



MILKEN INSTITUTE

*2002 Global Conference*

IN CONJUNCTION  
WITH

**Forbes**

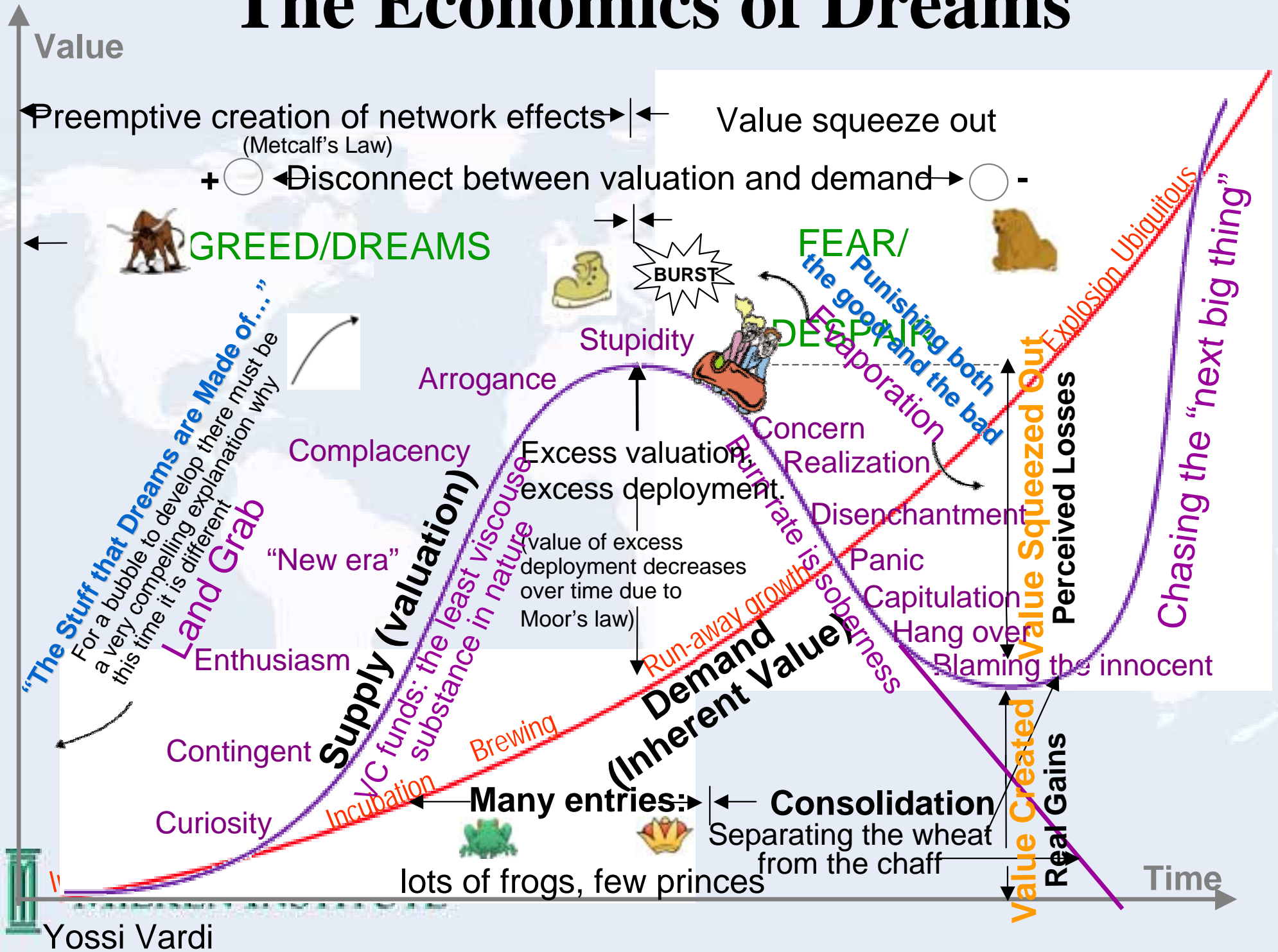
A light blue world map is centered in the background of the slide. The text is overlaid on the map.

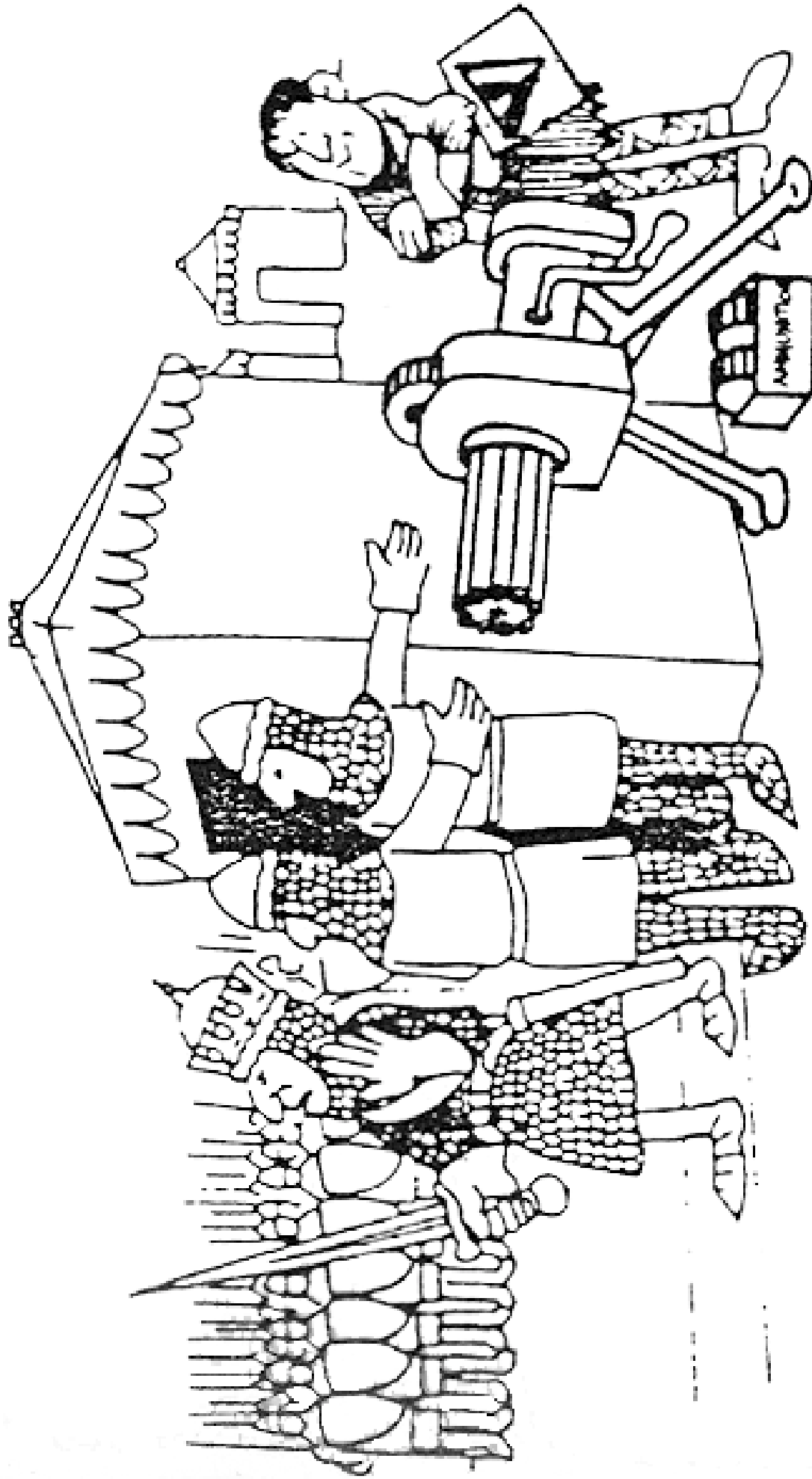
**After the gold rush**

**Or: Is it just the begging  
You ain't seen nothing yet**



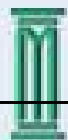
# The Economics of Dreams





“No! — I can't be bothered to see any crazy salesman — we've got a battle to fight!”

	The 50s	The 60s	The 70s	The 80s	The 90s
Trendsetters	James Dean Elvis Presley Jack Keruoac Marilyn Monroe Simone de Beauvoir	The Beatles The Rolling Stones Andy Warhol Jane Fonda Janice Joplin Bob Dylan	Frank Zappa David Bowie Sid Vicious ABBA Brigitte Bardot Bob Marley	Madonna Michael Jackson Peter Gabriel Magic Johnson Eric B & Rakim Blondie Michelle Pfeiffer	Beastie Boys Alanis Morissette Quentin Tarantino William Gibson Douglas Coupland Esther Dyson Kate Moss Philip Starck Irvine Welsh
Happenings	Rock 'n Roll Teenage gangs Beatnik Existentialism Movie stars	Mods Flower Power Young women start working The Vietnam movement Charter trips Color TV	Punk Reggae The Green Movement Disco Glamrock Heavy drugs	MTV & CNN Hip Hop Hard rock Aids Graffiti & Breakdance Interrailing	The Internet Supermodels Role-playing Spice Girls The Club Kids Vegans Rave & smart drugs Design collectives Cyberspace
Products	Vinyl records Jukeboxes Transistor radios Jeans Leather jackets Condoms	Electric guitars Pin-ball games The Pill Jet travel LSD & hash Duffel coats Parkas	Fax Skateboards Synthesizers Satellite TV Video (70) Platform Shoes Makeup	Mobile phones PCs Music videos Sony Walkman CDs (81) Spray paints Camecoder (81) E-mail	The World Wide Web Digital Video/Radio/TV Inline skates Snowboards Palm Pilots Minidisks/DVDs (96) MP3 Internet cafes DBS (94)



# **Eruptive Industries**

The Cutting Edge Of Technology

Financial Mania Fuels Eruptive Industry Development

**Steamboat Telephone**

**Railroad Television**

**Electricity Radio**

**Car Computer**

**Airplane Internet**



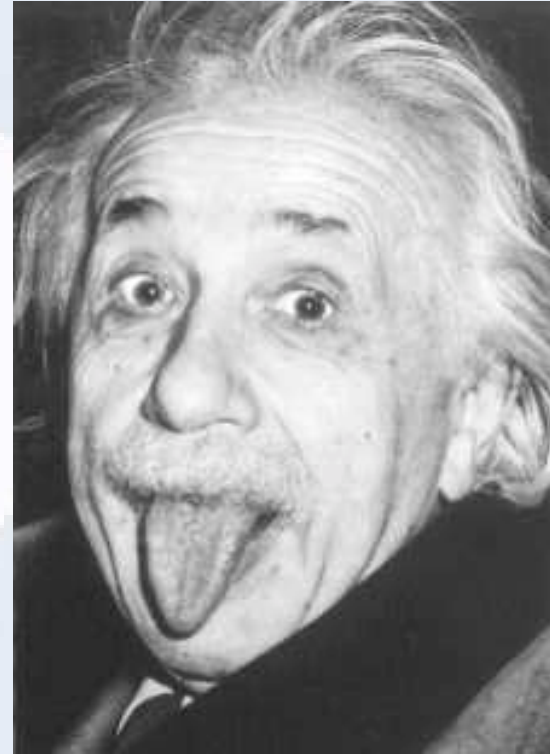
**.... Like Cinderella, they knew that midnight would bring the pumpkins and mice, but, hating to miss a second of a great party, they stayed too long...**

**Warren Buffett**



**The two things which are infinite, are the universe and human stupidity, and I am not sure about the first one.**

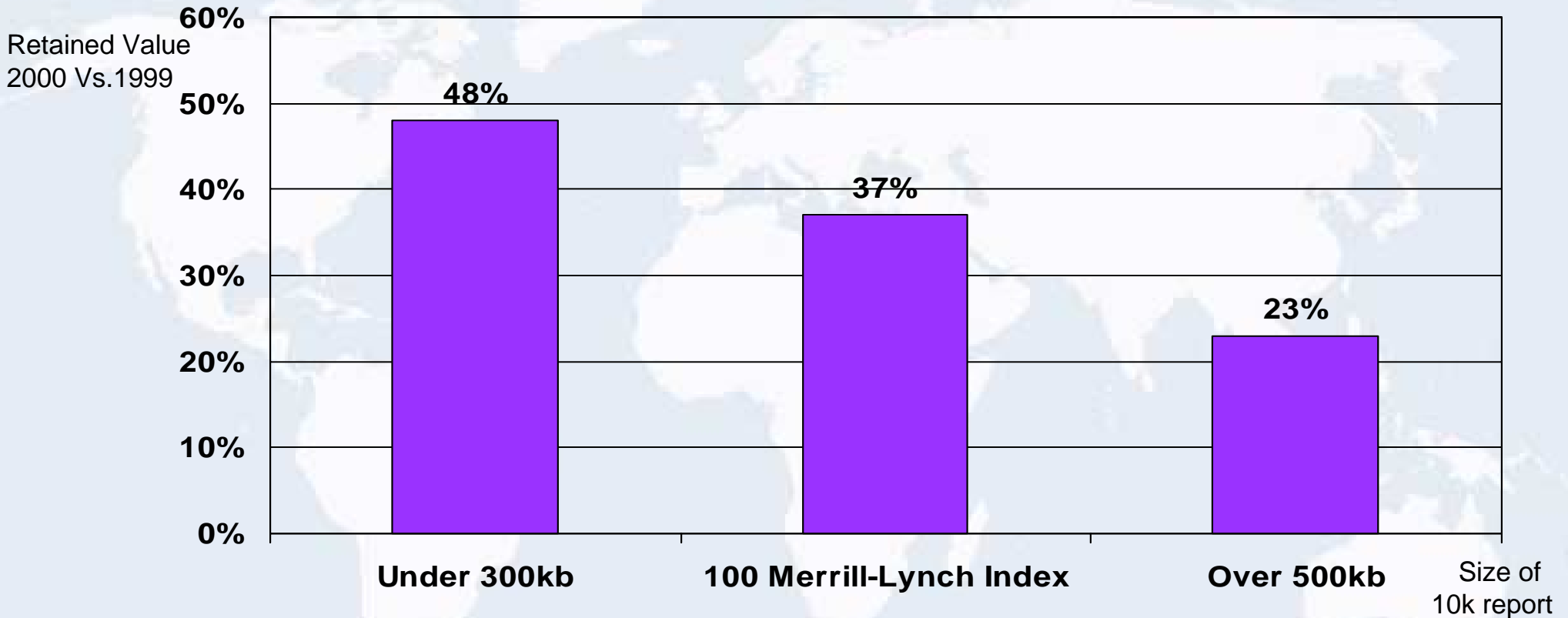
**Albert Einstein**



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# The Harder They Fall, The Bigger The Report

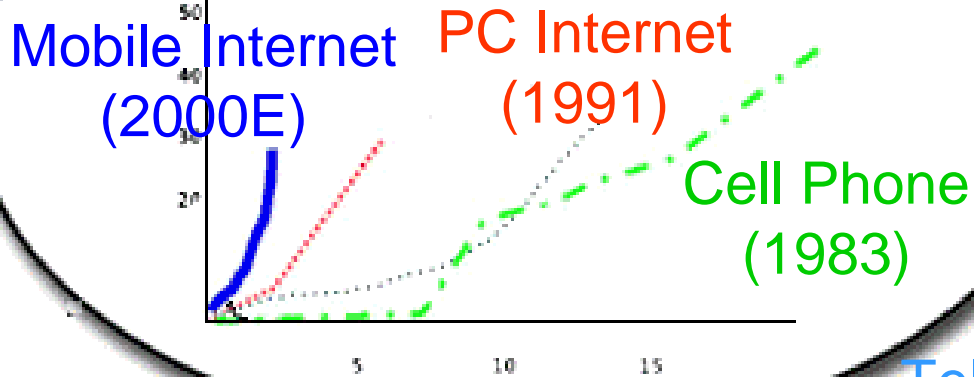
When The Argument Is Weak, Move Your Hands Forcefully



