Pervasive Computing

Dr Andy Stanford-Clark

IBM UK Labs, Hursley

andysc@uk.ibm.com

Objectives

- Introduce you to "Pervasive Computing"

- Help you understand the potential impact

- Describe some solutions in use today

- Provide a basis for discussion

Agenda

Pervasive Computing:

- What is it?

- Why is it important?

- Where is it at now?

- How will it affect me?

What is Pervasive Computing?

"...a billion people interacting with a million e-businesses with a trillion intelligent devices interconnected ..."

(L.V.Gerstner)

e-business everywhere

What is Pervasive Computing?

Client-Server

Network Computing

"e-business"

natural evolution

Pervasive Computing

connectivity services

content formats

natural and consistent presentation

"e-business... anywhere, anytime"
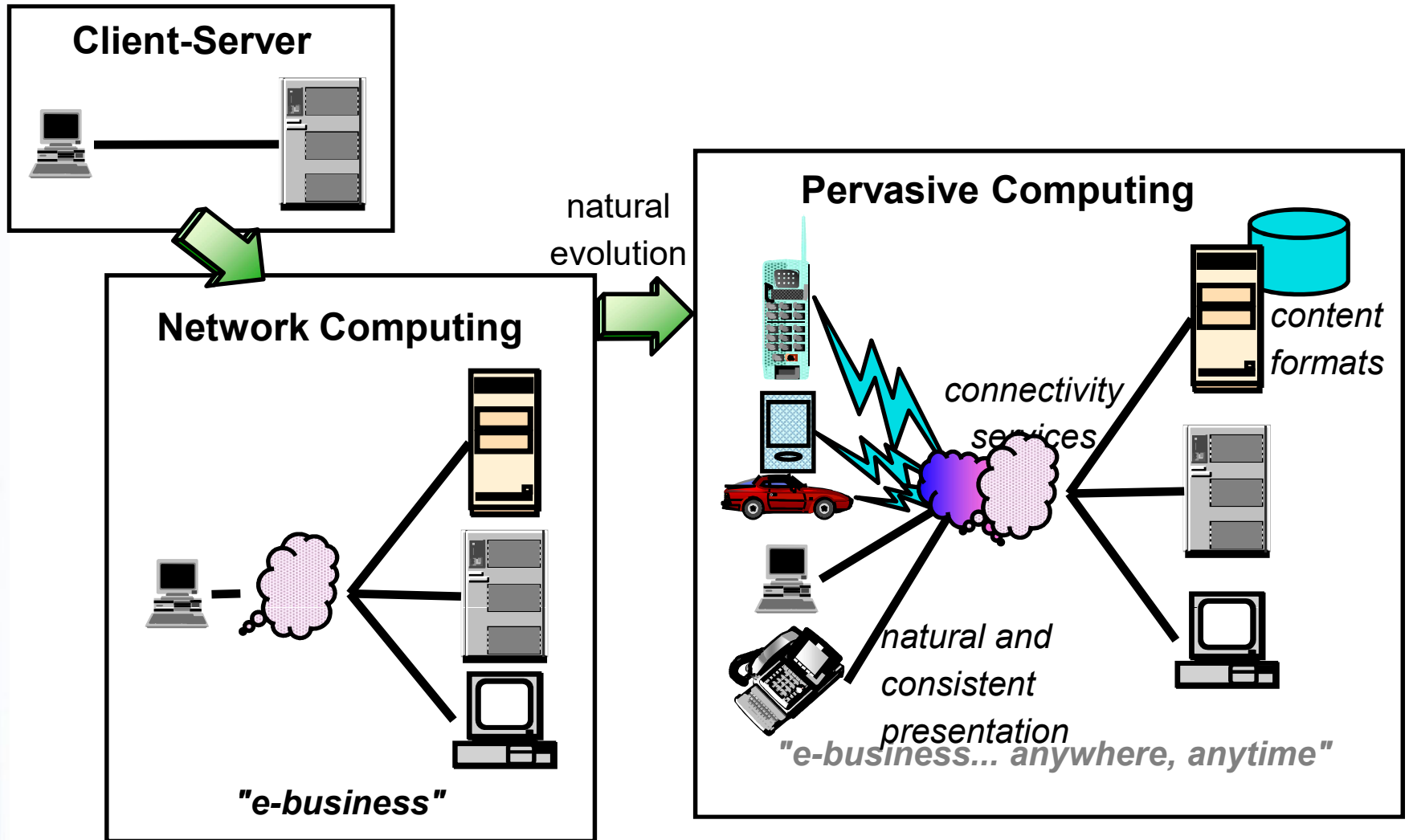
A Natural Evolution

What is Pervasive Computing?

