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**All-IP, fixed-mobile
 convergence, NGN, bit pipes,
 service platform ...
 how does IMS fit into all this?**

■ Dr.-Ing. Antonio Cuevas (cuevas@rus.uni-stuttgart.de)

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- Introduction, The context: technological and business aspects.
- Business models and service platforms
- IMS: a service infrastructure for multimedia communications
- IMS interfaces for enhanced multimedia communications
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Striking Statements

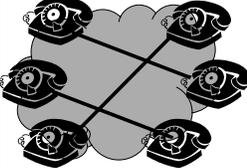


- Lots of Buzzwords and misconceptions in current telecommunication revolution
- **It is NOT about Fixed Mobile Convergence. It is about...**

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It is about Telephony to Internet migration (technologically)...



Circuit Switched





Packet Switched (IP)

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...and convergence and coexistence (in business models)

Monolithic & Closed (telephony)



Distributed & Open (Internet)

Semi-Walled Garden

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Implications of a universal IP network

- Any device
- Any access technology











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Implications of a universal IP network

- Any kind of use, fixed mobile, any application
- This already works: don't be dazzled by buzzwords such as "convergence" (they are mainly related to business aspects)








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Strong implication and disruptions

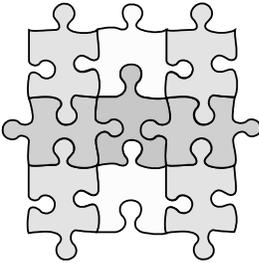
- **Internet is not *fully* prepared for this!!! (TECHNOLOGICALLY)**
 - Strong research efforts...to INTEGRATE...(almost everything **already** works but in a stand alone manner)
- **Business players are neither prepared for this**
 - Uncertainty, look for new business models, opportunities



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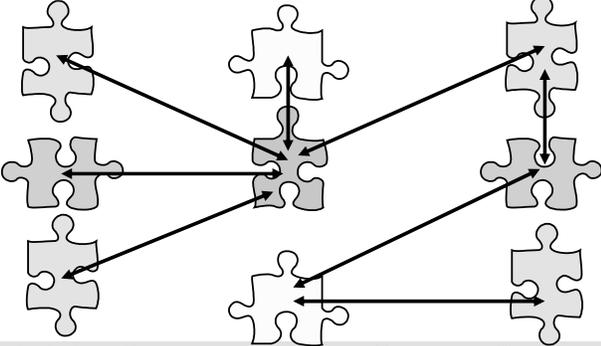
From Telephony to Internet: Telco breaks into pieces



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The future is to build links Between who is the key point



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Service platforms seem to be a meeting point, neutral zone

- Give really useful services and service "environment": users willingness to pay more
- All the players seem to take profit, share a fair portion of the telco. business
- Thus they are a key piece in 4G networks



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Internet Business model...known to everybody

- **Network operator is a bit pipe. Open to all services**

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Semi-walled garden business model

- **Network operator is a service broker.**

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The (operator-owned) service platform enables the semi-walled garden business model

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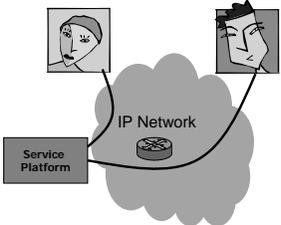
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The IMS service platform

- Targets *mainly* user to user communications, like voice calls (traditional telephony operator service)
- Strongly based on SIP and on other open IETF protocols
- Still, it is designed for 3G UMTS networks



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IMS as a merge of two worlds



A GLOBAL INITIATIVE

- IMS is a SIP platform running and interacting with a UMTS mobile network. Thus merge of two worlds, IETF and 3GPP

- **3GPP:**
 - IMS was introduced in UMTS release 5 (june 2002)
 - Keeps evolving: Release 7
- **IETF**
 - More than 40 RFCs dedicated to IMS, e.g. tailoring IETF protocols to IMS
- **IMS is a whole IT infrastructure for multimedia communications with the goal to be extended to a service environment**

