ANWIRE
Academic Network for Wireless Internet Research in Europe

Always Best connected (ABC) : Enabler of 4G

Anwire: NoE project

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Outline

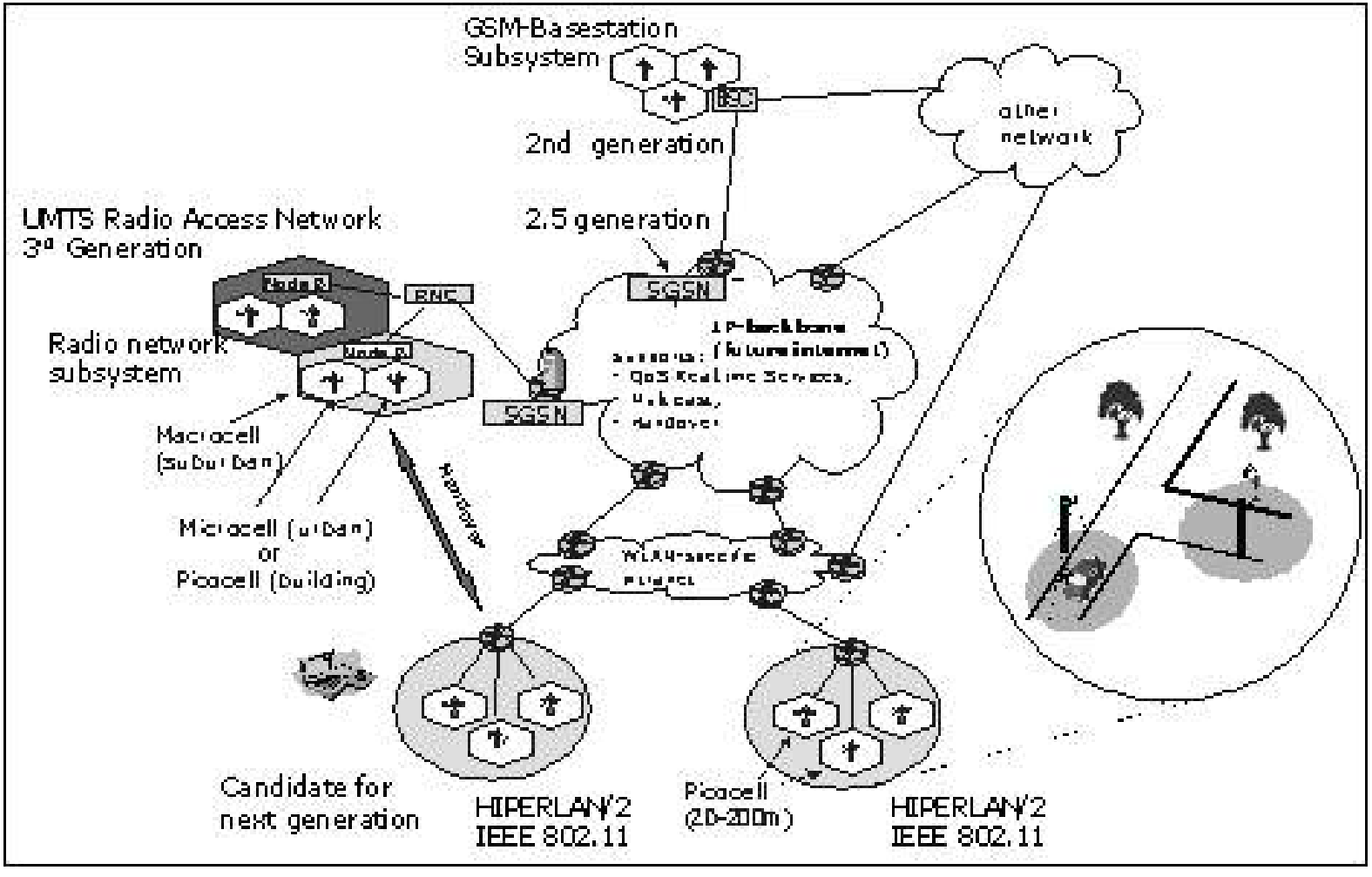
- Introduction to Anwire NoE project
- 4G: integration requirements
- Always Best Connected (ABC) overview
- ABC enabling technologies
  - SDR, terminal architecture and Reconfigurability
  - QoS and mobility interaction
  - Transport layer
- Conclusions

Introduction to Anwire

- Academic Network for Wireless Research In Europe (Anwire)
- ANWIRE is placed in the framework of the “European Virtual Center for Wireless Internet” (EVC-WIN), a newly established virtual center dedicated to integrated research and promotion of Wireless Internet in Europe.
- Anwire task forces
  - Adaptable Service Architectures
  - Efficient and "always on" connectivity
  - Application architectures for the support of Reconfigurability and Adaptability
  - Generic Requirements & System Concepts for System Integration

4G: integration requirements

M. Siebert & H. Chaouchi « Working toward an Anwire System Integration architecture », IEE Anwire Workshop, Glasgow April 2003.



