

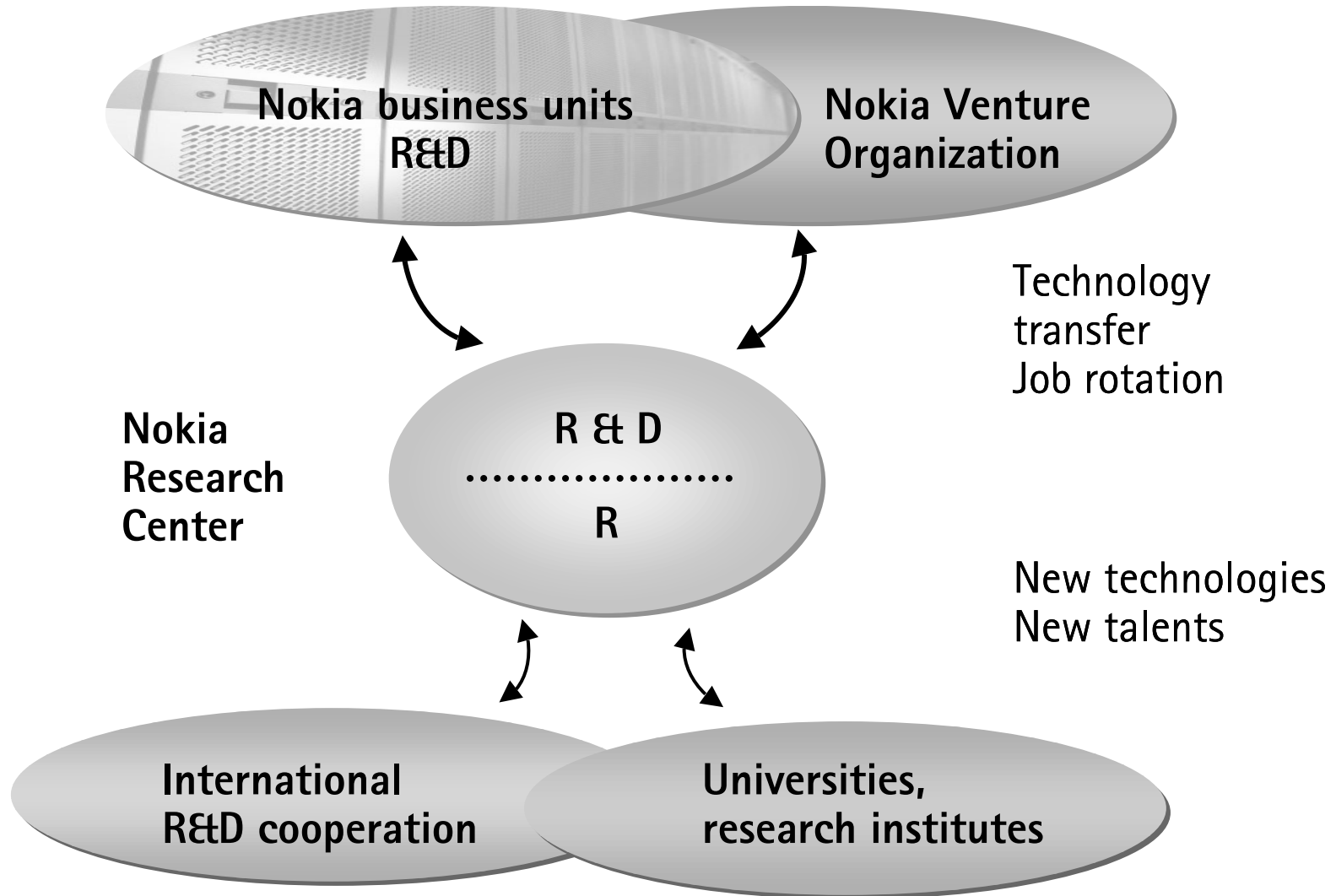
# Towards a Mobile Information Society

'adding a new dimension to the Internet'

Juha Ylä-Jääski

Nokia Research Center

# R&D in Nokia



# Nokia's Change

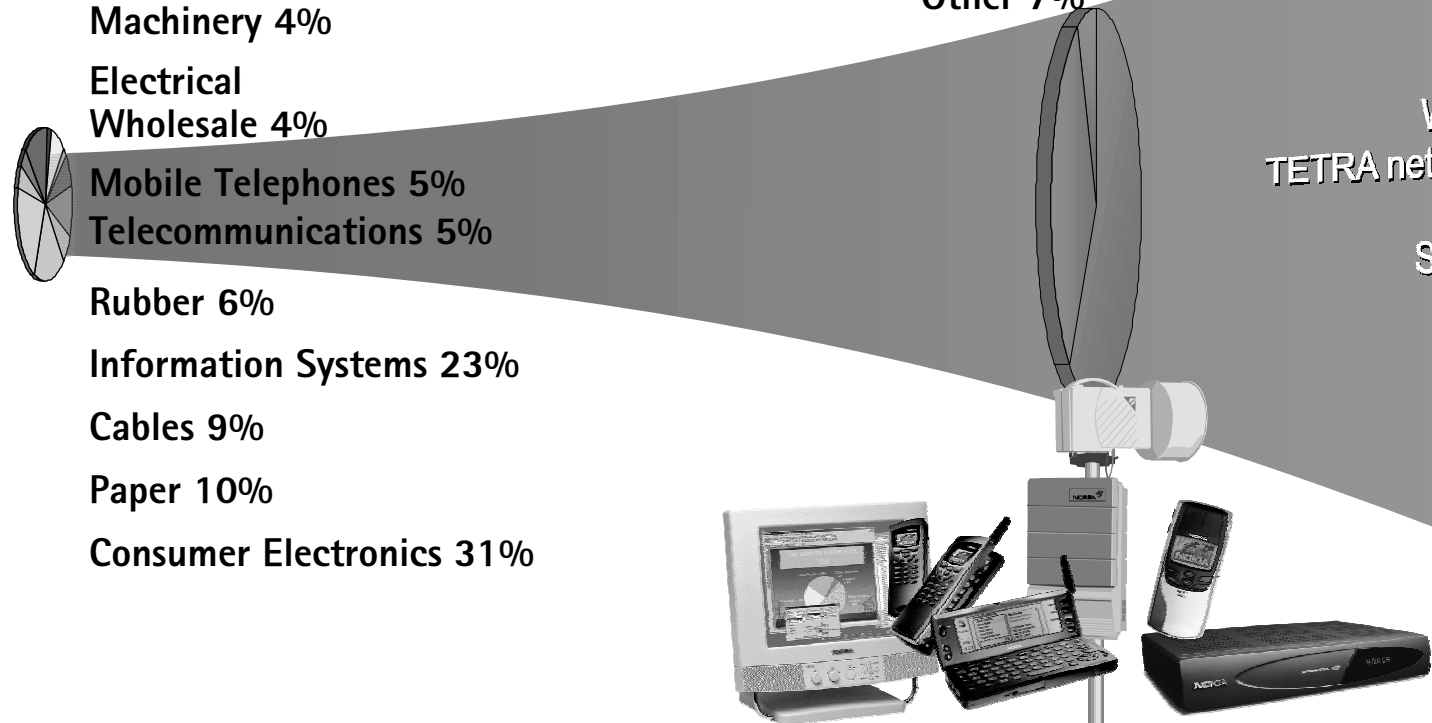
Net sales USD 2.61 billion 1988  
 Market capitalization USD 1.4 billion at year end 1988

