

Networking Concepts for All-IP Mobile Communications

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July 2004

- **IMS: The first big step towards All-IP**
- **Service evolution**
- **Integration of multiple access technologies**
- **Some thoughts about protocols for All-IP**

Future Multimedia Services will be based on IP technology



Communication

- Push-to-talk / push-to-show
- Multimedia Messaging
- Multi-Party Chat
- Multimedia Conferencing



Entertainment

- Person-to-Person Gaming
- Interactive Shows and Events
- Multimedia Advertisement
- Audio and Video Streaming

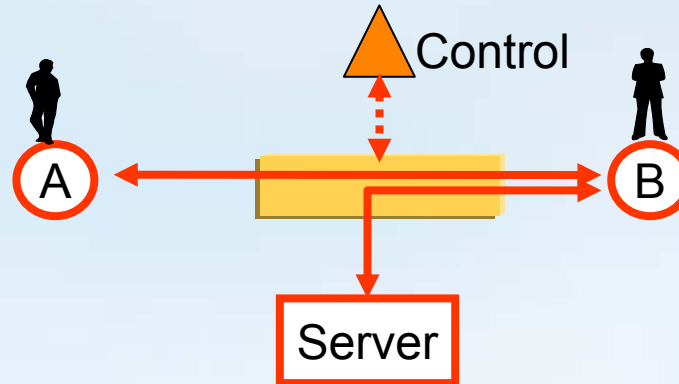


Enterprise and on the road

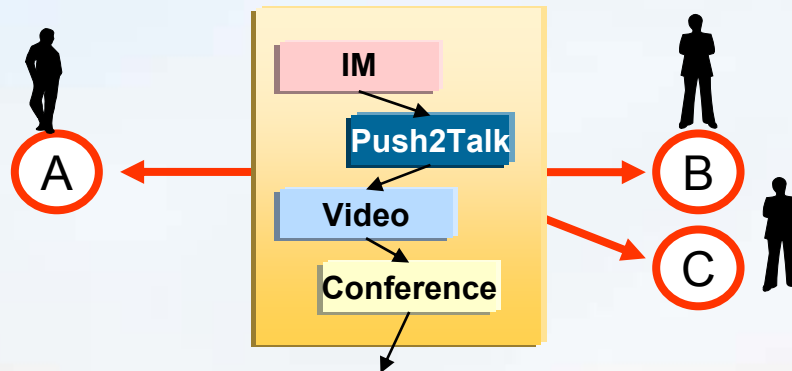
- Dynamic Info Services
- Interactive guidance
- Remote Facility Control
- Collaborative working

Challenges for operators

- **Control of the communication** (e.g. charging and quality of service)

