- World-class quality system
- Ability to supply to worldwide customer sites (logistically)
- Ability to link-up with e-procurement and supply systems
- Delivery always on-time or to replenishment hubs
- Provide aggressive prices

How is Opportunity for Korean Suppliers Realized?

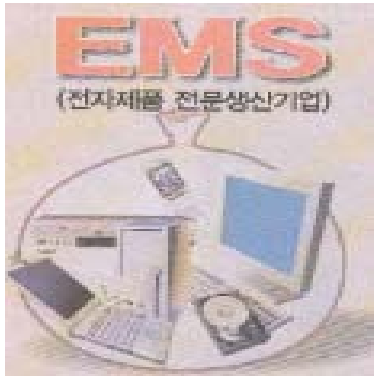
- **Branded Product**
- **Access OEMs through Korean or Asian IPO**
- **Prospect EMS companies that focus on low cost strategies**
- **Recruit the best Sales Representative to build relationships with OEM and EMS**
- **You need local support in the U.S.**
- **Strive to understand U.S. cultural differences**

Q & A

EMS 개척사례

(Electronics Manufacturing Service)

2002.7.



EMS 개척사례

Ⅰ
EMS Overview

Ⅱ
EMS업체 현황
및 최근동향

Ⅲ
EMS업체와의
거래조건

Ⅳ
EMS 업체
접근방법

Ⅴ
EMS업체 개척을
위한 준비

Ⅰ. EMS Overview

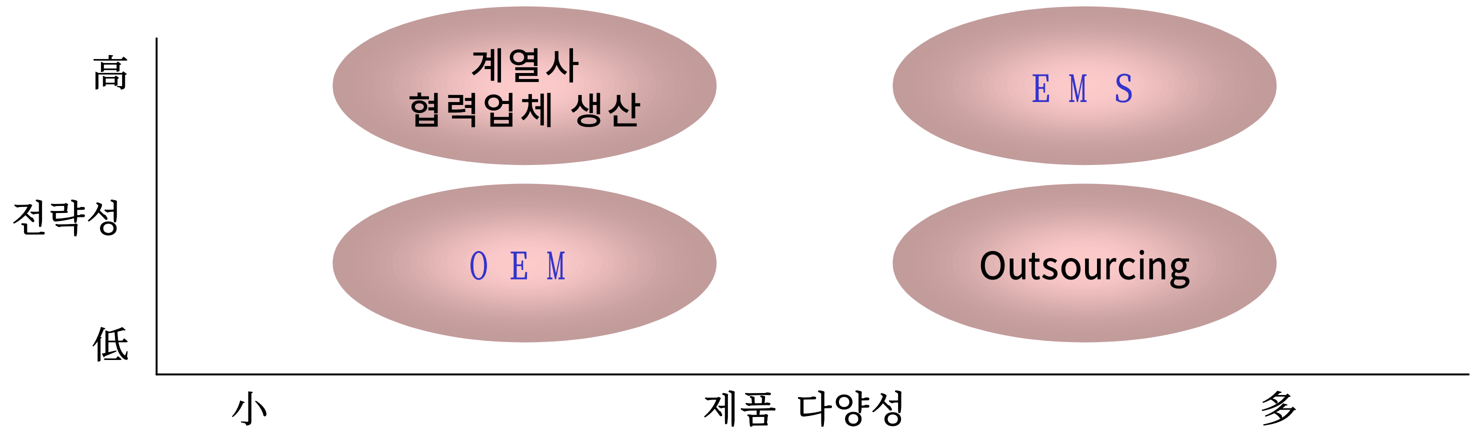
1 EMS(Electronics Manufacturing Service)란?

EMS란?

전기전자제품의 위탁생산을 담당하면서,
자체브랜드를 갖지 않는 생산전문업체

등 장 배 경	EMS 활성화 요인
실리콘밸리 지역 업체들에게 PCB등을 공급하던 단순 하청업체가 대형화되면서 태동 - CEM(Contract Electronic Manufacturing) 이라고도 호칭 = 전자분야의 하청생산 SONY는 자사 제조부문을 묶어 EMS화 - 新會社名 EMCS (Engineering Manufacturing Customer Services)	Time-to-Market - 경쟁증가, 신제품 개발속도 향상 Economic - 핵심역량에 집중, 생산성 최적화 Technology - 기술의 복잡성, 생산기술의 발전 제조 엔지니어링 회귀

2 EMS와 OEM의 차이점



	EMS	OEM
차이점	· 생산,생산설계,부품 공급선 등을 자율결정 · 부품~완성품 제조업체를 수평적으로 연결 · 다품종 대량생산을 세계적 차원에서 진행 · 가격중시 : 가동율 향상에 주력 · 생산중심 : 하이테크 범용제품	· 주문자 요구에 따라 부품까지 공급받아 생산 · 의뢰업체와 수직적 분업 · 소품종 대량생산 · 기술중시 : 의뢰업체 검사 수검 · 생산중심 : 성숙단계 제품
공통	· 생산 Outsourcing으로 수탁 · 생산자는 자체 브랜드 無 : 브랜드 인지도가 높은 대기업 의뢰를 받아 생산	

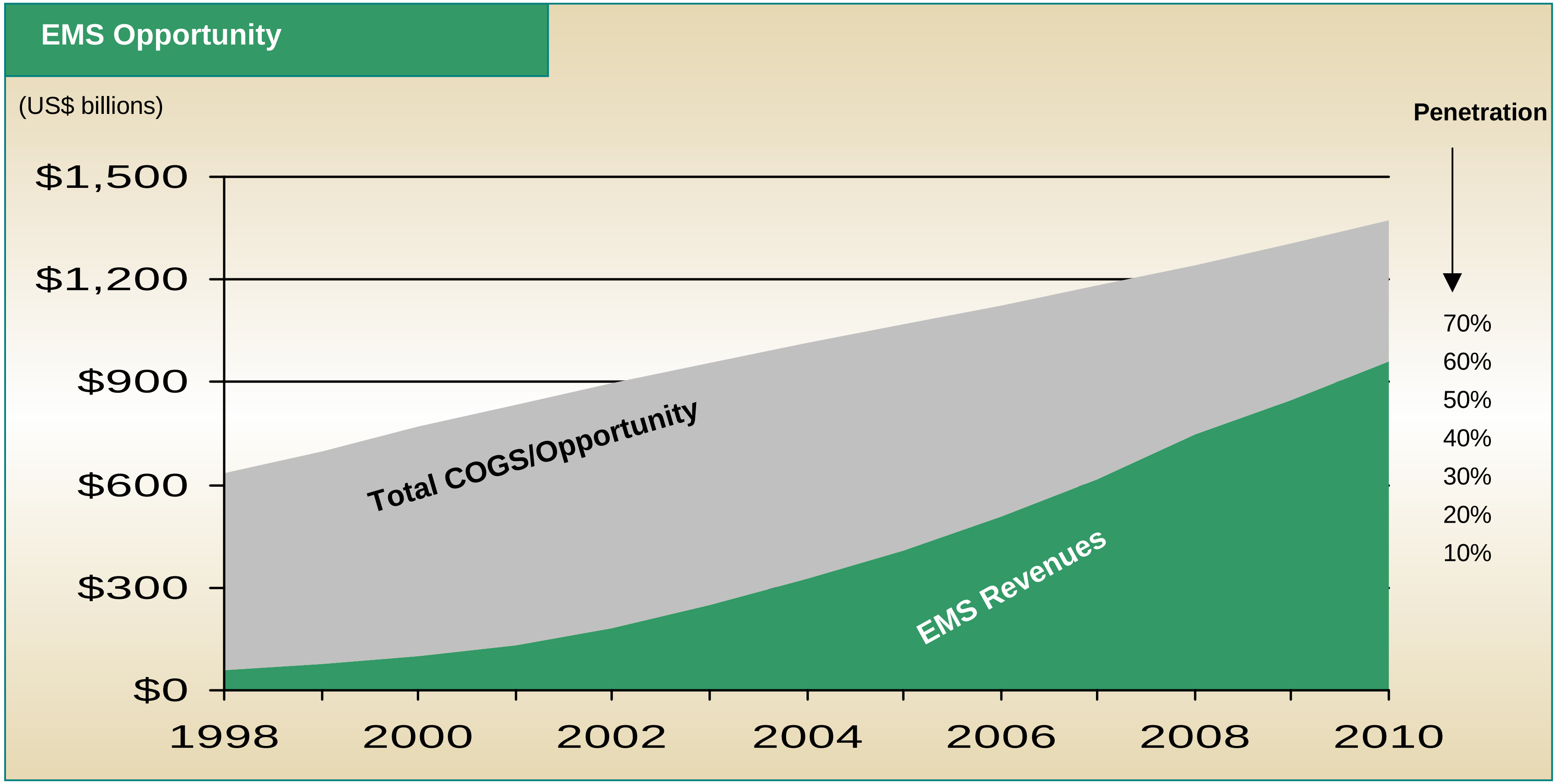
3 EMS의 서비스 범위

Design	Manufacture	Service
Building-block technology modules	Component and subsystem assembly	Asset recovery
Certification processing	Direct fulfillment	Customer call centers
Circuit test development	Distribution	Customer relationship management
Component engineering	Electromechanical assembly	End-of-life service support
Component qualification	Engineering change management	Failure analysis
Electrical design	Finished goods warehousing	Last-time-buy component management
Engineering revision control	Local supply-chain design	Recycling
Environmental stress testing	New product introduction	Refurbishment
Functional design	PCB assembly	Remanufacturing
Functional test development	Power, packaging and cooling	Returns processing
Manufacturability design	Quality assurance	Reverse logistics
Mechanical design	Retail packaging	Troubleshooting support
Prototype build	Supplier qualification	Upgrades
Qualification testing	Systems manufacturing	Warranty repair
Reliability engineering	Systems testing	
Systems test development	Vendor managed inventory control	
Testability design		

※ 출처 : Solectron 2001

4 EMS 시장규모

- ’96~’99년 년평균 48% 성장 → 향후 20% 이상 고성장 지속 예상
- 전자산업에서 차지하는 비중 : ’99년 11% → 2010년 60% 점유 전망

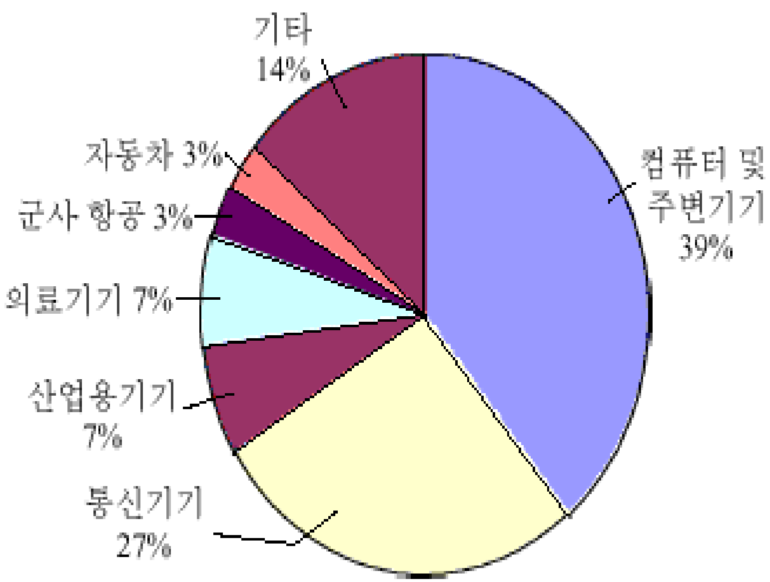


Source: Goldman Sachs, Technology Forecasters Inc.

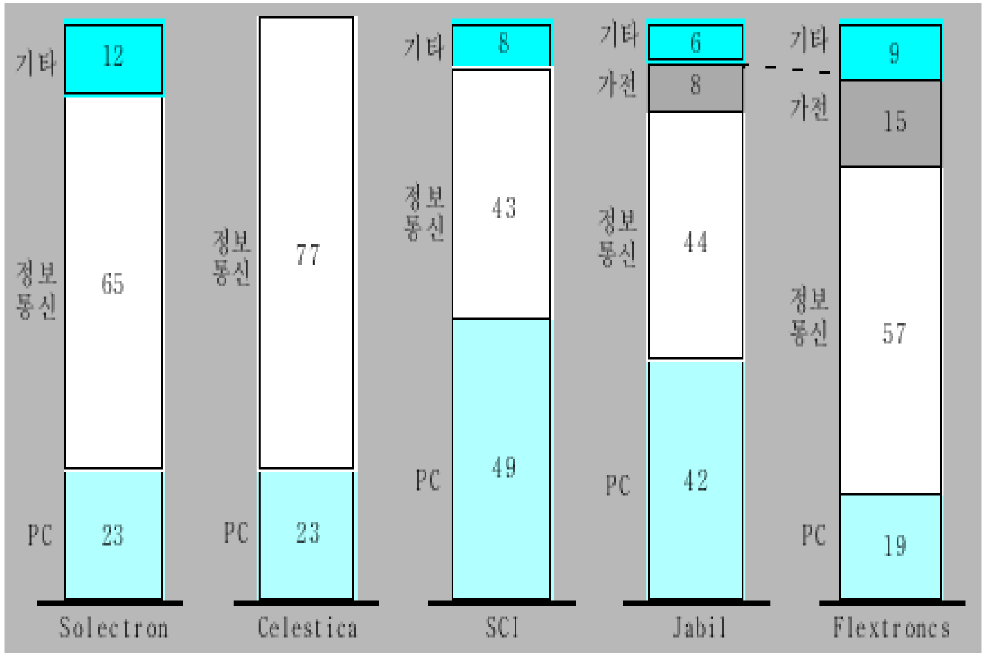
□ EMS 산업의 분야별 매출 비중

- EMS 전체 매출중 PC와 통신기기가 차지하는 비중이 절대적
- 특히 2000년대부터 이동통신기기의 비중이 급속히 증가

【 EMS산업의 분야별 매출비중 】



【 주요 EMS 업체의 사업구조 】



Ⅱ. EMS업체 현황 및 최근동향

1 주요 EMS업체

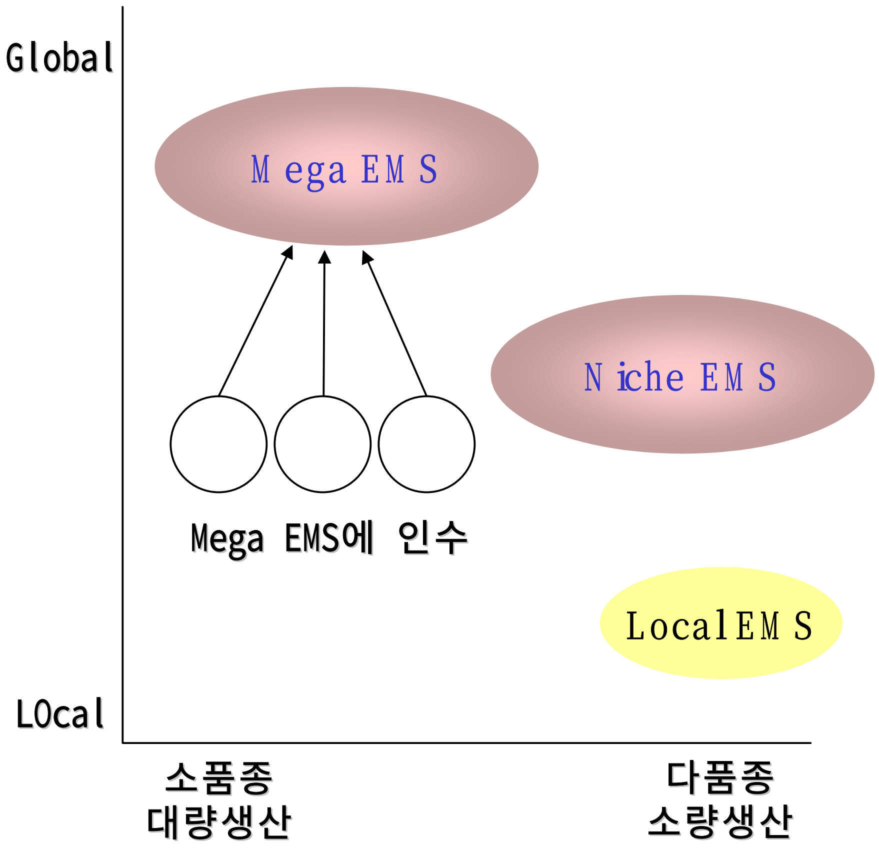
업 체 명	매 출	보유공장	인 력	주요고객	주요전략 및 Issue
Solectron (미 국)	187억$ 2000년 (141)	46個 (30國)	65,000 명	HP IBM Cisco Ericsson	· '00.11 업계 5위인 Natsteel 인수 → 아시아권 입지 강화 · 수익율 확보를 위해 Design 서비스 강조
SCI/Sanmina (미 국)	130 (87)	39 (19)	34,000	HP Dell	· 저부가 사업구조로 상대적 성장 둔화 · e-EMS Company로 변신 시도중
Celestica (캐나다)	10 (53)	31 (11)	23,000	Cisco 3COM	· 기술적 우위 강조 - 학위 보유 엔지니어 1,800명 · Global 대응력은 상대적으로 열세 - 생산설비의 60%가 북미에 집중 · Memory Module와 Power사업에 강점
Flextronics (싱가폴)	12 (43)	55 (27)	70,000	Cisco HP MS Siemens Ericsson	· 가장 Global하게 생산기지 운영중 - 미국 비중 23%에 불과 - 중국, 헝가리, 브라질이 중심역할 · 휴대폰 생산을 중단한 Ericsson의 생산기지 인수, 휴대폰 공급

2 EMS업체 유형별 특징

Mega EMS
· 상위 5개사 시장점유율 확대 - '98년 33% → '00년 49% → '02년 64% · Mega EMS 조건 - 세계 주요 지역에 생산거점 확보 - Supply Chain 관리능력 보유 - 설계, 제조, 보수 등 광범위한 서비스 제공 · 대기업이 Mega EMS 기업에 Outsourcing을 집중하는 경향은 지속될 전망

Niche EMS
· Mega EMS가 진입하지 않은 특정영역에서 선전 · Niche EMS 사례 - C-Mac : 전장품 생산에 특화 - Elcoteq : 휴대폰 생산에 특화 (Nokia, Ericsson이 주고객) - Sanmina : 통신장비 시스템용 PCB에 특화

【 EMS업계의 구조재편 방향 】



3 EMS업체 생산기지 운영현황

 북미를 중심으로 전 세계에 생산기지 운영

		Solectron	SCI	Flextronics	Celestica
미주	미국	13	18	16	16
	멕시코	2	4	2	1
	브라질	2	1	3	1
	캐나다	2	2	-	2
	기타	1	-	-	-
유럽	영국	4	1	2	5
	프랑스	3	1	1	-
	스웨덴	3	1	4	-
	독일	1	-	1	-
	헝가리	-	1	5	-
	기타	4	4	14	2
아시아	중국	1	1	3	2
	대만	1	-	1	-
	말련	2	1	2	1
	호주	4	-	-	-
	기타	3	2	1	1
계		46	39	55	31

Solectron

Solectron은 1996~1999년 기간중 연평균 45%의 고성장을 시현한 결과 1999년에는 EMS 업계 선두로 부상했음. PC 및 주변기기 중심의 사업 구조에서 정보통신 제품으로 사업영역을 확대하고 있음.

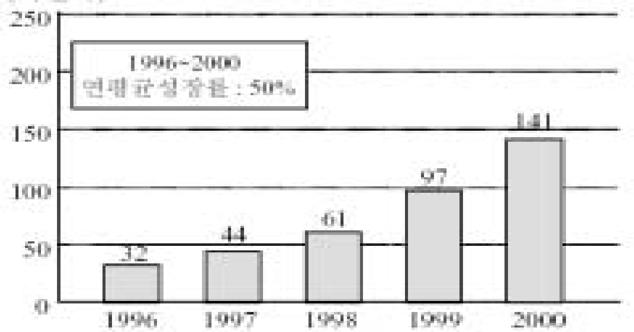
성장 과정

- 1977년 실리콘밸리에서 태양발전 분야의 벤처기업으로 출발한 후 한때 도산직전에 몰렸으나, IBM 출신의 Winston Chen을 비롯한 엔지니어 그룹이 인수한 후 고객중심, 종업원 중심 경영으로 성장가도에 진입함.
- 주요 고객(2000.1/4) : Cisco(11%), IBM(10%), Rucent(10%)

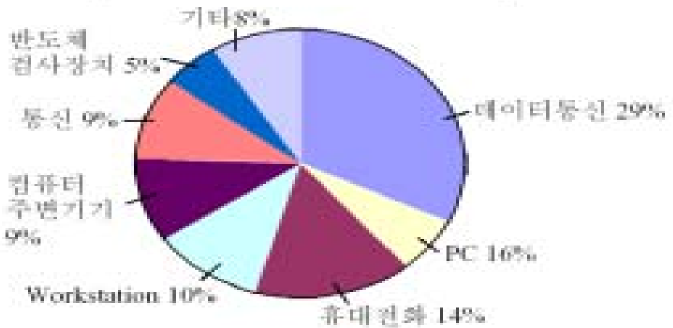
경영상의 주요 특징

- Malcolm Baldrige 상을 두 차례(1991, 1997) 수상한 최초의 기업일 정도로 품질 관리에 역점을 둠.
  - Malcolm Baldrige 상에 매년 도전하는 과정에서 심사위원회의 권고사항을 자사의 품질 경영 개선에 적극 활용
  - 5시그마 수준(백만개중 233개의 불량)
- 일본식 생산방식을 적극 도입하여 지속적인 생산성 향상을 추구함.
  - 5S에 의한 비전의 달성 : Seiri(整理), Seiton(整頓), Seiso(清掃), Seiketsu(清潔), Shitsuke

매출 추이



주요 제품별 매출 구성(2000.1/4)



※ 출처 : 권혁기 2002/원전=이나가끼 기미오,EMS전략 2001

S C I

SCI Systems는 장기간 EMS 업계 선두를 유지해 왔으나 지나친 PC 의존의 사업구조로 말미암아 한때 성장이 정체되어 2위로 밀려남. 최근에는 취약한 사업구조를 극복하기 위해 통신 분야의 진출에 적극 나서고 있음.

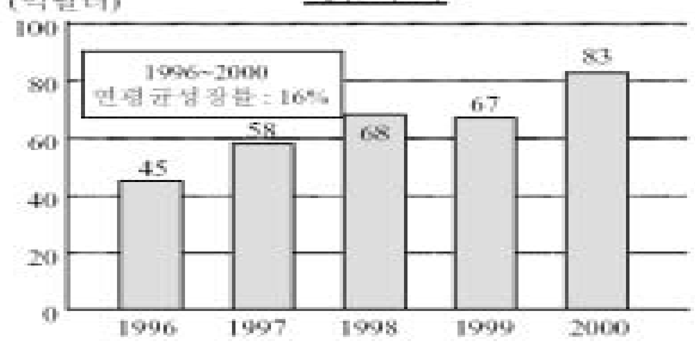
성장 과정

- SCI(Space Craft Inc.)는 로켓용 전자제품 제조 기업이었으나 70년대 후반 NASA의 예산 삭감 이후 컴퓨터 분야로 주력을 바꿈.
  - · 80년대초 IBM PC 용 마더보드 위탁 생산 시작
- 주요 고객 (2000.1/4) : HP(37%), Compaq(13%), Dell(10%)

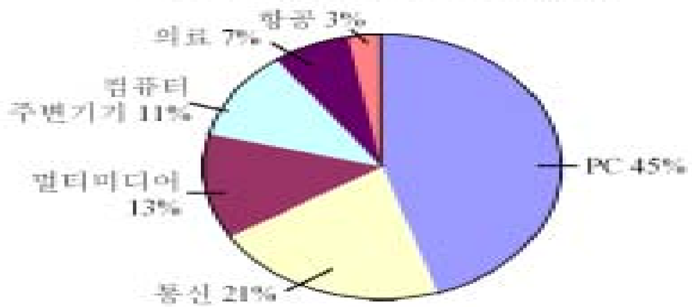
경영상의 주요 특징

- SCI는 제품 다양화보다는 PC 단일제품 분야에서 생산 규모를 확대하는 양적 팽창 전략으로 장기간 1위 자리를 유지하였으나, PC 가격 경쟁이 격화되면서 1998~1999년중 경영성과가 악화되었음.
- 1999년 Eugene Sapp가 CEO에 취임한 후 경영개혁에 착수함.
  - · 통신 부문에의 적극 진출 추진 : Notel Networks의 공장 인수 등
  - · 수요 변동에 신속히 대처하기 위해 메이커-SCI-Supplier 3자간에 Web을 통한 수발주 정보 시스템 (E-Solution) 구축

매출 추이



주요 제품별 매출 구성(2000.1/4)



Flextronics

Flextronics는 일본식 생산방식의 적극 도입, Global M&A 전략 등에 힘입어 90년대 후반 연평균 50%가 넘는 고성장을 시현해 왔음.