Net sales USD 15.7 billion 1998  
 Market capitalization USD 100.8 billion as of September 6, 1999

- Floorings 1%
- Chemicals 2%
- Machinery 4%
- Electrical Wholesale 4%
- Mobile Telephones 5%
- Telecommunications 5%
- Rubber 6%
- Information Systems 23%
- Cables 9%
- Paper 10%
- Consumer Electronics 31%

- Mobile Phones 60%
- Infrastructure 33%
- Other 7%

- Intelligent networks
- Transmission systems
- Fixed networks
- Access networks
- Wireless/mobile data
- TETRA networks and terminals
- GSM networks
- Smart traffic products
- Multimedia
- Internet
- Digital exchanges
- Mobile phones
- Base stations

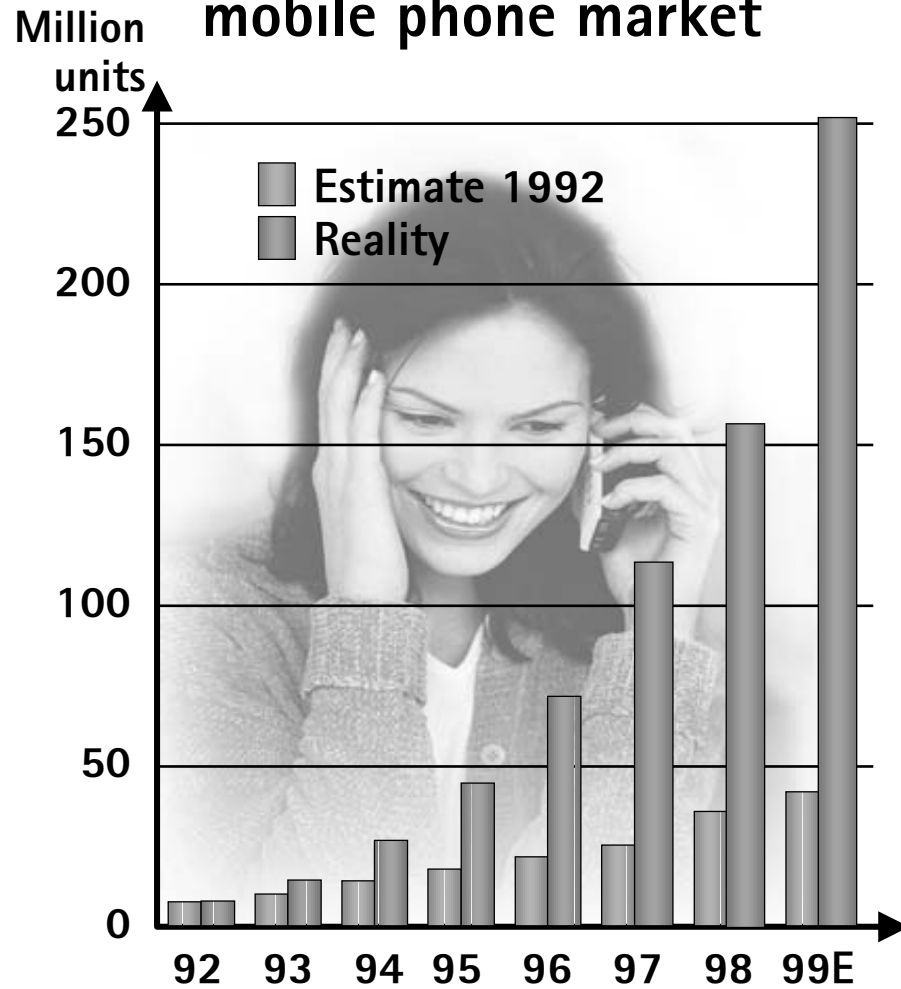


1988

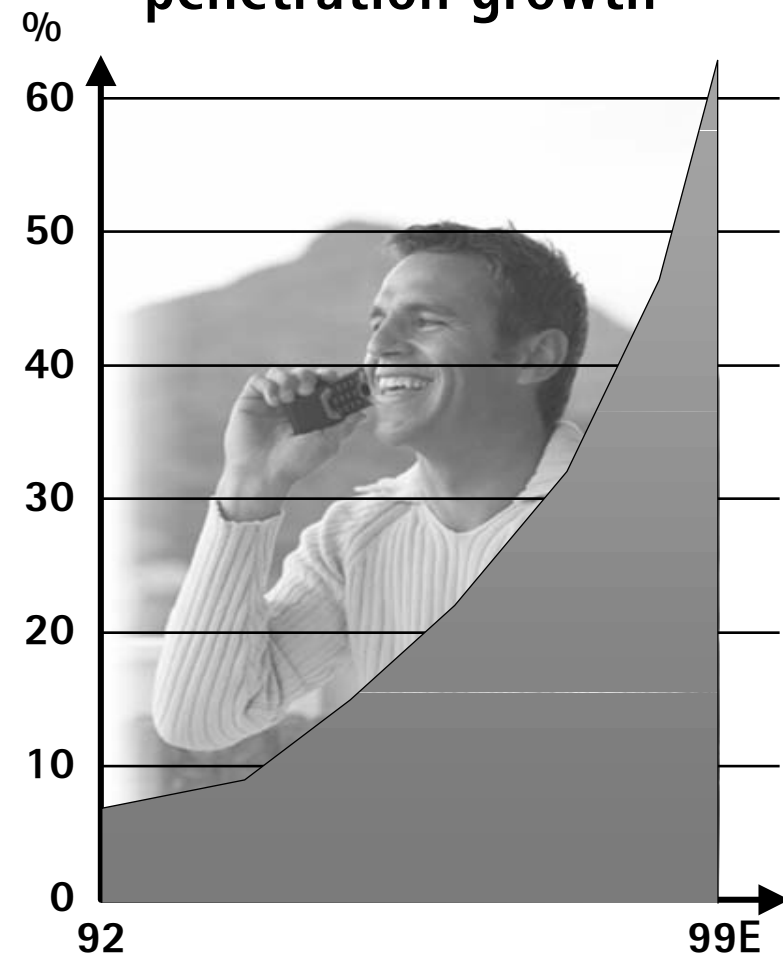
1998