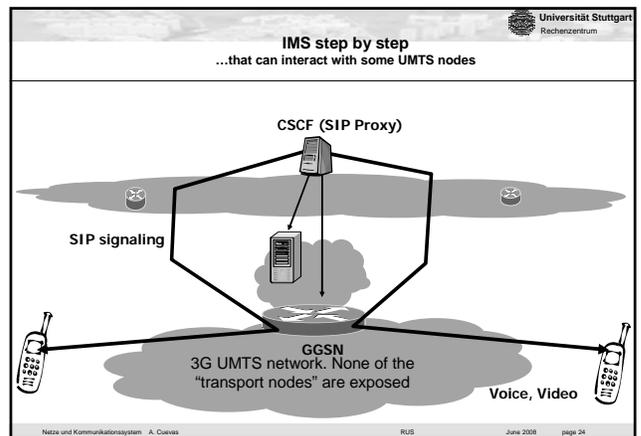
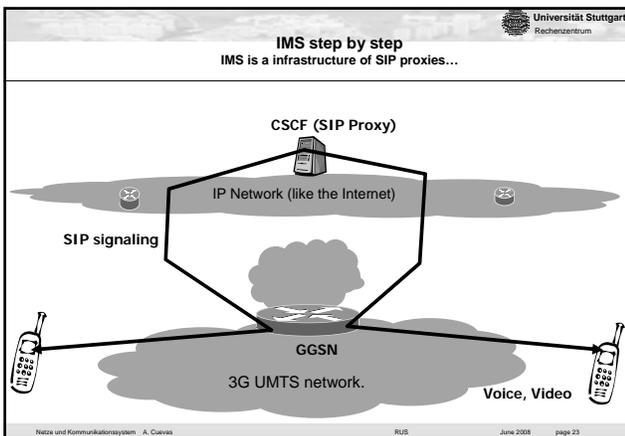
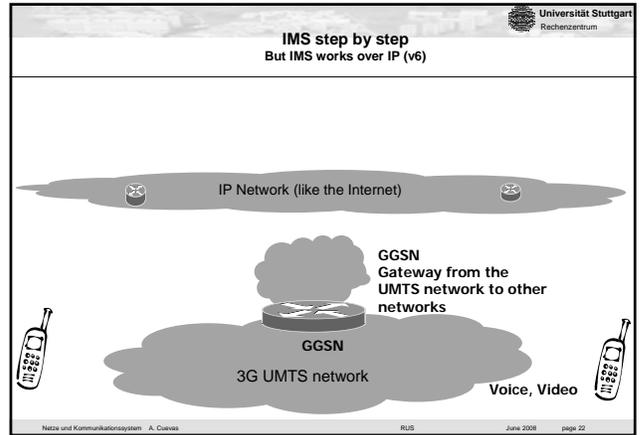
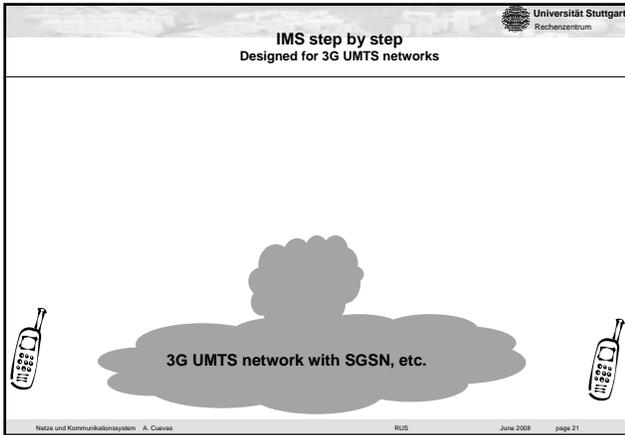
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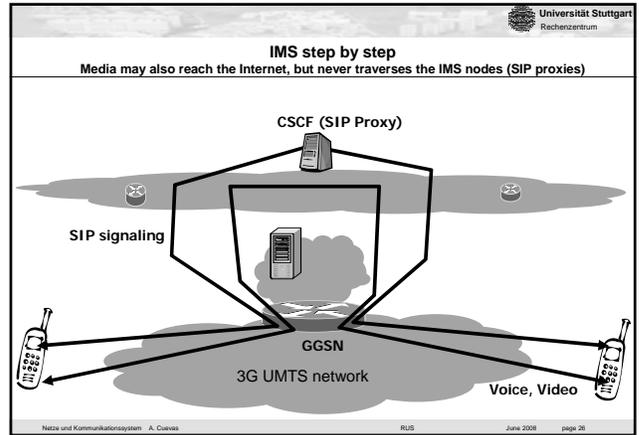
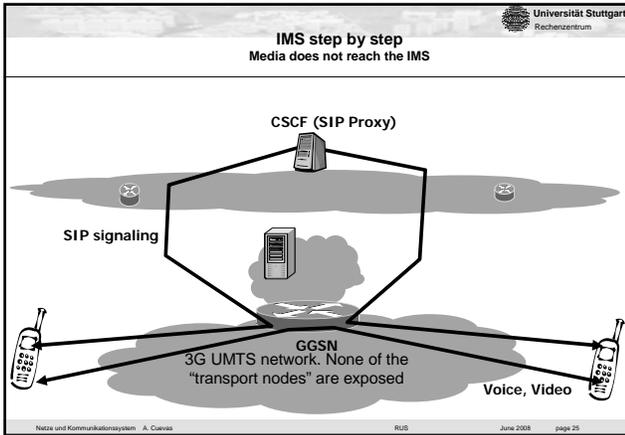
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One main IMS protocol: SIP (developped by IETF and existing in the Internet beefore IMS)