성장 과정

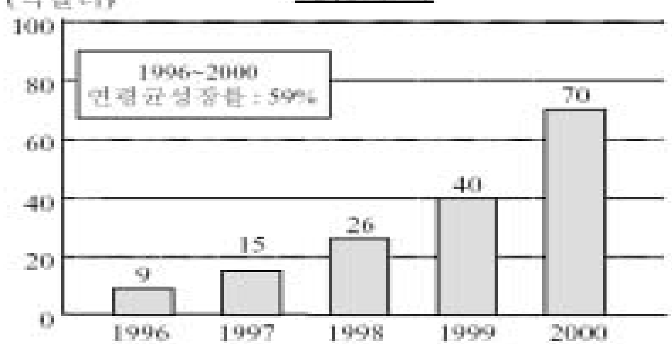
- 1969년 실리콘밸리에서 프린트기판 조립 벤처기업으로 출발함.
- 1981년 EMS 기업 최초로 싱가폴에 공장을 설치하였으며, 싱가폴 자회사가 지금의 Flextronics International의 모체임.
- 1995년 이후 상위 EMS 기업중 가장 빠른 성장세를 보임.
- 주요 고객(1999) : Ericson(17%), Philps(15%), Cisco(13%)

경영상의 주요 특징

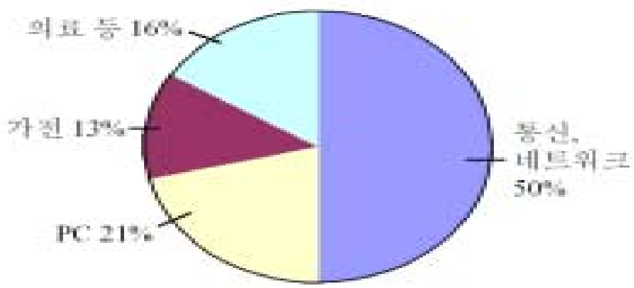
- 1995년 이후 경영계혁에 착수
  - DFT(Demand Flow Technology)의 도입
    : DFT란 도요타 시스템을 적용한 HP의 생산시스템을 지칭하는 것으로, 수요 변동에 따라 생산 흐름을 조절하는 것임.
  - 「공업단지방식」 도입
    : 쓰리콤의 Palmpilot(PDA), 마이크로소프트의 X-Box(게임기)등이 공업단지방식에 의해 생산된 제품들임.

* 「공업단지방식」 이란 일본 자동차기업들이 북미시장 진출시 계열 협력기업과 동반 진출하였던 방식에서 비롯된 용어임.

매출 추이



주요 제품별 매출 구성(1999년)



Celestica

Celestica는 컴퓨터 관련 제품의 매출비중이 높으며, 90년대 후반 이후 북미 지역에 편중되었던 생산거점을 Global 지역으로 확장하고 있음.

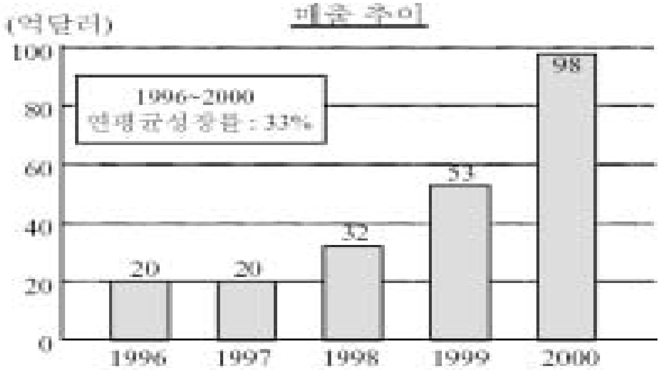
<u>성장 과정</u>

- 1994년 IBM 캐나다 공장이 스핀 아웃되면서 탄생한 기업임.
- 1998년 IPO 후, 주식시장에서 조달한 자금으로 적극적인 M&A에 나서 고성장을 시현함.
  - · 96년 10월 2개 공장(2개국)에서 2000년 2월에는 34개 공장 (10개국)으로 급증
- 주요 고객(1999) : HP(20%), Sun Microsystems(20%), Cisco(12%)

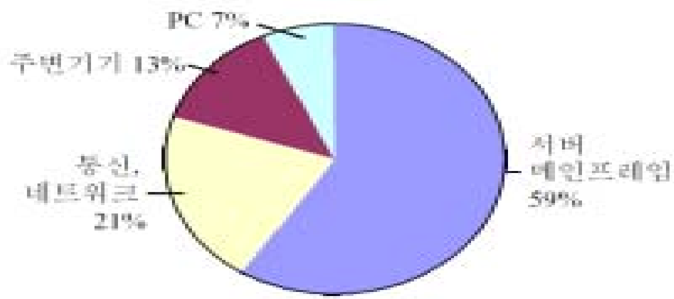
<u>경영상의 주요 특징</u>

- 메가 EMS 등이 High-end 제품에서 Low-end 제품까지 망라하는데 비해 Celestica는 컴퓨터 관련 High-end 제품에 주력
  - 서버, 메인프레임, 워크스테이션 등의 매출 비중이 높음.
  - 휴대폰, PC도 생산하고 있으나 그 비중은 높지 않음.
- 메가 EMS에 비해 북미지역의 매출 비중이 약 60%로 높은 편임.

<u>매출 추이</u>



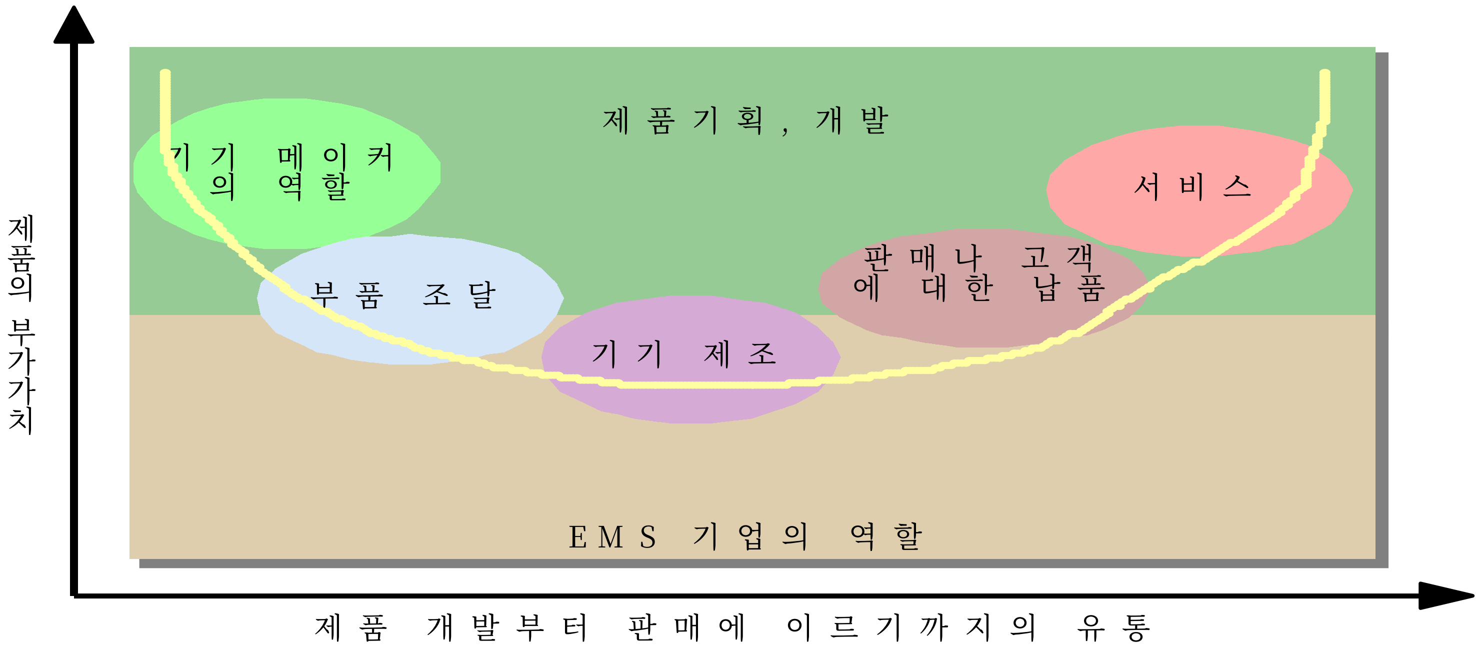
<u>주요 제품별 매출 구성(1999년)</u>



5 EMS업체의 역할 확대

 단순 생산전문업체 → Design, Testing, 물류, 고객서비스로 영역 확대중

- 이를위해 디자인 & 수리센터 인수, 설계기술 인력 보강
  - · Solectron : IBM수리센터와 엔지니어 인수, Nortel에 디자인 엔지니어 파견
  - · S C I : 디자인 능력 보유업체인 CMS Hartzell 인수, Nokia 기술인력 채용
  - · Flextronics : Chatham Tech. 합병, HP와 전자상거래 업체 설립
  - · Celestica : Alventives Online Design Community 인수



6 EMS업체 생산기지 운영현황

 ’01년 불경기로 인한 재고부담, Line 운영 어려움

 미국내 공장을 멕시코 등으로 이전

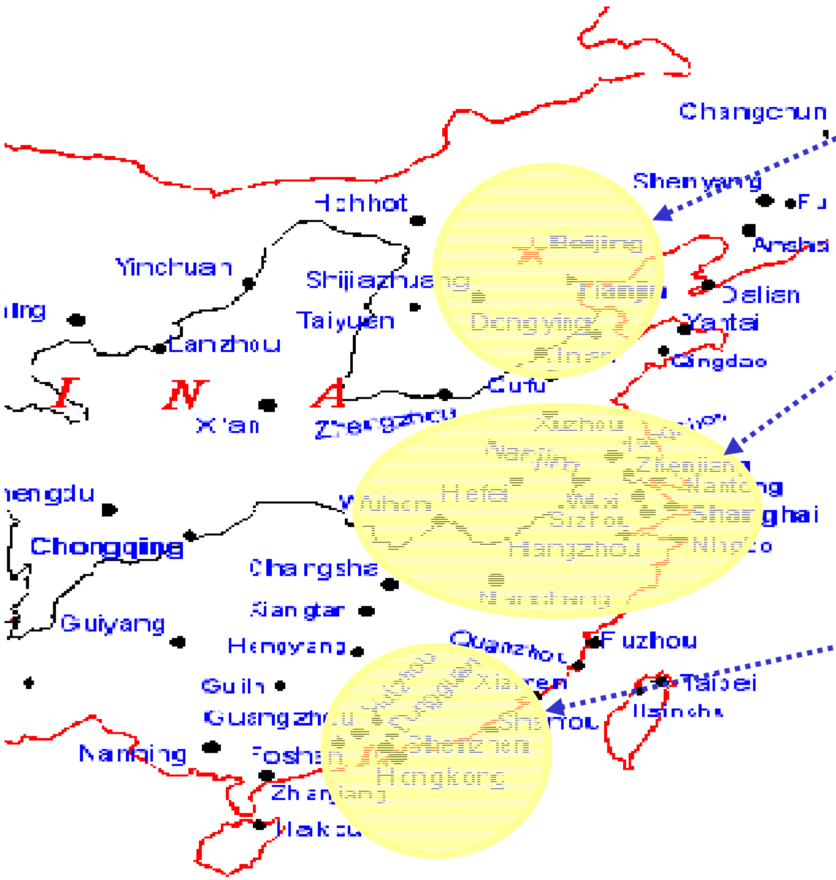
- 통신장비 고가품을 위주로 생산하던 미국내 공장을 Cost부담으로 이전

 대만 중국계 EMS업체와의 대대적 경쟁 돌입

 대형 EMS업체들의 중국진출 활발

대형 EMS업체의 중국진출 사례

- 低인건비, 低생산Cost 활용 : 馬聯은 중국대비 인건비 2배, 싱가폴은 高Cost
- 특히 Flextronics는 중국내 거점이 7개로 최대규모



華　　北
· 北京 : Flextronics, Elcoteq
· 天津 : Flextronics

華　　中
· 江蘇 : Flextronics
· 西鄉 : Flextronics
· 蘇州 : Solectron, Celestica
· 昆山 : SCI
· 上海 : Flextronics, Solectron

華　　南
· 東莞 : Celestica, Elcoteq
· 珠海 : Flextronics(2개)
· 深圳 : Solectron, Jabil
· 淡水 : Jabil

Ⅲ. ＥＭＳ업체와의 거래조건

1 EMS업체 구매 및 승인관련 업무현황

 World-wide 공급 시스템 운영

- ERP & BOM 시스템 운영
- 대부분의 거래는 EDI시스템과 e-Commerce 활용

  : Solectron의 경우, 매출의 70% · 구매의 40%를 e-Solution 이용

 Cost 관리 : 총체적 비용관리 및 간접비용 최소화 전략 추진

- Total Cost로 관리 : 구입비용 + 물류비용 + 간접비용을 포함

 Supply Chain에 대응 가능한 업체와만 거래

- 품질, 납기, CAPA에 대응력 있는 전략적 업체와만 거래
- Solectron의 경우, 120개 납품업체만 운영(구입금액의 85% 점유)

2 EMS와의 거래조건

- Manufacturing Solutions
- Product Management
- Quality & Reliability
- Cost Reductions
- Services
- Globalized Locations

※ Solectron의 거래조건

- 생산능력
- 생산의 유연성 및 물류능력
- 세계적인 경쟁력
- 기술적인 리더쉽
- Total Quality
- 튼튼한 재무구조
- World-wide 지원과 서비스
- Solectron의 전략적 목표에 대한 협력

3 EMS들이 요구하는 기본항목

- Pricing in Volume (RFQ)
- Vendor Reliability (Stable Supply / Leadtime Accuracy)
- VMI (SMI)
- Payment Terms
- Account Management
- “Incentive” Programs

Ⅳ. ＥＭＳ업체 접근방법

1 EMS업체 접근방법

 Find the right contact point

- 제품의 성격에 따라 누가 결정권을 갖는지 판단
- AVL 은 어디서 ? , Initiative 는 누가 ?
  - OEM에서 AVL관리 제품 : 주요 부품군
  - EMS에서 ” : 범용 부품군

 Approaching Method : 제품성격에 따라 접근방법

- 신기술 제안제품 이냐 ?
- 기존제품에 추가적인 경쟁력을 가진 제품이냐 ?

 Commodity managers in OEM and EMS

2 Case Study in Guadalajara Mexico

Guadalajara 지역적 특성

- 멕시코 중부내륙에 위치 : 멕시코시티 다음으로 큰 도시(인구 350만명)

- 고급인력 多 : 주요대학 7개 소재

  최근 산업화 바람으로 평균연령 29세 → 도시 활기

- 원활한 물류

  · Guadalajara 국제공항 및 항구도시(Veracruz, Manzanillo) 인접

  · 미국과의 운송은 양쪽 항구를 이용한 선박 위주

  (Trucking은 고비용, 도난 위험성 高)

  ※ Tijuana에서도 Trucking은 약 5~6일 소요 → Air운송이 多

- 날씨가 온화하여 휴양지로도 유명

Guadalajara 소재 주요 업체

- EMS업체들이 모이게 된 배경
  - 초기 Motorola가 반도체공장, IBM 이 Note PC, HP가 프린터사업 개시
  - 주정부가 해외공장 유치 특혜를 주기 시작하면서 업체들 집중

- 주요 업체들
  - E M S : Solectron(Natsteel), Flextronics, SCI, Jabil
    Benchmark(AVEX), MTI
  - I B M : Note PC 완성공정
    (Board조립은 인근 Solectron, Natsteel에서 수행)
  - V-Tech : Cordless Phone 생산중이나, 홍콩으로 이전 계획
  - H P : 프린터 디자인센터
  - Siemens : 전장품 조립
  - Motorola : IC Assembly

□ 주요 부품업체 진출 현황

- 수동부품(Passive) 관련
  - 미국 주요 Distri.들이 자체조직 및 창고 운영으로 EMS 직접 공략
    - → All America, Arrow, In Sight 현지 진출
    - → Taitron, Cal Chip이 소재부품으로 현지 재고운영 판매중
  - ROHM : 현지 창고업체를 통해 재고 운영
  - AVX : 현지 Taping 공정 운영, 일부 현지 창고업체 이용 VMI 서비스
  - Murata/TDK : 현지 재고 운영 검토

- 기타 제품
  - Connector 등 : 현지 조립생산에 많이 소요되는 부품은 현지 재고 운영
  - 기타 주요부품 : 현지에 Sales기능만 운영

- Rep. 및 사무소 영업인력난 및 임금 Inflation 현상 발생
  - 대부분의 부품이 아시아에서 오기 때문에 현지 직영사무소 설립 추세

□ Solectron의 경우

- 기존 Project별(공장건물별) 단순 조달구매 기능은 존속하되, 이들중 우수인력을 선발하여 신규조직 설립
- PST(Purchasing Strategic Team)
  - 현재 AVL List 업체중 범용성 제품은 Guadalajara 공장 전체 대상으로 (8개건물 10여개 Project) 통합구매 → Item별 담당자 선정
  - 1차 Inductor, Magnetics, Resistor, Tantal, MLCC 대상 → IC도 통합 구매 예정
- SBM(Supply Base Management)
  - Project별로 고객에게 Cost Down 제시를 위해 공급선 대안 찾는 그룹 → 업체를 찾아 EMS에서 Test후 문제 없으면 고객에게 승인신청
  - Mobile/Telecom, Computing, Networking, Periphal 분야 대상 → 담당자가 분야별로 책임지고 가격을 절감해야 하는 구조
  - 전화기의 경우, PCB를 포함 전 부품을 SBM을 통해 승인이 가능

▯ Flextronics의 경우

- 캠퍼스와 같은 큰 공장(Industrial Park)에서 Project별로 생산
- EMS 전체승인을 받더라도 Project별로 담당자를 별도로 만나야 함.

현지 VMI 물류 서비스

- Guadalajara에 전문 VMI 서비스 창고업체 多
  · ROHM과 AVX도 현지에 재고를 운영하면서 서비스중

- 운영방식
  · 아시아계 회사 물량은 일단 창고업자 명의로 현지에 재고 보관
  · EMS에서 필요할때 마다 Pick-up하고 정해진 기간별로 사용분 만큼 업체가 EMS로 Invocing하는 방식

- 멕시코의 경우, 마키아도라 규정에 의거 창고업자가 Consignee가 되어 통관없이 현지 보관 가능
  · 이경우 공급업자들은 통관을 위한 현지법인이 필요없음

- VMI도 모든 제품에 다 요구하는 것은 아님.
  · Solectron의 경우, 년간 $200K 이상 구매물량에 한해 요구
  · VMI 창고에서 통관없이 18개월 보관 가능
    → 장기재고 순환만 잘 하면 원거리 재고관리도 가능
  · 재고관리도 Web상에 창고재고를 조회할 수 있도록 시스템 운영중

Ⅴ. EMS업체 개척을 위한 준비

1 EMS 개척을 위한 준비

- Level of Technology
  - 기술이 최고의 Market Point
- Good Presentation Material
  - 제품에 대한 presentation
  - Business Model presentation
- Find the Communication Channel
  - 중간 매개체 통해 route 개척
  - 마케팅 비용 인정
- Estabilish a “Sales Company”
  - 인접한 application 제품군끼리 Synergy
  - Worldwide 조직대행, Reliable 한 규모제시 가능
  - 중소기업들의 공동 판매망 역할

Thank You!

New HP 의 구매전략과 HP GPS Korea 활용

New HP 의 탄생

HP 의 Compaq 인수는 HP 의 재창조 과정입니다. 즉, 단순히 제품만을 공급하는 업체가 아니라 유효 적절한 솔루션을 공급하는 기업으로, 고객에게 총체적인 경험을 제공하는 기업으로, 또 그 누구도 우리를 시장에서 감히 넘볼 수 없는 세계 1 위의 기업으로의 변환을 촉진시켜 줄 것이며, 거대한 문화와 브랜드, 목표를 가진 커다란 기업으로 탄생할 것입니다. 요약 드리자면, 이미징 및 프린팅 사업에서 업계 제 1 위의 리더로서 더 많은 시장점유의 기회를 갖게 되며, 다양한 솔루션 공급으로 더 많은 know-how 를 축적할 수 있게 됩니다.

합병으로 얻어지는 시너지 효과는 다음과 같습니다:

- Windows 및 UNIX 서버분야 세계 1 위.
- 기업용 저장장치 분야 세계 1 위,
- 이미징 및 프린팅 분야 세계 1 위,
- PC 분야 세계 1 위,
- 관리용 소프트웨어 분야 세계 1 위
- 업계 3 위의 IT 서비스 제공 업체

HP 의 구매조직, Global Procurement Services

국제구매본부는 우수한 국산 전자부품, 완제품을 발굴, 개발하여 본사에 조달하는 것을 업무로 있습니다. 국제구매본부(GPS: Global Procurement Services)는 조직상으로 HP 본사의 Worldwide Operations 의 Supply Chain 에 속해있으며, 4 개 부서가 GPS 내에 있습니다.

18 년 이상의 역사와 세계 16 개 사무소를 운영하며, 인원은 300 여명입니다. 주요 임무는 자재의 안정적 공급, Supplier 감사업무, 엔지니어링 서비스, e-procurement 서비스, 그리고 국내외 시장정보 제공등을 하고 있습니다.

지난해 HP 는 국내에서 25 억불상당의 구매를 했으며, 구 Compaq 은 32 억불 상당의 전자부품 및 완제품을 구매하였습니다. 통합 HP 에는 약 60 억불 이상을 구매할 것을 예상 됩니다. 주요 제품으로는 DRAM, TFT LCD, PC 완제품, 노트북완제품, ODD, HDD, Monitor, Wafer 입니다. 이는 한국업체 입장에서는 수출에 해당합니다.

HP 의 소싱(Sourcing) 원칙

HP 는 소싱전략이 수립되고, 선택영역을 정하고, 공급업체(supplier)을 선정 시작하는데 이때 사용되는 원칙은 TQRDC 입니다. TQRDC 는 Technology, Quality, Responsiveness, Delivery, 그리고 Cost 의 머리글자로 5 가지 항목에 점수를 배정하여 최적의 평가를 선정합니다. 이 TQRDC 는 최초의 공급업체 선정 뿐만 아니라, 기존의 공급업체의 평가시에도 사용됩니다.

몇 가지 원칙이 있는데, 기술력이 있으며 세계적인 조직망을 확보하고 있는 공급업체를 선정하며, 안정적 공급을 위해 최소의 공급업체를 선정하며, 이상적인 비용구조를 가진 업체를 선정하는 등등입니다.