# Recent history gives us reason to believe

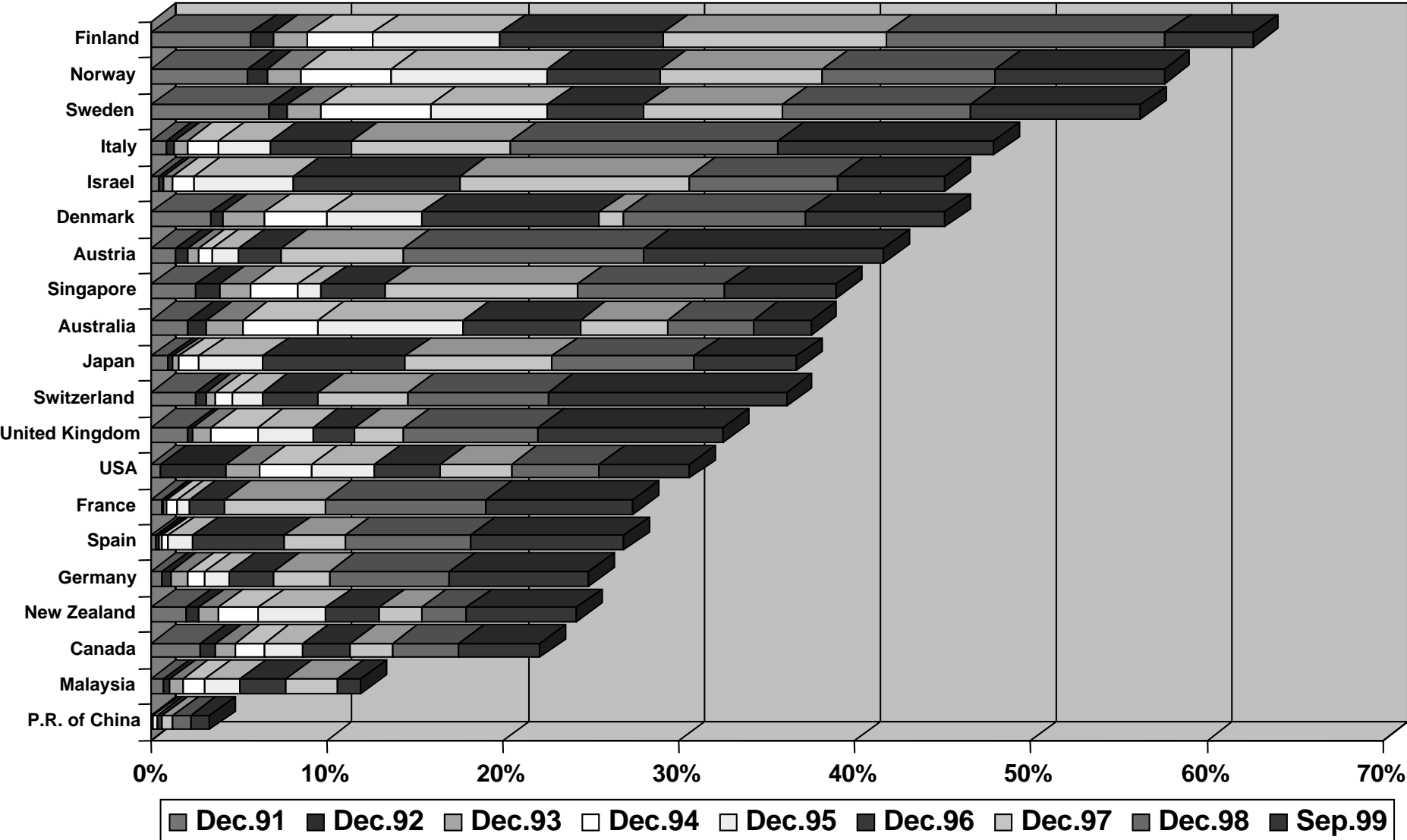
## Predicted vs actual mobile phone market



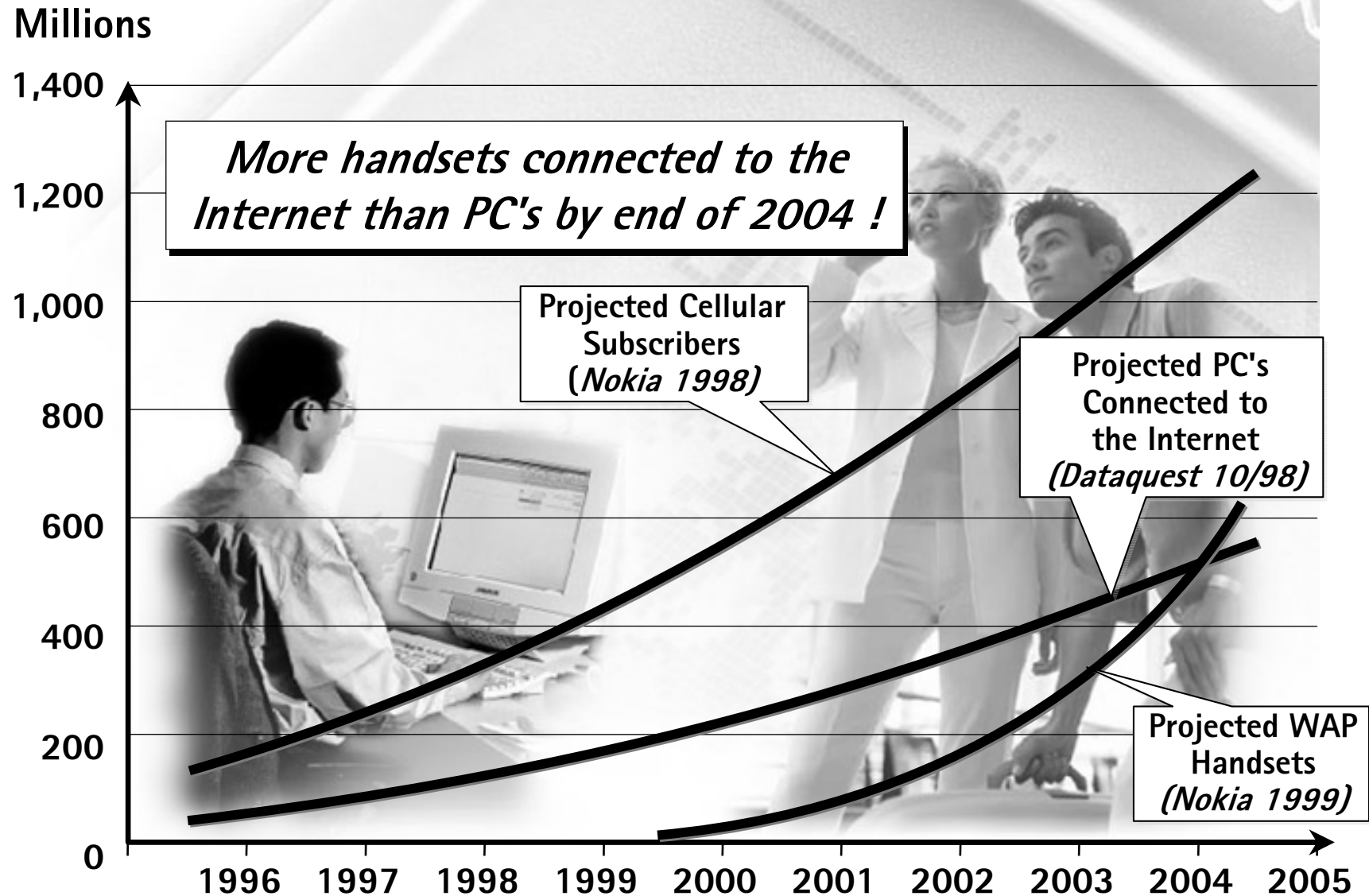
## Finnish mobile phone penetration growth



# Global Major Markets Cellular Penetration



# Internet Mobility Outlook



# Emerging Mobile Information Society

## End user view



# Access to services wherever you are

Information

Entertainment

Corporate Access

Voice

e-mail

Video

e-shopping  
and  
banking



# Your digital identity is in your hand

- Credit cards, Debit cards, E-cash
- Bus, Underground, Concert tickets
- Company keys, Home keys
- ID-cards: Driving licence, Passport
- Loyalty cards
- Access cards to IT systems

