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Personal Communicators of the Future

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Panelists

- ◆ Mikko Terho, Vice President, Wireless Products
Nokia
- ◆ Steven Spencer, Director, Business Development
Lucent Technologies
- ◆ Lew Turnquist, Product Manager, Consumer Products
Nortel
- ◆ Marion Lineberry, Sr. Member of Technical Staff
Texas Instruments
- ◆ Simon East, Product Marketing Manager
Psion



[The Web Provides...]

- ◆ Storage
- ◆ Global Access (private or public)
- ◆ Standards (like TCP/IP)
- ◆ Consumer expectations



[And Java Provides...]

- ◆ Security
- ◆ Third-party Applications
- ◆ Upload/Download via network
- ◆ Software Reuse
- ◆ Portability
- ◆ High-Level Language



The Result : A New Breed of Personal Communicators

- ◆ Programmability
- ◆ Delivery of Interactive Services via network
- ◆ Third-Party Software Market
- ◆ Good Investment (doesn't become obsolete soon)
- ◆ Competition

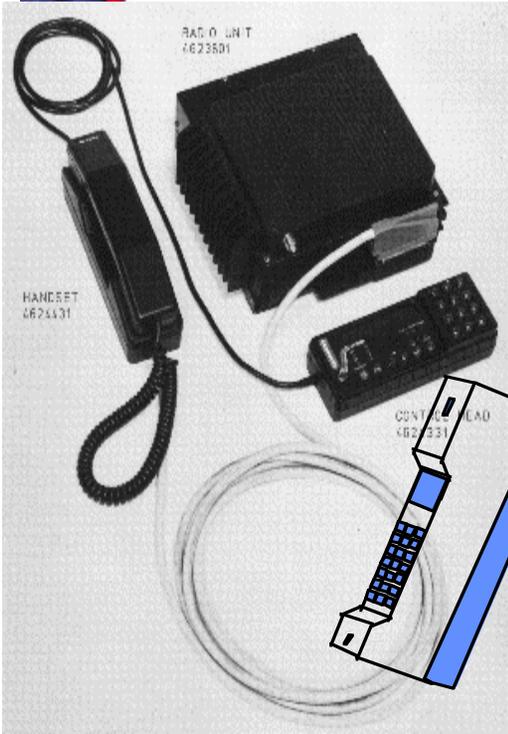




pJava and eJava match Communicators and Smart Phones

Mikko Terho, Vice President
Nokia Mobile Phones

[Cellular Business]