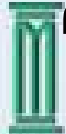
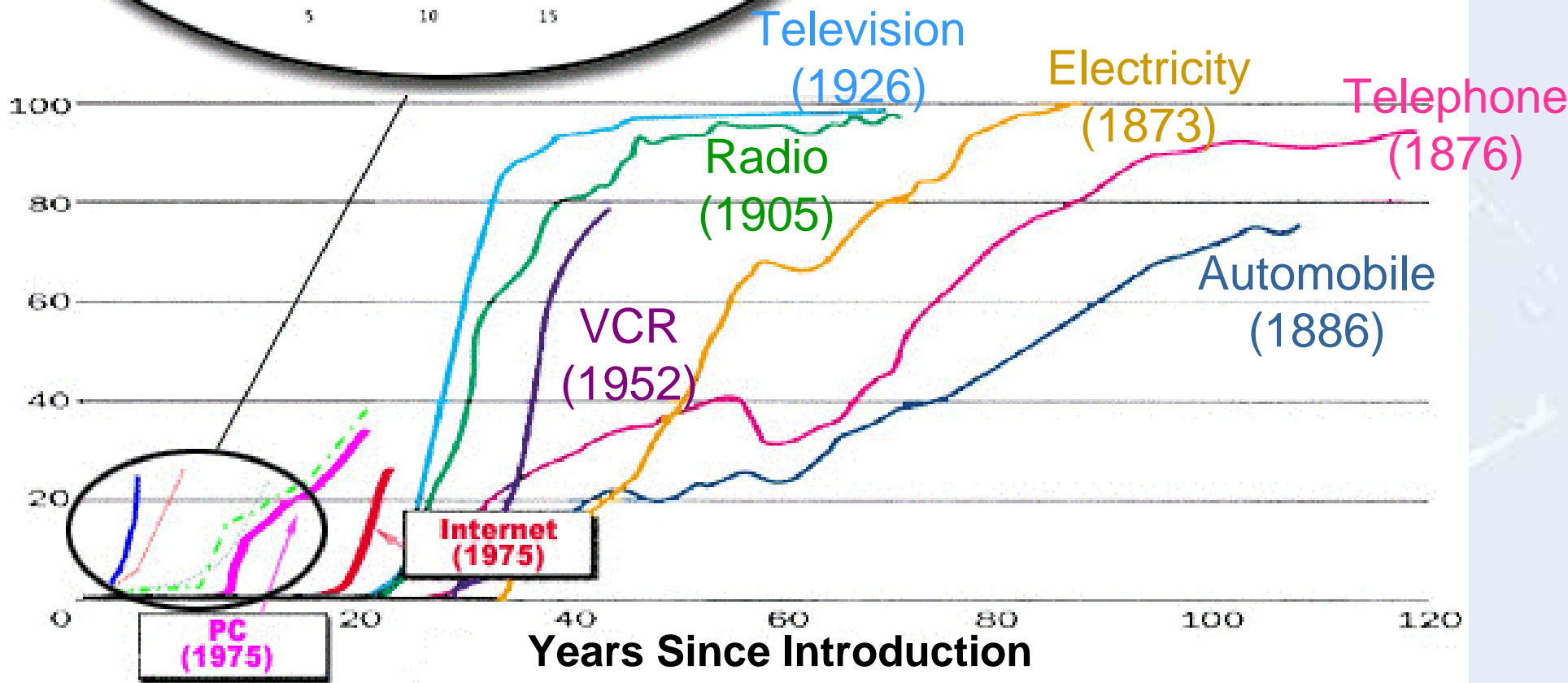
- Less than 20% of companies with 10k over 500kb outperformed the 100 Merrill-Lynch Index
- Turning point is 400kb. over that level rapid deterioration
- Some samples:

IBM	367kb	81.3%
AOL	1861kb	140% (exception)
CMGI	1939kb	2.3%
	636kb	3.2%

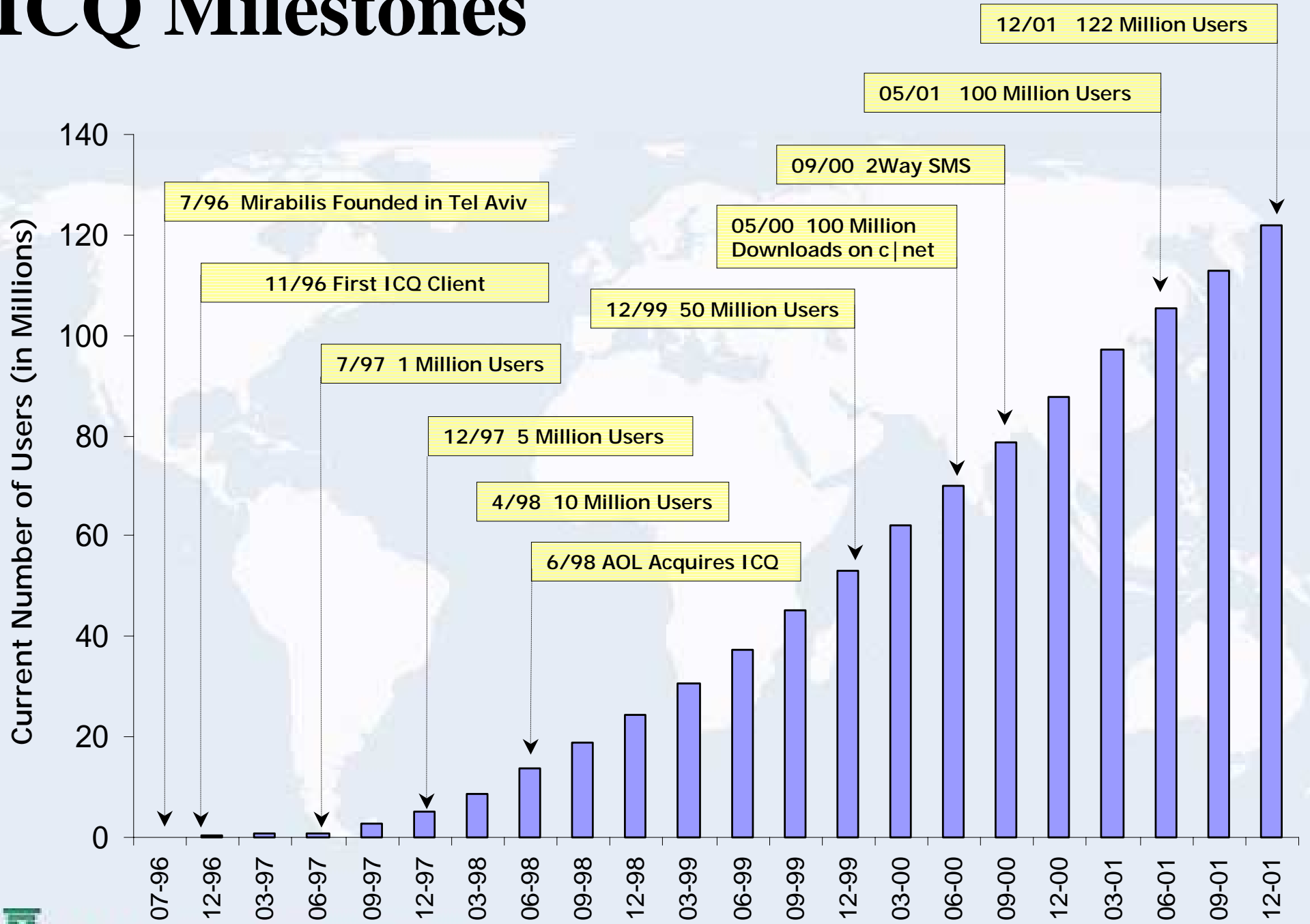
# The Internet – The Fastest Penetrating in History



Percent of Consumer Use



# ICQ Milestones



# Growth Enablers

- **Rapid deployment**
- **New innovations will inspire new opportunities**
- **Open standards**
- **Limitless scalability architecture: Loosely coupled federations, DNS**
- **DNS- finding the pins in the digital hay stack**
- **viral marketing**
- **The message is the product**
- **Metcalf's laws**
- **Moor's laws – storage, processing**
- **Gilder laws**
- **Commodigitization**
- **Always – on at home, on the road, reach and can be reached**
- **Enabling the grass-root, bottom-up**
- **Wide spread of new consumer electronics connected to the internet**
- **Continues partial attention**
- **Still lot of room to grow in internet, wireless**
- **Persistence connection**



# Mega Trends – The Promise

- **The digital life style - New paradigms of consumption and delivery of music, video**
- **Life @ the edge, peer-to-peer**
- **The fight over the living room**
- **The fight over the food chain – content distribution platforms**
- **Wireless, cellular, wifi**
- **Average age going up, cognitive age going down**
- **Pervasive computing**
- **Converting TV time to digital life style time**
- **Info Now! Time and location sensitive info**
- **ASP**
- **Collaboration, sharing, communication**
- **Micropublishing**
- **Information oligarchy.**
- **Attention is the scarcest resource - Attention deficit disorder!**
- **The big will get bigger**



# Digital life style narrow band

- **Communication and community**
- **Self expression, collaboration, sharing.**
- **E-mail**
- **Instant messaging, chat**
- **Message board**
- **Usenet**
- **Blogs**
- **Home pages**



# Digital Lifestyle: Rich Media

- **Hardware:**

Rich media PC, MP3 player, digital cameras, wireless text phones, game platforms, rich media phones, DVD, burners, camcoders, webcams, 802.11, home hub.

- **Software:**

Rippers, video editing, photo editing, file sharing burning, downloading, games, moving assets around, compression, codecs, players, viewers.

- **Services:**

Music, video sites, on-line games, storage, streaming & downloading.

- **User activities:**

Editing, self publishing, collaborating, sharing

- **Access:**

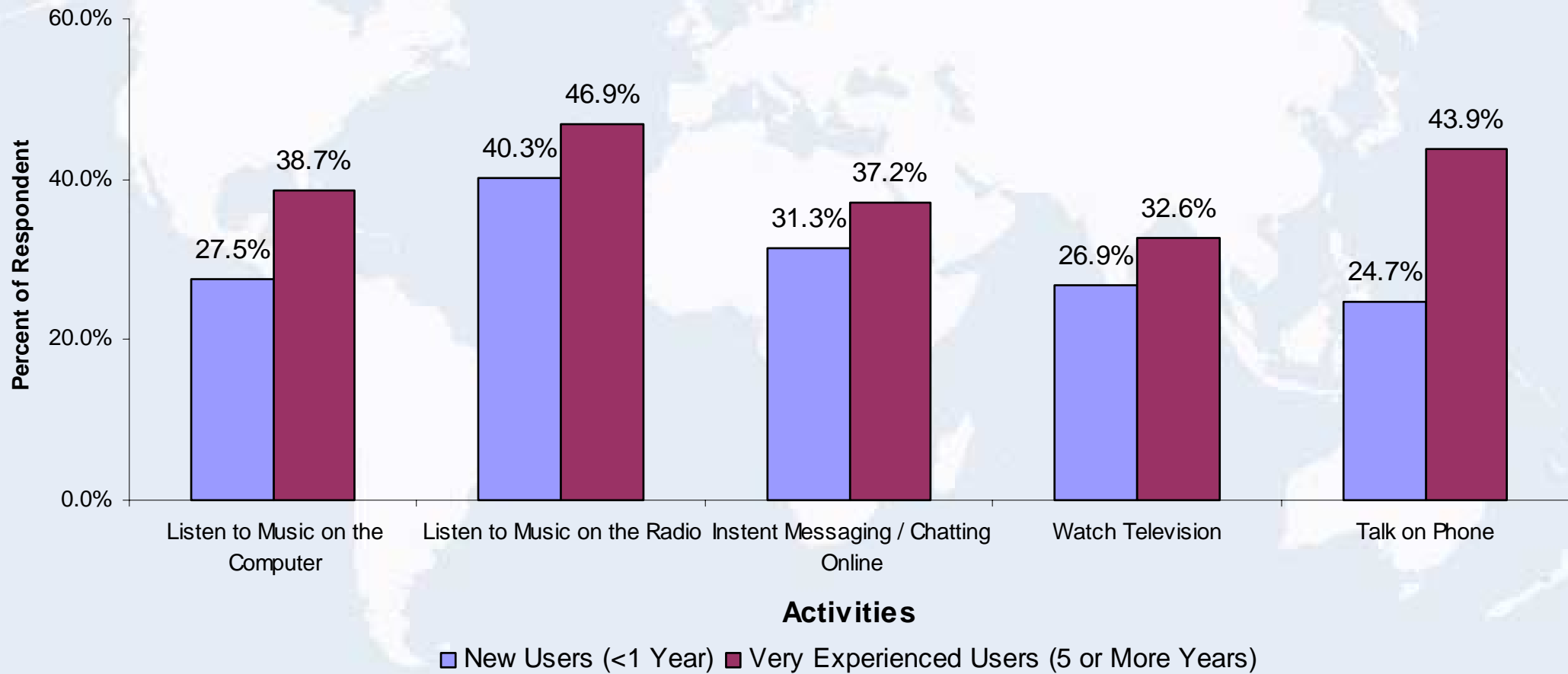
broadband, wireless, storage, semi conductors

- **Content:**

Music, video

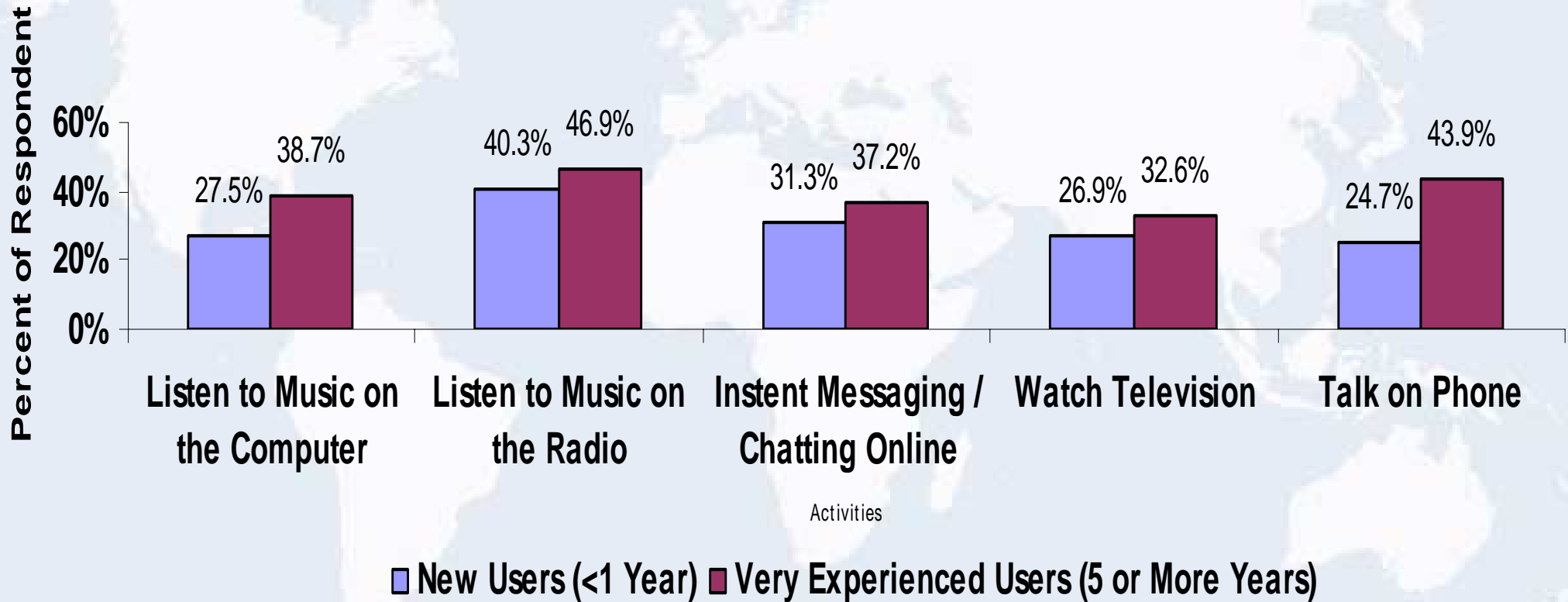


# TV Viewing Declines Among Internet Users



# Internet Users And Multi-Tasking

## While They Are On The Internet



# Life @ the edge

- **Finding people – IM**
- **Create content: self expression**
- **Collaborate – peer-to-peer**
- **Communicate**



# The Power Of The Hyper DNS

Finding The Needle In The Haystack, Find And Act:

