



IMS tutorial:

Is the IMS Service Platform a Solution for Next Generation Network Providers to Be More Than Bit Carriers?

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The Second International Conference on Digital Telecommunications
ICDT 2007
July 1-6, 2007 - Silicon Valley, USA



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Objectives

- ◆ **This tutorial will:**
 - ❖ **Present the IMS, a service platform key in NGN**
 - ❖ **Present IMS architecture CSCFs, PDF, MCF, AS, HSS,**
 - ❖ **Present IMS interfaces and protocols, “internal” and external**
 - ❖ **Present IMS philosophy, bias towards business models**
 - ❖ **Bias to NGN, and how IMS suits this and can be ported to this**
- ◆ **This tutorial will not:**
 - ❖ **Enter into details at “development level” e.g. we will say IMS security is based on tokens but we will not say that those tokens are hashes of 128 or 64 bits.**
- ◆ **Technical topics explained in a tutorial fashion. Also business related aspects and rationale**



Index

- ◆ **Introduction, Disruptions in Telco business**
- ◆ **Service platforms and business models**
- ◆ **SIP protocol and VoIP**
- ◆ **IMS Service Platform: SIP Proxies**
- ◆ **IMS Service Platform: key feature, enabling business models**
- ◆ **IMS Service Platform: signaling**
- ◆ **IMS Service Platform: extra features & services**
- ◆ **IMS Service Platform: current deployments**
- ◆ **Conclusion, IMS forecast**



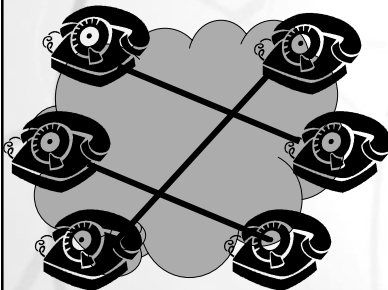
Striking Statements



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



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



Circuit Switched

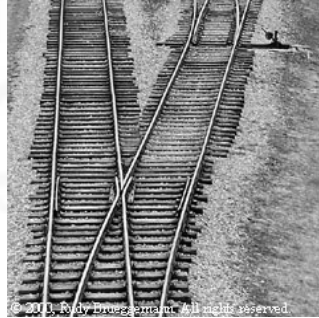


Packet Switched (IP)



...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)

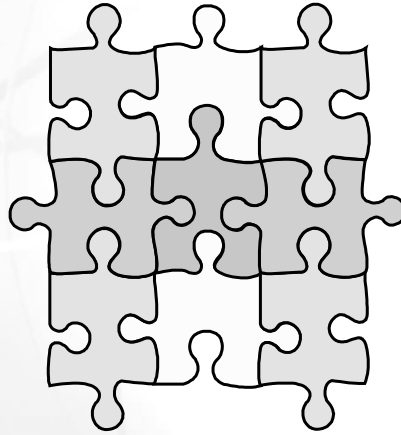


Strong implication and disruptions

- ◆ 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



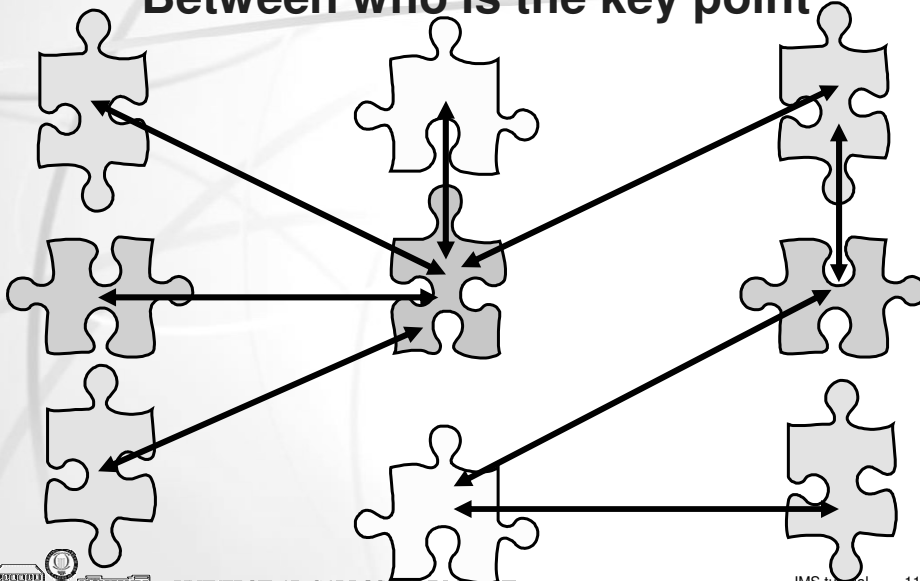
From Telephony to Internet: Telco breaks into pieces