Mobile voice communication for everybody

Growth of Cellular Industry



1981

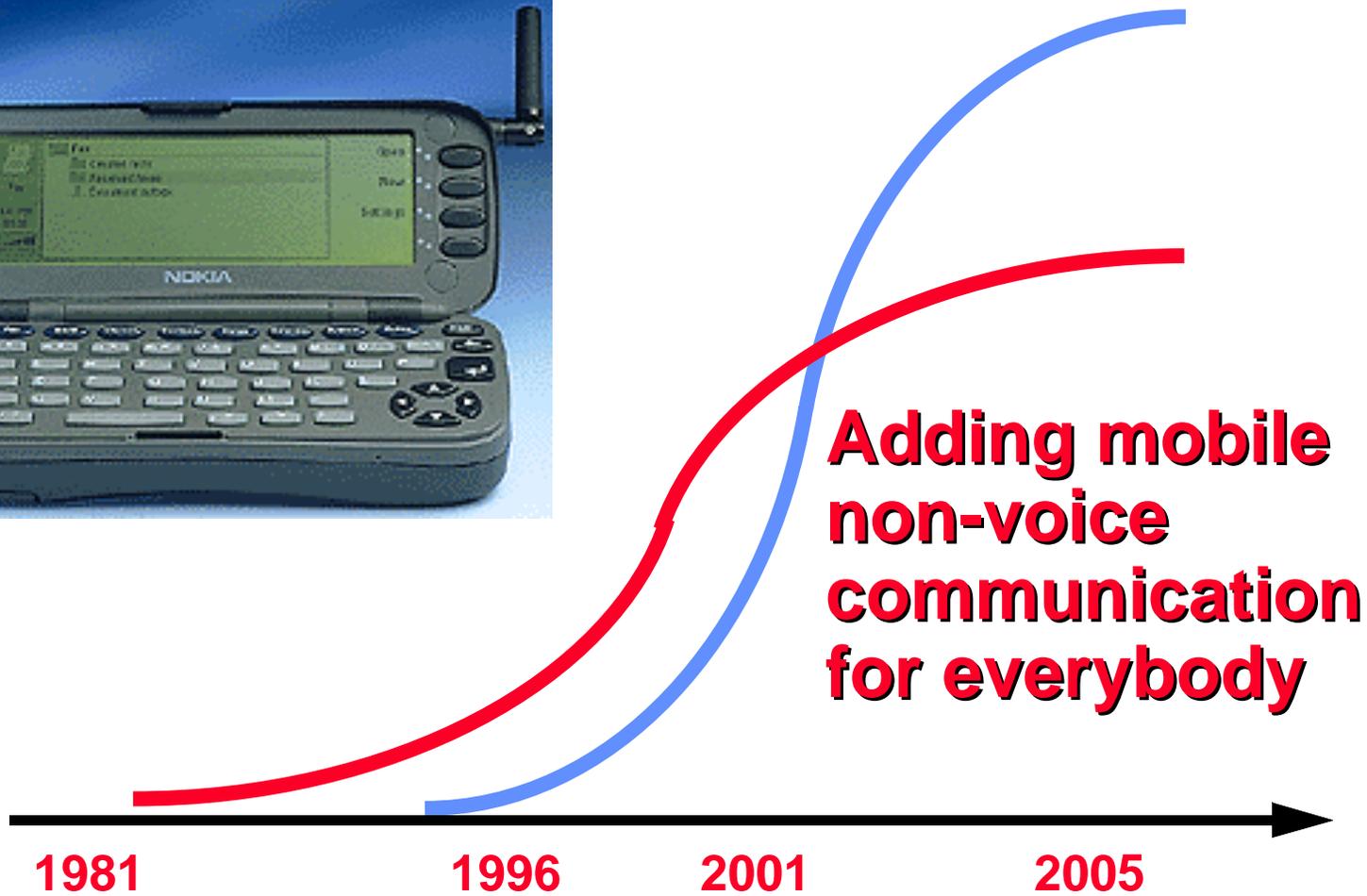
1996

2001

2005



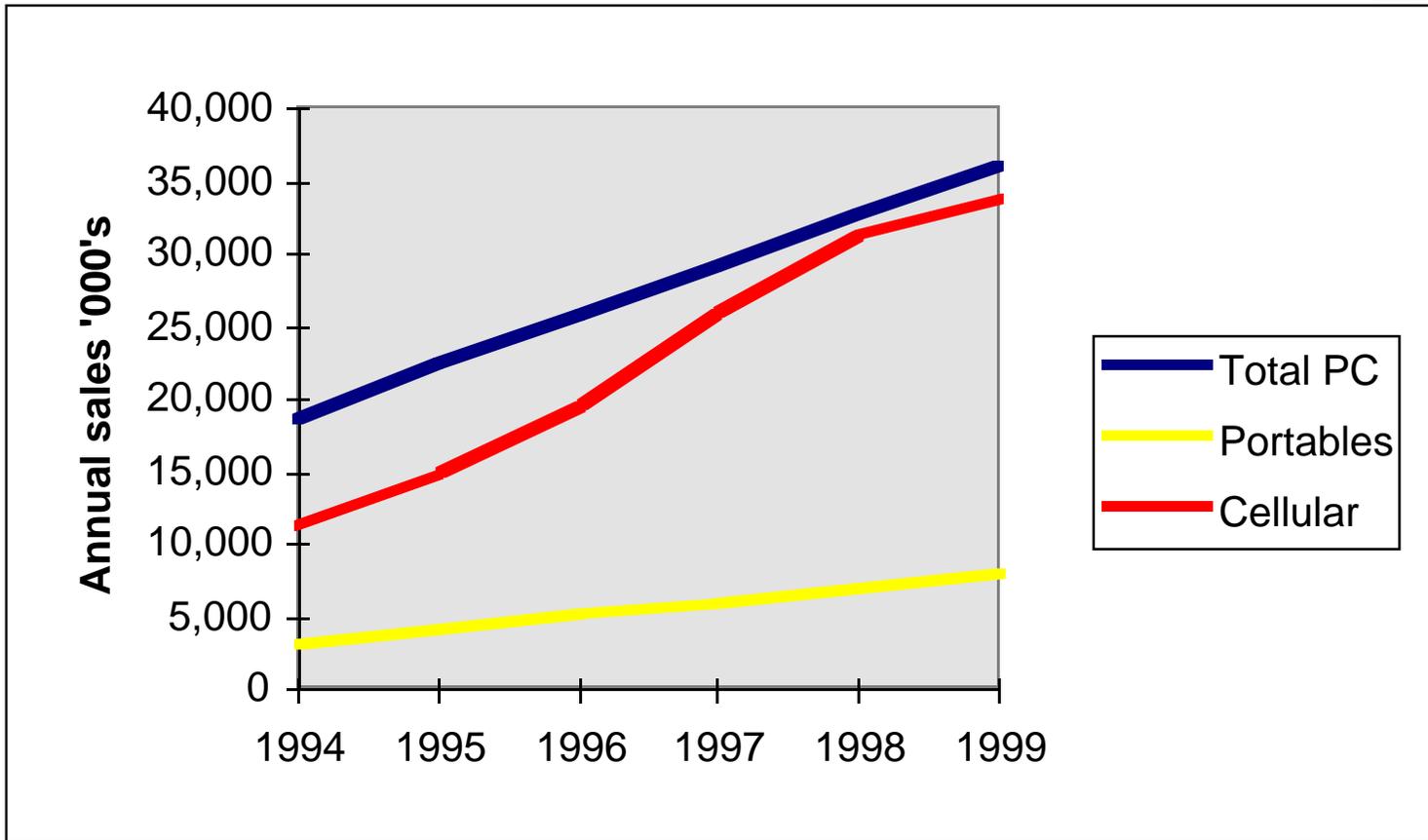
Wireless Data



Adding mobile non-voice communication for everybody

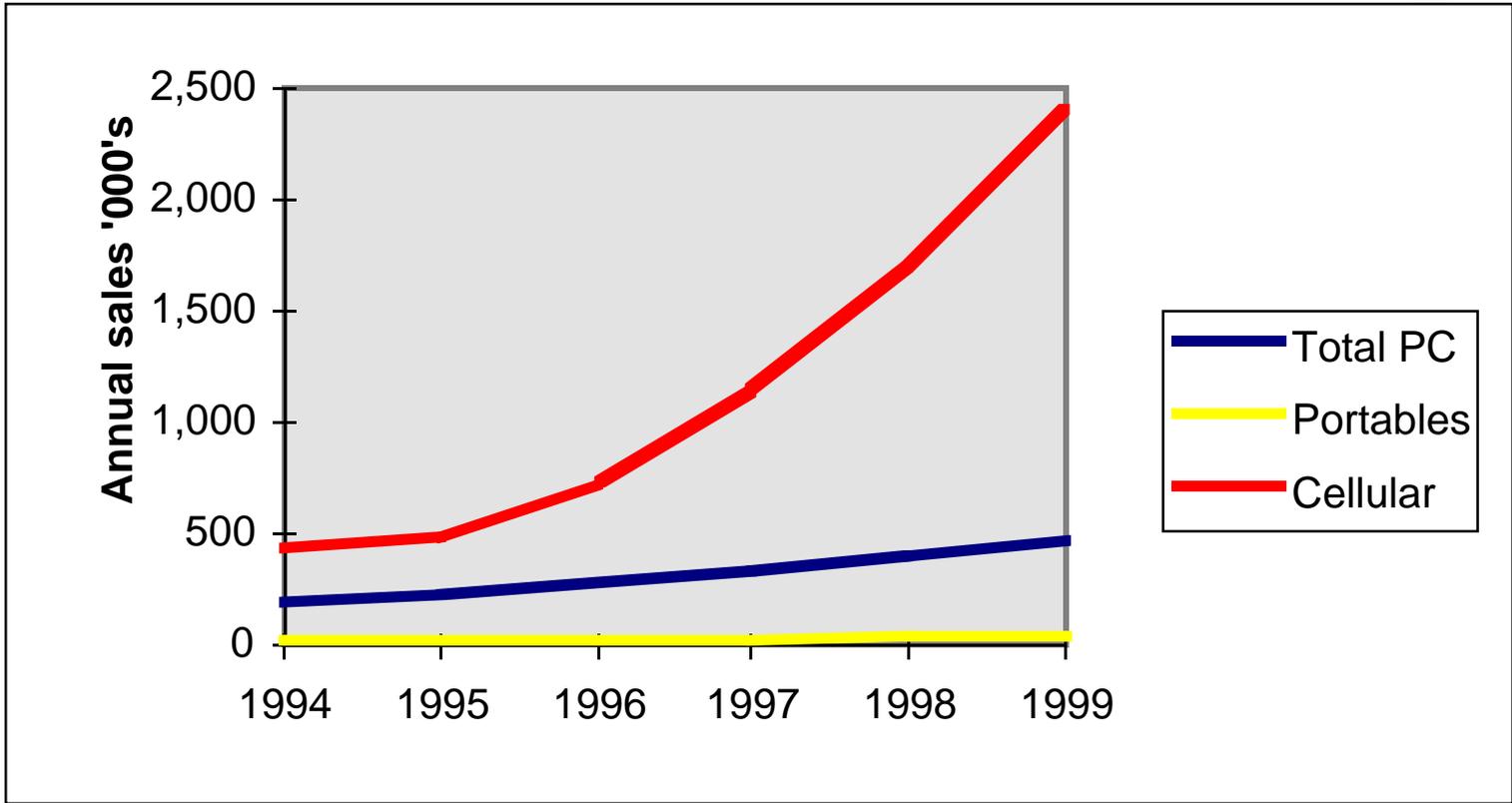


Cellular vs. PC: USA



