Ubiquitous Communication

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Generations of Wireless Access

Generations	1st gen	2nd gen	3rd gen	Wireless Computing
Typical example	NMT, AMPS...	GSM, IS-95	UMTS, IMT-2000	WLAN's
Design drivers	voice	voice/data	data/voice	data
Modulation and multiple access.	analogue, FM	digital, various	digital, various	digital, various
Architecture	cellular, hierarchical	cellular, hierarchial	cellular, hierachial	Point coverage, distributed
Voice capability	moderate	good	wireline quality	N/A
Data capability	circuit oriented, 2.4 kbit/s	circuit oriented, 9.6 kbit/s with evolution in circuit and packet oriented improvements up to 64 kbit/s	Packet oriented, 144 kbit/s outdoors and vehicular environment 384 kbit/s peak rate in urban environment outdoors 2 Mbit/s indoors isolated cells.	packet based, 2Mbit/s, near term evolution to 20 Mbit/s and up to 155 Mbit/s within 10 years.

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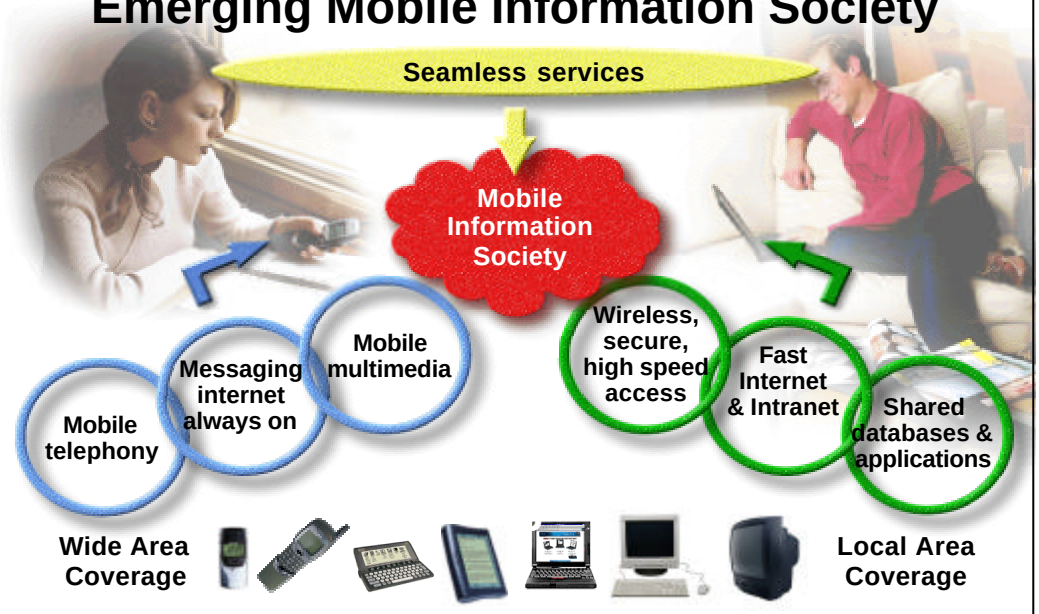
Emerging Mobile Information Society



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Life beyond the Digital Convergence

- It is a brand new world which is characterised predominately by:
  - rapid timescales on all dimensions
  - thus hard to predict but empasises rapid adaptation (like evolution)
- Divergence rather than convergence on:
  - types of devices
  - types of services
  - in the value chains of the Internet business
  - who have access and who do not have access
  - who want and who do not want
- But it will be wireless

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Waves of Computing

Next 10 Years

- **Fast change**
- **High technology risks**
- **Architecture is the key to handle complexity**

Network Computing

Internet connection

Midleware

E-business

Mobile Information Access

Contextual Computing

Devices for different Purposes

Interoperability and synchronization

Spontaneous Computing

Human computing

Continuous connection

1997 2002 2007 Time

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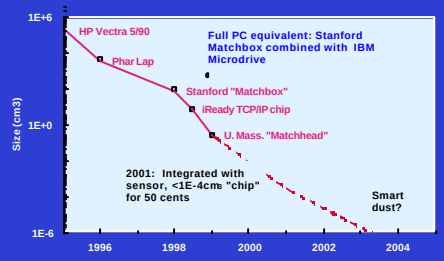
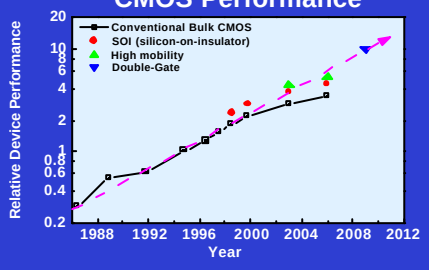
Environment - Technology