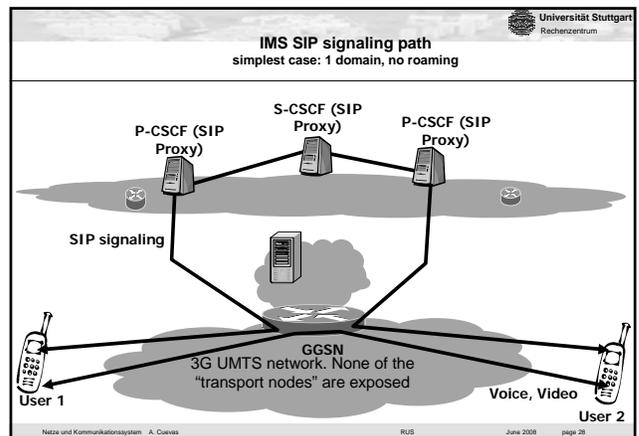
- This can be seen in <http://www2.rad.com/networks/2003/sip/flash.swf>

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- ### In IMS, different types of SIP proxies
- **P-CSCF**
 - IMS contact point for the user's SIP signaling
 - Several in a domain
 - Located in the visited domain
 - Terminals must know this proxy (e.g. DHCP used)
 - **S-CSCF**
 - Controls the user's SIP Session
 - 1 or a few in a domain
 - Located in the home domain
 - Is a SIP registrar (and proxy)
 - **I-CSCF**
 - domain's contact point for inter-domain SIP signaling
 - 1 or a few in the domain
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IMS SIP signaling path hardest case: 4 domains, roaming

- UMTS network is only used in the visited domains
- Media goes directly

The diagram shows a map of Europe with several countries labeled: UK, IRELAND, DENMARK, SWEDEN, FINLAND, ESTONIA, LATVIA, LITHUANIA, POLAND, BELARUS, CZECH REP., SLOVAKIA, ROMANIA, BULGARIA, GREECE, ITALY, FRANCE, PORTUGAL, and RUSSIA. Three Call Service Control Functions (CSCFs) are marked: S-CSCF in the UK, S-CSCF in Finland, and P-CSCF in France. Arrows indicate signaling paths: one from the UK S-CSCF to the Finland S-CSCF, and another from the Finland S-CSCF to the France P-CSCF. A third arrow points from the France P-CSCF to a mobile phone icon in France, representing direct media flow.

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UMTS networks are QoS enabled

- There are four QoS Classes in UMTS
 - Conversational, Streaming, Interactive, Background.
- QoS classes are mapped to Bearer Services
- The user, to employ the bearer services, needs to activate a PDP context
- PDP context are mapped to flows → traceable QoS
- But out of reach of IMS
- How the IMS can enjoy UMTS' QoS?