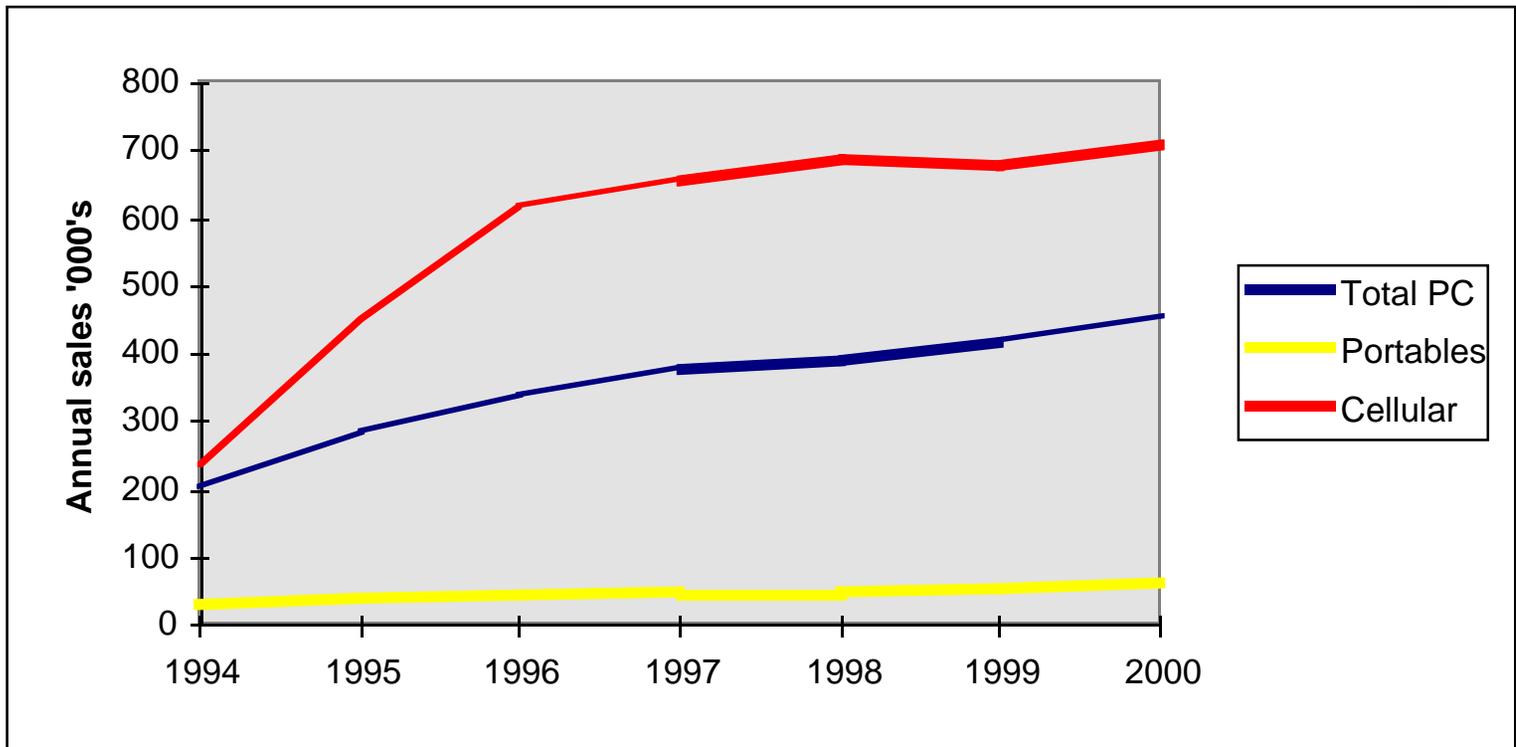
Source: NMP internal, IDC

Thailand



Source: NMP internal, IDC

Finland



Source: NMP internal, IDC

Market Directions

- ◆ Yearly sold new units Cellular Phones will pass PC:s this year
- ◆ In Europe and Asia almost all counties more cellphones sold than PCs