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



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The actors, fighting to gain a central position

◆ Network providers

- ❖ Migrating everything to a universal network reduces Operational Expenditures
- ❖ They do not resign to become mere bit pipes and lose central position in the business value chain.
- ❖ Money seems to be in the service delivery
- ❖ Deutsche Telekom president statement: make google pay



The actors, fighting to gain a central position

◆ service providers

- ❖ Like the Internet model as it is
- ❖ Make money beyond publicity
- ❖ Struggle to find new services/features that the users are willing to pay



The Scenario: 4G networks (or NGN)

- ◆ **misconception of 4G: many think its just more bandwidth**
- ◆ **Also a 4G network is much more than 3G's "All-IP"**
 - ❖ in 3G, IP is an overlay,
 - ❖ 3G are networks with links to IP networks both for transporting data and for control elements. But they are separate networks.
 - ❖ 4G is a native IP network (thus much easier to integrate any access technology)
- ◆ **So... what's a 4G Network (NGN)? No answer yet, but next slide may be a good approach**



A 4G network

Applications offered by the network operator (e-mail, IPTV)

Applications offered by third party service providers (e-mail, IPTV)

Service Enablers. Service Delivery Platforms. May include services such as "Calls" (IMS)

Operator's core IP network with basic services: QoS-enabled data transport, mobility, AAA ...

Access Networks with any kind of access technology and any kind of device

Internet

Applications in the Internet



Service platforms seem to be a meeting point, neutral zone

- ◆ Give really useful services: 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

- ◆ IMS is a promising service platform
- ◆ IMS uses SIP protocol



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- ◆ SIP protocol and VoIP
- ◆ IMS Service Platform: SIP Proxies
- ◆ IMS Service Platform: key feature, enabling business models
- ◆ IMS Service Platform: signaling
- ◆ IMS Service Platform: extra features & services
- ◆ IMS Service Platform: current deployments
- ◆ Conclusion, IMS forecast



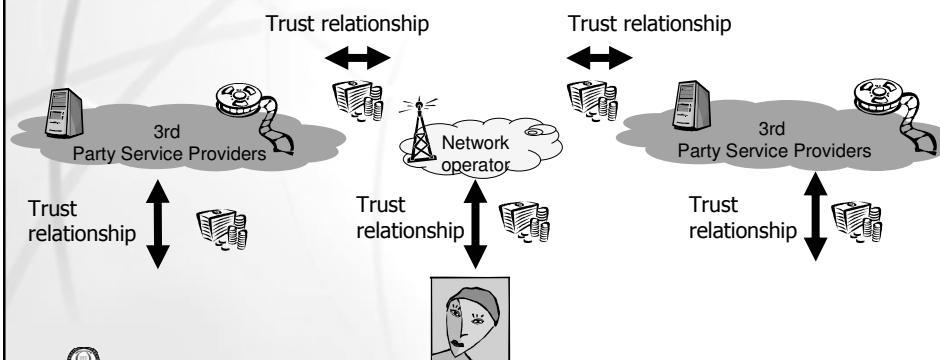
Index

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Internet Business model...known to everybody

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



The user receives many bills. E.g.



- ◆ One from the e-travel agency for purchasing via Web a ticket to Paris
- ◆ One from the Movie Theater for purchasing via Web a ticket to see “E.T.”
- ◆ One from a content provider for downloading a ring-tone
- ◆ And one from the network operator: e.g. flat rate for ADSL, 10€/month or 1€/Gb for GPRS usage in the mobile



The user may be “billed twice”

- ◆ **EXAMPLE**
- ◆ The user downloads a ring-tone: costs 0,30€
- ◆ The ring tone is 100kb big
- ◆ The user employs a GPRS connection in his mobile to access the Internet and download the ring-tone. He pays 1€/Gb
- ◆ The user pays 0,00001 € for the traffic to download the ring-tone



The user needs to authenticate many times

- ◆ Must provide his billing data to all the entities (e.g. credit card number)
- ◆ Must login to all the entities



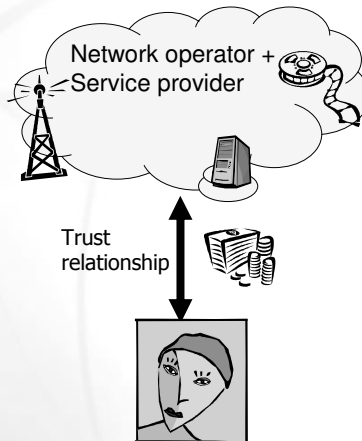
In short

- ◆ Model open to many parties and services
- ◆ The network operator is just a bit pipe
- ◆ Billing, authentication,...is a nuisance for the user