BusinessWeek US Edition, March 8th 1999.

Taking us "Beyond the PC"...

What is Pervasive Computing?

The three waves of pervasive computing:

- **Hand-held PCs**
- **Information Appliances**
- **Invisible Computers**

Palm VII

IBM e-Newspaper

Variety of device formats & capabilities

What is Pervasive Computing?

• Networked Devices Everywhere

• A Natural Evolution

• Taking us "Beyond the PC..."

• With a variety of devices and capabilities

aka:

"Ubiquitous" Computing, "Mobile" Computing,
"Information Appliances," "Tier zero," ...

Pervasive Computing is Coming...

Agenda

Pervasive Computing:

- What is it?

➔ Why is it important?

- Where is it at now?

- How will it affect me?

Why is PvC Important?

- Because it's disruptive

- Because of its penetration

- Because it has big backing

- Because of the *applications*

Because it's Disruptive

- Lots of new players

  ƒ Diamond Multimedia, TiVo, Replay Networks, Qubit Technology, Aplio,HandSpring...

- New moves from established companies

  ƒ IBM, Sun, Microsoft, 3Com, Telcos, AOL, Sony, Psion, Symbian, Nokia, Motorola, Ericcson,...
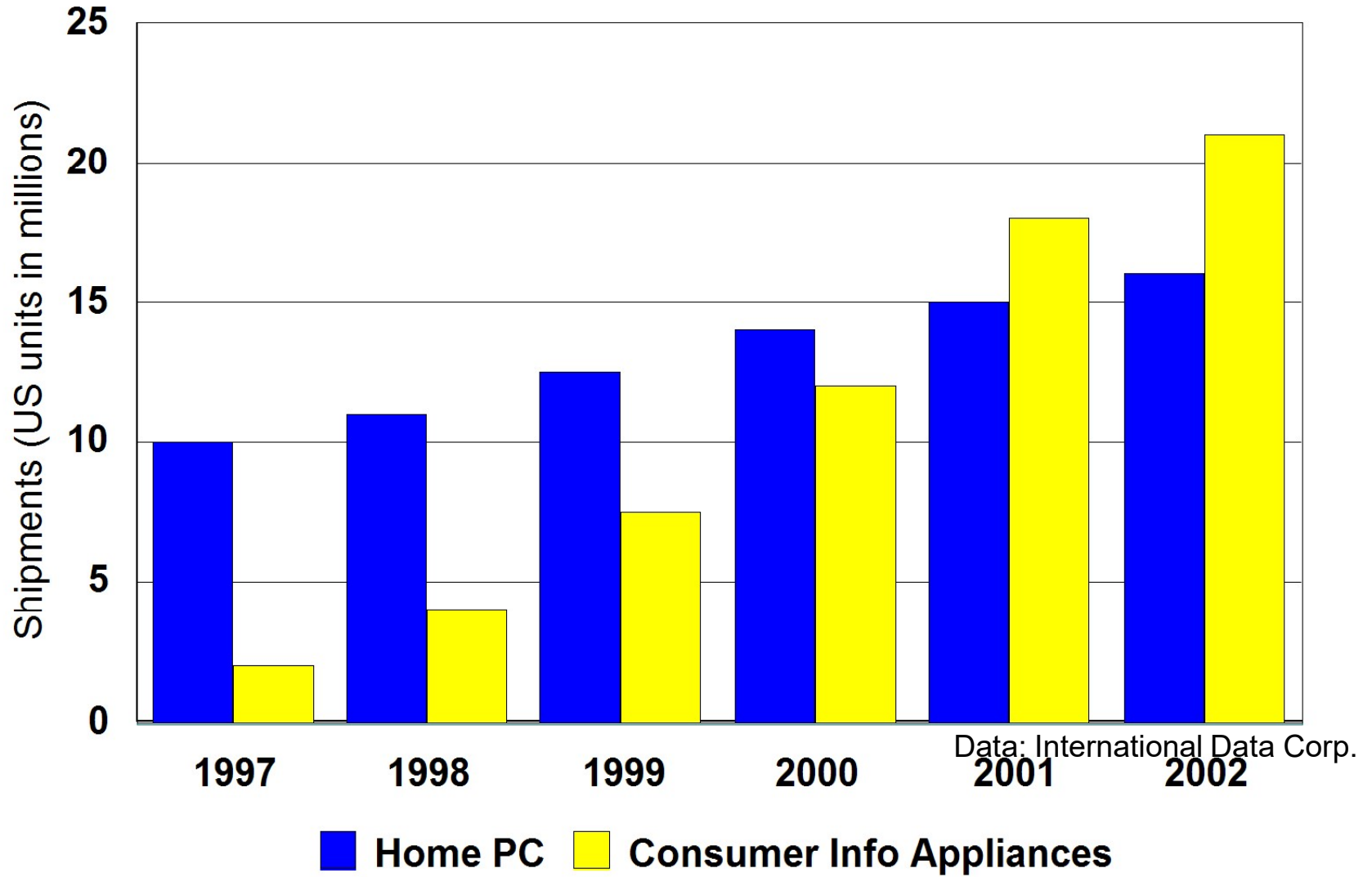
- No clear winners yet