4G: System integration requirements

- Network requirements:
  - Loose integration :
    - Upper Network layers integration (AAA, management)
    - Network layers integration (Mobility, horizontal and vertical handover, routing, …)
  - Tight integration
    - Link and physical layer integration (signal interference, interoperability, ..)
- Terminal requirements:
  - Multimode terminal
  - Adaptive and reconfigurable terminal
- Service and user requirements:
  - User universal identification
  - User contract with one or several providers
  - Adaptive services
  - Always Best Connected users

ABC overview

G. Morabito, H. Chaouchi & al "Always Best Connected" Enabled 4G Wireless World", IST Sumit, Portugal June 2003

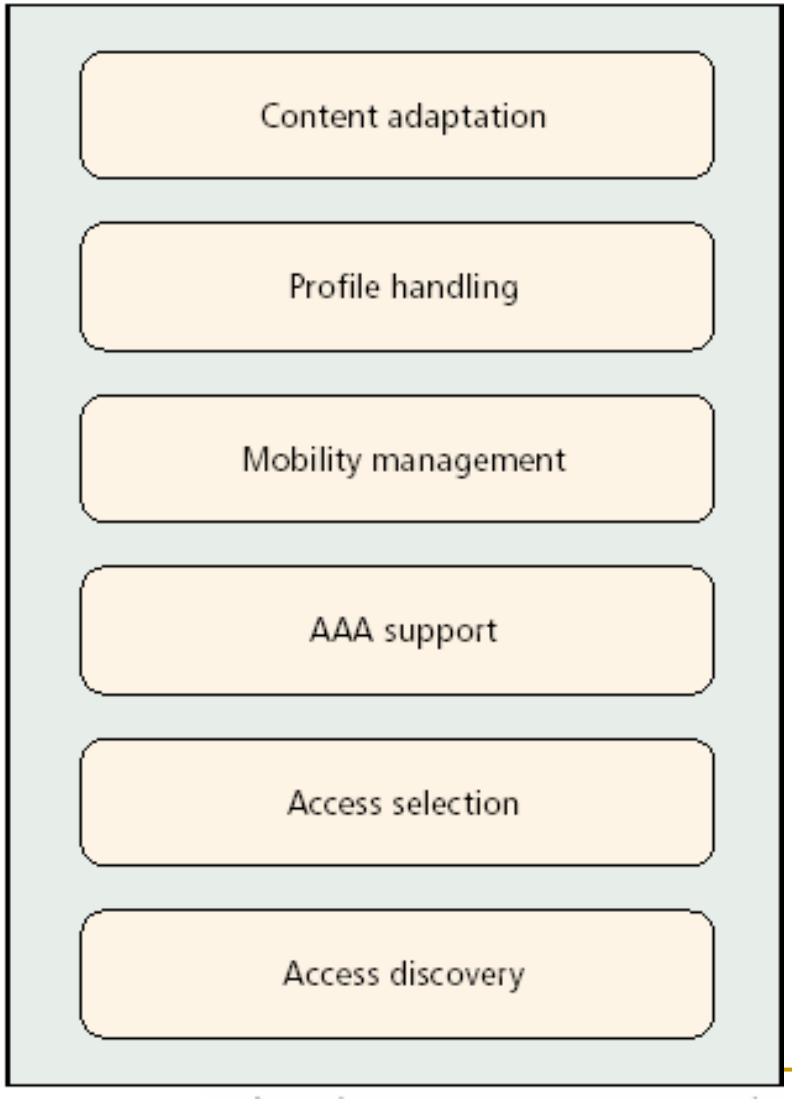
- Ultimate objective: Nomadic, ubiquitous, ambient computing
- ABC is a starting point!
  - *ABC and multiple overlapping access wireless networks (MOAWN)*
  - 4G and Vertical handover
- ABC for whom? Best = ?
  - *ABC from an Operator's viewpoint*
  - *ABC from a User's viewpoint*
  - *ABC from a Service Provider's viewpoint*