- **People:**

**ICQ, Ebay, Napster, Match, Classmate, Monster.**

- **Objects:**

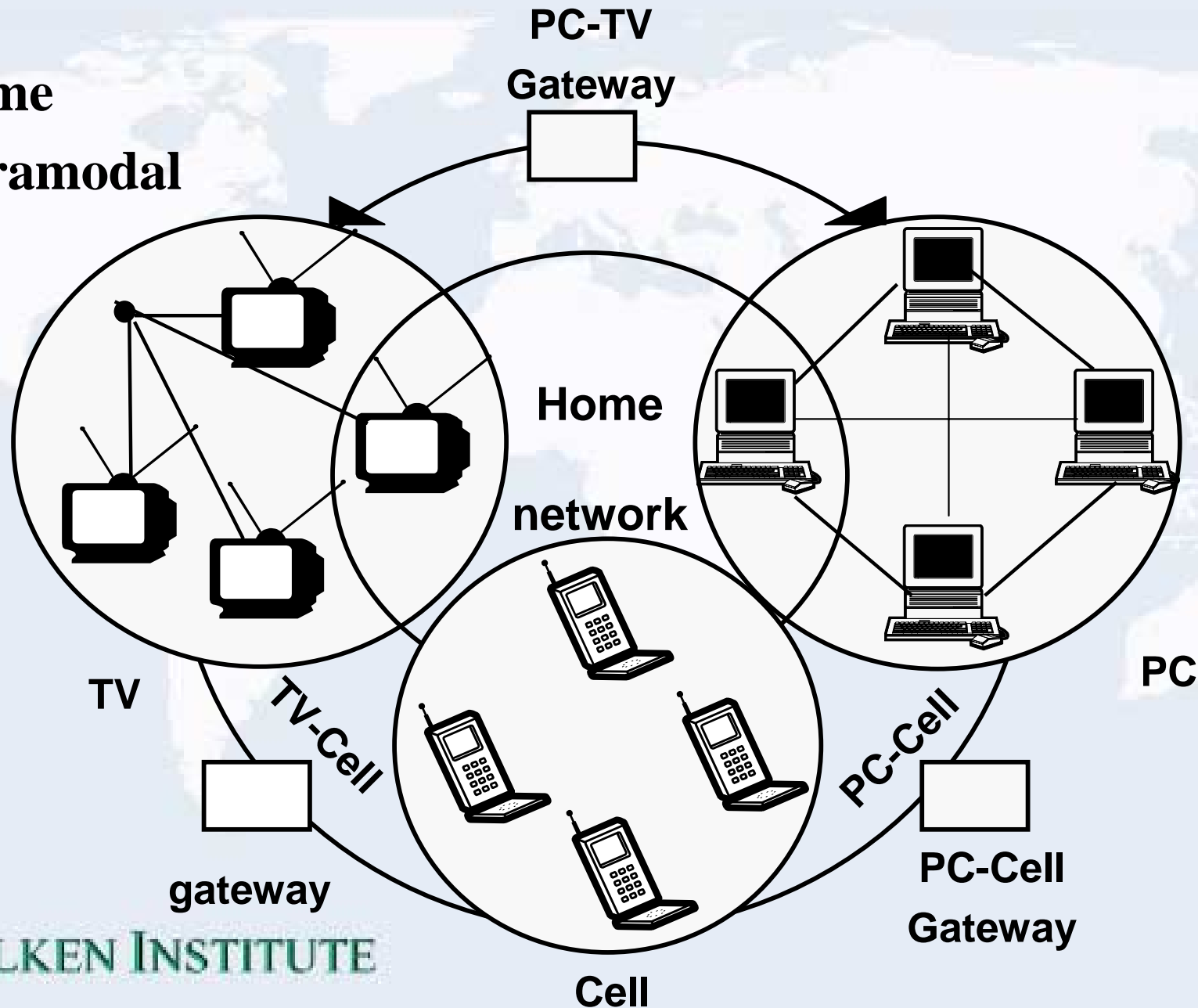
**Google, Amazon, Shopper, Browser.**



# Interconnection of Federations

## Three Layers of Interconnectivity

- Home
- Intramodal



# Lots Of Room For Growth (Part I)

## U.S. Household Penetration of Consumer Electronics

	<b>Jan-97</b>	<b>Jan-00</b>
<b>Laserdisc Player</b>	<b>2%</b>	<b>2%</b>
<b>DVD Player</b>	<b>-</b>	<b>5</b>
<b>All LCD TV</b>	<b>10</b>	<b>11</b>
<b>Home Fax Machines</b>	<b>9</b>	<b>11</b>
<b>Direct to Home Satellite</b>	<b>7</b>	<b>13</b>
<b>Projection TV</b>	<b>11</b>	<b>14</b>
<b>TV/VCR Combinations</b>	<b>10</b>	<b>18</b>
<b>Multi-line Phone</b>	<b>15</b>	<b>21</b>
<b>Home Theater System</b>	<b>14</b>	<b>21</b>
<b>Caller ID Equipment</b>	<b>14</b>	<b>25</b>
<b>Car CD Player</b>	<b>18</b>	<b>26</b>
<b>Personal CD Player</b>	<b>20</b>	<b>26</b>
<b>Electronic Car Alarm</b>	<b>27</b>	<b>29</b>
<b>Camcorder</b>	<b>26</b>	<b>36</b>
<b>Pager</b>	<b>28</b>	<b>37</b>
<b>CD Boom box</b>	<b>27</b>	<b>37</b>



# Lots Of Room For Growth (Part II)

## U.S. Household Penetration of Consumer Electronics

	<b>Jan-97</b>	<b>Jan-00</b>
<b>Monochrome TV</b>	<b>46%</b>	<b>43%</b>
<b>Computer printers</b>	<b>38</b>	<b>49</b>
<b>Wireless Telephones</b>	<b>34</b>	<b>51</b>
<b>Computer w/ CD-ROM</b>	<b>21</b>	<b>51</b>
<b>Modem or Fax/Modem</b>	<b>19</b>	<b>51</b>
<b>Personal Computers</b>	<b>40</b>	<b>54</b>
<b>Home CD Players</b>	<b>49</b>	<b>56</b>
<b>Color TV with Stereo</b>	<b>55</b>	<b>65</b>
<b>Phone Answering Device</b>	<b>65</b>	<b>74</b>
<b>Cordless Phone Device</b>	<b>66</b>	<b>78</b>
<b>VCR Decks</b>	<b>89</b>	<b>93</b>
<b>Corded Phone</b>	<b>96</b>	<b>96</b>
<b>All Television</b>	<b>98</b>	<b>98</b>
<b>Color TV</b>	<b>98</b>	<b>98</b>
<b>Home Radios</b>	<b>98</b>	<b>98</b>
<b>Rack Audio System</b>	<b>36</b>	<b>42</b>



# Many High-Tech Devices Yet To Reach 60% of Homes

Household Adoption & Manufacturer Sales of Selected High-Tech Electronics

Device	Introduction	Adoption			Sales (\$US Billions)	
		1998	1999	2000	2000	2001 (Est.)
Gaming Hardware	1972	40%	42%	44%	\$2.70	\$3.20
Personal Computer	1975	48%	54%	58%	\$16.40	\$16.60
Computer Printer	1978	44%	49%	54%	\$5.10	\$4.80
Modem	1980	38%	51%	55%	\$1.60	\$1.40
Cellular Phone	1983	44%	51%	59%	\$3.20	\$3.70
Digital Camera	1995	2%	4%	8%	\$2.30	\$2.90
Internet Access Device	1996	1%	2%	3%	\$0.20	\$0.20
DVD Player	1997	1%	5%	15%	\$1.70	\$2.40
MP3 Player	1998	N/A	N/A	5%	\$0.20	\$0.20
Personal Video Recorder	1999	0%	0%	1%	\$0.60	\$1.00



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# Innovations Inspire Opportunities

## Envisioned Uses of Key Technologies – Before and After

**Technology**  
Telephone

**Original Use Imagined**  
Broadcast programming to consumers

**Eventual Use Successful**  
Enabled “one-to-one” individual communication

**Radio**

**Enable “One to One” communication to consumers**

**Broadcast advertising sponsored programming**

**Television**

**Would replace movies**

**Got lucky; followed the successful radio model**

**Cable**

**Improve fuzzy broadcast reception**

**Mass market program aggregator, and developer/supporter of premium-price programming**

**VCR**

**Recording Video Programming**

**Renting, Buying and Playing Pre-recorded Video Programming**

**Home Microwave**

**Quickly prepare meals**

**Quickly prepare pre-made meals**

**Internet/World Wide Web-based Online Services**

**Enable Electric Commerce**

**Become and Advertising supported, multimedia, “some to some”, Information/Commerce Myway**



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# The Pervasive Computing:

- **Chips will be networked**
- **Hierarchical organisms**
- **Communities**
- **Civilizations will be developed**

**They will be networked together and then different civilizations will be first threaded and then interoperated, converged, and integrated together**



# Cognitive Age Is Getting Lower

## Harley Buyers Are Aging:

- **Medium age of Harley buyer:**

**1990 - 37ys old**

**2001 – 46ys old**



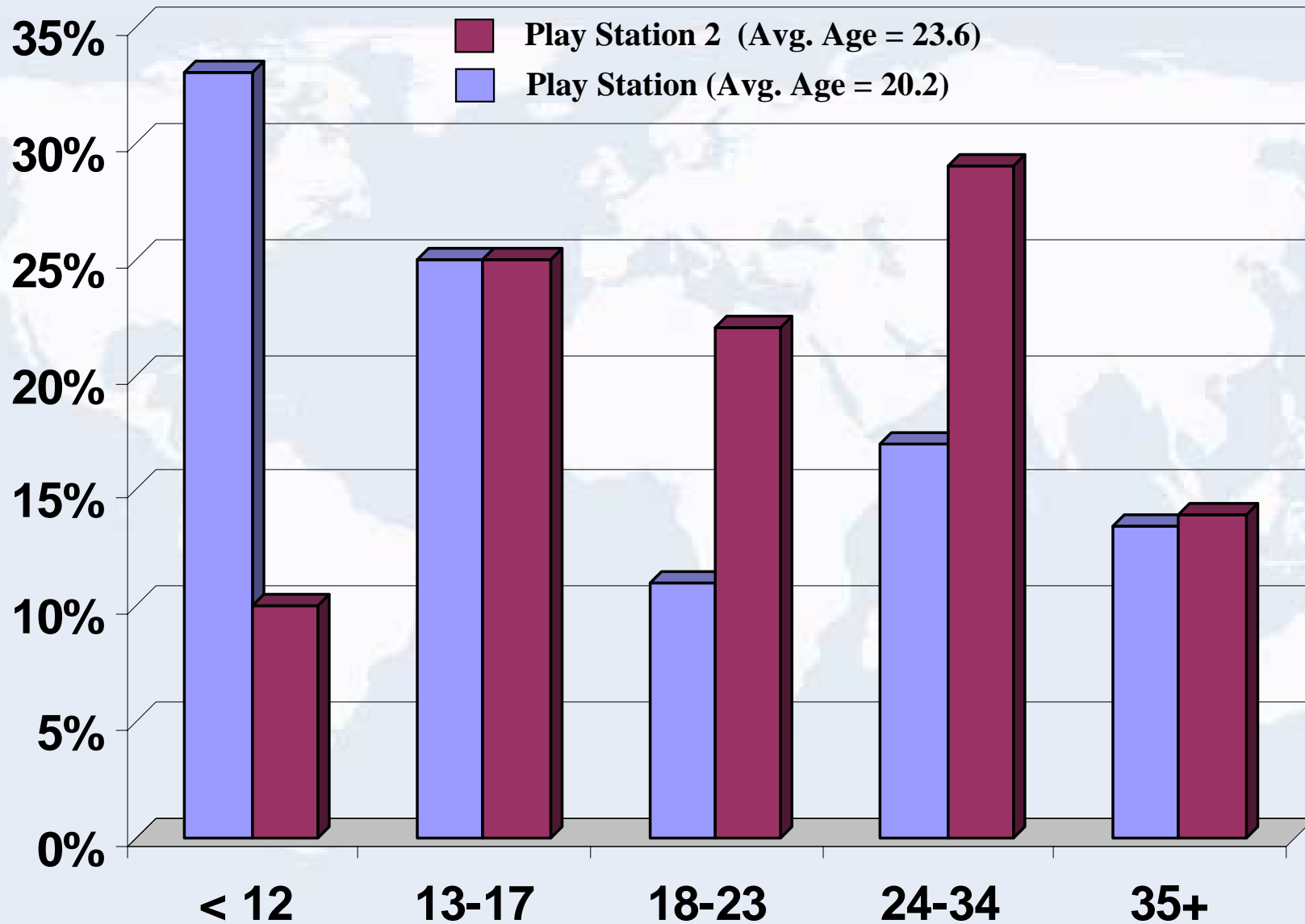
- **Possible reasons:**

- **Utilitarian products are positioned as expensive toys**
- **People carry their toys over the years**
- **More free time**
- **Certain toys become fashionable**
- **Older people want to do “young” things**
- **As toys become more-hi-tech they appeal to older ages**



# Sony Playstation

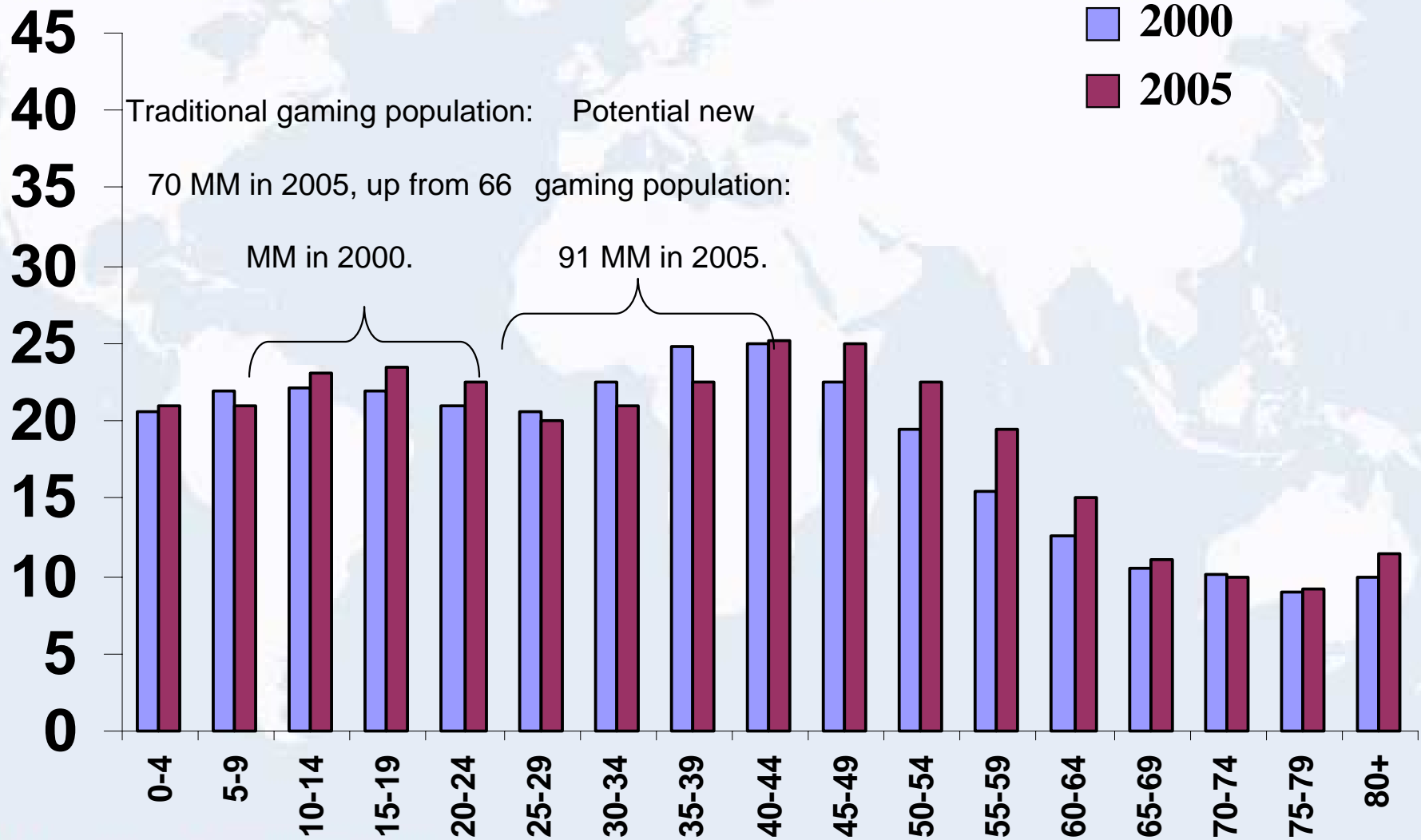
## Expanding Demographics



# Expanding North America

## Demographics Enlarge Target Base

Population in Millions



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**...ALL THE TIME...**

# **On Persistent Connection At Home**

**Will Be Driven By Broadband Connection  
Will Change the Way the Internet is Used at Home**

- **Always on & home networking will enable to use the Internet in each room in an appropriate way.**
- **Broadband will be the foundation to revolutionize the entertainment delivery and usage, affecting video, audio, music, games, TV**
- **A device at every room**
- **Different device for different rooms**
- **The Web-Pad (keyboard-less)**
- **Home network**
- **Streaming music**
- **Short sessions, info-on-demand**
- **Home entertainment: TV, Multimedia PC, Game Consul**
- **Networked image capturing and presenting devices**



# Great Experiences

- **Conversations**
- **Story telling**
- **Movies**
- **TV**
- **Music**
- **Books**
- **Visual Arts**
- **Performing Arts**
- **Dinning**
- **Travel**
- **Sports**
- **Hunting**
- **Games**
- **Chatting**
- **Recreation, outdoor, scenery**
- **Hobbies**
- **Homes, gardens,DIY**
- **Internet**
- **Cars**
- **Video, photography**
- **Romance**
- **Dance**
- **Construction, building**
- **Collecting**
- **Shopping**
- **Pone sing Owing**
- **Amusement parks**
- **Architecture**
- **Sailing, cruise**
- **Beach**
- **Religion**
- **Youth movement**
- **Organization**
- **Fantasy**
- **Role playing**
- **Computers**



**Paradigm Shift - From: Bringing The People To The Experience To: Bringing The Experience To The People.  
500 Years Of History**