*' more trust and functionality '*

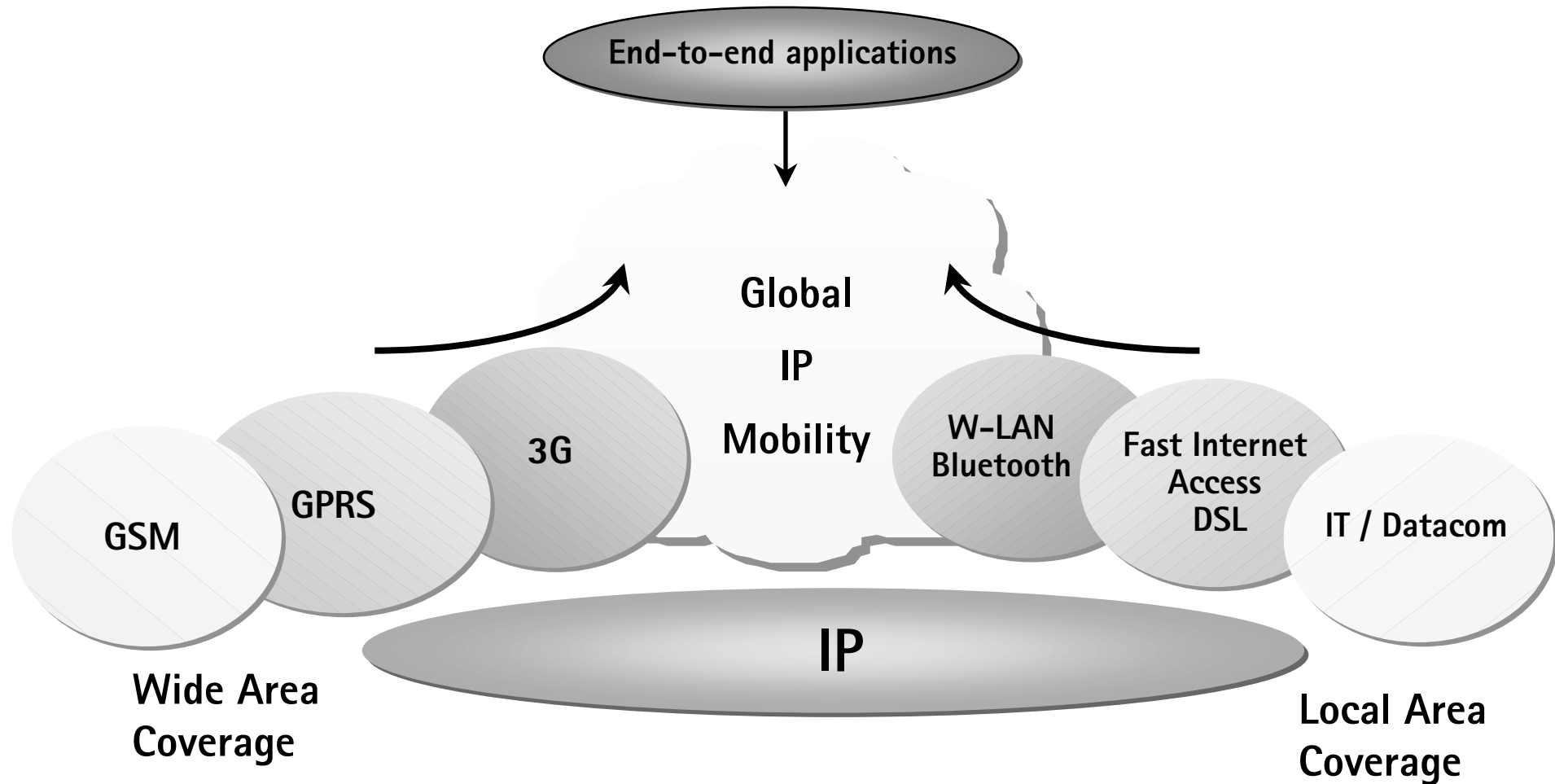
# Mobile Information Devices

- wide variety of devices and form factors
- content matched to the device
- primary application, portability, personal choice, lifestyle
- wireless end-user experience with seamless solutions



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# Technology Path to the Mobile Information Society

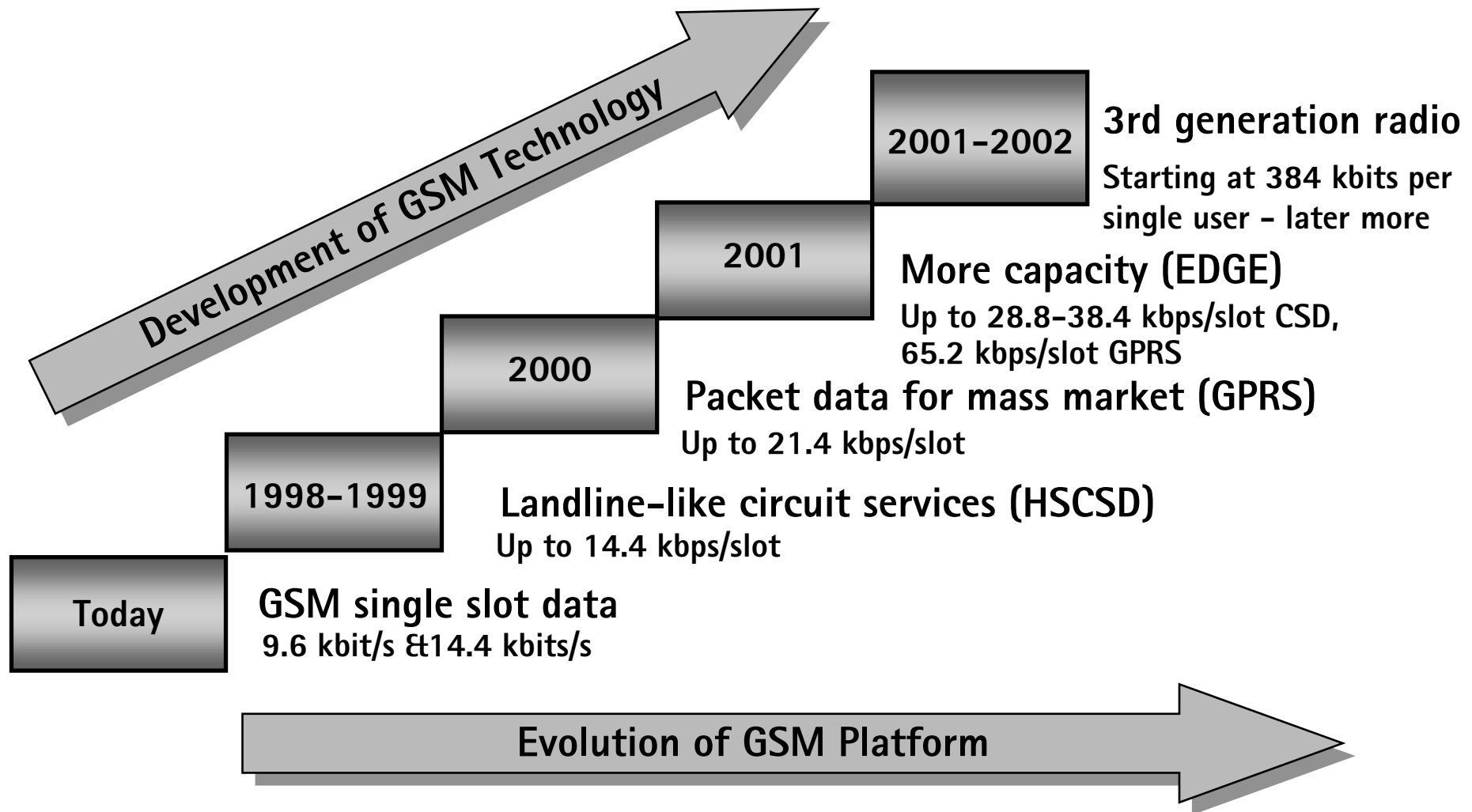


# Key Enabling Technologies

- Packet radio (GPRS)
- 3rd generation
- Global IP Mobility
- WLAN
- Bluetooth
- WAP
- Symbian operating system

