

**B336 Advanced Internet Computing**

**Wireless communications,  
services and devices**

# **Admin Stuff**

**Lecturer (Weeks 10 - 12)**

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**Location**

**ECL Room 2.061**

**Consultation times**

**Wednesdays, 4:30 - 6:30pm**

**Fridays, 11:30 - 1:30pm**

**\*\*\* Don't forget Assignment 2 is due 14th May \*\*\***

# Learning Objectives

- Understand the opportunities and problems of wireless delivery of content, services
- Learn about some wireless devices
- Learn about some wireless services
- Prepare to use the WML application of XML to deliver Web content to WAP devices

# Outline

- Wireless: Yet Another Revolution!
- Wireless Devices
  - modems   PDAs   Mobile Phones
- Wireless Protocols, Services
  - IEEE 802.11   GSM-SMS   WAP
- What we'll do

# Wireless: Yet Another Revolution!

- Technology push (shrinking PCs, more functional phones, advent of PDAs) ==> mobile computing
- Demand pull (more mobile executives, companies needing to continue tech innovation) ==> mobile computing
- Mobile computing has become the Next Big Thing
- Mobile computing as a form of media convergence
- Nobody knows what is going to happen, but everybody wants to be in on any market boom!

# Wireless: Yet Another Revolution!

- Content from where? - Peer or Internet (Web)
- To what? - Some kind of handheld device
- What content, services? - Unknown
- What protocols? - Unsettled between alternatives
- What social, economic impacts? - Unknown...

... but Ovum forecasts wireless portal revenues will soar to US\$42 billion by 2005 - US\$17b in advertising, placement fees, e-commerce, and content subscriptions and US\$25 b in operator revenues from wireless portals, comprising call stimulation, access charges, and subscriptions

[Ovum Report "Wireless Portals: Business Models and Market Strategies", July, 2000].

# Wireless Devices: Modems

- Wireless LAN (WLAN) connection via modem
- Usually radio signals coded using spread spectrum methods (better security, noise rejection).
- Frequencies of 902 - 928 MHz and 2.4 - 2.4835 GHz
- Data rates traditionally slower than wired LANs



wireless modems



# Wireless Devices: PDAs

- Possible due to increasing low power, fast CPUs
- Limitations: Text input, screen resolution, battery life
- Many now feature wireless links to a radio packet service



< Fujitsu wireless tablet

Palm VIIx wireless organiser >



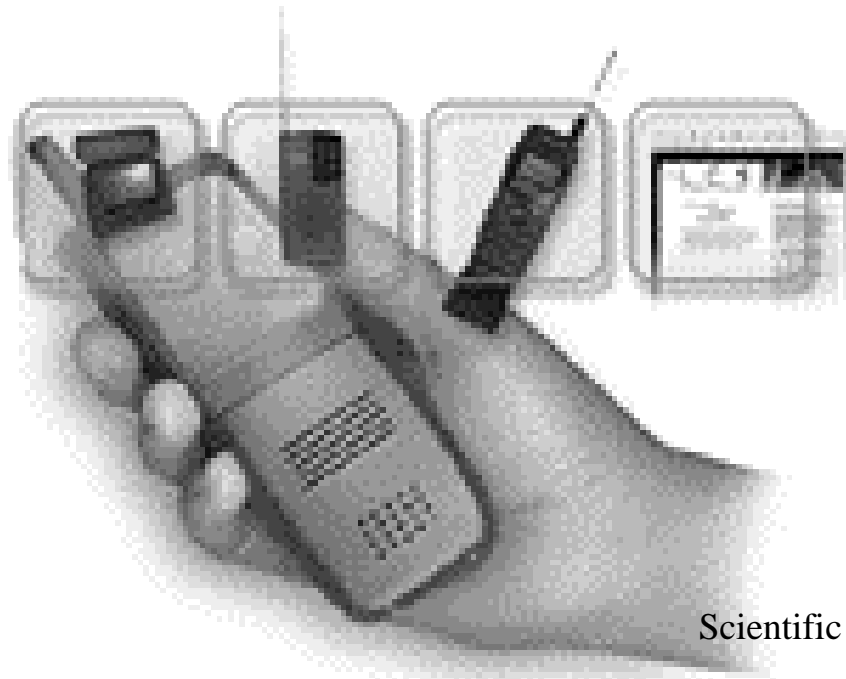
# Wireless Devices: Mobile Phones

- 1998: Sales of mobile phones exceeds desktop PCs
- Phone boom the first indication of the m-revolution
- Competition leads to more services on offer
- Internet content is an obvious candidate (e.g. Web pages)
- How can packets be reliably delivered over cellular radio system (e.g. GPS)?
- How can Web pages be browsed on a screen that size?
- No mouse, less buttons on mobile phone