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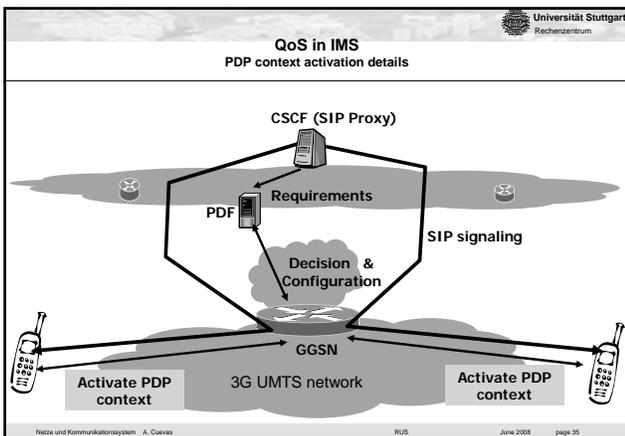
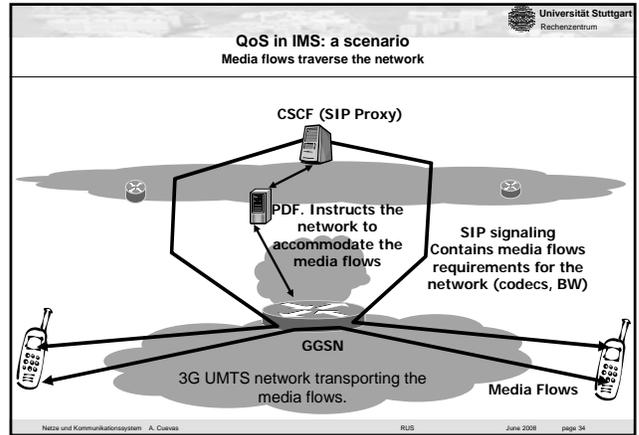
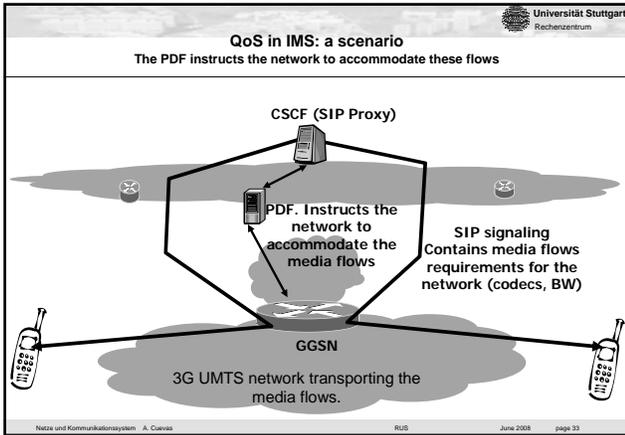
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QoS in IMS: a scenario

Two users want to setup a video call. The video flow needs 128 kbps, the audio one 16 kbps

The diagram illustrates a network architecture. At the top, a 'CSCF (SIP Proxy)' is shown. Below it, two mobile phones are connected to a 'GGSN' (Gateway GPRS Support Node). The GGSN is connected to the CSCF. A cloud labeled '3G UMTS network transporting the media flows.' is connected to the GGSN. A text box indicates 'SIP signaling Contains media flows requirements for the network (codecs, BW)'. Arrows show signaling paths from the phones through the GGSN to the CSCF and back.