국내 업체들이 향후 HP 와 사업을 시작하거나 확장하고자 한다면, HP 의 구매전략의 기본인 TQRDC 개념과 전체 구매전략을 이해하기 위해 GPS 의 전문성을 활용하는 것이 많은 도움을 줄 것 입니다.

invent

Welcome to the new HP

- The result of a merger with Compaq.
- Approximately 145,000 employees worldwide and business presence and service capability in 160 countries.
- New HP will lead Infrastructure solutions, IT services, Digital Imaging, Digital publishing and Mobility.
- To invent technologies and services that drive business, create social benefit and improve the lives of customers.
- HP Revenue in Fy01(ended in Oct '01): $45.2B, Compaq Revenue in Fy01 (ended in Dec.'01): $33.6B
- 4 core business groups of New HP: Enterprise Systems Group(ESG), Imaging and Printing Group(IPG), HP Services(HPS) and Personal Systems Group(PSG)

market leadership today

INFRASTRUCTURE

- #1 in fault-tolerant systems
- #1 in storage
- #1 in Windows servers
- #1 in Linux servers
- #1 in UNIX servers
- #1 in management software
- #3 in IT services

NETWORK EDGE

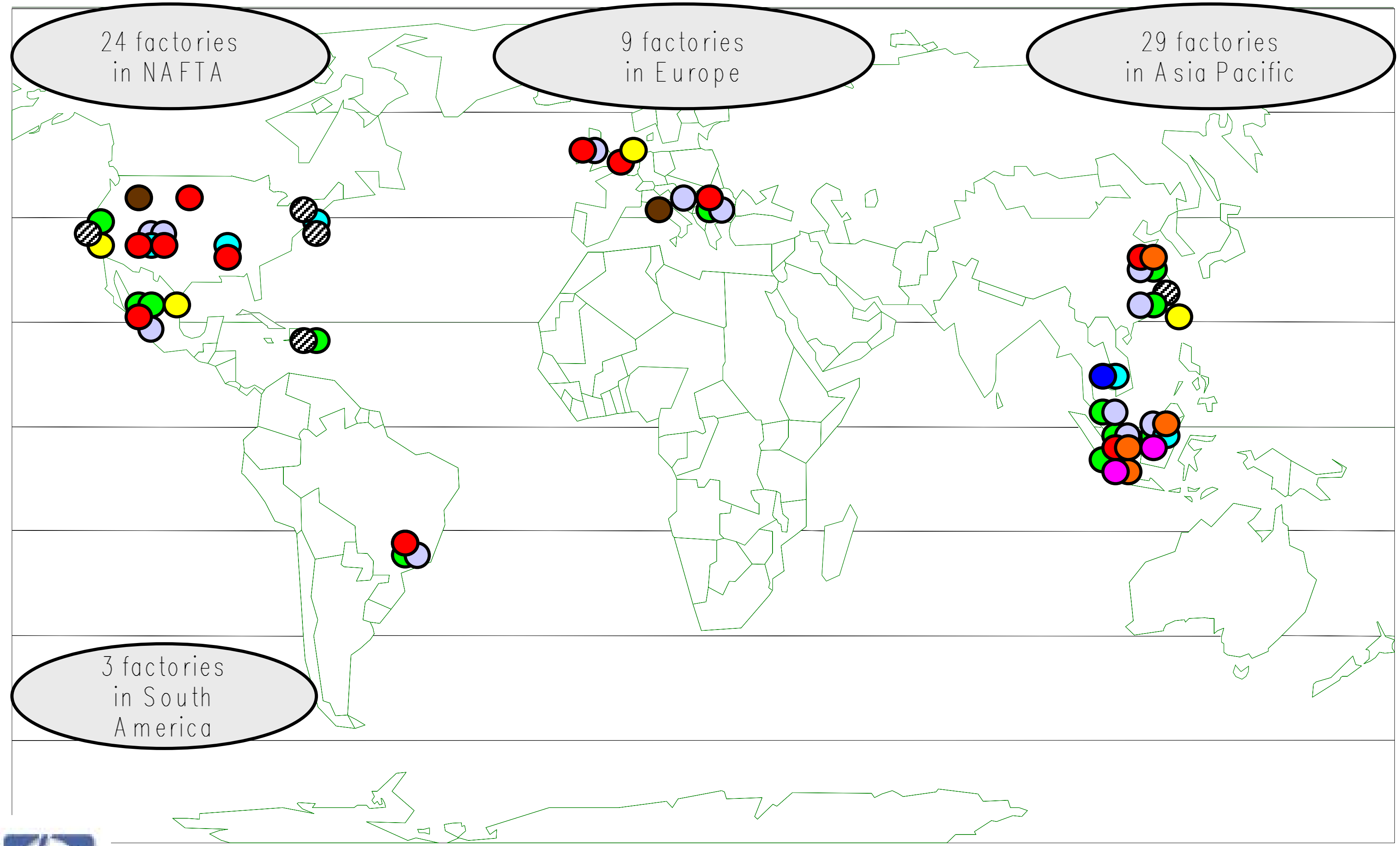
- #1 in PCs
- #1 in pocket PCs
- #1 in printing & imaging

ACCESS

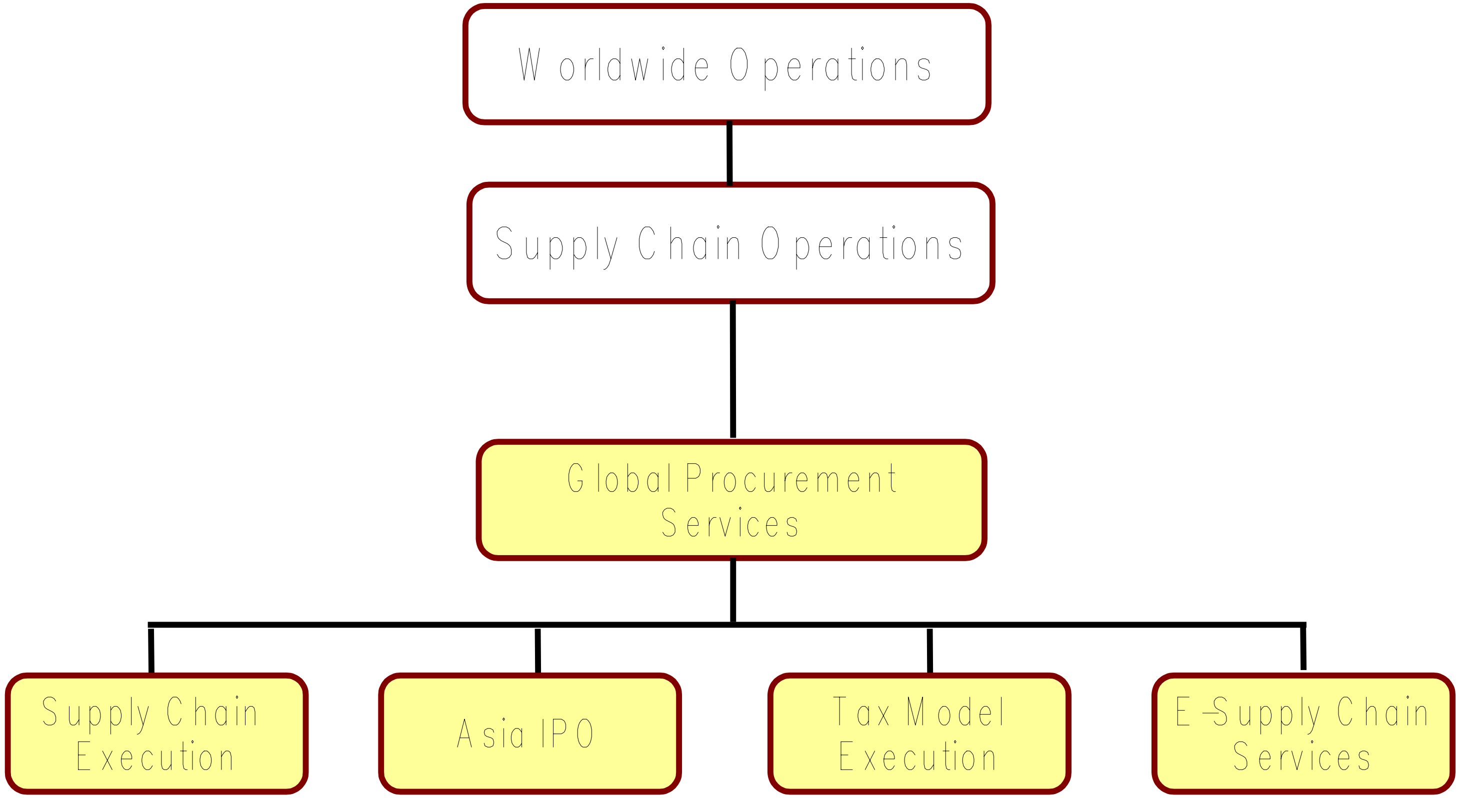
invent

HPs Manufacturing Clusters

spread among 15 suppliers, representing 65 sites ww



Worldwide Operations
Supply Chain Operations / Global Procurement Services

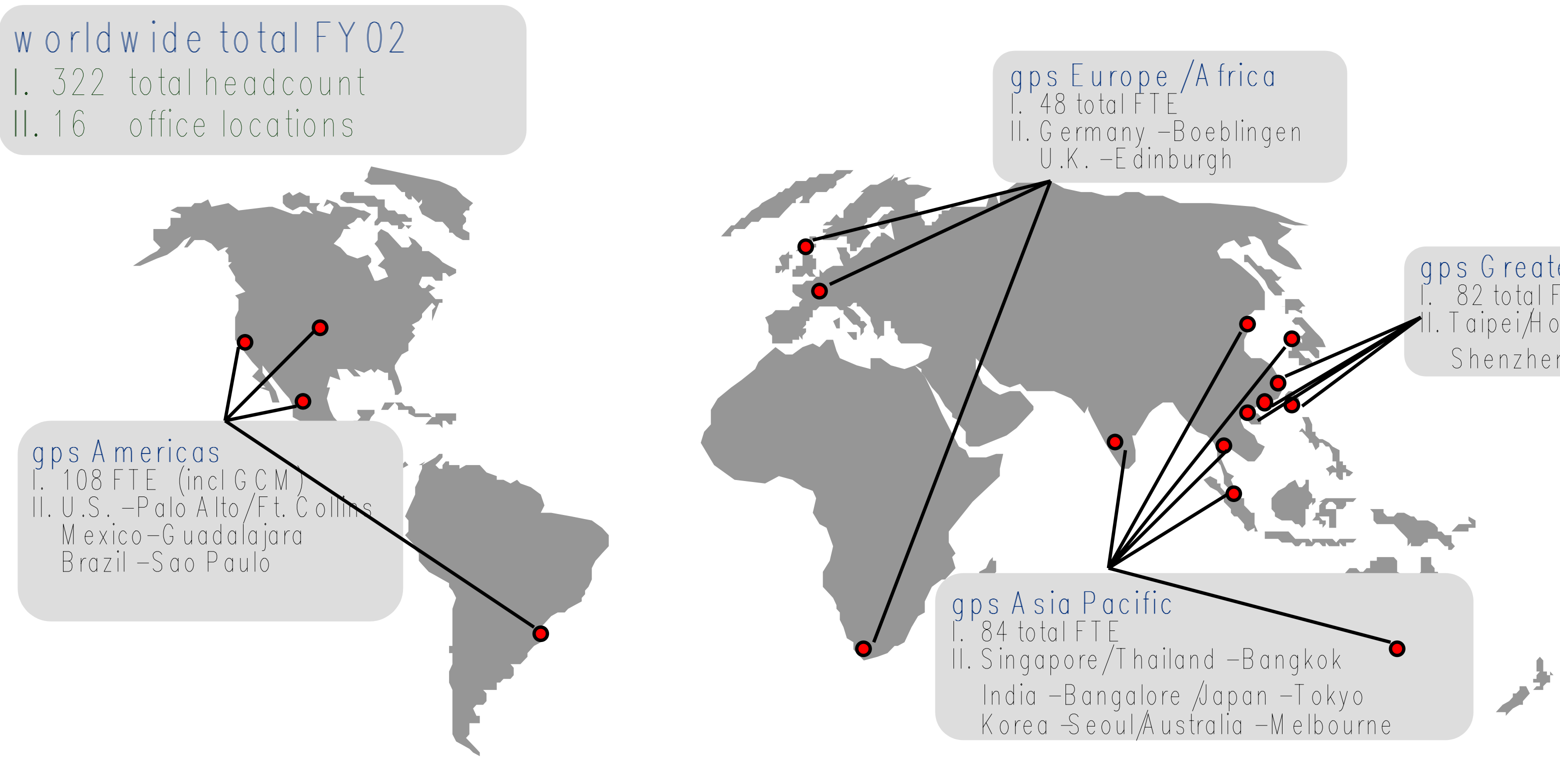


GPS Global Procurement Services

Geographic Distribution FY 2001

03/2002

18 years of integrated procurement services . around the world, around the clock



invent

Roles & Responsibilities
Global Procurement Services-Korea

Roles & Responsibilities:

Provide geographic presence and expertise through an integrated procurement network that delivers the benefits of world-class supply management to the HP businesses

- ❑ Assurance of supply and material cost management services
- ❑ Supplier audit and management services
- ❑ Design and engineering support services
- ❑ e-procurement tools and processes
- ❑ Market & Technology Intelligence

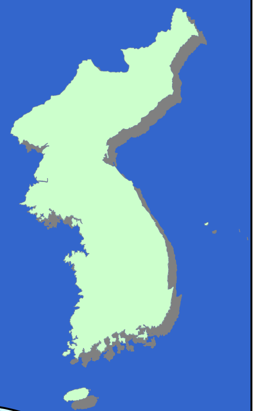
Korea
Market Business Development

Korean Products' Standings on WW IT and Communications Market :

- Memory
- TFT LCD, PDP
- PC System
- PC Monitor
- CDMA
- HDD / ODD
- PDA & Accessory
- Sheet Metal
- Wafer
- Power Supply

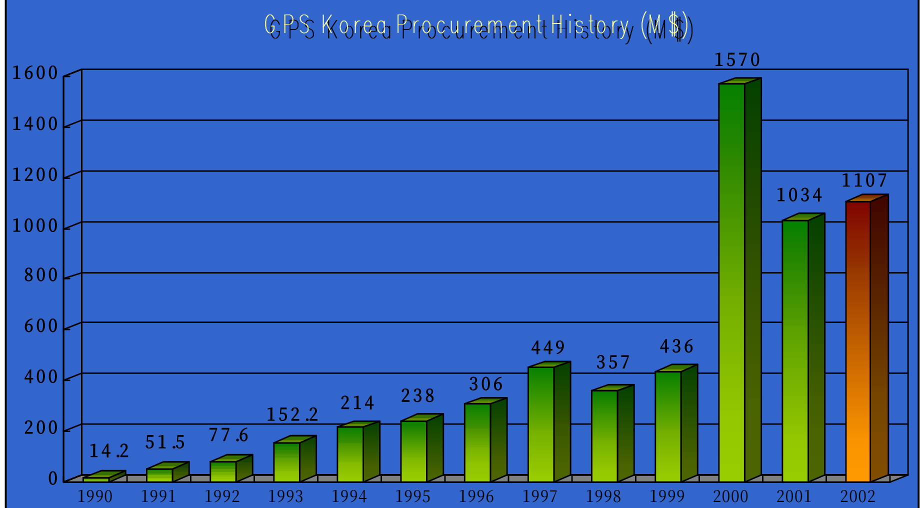
- Notebook ODM
- e-Book , Web Pad
- Smart Phone
- Wireless Module
- Digital Cameras
- Option Cards
- Lithium Ion Battery
- Facsimile

- Storage
- PCD, FPCB
- Heat Sink
- Wireless Headsets
- Software, Game
- VoIP
- Tooling, Resin
- Glue Components
- Keyboards
- Interconnect
- Motor

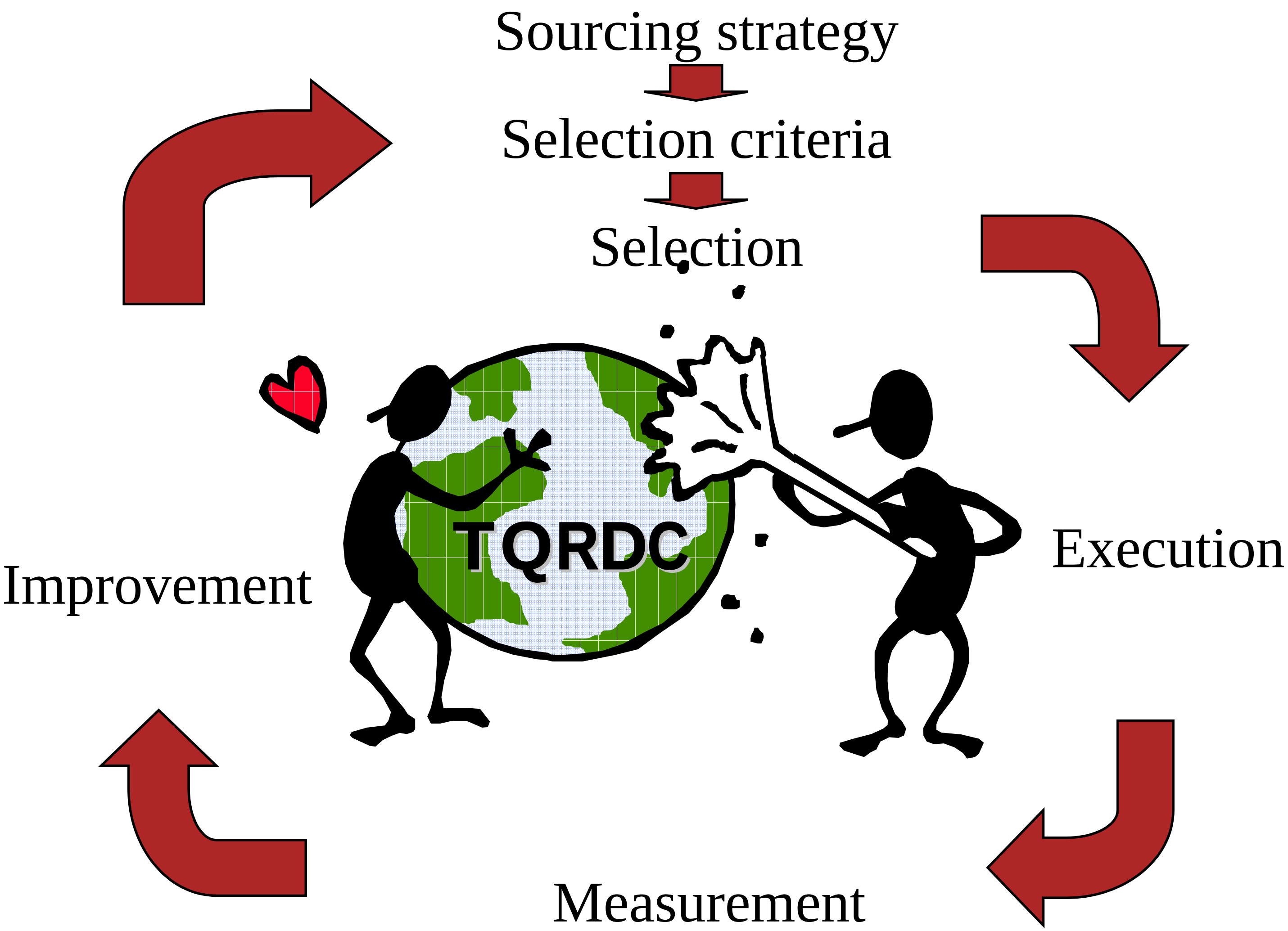


HP Product Lines doing business in Korea :

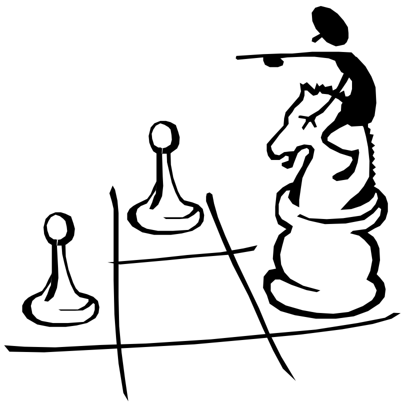
HPD	PC Monitor
BDD	PC Monitor
MCD	TFT LCD
AIO	Fax
IJMS	Wafer
ICD	MROM



TQRDC Purpose



TQRDC Sourcing Principles

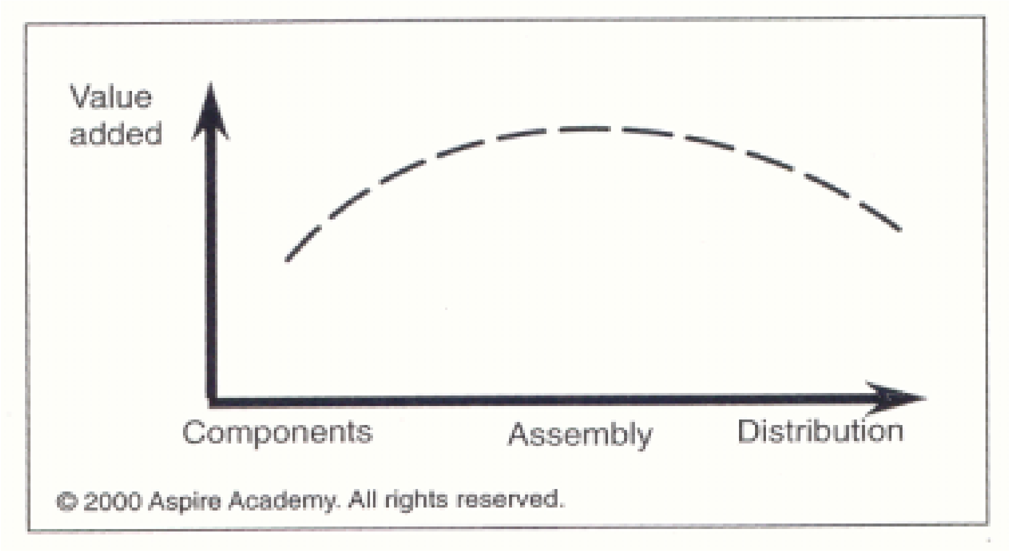


- Right suppliers for right technology
- Minimum number of suppliers to assure supply
- Closest to ABC, through optimized cost structure
- Privilege current suppliers, based on TQRDC results
- Privilege suppliers that can provide multiple products
- Not more than 30% with 1 supplier
- Controlled ramp up with new suppliers

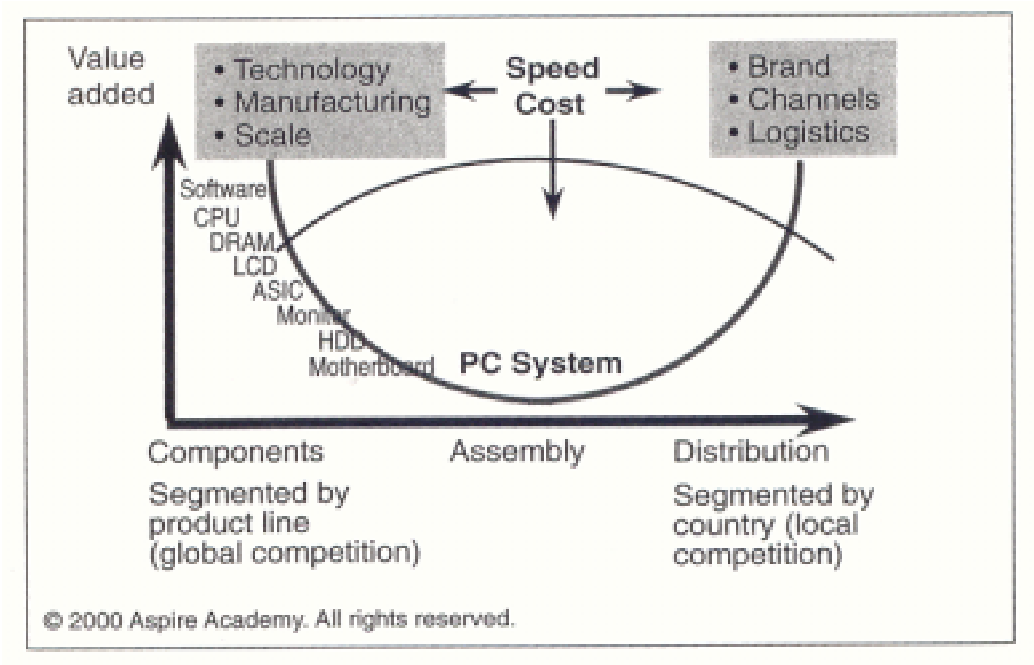
KOTRA 의 OEM/EMS 진출지원사업

I. Smile 커브와 EMS

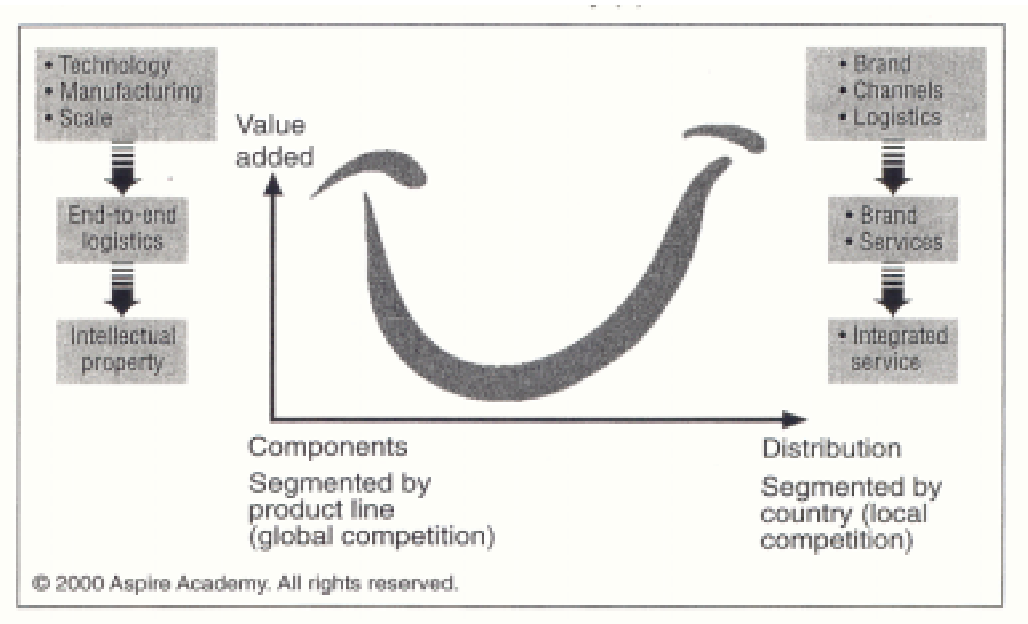
1. 컴퓨터산업의 Value-added Curve before 1980



2. Stan Shih's Smiling Curve(1)



3. Stan Shin's Smiling Curve(2)



4. EMS 의 고민과 기회

ㅇ EMS 의 고민

- Smile 커브의 최하점인 제조업을 OEM 이 처분하는 과정에서 생산설비를 인수하는 조건으로 OEM 에 장기 납품계약을 확보하면서 성장
- 부가가치가 가장 낮은 '제조' 부문을 떠안고 있음
- 생산비 절감이 최대 과제