A change of playing field

Because of its penetration

Info Appliances will outnumber Home PCs

Because it has Big Backing

- Consumer device manufacturers (e.g. Sony)

- Mobile Phone Companies (Nokia, Ericsson, Motorola)

- Network providers (AT&T, Cable&Wireless, Alcatel,...)

- IT Industry (IBM, Sun, Microsoft, HP,...)

Broad support across a wide range of companies

Because of the Applications

e-business

Smart Card

Personal Productivity

ƒ **Mail, scheduling etc.**

Line of Business (Intranet)

ƒ **Corporate database**
  - **customer profile**
  - **new product info.**
  - **inventory info.**

ƒ **Business transaction**
  - **order entry**
  - **simulation**

Mobile Workers, Consumers

ƒ **Corporate database access**

ƒ **Messaging, Communication**

ƒ **Personal information management**

Consumer Services

ƒ **Messaging**
ƒ **Online banking**
ƒ **Travel services**
ƒ **Stock tradings**
ƒ **Shopping**
ƒ **News, information**
ƒ **Entertainment**

Integration with

ƒ **ERP**
ƒ **CRM**
ƒ **Billing**
ƒ **SCM**
ƒ **Data mining**
ƒ **Security**
ƒ **etc.**

mobile e-business

IBM

Because of the Applications (II)