Telephony Business model...known to all of us

- ◆ Monolithic solution, closed to services



The user receives only one bill

- ◆ This bill is from the network provider
- ◆ Usually charged only for telephone calls or for very limited services, like ring-tone download



The user needs to authenticate only to the network provider

- ◆ Must provide his billing data only to the network provider
- ◆ Must “login” (SIM Card in mobile networks) to the network provider



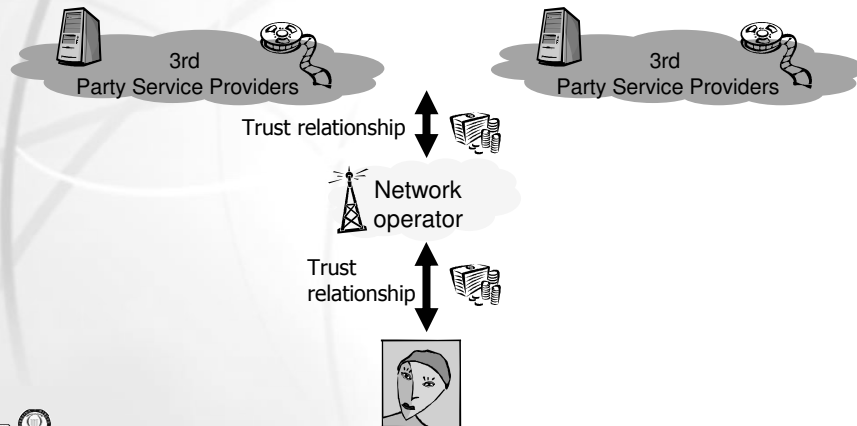
In short

- ◆ Very limited range of services. Model closed to other parties
- ◆ The network operator delivers the whole service



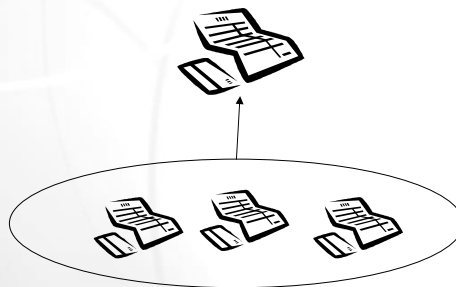
Semi-walled garden business model

- ◆ Network operator is a service broker.



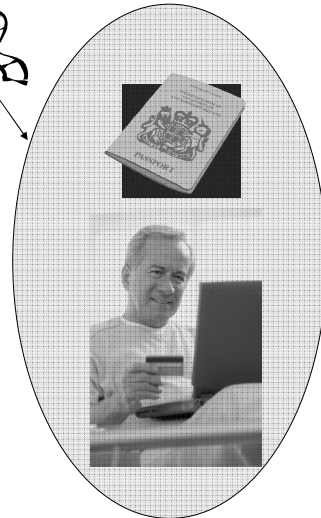
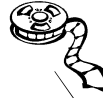
The user receives only one bill

- ◆ This bill is from the network provider
- ◆ Vast panoply of services. The network provider will divert the money (retaining a %) to the service providers



The user needs to authenticate only to the network provider

- ◆ Must provide his billing data only to the network provider
- ◆ Must login only to the network provider
- ◆ The service providers do not see user's data and depend on network provider user management

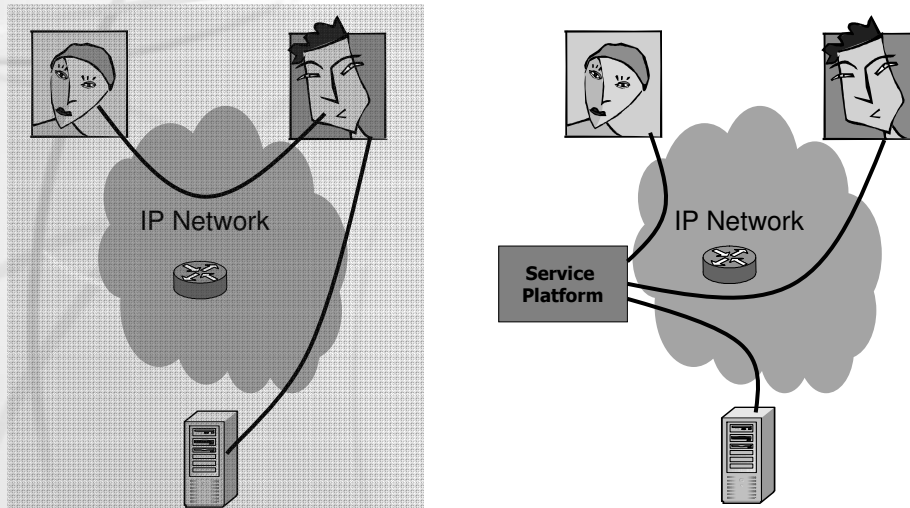


In Short

- ◆ Innovative business model
- ◆ Network provider is a bit pipe plus a service broker
- ◆ It is open to all parties, its service panoply is as rich as in the Internet
- ◆ It is as convenient as the telephony model, both for users and the network operator
- ◆ It is the CONVERGED business model
- ◆ Makes possible service aggregation and opens many opportunities



