

Challenges in the implementation of seamless mobility in the current and future telecommunication infrastructure

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Challenges of future mobile and wireless networks - roaming.

Requirements

- World and people do not stop moving
- Some years ago, roaming was not a big deal for network operators
- People were used to
 - change the terminal or/and
 - smart card insidewhen travelling abroad.
- Over the last few years
 - increasing roaming demand by the market globalisation
 - cheap, fast and easy ways to travel abroad.

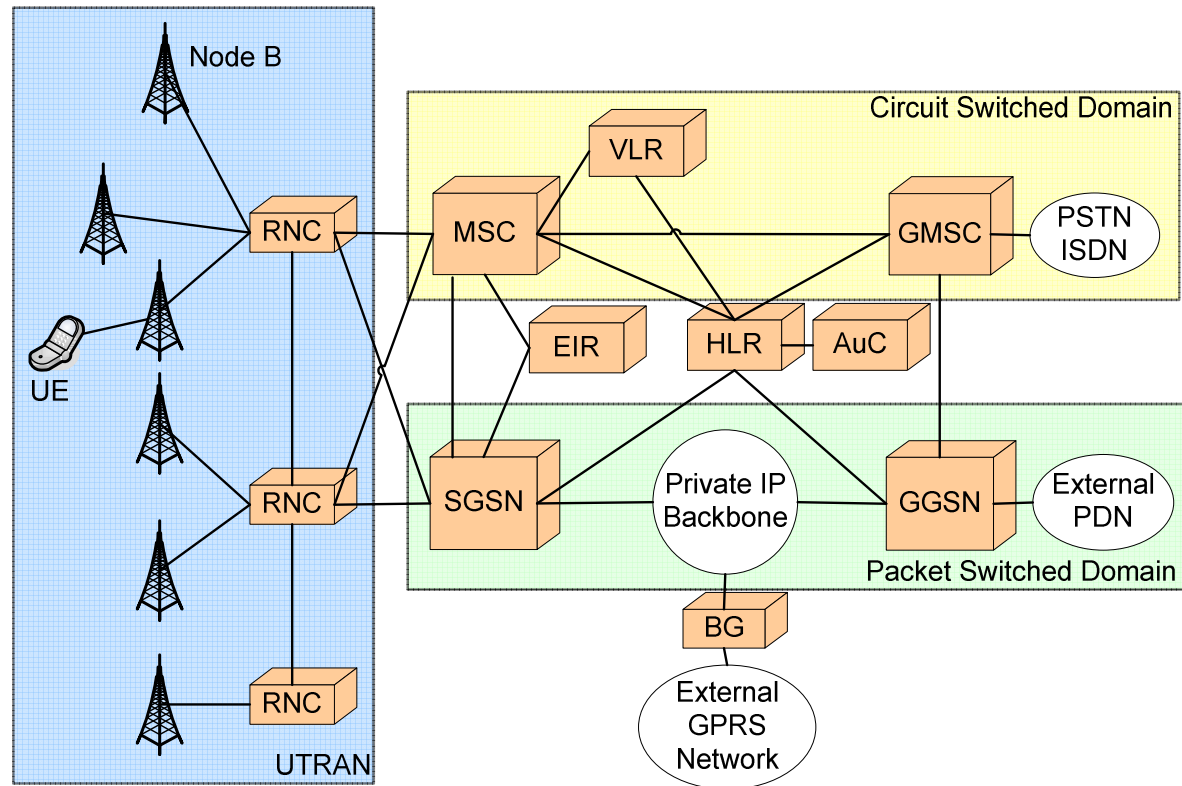
Roaming – mobility through domain and operator domains is becoming and will become more and more an important issue!



Overview 3rd Generation Partnership Project activities (1).