- ◆ USA more PC centric, due to standard multiple standard in wireless service

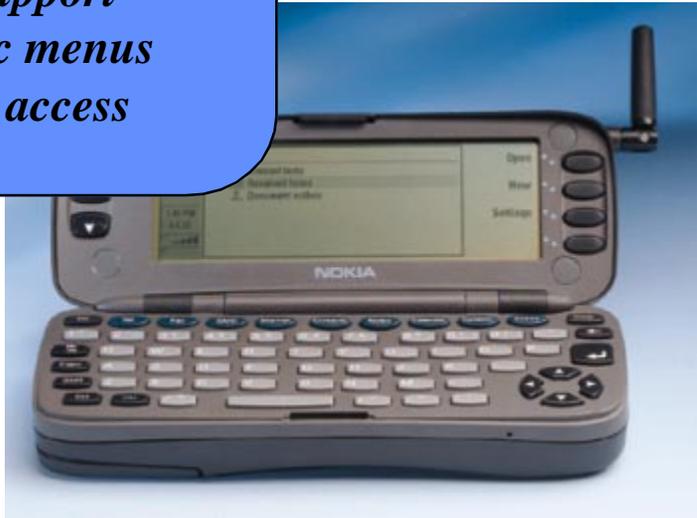


JavaOne

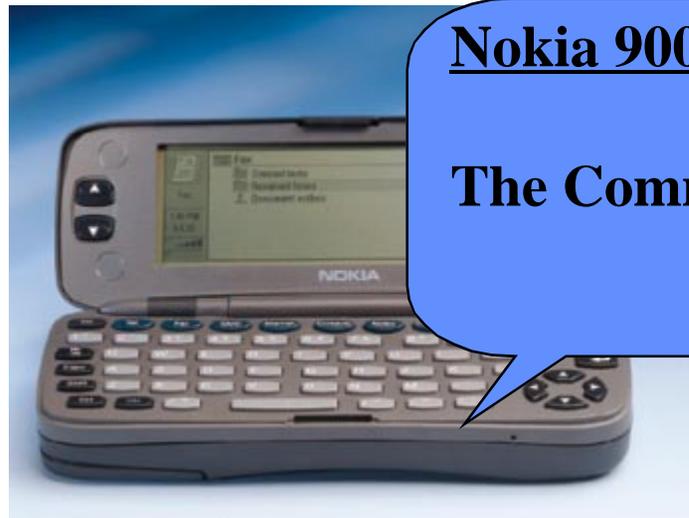
[Nokia Products]



Nokia 8110i
*Phone with full smart
messaging support
with dynamic menus
and Internet access*



[Nokia Products]