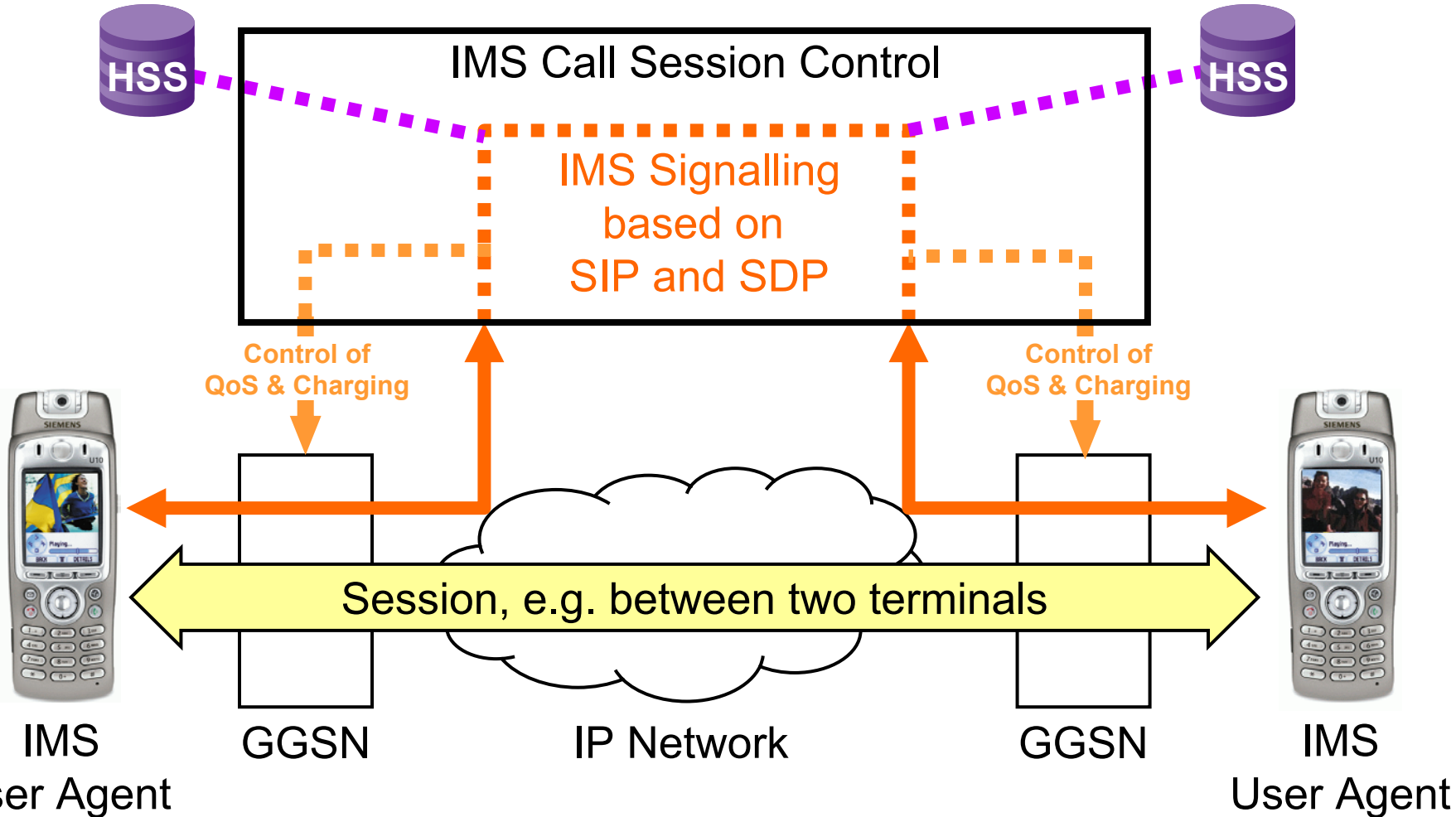


- **Present different services seamlessly to the users**



- **Manage the introduction and the withdrawal (!) of a multitude of new services**

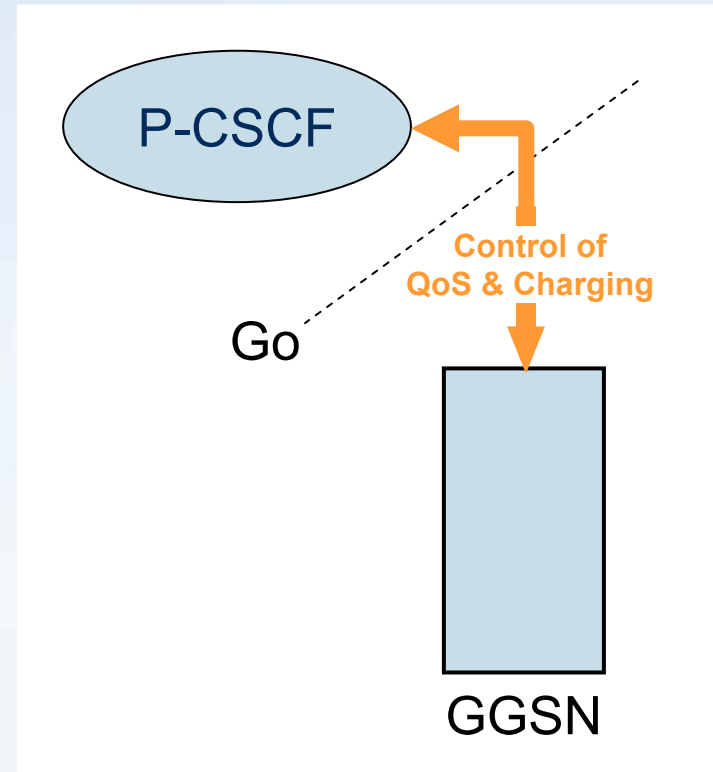
The 3GPP IP Multimedia Subsystem (IMS) is the first big step towards All-IP



HSS = Home Subscriber Server
SIP = Session Initiation Protocol
SDP = Session Description Protocol

The Go Interface: Control of QoS and Charging

- Authorises access bearers and their QoS parameters
- Provides packet filtering and charging information
- Builds on concepts for policy based networking:
 - GGSN is PEP
 - Proxy-CSCF is PDP
 - Uses COPS-PR
- Works in combination with GPRS session management:
 - Primary PDP Context for SIP
 - Secondary PDP Contexts for media
 - Set-up message for Secondary PDP Context carries authorisation token



CSCF	=	Call Session Control Function
PEP	=	Policy Enforcement Point
PDP	=	Policy Decision Point
COPS	=	Common Open Policy Service (Protocol)

IMS provides common enablers for a multitude of services

Examples of service enablers provided by IMS:

- Authentication and Authorisation
 - Naming and Addressing
 - Control of QoS and Charging
 - Presence and Location
 - Group Management
 - Session Management
- ➔ Services will be volatile with high dynamics, but the service enablers will stay.