3GPP Release 99 Architecture - Overview

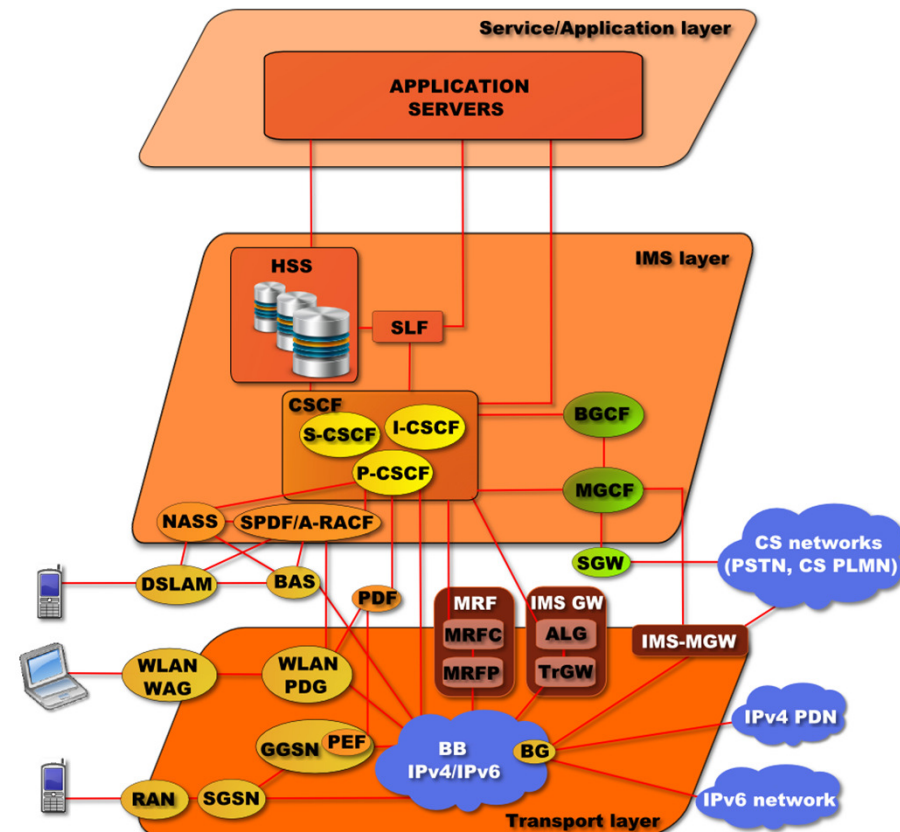
- Release 99 had a split architecture:
 - Circuit Switched Domain
 - Packet Switched Domain
- Access was based on the UMTS Terrestrial Radio Access Network (UTRAN)
 - Main component – Radio Network Controller



Overview 3rd Generation Partnership Project activities (2).

3GPP/TISPAN IMS Architecture – Overview

- After Release 99, backbone was increasingly moved to a packet based approach
- Different access technologies are connected
- IP Multimedia Subsystem was defined and standardised as a candidate for a common control platform for different use cases and applications
- Focus was a Fixed-Mobile Convergence architecture
- Split into
 - A Service/Application layer
 - A Control layer
 - A Transport layer



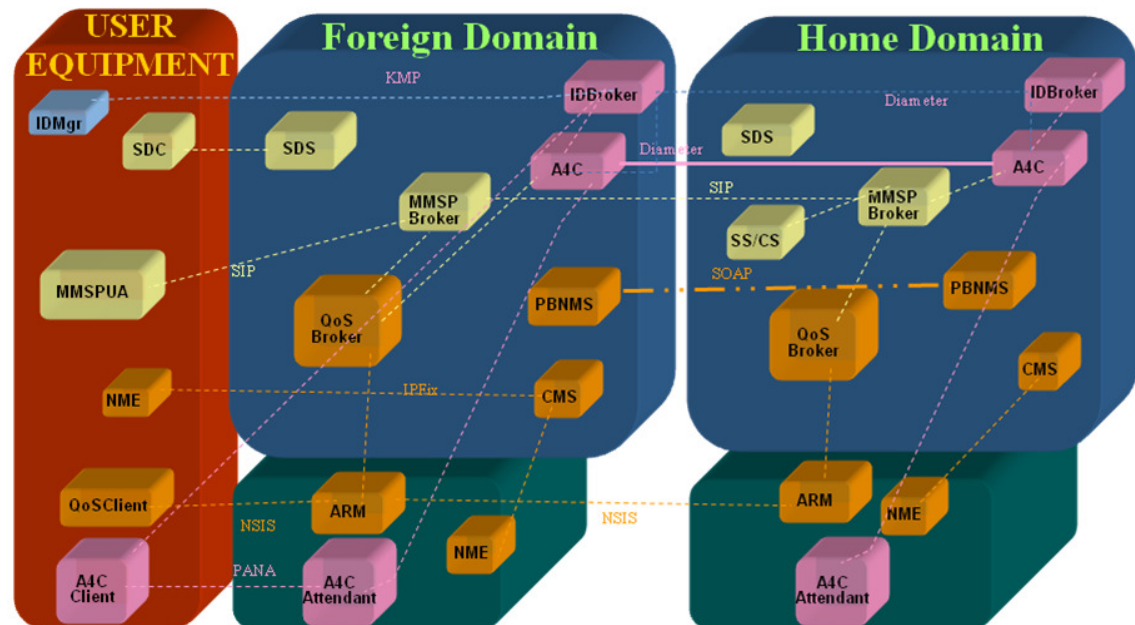
Picture source: http://de.wikipedia.org/wiki/IP_Multimedia_Subsystem