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



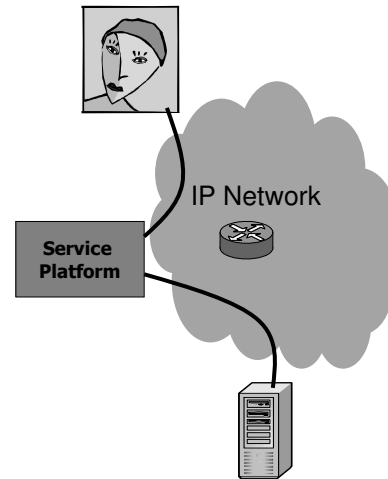
Attention

- ◆ Users can keep employing the “Internet” model
- ◆ Entice users to employ service platforms and the “semi-walled garden” model
 - ❖ Price reduction ☹
 - ❖ Better services



Service Platforms examples: i-mode

- ◆ Proprietary of NTT DoCoMo, mainly for mobile phones and service providers



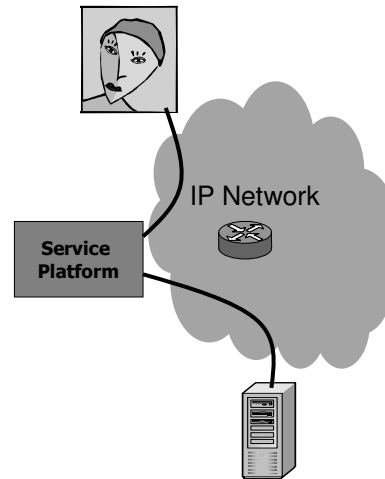
Service Platforms examples: i-mode

- ◆ Offers many services under the semi-walled garden model
 - ❖ Banking, e-shopping, news, games, restaurant guides, ...
- ◆ Huge success and growing. By 2002:
 - ❖ 31 Million subscribers
 - ❖ 3 000 services providers partnered with i-mode
 - ❖ 50 000 web sites allied with i-mode



Service Platforms examples: OSA

- ◆ OSA: Open Service Access
- ◆ Not big success
- ◆ Target services such as content downloading
- ◆ Not proprietary; standardized by the 3GPP (like IMS)
- ◆ Part of the “Virtual Home Environment”
- ◆ Offers a standard API (developed by Parlay) to service providers



Service Platforms examples: OSA

Service Providers



OSA API: Call control, UMTS QoS, User location, Terminal capabilities, Content based charging

OSA's Service Capability Servers



HLR/HSS

Location Server

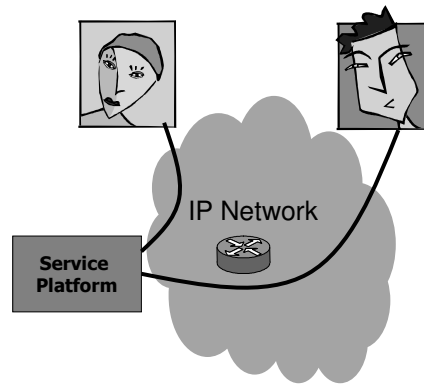


3G UMTS network



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



Index

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Internet, applications and protocols

- ◆ A bunch of protocols, most designed by IETF
- ◆ E-mail: pop3, SMTP, IMAP
- ◆ Web browsing: http
- ◆ VoIP, instant messaging: SIP
 - ❖ H323 could also be used but, in principle, it is more complicated and has not been adopted by IMS