*'seamless interoperability'*

# Evolution of Network Performance



# Third Generation Services Begin with GPRS



**64 - 144 kbits/s**  
**Rural outdoor**



**384 kbits/s**  
**Urban outdoor**

**2 Mbits/s Indoor, low range outdoor**



# Choose When and Where You Work

## Wireless LAN Solutions Extend the Local Area Network



**Airports, Public Places**



**Offices, Meeting Rooms**



**Hotels**



**Temporary  
Network Setups**

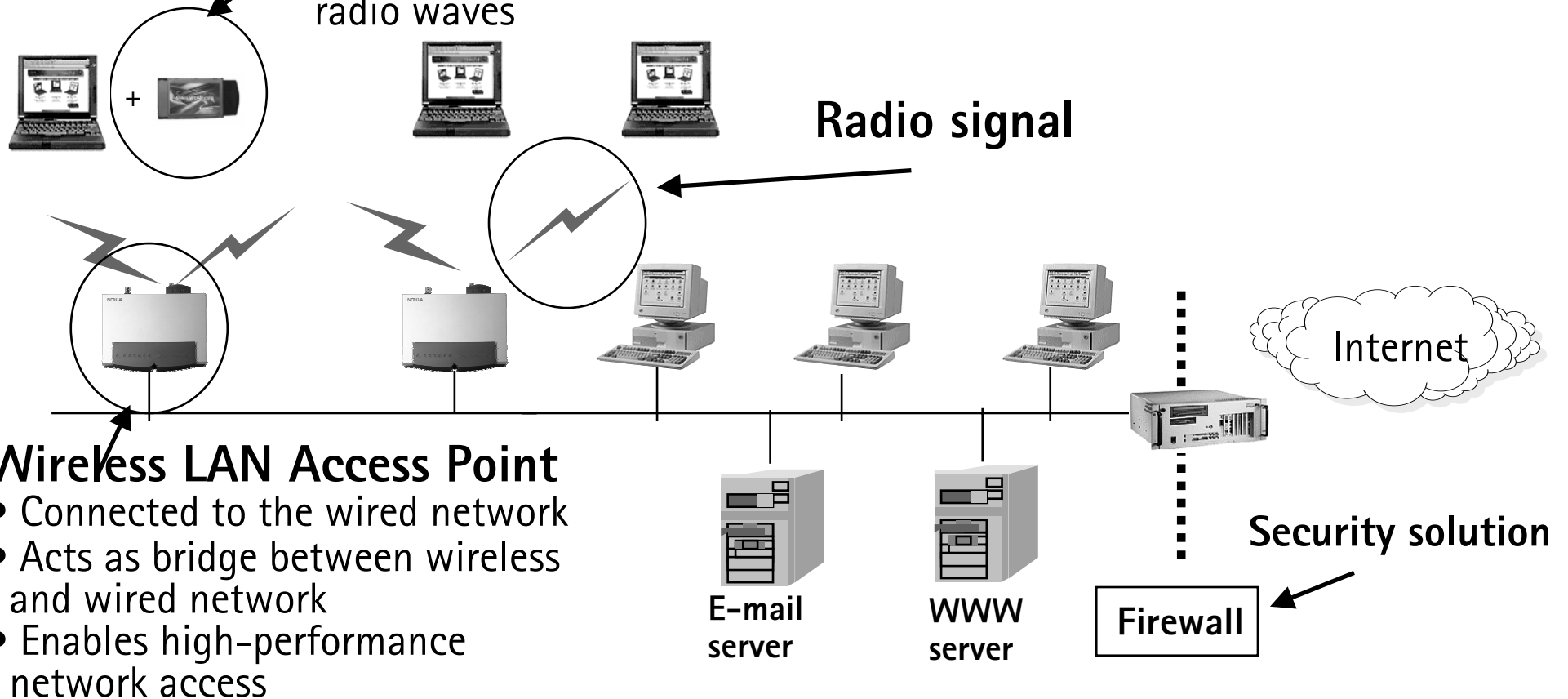


**Convention Centers**

# How Do Wireless LAN Solutions Work?

## Wireless LAN PC Card

- Each wireless station and access point has a wireless LAN card
- Provides an interface between an end-user device and radio waves



## Wireless LAN Access Point

- Connected to the wired network
- Acts as bridge between wireless and wired network
- Enables high-performance network access



# Internet in the Air

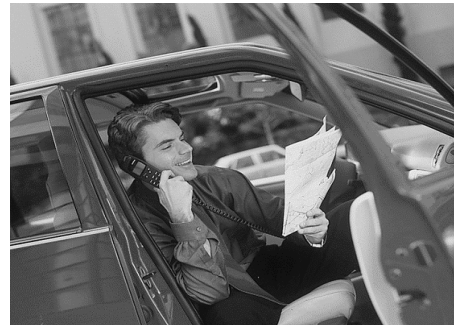
Combining wide area mobility with  
Wireless LAN access zones