ㅇ EMS 의 성장전략

- 대형 EMS : 생산비 절감을 위하여 아시아로 이동
- 소형 EMS : Local 화 , 특정품목 특화를 통하여 성장
- 거래선 축소경향
- 제조관련 부가서비스 개발

ㅇ EMS 에 대한 접근전략

- 아시아 시장에 적극적인 EMS
- 15%의 비용절감제시 가능해야
- VMI, 하자배상능력등 확대 필요

II. Target 300 IT 기업 DB 소개

♦**DB 1 : TOP 350 IT 기업의 구매책임자 400 명 DB**

<u>미국 350 개 IT 기업의 구매책임자 DB 공개</u>

ㅇ 수록업체

- OEM(80) ; IBM, HP, Lucent, Cisco, Motorola, Nortel 등
- EMS(120) : Solectron, Flextronics, Sanmina-SCI, JBL 등
- Distributor(100) : Avnet, Future, IngramMICRO, CompUSA 등
- REP(50) : NEC, Samsung, Murata 등 대기업의 세일즈랩

ㅇ수록내용 : 각사 Purchasing manager 연락처

ㅇ 첨부자료

[주요 OEM .명단]

1. 글로벌 TOP 100 Electronics OEM 명단(홈페이지/매출액/품목/국가)
2. 글로벌 TOP 100 Industrial OEM 명단(홈페이지/매출액/품목/국가)

[주요 EMS 명단]

3. TOP 15 EMS 별 OEM 고객, 매출액구성 및 국별공장보유현황
4. TOP 14 컴퓨터 OEM 들의 EMS 이용 현황
5.TOP 10 네트웍장비 OEM 들의 EMS 이용 현황
6. TOP 18 통신장비 OEM 들의 EMS 이용 현황
7. TOP 10 EMS 의 주요 OEM/EMS 생산설비인수 현황
8. TOP 30 EMS 의 주요 제조서비스 다양화 현황

[주요 Distributor 명단]

9. US TOP 50 Franchised Distributor
10. Top 10 Global Distributor
11. TOP 10 Semiconductor Distributor
12. TOP 10 Passive Distributors
13. TOP 10 Electromechanical Distributors
14. TOP 10 Interconnect Distributor
15. TOP 10 Power Sources Distributors
16. TOP 10 Computer Systems/Peripherals Distributors
17. TOP 10 Non-Franchised Distributors

♦ **DB 2 : TOP 50 기업의 벤더등록제도 DB**

미국 50 대 IT 기업의 벤더등록제도 DB

ㅇ 컴퓨터, 휴대폰, 통신장비, 광통신장비, 자동차, 항공기등 주요 OEM 35 개사와 Solectron, Flextronics, Sanmina-SCI 등 5 대 EMS 및 Avnet, Arrow, CDW, Ingram Micro 등 5 개 디스트리뷰터의 벤더등록제도 조사자료

OEM 의 벤더등록서류 견본

1. Boeing AQS & Supplier Information Request Form
2 Delphi Potential Supplier Assessment Sheet & Supplier Guidelines
3. CISCO supplier Profile Form 및 EFT Enrolment Form
4.Global eXchange Services Supplier Diversity Program Form
5. Lexmark Supplier Profile Form
6. SGI Potential Supplier Registration Form
7. Logitech New Business Venture Group Submission Package
8. CDW Computer Centers Vendor Information Sheet & Clarification of Terms, Policies and Conditions
9. Ingram MICRO New Vendor Submission Guidelines & Vendor Profile Form
10. Electronics Representatives Association's Evaluation of a Prospective Principal Form

♦ **DB 3 : 글로벌 Top 120 EMS 의 국가/도시별 800 여개 공장 연락처**

세계 36 개국 800 개 EMS 공장 연락처 DB

ㅇ미주: 미국 395, 카나다 31, 멕시코 42, 브라질 12

ㅇ아시아: 중국 49, 말레이지아 19, 일본 19, 대만 17, 홍콩 7, 싱가폴 14, 태국 10, 인도 5, 인도네시아 2, 필리핀 3, 호주 3

ㅇ유럽 : 영국 78, 이태리 21, 프랑스 20, 스웨덴 14, 핀란드 12, 독일 9, 네덜란드 7, 덴마크 3, 노르웨이 1,헝가리 9, 체코 3, 폴란드 2, 스위스 3, 오스트리아 2, 벨기에 1, 에스토니아 1, 루마니아 2, 러시아 1, 스페인 5, 이스라엘 6, 터키 1

♦ 자료 구입

ㅇ KOTRA 해외조사팀 조은진

전화 : (02)3460-7326, 팩스 : (02)3460-7924

ㅇ KOTRA 샌프란시스코무역관 이정순

전화 : 1-415-434-8400. 팩스 : 1-415-434-8450

Top 350 IT Companies contact DB 수록업체명단

(1) Top 80 OEM

No.	Company Name	Web Site	No.	Company Name	Web Site
1	3Com Corp.	www.3com.com	21	EMC Corp	
2	ADC Tlecommunications	www.adc.com	22	Emerson Electric	www.gotoemerson.com
3	Agilent Technologies	www.agilent.com	23	Enterasys Networks	www.enterasys.com
4	Andrew Corporation	www.andrew.com	24	Extreme Networks	www.extremenetworks.com
5	Apple Computer	www.apple.com	25	Gateway	www.gateway.com
6	Applied Materials	www.appliedmaterials.com	26	General Electric	www.gxs.ge.com
7	Audiovox	www.audiovox.com	27	Handspring	www.handspring.com
8	Avaya	www.avaya.com	28	Harris Corp.	www.harris.com
9	Best Buy	www.bestbuy.com	29	Hewlett Packard	www.hp.com
10	Boeing Company	www.boeing.com	30	Honeywell International	www.honeywell.com
11	Ciena	www.ciena.com	31	IBM	www.ibm.com
12	Circuit City	www.circuitcity.com	32	IGT	www.igtonline.com
13	Cisco Systems	www.cisco.com	33	InFocus	www.infocus.com
14	Compaq	www.compaq.com	34	Intel	www.intel.com
15	Danaher	www.danaher.com	35	Iomega	www.iomega.com
16	Delphi Automotive Systems	www.delphi.com	36	JDS Uniphase	www.jdsu.com
17	Diebold Inc.	www.diebold.com	37	Johnson Controls	www.johnsoncontrols.com
18	Dover Corp.	www.dovercorporation.com	38	Jupiter Networks	www.jupiter.net
19	Eastman Kodak	www.kodak.com	39	KLA-Tencor	www.kla-tencor.com
20	eMachines	www.emachines.com	40	L-3 Communications	www.L-3Com.com

No.	Company Name	Web Site	No.	Company Name	Web Site
41	Lam Research	www.lamrc.com	61	Quantum Technologies Worldwide	www.quantum.com
42	Lear	www.lear.com	62	Qwest Communications	www.qwest.com
43	Lexmark International	www.lexmark.com	63	Radio Shack International	www.radioshackcorporation.com
44	Lockheed Martin	www.lockheedmartin.com	64	Raytheon	www.raytheon.com
45	Lucent Technologies	www.lucent.com	65	Redback Networks	www.redbacknetworks.com
46	Mattel	www.mattel.com	66	Research in Motion	www.rim.net
47	Maxtor	www.maxtor.com	67	Rockwell Automation	www.rockwellautomation.com
48	Mitel Corp.	www.mitel.com	68	SBC communications	
49	Motorola Inc.	www.mot.com	69	Scientific-Atlanta	www.scientificatlanta.com
50	NCR Corp.	www.ncr.com	70	Seagate Technology	www.seagate.com
51	Nokia Corp.	www.nokia.com	71	Sensormatic Electronics	www.sensormatic.com
52	Nortel	www.nortelnetworks.com	72	Silicon Graphics Inc.	www.sgi.com
53	Northrup Grumman ComponentTechnology	www.littoninterconnect.com	73	Storage Technology	www.stortek.com
54	Novellus Systems	www.novellus.com	74	Struers, Inc/Logitech International	www.logitech-us.com
55	Nvidia	www.nvidia.com	75	Sycamore Networks	www.sycamorenet.com
56	Palm Inc.	www.palm.com	76	Symbol Technologies	www.symbol.com
57	PerkinElmer	www.perkinelmer.com	77	Tektronix	www.tek.com
58	Pitney Bowes	www.pb.com	78	Tellabs Inc.	www.tellabs.com
59	Power-One	www.power-one.com	79	Teradyne	www.teradyne.com
60	Qualcomm	www.qualcomm.com	80	Thermo Electron	www.thermo.com

(2) Top 120 EMS

No	Company Name	Web Site	No	Company Name	Web Site
1	Able Electronics	www.ableco.com	31	Circuit Works Corp.	www.cwems.com
2	Accton Technology	www.accton.com.tw	32	CMC Electronics.com	www.cmcelectronics.ca
3	ACME Electric	www.acmeelec.com	33	Coastline International	www.coastlineintl.com
4	ACT Manufacturing	www.actmfg.com	34	Cofidur	www.groupe-cofidur.com
5	ADCO Circuits Inc.	www.adcocircuits.com	35	Comtel Electronics	www.comtel-online.com
6	Advanced Electronics Inc.	www.aeiusa.com	36	Corlund Electronics	www.corlundelectronics.com
7	Advanced Flex	www.afiweb.com	37	CPM Elctronic Industries	www.cpmelectronics.com
8	Advance-Dial Co.	www.advance-dial.com	38	Creation Technologies	www.creationtech.com
9	Advantage Memory	www.advantagememory.com	39	CTS Corp.	www.ctscorp.com
10	Aerostar International	www.aerostar.com	40	DA-Tech	www.da-tech.com
11	Advanced Memory	www.advancedmemory.com	41	Debron Industrial Electronics	www.debron-electronics.com
12	Aimtronics	www.aimtronics.com	42	Dynalab	www.dynalabems.com
13	ALCO Electronics	www.alco.com.hk	43	Dynamic Details	www.ddiglobal.com
14	Altron	www.altronmfg.com	44	Eder Industries	www.ederindustries.com
15	APSCO International	www.aspsonic.com	45	EI Microcircuits	www.eimicro.com
16	APL Logistics	www.apllogistics.com	46	EIT Inc.	www.eit.com
17	APW Inc.	www.apw.com	47	Elcoteq	www.elcoteq.com
18	ARC-Tronics	www.arc-tronics.com	48	Electro Mechanical Solutions	www.e-m-solutions.com
19	Ayrshire Electronics	www.ayrshireelectronics.com	49	Eelectronics Systems Inc.	www.electronicsi.com
20	Benchmark Electronics	www.bench.com	50	EOG	www.eogresources.com
21	Boundless Manufacturing	www.boundless.com	51	EPI	www.epi.epson.com
22	Bulova Technologies	www.bulovatech.com	52	Epic Technologies	www.epicturbo.com
23	CalQuality Electronics	www.calquality.com	53	Express Manufacturing Inc.	www.eminc.com
24	Carlon	www.carlon.com	54	FINMEK	www.finmek.com

25	CDR	www.cdrmfg.com	55	Flextronics International	www.flextronics.com
26	Celestica Inc.	www.celestica.com	56	Foxxcon Electronics	www.foxxcon.com
27	China Products Inc.	www.chinaproductsinc.com	57	Gaston Electronics	www.gastonelectronics.com
28	Chippac Inc.	www.chippac.com	58	General Technology	www.gt-corp.com
29	Circuit Service Inc.	www.circuitservice.com	59	Genesis Manufacturing	www.genesismfg.com
30	Circuit Technology	www.circuit-technology.com	60	HANA Microelectronics	www.hanagroup.com

No	Company Name	Web Site	No	Company Name	Web Site
61	Harvard Custom Manufacturing	www.harvardgrp.com	91	Mid-South Industries	www.midsouthindustries.com
62	Honeywell Electronic Manufacturing	www.electronicmaterials.com	92	Millennia Group	www.the-millenia-group.com
63	IEC Electronics	www.iec-electronic.com	93	Milwaukee Electronics corp.	www.mecnorthwest.com
64	Inservco	www.inservco.com	94	MOREY Corp.	www.moreycorp.com
65	Integrity Technology	www.integrity-tech.com	95	MTI Electronics	www.mti-intl.com
66	Interalia	www.interalia.com	96	Namtai	www.namtai.com
67	Ionics Circuits	www.ionics-circuits.com	97	Newport Technology	www.newporttechnology.com
68	ISIS Surface Mounting	www.isis-smt.com	98	Nexus Custom Electronics	www.nexus.com
69	ITG Global	www.itgglobal.com	99	Nortech Systems	www.nortechsys.com
70	Jabil Circuit	www.jabil.com	100	NRT Technology	www.nrtpos.com
71	Janco Electronics	www.janco-electronics.com	101	Nu Visions Manufacturing	www.nuems.com
72	JMR Electronics	www.jmr.com	102	OAI Electronics	www.oaielectronics.com
73	K-Byte Manufacturing	www.kbyte.net	103	OEM Worldwide	www.oemworldwide.com
74	KDI Precision Products Inc.	www.kdi-ppi.net	104	OMNI FAB	www.omnifab.com
75	Key Tronic Corp.	www.keytronic.com	105	OSE	www.ose-usa.com
76	Kimball Electronics	www.kegroup.com	106	Pantronix Corp.	www.pantronix.com
77	LaBarge Products	www.labarge.com	107	Patapsco Designs	www.patapsco.com
78	Lexmark Electronics	www.lexmark.com	108	PDP Systems Inc.	www.pdpsys.com
79	Libra Industries	www.libraind.com	109	Pemstar Inc.	www.pemstar.com

80	LITE-ON	www.liteon.com	110	Pioneer Magnetics	www.pioneermag.com
81	Manufacturer's Services Ltd.	www.msl.com	111	Plexus Corp.	www.plexus.com
82	Mack Technologies	www.macktech.com	112	PNY	www.pny.com
83	Maxiswitch Inc.	www.maxiswitch.com	113	Polaris Contract Services	www.polariscmi.com
84	MC Assembly	www.mcati.com	114	Preco Electronics	www.preco.com
85	Metric Systems Corp.	www.metricsystems.com	115	Raven Industries	www.ravenind.com
86	M-Flex	www.mflex.com	116	Reliance Technical	www.rtsusa.com
87	MCMS Inc.	www.mcms.com	117	Reptron Manufacturing	www.reptron.com
88	Micro Dynamics	www.microdynamics.com	118	Riverside Electronics	www.rellew.com
89	Micro Industries	www.microindustries.com	119	Safari Technologies	www.safaripathways.com
90	Microelectronics Modules Corp.	www.mmccorp.com	120	Sandberg Industries	www.sandberg.com

(3) Top 100 Distributors

No	Company Name	Web Site	No	Company Name	Web Site
1	A.E. Petsche Co.	www.aepetsche.com	26	Converge Inc.	www.converge.com
2	ABC Phones Inc.		2	Costco	www.costco.com
3	Acal plc(UK)	www.acalplc.co.uk	28	DAC	www.heilind.com
4	Accutech International	www.accutech-intl.com	29	Dee Electronics	www.dee-inc.com
5	ACI Electronics	www.aci-elec.com	30	Dependable ComponentSupply	www.dependonus.com
6	Advanced MP Technology	www.advancedmp.com	31	Digi-Key	www.digikey.com
7	AE Associates	www.ae4electronicparts.com	32	Electro Sonic Inc.	www.e-sonic.com
8	Airtechnics Inc	www.airtechnics.com	33	Electrocomponents plc(UK)	www.electrocomponents.com
9	All American Semiconductors	www.allamerican.com	34	ESCO LLC	www.escollc.com
10	Allied Electronics	www.alliedelec.com	35	Flame Enterprises Inc.	www.flamecorp.com
11	America II Elctronics	www.americaii.com	36	Fred Meyers	www.fredmeyer.com
12	Arrow Electronics	www.arrow.com	37	Fry's Electronics	www.ifrys.com
13	Avnet Inc.	www.avnet.com	38	Future Electronics	www.futureelectronics.com

14	Bell Microproducts	www.bellmicro.com	39	Gilland	www.gilland.com
15	Best Buy	www.bestbuy.com	40	GlobalProcurement Systems	www.globalprocurementsystems.com
16	Beyond Components	www.beyondcomponents.com	41	Good Guy’s	www.goodguys.com
17	Bisco Industries Inc.	www.biscoind.com	42	Gopher Electronics	www.gopherelectronics.com
18	California Eastern Laboratories	www.cel.com	43	Hammond Electronics Inc.	www.hammondelec.com
19	Capsco Material Management	www.capsco.com	44	Hardware Specialty Co.	www.hardwarespecialty.com
20	CDW Computer Center	www.cdw.com	45	IBS Electronics	www.ibs-elec.com
21	Cellular America Distributing	www.cellam.com	46	IMS Inc.	www.imswire.com
22	Circuit City	www.circuitcity.com	47	Ingram Micro	www.ingrammicro.com
23	Classic Components Corp.	www.class-ic.com	48	Intelco	www.intelcotowers.com
24	Commodity Components	www.cci-inc.com	49	Jackson Telcom Inc.	www.jacksontelcom.com
25	CompUSA	www.compusa.com	50	Jaco electronics Inc.	www.jacoelectronics.com

No	Company Name	Web Site	No	Company Name	Web Site
51	Marsh Electronics	www.marshelectronics.com	76	RS Electronics	www.rselectronics.com
52	Master Distributors	www.masterdistributors.com	77	Sager Electronics	www.sager.com
53	Mobile Leasing Company	www.mobileleasingco.com	78	Schuster Electronics	www.schusterusa.com
54	Nedco Electronics	www.nedcoelectronics.com	79	Sears Roebuck&Company	www.sears.com
55	Newark Electronics	www.newark.com	80	Shecom Corp.	www.shecom.com
56	Nu Horizons Electronics	www.nuhorizons.com	81	Sioux Falls Towew and Communications	www.siouxfallstower.com
57	Office Depot	www.officedepot.com	82	Smith&Associates	www.smithweb.com
58	OfficeMax	www.officemax.com	83	SND Electronics	www.snd.com
59	Pagecorp Industries	www.pagecorp.com	84	Staples Inc.	www.staples.com
60	PartMiner Inc.	www.partminer.com	85	Steven Engineering	www.stevenengineering.com
61	Peerless Electronics	www.peerlesselectronics.com	86	Surface Mount Distribution	www.smdinc.com
62	PEI-Genesis	www.peigenesis.com	87	Survey Technology	www.surveytech.com

63	Pioneer-Standard Electronics	www.pioneerstandard.com	88	Symmetry Electronics	www.symmetryla.com
64	Powell Electronics	www.powell.com	89	Talley Communications	www.talleycom.com
65	Premier Farnell plc	www.premierfarnell.com	90	Tech Data	www.techdata.com
66	Projections Limited	www.gopui.com	91	Test Supply	
67	Questron Technology	www.questrontechnology.com	92	The Memec Goup	www.memec.com
68	R.S. Communications	www.rs-comm.com	93	TMS Technology(France)	www.tms-sourcing.com
69	Radio Shack	www.radioshackcorporation.com	94	TTI Inc.	www.ttinc.com
70	Ramco Distribution Services	www.ramcodistribution.com	95	Walker Component Group	www.walkercomponent.com
71	Rand Technology	www.randtech.com	96	Wes-Garde Components Group	www.wesgarde.com
72	Reptron Electronics		97	Wildgate Wireless	www.wildgatewireless.com
73	Resilien	www.resilien.com	98	World Peace Group	www.wpg.com.tw
74	Richardson Electronics	www.rell.com	99	XP Foresight	www.xp-foresight.com
75	Right Company	www.rightcompany.com	100	Zilex Electronics	www.zilex.ca

(4) Top 50 Sales Rep

No	Company Name	Web Site	No	Company Name	Web Site
1	Aspen	www.aspen30.com	26	IXYS	www.ix.netcom.com
2	BAE Sales	www,baesales.com	27	Jem Electroinics	www.jemelectronicsinc.com
3	Bridge Marketing	www.bridgerep.com	28	Magma Sales	www.magmasales.com
4	Cain-White	www.cainwhite.com	29	Magnecraft	www.magnecraft.com
5	Caltron Components	www.caltroncomponents.com	30	Micro Semi	www.mccsemi.com
6	Centaur North	www.centaur-north.com	31	Moulthrop Sales	www.moulthrop.com
7	Challenge Sales	www.challengesales.com	32	Newave Semiconductor	www.newavesemi.com
8	Costar	www.costar-rep.com	33	Nexus	www.nxs.com
9	E Rep	www.e-rep.com	34	O'Donnell Associates	www.odonnell.com
10	Electec	www.electec.com	35	Paragon Technical Sales	www.paragont.com
11	Elrepco	www.elrepco.com	36	PCA Sales	www.pca.norcal.com
12	English Technical Sales	www.englishsales.com	37	Phase 2 Technical Sales	www.phase2.com

13	Everhart Sales	www.everhartinc.com	38	Prism Technical Sales	www.prismtechsales.com
14	Ewing-Foley	www.ewingfoley.com	39	QCI	www.qcirep.com
15	Exis	www.exisinc.com	40	Quadrep	www.quadrep.com
16	Fahrner Miller	www.fmainc.com	41	Quarum Technical Sales	www.quarumsales.com
17	Fourfront Sales	www.fourfrontsales.com	42	Recht Associates	www.rechtassociates.com
18	Gagner Toomey	www.gagner-toomey.com	43	Ross Marketing	www.rossmarketing.com
19	Halbar North	www.halbarnorth.com	44	Ruppert Sales	www.ruppert-sales.com
20	Heaton Company	www.isheaton.com	45	SGS Thompson	www.st.com
21	I-2 Incorporated	www.isquared.com	46	Sharp	www.sharpsec.com
22	Impact Technical Sales	www.impact-TSI.com	47	Shur Sales	www.shursales.com
23	In Line Sales	www.inlinesales.net	48	Siemens/Epkos	www.sc.siemens.com
24	ISOCOM	www.isocom.com	49	Synergy Sales	www.pacbell.net
25	ITW/Paktron	www.paktron.com	50	Taarcom	www.taarcom.com

III. Marketing 채널별 사례연구

1. OEM 공략(IBM) : Mr. Andy Winterbottom/전 IBM 부사장

IBM 글로벌 구매부서 전모 공개!

- Chief Procurement Officer(John Paterson)
- Supplier Ombudsman(Hector Granda)
- Global Procurement (John Paterson)부사장과 11 명의 Directors
- Actives/Optics/Passives 등 22 개 품목그룹별 구매책임자 Commodity Managers 24 명의 상세한 연락처(e-mail 포함) 수록

2. IPO 를 통한 진출(New HP) : 김영학차장/한국 HP

New HP 의 글로벌 구매조직과 한국 HP

- IPO(International Procurement Office)를 통한 수출
- HP 의 글로벌 IPO 조직과 한국 IPO 활용

3. EMS 공략 (삼성전기사례) : 서정화부장/삼성전기 미주법인

삼성전기, EMS 개척 Know-How 최초 공개!