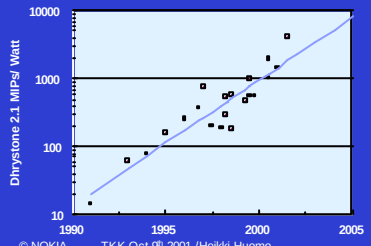
Web Server Dimensions



CMOS Performance



Power Efficiency Trends



Devices

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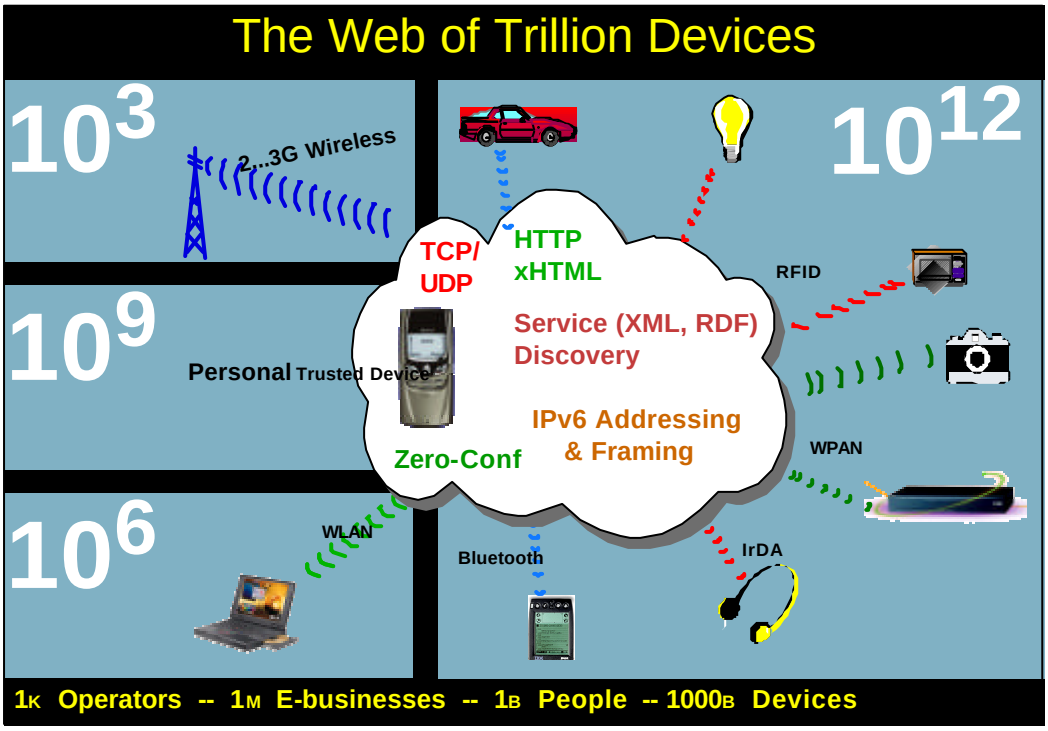
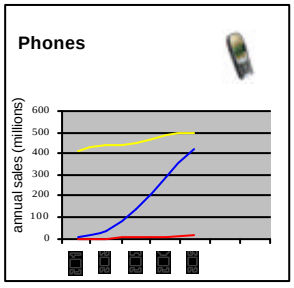
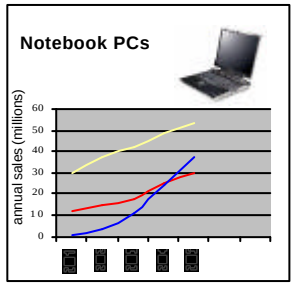
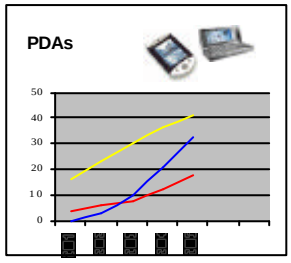
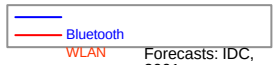