- Access zones



- Wireless office – wireless LANs



- Wireless cars – Smart Traffic Products



- Wireless homes

# Bluetooth Vision

Build an invisible connection  
between all your personal  
information devices



*Phone*



*Headset*

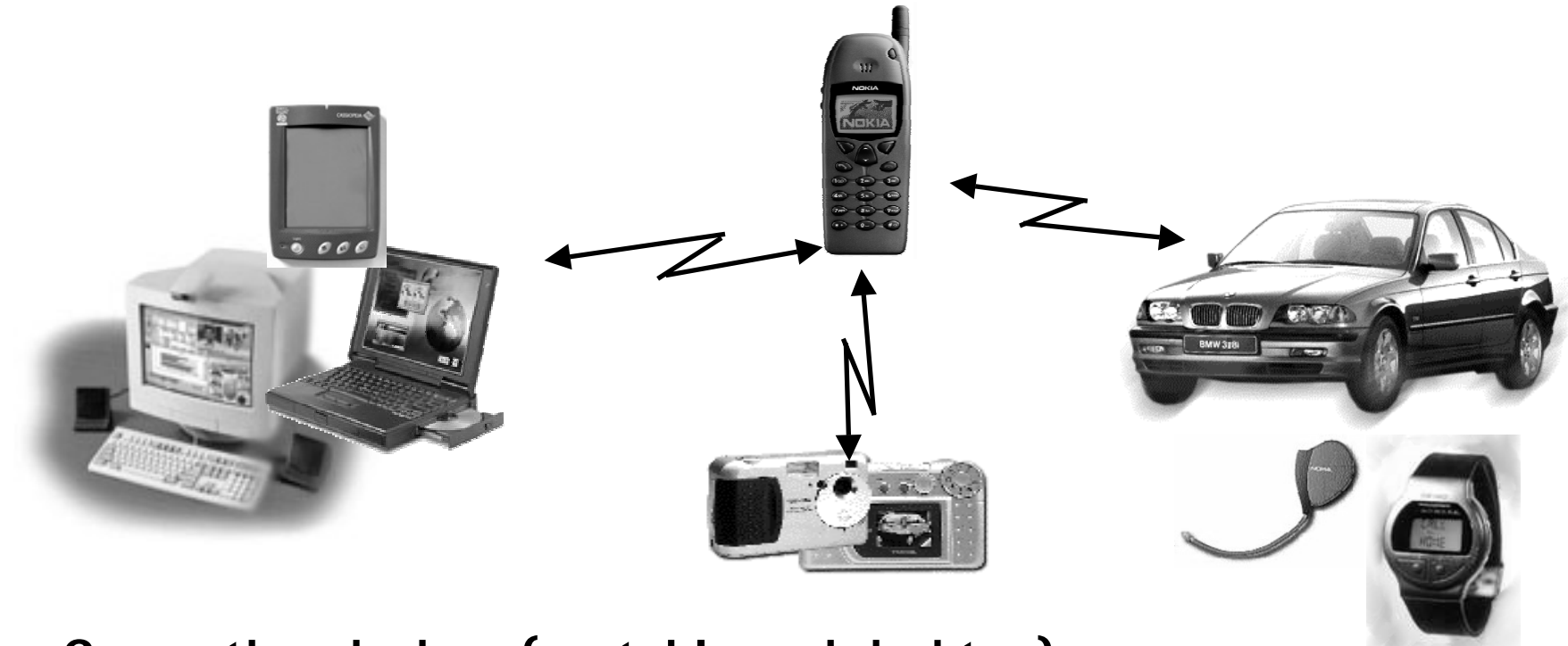


*Watch*



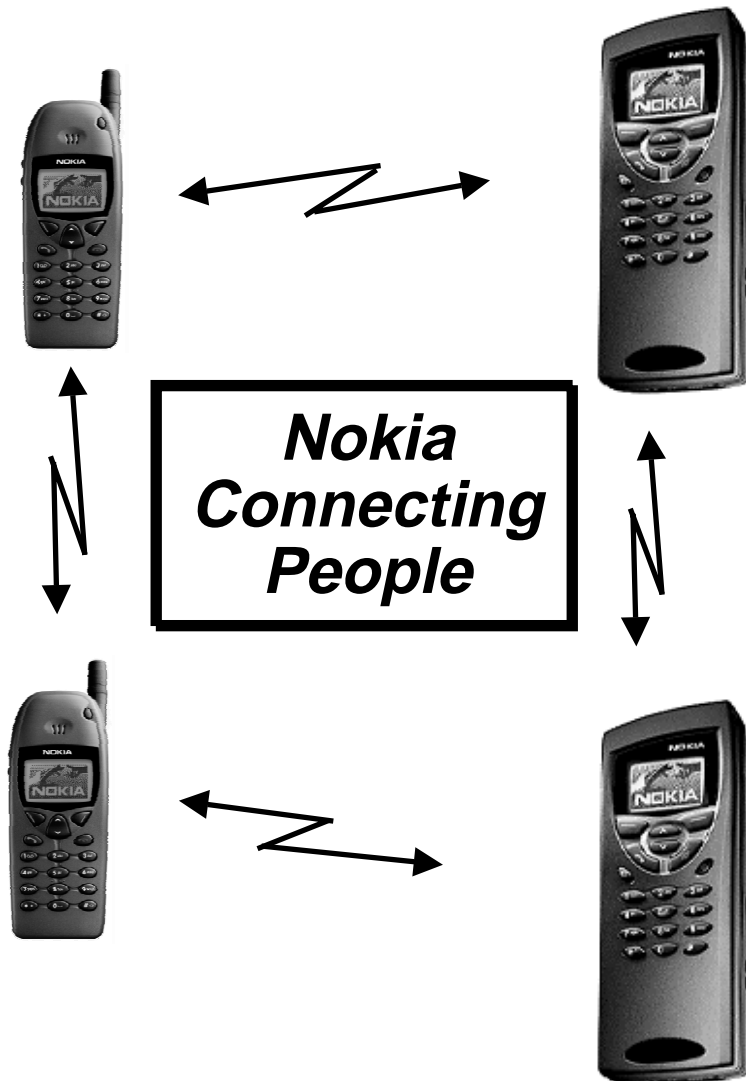
*Computer*

# Usage model: cable replacement



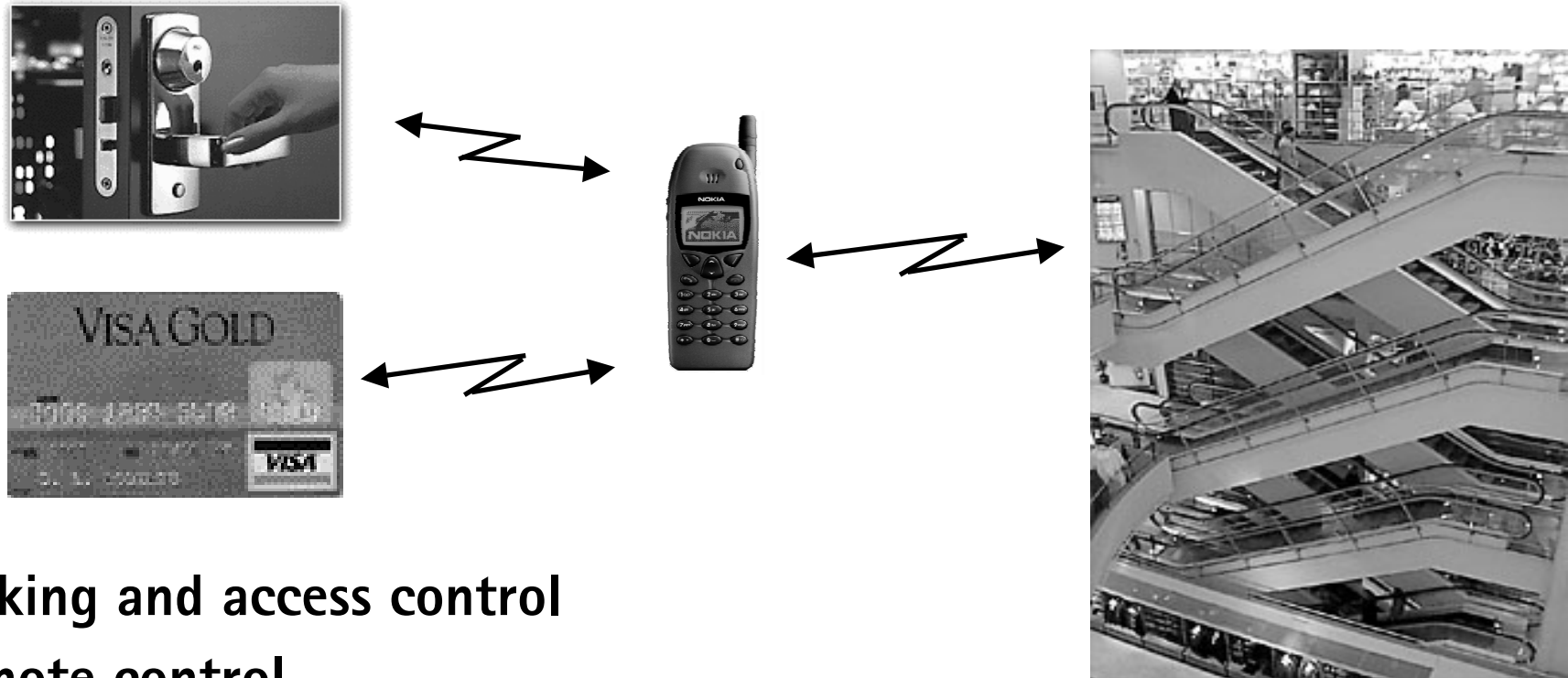
- Computing devices (portable and desktop)
- Accessories and multiparty terminals
- Digital imaging
- Smart car systems
- Access points (Internet, LAN, telephony)

# Usage model: multiparty data exchange



- Exchange business cards
- Set up a meeting in calendar
- Share presentation material
- Sync personal information between multiple terminals
- Play multiplayer games!