ABC enabling technologies

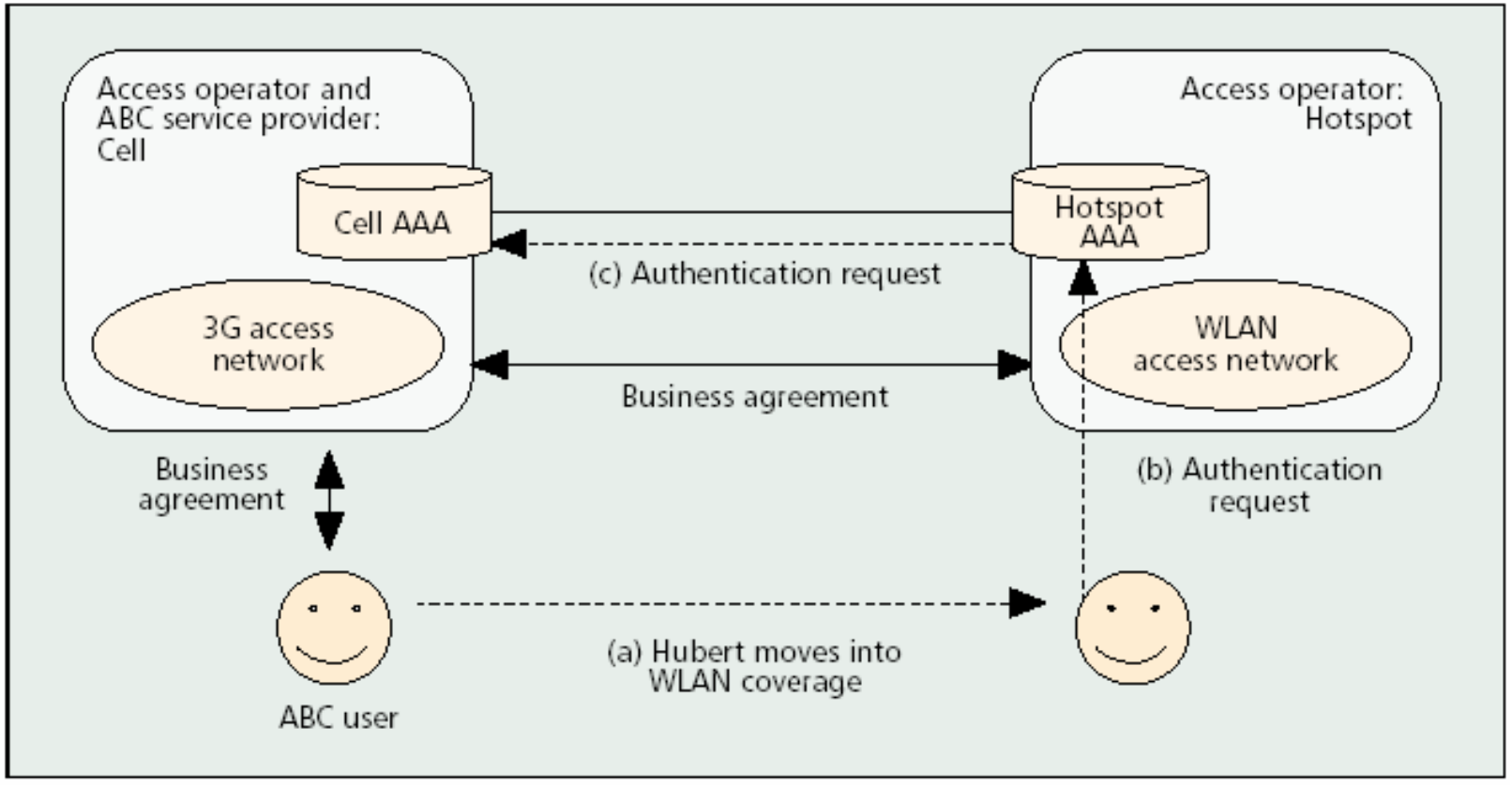
- System and terminal architecture
- Re-configurability in the communication layers
- SDR (Software Defined Radio) in physical layer
- QoS and mobility interaction
- Transport layer