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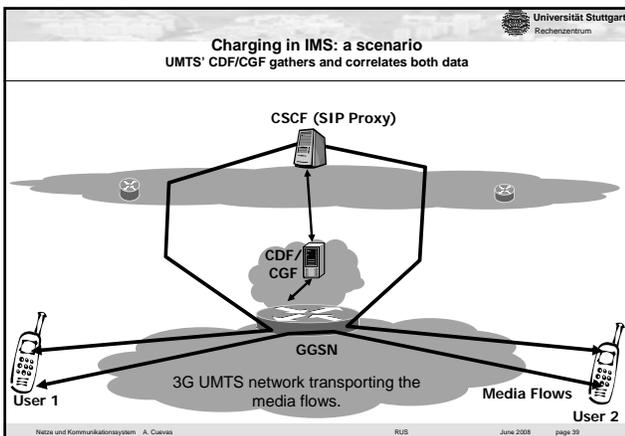
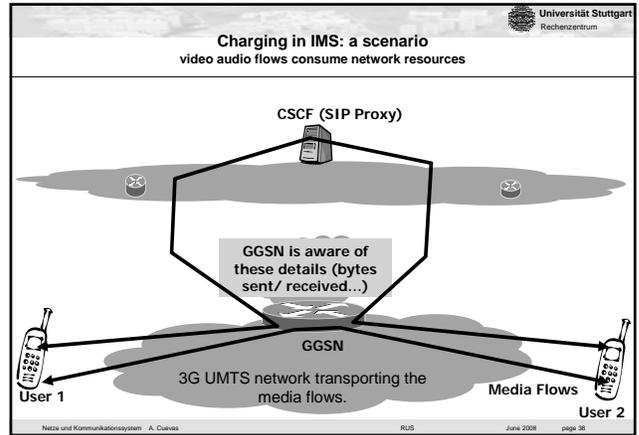
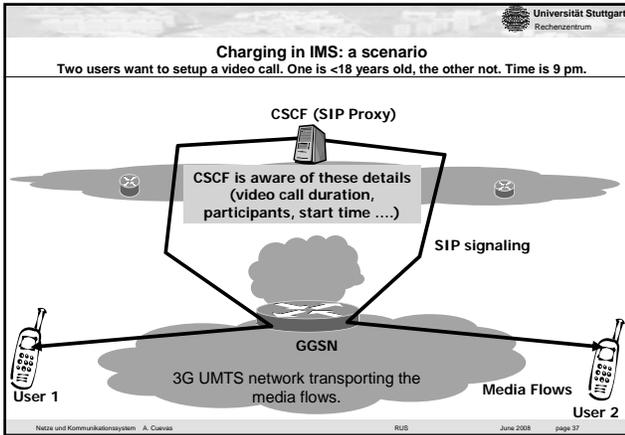
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AAA in IMS

emulating the semi-walled garden business model

- In IMS we enjoy single sign on and unified non duplicated billing, all centralized by the UMTS network control elements
- Let's deal now with accounting, charging and billing
- IMS can not bill its users. It will just send accounting information to the network operator's UMTS nodes. Centralizing point will be the network operator, its UMTS infrastructure.