**Books**

**Newspapers**

**Magazines**

**Catalogs**

**Records**

**Personal Photography**

**Radio**

**Colored Books**

**Picture Magazines**

**B/W Television**

**Color TV**

**Video**

**PC**

**Home Printing**

**Internet**

**DVD**



# The Emergence Of The Couch Potato

Americans Began Cocooning In The 1970's

## More Frequent vs. Less Frequent Activities

Doing Less

Doing More

-50%

-25%

0%

25%

50%



# The On-Line Living Room



**PC**

**Music**

**Games**

**Interactive TV**

**Radio**

**Video Editing, Sharing, Storing**

**Rich Media Delivery**

**Home Networking**

**E-Photos**

**Voice Over IP**

**Browsing**

**Home Printing**

**DVD**

**File Sharing**

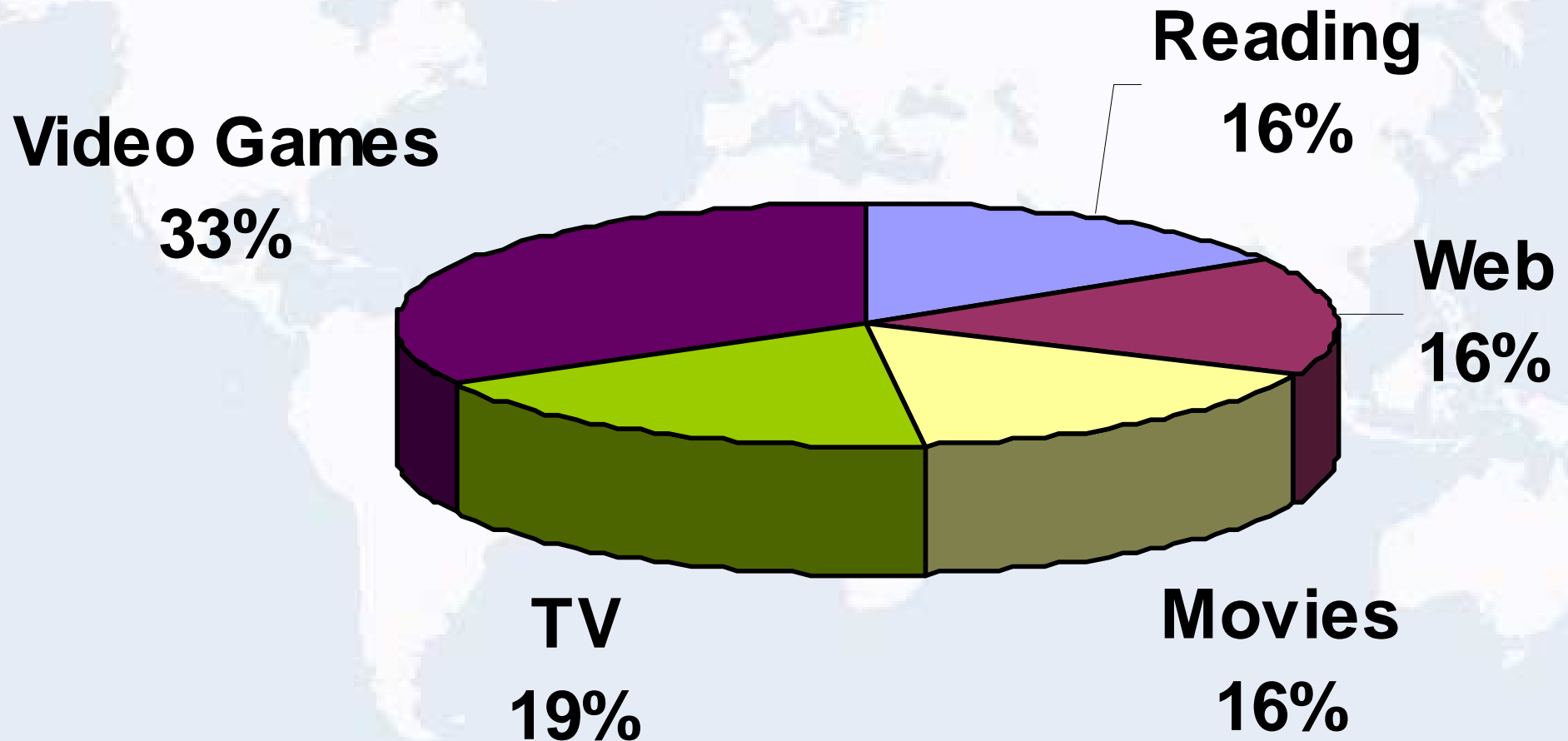
**Camcorder**

**Webcam**



# The Quest For The Consumer's Heart

What Is The Most Satisfying Entertainment Activity?, 2000



# **Bringing People To The Experience: Togetherness**

- **The River Bank, The Well, The Town Square, The Coffee Shop, The Theater**

# **Bringing The Experience To The People: Solitude**

- **Books, TV, Radio**

# **The Internet: Offering Virtual Togetherness**

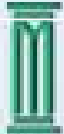
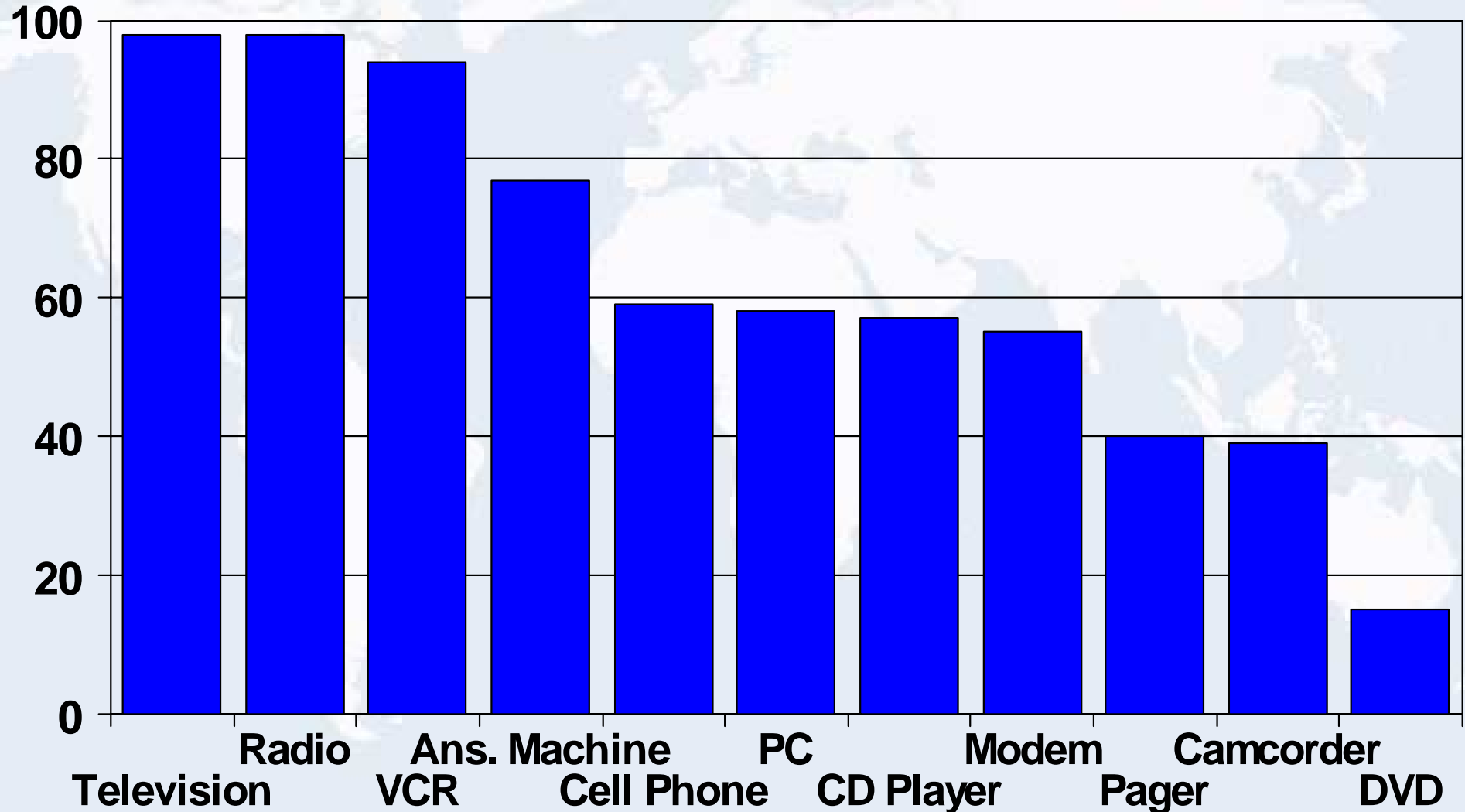
- **Sharing, Collaborating, Interpersonal Comm.**



# TV, Radio and VCRs Are Most Common

U.S. Household Adoption Rates For Selected Products

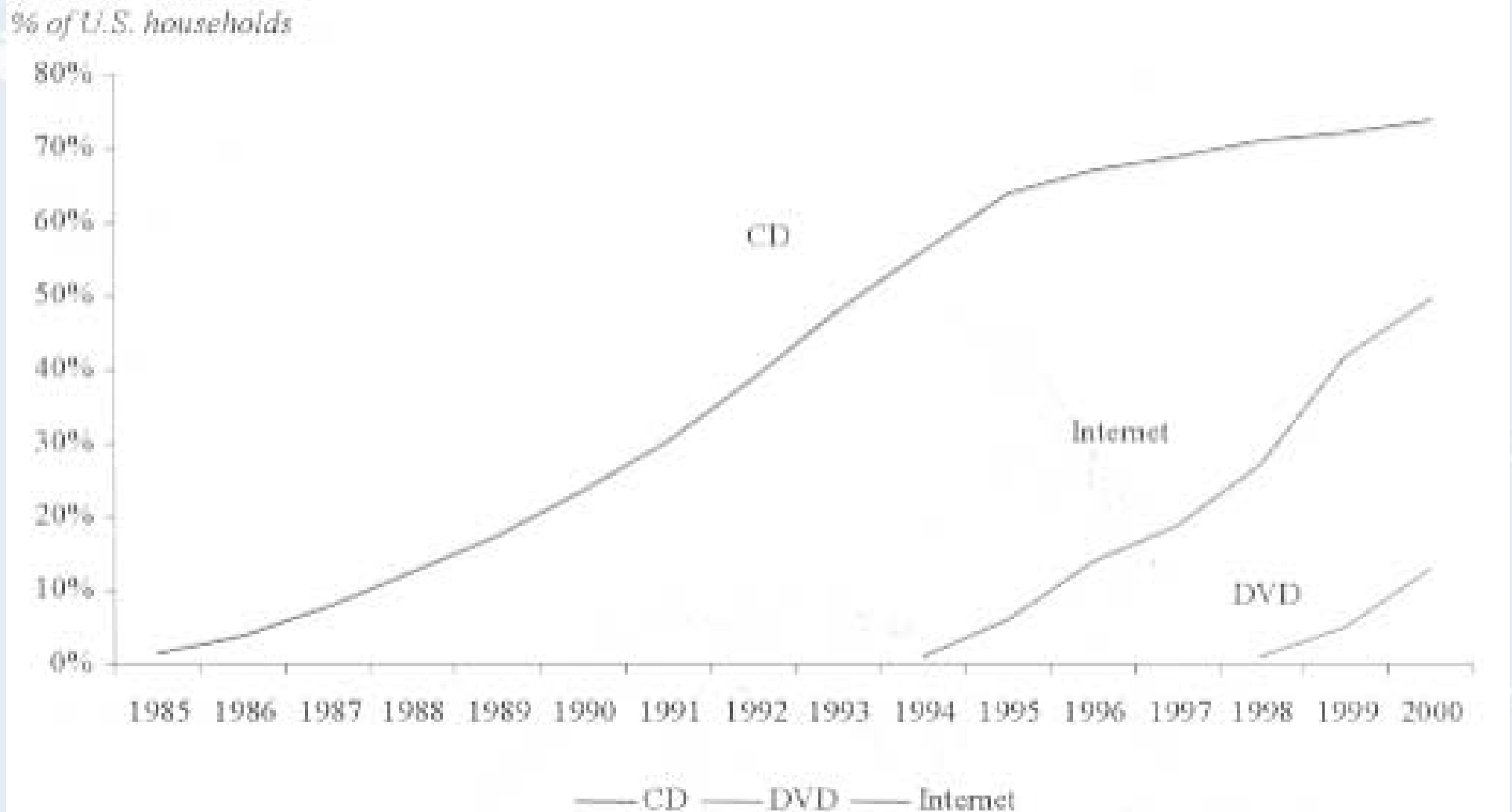
Household Adoption Rate



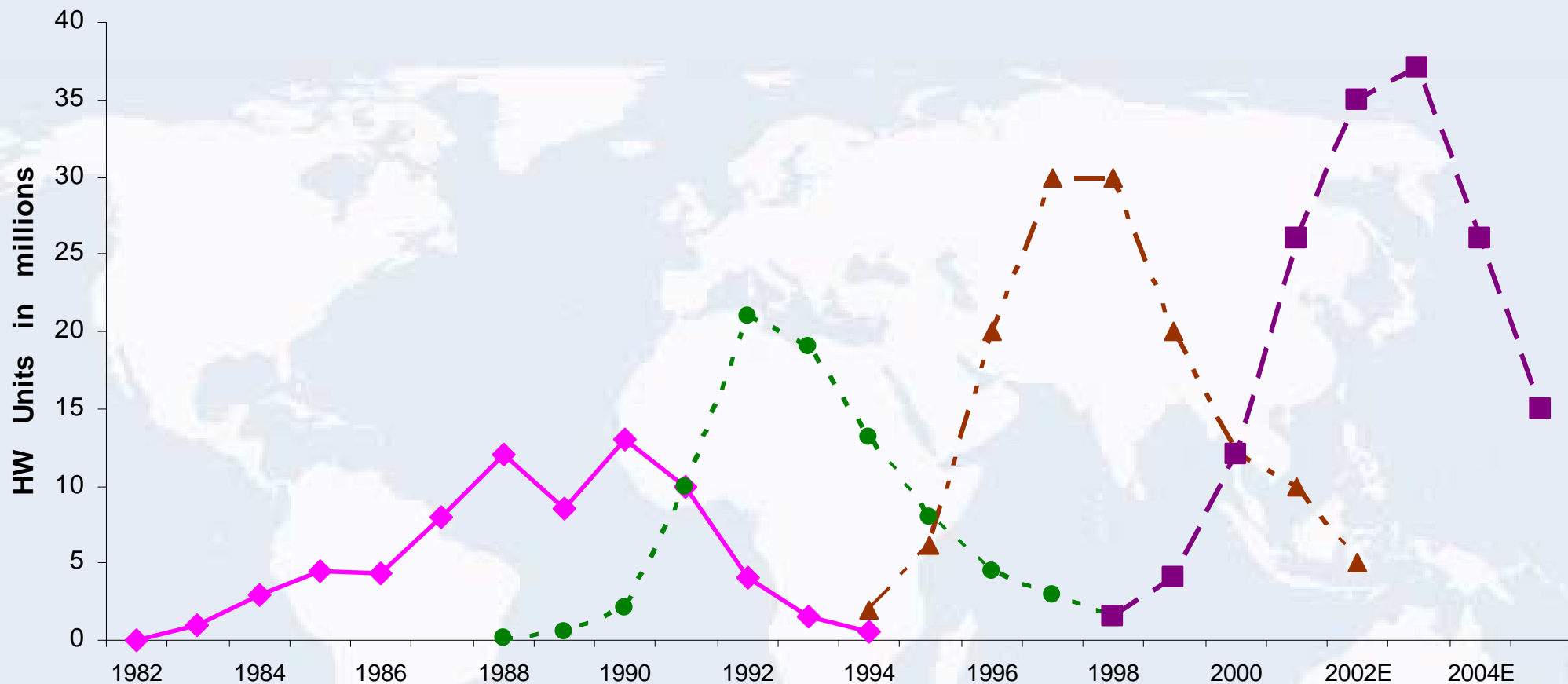
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# CD, DVD, And Internet Penetration

## United States



# Worldwide Console Hardware Shipment



◆ Total 8 Bit System (LHS)

● Total 16 Bit System (LHS)

▲ Total 32/64 Bit System (LHS)