ABC components

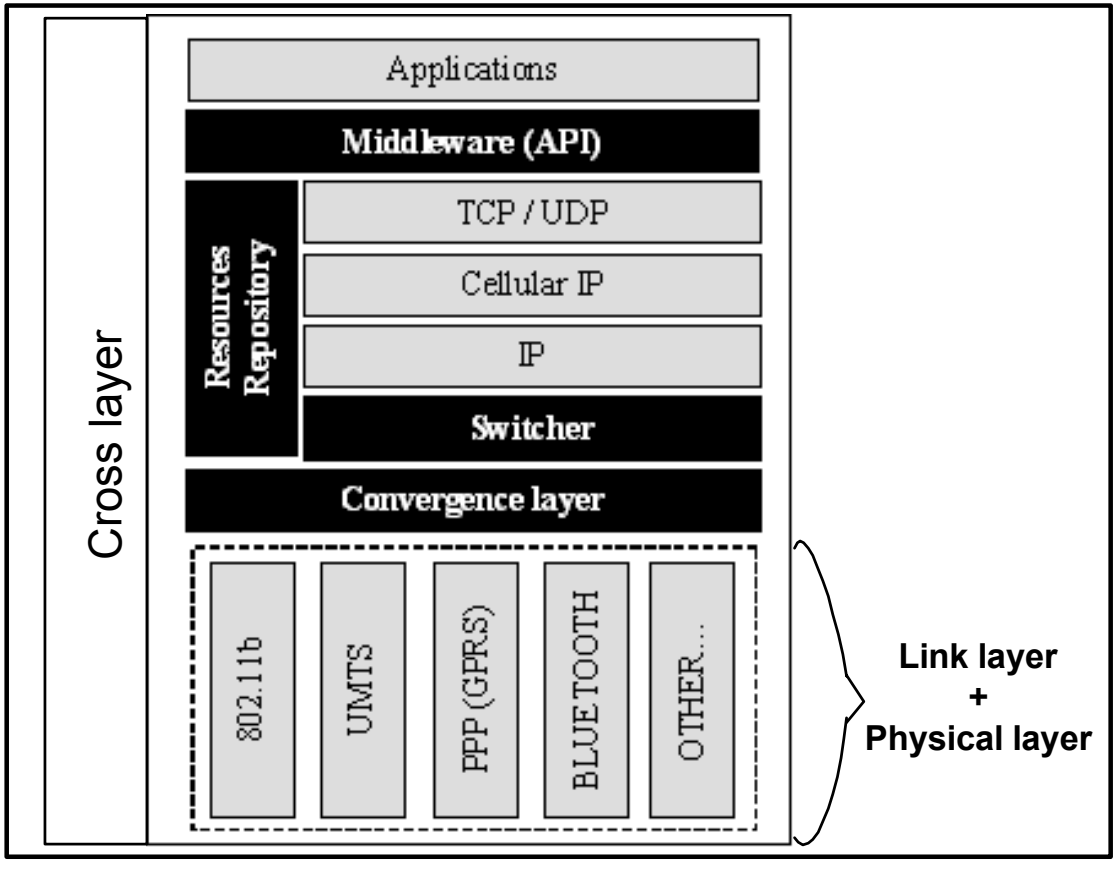
E.Gustafon, A. Johnson « Always Best Connected « , IEEE Wireless magazine, Febrary 2003



