Standards Convergence

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- A proposed approach to standards convergence for 3G+
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- 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?

Evolution of wireless systems

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

- 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.

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