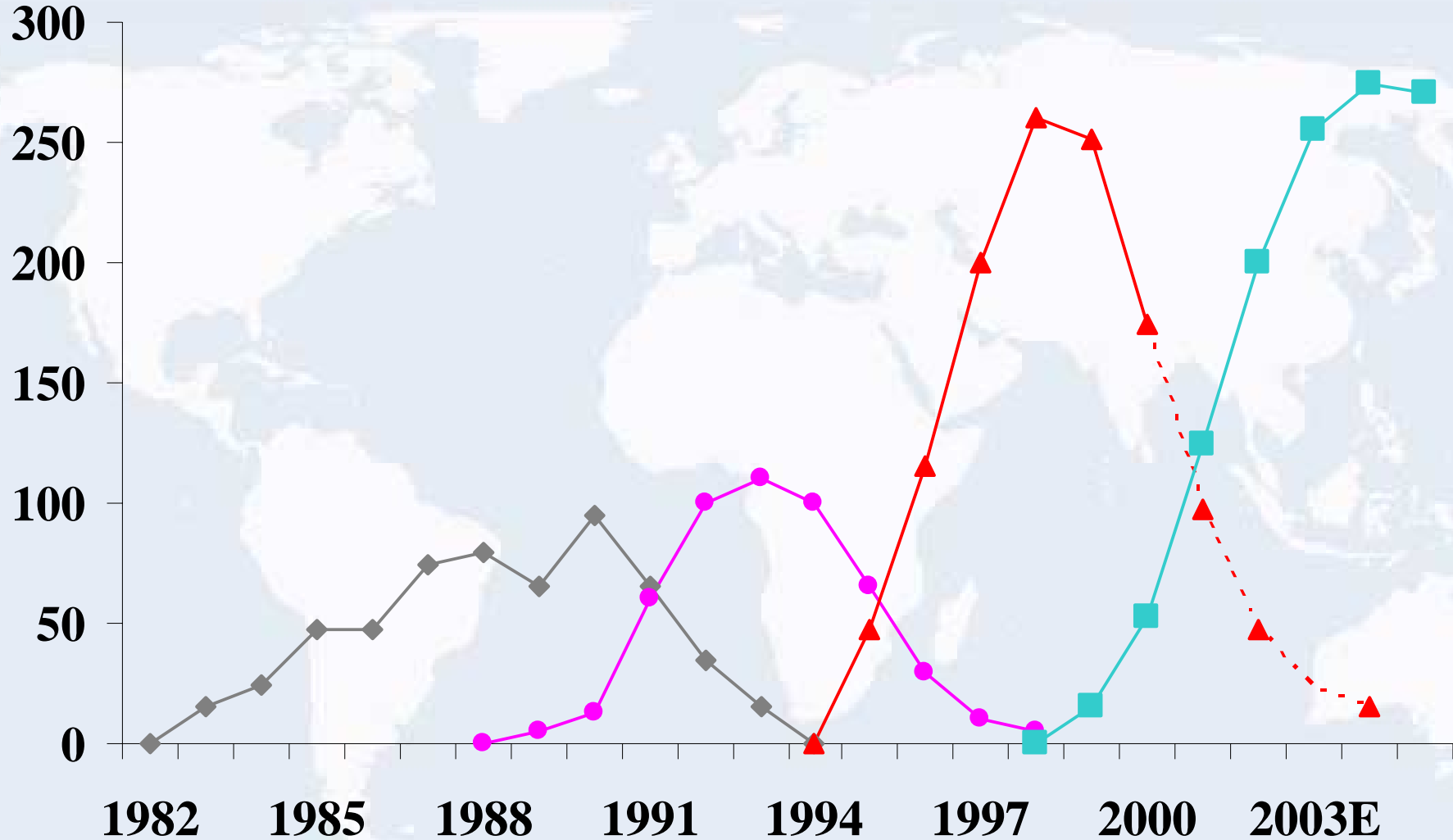
■ Total 128 Bit System (LHS)



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# Worldwide Console Software Shipments

Units in Millions

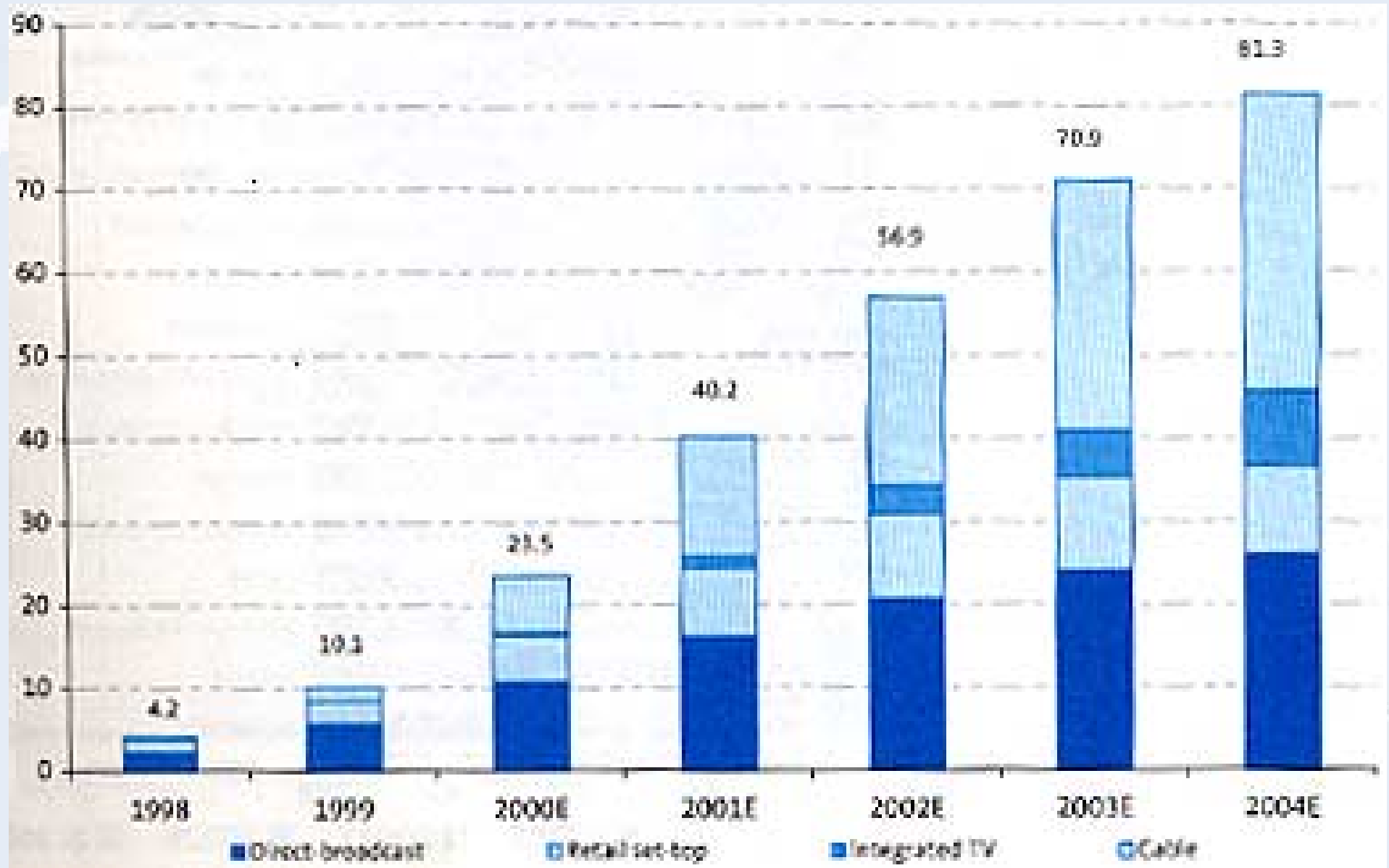


—◆— 8 bit —●— 16 bit —▲— 32/64 bit —■— 128 bit



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# Growth In Worldwide Installed Base Of Internet-Enabled Televisions

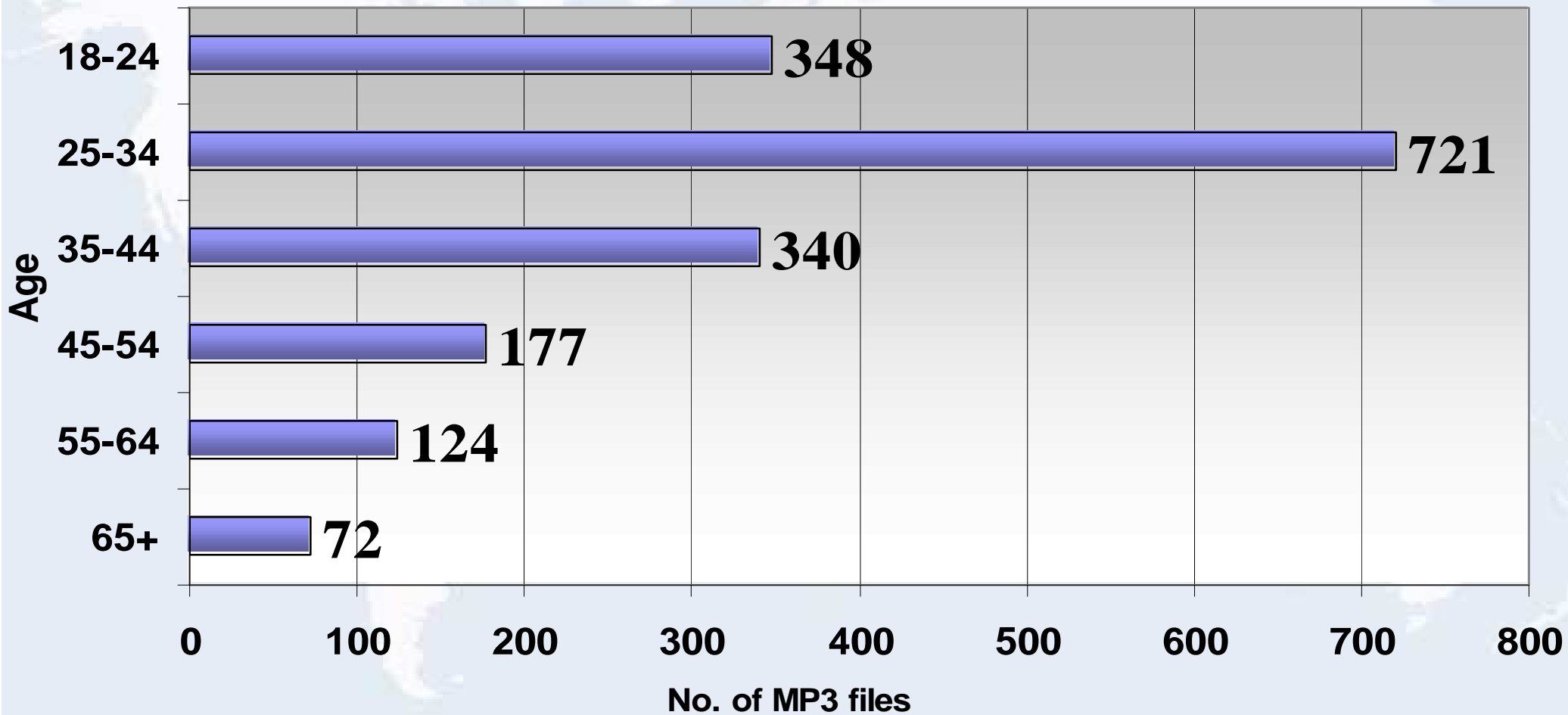


# Music

- **Distribution, Selling CD, Selling Digital**
- **Sharing**
- **Selecting**
- **Reaping CD**
- **Burning CD**
- **CDDDB, Lyrics**
- **Background Info**
- **Fun Clubs, Interest Groups**
- **Artists Info**
- **Juke box**
- **Searching, Advising**
- **Lockers ,Web Storage**
- **Microcasting**
- **Radio Stations, Creating, Listening**
- **Stand Alone Appliances**
- **Wireless Delivery**
- **Creating Posting**
- **Creating Clips**

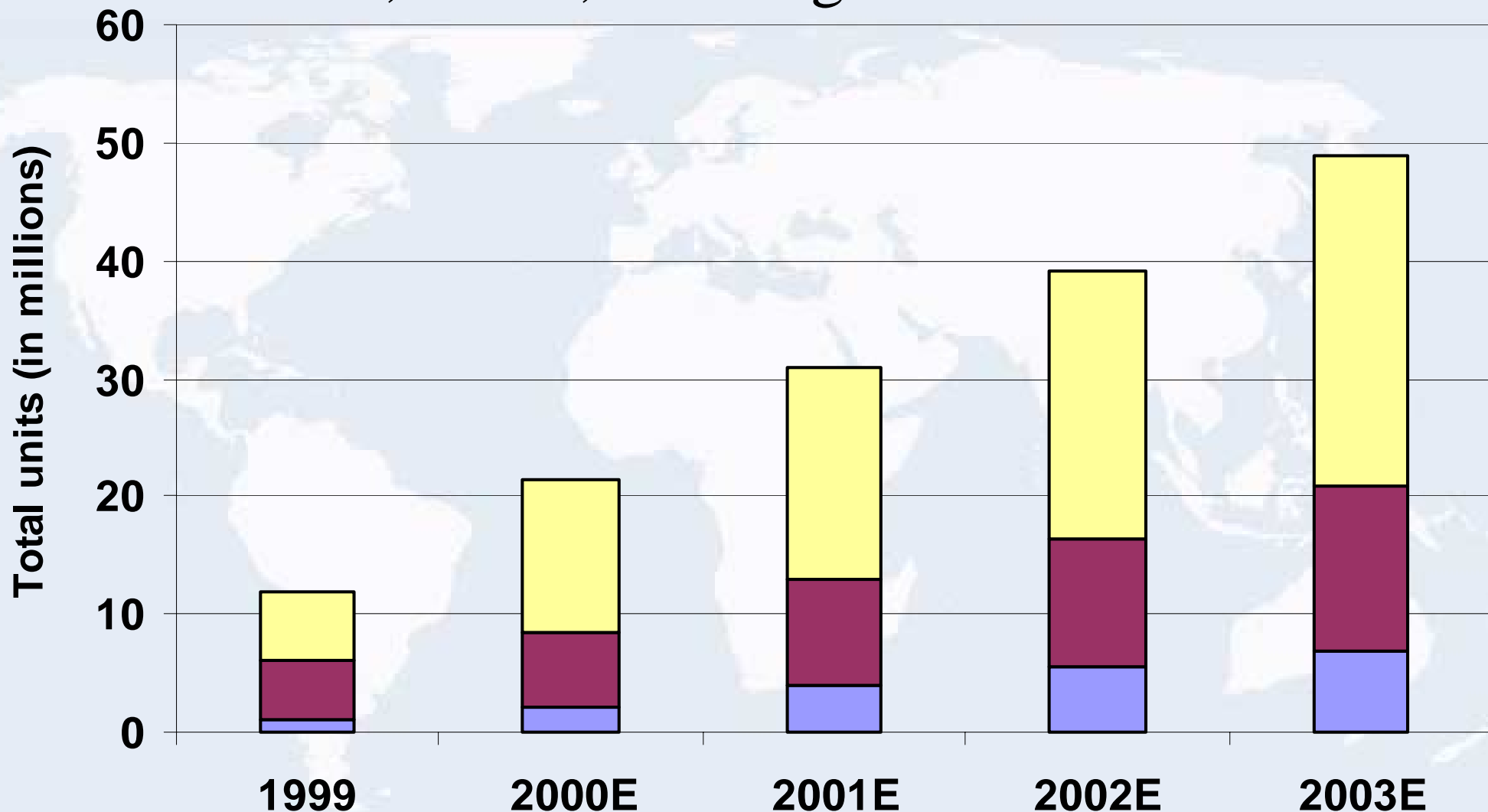


# Average Number of MP3 Files On Home Computers By Age



# Forecast Unit Growth

## MP3, PDAs, And Digital Cameras



■ MP3 ■ PDAs ■ Digital Cameras



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# **File Sharing – Based VOD**

Home – Brewed

- **TV**
- **PC**
- **Scam converter**
- **Fasttrack**
- **Wireless keyboard**



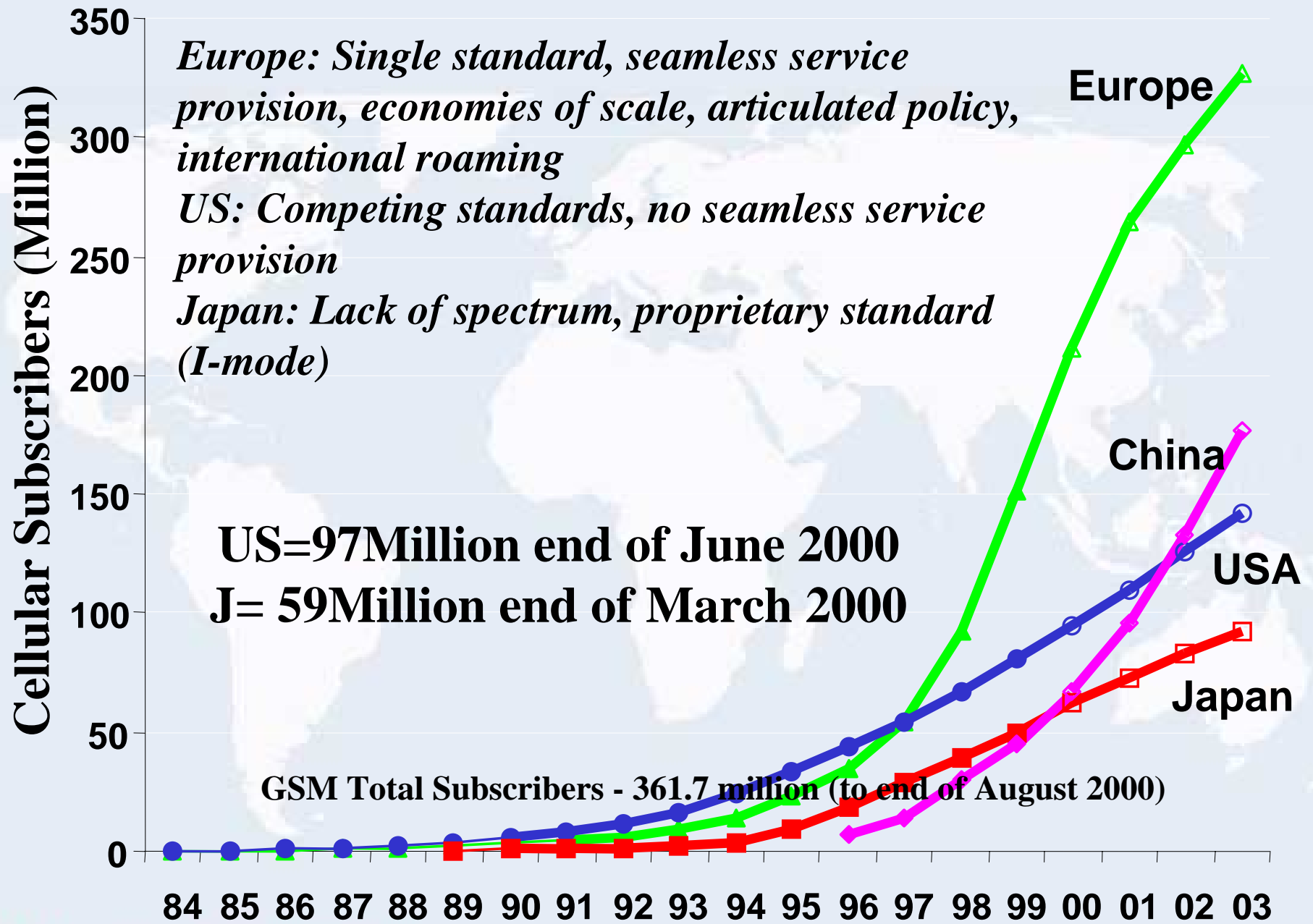
# File Sharing

3rd generation

- **Fasttrack**
- **Kazaa**
- **Morpheus (Music City)**
- **Grockster**
- **Lime wire**