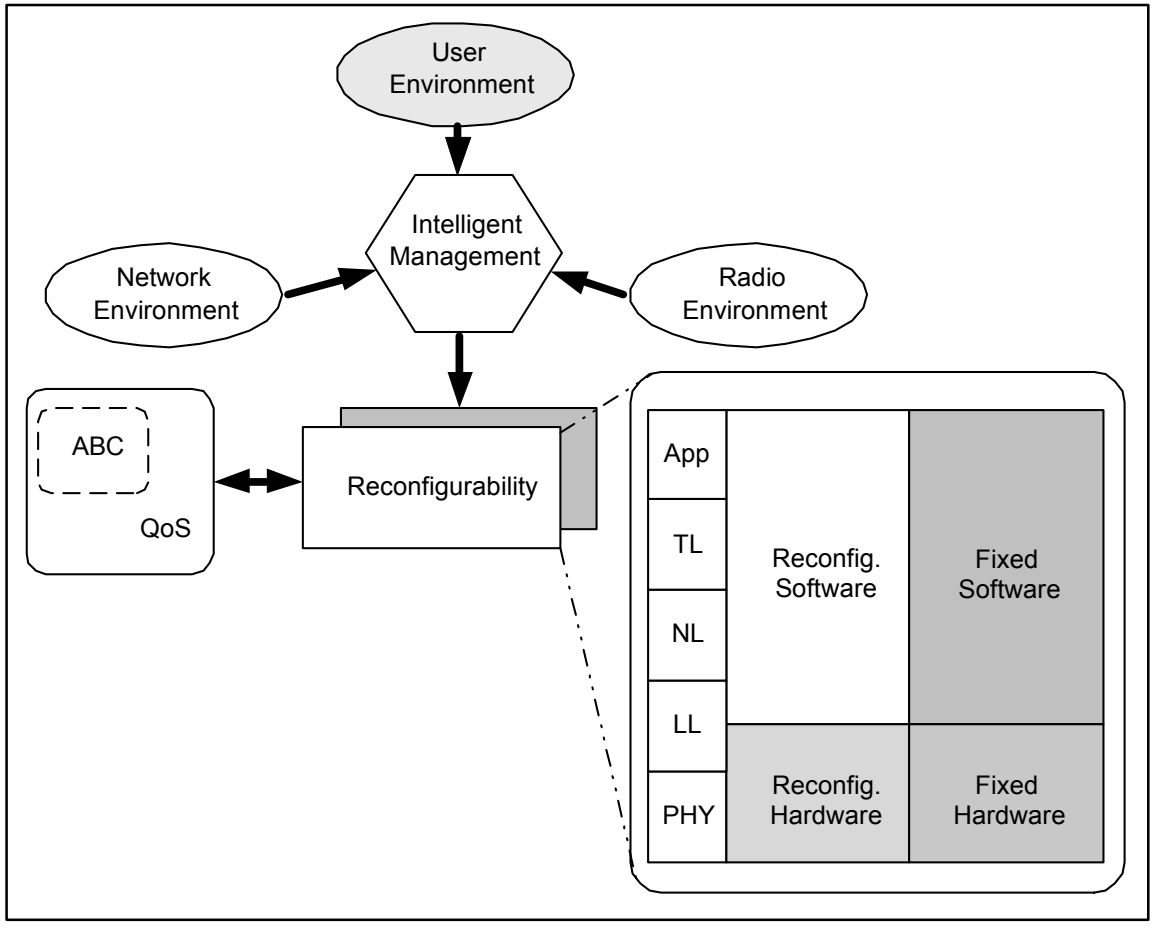
Example of AAA support in ABC



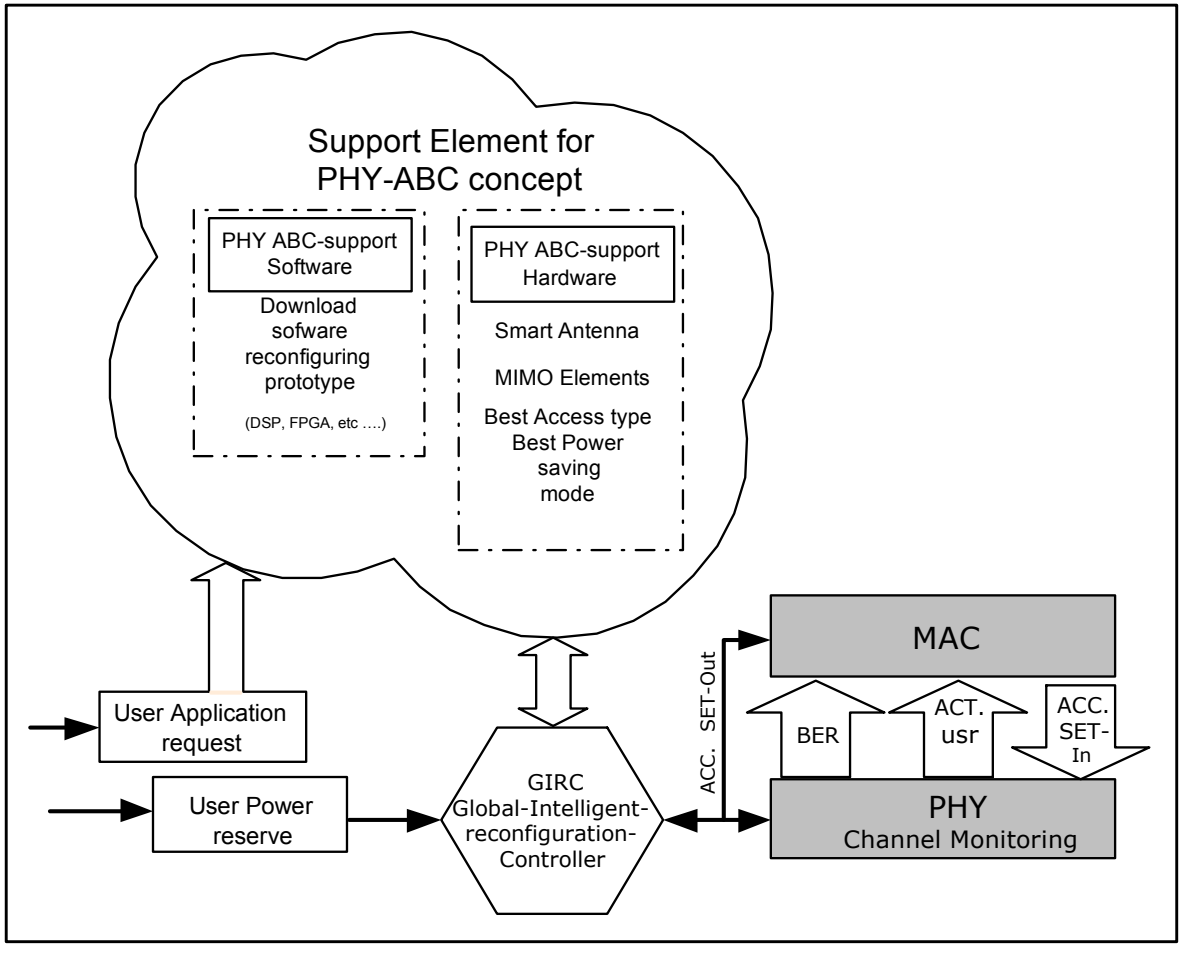
Terminal and system architecture



Reconfigurability



Physical layer ABC support