Introduction Strategy for Roaming and Interworking

Phase 1: GPRS-based Roaming

- User get connected to a GGSN in their home network
- ⇒ Access to IMS services from all over the world

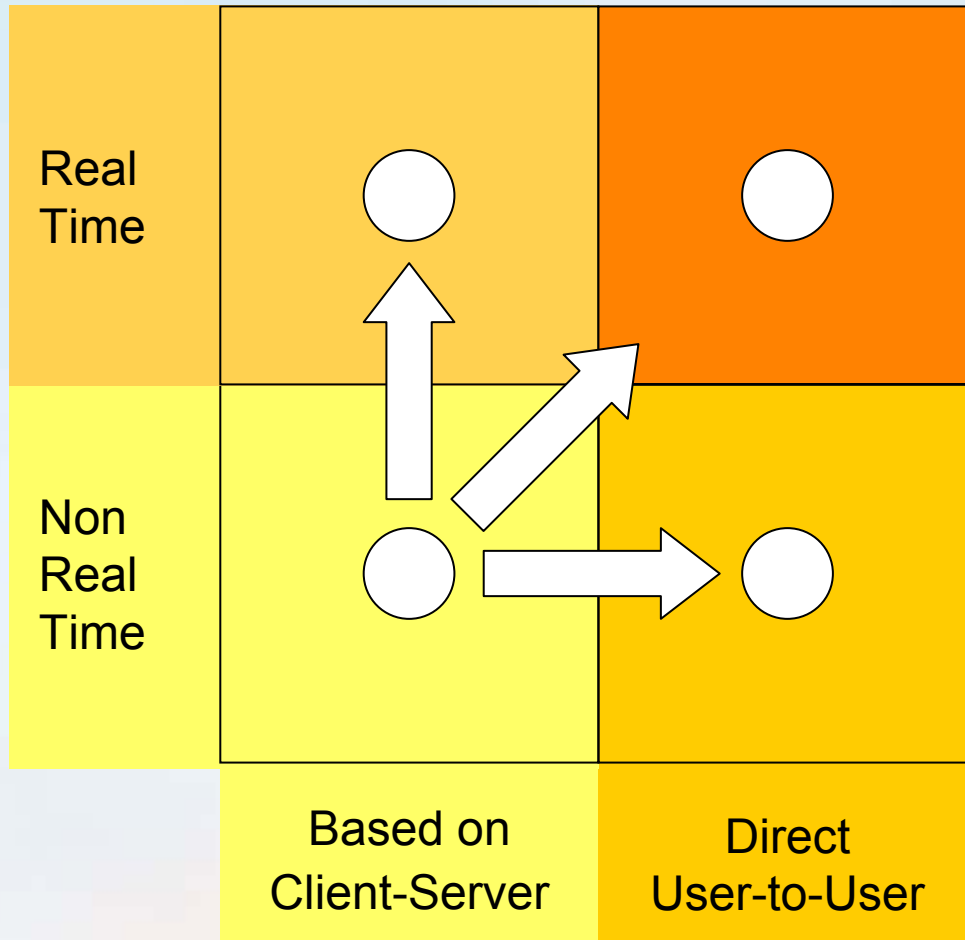
Phase 2: IMS Interconnection

- IMS systems of different operators are interconnected
- ⇒ IMS multimedia services between subscribers of different operators

Phase 3: IMS based Roaming

- Users can connect to IMS system in visited network
- ⇒ Optimises traffic routing of media streams

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■ **Initial Services will be based on client-server paradigms:**

- Presence
- Buddy Lists
- Messaging
- Push-to-Talk
- Chat

■ **Over time, real-time requirements and high data volumes will create the need to support direct user-to-user traffic**