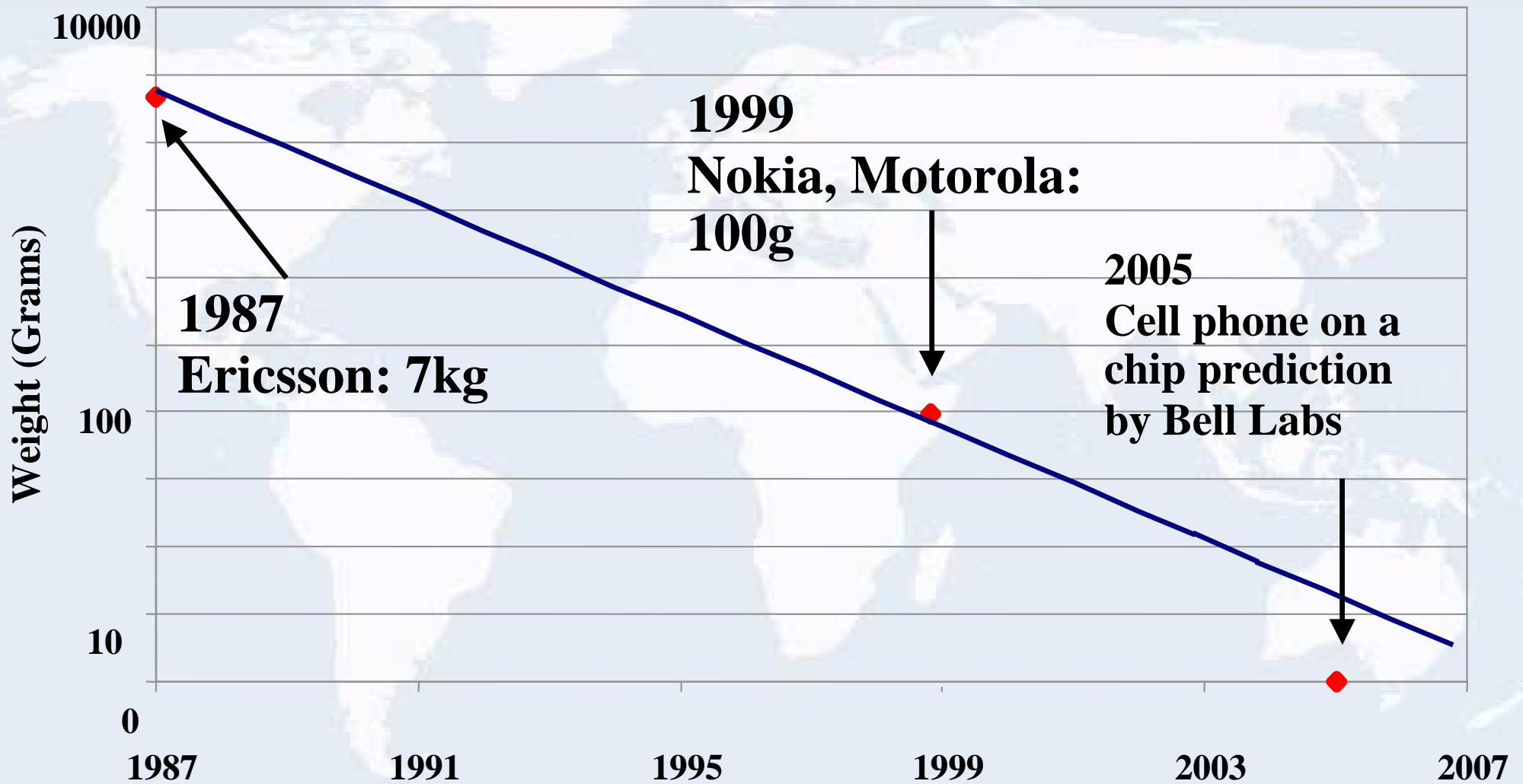


# 4 Largest Cellular Markets



# The Disappearing Terminal

## Cellular Phone Weight vs. Year in Market



# The Fight Over The Food-Chain

Dividing The Pie

- **Content**
- **Distribution**
- **platforms**





RICOCHET IS BACK.  
AFTER ALL, THAT'S WHAT RICOCHETS DO.

## **RICOCHET® OPPORTUNITIES**

**The Milken Institute  
Discussion  
April 24, 2002**



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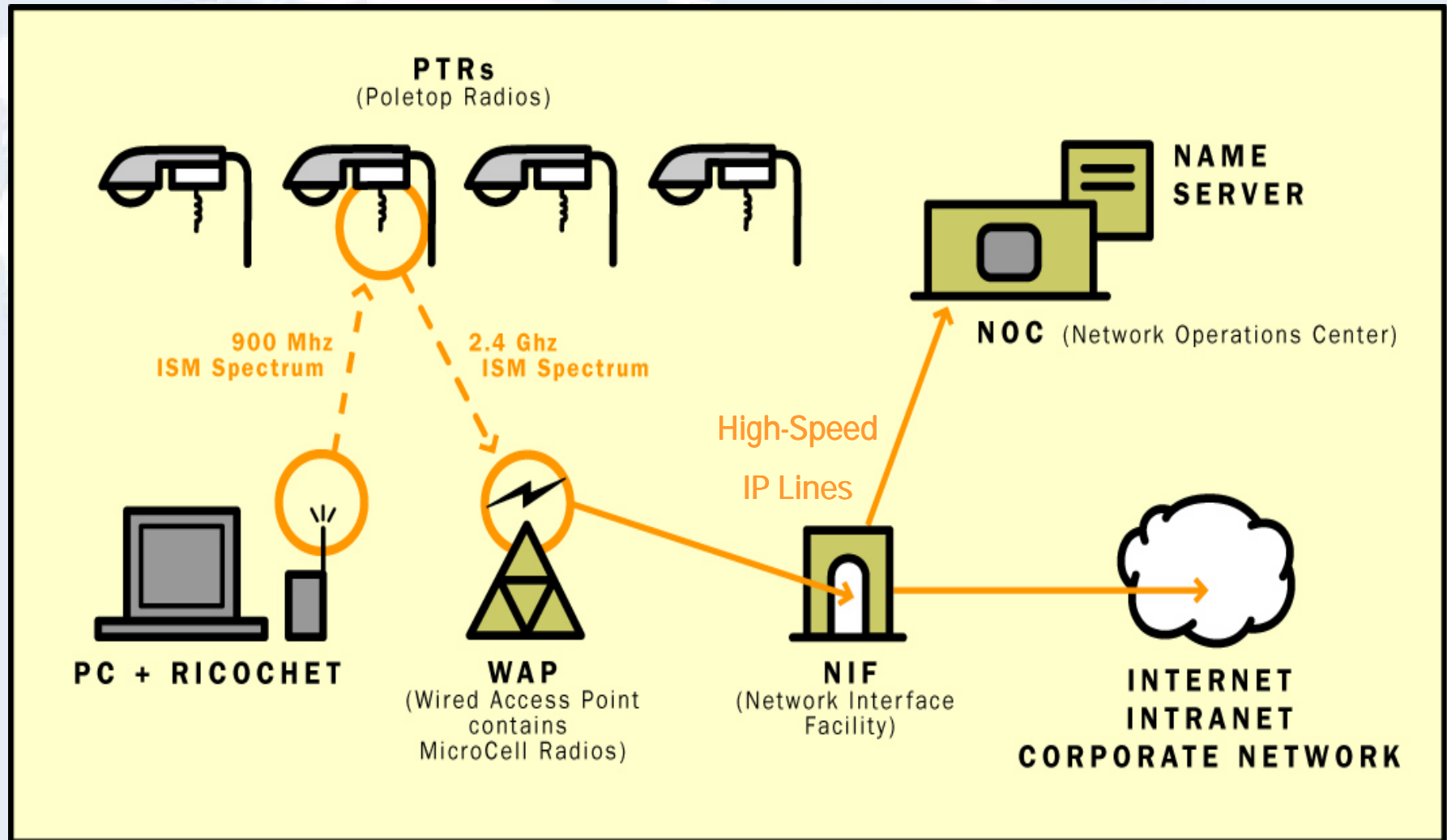
**ricochet.**  
high-speed wire-free internet

# The Aerie/Ricochet Opportunity

- **Demand outstrips supply for high-speed access**
- **The first broadband wireless network with extensive coverage**
- **Proven technology – built in 21 markets – 51,000 customers**
- **Inventoried capital to build 20-40 additional markets**
- **Over \$1B invested to develop and deploy network**
- **Limited CapEx to deploy – variable OpEx requirements**
- **Low cost customer acquisition plan**
- **Scalable business plan with low market share breakeven**
- **Team and resources to execute**



# Ricochet Micro Cellular Data Network



# Where Was Ricochet Deployed?

## National Network Coverage

- 21 Major U.S. Markets <
- 56.9 million total population <
- 52.8% of total population <
- 35.2 MM PC users <

## National Network Infrastructure

- 1,431 Wired Access Points <
- 64,554 Pole Top Radios <

## National Market Demographics

- 107.7 million total population <
- 62.8% PC penetration <
- 55.1% Internet penetration <



# Why Did Metricom Fail?

- **High, in-market fixed operating costs**
- **Unachievable market share needs**
- **Poorly conceived distribution plan**
- **Deployed in most competitive markets**
- **Target market too small to support network build-out**
- **Price point out of mass-market price range**
- **Advertising the market didn't understand**
- **No ability to order product online**

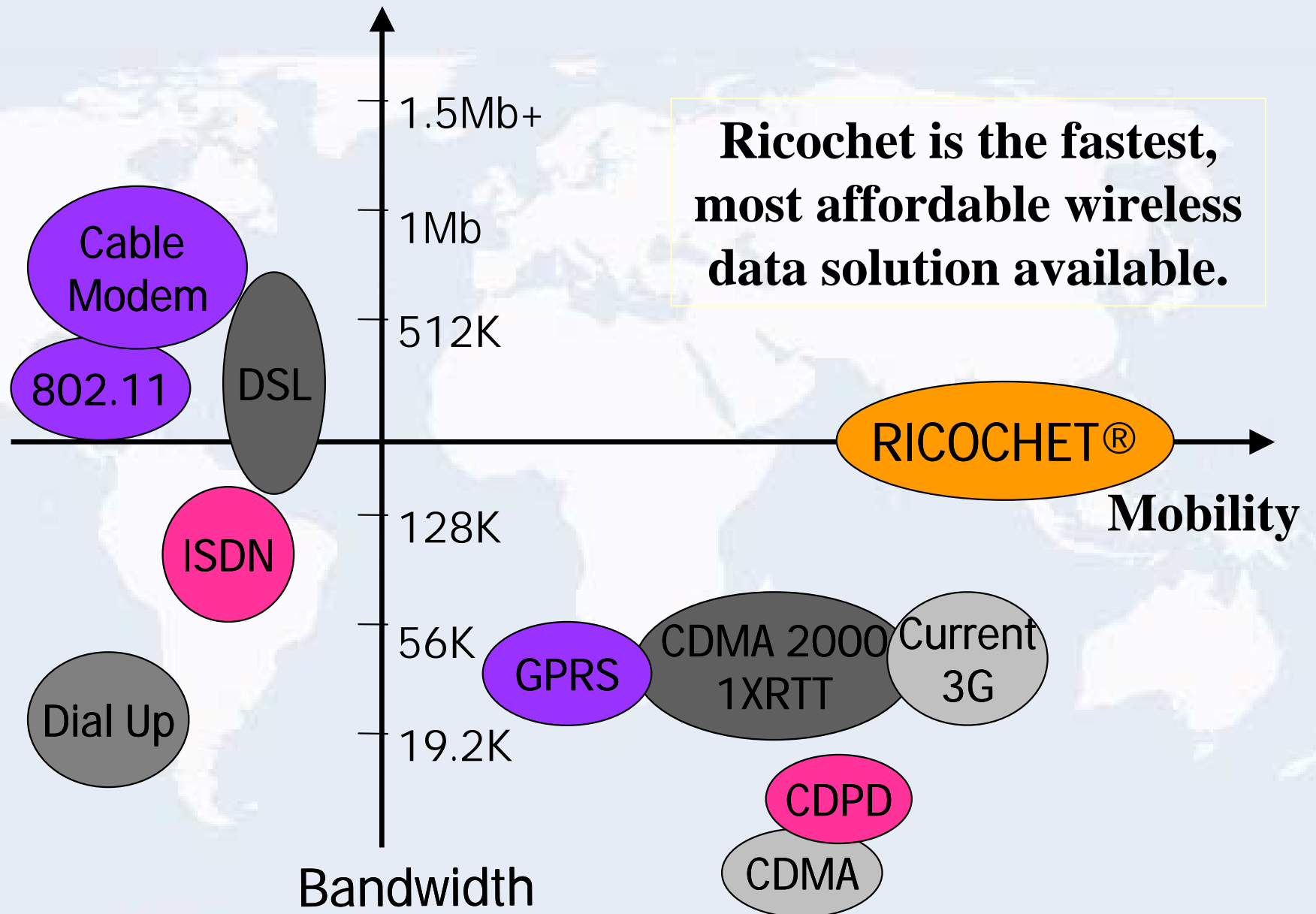


# What Did We Buy?

- **Intellectual property, incl. 40 U.S. and 30 Intl. patents**
- **Deployed, existing network worth \$336 in 21 markets**
- **Inventory worth \$198 MM for 20 – 40 new markets**
- **101,000 customer modems worth \$25.8 MM**
- **\$150 MM in technology development**
- **A very vocal and loyal customer base**



# Broadband Technologies



# Ricochet Game Plan

- **Marketing Ricochet with new value proposition**, lower price point, and broad target audience
- **Leveraging public/private partnerships** to lower costs and secure fixed market base
- **Expanding the network footprint** balancing execution risk with economic upside
- **Deploying a multi-tiered distribution plan**
- **Building Greenfield markets** in underserved tier 1/tier 2 areas
- **Licensing the technology for international use**
- **Charting a new technology roadmap** for 802.11 compatibility and network speed and capacity upgrades





READY FOR A SIMPLER,  
FASTER INTERNET EXPERIENCE?  
RAISE YOUR HAND.