Airports

Smart card-enabled MFP

Hotels

Smart card-enabled MFP

Travel Business Centers

Smart card-enabled MFP
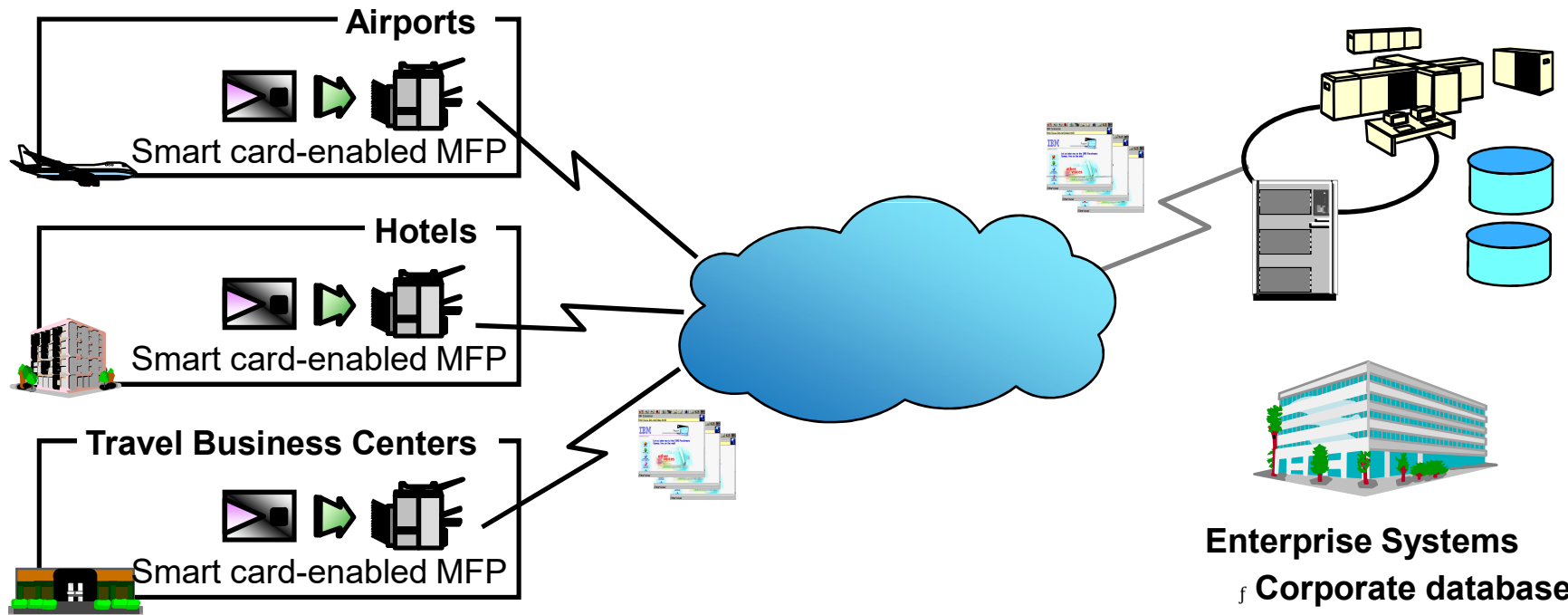
Mobile workers, sales persons
ƒ **Secure transmission of faxes & printed documents**
ƒ **Smart card enables:**
- secure access
- payment

Enterprise Systems
ƒ **Corporate database**
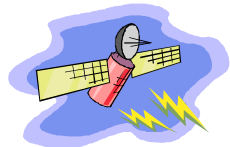- documents
ƒ **Collaboration**
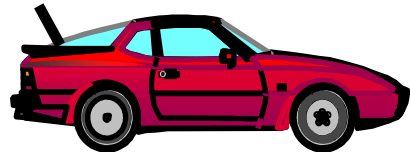- mail, scheduling
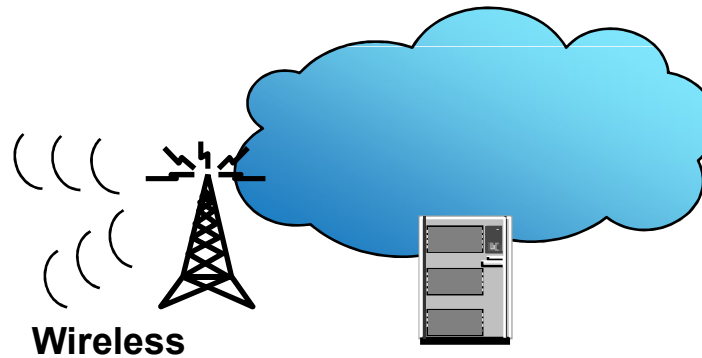
"Nomadic Document"

Because of the Applications (III)

GPS

In-vehicle Intelligent Appliance

Wireless

Network Service Providers
- ƒ **Service infrastructure**
- ƒ **Content aggregation**