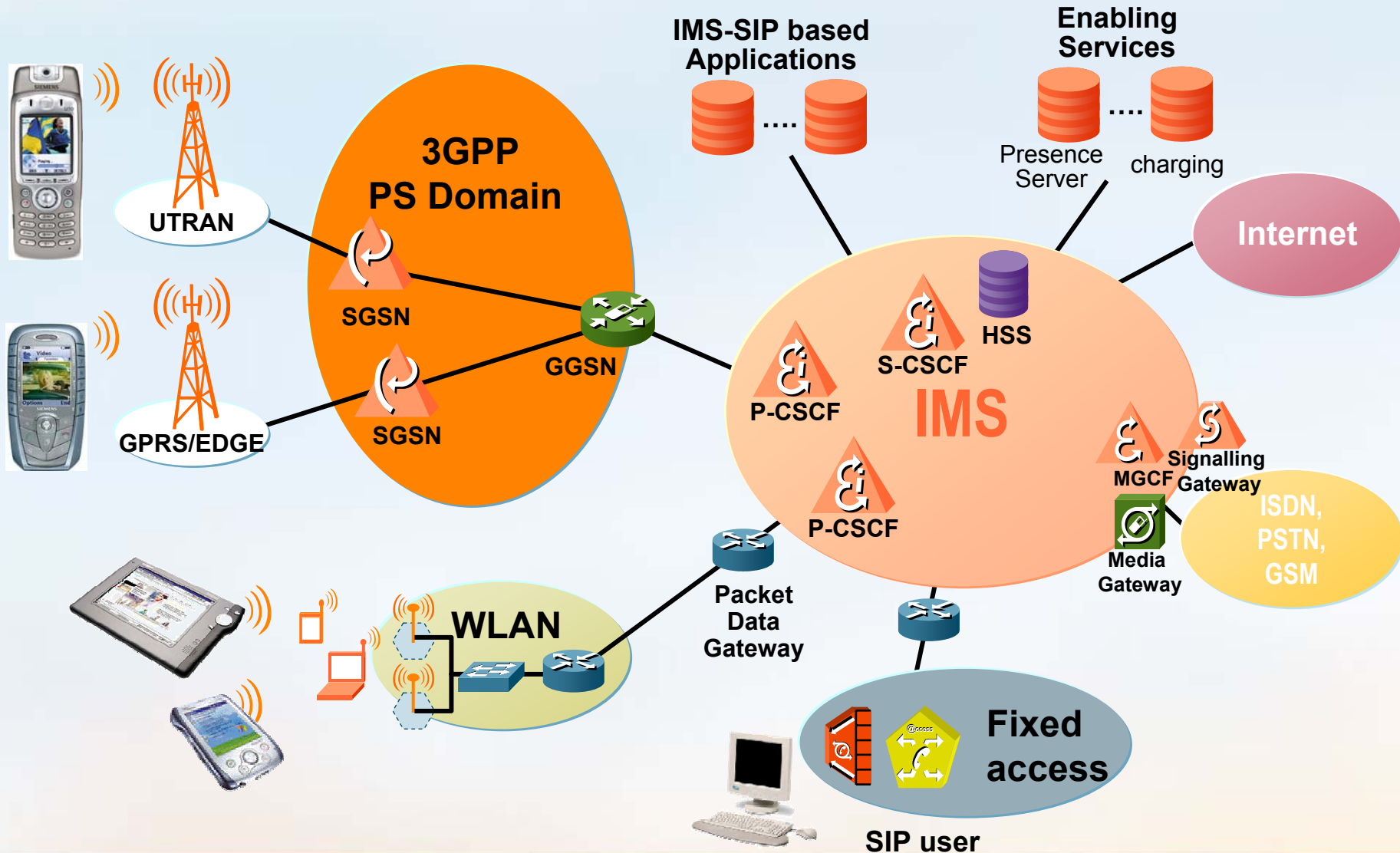
- P2P Gaming
- Instant file transfer
- Conferencing/Netmeeting
- Voice & Video

Conclusions from service evolution with respect to IPv6 and VoIP

- Initial services may be built on either IPv4 or IPv6, because the client server paradigm does not require direct addressing between users.
- In the long run however, IPv6 will be needed in order to support direct user-to-user traffic in an efficient way.
- Voice is not the dominant feature of the new services.
- In the long run, voice will become part of the IMS services as an add-on (e.g. during a gaming session).
- Telephony can also be enhanced by IMS (Rich Call).
- However, it is not yet clear if VoIP over Cellular is a sensible solution. (Alternative: Integration of CS bearers).