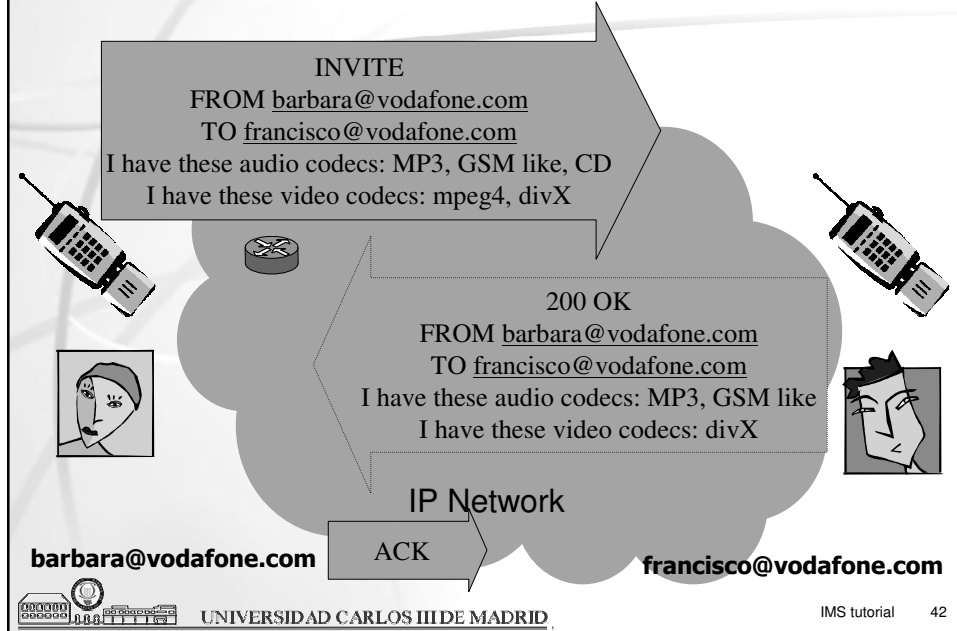


What is SIP?

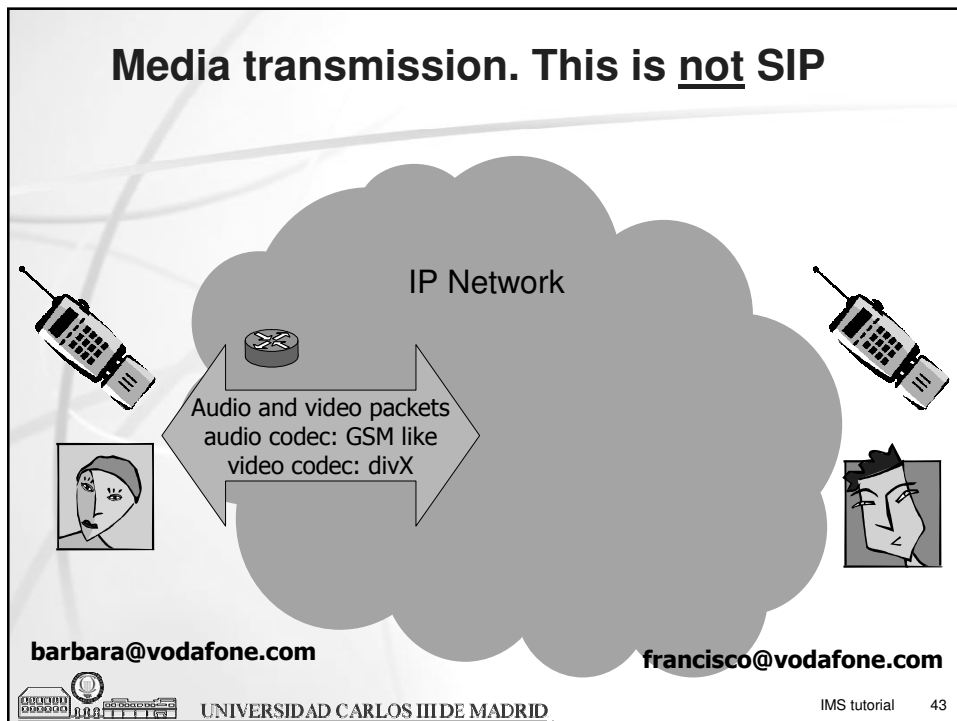
- ◆ SIP is a signaling protocol to setup any kind of sessions
- ◆ When those sessions are voice calls, SIP is to the Internet what SS#7 is to mobile telephony: a signaling protocol to setup voice calls