Daidalos – an example of a full IP based network architecture taking partly backwards compatibility into account.

Pure all-IPv6 packet-based architecture independent of the underlying access and core technologies

- Different roles are defined:
 - User Equipment
 - Two administrative domains.
- Each domain two main blocks:
 - Access network
 - Core network and service support platform
- Three overlays
 - Technology Overlay (transport)
 - Service Controllers and Network Overlay (control)
 - Service Enablers Overlay (service/application).



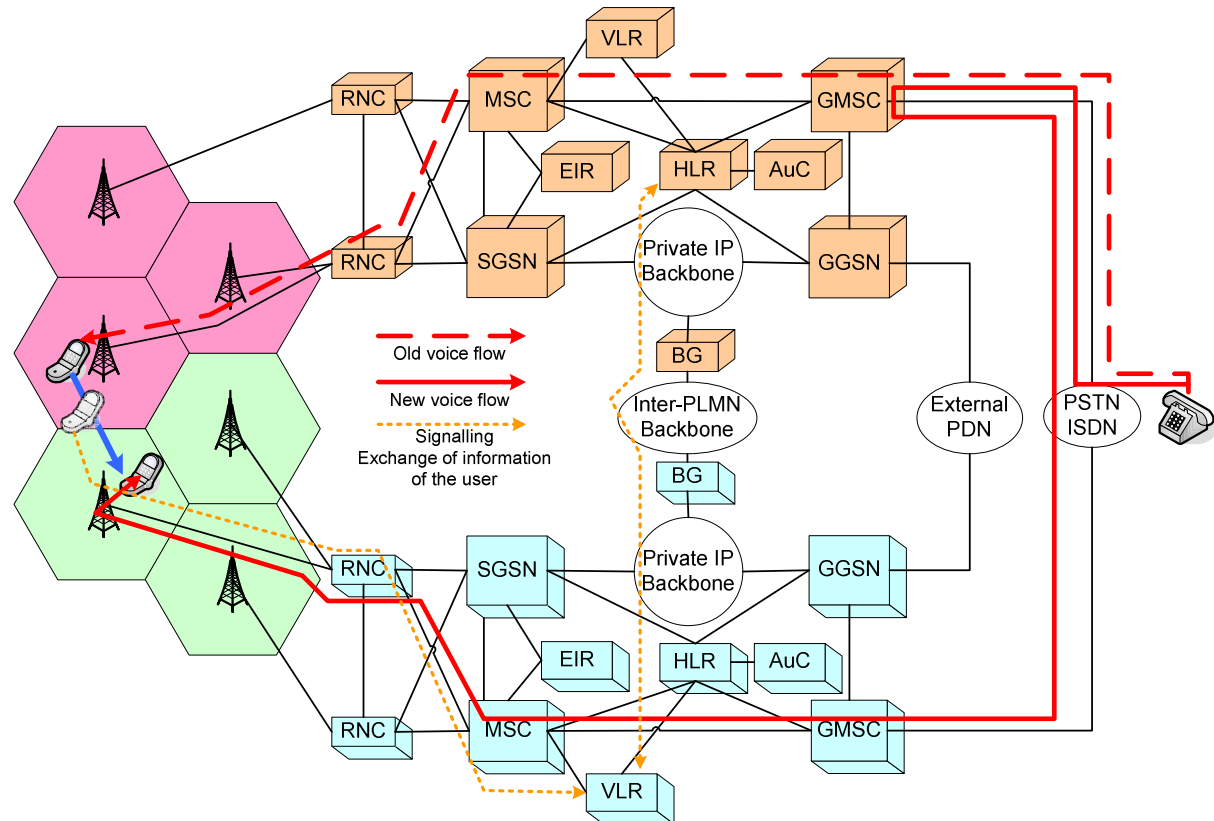