Content Owners (business-to-consumer)
- ƒ **Transaction service**
  - –Emergency assistance (insurance, medical, ...)
  - –Maintenance service
- ƒ **Information service**
  - –News
  - –Weather
  - –Parking lots
  - –Traffic information
  - –Restaurant guide
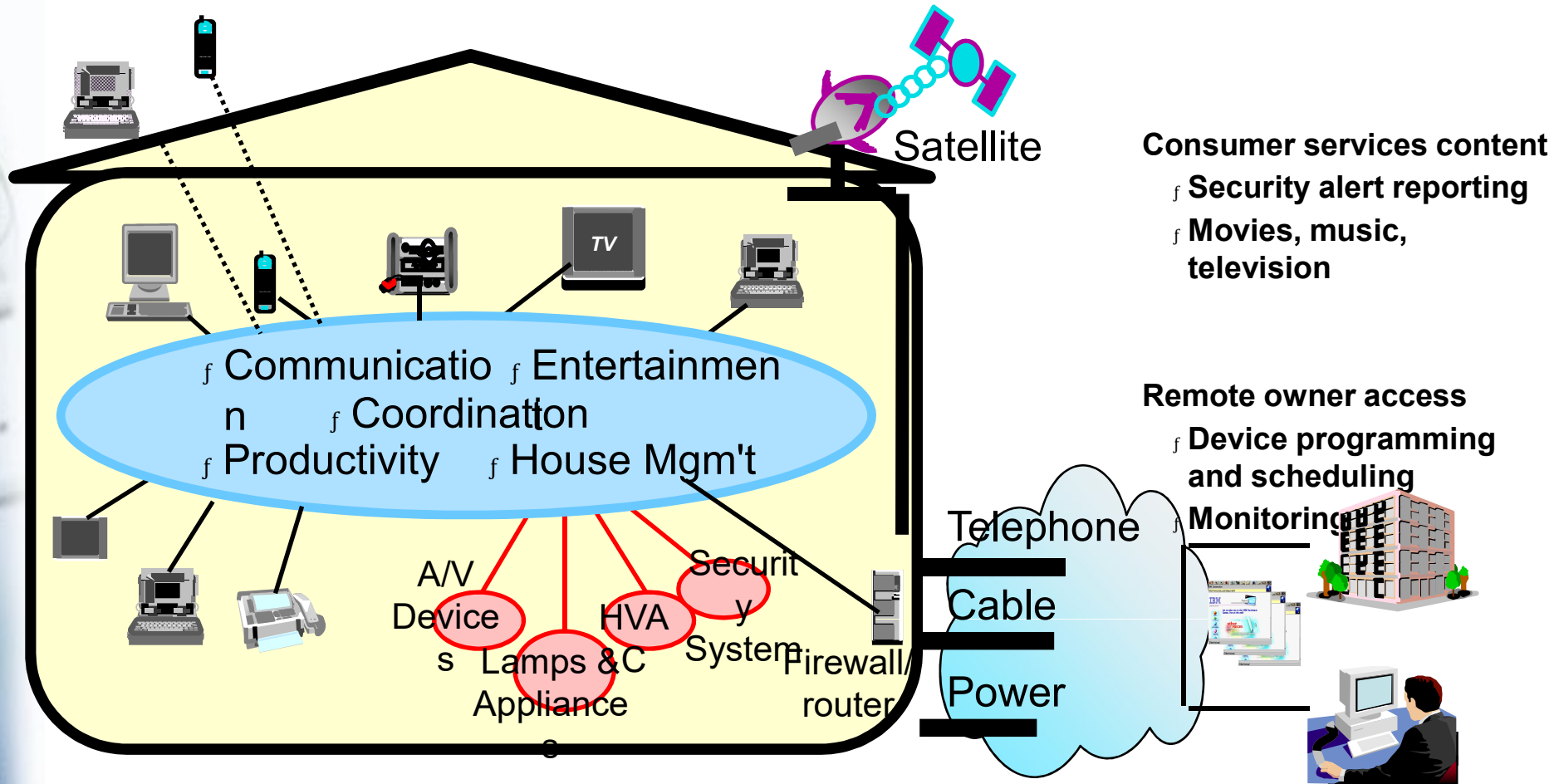 - –Leisure guide
  - –Telephone directory

Consumers
- ƒ **Emergency call**
- ƒ **Maintenance**
- ƒ **GPS navigation**
- ƒ **Information access**
- ƒ **Personal communication**

Networked Vehicle

e-business

IBM

Because of the Applications (IV)

Satellite

Consumer services content
  ƒ **Security alert reporting**
  ƒ **Movies, music, television**

Remote owner access
  ƒ **Device programming and scheduling**
  ƒ **Monitoring**

ƒ Communication
ƒ Entertainment
ƒ Coordination
ƒ Productivity
ƒ House Mgm't

A/V Devices
Lamps & Appliance
HVA C
Security System
Firewall/router

Telephone

Cable

Power

Networked Home

Because of the Applications (V)

Smartcard

**PSTN
ISDN
xDSL**

Security

Screenphone

**Network Service
Providers**
  ƒ **Service
    infrastructure**
  ƒ **Content aggregatio**n

**Content Owners
(business-to-consumer)**
  ƒ **Transaction service**
    – **Banking**
    – **Stock dealing**
    – **Ticketing/shopping**
  ƒ **Information service**
    – **News**
    – **Weather**
    – **Telephone directory**