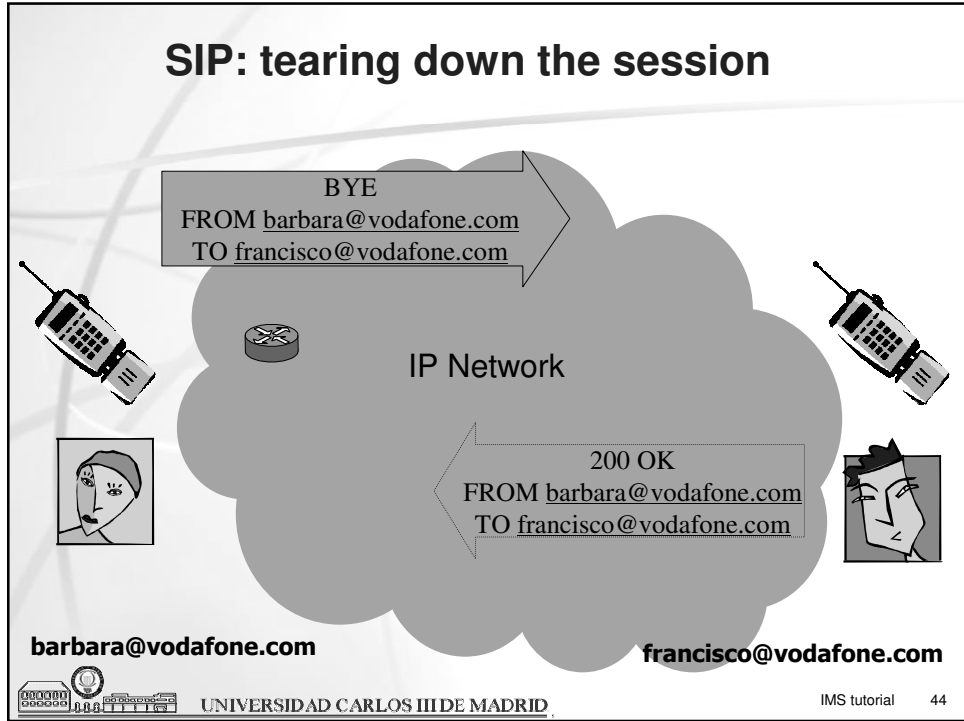


SIP: setting up the session



Media transmission. This is not SIP



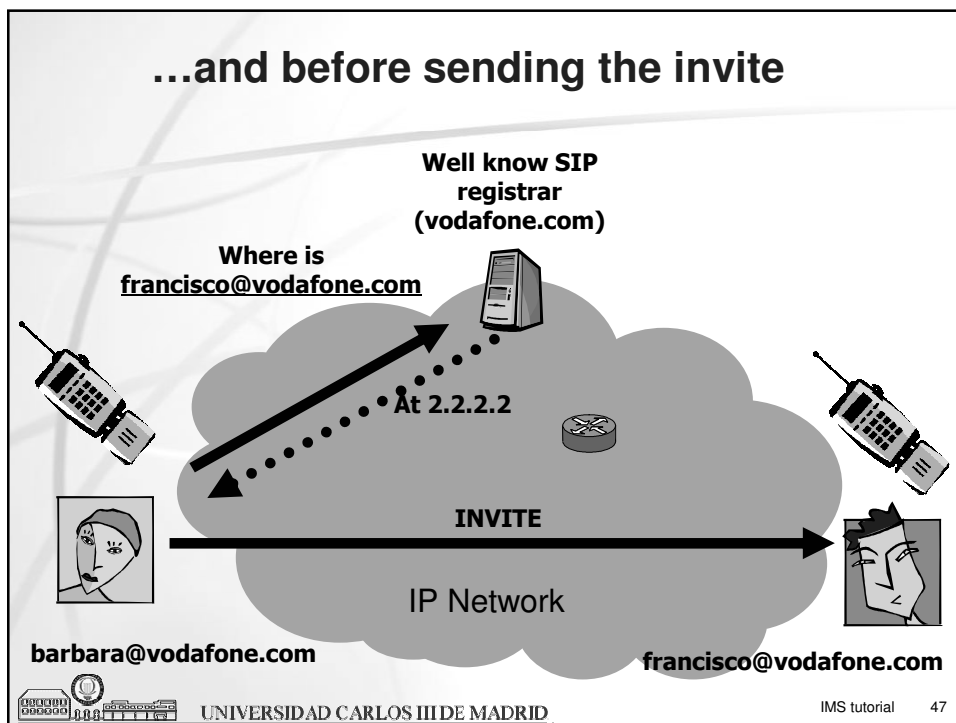
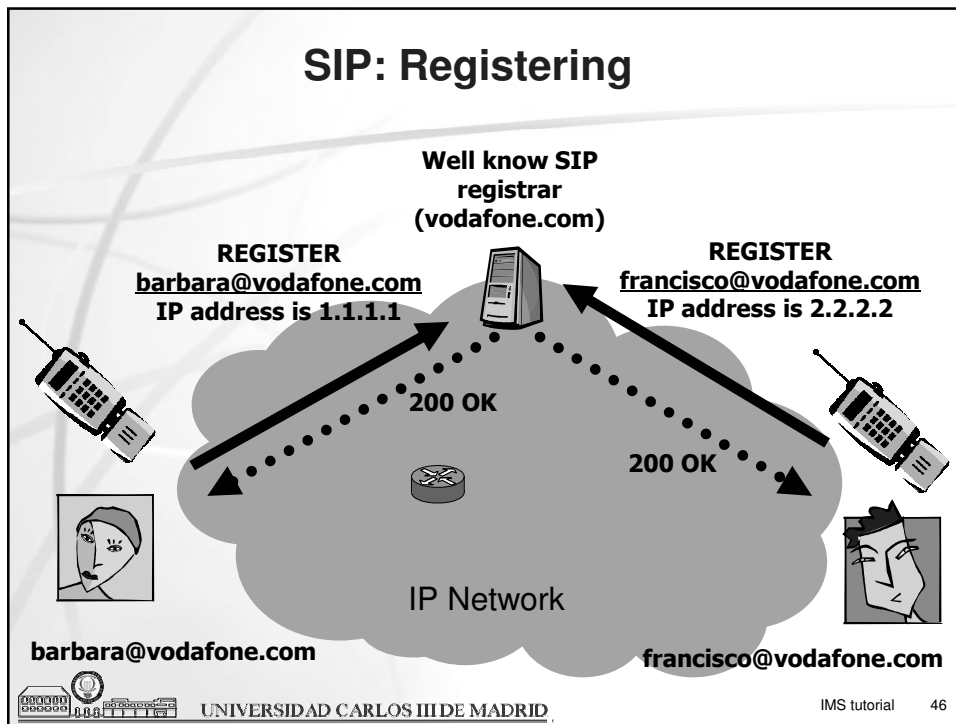