# Wireless Devices: Mobile Phones++

- Functionality of mobile phones may expand dramatically

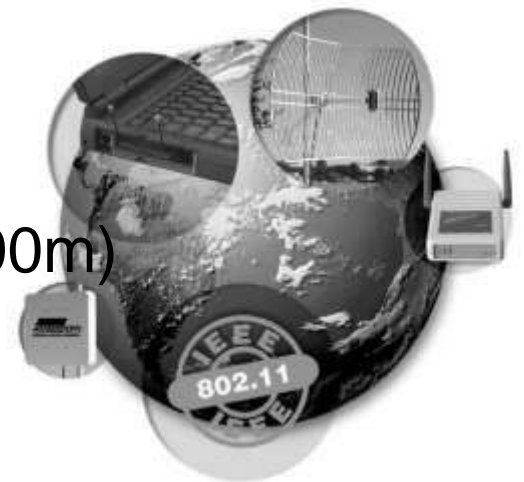


Scientific American

MIT Oxygen project's proposed "Handi-21" universal wireless device

# Wireless Protocols, Services: 802.11

- Lack of standards ==> lack of adopters
- Proposed standard - IEEE 802.11 WLAN
- 2 kinds of network - ad hoc and client/server
- Includes the physical layer protocols for
  - Frequency-hopping spectrum
  - Direct Sequencing Shared Spectrum
  - Pulse Position Modulation infrared
  - Media access control layer
  - 2.400-2.483Mhz radio at 11MBit/sec (100m)
- Now with roaming capabilities!



# Wireless Protocols, Services: SMS

- Short Messaging Service protocol defined as part of GSM mobile phone standard (for paging).
- Initially phone-to-phone, but now can go to fax, or Internet IP number (email to/from some services)
- Features
  - Up to 140 characters per message or binary
  - Store-and-forward service (via an SMS centre)
  - Confirmation of delivery (unlike pagers)
  - Methods to extend functionality included
- Cheap, available now, being used in interesting ways, may be expanded to 900 characters.

# Wireless Protocols, Services: WAP

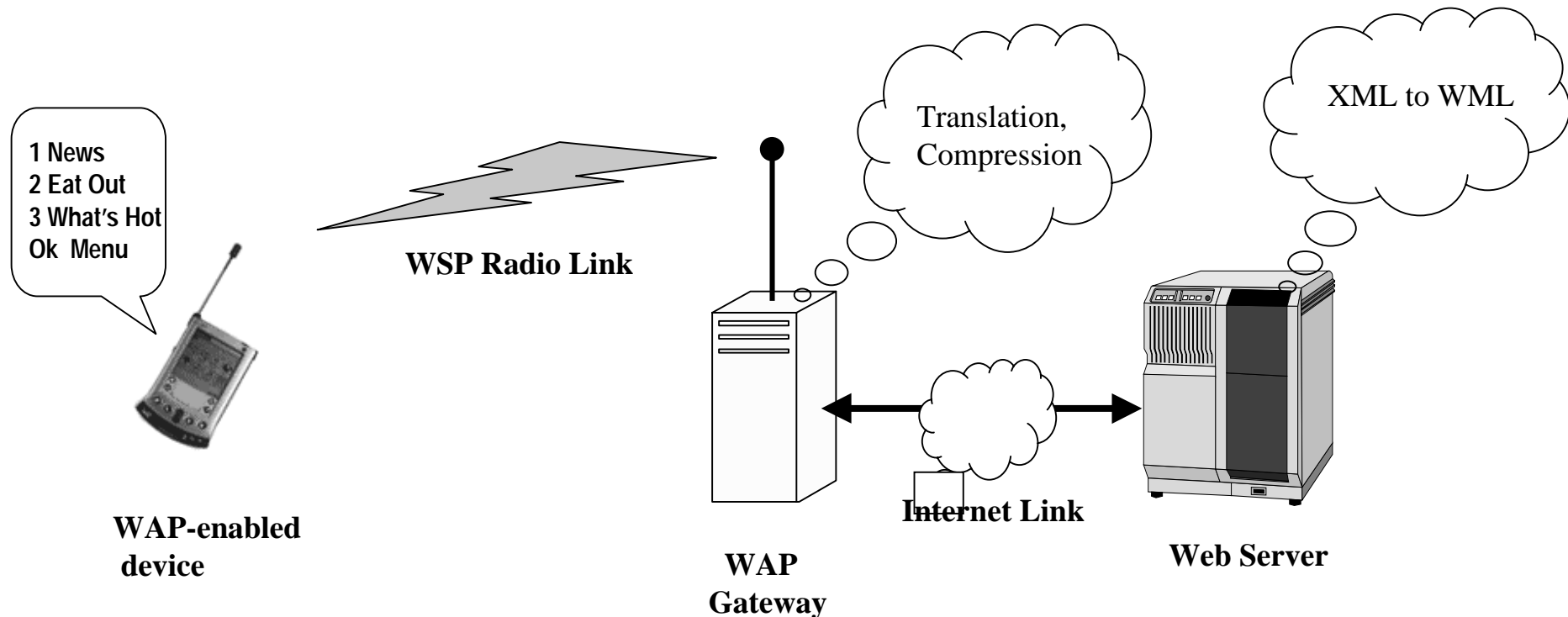
"An open, global specification that empowers mobile users with wireless devices to easily access and interact with information and services, instantly." - WAPforum