<http://www.ist-daidalos.org/>



Roaming – inter domain – hand-over – in a 3GPP Release 99 operator infrastructure (circuit switched infrastructures).

A possible 3GPP R99 roaming example

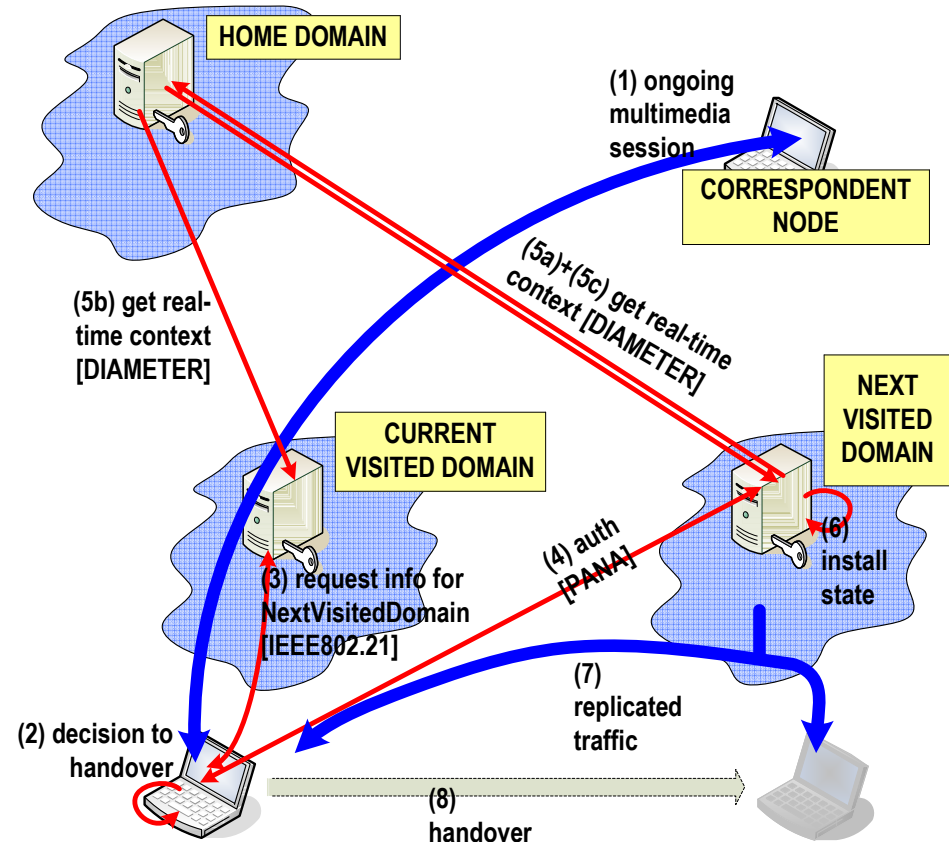
- The terminal sends network changes, signal strength, and coverage to the home domain
- Challenges:
 - Signalling overhead
 - Implementation in terminals network
- The network operators keep inter-domain handovers under its own control
- Billing and charging still performed in the Home domain



Hand-over between two All-IP Foreign Domains – Example system concept is based on Daidalos.