- EMS 의 Requirements : Flextronics, Celestica 자료
- EMS 의 구매조직 : Flextronics 사례
- EMS 에 납품사례 : Flextronics, Solectron 의 Guadalajara 공장 납품
- EMS 에 대한 Presentation 자료 : 삼성전기 자체 자료

4. 부품 OEM 을 통한 공략 : KOTRA 샌프란시스코지사화사업

부품 OEM 을 통한 납품

- 오실레이터를 공급하는 OEM 을 통한 납품
- KOTRA 샌프란시스코지사화사업

5. 실리콘밸리 IT 기업의 반응

- 시스코(Mr. Koh) : 소프트웨어, 엔지니어를 접촉하라
- 루슨트(Mr. Kim) : 하자발생시 해결능력이 중소기업의 문제다
- 샌미나(Mr. Choi) : EMS 의 바이어는 Local Sales Rep 을 선호한다.
- 플래쉬(Mr. Lee) : 특별한 기술있는 부품은 Sales Rep.을 이용하고 일반부품은 Distributor 를 이용하라.
- FreeMarkets.com(Mr. Cho) : e-Procurement 에 주목하라
- Compaq : 한국부품업체공동 Web-Site 가 있으면 좋겠다
- Future : 한국의 범용부품 공급자발굴에 관심있다.

IV. 패키지 마케팅

1. OEM/EMS 의 요구사항 : SMILE

SMILE	OEM/EMS 의 부품공급자에 대한 요구
Superior	○ 기술, 품질, 디자인이 우수한가? ○ 품질관리 매뉴얼은? ○ 기술 Road-map 과 기술자보유현항은?
Merit	○ 가격면에서 경쟁력이 있는가? ○ 가격경쟁력이 일시적인가 지속가능한가? ○ 비용절감에 대한 향후 계획이 합리적인가?
Insure	○ 다른 업체에 납품한 경력이 있는가? ○ 재무구조가 안정적인가?(D&B No.) ○ 하자발생시 배상능력이 있는가?
Lead-time & Location	○ 공장의 생산설비규모가 충분한가? ○ 최종 납품처와 물류상 문제소지는 없는가? ○ 인프라 및 천재지변으로 인한 생산차질 가능성은?
e-Procurement	○ 웹사이트는 잘 정리되어 있는가? ○ EDI 능력은? ○ 결재시스템은?

2. 패키지마케팅

○ 중소기업의 애로
- 최근 OEM/EMS 의 'Line-card'축소경향
- 대량 공급능력 문제
- 하자발생시 배상능력
- 마케팅비용의 부담의 과중
- OEM/EMS 의 중소기업 기피경향

○ **Dream Team(패키지마케팅그룹)(예시)**
- 컴퓨터/주변기기 부품업체 공동 마케팅
- 휴대폰/PDA 부품업체 공동 마케팅
- 통신장비 및 부품업체 공동 마케팅
- 범용부품 공동 마케팅

3. Sales Rep.과 distributor 의 활용

ㅇ 세일즈랩
- 특별한 기술을 보유한 기업이 아니면 관심이 적음
- 군사용, 항공기용, 의료용등 특별 용도 부품에 유리
- 랩은 특정 OEM 과 밀접한 인연으로 ‘Design-Win
- 지역적으로 한정되며, 재고를 부담하지 않음

ㅇ 디스트리뷰터
- Arrow 등 글로벌기업 : New Vendor 등록 의사 없음
- 일부 품목에 특화된 디스트리뷰터 선정 바람직
- 디스트리뷰터의 마진율은 15-20%

ㅇ 중소기업의 선택
- 패키지마케팅그룹 공동 세일즈랩 선정, 운영

4. KOTRA 의 활용

ㅇ **KOTRA** 지사화사업 부가서비스
- 가입비 : 220 만원+부가서비스비용
- 지원범위 : 바이어 발굴, 상담에 따른 현지지원
- 현재의 시스템으로는 세일즈랩을 이용한 ‘Design-Win’기능이 취약하지만, ‘부가서비스’를 ‘패키지마케팅’ 공동으로 이용시 전담 세일즈랩을 공동으로 선정,운영 가능

ㅇ **KOTRA** 해외세일즈출장 지원
- 바이어 발굴 및 상담주선지원
- 예; 광통신부품업체 공동 해외세일즈 출장

ㅇ **KOTRA** 해외시장조사대행
- 심층조사 : 전문조사기관을 통한 조사대행 가능
(예; 휴대폰부품업체 공동으로 관련부품시장조사, 활용)

ㅇ **KOTRA** 주관 전시회참가
- 관련 전시회 공동 참가

V. KOTRA 의 'SMILE 2003' 프로그램

프로그램	시기	주 요 내 용
Submitting	2002 3/4	○ **Target 300 개사에 대한 자료제출지원사업** - 대상 : TOP 300 IT 기업 DB 구입업체 - 자료접수 : 2002.8. 월말 - 자료전달 : 2002. 9 월말 - 반응조사 : 2002.11 월말 ○자료제출 : KOTRA 샌프란시스코 ○비용 : 신청업체 실비부담원칙
Meeting	2003 (3 회)	○ **OEM/EMS 순회상담 사업** - 대상 : 품목별 패키지참가업체 - 내용 : 휴대폰,광통신, 컴퓨터, RF 부품등 품목별로 패키지 시개단 구성 - 일정 : 3-4 개 OEM/EMS 순회 방문상담 ○참여절차 : 방문희망 OEM/EMS 기업명단을 샌프란시스코 한국무역관으로 제출(8 월말)
Inviting	2003 (3 회)	○ **EMS 구매책임자 방한초청 설명회** - 내용 : OEM/EMS 의 구매책임자를 초청하여 동 사의 구매전략에 대한 설명을 듣고, 관심업체와 상담실시 - 초청대상 : OEM/EMS 3 개사 및 품목전문가 ○ 수요조사 : 초청희망기업을 제출요망 (별도 배포 설문조사서 제출)
Listing	2003	○ **OEM/EMS 벤더등록지원사업** - 대상 : ISO 인증기업을 원칙으로 함 - 내용 : 벤더등록희망기업에 대한 관련서류 입수, 제출, 심사, 등록에 따른 현지지원 ○ 참가비 : 미정(2002 년 9 월경 확정) ○ 참여절차 : 별도배포 설문조사서 제출요망
e-Procurement	2003	○ **FreeMarkets.com 공급자 등록** - 무료신청가능 ○ **부품업체공동 웹사이트 구축** - KOTRA 특별사업으로 추진중

부록 1 : 글로벌 TOP 200 OEM 명단

#1-1 글로벌 TOP 100 Electronics OEM 명단(홈페이지/매출액/품목/국가)

#1-2 글로벌 TOP 100 Industrial OEM 명단(홈페이지/매출액/품목/국가)

부록 2 : 주요 EMS 명단

#2-1 TOP 15 EMS 별 OEM 고객, 매출액구성 및 국별공장보유현황

#2-2 TOP 14 컴퓨터 OEM 들의 EMS 이용 현황

#2-3 TOP 10 네트웍장비 OEM 들의 EMS 이용 현황

#2-4 TOP 18 통신장비 OEM 들의 EMS 이용 현황

#2-5 TOP 10 EMS 의 주요 OEM/EMS 생산설비인수 현황

#2-6 TOP 30 EMS 의 주요 제조서비스 다양화 현황

부록 3 : 주요 Distributor 명단

#3-1 US TOP 50 Franchised Distributor

#3-2 Top 10 Global Distributor

#3-3 TOP 10 Semiconductor Distributor

#3-4 TOP 10 Passive Distributors

#3-5 TOP 10 Electromechanical Distributors

#3-6TOP 10 Interconnect Distributor

#3-7 TOP 10 Power Sources Distributors

#3-8 TOP 10 Computer Systems/Perpherals Distributors

#3-9 TOP 10 Non-Franchised Distributors

부록 4 : 주요 통신장비시장 중기전망(2000-2005)

#4-1 세계 통신장비시장 전망(2005 년까지)

#4-2 미국 통신장비수출입현황(2001 년)

#4-3 미국 통신사업자의 장비수요 전망(2005 년까지)

#4-4 미국 음성, 데이터서비스시장 전망(2005 년까지)

#4-5 미국 음성프로세싱장비 및 서비스시장 전망(2005 년까지)

#4-6 미국 소비자용 통신장비시장 전망(2005 년까지)

#4-7 세계 이더넷 시장 전망(2005 년까지)

#4-8 미국 데이터통신 및 네트워크시장 전망(2005 년까지)

#4-9 미국 케이블모뎀시장 전망(2005 년까지)

#4-10 미국 DSL 시장 전망(2005 년까지)

#4-11 미국 Frame Relay 시장 전망(2005 년까지)

#4-12 미국 ATM 시장 전망(2005 년까지)

#4-13 미국 인터넷회의장비시장(화상,음성) 전망(2005 년까지)
#4-14 미국 와이어리스시장전망(휴대폰, 페이저, SMR) 전망(2005 년까지)
#4-15 미국 고정무선장비시장 전망(2005 년까지)

[1-1]**Top 100 Electronics OEMs**

Rank	Company	Web Site	Sales $millions	Market	Country
1	Sony	www.sony.com	58,511	Audio/Video Computer	Japan
2	Toshiba	www.toshiba.com	55,192	Computer, Computer Peripherals, Machinery Instruments	Japan
3	Fujitsu	www.fujitsu.com	49,254	Computer Computer Peripherals Communications	Japan
4	Hewlett-Packard	www.hp.com	49,057	Computer Computer Peripherals	U.S.
5	NEC	www.nec.com	48,583	Computer Computer Peripherals Communications	Japan
6	Compaq	www.compaq.com	42,383	Computer	U.S.
7	Philips Electronics	www.philips.com	37,862	Communications Appliances Computer Peripherals	Netherlands
8	Motorola	www.motorola.com	37,580	Communications	U.S.
9	Mitsubishi Electric	www.mitsubishi.com	37,085	Computer Communications Machinery, Appliances	Japan
10	Dell Computer	www.dell.com	31,888	Computer	U.S.
11	LM Ericsson	www.ericsson.com	31,857	Communications	Sweden
12	Lucent Technologies	www.lucent.com	31,589	Communications	U.S.
13	Nokia	www.nokia.com	30,376	Communications	Finland
14	Samsung Electronics	www.samsungelectronics.com	30,316	Computer, Computer Peripherals, Communications, Audio/Video,Appliance	Korea
15	Nortel Networks	www.nortelnetworks.com	30,275	Communications	Canada
16	Alcatel	www.alcatel.com	28,921	Communications	France
17	Canon	www.canon.com	24,185	Photography/graphics Computer Peripherals Audio/Video	Japan
18	Cisco Systems	www.cisco.com	23,920	Communications	U.S.
19	Sun Microsystems	www.sun.com	19,182	Computer	U.S.
20	Sharp	www.sharp-world.com	18,025	Computer Peripherals Audio/Video Appliances Computer	Japan
21	Invensys	www.invensys.com	14,613	Instruments	U.K.

22	LG Electronics	www.lge.com	13,118	Communications Computer Peripherals Audio/Video	Korea
23	Ricoh	www.ricoh.com	12,996	Computers Computer Peripherals Machinery	Japan
24	Agilent Technologies	www.agilent.com	11,368	Instruments	U.S.
25	Seiko Epson	www.epson.co.jp/e/index.html	10,994	Computer Peripherals Photography/Graphics	Japan
26	Marconi	www.marconi.com	10,502	Communications Instruments	U.K.
27	Gateway	www.gateway.com	9,601	Computer	U.S.
28	Schneider Electric	www.schneider-electric.com	8,927	Machinery	France
29	EMC	www.emc.com	8,873	Computer Peripherals	U.S.
30	Thompson Multimedia	www.thompsonmm.co.uk	8,565	Audio/Video	U.K.
31	Thales	www.thalesgroup.com	7,901	Aerospace	France
32	Avaya	www.avaya.com	7,615	Communications	U.S.
33	Hughes Electronics	www.hughes.com	7,288	Communications	U.S.
34	Unisys	www.unisys.com	6,885	Computer	U.S.
35	Oki Electric	www.oki.co.jp/OKI/Home/English	6,648	Computer Peripherals Communications	Japan
36	Apple Computer	www.apple.com	6,647	Computer	U.S.
37	Seagate Technology	www.seagate.com	6,448	Computer Peripherals	U.S.
38	TDK	www.tdk.co.jp/tetop01/index.html	6,196	Computer Peripherals	Japan
39	NCR	www.ncr.com	5,959	Computer	U.S.
40	China PTIC Information		5,617	Communications	China
41	Nintendo	www.nintendo.com	5,002	Computer	Japan
42	Agfa	www.agfa.com	4,843	Photography/Graphics	Germany
43	Minolta	www.minolta.com	4,595	Photography/Graphics	Japan
44	Lexmark International	www.lexmark.com	3,807	Computer Peripherals Computer Photography/Graphics	Japan
45	Casio Computer	www.casio.com	3,685	Computer Peripherals Computer Photography/Graphics	Japan
46	Trigem Computer	www.trigem.com	3,546	Computer	Korea
47	Legend Group		3,436	Computer	China

48	Tellabs	www.tellabs.com	3,387	Communications	U.S.
49	Acer	www.acer.com	3,296	Computer	Taiwan
50	ADC Telecom.	www.adc.com	3,288	Communications	U.S.
51	3Com	www.3com.com	3,117	Communications	U.S.
52	Brother	www.brother.com	3,060	Computer Peripherals Appliances Machinery Communications	Japan
53	Groupe Bull	www.bull.com	2,987	Computer	France
54	Shanghai Audio&Video Electronics		2,779	Audio/Video	China
55	Qualcomm	www.qualcomm.com	2,761	Communications	U.S.
56	Oce	www.oce.com	2,709	Computer Peripherals Photography/Graphics	Netherlands
57	Maxtor	www.maxtor.com	2,705	Computer Peripherals	U.S.
58	Kenwood	www.kenwood.com	2,645	Audio/Video Photography/Graphics	U.S.
59	Aiwa	www.aiwa.com	2,630	Audio/Video	Japan
60	Tatung	www.tatung.com	2,450	Computer Computer Peripherals Appliances	Taiwan
61	Asustek Computer	www.asustek.com	2,229	Computer Communications	Taiwan
62	First International Computer	www.fic.com.tw	2,200	Computer	Taiwan
63	Mitsumi Electric	www.mitsumi.com	2,092	Computer Peripherals	Japan
64	Storage Technology	www.storagetek.com	2,060	Computer Peripherals	U.S.
65	Panda Electronics		2,034	Audio/Video	China
66	Silicon Graphics	www.sgi.com	2,011	Computer Computer Peripherals	U.S.
67	KLA-Tencor	www.kla-tencor.com	2,003	Instruments	U.S.
68	Western Digital	www.weterndigital.com	1,961	Computer Peripherals	U.S.
69	China Great Wall Computer		1,960	Computer	China
70	Huawei Technology		1,836	Communications	China
71	Clarion	www.clarion.co.jp	1,818	Audio/Video	Japan
72	Harris	www.harris.com	1,807	Audio/Video	U.S.
73	Diebold	www.diebold.com	1,744	Computer Peripherals	U.S.

74	Harman International	www.harman.com	1,703	Audio/Video	U.S.
75	Micron Computer	www.micronpc.com	1,556	Computer	U.S.
76	Advantest	www.advantest.com	1,550	Instruments	Japan
77	Palm	www.palm.com	1,546	Computer	U.S.
78	Teac	www.teac.com	1,487	Audio/Video	U.S.
79	Quantum	www.quantum.com	1,444	Computer Peripherals	U.S.
80	Symbol Technologies	www.symbol.com	1,347	Machinery	U.S.
81	Shanghai Bell		1,307	Communications	China
82	Iomega	www.iomega.com	1,300	Computer Peripherals	U.S.
83	VTech Holdings	www.vtech.com	1,234	Communications	Hong Kong
84	Tektronix	www.tektronix.com	1,182	Instruments	U.S.
85	ECI Telecom	www.ecitele.com	1,170	Communications	Israel
86	Racal Electronics	www.racal.com	1,168	Aerospace Machinery	U.K.
87	Sensormatic Electronics	www.sensormatic.com	1,100	Machinery	U.S.
88	Cabletron Systems	www.cabletron.com	1,072	Communications	U.S.
89	Andrew Corp.	www.andrew.com	1,066	Communications	U.S.
90	ANTEC	www.antec.com	999	Communications	U.S.
91	Network Appliance	www.netapp.com	980	Communications	U.S.
92	Mitel Corp.	www.mitel.com	963	Communications	Canada
93	InFocus	www.infocus.com	887	Audio/Video	U.S.
94	Uniden	www.uniden.co.jp	767	Communications	Japan
95	Logitech International	www.logitech.com	740	Computer Peripherals	Switzerland
96	eMachines Inc	www.e4me.com	684	Computer	U.S.
97	Juniper Networks	www.juniper.net	674	Communications	U.S.
98	Xiamen Electronics		665	Computer Peripherals	China
99	Intergragh	www.intergragh.com	650	Computer	U.S.
100	Pioneer Corp.	www.pioneer.co.jp/index-e.html	633	Audio/Video	Japan

[1-2]Top 100 Industrial OEMs

Rank	Company	Web Site	Sales $million	Market	Country
1	General Motors	www.gm.com	184,632	Motor vehicles & engines	U.S.
2	Ford Motor	www.ford.com	170,064	Motor vehicles & engines	U.S.
3	Daimler Chrysler	www.daimlerchrysler.com	149,525	Motor vehicles & engines	Germany
4	General Electric	www.ge.com	129,417	Appliances	U.S.
5	Toyota Motor	www.toyota.com	120,521	Motor vehicles & engines	U.S.
6	IBM	www.ibm.com	88,396	Diversified	U.S.
7	Volkswagen	www.vw.com	78,780	Motor vehicles & engines	Germany
8	Hitachi	www.hitachi.co.jp/cgi-bin/goto	75,590	Audio/video , Computer peripherals , Machinery	Japan
9	Siemens	www.siemens.com	72,188	Diversified	Germany
10	Matsushita Electric Ind.	www.panasonic.co.jp/global/top.html	68,996	Diversified	Japan
11	Honda Motor	www.honda.co.jp/	57,923	Motor vehicles & engines	Japan
12	Nissan	www.nissandriven.com	53,678	Motor vehicles & engines	Japan
13	Fiat	www.fiatgroup.com/e-index-htm	53,059	Motor vehicles & engines	Italy
14	Boeing	www.boeing.com	51,321	aerospace	U.S.
15	SBC Communicatio	www.sbc.com	45,088	Communications	U.S.
16	PSA Peugeot Citroen	www.psa-peugeot-citroen.com	40,328	Motor vehicles & engines	France
17	Renault	www.renault.com	40,099	Motor vehicles & engines	France
18	Bayerische Moteren Werke	www.BMW.de	32,556	Motor vehicles & engines	Germany
19	Mitsubishi Motors	www.mitsubishi-motors.co.jp	29,427	Motor vehicles & engines	Japan
20	Delphi Automotiv Sys.	www.delphiauto.com	29,139	Motor vehicles & engines	U.S.
21	Robert Boshe	www.boshe.com/en/start	29,050	Motor vehicles & engines	Germany
22	Olive tti	www.olivetti.it	27,731	Diversified	Italy
23	United Technologies	www.utc.com	26,206	Aerospace Machinery, Appliances	U.S.
24	Lockheed Martin	www.lockheedmartin.com	25,329	Aerospace	U.S.

25	Honeywell	www.honeywell.com	25,023	Instruments Machinery, Aerospace	U.S.
26	EADS Company	www.eads.net	22,794	Aerospace	France Germany
27	Alstom	www.alstom.com	22,606	Machinery	France
28	Caterpillar	www.caterpillar.com	20,175	Off-road vehicles	U.S.
29	Visteon	www.visteon.com	19,467	Motor vehicles & engines	U.S.
30	Xerox	www.xerox.com	18,632	Machinery	U.S.
31	Mazda Motor	www.mazda.com	18,103	Motor vehicles & engines	Japan
32	Denso	www.denso.co.jp/index-e.html	18,096	Diversified	Japan
33	Sanyo Electric	www.sanyo.co.jp/koho/index_e.html	17,426	Diversified	Japan
34	Johnson Controls	www.johnsoncontrols.com	17,291	Machinery Motor vehicles & engines	U.S.
35	TRW	www.trw.com	17,231	Aerospace Motor vehicles & engines	U.S.
36	Raytheon	www.raytheon.com	16,895	Aerospace	U.S.
37	Emerson Electric	www.emersonelectric.com	15,921	Machinery Instruments	U.S.
38	Hyundai Motor	www.hyundai-motor.com	14,390	Motor vehicles & engines	Korea
39	Eastman Kodak	www.kodak.com	13,994	Photography/graphics	U.S.
40	Volvo	www.volvo.com	13,800	Motor vehicles & engines	Sweden
41	Suzuki Motor	www.sujuki.co.jp	13,754	Motor vehicles & engines	Japan
42	Isuzu Motors	www.isuza.co.jp	13,622	Motor vehicles & engines	Japan
43	AB Electrolux	www.electrolux.com	13,568	Appliances	Sweden
44	Fuji Photo Film	www.fujifilm.com	12,936	Photography/graphics	Japan
45	Dana	www.dana.com	12,460	Motor vehicles & engines	U.S.
46	Textron systems	www.textron.com	12,399	Diversified	U.S.
47	Fuji Heavy Industries	www.fhi.co.jp	11,872	Motor vehicles & engines	Japan
48	Deere and Co.	www.deere.com	11,642	Off-road vehicles	U.S.
49	Bombardier	www.bombardier.com	10,705	Off-road vehicles	Canada
50	General Dynamics	www.generaldynamics.com	10,356	Diversified	U.S.
51	Whirlpool	www.whirlpool.com	10,325	Appliances	U.S.
52	Komatsu	www.komatsu.com	9,875	Off-road vehicles	Japan

53	Applied Materials	www.appliedmaterials.com	9,564	Machinery	U.S.
54	Kia Motors	www.kia.co.kr	9,556	Motor vehicles & engines	Korea
55	Daihatsu	www.daihatsu.com	8,970	Motor vehicles & engines	Japan
56	Kubota	www.kubota.co.jp/english/index.htm	8,931	Off-road vehicles	Japan
57	BAE Systems	www.baesystems.com	8,802	Aerospace	U.K.
58	Navistar International	www.internationaldelivers.com/home.asp	8,407	Motor vehicles & engines	U.S.
59	Valeo	www.valeo.com	8,398	Motor vehicles & engines	France
60	Eaton	www.eaton.com	8,309	Diversified	U.S.
61	Fuji Electric	www.fujielectric.co.jp/	8,003	Machinery	Japan
62	Yamaha Motor	www.yamaha-motor.co.jp/eng/start.html	7,994	Motor vehicles & engines	Japan
63	Paccar	www.paccar.com	7,919	Motor vehicles & engines	U.S.
64	Northrop Grumann	www.northropgrum.com	7,618	Aerospace	U.S.
65	Rockwell International	www.rockwell.com	6,598	Machinery	U.S.
66	Cummins Engine	www.cummins.com	6,597	Motor vehicles & engines	U.S.
67	Scania	www.scania.com	6,157	Motor vehicles & engines	Sweden
68	Hino Motors	www.hino.co.jp/index_e.html	5,907	Motor vehicles & engines	Japan
69	Parker Henifin	www.parker.com	5,811	Machinery	U.S.
70	Finmeccanica	www.finmeccanica.net	5,537	Aerospace Machinery	Italy
71	Dover	www.dover.com	5,401	Instruments Machinery	U.S.
72	Daewoo Motors	www.daewoomotor.com	5,051	Motor vehicles & engines	Korea
73	Haier Group	www.haier.com/english/index.asp	4,908	Appliances	China
74	Konica	www.konica.com	4,883	Photography/graphics	Japan
75	Goodrich	www.bfgoodrich.com	4,364	Aerospace	U.S.
76	Maytag	www.maytag.com	4,248	Appliances	U.S.
77	Sagem	www.sagem.com	3,932	Communications	France
78	Pitney Bowes	www.pitneybowes.com	3,881	Machinery	U.S.
79	Olympus Optical	www.olympus.co.jp/world/index.html	3,850	Instruments	Japan
80	Porshe	www.porshe.com	3,440	Motor vehicles & engines	Germany

81	Daewoo Electronics	www.dwe.co.kr	3,347	Audio/video Appliances	Korea
82	Dassault Aviation	www.dassault-aviation.fr	3,210	Aerospace	France
83	Yokogawa Electric	www.yokogawa.com	3,167	Instruments Machinery	Japan
84	Teradyne	www.teradyne.com	3,044	Instruments Machinery	U.S.
85	Embraer	www.embraer.com/english	2,787	Aerospace	Brazil
86	SPX	www.spx.com	2,679	Machinery	U.S.
87	Smiths Group	www.smiths-group.com	2,321	Diversified	U.K.
88	Thermo Electron	www.thermo.com	2,281	Instruments	U.S.
89	Scientific-Atlanta	www.sciatl.com	2,222	Instruments	U.S.
90	TCL Group		2,145	Communications	China
91	Saab	www.saab.com	1,944	Motor vehicles & engines	Sweden
92	Polaroid	www.polaroid.com	1,856	Photography/graphics	U.S.
93	Shimadzu	www.shimadzu.com	1,775	Instruments	Japan
94	Perkin-Elmer	www.perkin-elmer.com	1,695	Instruments	U.S.
95	Hisense Group Co.		1,628	Appliances	China
96	Lam Research	www.lamrc.com	1,627	Machinery	U.S.
97	Yamatake	www.yamatake.co/jp/	1,598	Instruments Machinery	Japan
98	Shichuan Changhon Elec		1,569	Appliances	China
99	Anritsu	www.anritsu.co/jp/english/index_E.html	1,428	Communications Instruments, Machinery	Japan
100	Konka Group		1,389	Appliances	China