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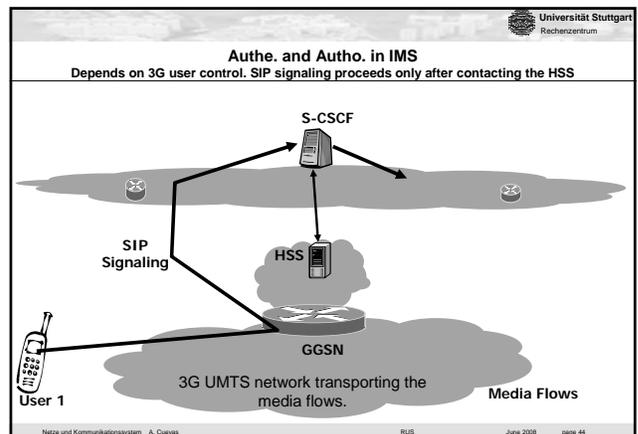
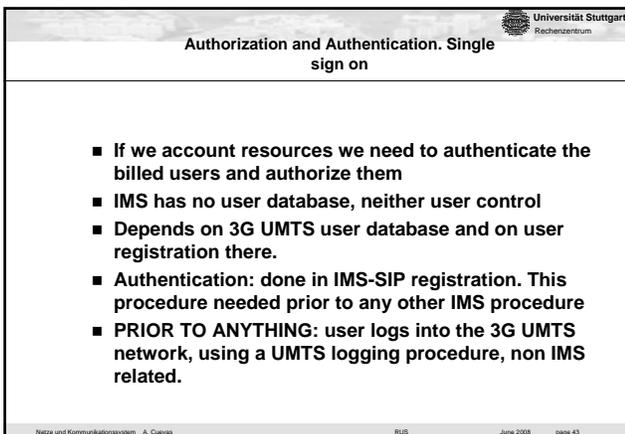
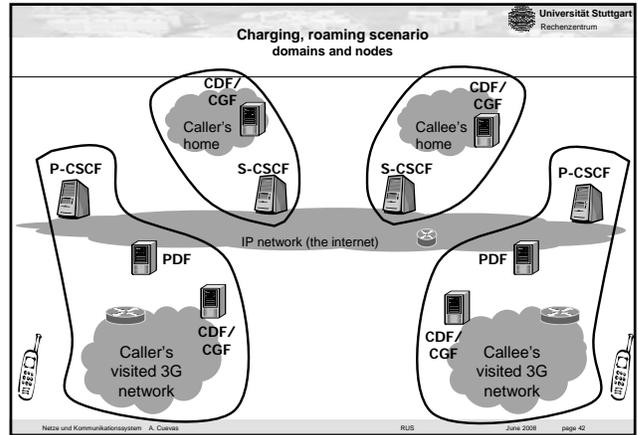
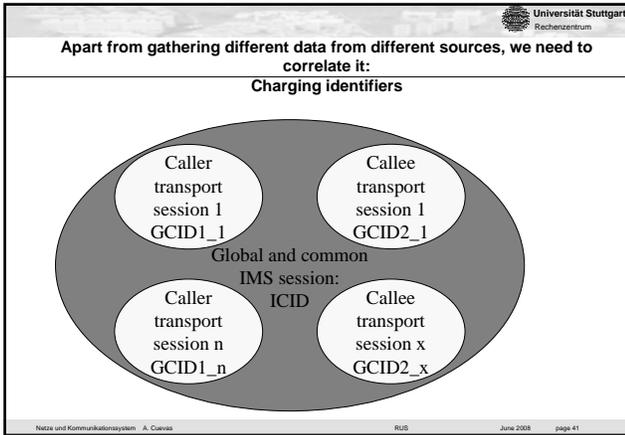


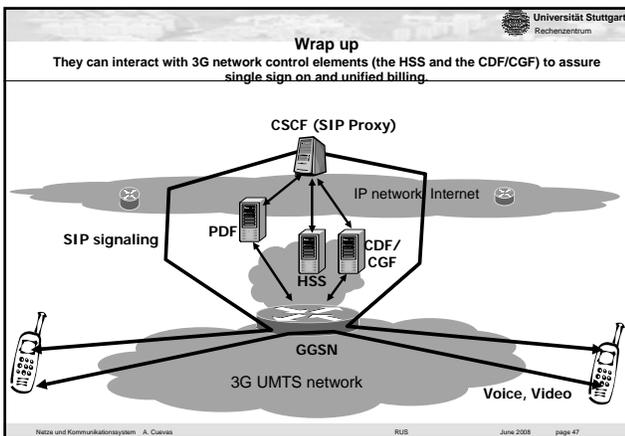
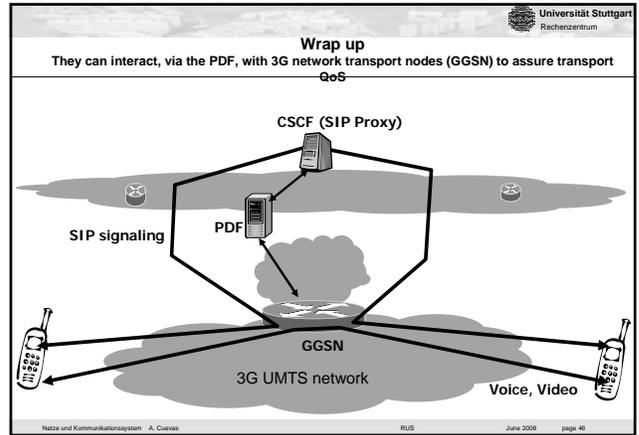
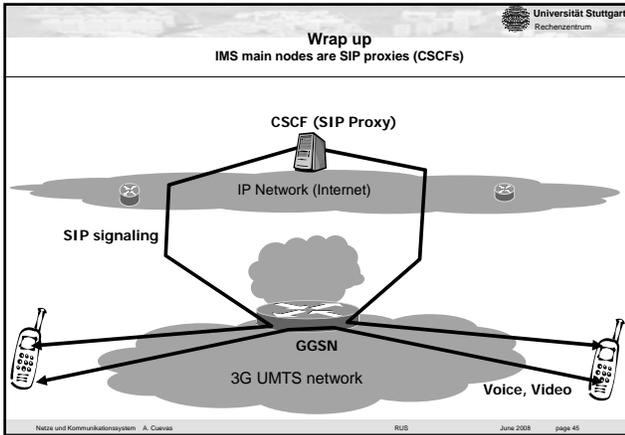
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Apart from gathering different data from different sources, we need to correlate it