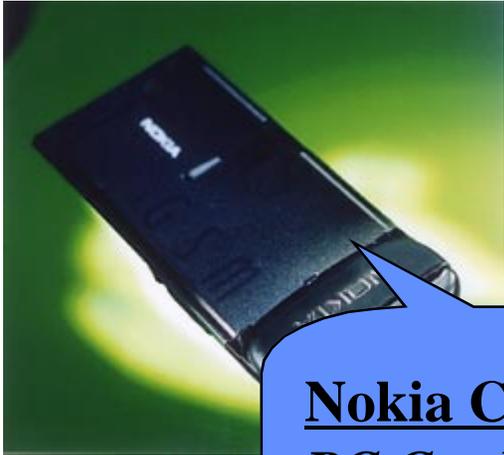


Nokia 9000

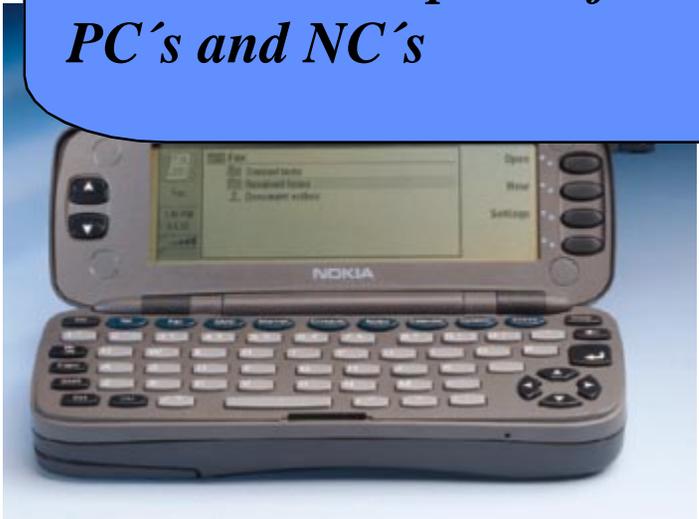
The Communicator



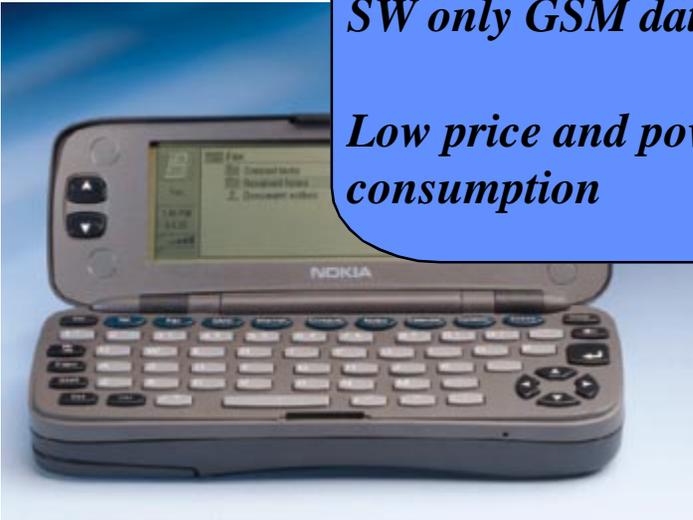
[Nokia Products]



Nokia Cellular Card Phone
*PC Card GSM phone for
PC's and NC's*



[Nokia Products]



Nokia Cellular Data Suite
SW only GSM data solution

Low price and power consumption



[Personal Java and Communicator]

- ◆ Communicator digital cellular phone with voice telephony and NC Internet features
- ◆ Own storage for PIM
- ◆ Nokia and Sun working to get Personal JAVA into this space



Embedded Java and Smart Phones

- ◆ High End Digital Cellular Phone with limited over the air programmability
- ◆ Smart Messaging required
- ◆ Nokia and Sun working to bring “*Nokia Smart Messaging*” and Narrow Band Socket into this space



JavaOne

Nokia Smart Messaging

- ◆ Nokia will work together with the industry to make Smart Messaging an open de facto standard
- ◆ The companies are encouraged to specify new messages and new applications which will be incorporated to this standard
- ◆ There are currently several Operators, Software Companies and Manufacturers who are developing Smart Messaging solutions



Where to get more information

- ◆ Download the Spec from
 - ◆ <http://www.club.nokia.com/sm>
 - ◆ <http://www.club.nokia.com/nbs>
- ◆ Send your comments to
 - ◆ smart.messaging@nmp.nokia.com
- ◆ Spaker and Nokia
 - ◆ Mikko.Terho@nmp.nokia.com
 - ◆ <http://www.nokia.com>



Conclusion



Communicator

- ◆ Voice, Data, Fax
- ◆ Smart Messaging
- ◆ pJAVA



Smart Phone

- ◆ Voice
- ◆ Smart Messaging
- ◆ eJAVA



Cellular Phone

- ◆ Voice
- ◆ Smart Messaging



JavaOneSM

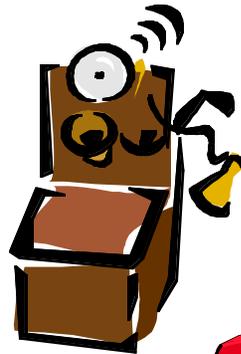
Sun's 1997 Worldwide Java Developer Conference™