SIP Registrars

- ◆ All the above is nice and simple but...
- ◆ In the Internet we can not route the packets using francisco@vodafone.com, we need the IP address of the machine used by Francisco
- ◆ Mapping IP addresses to users is the function of the SIP registrars
- ◆ User's devices need to know the IP address of the SIP registrar (configuration, DHCP)

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IMS tutorial 45

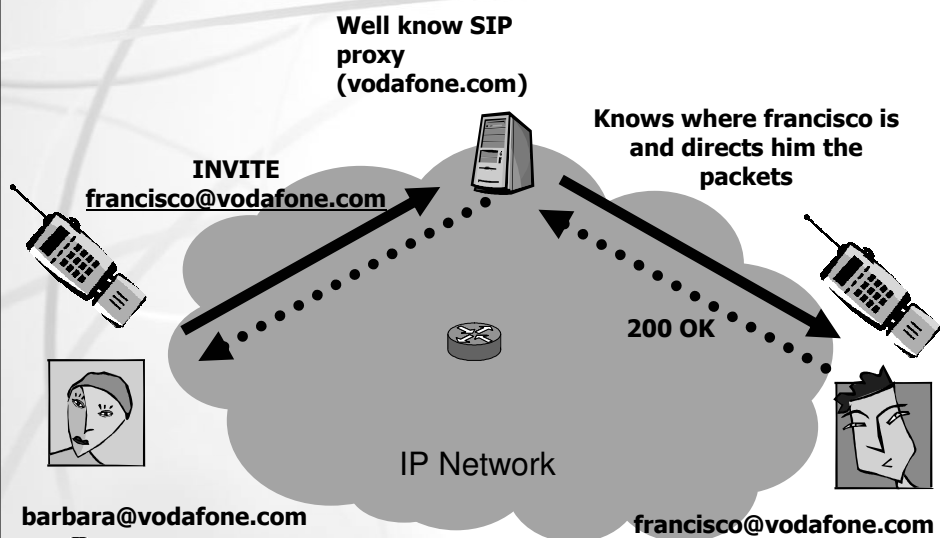


Actually...we use sip proxies

- ◆ SIP proxies can contact a registrar or are a registrar
- ◆ They do not participate in the session but they assist in setting it → never traversed by the media packets
- ◆ They receive and forward the sip messages
- ◆ Their address must be know by the SIP terminals (configuration or DHCP)



Using SIP Proxies



Wrap-up

- ◆ INVITE and 200 OK let the conferees agree on the session parameters
- ◆ SIP messages, not sent directly between the conferees, they traverse a SIP proxy
- ◆ SIP Proxy/registrar maps user's device IP address to user identification (francisco@vodafone.com)
- ◆ SIP proxy address must be known by the conferees
- ◆ Media transport is not SIP
- ◆ Media never traverses SIP proxies



SIP message format and messages

- ◆ SIP has messages (e.g. INVITE), each needs 1 definitive answer. Exception: no answer for the ACK message
- ◆ May also receive (0..n) provisional answers (codes 1XX)
- ◆ Definitive answers may be o.k. (codes 2XX) or k.o.



