



Standards Convergence

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Content

- Mobile communications today
- Where next, 3G+
- A proposed approach to standards convergence for 3G+
- Managing convergence
- Technology consideration
- Commercial implications
- The FLOWS project team
- Summary





Today

- Mobile is widely used (2G)
- GPRS
- MMS - picture messaging
- 3G is imminent (1st March in UK)
- Killer applications for 3G?
- WLAN deployed in public "hot spots"
- Applications convergence by IP

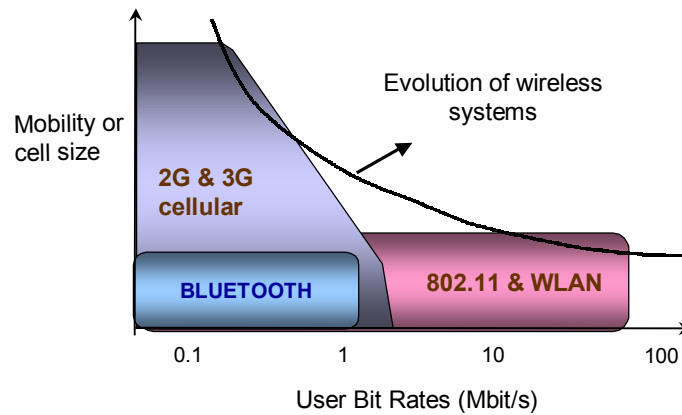


Today

- Nokia - laptop modem D211, WLAN+GPRS
- Ericsson - "Always best connected"
- Qualcomm - 802.11b included in next generation 3G chip sets
- Bluetooth in mobile handset
- One wireless solution fits all?
 - No, not in the short term
- Competition between mobile and WLAN
 - No, complementary
- One piece of hardware?
 - Integrated into a single terminal - Yes



Mobility versus bit rate - a limit? Where are we moving to?



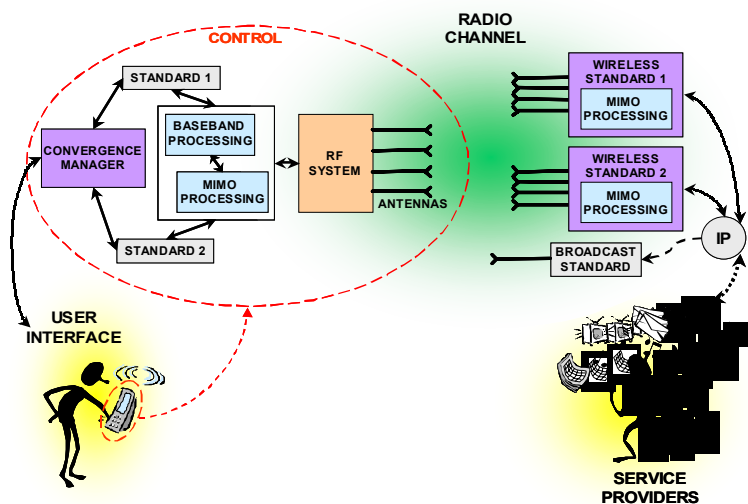
What next?

- Current approach is to use one connection per session, either cellular or WLAN, not both.
- Our proposed approach, use a simultaneous solution:
 - Get the best from each wireless system, cellular or WLAN, at any instance
 - Provide the best support for the applications at any instance
 - Provide greatest flexibility to the user and service provider
- Need to develop a definition of "simultaneous use"

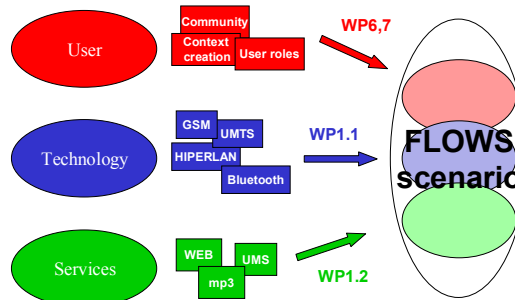
Standards convergence - a definition

- Simultaneous use of standards
 - Parallel or alternate use of equipment and radio networks adhering to two or more physical layer transmission standards for the transmission of information related to the same communication.
- Standards convergence
 - Utilising two or more wireless standards to provide better support for users and their applications.
- Which standards?
 - GSM, UMTS and WLAN
 - DVB and WPAN may be included in future
- FLOWS
 - Flexible convergence of wireless standards and services