Consumers
  ƒ **Online transaction**
  ƒ **Information access**
  ƒ **Personal communication**

Personal e-business

Because of the Applications (VI)

At Corporate Campus ...
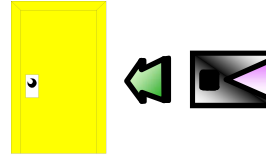
Security control

Single logon

Payment
(e.g., at cafeteria)

Corporate Employees
provided with
Smart Cards
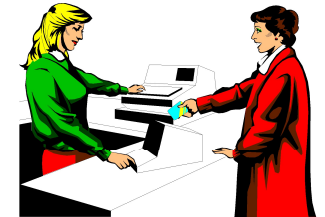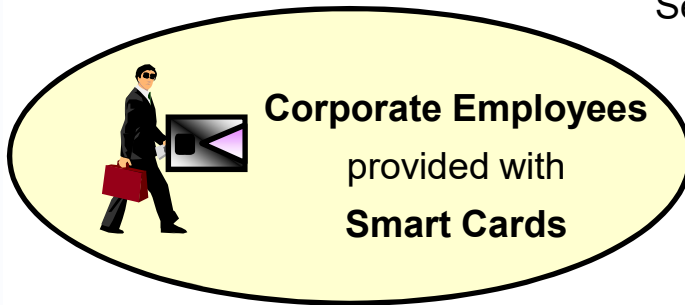
While Traveling ...
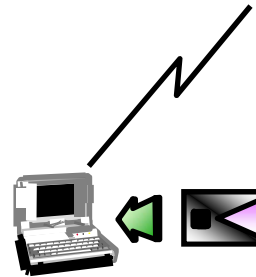
Secure transaction
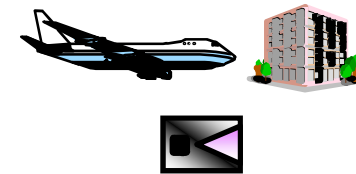
Flight / hotel check-in

Payment

Smartcards

Why is Pervasive Important?

- A change of playing field

- Info appliances will outnumber home PCs

- Broad support across a wide range of companies

- Creates new ways to reach consumers and employees

Pervasive computing opens new horizons

Agenda

Pervasive Computing:

- What is it?

- Why is it important?

➔ Where is it at now?

- How will it affect me?

Where are we now?

- Plethora of devices emerging
  - ƒ Hand-held PC devices:
    - Win CE vs PalmOS vs Symbian, many manufacturers
  - ƒ Information appliances
    - Rio,
    - e-books
    - Sony Digital Picture Frame,
    - Nokia Comm
    - ...

Divergence not convergence

Where are we now?

- Wireless Application Protocol

- Open Service Gateway

- Internet ScreenPhone Reference Forum

- Salutation

- and a host of others

  ƒ OpenCard, JavaCard, MNCRS, ETSI MExE, W3C Mobile IG, Bluetooth, SpeechML, Real-time Java, etc.

  Standards activities underway

Where are we now?

- Alliances
    - ƒ e.g. Microsoft & AT&T
    - ƒ Symbian
    - ƒ Netscape - Sun - AOL
    - ƒ IBM and many partners
- Supporting Products
    - ƒ IBM Mobile Connect
    - ƒ IBM Mobile Net.Connect
    - ƒ VisualAge for Embedded
    - ƒ DB2 Everywhere
    - ƒ MQSeries Everywhere
    - ƒ Satellite Forms

Marketplace finding its feet

Where are we now?

- Diamond Multimedia Rio

- WebTVs and Set-top-boxes

- EPhysician - prescribing by Palm

- Custom content networks - e.g. Palm

- Safeways Easi-Order

Early success stories

In-car telematics

Where's Andy's car?