Hand-over from a visiting domain to another visiting domain in a pure IPv6 infrastructure

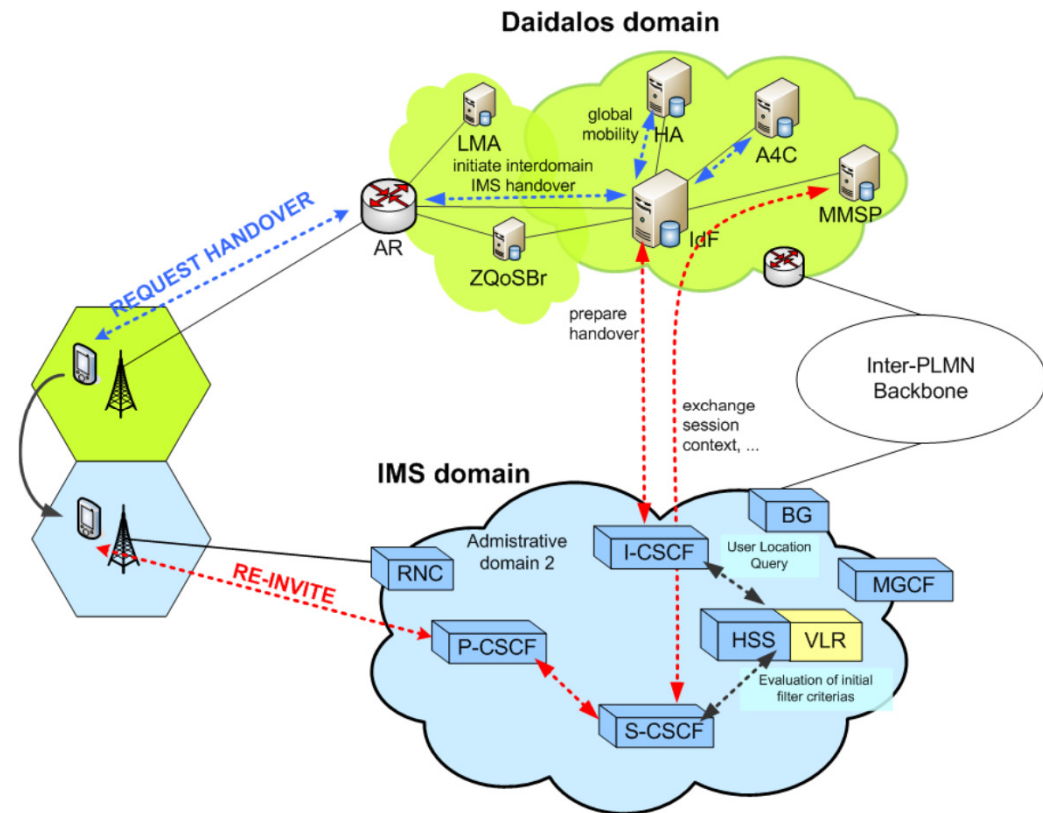
- Home domain is federated with both visiting domains
- The visiting domains are not necessarily federated
- Mobile terminal requests information about the new visiting domain
- Home domain prepares with the new visiting domain the hand-over (security and Quality of Service)
- During a certain time the traffic is bi-casted from both visiting to the terminal
- Decision for the hand-over is controlled by the home domain



Hand-over between Daidalos system concept and 3GPP Release 8 as a candidate for a packet based 3GPP system concept.

Hand-over of a packet based service such as a multimedia application

- Hand-over works in this example only for packet based application
- Hand-over from a circuit switched service towards and backwards from a packet-based is far too complicated
- 3GPP infrastructure is based on Release 8 since it is packet based and the control platform is IMS
- Both domains have similar components, translate function is necessary
- Local break out is possible
- Charging and billing have to be done on a full federation bases



Conclusions.

Summary

- The paper discusses more examples for combining different system concepts (3GPP and pure-IP infrastructures based on the Daidalos approach)
- Inter-domain hand-over in 3GPP is possible with some extensions
- Focus of mixed approaches are on packet based solution since signalling overhead is smaller
- Hand-overs from circuit switched domain towards and backwards from a packet based domain are to complicated
- Daidalos system concept offers an optimised solution for less signalling overhead
- Global society will have a need for inter-domain roaming in the near future

Different packet based system concepts will exist in parallel therefore mechanisms for roaming are necessary for future global roaming



Thanks for your attention.

Any questions?