Market projections









Forecasts: IDC, 2001

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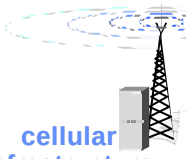
Roaming between contexts

peer context



cellular infrastructure

- ad hoc networking
- local communication

WWW

home context

car context

wired infrastructure

mall context

office context

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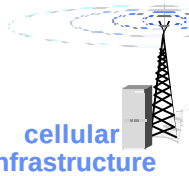
Roaming between contexts

media sharing

peer context



cellular infrastructure

- ad hoc networking
- local communication

WWW

home context

car context

wired infrastructure

mall context

office context

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Roaming between contexts

- ad hoc networking
- local communication

cellular infrastructure

door key

AV control

household appliances

computer

MyDomain

home context

WWW

car context

office context

wired infrastructure

mall context

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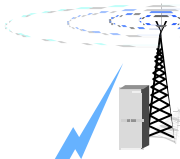
Roaming between contexts

peer context

- ad hoc networking
- local communication



WWW

door key

navigator

handsfree

MyDomain

home context

car context

office context

wired infrastructure

mall context

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Roaming between contexts

peer context

- ad hoc networking
- local communication

cellular infrastructure

WWW

home context

car context

locato r

product info

e-money

MyDomain

wired infrastructure

mall context

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Roaming between contexts

peer context

- ad hoc networking
- local communication

cellular infrastructure

WWW

printer

access control

browsing

find objects

sync data

MyDomain

home context

car context

office context

wired infrastructure

mall context

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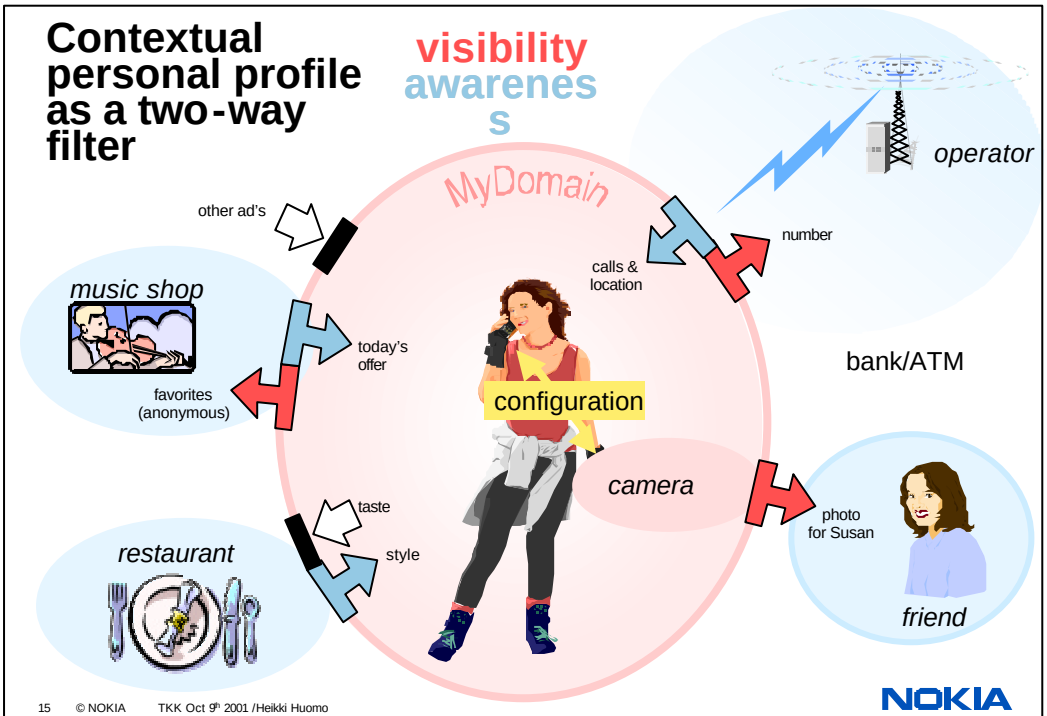
Contextual personal profile as a two-way filter



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Key research challenges

- Evolution of Bluetooth radio is needed
  - low on everything: bitrate, power, cost, implementation/use complexity, range, quality ...
- Middleware challenge
  - how to re-engineer the TCP/IP and related protocols for the PAN
  - implementation limitations drive away from generic flexibility
- Understanding the user needs, fears, behavior and acceptance of technology
  - security and privacy
  - context of use
  - profiles
- Business models
  - confusion of business models: consumer electronics, traditional and .com business models

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"Without effort,
a great vision will remain just
an unfulfilled dream."

Kazuo Inamori, founder of Kyosera

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