[2-1]Top 15 EMS 의 OEM 고객, 품목 및 글로벌 생산거점

Rank	EMS	OEM	Revenue(2001)	Facility
1	Solectron Corp. Milpitas, CA www.solectron.com	Nortel Cisco Alcatel Cabletron HP Motorola Nokia Palm Ericsson Philips Sony	$16,149million Computer 31% Network 42% Wireless 12% Industrial 15%	N.America 16 Latin America 2 W. Europe 12 EMEA 2 Japan 2 China 1 Taiwan 1 Rest of Asia 7
2	Flextronics International Singapore www.Flextronics.com	Ericsson HP MS Motorola Nokia Palm Philips Siemens	$12,922million Wireless 34% Computer 29% Network 18% Industrial 13% Consumer 6%	N.America 12 Latin America 2 W. Europe 28 EMEA 4 Japan 0 China 5 Rest of Asia 7
3	Sanmina SCI San Jose. CA www.Sanmina.com	Nortel Alcatel Cisco Lucent Motorola HP Dell	$10,830million Computer 39% Wireless 28% Network 15% Industrial 12% Consumer 6%	N.America 65 Latin America 2 W. Europe 28 EMEA 2 Japan 0 China 3 Taiwan 1 Rest of Asia 5
4	Celestica Inc. Toronto,Ontario Canada www.celestica.com	IBM SUN Dell Cisco EMC JDS Nortel Lucent Motorola Alcatel	$10,004million Computer 62% Network 33% Wireless 5%	N.America 23 Latin America 2 W. Europe 7 EMEA 2 Japan 2 China 4 Taiwan 0 Rest of Asia 5

5	Jabil Circuit St.Petersburg. Florida,USA www.Jabil.com	Cisco Dell HP Lucent Marconi	$4,086million Network 48% Computer 35% Auto 7% Consumer 7% Wireless 3%	N.America 11 Latin America 1 W. Europe 7 EMEA 1 Japan 1 China 2 Rest of Asia 1
6	Hon Hi Precision Tu-Cheng City, Taiwan www.foxconn.com	Intel Dell Compaq Nokia Sony UMC	$3,562million Computer 55% Consumer 35% Wireless 10%	N.America 2 Latin America 0 W. Europe 3 China 3 Taiwan 1
7	Elcoteq Network Corp. Espoo, Finland www.Elcoteq.com	ABB Ericsson Motorola Kone Nokia Philips	$1,667million Wireless 78% Network 9% Industrial 13%	N.America 2 Latin America 0 W. Europe 5 EMEA 5 Japan 1 China 3
8	SYNNEX Information Technology Fremont, CA www.synnex.com	IBM Sun HP	$1,620million Computer100%	N.America 5 Latin America 0 W. Europe 1 EMEA 0 Japan 1 China 0 Taiwan 0
9	Manufacturers Services Ltd. Concord, MA www.msl.com	IBM Palm 3Com HP Emulex GE Medical Iomega	$1,522million Computer 56% Network 33% Industrial 8% Consumer 3%	N.America 5 Latin America 0 W. Europe 5 EMEA 0 Japan 0 China 1 Taiwan 0 Rest of Asia 2
10	Benchmark Electronics Angleton, Tx www.bench.com	EMC Sun	$1,277milli Computer 36% Network 34% Industrial 22% Consumer 8%	N.America 8 Latin America 1 W. Europe 3 Japan 0 China 0 Rest of Asia 2

11	Via Systems St. Louis, MO www.viasystems.com	Lucent Alcatel Cisco Marconi Sun Nortel Tellabs	Network 59% Industrial 17% Computer 9% Consumer 6% Industrial 6% Wireless 3%	N.America 19 Latin America 0 W. Europe 5 Japan 0 China 8 Rest of Asia 0
12	ACT Manufacturing Hudson, MA www.actmfg.com	EMC Efficient Network Emerson Nortel Meto-Optix	Network 59% Computer 23% Industrial 18%	N.America 8 Latin America 0 W. Europe 3 China 0 Taiwan 0 Rest of Asia 1
13	APW Waukesha, WI www.apw.com	Applied Materials Compaq Cymer EMC Ericsson HP IBM NCR Sun	Computer 48% Network 29% Wireless 18% Industrial 5%	N.America 14 Latin America 1 W. Europe 12 EMEA 0 Japan 0 China 1 Taiwan 0 Rest of Asia 3
14	Universal Scientific Industrial Co. Taipei, Taiwan www.usi.com.tw	IBM Lucent Panasonic Ford Siemens Nortel Motorola	Computer 67% Network 15% Wireless 13% Automotive 3% Industrial 2%	N.America 2 Latin America 0 W. Europe 1 EMEA 0 Japan 1 China 1 Taiwan 4 Rest of Asia 0
15	Plexus Corp Neenah, WI www.Plexus.com	Lucent G.E. Cisco Johnson Control Extreme Network JDS	Industrial 48% Network 40% Computer 8% Automotive 4%	N.America 10 Latin America 0 W. Europe 2 EMEA 0 Japan 0 China 0 Taiwan 0 Rest of Asia 0

(Source : iSuppli.com)

[2-2]주요 Computer OEM 들의 EMS 이용현황

Computer	Celestica	Flextronics	Jabil	Sanmina	SCI	Solectron
Acer		X			X	X
Apple			X			
Compaq		X	X	X	13%	10%
Dell	X	X	>10%	X	10%	X
EMC	X	X		X		
Fujitsu		X			X	
Gateway		X	X		X	
HP	20%	X	25%	X	37%	X
IBM	X	X	X	X	X	X
Integraph					X	
NCR		X			X	X
Silicon Graphics	X				X	X
Sun Micro	20%				X	X
Toshiba					X	X

(Source : Merrill Lynch & Co., Inc.)

[2-3]주요 Networking OEM 들의 EMS 이용현황

Network	Celestica	Flextronics	Jabil	Sanmina	SCI	Solectron
Brocade Comm						X
Cabletron		X			X	
Cisco	12%	X	20%	>10%	X	
Extreme Networks		X		X		
Foundy Networks	X					
Juniper Networks	X	X				X
Network Appliance			X			
Olicom					X	
Redback Networks		X				
Sycamore Networks	X		X			

(Source : Merrill Lynch & Co., Inc.)

[2-4]주요 Telecom OEM 들의 EMS 이용현황

Telecom	Celestica	Flextronics	Jabil	Sanmina	SCI	Solectron
Alcatel	X	X	X	X	X	X
Ascom		X				
ECI Telecom		X			X	
Ericsson	X	12%		X	X	10%
Harris Comm		X		X	X	
Lucent	X	X	X	X		X
Marconi	X		X	X	X	X
Metricom				X		
Mitsubishi						X
Motorola	X	X	X	X	X	X
Newbridge		X		X		
Nokia	X	X	X	X	X	X
Nortel	X	X	X	>10%	X	X
PairGain					X	
Qualcomm		X		X		X
Rockwell		X			X	
3Com		X	X	X	X	X
Tellabs				X		X

(Source : Merrill Lynch & Co., Inc.)

[2-5]주요 EMS 의 생산설비 인수 동향

EMS	OEM	Product	Facility	Employee
Solectron	Sony (Dec2000)	Auto navigation and audio system, Li-ion Battery pack	1-Japan	1,145
	Natsteel Electronics (Feb.2001)	EMS	11-Around the world	12,000
	Sony (Apr.2001)	Cordless phone Li-ion battery pack Infrared rec.	1-Taiwan	750
	Cisco (Apr.2001)	DWDM optical modules	1-US	N/A
	Centennial Technologies (Apr.2001)	PC card based memory products	1-US	140
	Shinei Sangyo Pte.,Ltd. (Jun.2001)	Enclosures	5-US, Singapore, Scotland China Malaysia	3,000
	MSS-Sequel Limited (Aug.2001)	After sales services	1-Japan	N/A
	Iphotonics (Oct.2001)	Core optical mfg. Services	1-us	N/A
	NEC (Oct.2001)	EMS-for Server, Workstation, Electro-mech. Storage products	1-Ibaraki, Japan	500
	Stream International (Dec.2001)	CRM support solution	19-customer center in 9 countries	10,000

	Artesyn Solutions (Dec.2001)	Post-mfg. services	2-US	N/A
	C-MAC (Dec.2001)	EMS-Complex full System & electro-mech. Assembly, & optical network component fab	7-Canada	9,000
Flextronics International Ltd.	Wave Optics (Feb.2001)	Custom mfg. of Optical component (esp. 10Gbit/s transmission)	1-US	N/A
	Fico Fiber Optics, Inc. (Feb.2001)	Electro-optical modules, passive Optical component	1-US	N/A
	Alcatel (July, 2001)	GSM handsets	1-France	830
	Telecom Global Solution (Aug.2001)	Wireless networks, RF consulting services	1-US	225
	HP (Sep. 2001)	Large-format Printers	1-Singapore	250
	Instrumentation Engineering (Sep. 2001)	Automatic test equipment(for optical and wireless network equipment)	3-US 1-Italy	200

	Xerox (Dec.2001)	Office mfg. Operations 5 yr. $1billion contract	1-Canada 1-Brazil 1-Malaysia 1-Mexico 1-Netherland	3,650
	The Orbiant Group (Dec. 2001)	Design, installation, operation, maintenance of networks and equipment for mobile data and telecom	1-Sweden	5,400
Sanmina-SCI Corporation	AB Segerstrom & Svensson (Mar. 2001)	Integrated enclosure systems mostly for communication	12 in Sweden US, Finland, Brazil Hungary Scotland	2,000
	Nokia facility (Mar. 2001)	Wireless Infrastructure mfg. (Bought by SCI)	1-Finland 1-UK	1,250
	Nokia facility (July 2001)	Repair/test wireless products (bought by SCI)	1-UK	46
	Alcatel facility (Sep.2001)	Mech. Assemblies for optical networks	1-US	450
	IBM facility (Oct. 2001)	Design and Engineering (bought by SCI)	1-Japan	N/A
	EM Solution (Oct. 2001)	Electronic enclosures	1-US Mexico Ireland	N/A
	SCI (Dec.2001)	EMS	46-mfg. Plants world wide	39,000

	IBM facility (pending)	NetVista Desktop computers	1-US 1-Scotland	980
	HP facility (pending)	Vectra desktop & Omnibook notebook computers	1-France	500
Celestica	Motorola (Feb.2001)	Wireless telecom	1-US 1-Ireland	1,200
	N.K.Techno facility (Mar. 2001)	Computer & telecom Specialized in repair	1-Japan	N/A
	Avaya (May 2001)	Telecom(mfg. Repair and supply-chain operations)	2-US	850
	Sagem CR (June 2001)	Mobile phones and telecom products	2-Czech Republic	1,400
	Avaya facility (Aug. 2001)	Telecom	1-France	N/A
	Primetech (Aug. 2001)	EMS(computer & telecom industries)	1-Canada	N/A
	Lucent (Aug. 2001)	Switching, access & wireless networking system products	2-US	6,000
	Omni industries (Oct. 2001)	EMS	4-china, Malaysia Singapore Indonesia	9,000
	NEC (Mar. 2002)	Optical transmission systems	2-Japan	1,200
Jabil Circuit	Marconi PLC (June 2001)	Communication	1-US 1-Italy, 1-Germany 2-UK	2,900
	Intel (Oct. 2001)	RF access products	1-Malaysia	900

	Compaq (Pending)	PC servers	1-Scotland	240
Hon Hai Precision	Avanex (Mar. 2001)	Optical Communication products	1-China	N/A
Elcoteq	ABB (Jan. 2001)	Industrial electronics	1-Swiss	300
	Nokia (Nov. 2001)	Hardware repair center for telecom equipment	1-Finland	23
SYNNEX Information Technology	MiTac U.K. (2000)	Component mfg. Some assembly	1-UK	200
Manufacturing Services	3Com (Oct. 2000)	DSL and cable modems, digital cameras, carrier system products	1-US	150 (engineers)
	Oce-Industries (Jan. 2001)	Manufacturing complex printer systems	1-France	N/A
Benchmark Electronics	Avex Electronics (Aug. 1999)	EMS mostly serving telecom/network & consumer sectors	2-US 1-Brazil 1-Mexico 1-Ireland 1-Scotland 1-Sweden 1-Singapore	4,440
	MSI Division of Outreach Technology	Manufacturing	1-US (Virginia)	N/A

(Source : iSuppli)

[2-6]Top 30 EMS Player Capability Matrix(Part-1)

Rank	Company	Design	Component Mfg.	Box / Sys. Build
1	Solectron Corp.	Asic, Board, System	enclosures	**Yes**
2	Flextronics International Ltd.	Asic, Board, System	PCB, sheet metal plastic molding, Custom enclosures	Yes
3	Sanmina SCI	Asic, Board, System	PCB, backplane, plastic molding, sheet metal, cable,harness	Yes
4	Celestica Inc.	Board, System	Plastic molding	Yes
5	Jabil Circuit	Board, System	No	Yes
6	Hon Hi Precision (Foxconn)	System	Enclosures, backplane, Connectors, Plastic molding	Yes
7	Elcoteq Network Corp.	Board, System	No	Yes
8	SYNNEX Information Technology	Board, System	yes	
9	Manufacturers' Services Ltd.	Asic, Board, System	No	Yes
10	Benchmark Electronics	Asic, Board, System	No	Yes

11	Via Systems	Board, System	PCB,backplane, cable,harness, Enclosures	Yes
12	ACT Manufacturing Inc.	Board, System	Cable harness	Yes
13	APW	Board, System	Enclosures, cable, backplane	Yes
14	Universal Scientific Industrial Co.	Board, System	Resistors	Yes
15	Plexus Corp.	Board, System	No	Yes
16	Venture Manufacturing	Board,	No	Yes
17	Pemstar	System	Cable	Yes
18	SMTC Corp.	Asic, Board, System	Plastic molding, sheet metal, cable, harness	Yes
19	Finmark	Board, System	Yes	
20	Saturn Electronics & Engineering	Board, System	Flex circuits, Cable & relays	Yes

21	Kimball Electronics Group	Board, System	Cable, enclosures, Backplane	Yes
22	EFTC Corp. (Merged w/K*Tec)	Yes	Cable Harness	Yes
23	Electronic Manu-facturing Services	No	Cable,Harness plastic molding	Yes
24	Ddi Corp.	Board, System	Harness Enclosures Backplane	Yes
25	K*Tec Electronics (Merged w/EFTC)	Yes	Cable Plastic molding Metal	Yes
26	Vogt Electronics AG	System		
27	Cofidur	Asic, Board, System	PCB Wire assembly	Yes
28	Nam Tai Electronics Inc.		Plastic molding	Yes
29	The Mateco Electronics Group	Board, System	plastic molding Metal sheet & harness, PCB	Yes
30	Mack Technologies	System	Metal & plastic molding	Yes

[2-6-1]Top 30 EMS Player Capability Matrix(Part-2)

No	Company	PCBA	Logistics	Repair & Returns	Other
1	Solectron Corp.	Yes	Fulfillment	Yes	SMART modular Memory module Embedded PC
2	Flextronics International	Yes	Fulfillment BTO	Yes	Photonics
3	Sanmina-SCI	Yes	Fulfillment	Yes	Microelectronics assembly, Photonics
4	Celestica Inc.	Yes	Fulfillment	Yes	Memory modules power subsys.
5	Jabil Circuit	Yes	Fulfillment	Yes	Photonics
6	Foxconn	Yes			Modules
7	Elcoteq Network Corp.	Yes	Fulfillment	Repair	Microelectronics assembly
8	SYNNEX Information Technology	Yes	Fulfillment BTO		MiTac provide Design & PCBA
9	Manufacturer' Services Ltd.	Yes	Fulfillment BTO	Yes	Optical Lab
10	Benchmark Electronics	Yes	Fulfillment	No	Real time tracking

11	Via Systems	Yes	Fulfillment BTO	Repair & upgrades	Thermal management equipment
12	ACT Manufacturing.	Yes	Fulfillment BTO	Yes	
13	APW	Yes	Fulfillment BTO		Thermal management power systems
14	Universal Scientific Industrial Co.	Yes	No	Yes	Power module crystal,oscillator hybrid packag.
15	Plexus Corp.	Yes	Fulfillment BTO	Replace	
16	Venture Manufacturing	Yes	Fulfillment	Repair	Ecommerce software devel. & site access
17	Pemstar	Yes	Fulfillment BTO	Yes	Magnetics assembly, Optical module
18	SMTC Corp.	Yes	Fulfillment BTO	Yes	Power supplies ePlenishment (web tracking))
19	Finmark	Yes	Fulfillment		Installation
20	Saturn Electro Yesnics & Engineering	Yes	Fulfillment	Repair	Junction box Actuators Solenoids

21	Kimball Electronics	Yes	Fulfillment		
22	EFTC Corp.	Yes	Yes	No	
23	Electronic Mfg. Services	Yes		Yes	
24	DDi Corp.	Yes			
25	K*Tec Electronics (Merged EFTC)	Yes	Yes	No	Battery pack & cabling division
26	Vogt Electronics AG	Yes	Fulfillment	Yes	Power supplies, controller boards
27	Cofidur	Yes		Yes	
28	Nam Tai Electronics Inc.	Yes	Fulfillment		Part silkscreen (plastic/metal) lcd module ass.
29	The Mateco Electronics Group	Yes	Fulfillment BTO	Yes	CRT/electronic equip. recycling equip. refurbish
30	Mack Technologies	Yes	Fulfillment BTO	repair	

(Source : iSuppli.com)

[3-1]U.S. Top 50 Franchised Distributors

Rank	Company Name	Sales(2001)	Web Site	State
1	Avnet	$6.5 billion	www.avnet.com	AZ
2	Arrow Electronics Inc.	$6.21 billion	www.arrow.com	NY
3	Pioneer-Standard Electronics	$2.54 billion	www.pioneerstandard.com	OH
4	Future Electronics Inc.	$1.9 billion	www.futureelectronics.com	MA
5	Bell Microproducts Inc.	$1.21 billion	www.bellmicro.com	CA
6	Memec plc	$1.03 billion	www.memec.com	CA
7	TTI Inc.	$650 million	www.ttiinc.com	TX
8	Newark Electronics	$534.4 million	www.newark.com	IL
9	Reptron Electronics Inc.	$398.6 million	www.reptron.com	FL
10	All American Semiconductor	$381 million	www.allamerican.com	GA
11	Digi-Key Corp.	$350 million	www.digikey.com	MN
12	Nu Horizons Electronics	$303 million	www.nuhorizons.com	NY
13	DAC	$273.2 million	www.heilind.com	MA
14	Richardson Electronics	$267.2 million	www.rell.com	IL
15	Jaco Electronics Inc.	$247.7 million	www.jacoelectronics.com	NY
16	Sager Electronics	$200 million	www.sager.com	MA
17	Allied Electronics Inc.	$172 million	www.alliedelec.com	TX
18	Questron Technology Inc.	$129 million	www.questrontechnology.com	FL
19	California Eastern Laboratories	$85 million	www.cel.com	CA
20	XP ForeSight	$82.4 million	www.xp-foresight.com	CA
21	RS Electronics	$80.1 million	www.rselectronics.com	MI
22	Electro Sonic Inc.	$78.5 million	www.e-sonic.com	Canada
23	Dependable Component Supply	$78 million	www.dependonus.com	FL
24	Master Distributors Inc.	$75.3 million	www.masterdistributors.com	
25	ESCO LLC	$75.2 million	www.escollc.com	CA

26	Powell Electronics	$73 million	www.powell.com	PA
27	Airtechnics Inc.	$67.5 million	www.airtechnics.com	KS
28	A.E. Petsche Co. Inc.	$67 million	www.aepetsche.com	TX
29	Wes-Garde Components Group	$57.2 million	www.wesgarde.com	CT
30	PEI-Genesis	$54.2 million	www.peigenesis.com	PA
31	Hardware Specialty Co.	$51.1 million	www.hardwarespecialty.com	NY
32	Hammond Electronics Inc.	$49.9 million	www.hammondelec.com	FL
33	Bisco Industries Inc.	$46 million	www.biscoind.com	CA
34	Peerless Electronics Inc.	$45.2 million	www.peerlesselectronics.com	NY
35	ACI Electronics Corp.	$41.7 million	www.aci-elec.com	NY
36	IMS Inc.	$41.6 million	www.imswire.com	CT
37	Nedco Electronics	$36.6 million	www.nedcoelectronics.com	UT
38	Flame Enterprises, Inc.	$35.6 million	www.flamecorp.com	CA
39	Steven Engineering Inc.	$33.1 million	www.stevenengineering.com	CA
40	Projections Unlimited	$30.9 million	www.gopui.com	CA
41	Walker Component Group	$30 million	www.walkercomponent.com	CO
42	Capsco Material Management	$29.9 million	www.capsco.com	CA
43	Beyond Components, Inc.	$24.1 million	www.beyondcomponents.com	MA
44	Marsh Electronics Inc.	$24 million	www.marshelectronics.com	WI
45	Dee Electronics Inc.	$21.1 million	www.deei.com	IO
46	IBS Electronics Inc.	$20.4 million	www.ibs-elec.com	CA
47	Schuster Electronics Inc.	$19.4 million	www.schusterusa.com	OH
48	Symmetry Electronics	$18 million	www.symmetryla.com	CA
49	Gopher Electronics	$ 16.7 million	www.gopherelectronics.com	MN
50	Surface Mount Distribution	$ 14.8 million	www.smdinc.com	CA

[3-2]Top 10 Global Distributors

Rank	Company Name	Sales(2001) $millions	Web Site	Location
1	Avnet	10,600.0	www.avnet.com	Phoenix, AZ
2	Arrow	10,028.0	www.arrow.com	Melville, NY
3	Future	2,900.0	www.futureelectronics.com	Bolton, MA
4	Memec	2,100.0	www.memec.com	San Diego, CA
5	Bell	2,007.0	www.bellmicro.com	San Jose, CA
6	World Peace Industries	1,250.0	www.wpi.com.tw/english	Taiwan
7	TTI	750.0	www.ttiinc.com	Fort Worth, TX
8	Eurodis Electron	589.3	www.eurodis.com	Europe
9	Richardson	466.0	www.rell.com	LaFox, IL
10	Nu Horizons	319.0	www.nuhorizons.com	Melville, NY

[3-3]TOP 10 Semiconductors Distributors

Rank	Company Name	Sales(2001) $millions	Web Site	Location
1	Arrow	3,314.0	www.arrow.com	Melville, NY
2	Avnet	2,700.0	www.avnet.com	Phoenix, AZ
3	Memec	1,030.0	www.memec.com	San Diego, CA
4	Pioneer-Standard	830.0	www.pioneerstandard.com	Cleveland, OH
5	All American	336.0	www.allamerican.com	Duluth, GA
6	Nu Horizons	242.0	www.nuhorizons.com	Melville, NY
7	Bell	237.0	www.bellmicro.com	San Jose, CA
8	Jaco	136.2	www.jacoelectronics.com	Hauppauge, NY
9	Digi-Key	98.0	www.digikey.com	Thief River Falls, MN
10	Dependable	46.8	www.dependonus.com	Deerfield Beach, FL

[3-4]Top 10 Passive Distributors

Rank	Company Name	Sales(2001) $millions	Web Site	Location
1	Arrow	447.0	www.arrow.com	Melville, NY
2	TTI	422.5	www.ttiinc.com	Fort Worth, TX
3	Avnet	365.0	www.avnet.com	Phoenix, AZ
4	Digi-Key	143.5	www.digikey.com	Thief River Falls ,MN
5	Jaco	111.5	www.jacoelectronics.com	Hauppauge, NY
6	Nu Horizons	61.0	www.nuhorizons.com	Melville, NY
7	Richardson	38.2	www.rell.com	LaFox, IL
8	Sager	38.0	www.sager.com	Weymouth, MA
9	All American	27.0	www.allamerican.com	Duluth, GA
10	Capsco	26.7	www.capsco.com	Sunnyvale, CA