A scenario



Scenarios and services

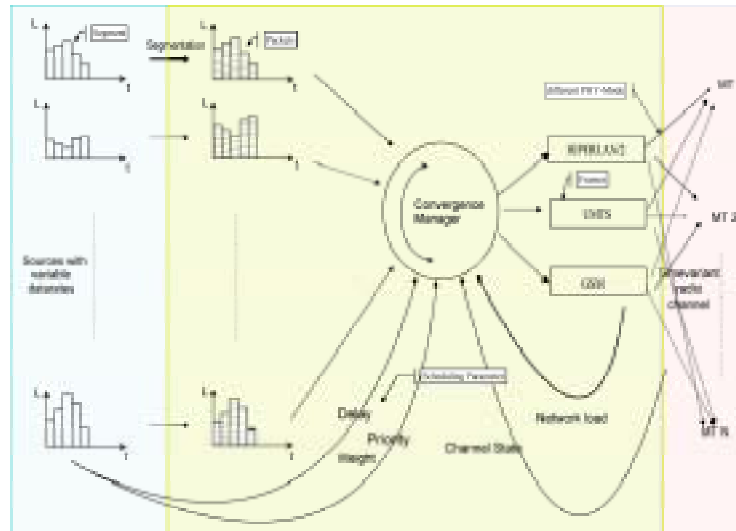


- Mapping of services to standards
- Identify common operational scenarios for FLOWS
- Allows us to define potential new services & applications

Partitioning an application & mapping services to standards

- **Multimedia telephony**
 - Service type
 - Audio - GSM or UMTS
 - Video - WLAN
- **MPEG video & audio**
 - Service requirements
 - Most important data - UMTS
 - Least important data - WLAN
- **Context aware advertising**
 - Services are different
 - User location & mobility management - UMTS
 - Context aware content - WLAN

Managing Convergence



Managing Convergence

- Role of the convergence manager
 - In the access point - mapping services to standards and functioning as an inter-working unit
 - In the mobile terminal - mapping applications to services
- Scheduling strategies
 - Application requirements
 - Delay
 - Priority
 - Channel state
 - Rate of dropped packets
 - Load
- Coded route diversity
 - Make use of more than one wireless connection to enhance link robustness



Managing Convergence at the link and physical layers

- Technical challenge - simultaneous operation of two or more wireless systems in close proximity (shared antenna)
- How?
 - TX + TX... difficult
 - TX + RX... possible
 - RX + RX... OK
- Careful isolation
- Interleaving the transmission and reception slots
- Rapid and regular handover between standards
 - Is this necessary in a packet based network?



Technology issues that are being addressed by the FLOWS project

- How do we best exploit MIMO antenna techniques?
- What techniques should we use?
 - Multi-standard "friendliness" & performance
 - Linear beamforming
 - Spatial multiplexing
- Radios for both multiple standards & MIMO
 - Very little reported work for MIMO
 - Component sharing is possible
- Antenna - MIMO array, also multi-band
 - Probably restricts use to PDAs and laptops
- New channel propagation models specifically for MIMO
 - Based on eigenvalue statistics





Commercial Implications

- Strategic analysis of benefits and impacts on users and operators.
- Assessment of potential barriers to uptake of the converged multi-standard approach
 - Cost, battery life
 - Implication for infrastructure, mix of service providers
- What is the key issue, the "pole of attraction" that will interest people to the concept of standards convergence?
- Where best to target the results of FLOWS in current and future standardisation activities?



European FLOWS project

The partners



Philips Research Laboratories, UK.
Siemens AG, Germany.



Telenor R&D, Norway.
Mobilkom, Austria.



FTW, Austria.



Technical University of Lisbon, Portugal.



University of York, UK.

Technical University of Hamburg-
Harburg, Germany.



The University of Edinburgh, UK.
University of Kaiserslautern, Germany.



Project duration: January 2002 to December 2004



Summary

- The FLOWS project is developing a concept whereby two or more wireless standards are used "simultaneously."
- We call this standards convergence
- This approach potentially offers improved use of existing wireless standards and the services that they support.
- The use of MIMO techniques offers additional flexibility for service provision.
- Our objective is to influence standardisation activities to create harmonisation, in particular those concerned with current & future mobile systems.



Acknowledgements

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- Please look at www.flows-ist.org for more information on the project.



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