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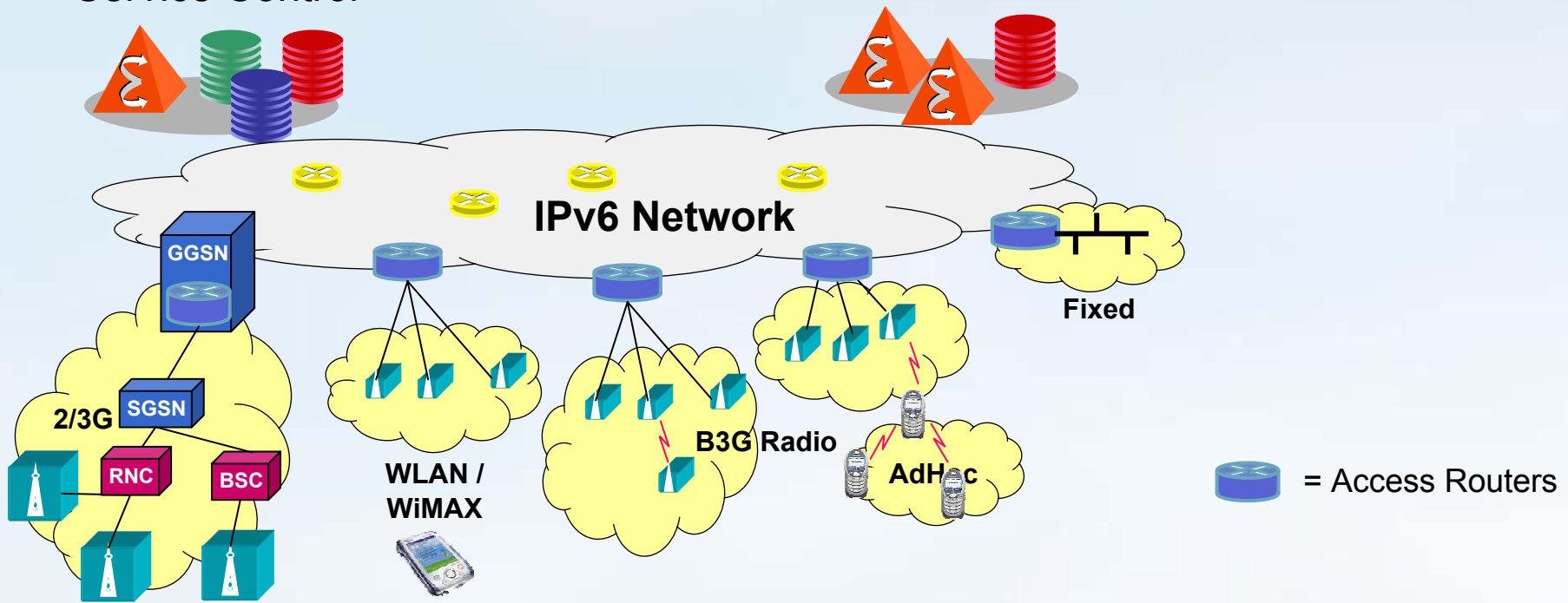
IMS has been defined as an access independent core network subsystem



Beyond 3G Network Architecture: Access Routers are the key integration points

Services and Service Control

Transport/Network Control and Optimisation Functions



Challenge: Mobility between Access Routers

- Current networking concepts rely on a fixed point in the network for the integration of AAA, QoS and Mobility. (See Go interface).
- Changing the access router requires the relocation of a complex context.

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Non Access Stratum (NAS) signalling towards the SGSN:

■ GPRS Mobility Management

- Idle Mode Support (Location Updating & Paging)
- User Privacy Protection (TMSI)
- User Identification and Authorisation
- Ciphering Support

■ GPRS Session Management

- Host configuration (IP address, address of DNS server and of P-CSCF)
- External network selection (based on Access Point Name) & Roaming
- QoS Signalling
- Differentiated QoS concept (Primary and Secondary PDP Context)
- Transport of security token for IMS authorisation

Mobility solution in the PS domain:

- GTP protocols guarantee a stable IP address. (This is also a privacy issue).

New radio access technologies for All-IP

- **Upcoming Radio Access Technologies (e.g. from IEEE) will be optimised for IP traffic.**
- **The “All-IP assumption” helps to design simpler systems because no other network layers or other core network domains need to be taken into account.**
- **The functions that are today typically provided by the horizontally integrated 3GPP protocols (see NAS signalling) will now be provided by a set of independent vertically separated protocols:**
 - DHCP
 - EAP (incl. extensions)
 - ...
- **Challenges:**
 - Gaps compared to 3GPP world.
 - Stacks and network architectures are not yet settled.