# Usage model: the personal device (future)

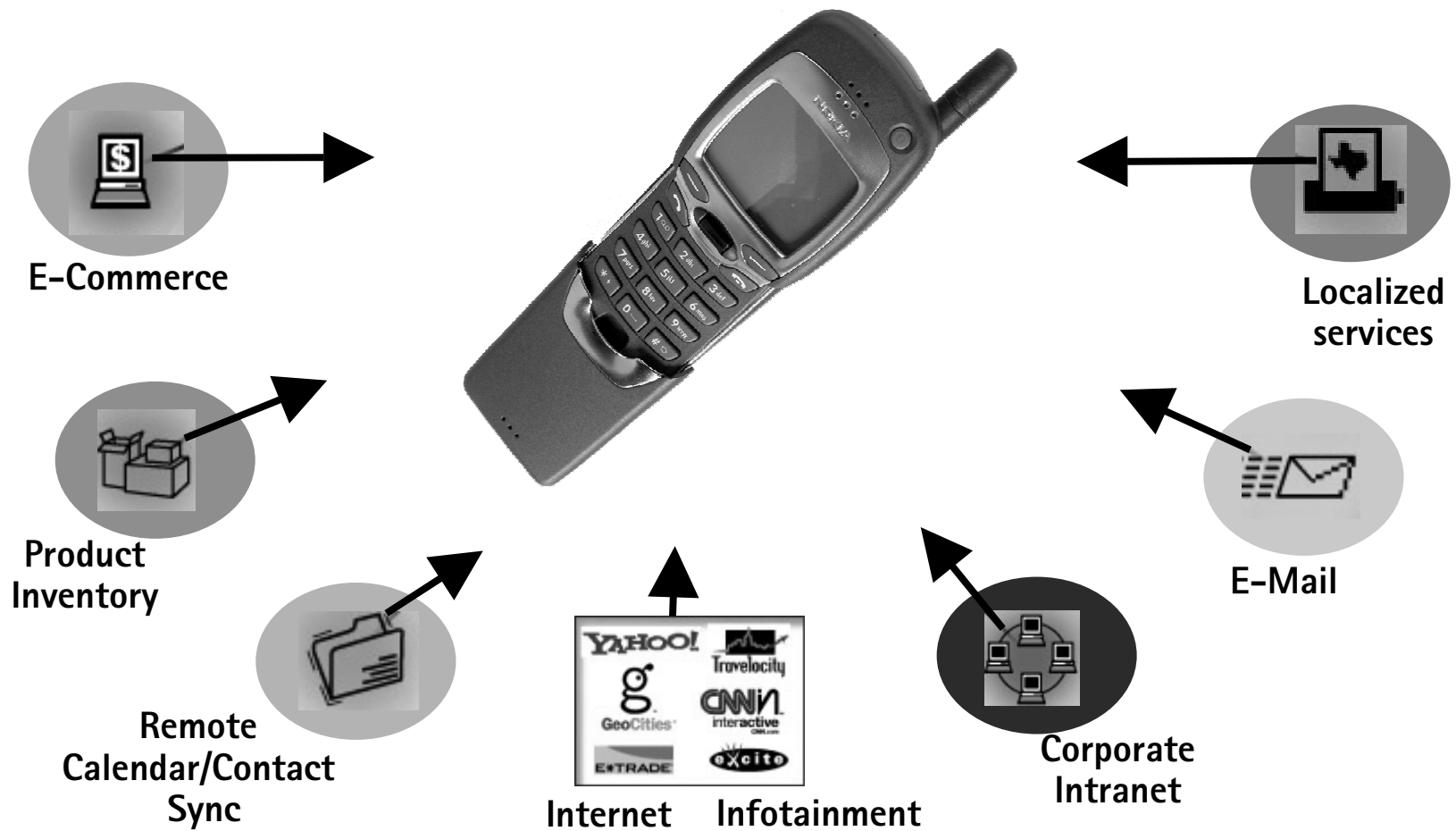


- Locking and access control
- Remote control
- Local VAS (operators, shops, frequent flyers)
- E-commerce secure transactions
- Active profile changes

# Bluetooth User Interface Challenges

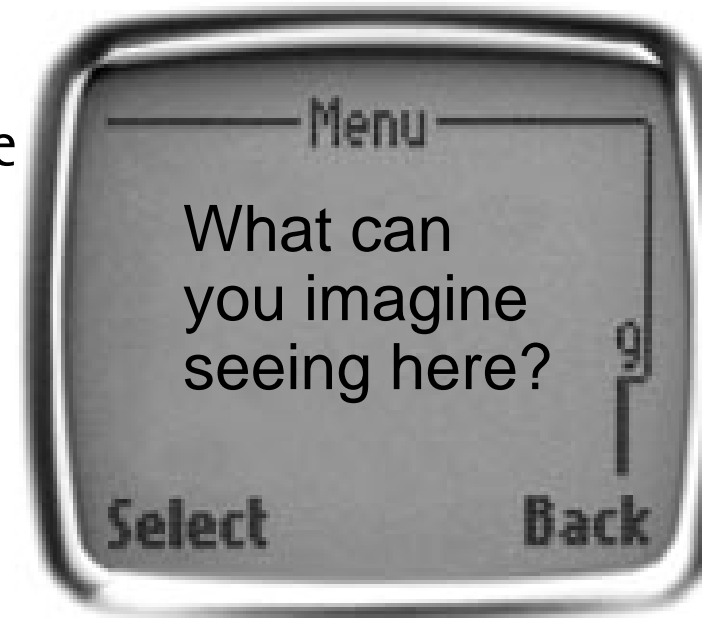
- Intuitive and consistent operation is critical
- Connections cannot be enabled by cables or pointing at devices
- Connections may be:
  - permanent (e.g. between phone and headset) or
  - temporary (e.g. exchanging business cards between phones)
- Some devices (e.g. headset) have a very simple or no user interface
- Access from local VAS providers needs to be granted or rejected

# WAP provides mobile access to services



# Information services

- Interactive applications
  - Fetch information from Internet and intranet
    - XML, HTML, TTML, HDML etc.
  - Easy reading, navigation and input
    - WML optimized for small devices
  - Vendor specific user interface
    - Familiar way to use the phone
- Latest stock news
- Weather information
- Flight itinerary requests
- Corporate phone book and calendar