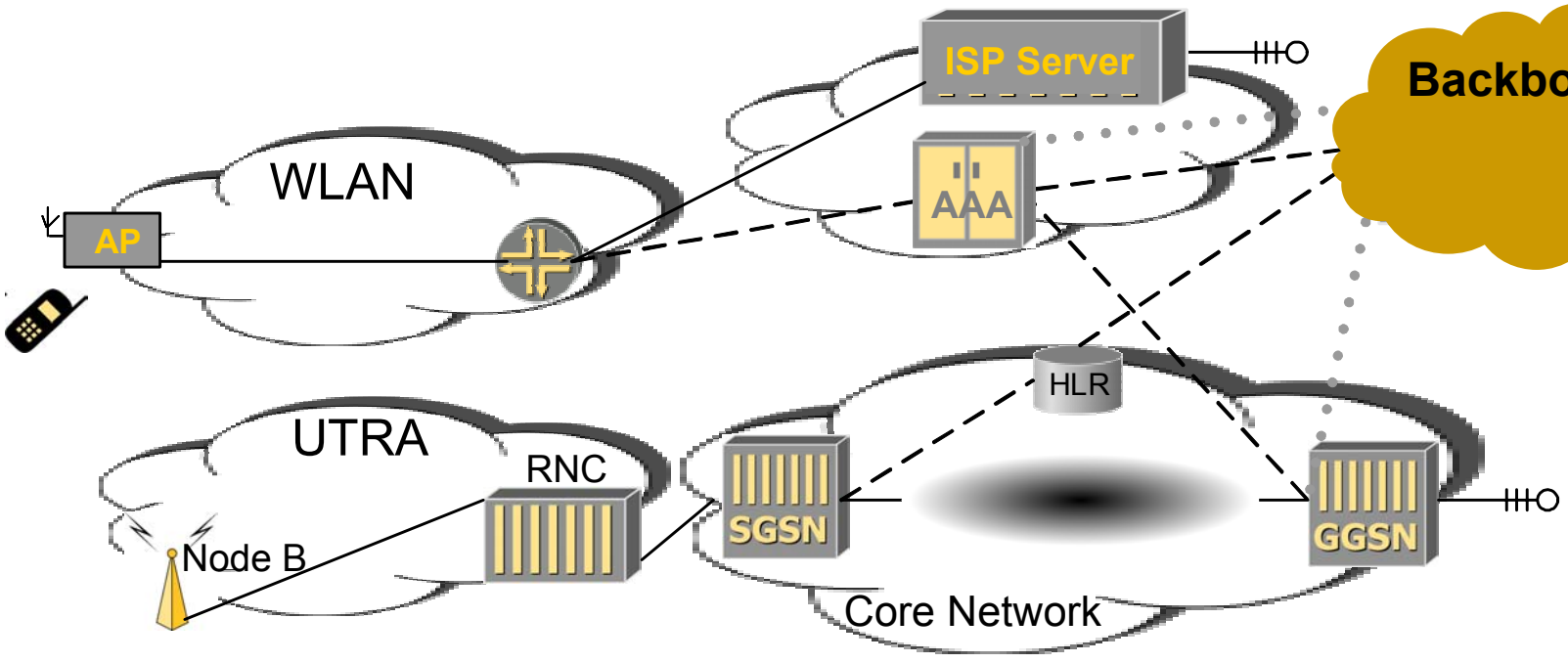


Mobility and QoS interaction

V. Frederikos, H. Chaouchi et al «QoS Challenges in All IP Based Core and Synergetic Wireles Access Networks", To appear Annual Telecommunication review 2003