**RICOCHET®**  
**READY**

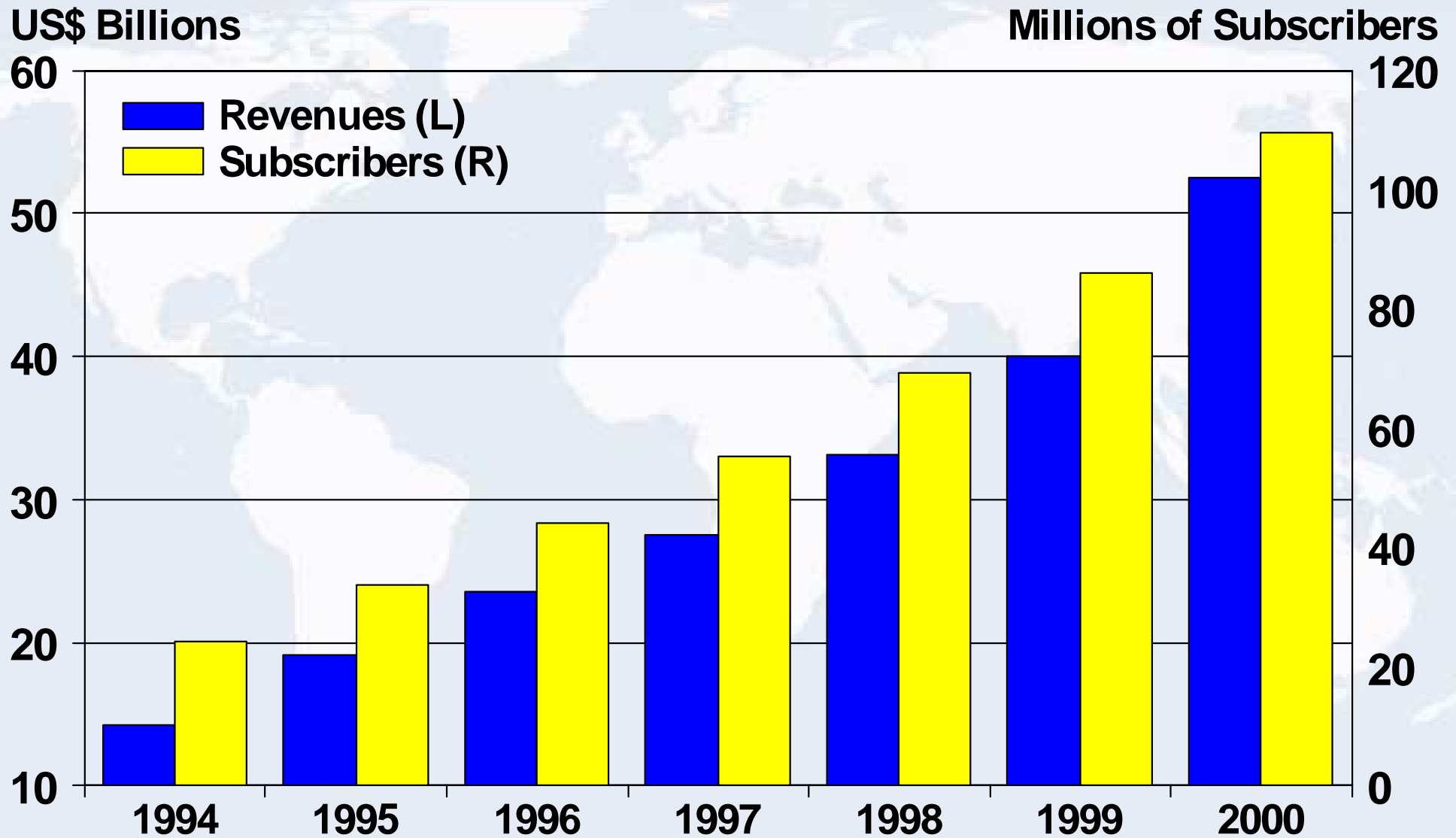
**ricochet.**  
*high-speed wire-free internet*



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# U.S. Wireless Industry

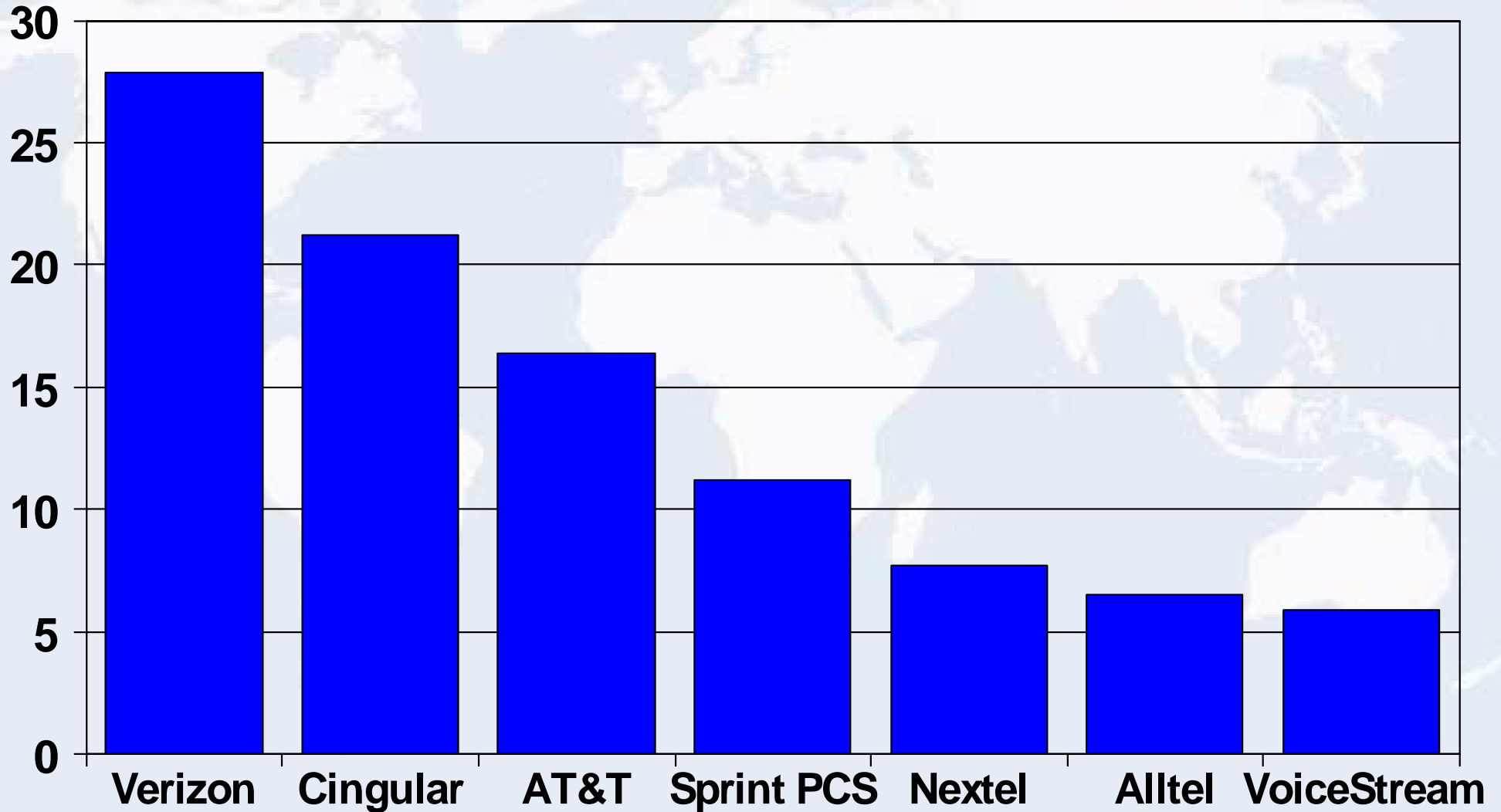
## Revenues vs. Subscribers, 2000



# Leading Wireless Carrier Companies

Market Share, 2001

Percent

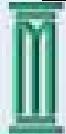


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# Leading Global Wireless Companies

Millions of Subscribers, 2001

<b>Company</b>	<b>Country</b>	<b>Number of Subscribers</b>
<b>Vodafone PLC</b>	<b>United Kingdom</b>	<b>83.0</b>
<b>China Mobile</b>	<b>China</b>	<b>75.8</b>
<b>NTT DoCoMo</b>	<b>Japan</b>	<b>66.8</b>
<b>Telecom Italia Moviles</b>	<b>Italy</b>	<b>48.0</b>
<b>T-Mobile</b>	<b>Germany</b>	<b>45.0</b>
<b>Orange S.A.</b>	<b>France</b>	<b>33.1</b>
<b>Verizon Wireless</b>	<b>United States</b>	<b>27.0</b>
<b>China Unicom</b>	<b>China</b>	<b>24.5</b>
<b>Telefonica Moviles</b>	<b>Spain</b>	<b>23.2</b>
<b>Cingular Wireless</b>	<b>United States</b>	<b>19.7</b>



# Top Ten States

Communications Equip. Employment Growth 97- 01

Percent

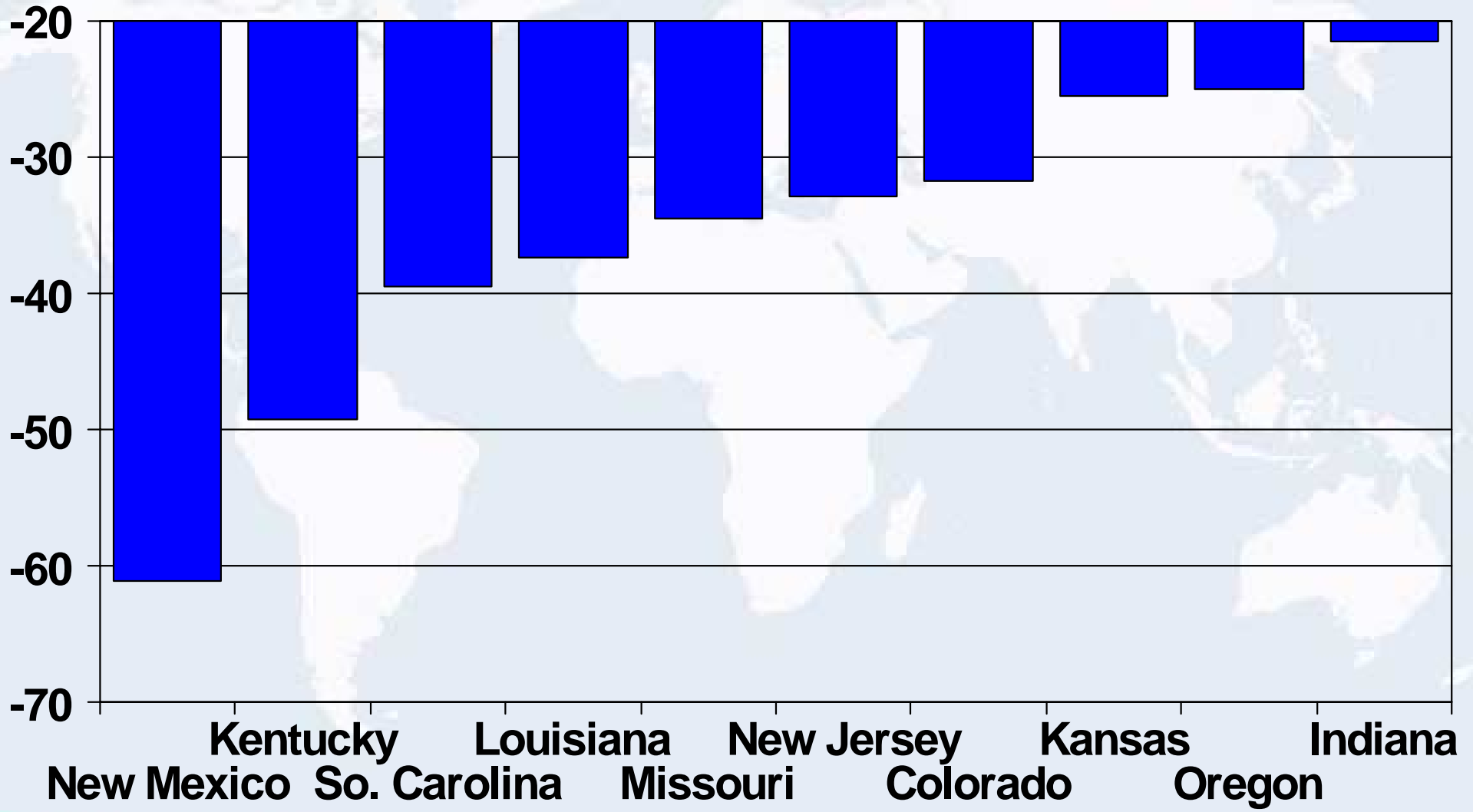


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# Bottom Ten States

Communications Equip. Employment Growth 97- 01

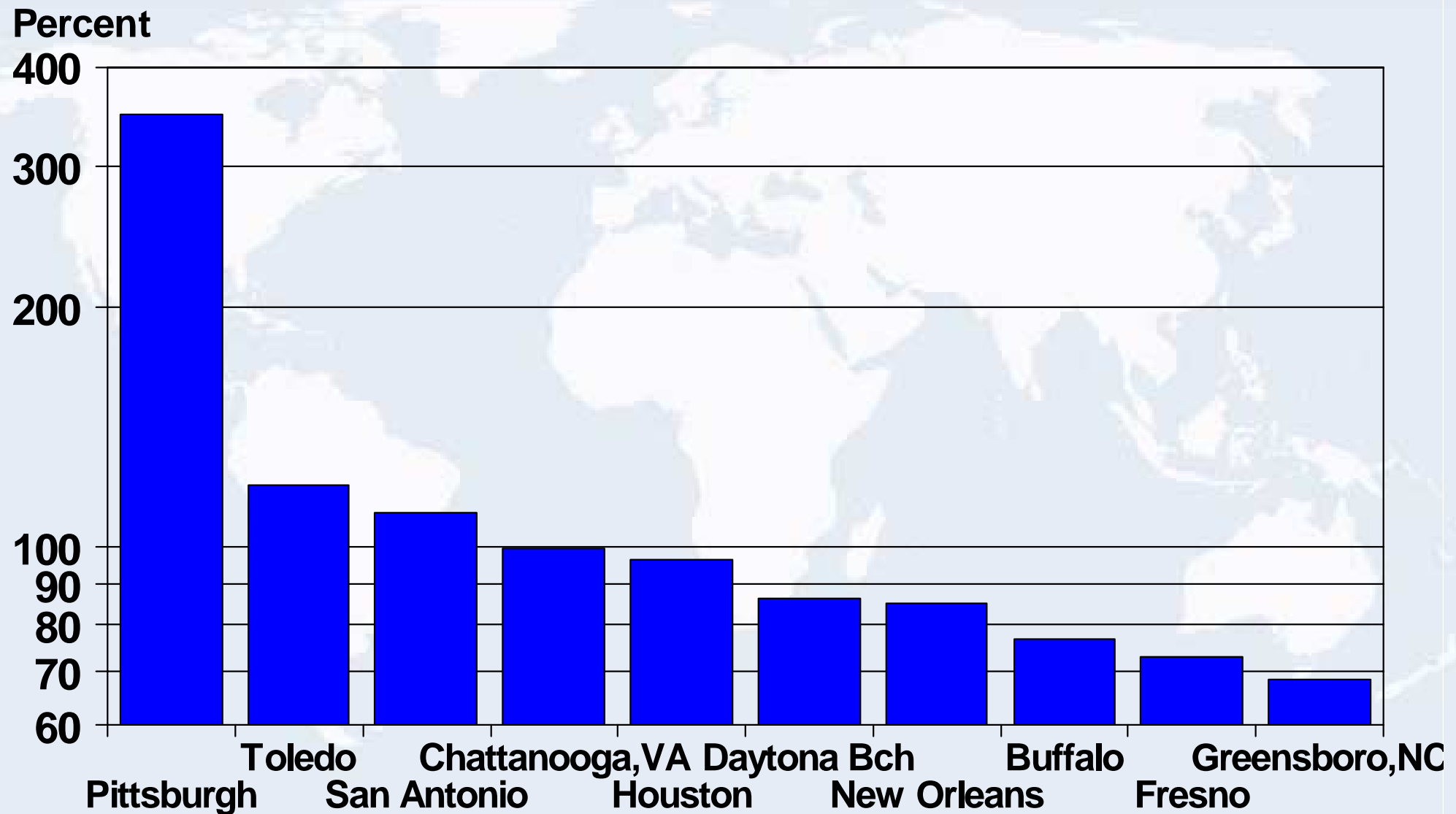
Percent



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# Top Ten Metros

Communications Equip. Employment Growth 97- 01

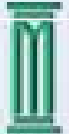
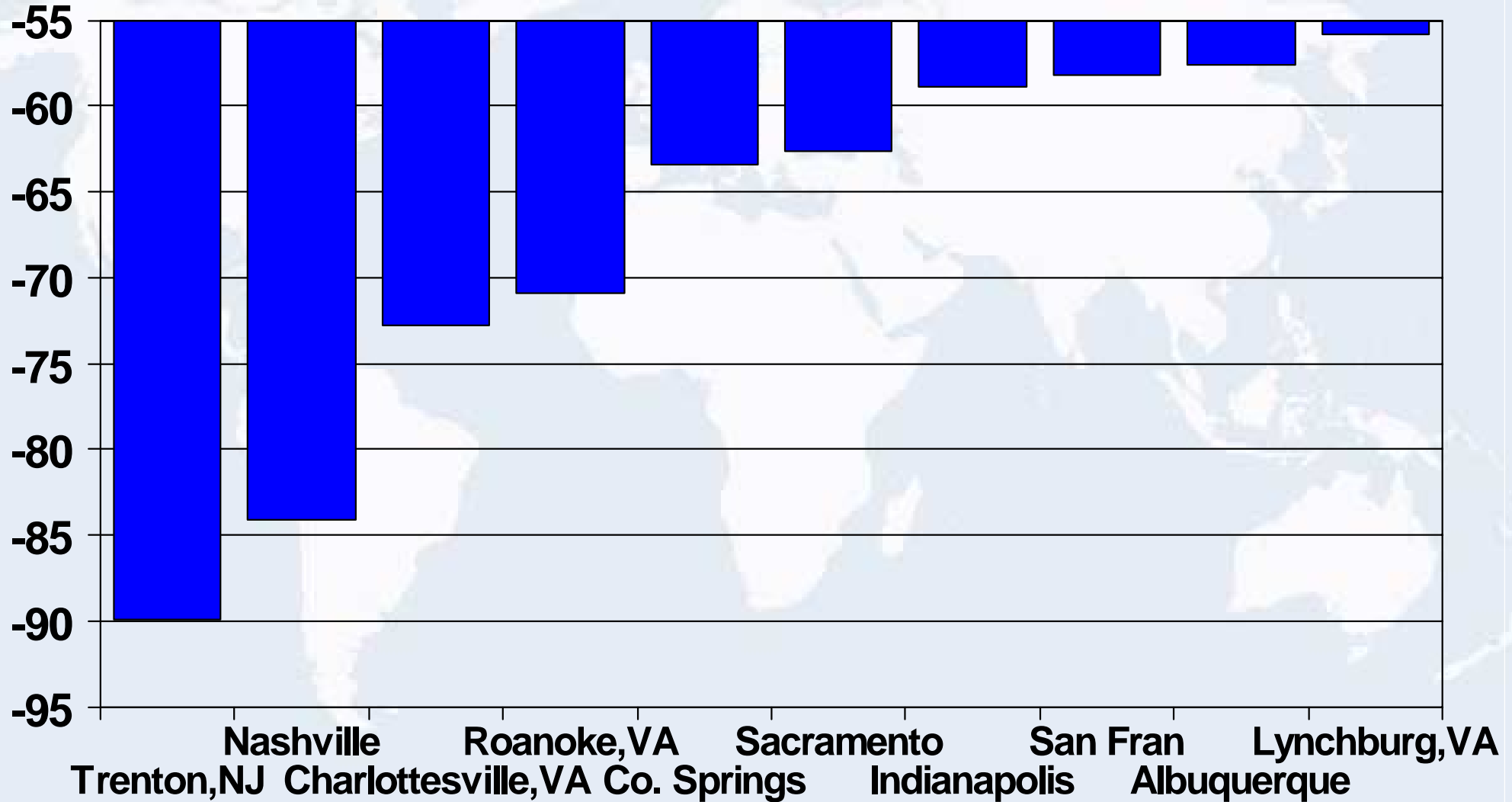