# Transaction services

- Banking: bill payment, money transfers, balance queries
- Travel
  - ordering and booking
  - ticket sales ('electronic tickets')
- Corporate IT applications:
  - sales systems (orders, bookings)
  - logistics
- Betting, gambling



# WAP Service - Online Travel Ticketing

- Notification from your travel agent (WapTravel)

Choose *"Change your travelplan"*

- Authentication

- Available alternatives:

The *"16:10 flight"*

The *"16:25 flight"*

Call *"Wap Travel"*

Choose one for further information

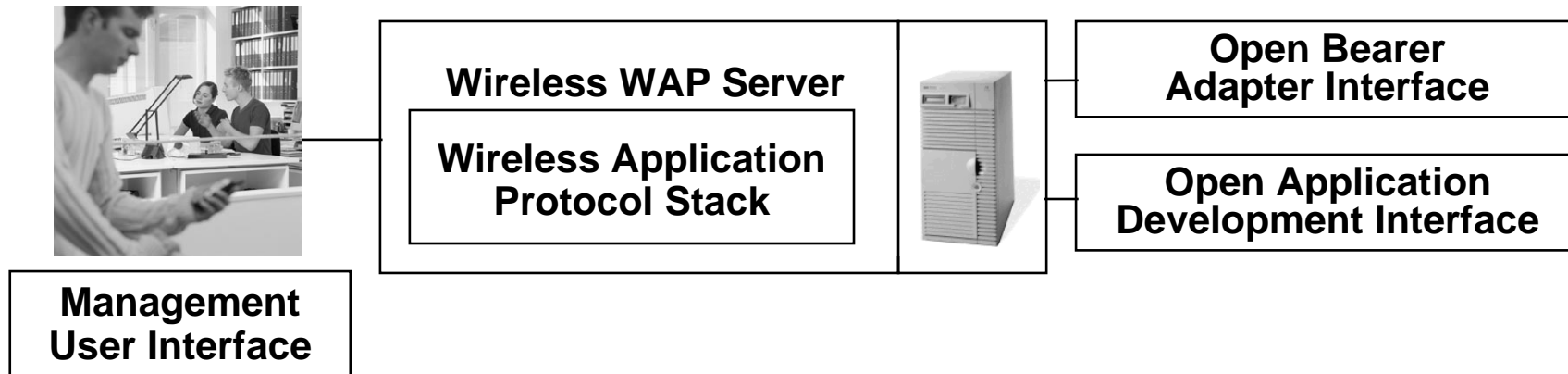
- Choose "Accept"

- Confirmation Message appears



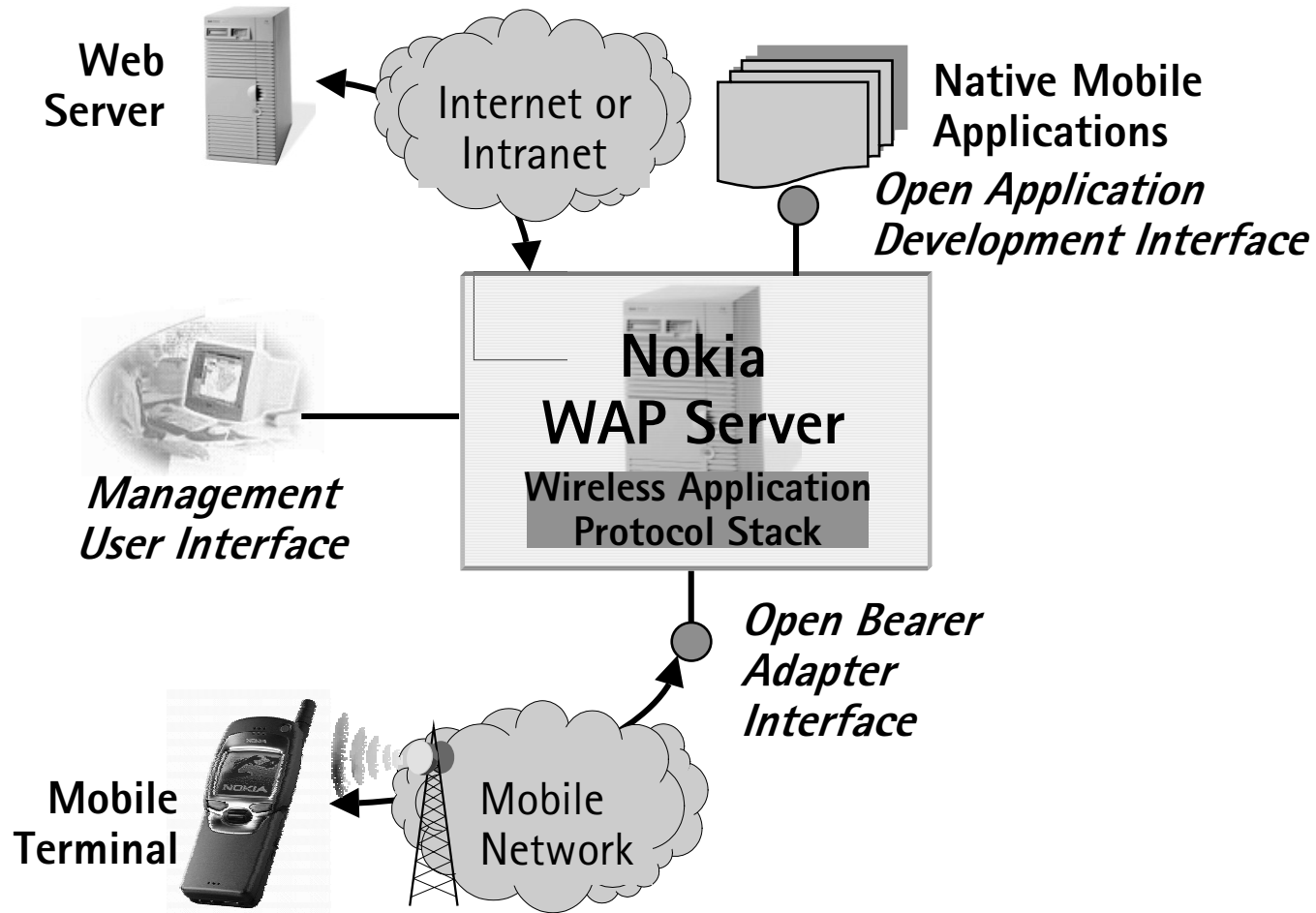
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# WAP Server Basic Functionality



- Serve WAP clients through Wireless Application Protocol
- Run WAP over wireless bearers
- Application Hosting extension interface for accessing local applications
- Access to WWW servers
- Authenticate and authorize users
- Secure client-server communication
- Configure and manage the product
- Access HTML/WML content
- Interfaces for
  - accessing other than Web servers
  - billing, monitoring

# WAP Service Architecture



# Mobility - New Dimension to the Internet

- third generation - 'killer environment'
- mobile devices - main access to data services
- end-user needs drive development of services
- seamless interoperable solutions
- open platforms facilitate service development

*'work is no longer a place'*

# The Internet revolution has just begun

The internet will change the relationship between consumers and producers in ways more profound than you can yet imagine

The Internet is the foundation for a new industrial order

**THIS IS NOT A RISING TIDE, IT'S A TIDAL WAVE**

FORTUNE Dec 7, 1998  
Gary Hamel and Jeff Sampler

**Thank You**



**CONNECTING PEOPLE**

**NOKIA**