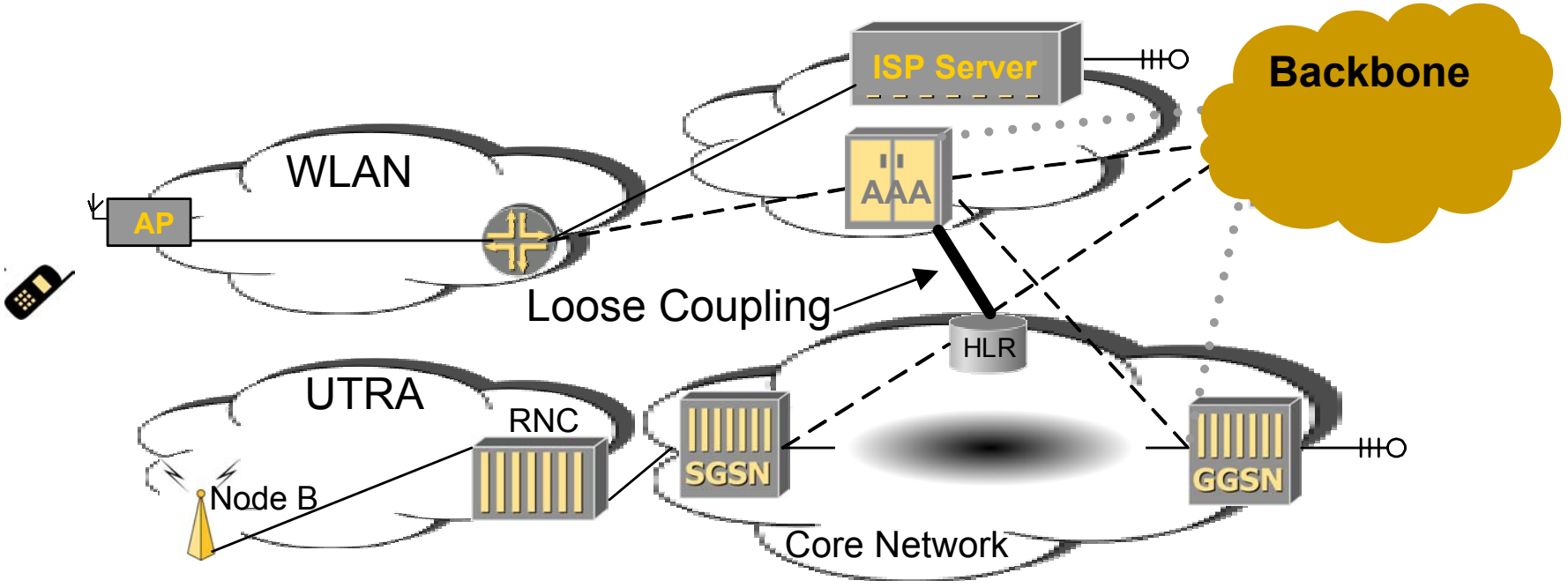
- QoS state re-establishment in every router in the end-to-end path (IntServ);
- QoS state re-establishment only in the access link (DiffServ);
- hybrid of the two above.

QoS and Mobility: Open coupling



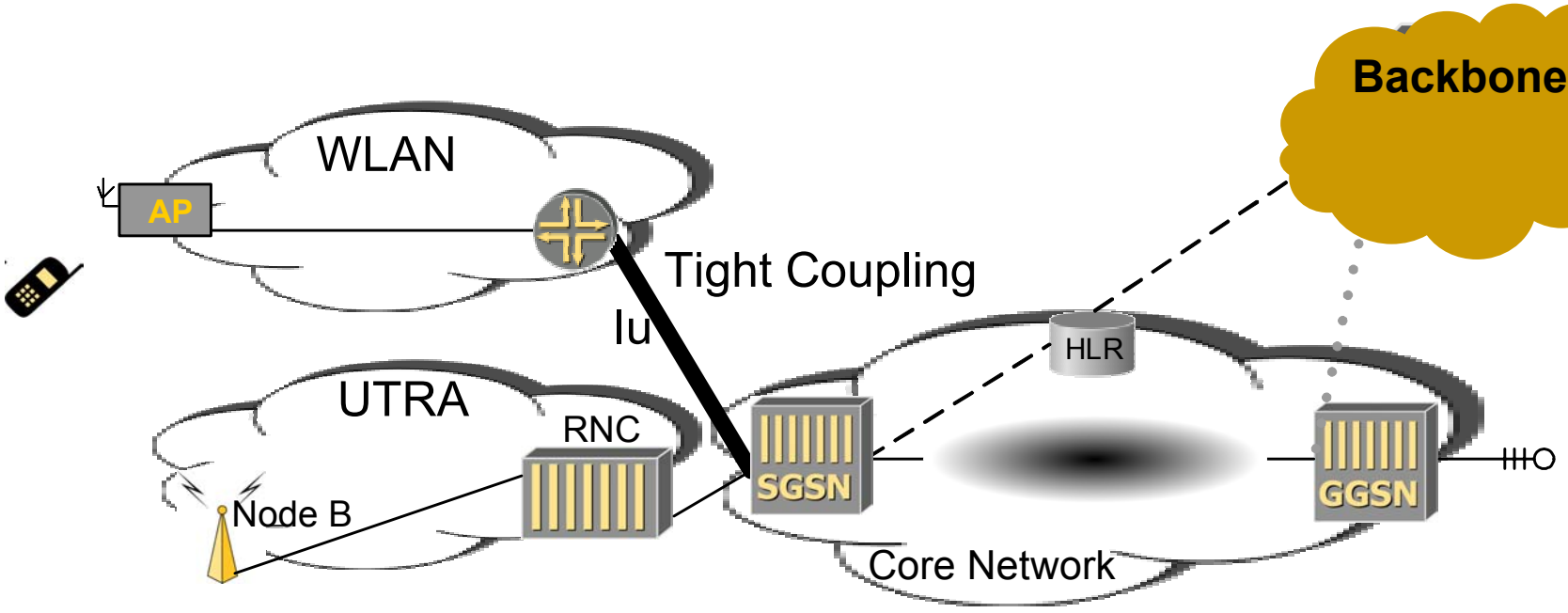
- **Billing system interaction**
- **Different authentication**
- **No vertical handover support**