In-car telematics

OBD data

Power monitoring

Power monitoring

Power Consumption
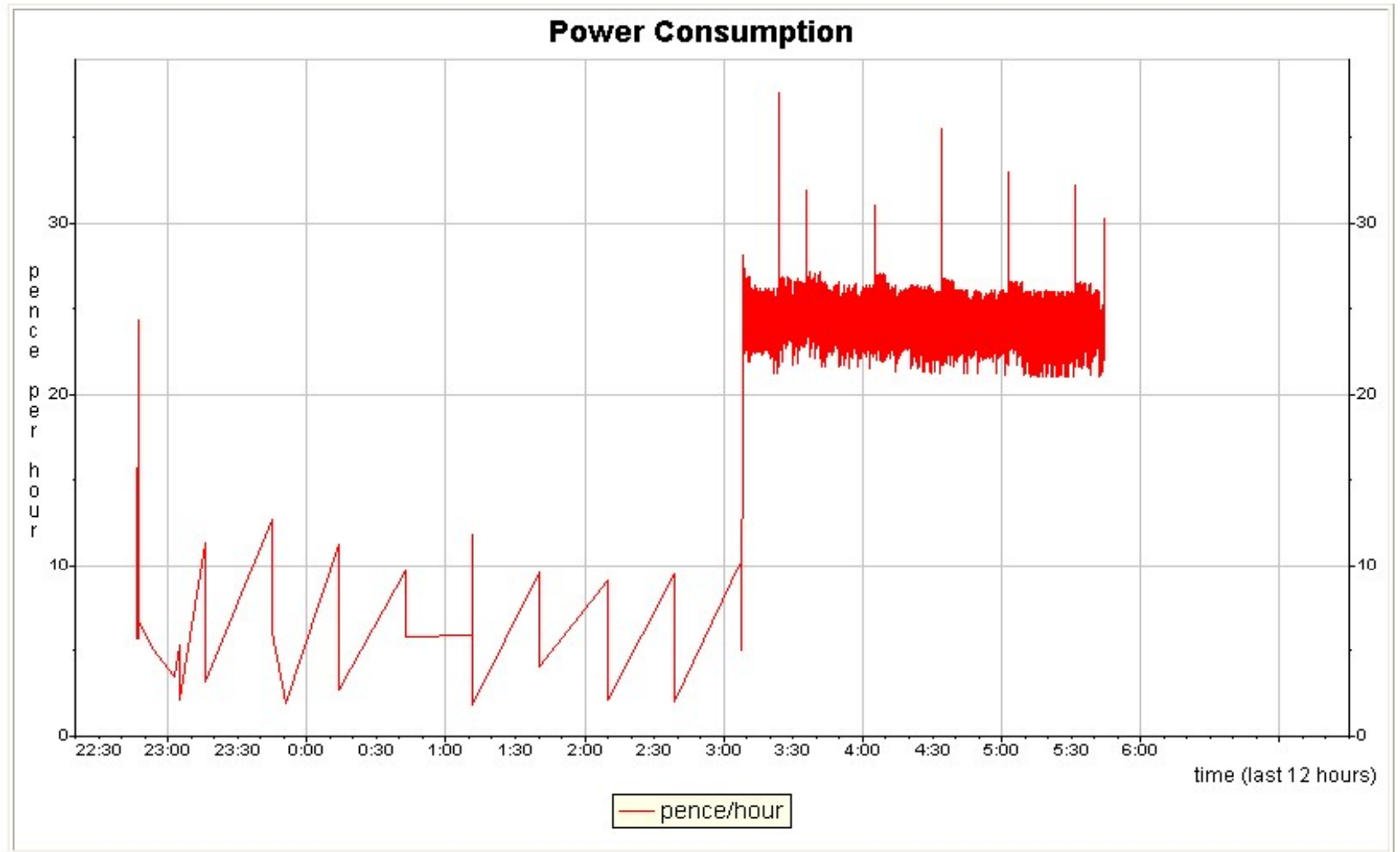
Inventing a better mousetrap