[3-5]Top 10 Electromechanical Distributors

Rank	Company Name	Sales(2001) $millions	Web Site	Location
1	Avnet	206.0	www.avnet.com	Phoenix, AZ
2	Richardson	117.2	www.rell.com	LaFox, IL
3	Master Distributors	55.7	www.masterdistributors.com	
4	Wes-Garde	54.6	www.wesgarde.com	Hartford, CT
5	Sager	54.0	www.sager.com	Weymouth, MA
6	Airtechnics	48.9	www.airtechnics.com	Wichita, KS
7	DAC	48.0	www.heilind.com	Wilmington, MA
8	Allied Electronics	43.0	www.alliedelec.com	Fort Worth, TX
9	TTI	39.0	www.ttiinc.com	Fort Worth, TX
10	RS Electronics	34.4	www.rselectronics.com	Livonia, MI

[3-6]Top 10 Interconnect Distributors

Rank	Company Name	Sales(2001) $millions	Web Site	Location
1	Avnet	461.0	www.avnet.com	Phoenix, AZ
2	DAC	225.2	www.heilind.com	Wilmington, MA
3	Arrow	206.0	www.arrow.com	Melville, NY
4	TTI	162.5	www.ttiinc.com	Fort Worth, TX
5	Digi-Key	56.0	www.digikey.com	Thief River Falls, MN
6	PEI-Genesis	51.5	www.peigenesis.com	Philadelphia, PA
7	Sager	50.0	www.sager.com	Weymouth, MA
8	Electro Sonic	31.2	www.e-sonic.com	Toronto, Canada
9	Hammond	27.9	www.hammondelec.com	Orlando, FL
10	ESCO	24.8	www.escollc.com	Irvine, CA

[3-7]Top 10 Power sources Distributors

Rank	Company Name	Sales(2001) $millions	Web Site	Location
1	XP Foresight	79.6	www.xp-foresight.com	Sunnyvale, CA
2	Sager	48.0	www.sager.com	Weymouth, MA
3	Allied	36.0	www.alliedelec.com	Fort Worth, TX
4	TTI	6.5	www.ttiinc.com	Fort Worth, TX
5	Electro Sonic	5.5	www.e-sonic.com	Toronto, Canada
6	Digi-Key	4.5	www.digikey.com	Thief River Falls, MN
7	Dependable	3.3	www.dependonus.com	Deerfield Beach, FL
8	RS Electronics	3.2	www.rselectronics.com	Livonia, MI
9	Master Distributors	3.0	www.masterdistributors.com	
10	Steven Engineering	2.8	www.stevenengineering.com	South SanFrancisco,CA

[3-8]Top 10 Computer Systems/Peripherals Distributors

Rank	Company Name	Sales(2001) $millions	Web Site	Location
1	Avnet	2,700.0	www.avnet.com	Phoenix, AZ
2	Arrow	2,244.0	www.arrow.com	Melville, NY
3	Pioneer-Standard	1,360.0	www.pioneerstandard.com	Cleveland, OH
4	Bell	970.0	www.bellmicro.com	San Jose, CA
5	Richardson	49.0	www.rell.com	LaFox, IL
6	Digi-Key	16.5	www.digikey.com	Thief River Falls, MN
7	Hammond	2.7	www.hammondelec.com	Orlando, FL
8	RS Electronics	2.5	www.rselectronics.com	Livonia, MI
9	Electro Sonic	1.6	www.e-sonic.com	Toronto, Canada
10	Steven Engineering	0.2	www.stevenengineering.com	South SanFrancisco,CA

[3-9]Top 10 Non-Franchised Distributors

Rank	Company Name	Sales(2001) $millions	Web Site	Location
1	Smith & Associates	324.4	www.smithweb.com	Houston, TX
2	Shecom	309.7	www.shecom.com	Yorba Linda, CA
3	Converge	229.0	www.converge.com	Peabody, MA
4	SND	195.8	www.snd.com	Greenwich, CO
5	Resilien	188.9	www.resilien.com	Melville, NY
6	Advanced MP	170.0	www.advancedmp.com	San Clemente, CA
7	Classic Components	167.0	www.class-ic.com	Torrance, CA
8	ACG	150.0	www.mgiusa.com	Upper Saddle River, NJ
9	America II	149.0	www.americaii.com	St. Petersburg, FL
10	Rand	89.6	www.randtech.com	Irvine, CA

[4-1]World Telecommunications Equipment Spending ($ Millions)

Year / Country	2000	2001	2002	2003	2004	2005
USA	171,511	166,721	160,128	172,216	187,936	208,398
Canada&Mexico	16,200	17,000	18,100	20,000	22,400	24,800
Asia-Pacific	90,000	98,500	105,800	118,000	137,500	158,600
Western Europe	106,250	94,000	96,500	100,300	106,800	116,000
Eatern Europe	14,200	15,100	16,150	17,800	19,850	22,200
Latin America	21,200	20,000	20,100	22,400	25,500	28,400
Total	**419,361**	**411,321**	**416,778**	**450,716**	**499,986**	**558,398**

[4-1-1]The Telecommunications Marketplace ($ Millions)

Category	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*
United States						
Equipment and sosftware						
Network Equipment and Facilities	47,528	40,950	36,520	38,050	41,450	46,150
Voice/Data Equipment	96,834	98,022	102,890	110,653	120,422	131,863
Wireless Capital Expenditures	18,360	19,500	11,500	14,000	17,000	21,000
Wireless Handsets	8,789	8,249	9,218	9,513	9,064	9,385
Total	**171,511**	**166,721**	**160,128**	**172,216**	**187,936**	**208,398**
Transport Services						
Local Exchange Services	117,000	125,000	133,400	142,300	151,000	160,000
Toll Service	108,181	105,000	106,000	108,500	112,000	117,000
Wireless Services	59,196	72,916	87,640	103,320	116,571	130,054
Total	**284,377**	**302,916**	**327,040**	**354,120**	**379,571**	**407,054**
Specialized Services						
Broadband Internet Access	3,240	5,790	8,490	10,250	12,130	13,770
Unified Messaging	1,021	1,150	1,400	1,900	2,700	3,500
Videoconferencing Public Room Services	300	400	600	800	1,000	1,200
Audioconferencing Service Bureau Spending	1,500	1,850	2,300	2,700	3,100	3,500
Total	**6,061**	**9,190**	**12,790**	**15,650**	**18,930**	**21,970**
Support Services						
Spending on Services in Support of Network Infrastructure Equipment	25,212	28,347	31,301	35,125	38,754	43,223
Spending on Services in Support of Wireless Infrastructure Equipment	4,747	6,001	7,429	8,337	9,968	12,015
Spending on Services in Support of Voice and Data Communications Equipment	138,332	164,717	192,167	219,024	250,469	288,849
Total	**168,291**	**199,065**	**230,897**	**262,486**	**299,191**	**344,087**
U.S. Total*	**618,129**	**662,696**	**712,975**	**784,563**	**862,556**	**954,386**
International						
Transport Services	571,740	648,000	706,000	792,000	871,000	947,050
Equipment	247,850	244,600	256,650	278,500	312,050	350,000
Spending on Services in Support of Equipment	225,287	268,226	319,218	381,488	457,730	524,492
International Total	**1,044,877**	**1,160,826**	**1,281,868**	**1,451,988**	**1,640,780**	**1,821,542**
Worldwide Total	**1,663,006**	**1,823,522**	**1,994,843**	**2,236,551**	**2,503,336**	**2,775,928**

* Installation charges are included in both equipment and support services but only once in the total

** Canada and Mexico, Western Europe, Eastern Europe, Latin America, Asia-Pacific

[4-1-2]Growth of the Telecommunications Marketplace (%)

Category	*2001*	*2002*	*2003*	*2004*	*2005*	*2001-2005 CAGR*
United States						
Equipment and sosftware						
Network Equipment and Facilities	-13.8	-10.8	4.2	8.9	11.3	3.0
Voice/Data Equipment	1.2	5.0	7.5	8.8	9.5	7.7
Wireless Capital Expenditures	6.2	-41.0	21.7	21.4	23.5	1.9
Wireless Handsets	-6.1	11.7	3.2	-4.7	3.5	3.3
Total	**-2.8**	**-4.0**	**7.5**	**9.1**	**10.9**	**5.7**
Transport Services						
Local Exchange Services	6.8	6.7	6.7	6.1	6.0	6.4
Toll Service	-2.9	1.0	2.4	3.2	4.5	2.7
Wireless Services	23.2	20.2	17.9	12.8	11.6	15.6
Total	**6.5**	**8.0**	**8.3**	**7.2**	**7.2**	**7.7**
Specialized Services						
Broadband Internet Access	78.7	46.6	20.7	18.3	13.5	24.2
Unified Messaging	12.6	21.7	35.7	42.1	29.6	32.1
Videoconferencing Public Room Services	33.3	50.0	33.3	25.0	20.0	31.6
Audioconferencing Service Bureau Spending	23.3	24.3	17.4	14.8	12.9	17.3
Total	**51.6**	**39.2**	**22.4**	**21.0**	**16.1**	**24.3**
Support Services						
Spending on Services in Support of Network Infrastructure Equipment	12.4	10.4	12.2	10.3	11.5	11.1
Spending on Services in Support of Wireless Infrastructure Equipment	26.4	23.8	12.2	19.6	20.5	19.0
Spending on Services in Support of Voice and Data Communications Equipment	19.1	16.7	14.0	14.4	15.3	15.1
Total	**18.3**	**16.0**	**13.7**	**14.0**	**15.0**	**14.7**
U.S. Total*	**7.2**	**7.6**	**10.0**	**9.9**	**10.6**	**9.5**
International*						
Transport Services	13.3	9.0	12.2	10.0	8.7	10.0
Equipment	-1.3	4.9	8.5	12.0	12.2	9.4
Spending on Services in Support of Equipment	19.1	19.0	19.5	20.0	14.6	18.3
International Total	**11.1**	**10.4**	**13.3**	**13.0**	**11.0**	**11.9**
Worldwide Total	**9.7**	**9.4**	**12.1**	**11.9**	**10.9**	**11.1**

* Installation charges are included in both equipment and support services but only once in the total

** Canada and Mexico, Western Europe, Eastern Europe, Latin America, Asia-Pacific

[4-2]U.S. Exports of Telecommunications Equipment ($ Millions)

Category	*1997*	*1998*	*1999*	*2000*	*2001e*
Telephone Sets and Parts	462	341	374	439	382
Telephone Apparatus and Parts	4,495	5,146	6,484	8,553	7,518
Tlelgraphic Apparatus and Parts	1,619	1,970	2,104	2,760	2,766
Radio Transmitters	709	627	624	691	684
Radio Receivers	409	296	293	262	264
Radio Transceivers	1,938	1,709	2,001	2,282	1,675
Telephone Answering Devices	108	87	71	42	36
TV Transmission/Reception Apparatus	5,286	4,559	4,524	5,027	4,905
Cellular Telephones	1,903	1,901	1,895	1,459	1,391
Facsimile Machines	52	56	47	54	48
Cordless Telephones	1,444	1,729	1,821	2,256	2,071
Modems	1,084	873	993	1,369	1,258
Paging Alert Devices	5	5	6	7	9
Fiber Optic Cable	815	821	1,109	1,944	2,144
Other Cable and Parts	508	399	389	732	701
Worldwide Total	**20,837**	**20,518**	**22,735**	**2,7877**	**25,852**

Source : U.S. Department of Commerce, TIA

[4-2-1]Change in U.S. Exports of Telecommunications Equipment (%)

Category	*1997*	*1998*	*1999*	*2000*	*2001e*
Telephone Sets and Parts	32.0	-26.1	9.6	17.3	-13.0
Telephone Apparatus and Parts	17.2	14.5	26.0	31.9	-12.1
Tlelgraphic Apparatus and Parts	29.6	21.7	6.8	31.2	0.2
Radio Transmitters	16.8	-11.6	-0.5	10.8	-1.0
Radio Receivers	12.1	-27.7	-1.1	-10.6	1.0
Radio Transceivers	13.7	-11.8	17.1	14.0	-26.6
Telephone Answering Devices	-15.0	-19.6	-17.7	-41.9	-13.3
TV Transmission/Reception Apparatus	31.6	-13.8	-0.8	11.1	-2.4
Cellular Telephones	-4.1	-0.1	-0.3	-23.0	-4.7
Facsimile Machines	-40.9	7.7	-15.9	15.1	-11.4
Cordless Telephones	274.1	19.7	5.3	23.9	-8.2
Modems	-2.5	-19.5	13.7	37.9	-8.1
Paging Alert Devices	66.7	6.0	17.0	16.1	25.0
Fiber Optic Cable	25.2	0.7	35.2	75.2	10.3
Other Cable and Parts	6.7	-21.5	-2.4	88.2	-4.3
Worldwide Total	**22.9**	**-1.5**	**10.8**	**22.6**	**-7.3**

Source : U.S. Department of Commerce, TIA

[4-2-2]U.S. Imports of Telecommunications Equipment ($ Millions)

Category	*1997*	*1998*	*1999*	*2000*	*2001e*
Telephone Sets and Parts	1,299	1,321	1,393	1,350	1,139
Telephone Apparatus and Parts	3,126	3,728	6,004	11,786	7,166
Tlelgraphic Apparatus and Parts	253	310	652	1,239	1,238
Radio Transmitters	155	256	311	319	384
Radio Receivers	243	349	416	386	276
Radio Transceivers	723	786	1,164	1,725	2,109
Telephone Answering Devices	206	155	160	108	78
TV Transmission/Reception Apparatus	3,966	4,948	6,721	10,020	9,272
Cellular Telephones	1,001	1,373	3,082	6,126	8,544
Facsimile Machines	811	749	658	555	410
Cordless Telephones	1,805	2,107	2,106	2,088	1,725
Modems	514	637	941	2,039	1,858
Paging Alert Devices	15	21	20	20	11
Fiber Optic Cable	272	398	729	1,399	1,664
Other Cable and Parts	595	529	811	616	305
Worldwide Total	**14,984**	**17,667**	**25,166**	**39,776**	**36,179**

Source : U.S. Department of Commerce, TIA

[4-2-3]Change in U.S. Imports of Telecommunications Equipment (%)

Category	*1997*	*1998*	*1999*	*2000*	*2001e*
Telephone Sets and Parts	12.8	1.7	5.5	-3.1	-15.6
Telephone Apparatus and Parts	4.3	19.3	61.1	96.3	-39.2
Tlelgraphic Apparatus and Parts	-5.6	22.5	110.3	90.0	0.0
Radio Transmitters	44.9	65.2	21.6	2.6	20.2
Radio Receivers	5.2	43.6	19.1	-7.2	-28.5
Radio Transceivers	10.4	8.7	48.0	48.3	-22.3
Telephone Answering Devices	0.5	-24.8	2.9	-32.1	-28.0
TV Transmission/Reception Apparatus	7.6	24.8	35.8	49.1	-7.5
Cellular Telephones	38.5	37.2	124.5	98.7	39.5
Facsimile Machines	11.6	-7.6	-12.1	-15.7	-26.1
Cordless Telephones	25.2	16.7	-0.1	-0.8	-17.4
Modems	0.8	23.9	47.7	116.8	-8.9
Paging Alert Devices	-59.5	40.0	-7.1	0.0	-43.6
Fiber Optic Cable	25.9	46.3	83.1	92.1	18.9
Other Cable and Parts	59.5	-11.1	53.3	-24.1	-50.5
Worldwide Total	**12.4**	**17.9**	**42.4**	**58.1**	**-9.0**

Source : U.S. Department of Commerce, TIA

[4-2-4]

U.S. Exports of Telecommunications Equipment by Leading Countries ($ Millions)

Country	*2000*	*2001e*	*Percent Change*
Canada	5,018	4,505	-10.2
Mexico	3,487	3,453	-1.0
Japan	2,862	1,995	-30.3
United Kingdom	1,592	1,508	-5.3
Hong Kong	594	1,155	94.4
Germany	871	1,119	28.5
China	767	1,117	45.6
Netherlands	1,320	1,002	-24.1
Brazil	1,387	988	-28.8
Ireland	467	701	50.1
Korea	1,247	591	-52.6
Taiwan	637	467	-26.7
Worldwide Total	**27,877**	**25,852**	**-7.3**

Source : U.S. Department of Commerce, TIA

[4-2-5]

U.S. Imports of Telecommunications Equipment by Leading Countries ($ Millions)

Country	*2000*	*2001e*	*Prercent Change*
Mexico	7,732	8,006	3.5
Canada	9,973	5,060	-49.3
Korea	3,421	5,043	47.4
China	3,308	3,446	4.2
Japan	4,592	3,111	-32.3
Malaysia	2,052	2,355	14.8
Taiwan	2,054	1,799	-12.4
Brazil	403	1,012	151.1
Israel	1,068	987	-7.6
United Kingdom	838	925	10.4
Worldwide Total	**39,776**	**36,179**	**-9.0**

Source : U.S. Department of Commerce, TIA

[4-3]

Spending by Carriers on Telecommunications Equipment by Category ($ Millions)

Category	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*
Central Office Eqipment	18,500	15,000	13,000	13,500	14,200	15,500
Fiber	17,115	14,500	12,500	12,300	13,500	15,000
WDM, SONET/SDH, Digital Cross-Connects	84,00	8,000	7,000	7,200	7,500	7,900
DWDM	2,550	2,000	1,800	1,900	2,050	2,250
Optical Switches	428	600	620	650	700	800
Signaling Gateways	190	300	600	1,000	1,500	2,100
Softswitches	345	550	1,000	1,500	2,000	2,600
Total	**47,528**	**40,950**	**36,520**	**38,050**	**41,450**	**46,150**

Souces : Federal Communications Commission, KMI Corporation, Pioneer Consulting, IDC, Insight Research, Frost & Sullivan, International Softswitch Consortium, TIA

[4-3-1]**Growth of spending by Carriers on Telecommunications Equipment by Category(%)**

Category	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2001-2005 CAGR*
Central Office Eqipment	10.1	-18.9	-13.3	3.8	5.2	9.2	0.8
Fiber	42.7	-15.3	-13.8	-1.6	9.8	11.1	0.9
WDM, SONET/SDH, Digital Cross-Connects	15.3	-4.8	-12.5	2.9	4.2	5.3	-0.3
DWDM	21.4	-21.6	-10.0	5.6	7.9	9.8	3.0
Optical Switches	8,460.0	40.2	3.3	4.8	7.7	14.3	7.5
SignalingGateways	90.0	57.9	100.0	66.7	50.0	40.0	62.7
Softswitches	238.2	59.4	81.8	50.0	33.3	30.0	47.5
Total	**23.8**	**-13.8**	**-10.8**	**4.2**	**8.9**	**11.3**	**3.0**

Souces : Federal Communications Commission, KMI Corporation, Pioneer Consulting, IDC, Insight Research, Frost & Sullivan, International Softswitch Consortium, TIA

[4-4]**Total Voice/Data Spending ($ Million)**

Category	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*
Voice/Data Equipment	96,834	98,022	102,890	110,653	120,422	131,863
Services in Support of Voice/Data Equipment	138,332	164,717	192,167	219,024	250,469	288,849
Broadband Services	26,052	30,685	35,835	40,137	44,496	48,259
Unified Messaging	1,021	1,150	1,400	1,900	2,700	3,500
Videoconferencing Public Room Services	300	400	600	800	1,000	1,200
Audioconferencing Service Bureau Spending	1,500	1,850	2,300	2,700	3,100	3,500
Total Voice/Data Spending	**264,039**	**296,824**	**335,192**	**375,214**	**422,187**	**477,171**

Source : Eastern Management Group, IDC, Tern Systems, Vertical Systems Group, Allied Business Intelligence, Frost & Sullivan, Wainhouse Research, TIA, Wilkofsky Guen Associates

[4-4-1]**Growth of Total Voice/Data Spending (%)**

Category	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2001-2005 CAGR*
Voice/Data Equipment	7.9	1.2	5.0	7.5	8.8	9.5	7.7
Services in Support of Voice/Data Equipment	18.4	19.1	16.7	14.0	14.4	15.3	15.1
Broadband Services	20.9	17.8	16.8	12.0	10.9	8.5	12.0
Unified Messaging	85.6	12.6	21.7	35.7	42.1	29.6	32.1
Videoconferencing Public Room Services	30.4	33.3	50.0	33.3	25.0	20.0	31.6
Audioconferencing Service Bureau Spending	15.4	23.3	24.3	17.4	14.8	12.9	17.3
Total Voice/Data Spending	**14.7**	**12.4**	**12.9**	**11.9**	**12.5**	**13.0**	**12.6**

Source : Eastern Management Group, IDC, Tern Systems, Vertical Systems Group, Allied Business Intelligence, Frost & Sullivan, Wainhouse Research, TIA, Wilkofsky Guen Associates

[4-5]**Voice/Data Equipment Spending ($ Million)**

Category	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*
PBX	4,891	4,273	4,021	4,143	4,583	5,221
KTS/Hybrid	2,865	1,896	1,580	1,665	1,980	2,394
Voice Processing Equipment	5,808	5,796	5,944	6,317	6,749	7,365
Consumer Telecommunications Equipment	3,435	2,985	2,560	2,495	2,485	2,520
Internetworking Equipment	66,135	67,940	71,715	76,950	83,435	90,960
ISDN Equipment	1,350	1,400	1,400	1,350	1,300	1,250
Frame Relay Equipment	1,815	1,810	1,800	1,790	1,775	1,750
ATM Equipment	2,690	3,100	3,675	4,350	4,900	5,400
Videoconferencing Equipment	900	1,100	1,450	1,750	2,100	2,450
Groupware	925	1,000	1,100	1,250	1,450	1,600
CTI Hardware and Software	6,020	6,722	7,645	8,593	9,665	10,953
Total	**96,834**	**98,022**	**102,890**	**110,653**	**120,422**	**131,863**

Source : Eastern Management Group, IDC, Tern Systems, Vertical Systems Group, TIA, Wilkofsky Guen Associates

[4-5-1]**Growth of Voice/Data Equipment Spending(%)**

Category	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2001-2005 CAGR*
PBX	-.12	-12.6	-5.9	3.0	10.6	13.9	5.1
KTS/Hybrid	-9.8	-33.8	-16.7	5.4	18.9	20.9	6.0
Voice Processing Equipment	4.1	-0.2	2.6	6.3	6.8	9.1	6.2
Consumer Telecommunications Equipment	-25.1	-13.1	-14.2	-2.5	-0.4	1.4	-4.1
Internetworking Equipment	11.0	2.7	5.6	7.3	8.4	9.0	7.6
ISDN Equipment	12.5	3.7	0.0	-3.6	-3.7	-3.8	-2.8
Frame Relay Equipment	7.5	-0.3	-0.6	-0.6	-0.8	-1.4	-0.8
ATM Equipment	20.4	15.2	18.5	18.4	12.6	10.2	14.9
Videoconferencing Equipment	12.5	22.2	31.8	20.7	20.0	16.7	22.2
Groupware	27.6	8.1	10.0	13.6	16.0	10.3	12.5
CTI Hardware and Software	15.0	11.7	13.7	12.4	12.5	13.3	13.0
Total	**7.9**	**1.2**	**5.0**	**7.5**	**8.8**	**9.5**	**7.7**

Source : Eastern Management Group, IDC, Tern Systems, Vertical Systems Group, TIA, Wilkofsky Guen Associates

[4-5-2]The Voice Processing Equipment and Services Market ($ Million)

Year	*Voice Mail Equipment*	*Interactive Voice Response Equipment*	*Automatic Call Distributors **	*Predictive Dialing*	*Total Equipment Spending*	*Unified Messaging Software and Services*	*Total*
2000	2,450	1,206	1,497	655	5,808	1,021	6,829
2001	2,250	1,225	1,604	717	5,796	1,150	6,946
2002	2,050	1,402	1,710	782	5,944	1,400	7,344
2003	2,100	1,506	1,822	889	6,317	1,900	8,217
2004	2,250	1,601	1,932	966	6,749	2,700	9,449
2005	2,500	1,737	2,040	1,088	7,365	3,500	10,865

Source : Tern Systems, Frost & Sullivan, TIA, Wilkofsky Gruen Associates

* Stand-alone and integrated

[4-5-3]Growth of the Voice Processing Equipment and Services Market (%)

Year	*Voice Mail Equipment*	*Interactive Voice Response Equipment*	*Automatic Call Distributors**	*Predictive Dialing*	*Total Equipment Spending*	*Unified Messaging Software and Services*	*Total*
2000	-3.2	12.6	8.2	10.1	4.1	85.6	11.4
2001	-8.2	1.6	7.1	9.5	-0.2	12.6	1.7
2002	-8.9	14.4	6.6	9.1	2.6	21.7	5.7
2003	2.4	7.4	6.5	13.7	6.3	35.7	11.9
2004	7.1	6.3	6.0	8.7	6.8	42.1	15.0
2005	11.1	8.5	5.6	12.6	9.1	29.6	15.0
2001-2005 CAGR	**2.7**	**9.1**	**6.2**	**11.0**	**6.2**	**32.1**	**11.8**