- ISO *de facto* standard for mobile-Internet connectivity
- Open Standards Interface specification ==> wide acceptance, wide interoperability
- WAP Forum - industry association of > 250 members working on drafts of protocol
- WAP-enabled phones, PDAs now available; not many WAP services yet
- Growing acceptance in Europe; IP problems in the US

# Wireless Protocols, Services: WAP

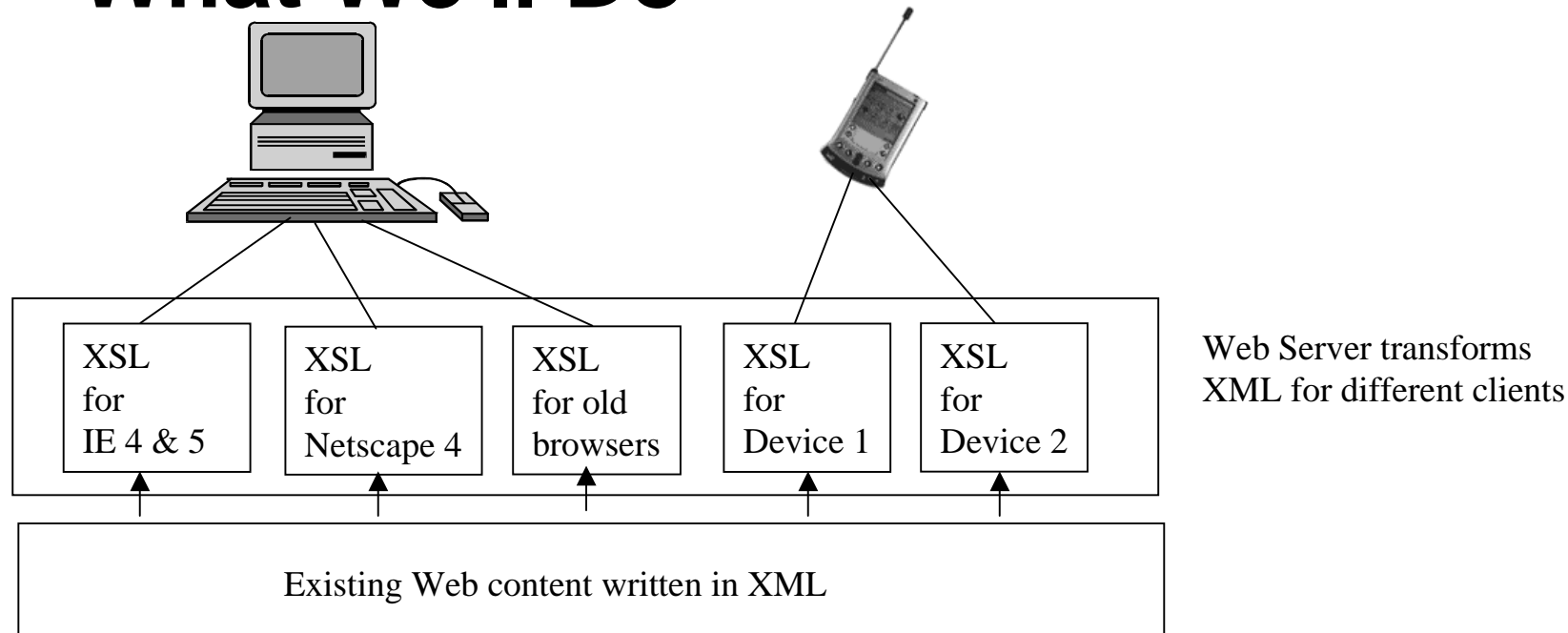
- Problems getting Internet (Web) content to wireless devices:
- Device limitations
  - smaller, lower-resolution screens
  - less memory and processing power for applications
  - lower network bandwidth compared to wired networks
- Communications limitations
  - wireless links suffer sudden, reversible dropouts
  - need seamless switching between adjacent radio cells
  - TCP/IP not ideally suited to work over radio services
- Multiple presentation form standards
  - various proprietary subsets of HTML (some have extensions)
  - Handheld Devices Markup Language (HDML)
  - Wireless Markup Language

# Wireless Protocols, Services: WAP



- WAP separates Web server from different wireless services by a WAP Gateway. WAP forum defines binary variations of web protocols, such as WSP

# What We'll Do



- To avoid rewriting our Web content to suit mobile devices, we'll use XSL Transformation to convert existing XML into Wireless Markup Language, which will work on WAP enabled-devices.
- We'll do this in Assignment 3, using a Nokia simulator<sup>6</sup>

# References

Anderson, et.al. *Professional XML*. Wrox Press, 2000. Chapter 14.

And see

WAP Forum at <http://www.wapforum.com>