Arcom
"Field Sentry"
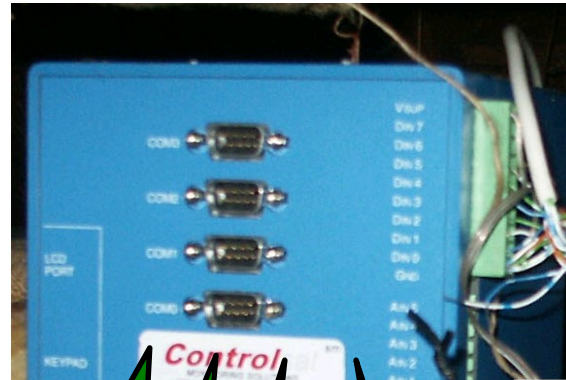
digital
inputs
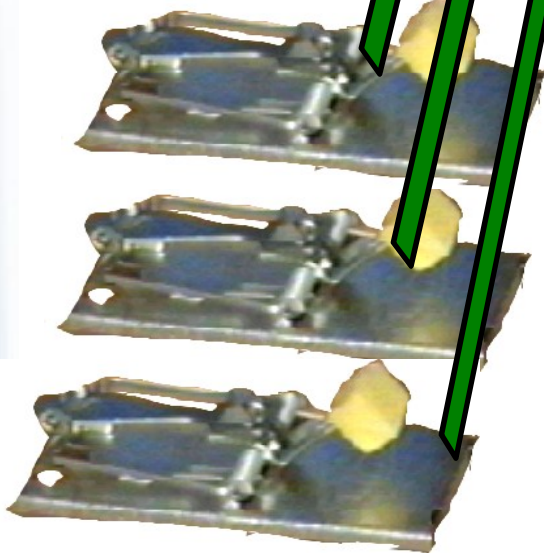
MQTT
over PPP

SMS via
SMTP

Message
Broker
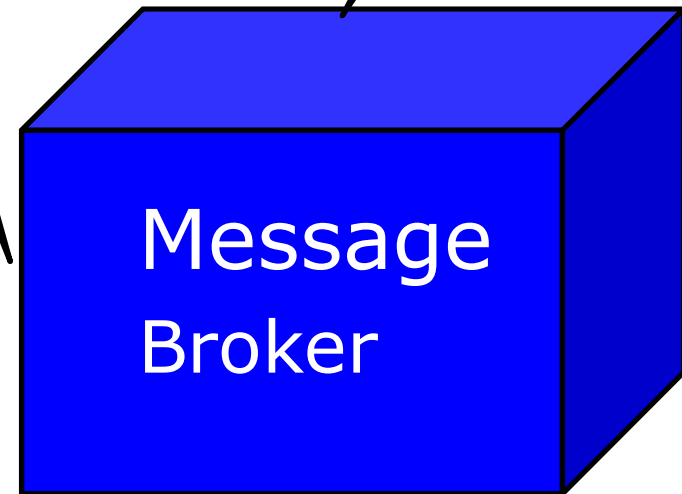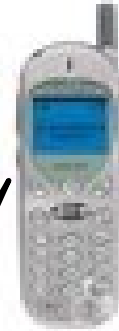
Mousetrap

The mice get revenge…

Where are we now?

- Divergence of device types

- Standards activities underway

- Marketplace finding its feet

- It's starting to happen!

Making an impact

Agenda

Pervasive Computing:

- What is it?

- Why is it important?

- Where is it at now?

➔ How will it affect me?

How will it affect me?

- New ways of dealing with customers
    - ƒ more direct (disintermediation again)
    - ƒ more personalised
    - ƒ many more channels
- New competition
    - ƒ size doesn't matter!
- New opportunities to partner
- New ways of working
    - ƒ Mobile workforce
    - ƒ Streamlined processes

    Bigger than the web as we know it today!

How will it affect me?

- Infrastructure challenges

  ƒ Support for large client volumes

  ƒ Support for many device types

  - Dynamic content translation & formatting

  - applications

  ƒ 24x7x52 - no excuses!

  ƒ "e-channels"

New demands on information systems

How will it affect me?

- Value to End Users

  ƒ New lifestyle - personal, in-touch, secure, convenient and fun

  ƒ Flexible and productive work style - location-independent, secure information access and transactions at point-of-needs

- Value to Industry and Corporate Customers

  ƒ Lower operational costs - new work environments, efficient information logistics, and enhanced resource manageability

  ƒ Improved customer service and competitiveness - timely and extensive capturing of end user information

  ƒ New business creation - expanded online reach to consumers

- Value to Technology & Device Partners

  ƒ New source of demand for devices and technology

Value-chain is aligned

Summary

- Pervasive Computing...

  - ƒ is the next "New Thing"
  - ƒ is coming!
  - ƒ opens new horizons
  - ƒ is making an impact
  - ƒ brings new opportunities and new challenges

- IBM is committed to making it happen

  Pervasive Computing is Coming!

Thanks for listening !

andysc@uk.ibm.com