Steven Spencer
***Director, Business
Development***

Lucent Technologies
Bell Labs Innovations

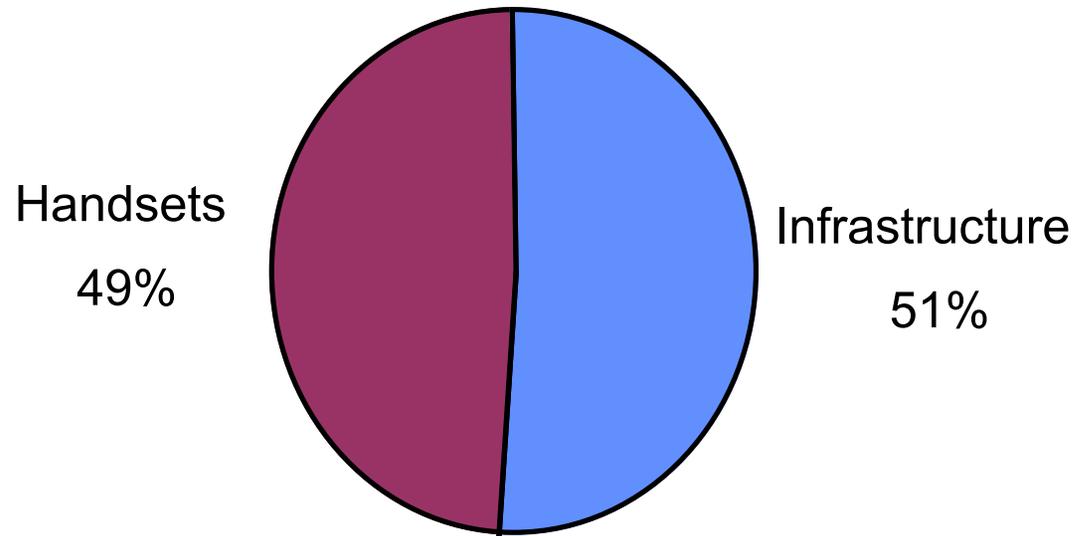


Personal Communications



Lucent Technologies
Bell Labs Innovations

Global Cellular Revenue - 1996



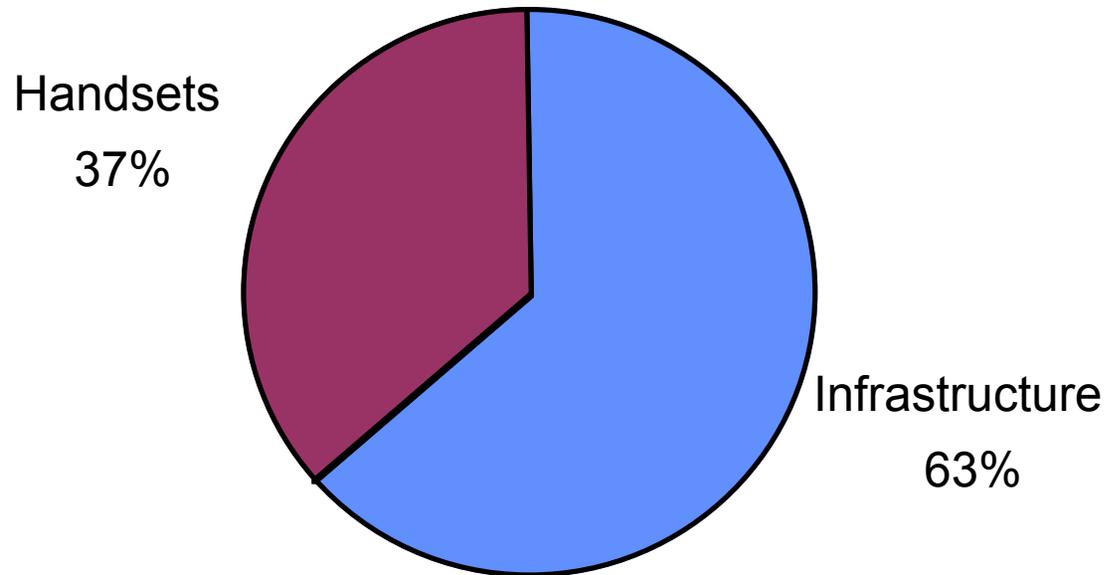
Total Revenue = \$23.2B



Lucent Technologies
Bell Labs Innovations



Global Cellular Revenue - 2001



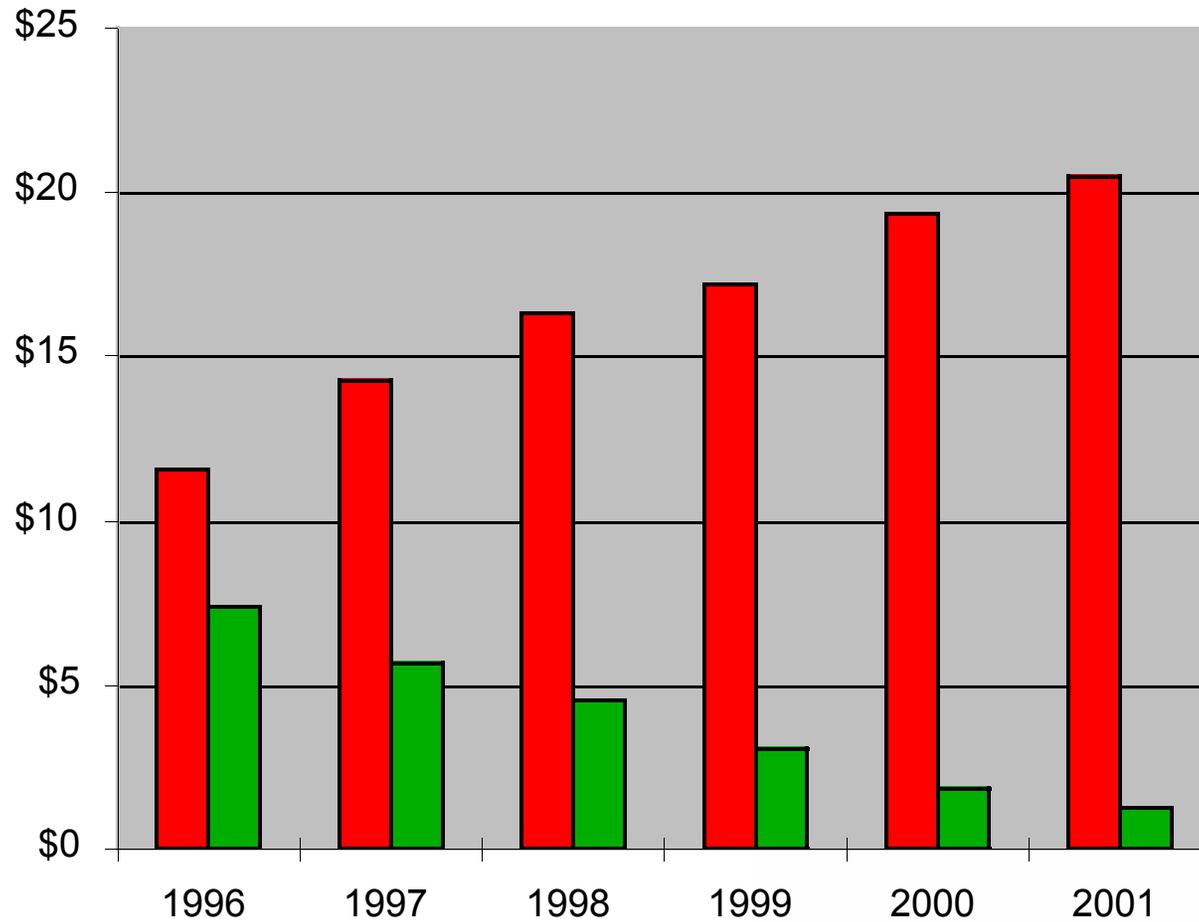
Total Revenue = \$55.6B



Lucent Technologies
Bell Labs Innovations



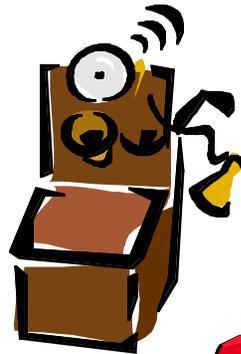
Global Handset Sales; Analog vs. Digital
\$=Billions



Lucent Technologies
Bell Labs Innovations



Personal Communications



Lucent Technologies
Bell Labs Innovations



JavaOneSM
Sun's 1997 Worldwide Java Developer Conference™

Steven Spencer
Director, Business
Development

Lucent Technologies
Bell Labs Innovations





JavaOneSM