Source : Tern Systems, Frost & Sullivan, TIA, Wilkofsky Gruen Associates

* Stand-alone and integrated

[4-6]The Consumer Telecommunications Market

	Corded Phones		*Cordless Phones*		*Answering Machines*		*Home Fax Machines*		*Total*	
Year	*Unit millions*	*Sales $millions*	*Unit millions*	*Sales $millions*	*Unit millions*	*Sales $millions*	*Unit millions*	*Sales $millions*	*Unit millions*	*Sales $millions*
2000	29.7	465	35.1	1,360	19.9	1,145	2.7	465	87.4	3,435
2001	26.6	385	31.7	950	21.0	1,230	2.6	420	81.9	2,985
2002	25.7	340	30.6	765	20.7	1,095	2.3	360	79.3	2,560
2003	26.0	315	31.0	770	21.5	1,110	2.0	300	80.5	2,495
2004	26.5	320	32.0	780	22.5	1,135	1.8	250	82.8	2,485
2005	27.0	325	33.5	800	24.0	1,180	1.6	215	86.1	2,520

Sources : Consumer Electronics Association, TIA, Wilkofsky Gruen Associates

[4-6-1]**Change in the Consumer Telecommunications Market (%)**

	Corded Phones		*Cordless Phones*		*Answering Machines*		*Home Fax Machines*		*Total*	
Year	*Unit*	*Sales*	*Unit*	*Sales*	*Unit*	*Sales*	*Unit*	*Sales*	*Unit*	*Sales*
2000	-13.9	-19.8	-11.6	-39.8	-4.8	-4.6	-10.0	-14.7	-10.9	-25.1
2001	-10.4	-17.2	-9.7	-30.1	5.5	7.4	-3.7	-9.7	-6.3	-13.1
2002	-3.4	-11.7	-3.5	-19.5	-1.4	-11.0	-11.5	-14.3	-3.2	-14.2
2003	1.2	-7.4	1.3	0.7	3.9	1.4	-13.0	-16.7	1.5	-2.5
2004	1.9	1.6	3.2	1.3	4.7	2.3	-10.0	-16.7	2.9	-0.4
2005	1.9	1.6	4.7	2.6	6.7	4.0	-11.1	-14.0	4.0	1.4
01-05 CAGR	**0.4**	**-4.1**	**1.4**	**-4.2**	**3.4**	**-1.0**	**-11.4**	**-15.4**	**1.3**	**-4.1**

Sources : Consumer Electronics Association, TIA, Wilkofsky Gruen Associates

[4-6-2]

Consumer Telecommunications Market, Distribution of Shipments and Spending, by Category (%)

	Corded Phones		*Cordless Phones*		*Answering Machines*		*Home Fax Machines*	
Year	*Unit*	*Sales*	*Unit*	*Sales*	*Unit*	*Sales*	*Unit*	*Sales*
2000	34.0	13.5	40.2	39.6	22.8	33.3	3.1	13.5
2001	32.5	12.9	38.7	31.8	25.6	41.2	3.2	14.1
2002	32.4	13.3	38.6	29.9	26.1	42.8	2.9	14.1
2003	32.3	12.6	38.5	30.9	26.7	44.5	2.5	12.0
2004	32.0	12.9	38.6	31.4	27.2	45.7	2.2	10.1
2005	31.4	12.9	38.9	31.7	27.9	46.8	1.9	8.5

Sources : Consumer Electronics Association, TIA, Wilkofsky Gruen Associates

[4-7]**Worldwide Gigabit Ethernet Market**

Year	*Ports(000)*	*Price Per Port($)*	*Revenue ($ Millions)*
2000	3,623	1,013	3,669
2001	5,990	843	5,050
2002	11,050	769	8,500
2003	17,570	719	12,640
2004	25,664	672	17,250
2005	33,683	619	20,860

Source : Cahners In-Stat Group

[4-7-1]Growth of Worldwide Gigabit Ethernet Market (%)

Year	*Ports*	*Price Per Port*	*Revenue*
2000	185.3	-27.0	108.3
2001	65.3	-16.7	37.6
2002	84.5	-8.8	68.3
2003	59.0	-6.5	48.7
2004	46.1	-6.6	36.5
2005	31.2	-7.9	20.9
2001-2005 CAGR	**54.0**	**-7.4**	**42.6**

Source : Cahners In-Stat Group

[4-7-2]Worldwide 10 Gigabit Ethernet Market

Year	*Ports(000)*	*Price Per Port($)*	*Revenue ($ Millions)*
2002	18	2,667	48
2003	150	2,500	375
2004	861	2,300	1,980
2005	3,240	2,160	7,000

Source : Cahners In-Stat Group

[4-7-3]Growth of the Worldwide 10 Gigabit Ethernet Market (%)

Year	*Ports*	*Price Per Port*	*Revenue*
2003	733.3	-6.3	681.3
2004	474.0	-8.0	428.0
2005	276.3	-6.1	253.5

Source : Cahners In-Stat Group

[4-8]The Data Communications and Internetworking Equipment Market ($ Millions)

Category	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*
LAN Cards	2,500	2,200	2,150	2,050	2,000	2,000
Servers	23,200	23,500	24,300	25,700	27,800	30,300
PC LAN Operating Systems	2,900	3,000	3,120	3,300	3,550	3,900
Hubs	3,255	3,100	3,150	3,300	3,450	3,650
Wiring	3,700	3,750	3,850	4,100	4,400	4,800
Routers	3,750	3,700	3,750	3,900	4,200	4,600
SNA Gateways and Connectivity Gear	940	900	910	920	935	960
Ethernet/Gigabit Ethernet Switches	7,900	8,600	9,300	10,500	12,000	14,000
Network and Systems Management	5,500	5,650	6,000	6,500	7,000	7,500
Network Security	2,575	3,300	4,000	4,700	5,300	5,800
Diagnostic and Test Equipment	720	720	730	750	770	800
Modems	2,500	2,000	1,800	1,700	1,600	1,500
CSU/DSUs	930	920	925	940	970	1,000
Multiplexers	565	500	480	490	510	550
Web Servers and Software/IP Equipment	2,800	3,500	4,400	5,000	5,600	6,000
Remote Access Devices	2,400	2,600	2,850	3,100	3,350	3,600
Total	**66,135**	**67,940**	**71,715**	**76,950**	**83,435**	**90,960**

Source : Data Communications, TIA, Wilkofsky Gruen Associates

[4-8-1]**Growth of the Data Communications and Internetworking Equipment Market(%)**

Category	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2001-2005 CAGR*
LAN Cards	-6.9	-12.0	-2.3	-4.7	-2.4	0.0	-2.4
Servers	9.0	1.3	3.4	5.8	8.2	9.0	6.6
PC LAN Operating Systems	9.4	3.4	4.0	5.8	7.6	9.9	6.8
Hubs	3.5	-4.8	1.6	4.8	4.5	5.8	4.2
Wiring	11.6	1.4	2.7	6.5	7.3	9.1	6.4
Routers	9.0	-1.3	1.4	4.0	7.7	9.5	5.6
SNA Gateways and Connectivity Gear	1.1	-4.3	1.1	1.1	1.6	2.7	1.6
Ethernet/Gigabit Ethernet Switches	16.6	8.9	8.1	12.9	14.3	16.7	13.0
Network and Systems Management	20.0	2.7	6.2	8.3	7.7	7.1	7.3
Network Security	39.9	28.2	21.2	17.5	12.8	9.4	15.1
Diagnostic and Test Equipment	9.9	0.0	1.4	2.7	2.7	3.9	2.7
Modems	-10.7	-20.0	-10.0	-5.6	-5.9	-6.3	-6.9
CSU/DSUs	3.9	-1.1	0.5	1.6	3.2	3.1	2.1
Multiplexers	-0.9	-11.5	-4.0	2.1	4.1	7.8	2.4
Web Servers and Software/IP Equipment	46.6	25.0	25.7	13.6	12.0	7.1	14.4
Remote Access Devices	14.3	8.3	9.6	8.8	8.1	7.5	8.5
Total	**11.0**	**2.7**	**5.6**	**7.3**	**8.4**	**9.0**	**7.6**

Source : Data Communications, TIA, Wilkofsky Gruen Associates

[4-9]**The Cable Modem Market**

Year	*Subscribers (Millions)*	*Monthly Fee ($)*	*Revenues ($ Millions)*
2000	4,1	39	1,920
2001	6.9	40	3,310
2002	9.5	42	4,790
2003	12.2	39	5,710
2004	15.2	37	6,750
2005	18.1	35	7,600

Source : Allied Business Intelligence

[4-9-1] **Growth of the Cable Modem Market(%)**

Year	*Subscribers*	*Monthly Fee*	*Revenues*
2000	95.2	-13.0	69.9
2001	68.3	2.4	72.4
2002	37.7	5.1	44.7
2003	28.4	-7.2	19.2
2004	24.6	-5.1	18.2
2005	19.1	-5.4	12.6

Source : Allied Business Intelligence

[4-10]**The DSL Market**

Year	*Subscribers (Millions)*	*Monthly Fee ($)*	*Service Revenues($ Millions)*
2000	2.4	46	1,320
2001	4.6	45	2,480
2002	6.7	46	3,700
2003	9.0	42	4,540
2004	11.5	39	5,380
2005	13.9	37	6,170

Source : Allied Business Intelligence

[4-10-1]**Growth of the DSL Market (%)**

Year	*Subscribers*	*Monthly Fee*	*Service Revenues*
2000	380.0	-16.7	300.0
2001	91.7	-2.0	87.9
2002	45.7	2.4	49.2
2003	34.3	-8.7	22.7
2004	27.8	-7.3	18.5
2005	20.9	-5.1	14.7

Source : Allied Business Intelligence

[4-10-2]**Worldwide Broadband Subscribers by Access Technology(000)**

Year	*Cable Modems*	*DSL*	*Fixed wireless*	*Fiber to the Home*	*Satellite*	*Total*
2000	6,775	4,899	210	10	88	11,982
2001	10,850	9,805	366	95	378	21,494
2002	16,050	16,398	851	390	1,260	34,949
2003	21,040	25,044	1,699	850	3,065	51,698
2004	26,430	31,823	2,571	1,720	5,760	68,304
2005	30,785	37,455	3,468	3,234	9,040	83,982

Source : Cahners In-Stat Group

[4-11]**The U.S Frame Relay Market ($ Millions)**

Year	*Services*	*Equipment*	*Total*
2000	6,552	1,815	8,367
2001	7,603	1,810	9,413
2002	9,068	1,800	10,868
2003	10,467	1,790	12,257
2004	11,856	1,775	13,631
2005	13,050	1,750	14,800

Sources : Services numbers through 2004 provided by Vertical Systems Group. Remaining figures TIA, Wilkofsky Gruen Associates

[4-11-1]**Growth of the U.S. Frame Relay Market (%)**

Year	*Services*	*Equipment*	*Total*
2000	27.5	7.5	22.6
2001	16.0	-0.3	12.5
2002	19.3	-0.6	15.5
2003	15.4	-0.6	12.8
2004	13.3	-0.8	11.2
2005	10.1	-1.4	8.6
2001-2005 CAGR	**14.5**	**-0.8**	**12.0**

Sources : Services numbers through 2004 provided by Vertical Systems Group. Remaining figures TIA, Wilkofsky Gruen Associates

[4-12]**U.S. ATM Equipment Revenues by Segment**

Segment \ Year	**2001**	**2002**
Lan Equipment	17%	15%
Ent. WAN Switches	12%	11%
ISP Switches	18%	18%
WAN Access	11%	11%
Carrier Switches	42%	45%

Sources : Vertical Systems Group

[4-12-1]**The U.S. ATM Market ($ Millions)**

Year	*Services*	*Equipment*	*Total*
2000	1,121	2,690	3,811
2001	1,627	3,100	4,727
2002	2,256	3,675	5,931
2003	3,000	4,350	7,350
2004	3,817	4,900	8,717
2005	4,539	5,400	9,939

Sources : Sources : Services numbers through 2004 provided by Vertical Systems Group; Remaining figures TIA, Wilkofsky Gruen Associates

[4-12-2]**Growth of the U.S. ATM Market (%)**

Year	*Services*	*Equipment*	*Total*
2000	48.6	20.4	27.5
2001	45.1	15.2	24.0
2002	38.7	18.5	25.5
2003	33.0	18.4	23.9
2004	27.2	12.6	18.6
2005	18.9	10.2	14.0
2001-2005 CAGR	**29.2**	**14.9**	**20.4**

Sources : Sources : Services numbers through 2004 provided by Vertical Systems Group; Remaining figures TIA, Wilkofsky Gruen Associates

[4-13]**The Groupware Market**

Year	*Spending ($ Millions)*	*Percent Change (%)*
2000	925	27.6
2001	1,000	8.1
2002	1,100	10.0
2003	1,250	13.6
2004	1,450	16.0
2005	1,600	10.3
2001-2005 CAGR		**12.5**

Source : TIA, Wilkofsky Gruen Associates

[4-13-1]**The Overall Collaboration Market ($ Millions)**

Year	*Video-Conferencing*	*Audio-Conferencing*	*Groupware*	*Total*
2000	1,200	1,500	925	3,625
2001	1,500	1,850	1,000	4,350
2002	2,050	2,300	1,100	5,450
2003	2,550	2,700	1,250	6,500
2004	3,100	3,100	1,450	7,650
2005	3,650	3,500	1,600	8,750

Source : Wainhouse Research, Frost & Sullivan, TIA, Wilkofsky Gruen Associates

[4-13-2]**Growth of the Overall Collaboration Market (%)**

Year	*Video-Conferencing*	*Audio-Conferencing*	*Groupware*	*Total*
2000	16.5	15.4	27.6	18.7
2001	25.0	23.3	8.1	20.0
2002	36.7	24.3	10.0	25.3
2003	24.4	17.4	13.6	19.3
2004	21.6	14.8	16.0	17.7
2005	17.7	12.9	10.3	14.4
2001-2005 CAGR	**24.9**	**17.3**	**12.5**	**19.1**

Source : Wainhouse Research, Frost & Sullivan, TIA, Wilkofsky Gruen Associates

[4-14]**Wireless Subscribers (Millions)**

Year	*Cellular*	*PCS*	*Paging*	*SMR*	*Total*
2000	72.7	20.4	51.6	11.6	156.3
2001	81.4	33.0	50.3	12.7	177.4
2002	89.6	46.0	51.1	14.0	200.7
2003	95.8	60.0	51.1	16.1	223.0
2004	100.5	71.0	52.6	16.2	240.3
2005	103.7	82.0	54.9	16.3	256.9

Source : Donaldson, Lufkin & Jenrette, The Strategies Group, Cellular Telecommunications and Internet Association, Paul Kagan Associates, TIA, Wilkofsky Gruen Associates

[4-14-1]**Growth of Wireless Subscribers (%)**

Year	*Cellular*	*PCS*	*Paging*	*SMR*	*Total*
2000	14.8	90.7	-1.3	36.5	15.9
2001	12.0	61.8	-2.5	9.5	13.5
2002	10.1	39.4	1.6	10.2	13.1
2003	6.9	30.4	0.0	15.0	11.1
2004	4.9	18.3	2.9	0.6	7.8
2005	3.2	15.5	4.4	0.6	6.9
2001-2005 CAGR	**6.2**	**25.6**	**2.2**	**6.4**	**9.7**

[4-14-2]**Wireless Communications Spending ($ Millions)**

Year	*Services*	*Handsets*	*Capital Expenditures*	*Services in Support of Wireless Infrastructure*	*Total*
2000	59,195.6	8,788.6	18,360.0	4,747.0	91,091.2
2001	72,916.0	8,249.3	19,500.0	6,001.0	106,666.3
2002	87,639.5	9,217.8	11,500.0	7,429.0	115,786.3
2003	103,320.2	9,512.7	14,000.0	8,337.0	135,169.9
2004	116,571.4	9,063.8	17,000.0	9,968.0	152,603.1
2005	130,053.6	9,385.0	21,000.0	12,015.0	172,453.5

Sources : Cellular Telecommunications and Internet Association, The Strategis Group, Electronic Industries Alliance, Donaldson, Lufkin & Jenrette, Paul Kagan Associates, d.f. Blumberg & Associates, TIA, Wilkofsky Gruen Associates

[4-14-3]**Growth of Wireless Communications Spending (%)**

Year	*Services*	*Handsets*	*Capital Expenditures*	*Services in Support of Wireless Infrastructure*	*Total*
2000	31.2	16.7	71.2	27.3	35.8
2001	23.2	-6.1	6.2	26.4	17.1
2002	20.2	11.7	-41.0	23.8	8.5
2003	17.9	3.2	21.7	12.2	16.7
2004	12.8	-4.7	21.4	19.6	12.9
2005	11.6	3.5	23.5	20.5	13.0
2001-2005 CAGR	**15.6**	**3.3**	**1.9**	**19.0**	**12.8**

Sources : Cellular Telecommunications and Internet Association, The Strategis Group, Electronic Industries Alliance, Donaldson, Lufkin & Jenrette, Paul Kagan Associates, d.f. Blumberg & Associates, TIA, Wilkofsky Gruen Associates

[4-14-4]**Wireless Communications Handset Spending ($ Millions)**

Year	*Cellular*	*PCS*	*Paging*	*SMR*	*Total*
2000	3,272.4	2,731.8	305.0	2,479.4	8,788.6
2001	3,006.0	3,663.4	443.0	1,137.0	8,249.3
2002	2,569.0	4,139.2	416.0	2,093.6	9,217.8
2003	1,925.0	4,698.0	357.0	2,532.7	9,512.7
2004	2,005.0	4,984.0	425.0	1,649.8	9,063.8
2005	2,070.0	5,665.1	450.0	1,199.9	9,385.0

Source : TIA, Wilkofsky Gruen Associates, Donaldson, Lufkin & Jenrette, Electronic Industries Alliance

[4-14-5]**Growth of Wireless Communications Handset Spending(%)**

Year	*Cellular*	*PCS*	*Paging*	*SMR*	*Total*
2000	-14.6	64.8	35.0	36.7	16.7
2001	-8.1	34.1	45.2	-54.1	-6.1
2002	-14.5	13.0	-6.1	84.1	11.7
2003	-25.1	13.5	-14.2	21.0	3.2
2004	4.2	6.1	19.0	-34.9	-4.7
2005	3.2	13.7	5.9	-27.3	3.5
2001-2005 CAGR	**8.9**	**11.5**	**0.4**	**1.4**	**3.3**

Source : TIA, Wilkofsky Gruen Associates, Donaldson, Lufkin & Jenrette, Electronic Industries Alliance

[4-14-6]**3G Migration path for GSM Technology**

Technology	*Commercial Date*	*Theoretical Speed*	*Architecture*
GPRS	2001	115 Kbps	Packet
EDGE	2002	384 Kbps	Packet
W-CDMA	2003	Fixed: 2 Mbps; Mobile: 384+ Kbps	Packet

Source : Merrill Lynch

[4-14-7]**3G Migration path for CDMA Technology**

Technology	*Commercial Date*	*Theoretical Speed*	*Architecture*
IS-95A	1999	14.4 Kbps	Circuit
IS-95B	2000	64 Kbps	Packet
1XRTT	2001	144 Kbps	Packet
HDR	2002	Fixed: 2.4 Mbps; Mobile : 384+ Kbps	Packet
3XRTT	2005	2+ Mbps	Packet

Source : Merrill Lynch

[4-14-8]**Licensed Broadband PCS Allocation**

Channel Block	*Total Bandwidth Allocated (MHz)*	*Mobile TX*	*Base TX*	*Service Area*
A	30	1850-1865	1930-1945	MTA
B	30	1870-1885	1950-1965	MTA
C	30	1895-1910	1975-1990	BTA
D	10	1865-1870	1945-1950	BTA
E	10	1885-1890	1965-1970	BTA
F	10	1890-1895	1970-1975	BTA

Source : Federal Communications Commission

[4-14-9]**PCS Handset Sales**

Year	*Number of Handsets (Millions)*	*Average Price($)*	*PCS Handset Spending ($Millions)*
2000	13.7	200	2,732
2001	20.4	180	3,663
2002	25.9	160	4,139
2003	32.4	145	4,698
2004	35.6	140	4,984
2005	40.5	140	5,665

Source : TIA, Wilkofsky Gruen Associates

[1-14-10]**Growth of PCS Handset Sales(%)**

Year	*Number of Handsets*	*Average Price*	*PCS Handset Spending*
2000	82.1	-9.5	64.8
2001	49.0	-10.0	34.1
2002	27.1	-11.1	13.0
2003	25.2	-9.4	13.5
2004	9.9	-3.4	6.1
2005	13.7	0.0	13.7
2001-2005 CAGR	**27.1**	**-8.5**	**16.2**

Source : TIA, Wilkofsky Gruen Associates

[4-14-11]**Enterprise Wireless Products**

Technology	*Frequency Band*	*Products Available*
Unliecnsed Voice		
900 MHz	902-928 MHz	SpectraLink(Link 150/Link 3000) Mobicel DCTS-900 Avaya Trans Talk 9000
Unlicensed PCS	1920-1930 MHz	Avaya Definity Wireless Business System Nortel Companion NEC Wireless Communications System Ascom Freeser DCT 1900, Alcatel OmniPCX 4400, Iwatsu Omegatrek WCS Comdial Air Impact, eOn Orbit Toshiba Strata AirLink , ECI Elecom CoralAIR Telrad Wireless
Converged Voice & Data		
VOIP over WLAN	2.4000-2.4835 GHz	Symbol Technologies NetVision SpectraLink NetLink IP Blue VTGo!
Licensed		
Cellular	824-894 MHz	Erickson Mobile Advantage Wireless Assistant
PCS	1850-1910 MHz	Ascendent WirelessConnect
	1930-1990 MHz	Avaya EC500

Source : InfoTrack for Wireless Business

[4-14-12]**The SMR Handset Market**

Year	*Unit Sales (Millions)*	*Average Price ($)*	*SMR Handset Spending ($ Millions)*
2000	3.53	703	2,479
2001	1.68	677	1,137
2002	3.10	675	2,094
2003	3.73	679	2,533
2004	2.40	687	1,650
2005	1.74	690	1,200

Source : TIA, Wilkofsky Gruen Associates

[4-14-13]**Growth of the SMR Handset Market (%)**

Year	*Unit Sales*	*Average Price*	*SMR Handset Spending*
2000	40.2	-2.4	36.7
2001	-52.3	-3.8	-54.1
2002	84.5	-0.2	84.1
2003	20.3	0.5	21.0
2004	-35.7	1.2	-34.9
2005	-27.5	0.3	-27.3
2001-2005 CAGR	**0.9**	**0.5**	**1.4**

Source : TIA, Wilkofsky Gruen Associates

[4-14-14]**Wireless Data Technologies**

Service	*Data Capability*	*Expected Deployment*
GSM		
Circuit-Switched Data	9.6 Kbps or 14.4 Kbps	Currently Available
High-Speed Circuit-Switched Data	28.8-56 Kbps	Limited. Most operators are bypassing for GPRS
Global Packet Radio Service	IP at rates of 28-56 Kbps	Rollout in 2001
Enhanced Data Rate For GSM	IP to 384 Kbps	2002 or 2003
W-CDMA	Outdoors: 384 Kbps; Indoors: 2 Mbps	Initial deployment in 2002 or 2003; Widespread deployment in 2005 or later
TDMA		
EDGE/EGPRS-136	IP to 384 Kbps;	Initial deployment in 2002; Widespread deployment in 2003
Wideband TDMA	2 Mbps Indoors	No announcement
CDMA		
Circuit-Switched Data	9.6Kbps or 14.4 Kbps	Currently Available
IS-95B	IP to 64 Kbps	Available in Japan and Korea
CDMA 2000 1X	IP to 144 Kbps	2002
CDMA 2000 3X	Outdoors: 384 Kbps; Indoors: 2 Mbps	2002 or 2003
1XEV	IP to 2 Mbps	N/A

Source : Network Computing

[4-15]**The LMDS Market**

Year	*Services Spending ($ Millions)*	*Percent Change*
2000	61	916.7
2001	220	260.7
2002	785	256.8
2003	1,325	68.8
2004	2,280	72.1
2005	3,200	40.4

Source : The Strategis Group, TIA, Wilkofsky Gruen Associates