- **accounting: is able to correlate the accounting at two levels:**
 - Network usage (e.g. bytes sent/received)
 - Application characteristics
 - E.g. in a voice call, number of parties involved and duration
 - E.g. in streaming a movie, if it was done in prime time and type of movie (recent hits)
- **This allows, according to the business model used, unified billing and non duplicated billing.**

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IMS forecast



- Plain IMS is not much more than today's telephony.
- Plain IMS is mandatory if you need to migrate to all IP and do not want to become a bit pipe even in your traditional business: Voice Calls
- Plain IMS offers a little more than Skype and its priced
 - Network resources consumed by Skype neither are free!!! (Attention to flat-rates)
- Plain IMS good to compete in... Price ☹ . Useful if operator wants to keep user control

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IMS forecast

- Instead of competing in price: look for success in integrating all applications (killer or not ☺)
- From killer application to “killer environment”
- IMS is a very good starting point for making this environment
- Services to come



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References

- **The 3G IP Multimedia Subsystem (IMS): Merging the Internet and the Cellular Worlds**
Gonzalo Camarillo et al.
John Wiley & Sons
ISBN-13: 978-0470871560
- **The IMS: IP Multimedia Concepts and Services**
Miikka Poikselka
Wiley
ISBN-13: 978-0470019061




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References

- **“The IMS Service Platform: A Solution for Next Generation Network Operators to Be More Than Bit Pipes”**
Antonio Cuevas, Jose I. Moreno, Pablo Vidales, Hans Einsiedler,
IEEE Communications Magazine, ISSN 0163-6804
August 2006.



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Thank you



Questions?

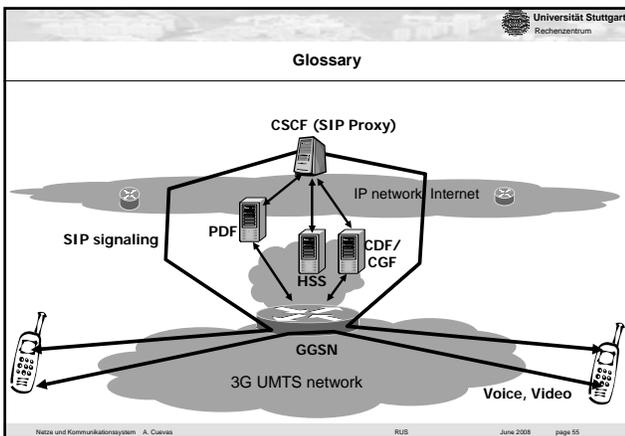
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Glossary

- **PCRF: Policy Control and Charging Rules Function**
 - PDF: Policy Decision Function, old term
 - controls the network (the PCEF)
- **PCEF Policy and Charging Enforcement Function.**
 - GGSN Gateway GPRS Support Node. Connects the mobile network to other networks (Internet).
 - In next generation networks, it is a router
- **CSCF: Calls Session Control Function**
 - Advanced SIP Proxies
- **SIP: Session Initiation Protocol**
 - A protocol to setup and manage sessions, typically voice or video calls
- **HSS: Home Subscriber Service**
 - A user database including the user passwords.
- **CDF/CGF: Charging Data Function / Charging Gateway Function**
 - In charge of collecting and correlating charging information coming from different sources and for different aspects

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