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# Bottom Ten Metros

Communications Equip. Employment Growth 97- 01

Percent



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# Top Ten States

## Telecomm Services Employment Growth 97- 01

Percent

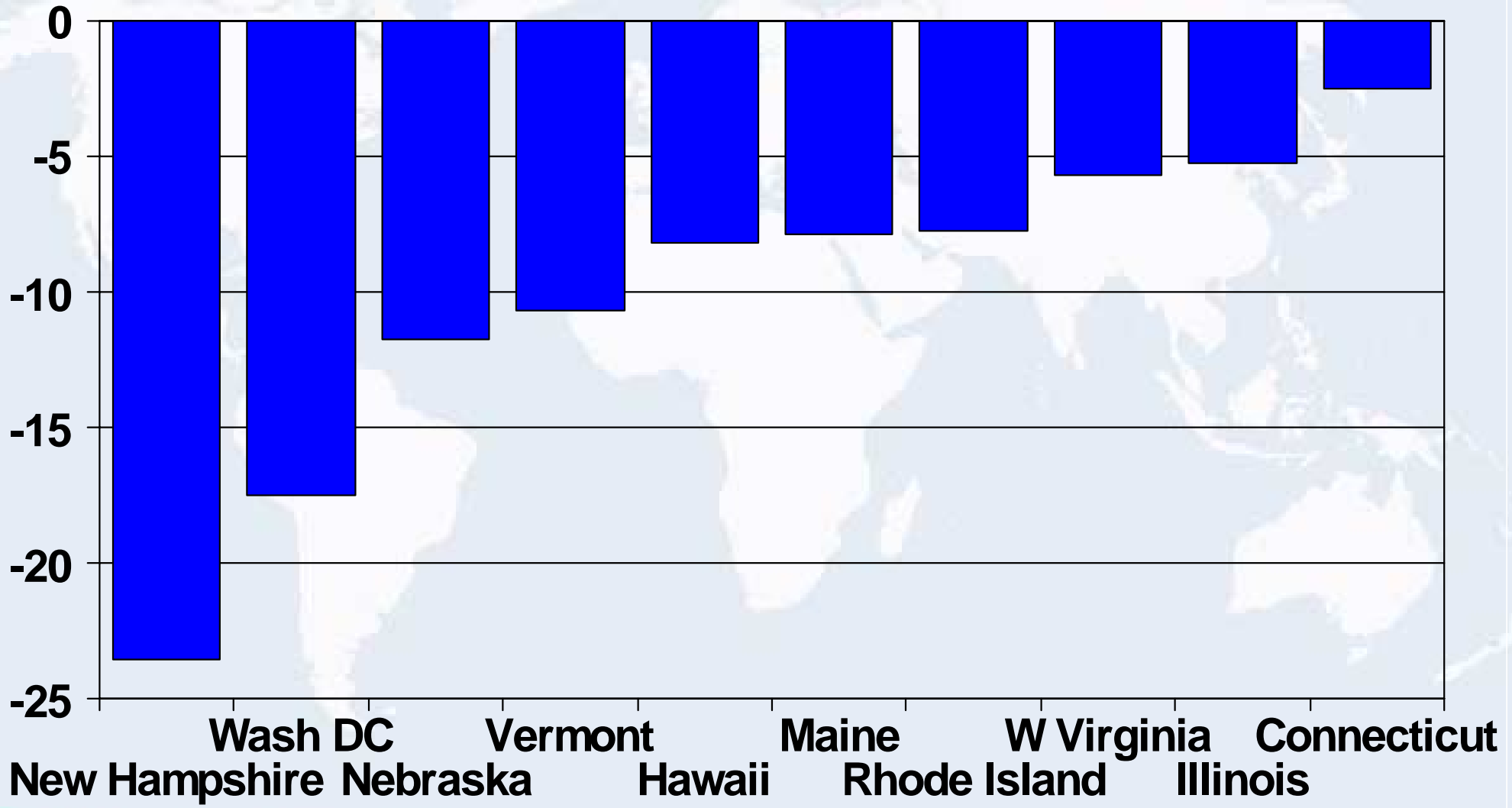


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# Bottom Ten States

Telecomm Services Employment Growth 97- 01

Percent

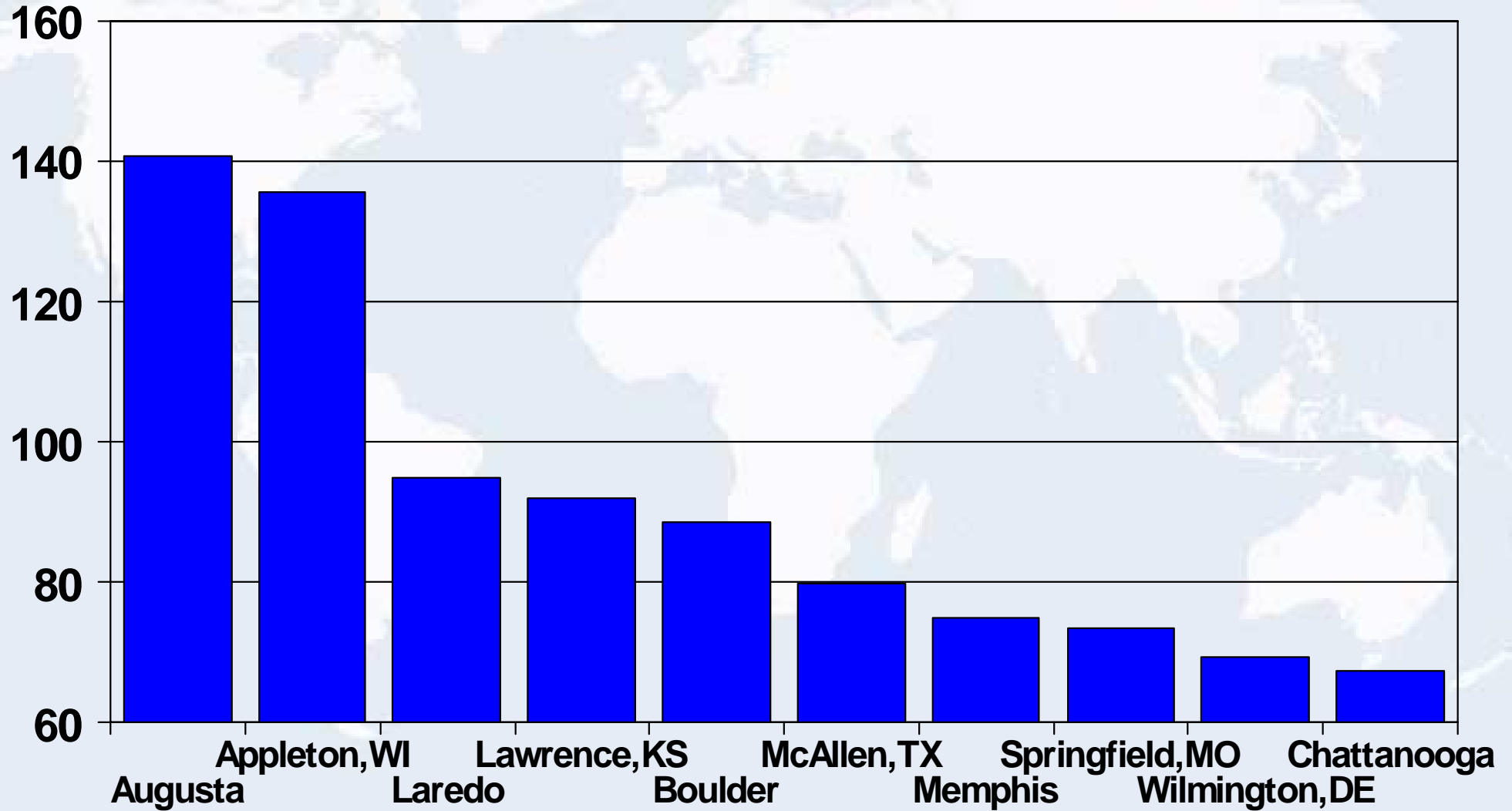


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# Top Ten Metros

## Telecomm Services Employment Growth 97- 01

Percent

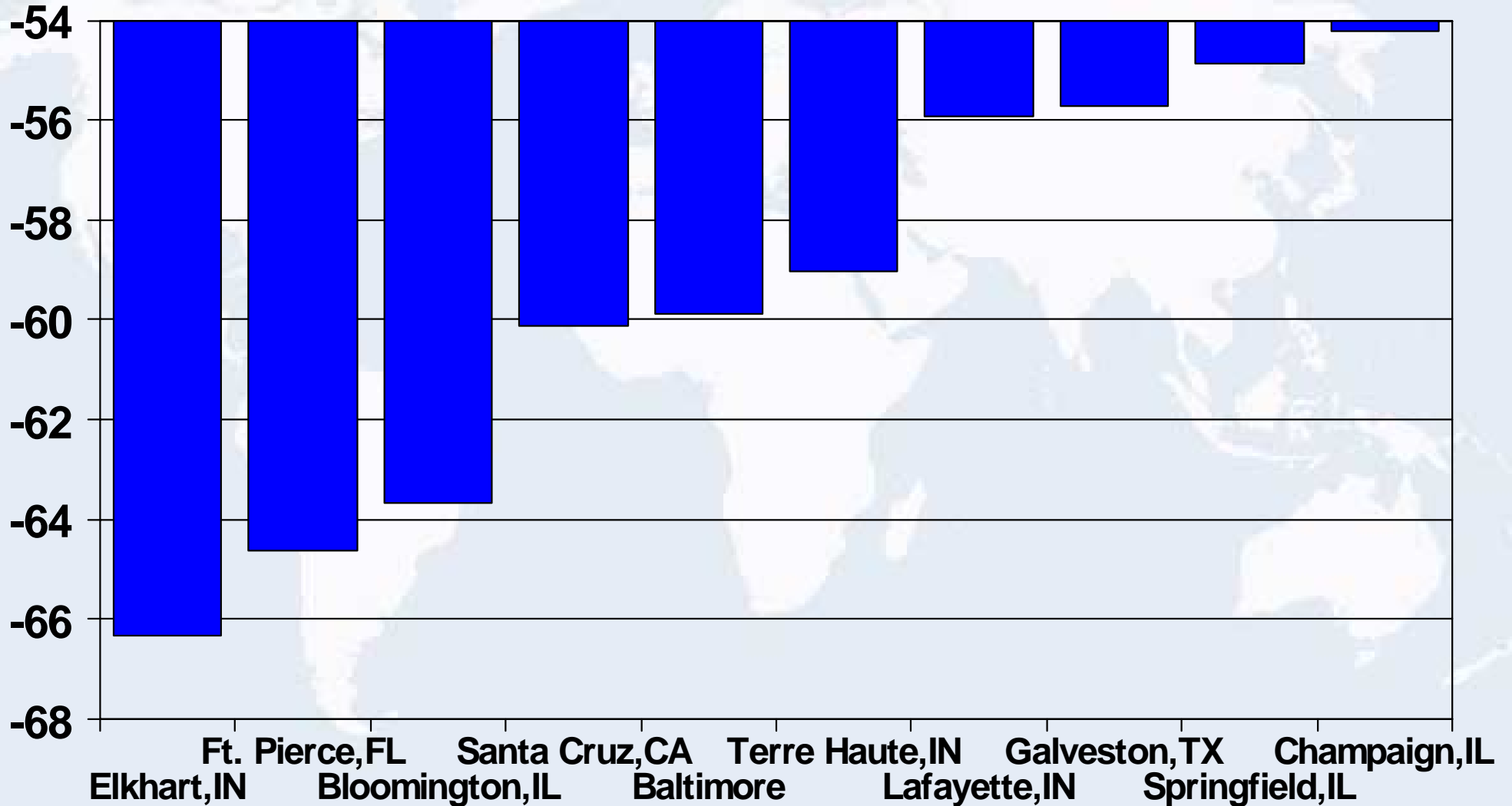


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# Bottom Ten Metros

## Telecomm Services Employment Growth 97- 01

Percent



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# Chela Technology Partners

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***2002 Global Conference***

**Telecommunications & Technology:  
After the Gold Rush**

Afsaneh Naimollah  
Managing Partner



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April 24, 2001

# Innovations in the Wireless Industry



- **The need for “Always On” communication is turning into the need for “Persistent” wireless Internet connection.**
- **By December 2002, nearly one billion mobile devices globally will have Internet access.**
- **By 2006, the number of data-enabled phones will exceed Internet subscriber population.**
- **Many people will first experience the Internet on a wireless device.**



# Innovations in the Wireless Industry



- “Persistent” wireless Internet connection will give rise to new cyber trends / products. Person to Person payment systems, credit card bids per transaction, wireless wallets, etc...are just a few examples.
- The extend of the *structural* impact on the telecommunication sector will be immense.
- Over time, innovations will continue to transcend economic cycles as long as *productivity gains* generated are above *inflation rate*.



# Telecommunication Costs and Limitations

- Many innovators deeply believe that nearly-free Internet access should be a basic human right.
- Telecommunication investments requiring gigantic upfront investments (i.e. under-sea cable, spectrum costs, etc...) are inherently risky. Because of the \$\$\$ involved, cost of mobility will always be high enough to exclude many consumers, slowing adoption curve.
- We will continue to see enthusiasts and innovators building technologies which will overcome these limitations.



# Technologies to watch for....



- **Wi-Fi, also known as 802.11b, uses unlicensed radio spectrum to enable computers within meters of a small base station to share an Internet connection.**
- **Wi-Fi came about a few years ago as a way to connect local networks without creating a mess with the blue Ethernet cables in the office.**
- **Unlike 3G, Wi-Fi is cheap, fast and working today. Cost of a base station is \$150.**
- **Wi-Fi capability is fast becoming a standard feature for laptops.**





# Technologies to watch for....

- **It is the Napster of wireless connection, gaining ground and growing like wildflower.**
- **It could give rise to an infrastructure network implemented not by the giant telecoms but by small entrepreneurs.**
- **The outlook could be bright. Wi-Fi companies can bring the necessary subsidy that our broadband networks need, not from the government but from the individual users themselves.**





# Technologies to watch for....

• **Cable and phone companies are aghast. Wi-Fi users are sharing their broadband lines for free!!**

• **Prediction:**

- **Wi-Fi and cellular networks will work together contributing to the solution of last mile connection.**
- **This industry is well underway to be a grown-up sector.**



# Technologies to watch for....

- **Wireless Application Gateways (“WAGS”)** are server- based software products that plug into the existing application infrastructure providing secure access to any data source and the ability to render the data to any device.
- The sector was driven by B2C applications, i.e. online shopping, wireless trading and has now shifted to the B2E applications.

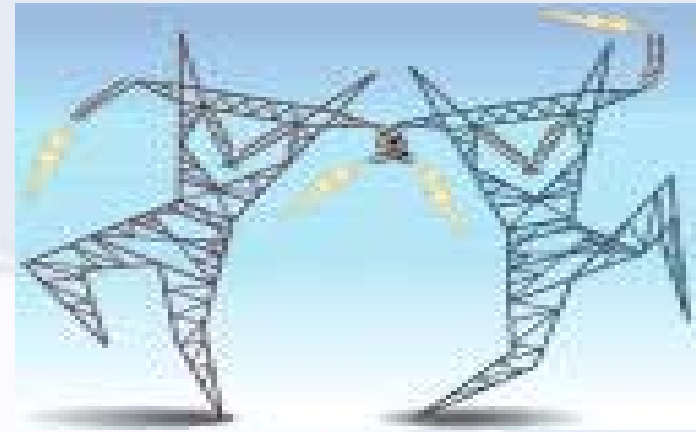


# Technologies to watch for....

- **WAG Companies are focused on delivering successful:**
  - **Real time email / Voicemail**
  - **Offline data systems**
  - **PIM sync**
  - **Legacy application integration**
  - **Voice integration to interactive voice response (IVR) systems**



# Technologies to watch for....



## Prediction:

- The industry will slowly be absorbed into application servers, middleware and portal systems.
- Gartner predicts that by 12/2002, 70% of portals and application servers will incorporate WAG functionality.
- The collision course with fringe sectors means many WAG's will go out of business and a select few will merge with the bigger players.