Sun's 1997 Worldwide Java Developer Conference™

Lew Turnquist
Product Manager
Consumer Products
Nortel

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NORTEL
NORTHERN TELECOM

Corporate Java Initiative

Wireless Network



Enterprise Network



Residential Network



Public Network



Multimedia Connection



Digital

GSM Network

Voice

PSTN

Mobile

Corporate

Other

Data
Fax

PSTN (Modems)

ISDN

X.25

TCP/IP

Messaging

GSM Mobile

Paging/ERMES

Fax

E-mail

X.400

Voice

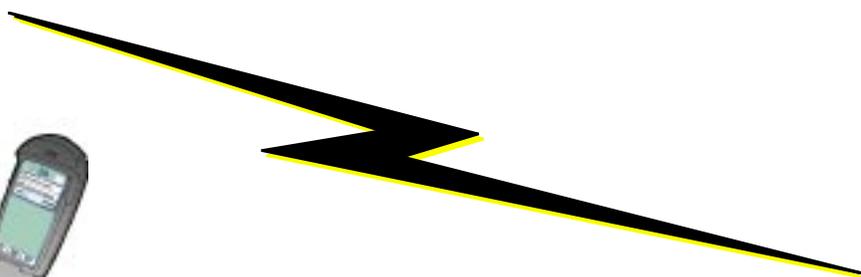


[The Power of Client, Server, and Client/Server]

Client



Co-ordinated Client/Server



Server



Business Proposition

“Useability of Network Services”

- Standard Services
- Value Added Services

Business Proposition

“The Services Sweet Spot”

- Branded/ Personalized Services
- Fixed / Mobile Service Ubiquity

Business Proposition

“Power to the Palm”