QoS and mobility: Loose coupling



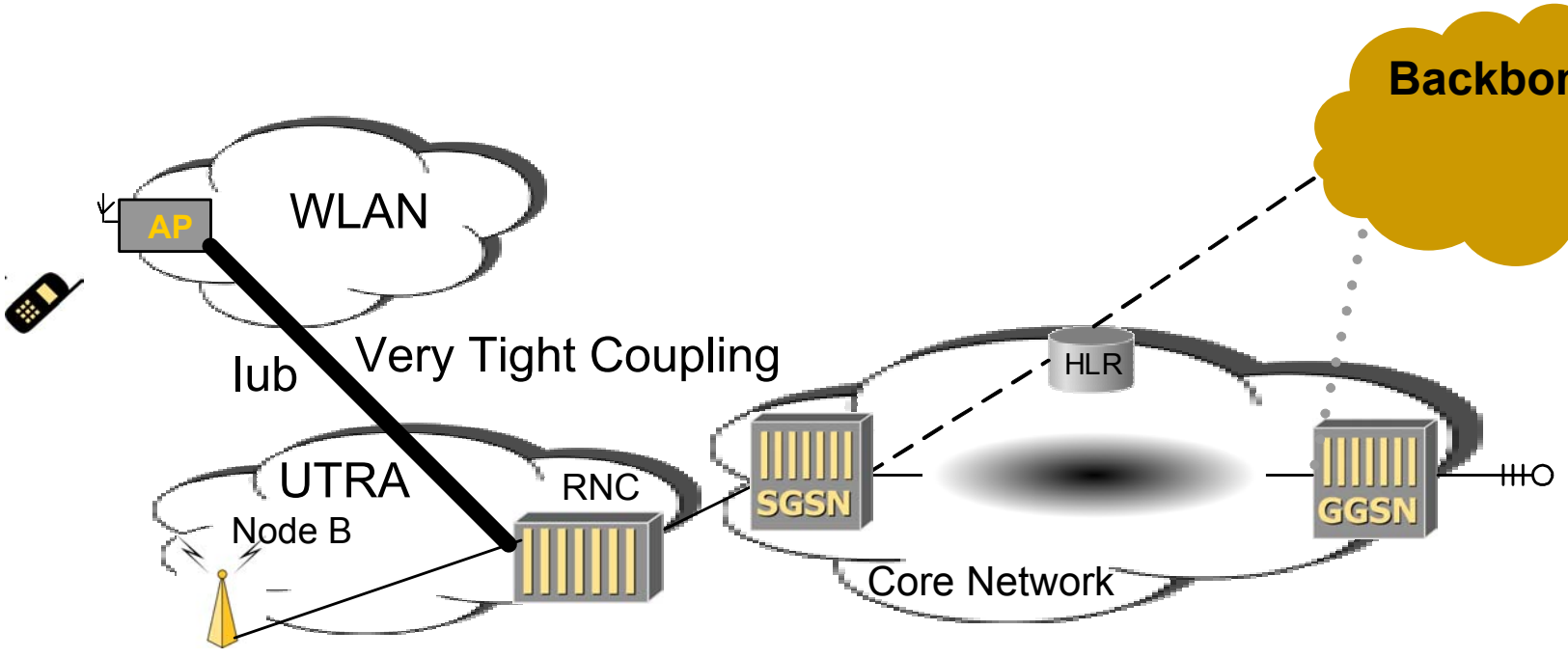
- **Billing system interaction**
- **Authentication interaction**
- **No vertical handover support**

QoS and mobility: Tight coupling



- **Billing system interaction**
- **Authentication interaction**
- **Vertical handover support: Not seamless**

QoS and Mobility: Very tight coupling



- **Billing system interaction**
- **Authentication interaction**
- **Vertical handover support: Seamless handover is possible**

Transport layer

- TCP performance in wireless networks:
  - link layer (LL) solutions (e.g. TCP aware and TCP-Unaware LL Protocols)
  - TCP modifications (e.g. TCP selective acknowledgments options (TCP SACK), Indirect TCP (I-TCP) and mobile M-TCP);
  - new transport protocols designed specially for wireless networks (e.g. the Wireless Transmission Control Protocol (WTCP)).

Conclusions

- ABC, enabler of ‘fourth generation wireless world’, 4GWW paradigm
- ABC user and operator viewpoints
- ABC enabled technologies:
  - SDR, system and terminal architecture
  - Reconfigurability
  - QoS and Mobility interaction
  - Transport layer
- 4G may be the Ultimate “SAUVEUR“ of 3G ☺