- Any Handset
- Fixed / Mobile Linking





Application Development for Personal Communicators

Marion Lineberry, Texas Instruments



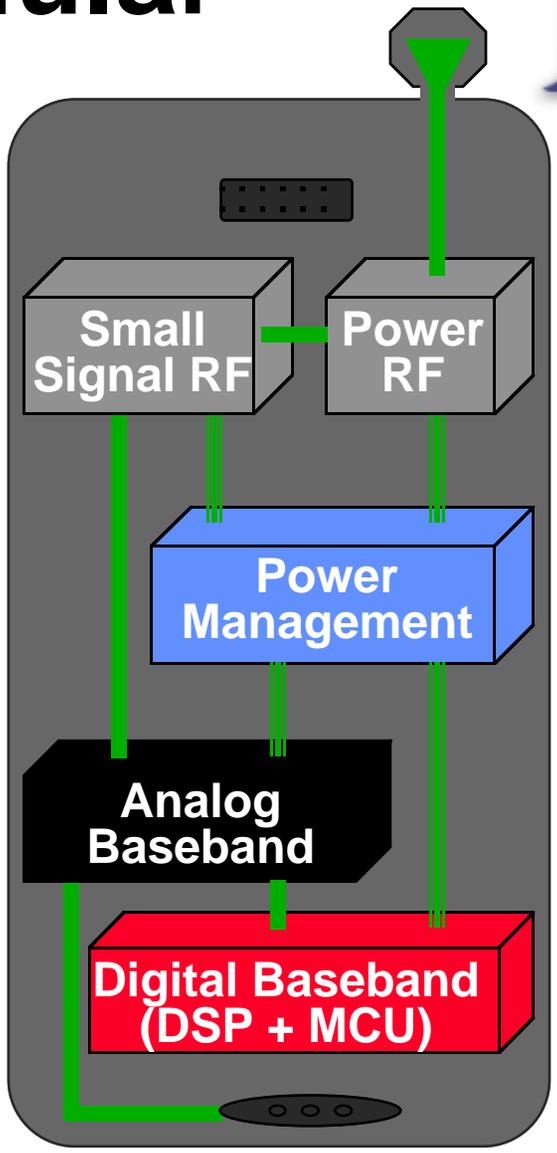
TI in Digital Cellular

Digital Cellular Market	1996	1997
	39M	60+M

DBB/DSP Units	23.6M	33M
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Analog Baseband Units	17M	27M
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Power Management Units	6M	22M
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Application Development Trends

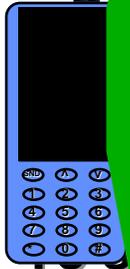
Why Java™ personal communicators?

- ◆ Easily downloadable and upgradable services
- ◆ Similarity of application interfaces across multiple platforms
- ◆ Opening platforms to wider base of content and service developers



Typical Applications

1 Maps
2 Yellow
3
4



info



JavaOne

Home Page

- 1 Maps and Traffic
- 2 Yellow Pages
- 3 Weather
- 4 Calculator
- 5 Photo Album
- 6 Bookmarks
- 7 Personal Info
- 8 Portfolio Mgr
- 9 Address Book
- * Bank Account
- 0 Security Camera
- # Games



Evelyn's Room



- v Zoom In
- ^ Zoom Out
- * Pan Left
- # Pan Right
- 1 Switch Cameras



Wireless Communications Issues

How to target content to comm link?

- ◆ Relatively high cost per bit
 - ◆ charged by time or actual use
- ◆ Relatively slow speed
- ◆ Variety of transport options
 - ◆ messaging, packets, circuits, ...
- ◆ Variety of service providers
 - ◆ analog, digital, paging, satellites, ...



Reference Platform Issues

What capability is in the platform?

- ◆ Core GUI functionality
 - ◆ display, text and key entry, pointing
- ◆ Extended media functionality
 - ◆ audio, speech, graphics, video, ...
- ◆ Other extended functionality
 - ◆ smart cards, commerce, ...
- ◆ Memory usage



Application Development Issues

How can content be delivered?

- ◆ Client pull or server push
- ◆ Broadcast, multicast, peer to peer...
- ◆ Applies to public and private info
 - ◆ database access, groupware, agents...
- ◆ Applies to all media formats
- ◆ Content delivered from gateways, public sites, private sites, ...



Application Development Issues

How are applets presented?

- ◆ Single applet for multiple platforms
- ◆ One applet for each platform
- ◆ Website presentation
 - ◆ provide cost of downloading
 - ◆ presentation based on platform type





Conclusions

Low cost and low latency are crucial

- ◆ Applets should be small
 - ◆ be smart about modularity
 - ◆ be smart about dynamic memory
- ◆ Applets should be targeted
 - ◆ be smart about user input
 - ◆ be smart about use of wireless link
- ◆ Distribute intelligence among tools, developer, platform, and server 



Java, PDA's and Communicators

Simon East -- Psion Software PLC

[The Psion Group]

- ◆ Psion is a 15 year old company
- ◆ Based in the UK
- ◆ 1000 people worldwide
- ◆ Series 3 family the world market leading PDA



Psion Software PLC

- ◆ Psion split into separate companies
- ◆ We are licensing our OS and Application suites to others
 - ◆ Its a platform - EPOC
- ◆ Market is mainly mobile devices
- ◆ NC's and Web TVs too



Why Are We Here?

- ◆ We licensed Java a month ago
- ◆ These devices need RAD
 - ◆ Currently we use VB (OVAL)
 - ◆ The future is Java
- ◆ Involved in PersonalJava



[Java in EPOC]

- ◆ EPOC is all C++
- ◆ Powerful objects in ROM
- ◆ Java classes and beans will expose these
- ◆ Pluggable UI's, etc.



What Devices?

- ◆ PDA's
 - ◆ Integrated wireless comms
 - ◆ Laptop killers
 - ◆ Two box solutions
- ◆ Smartphones
- ◆ Many many form factors



Form Factors

- ◆ Phones and PDA's are different
- ◆ Tradeoffs in integrated devices
- ◆ Two box solutions
 - ◆ Good individual components
 - ◆ Link between them is the tradeoff
- ◆ Depends on the market



Java on These Devices

- ◆ Applications for mobile users
- ◆ Horizontal applications
 - ◆ e.g., Restaurant booking
- ◆ Corporate applications
 - ◆ e.g., Expenses
- ◆ Productivity suites



Java Smartphones

- ◆ Soft smartphones
 - ◆ Customize with Java applications
- ◆ UI for service provision
 - ◆ e.g. voice mail
- ◆ GSM is a big enabler - Europe
 - ◆ Digital networks coming to the US



[The Issues]

- ◆ Low bandwidth connections
- ◆ Intermittent connections
- ◆ Small memory footprints
- ◆ Robust
- ◆ Responsive





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