Some useful provisional answers

- ◆ “180 Session Progress” indicates all is going on
- ◆ “183 Ringing” tells the caller the callee phone is ringing. The “200 OK” definitive answer will be received when the callee hangs-up

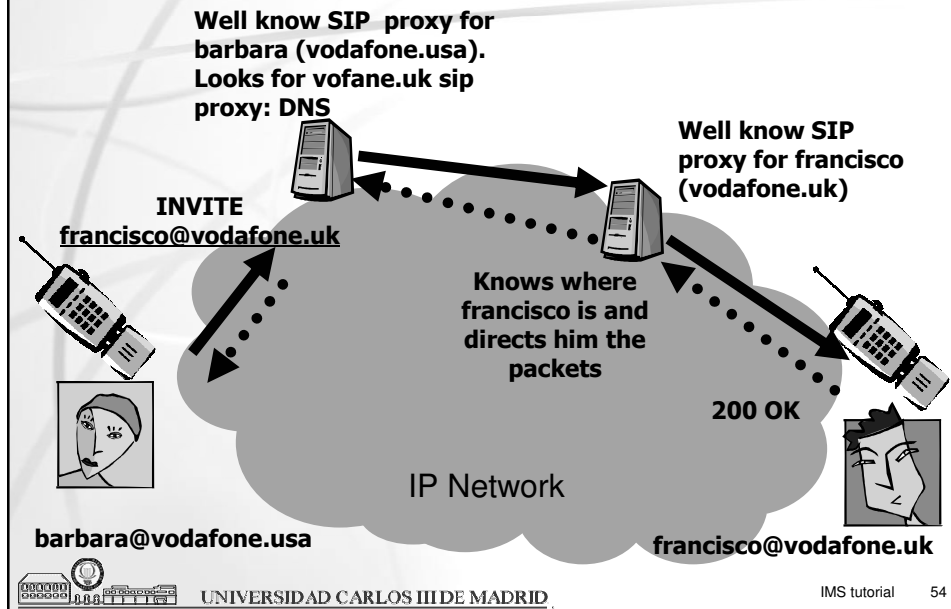


A complete example

- ◆ <http://www2.rad.com/networks/2003/sip/flash.swf>



Multiple domains and SIP proxies



Multiple domains and sip proxies

- ◆ Each user must know his proxy
- ◆ He must register in his proxy/registrar.
Only his proxy/registrar can map him and his IP address
- ◆ Proxies know each other using DNS lookup

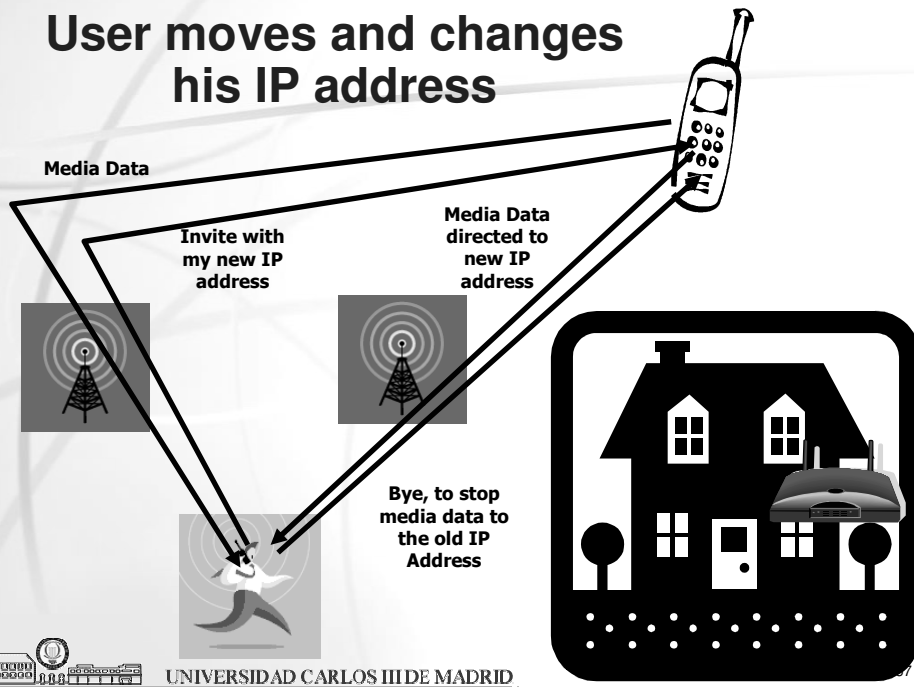
Advanced SIP, more SIP messages

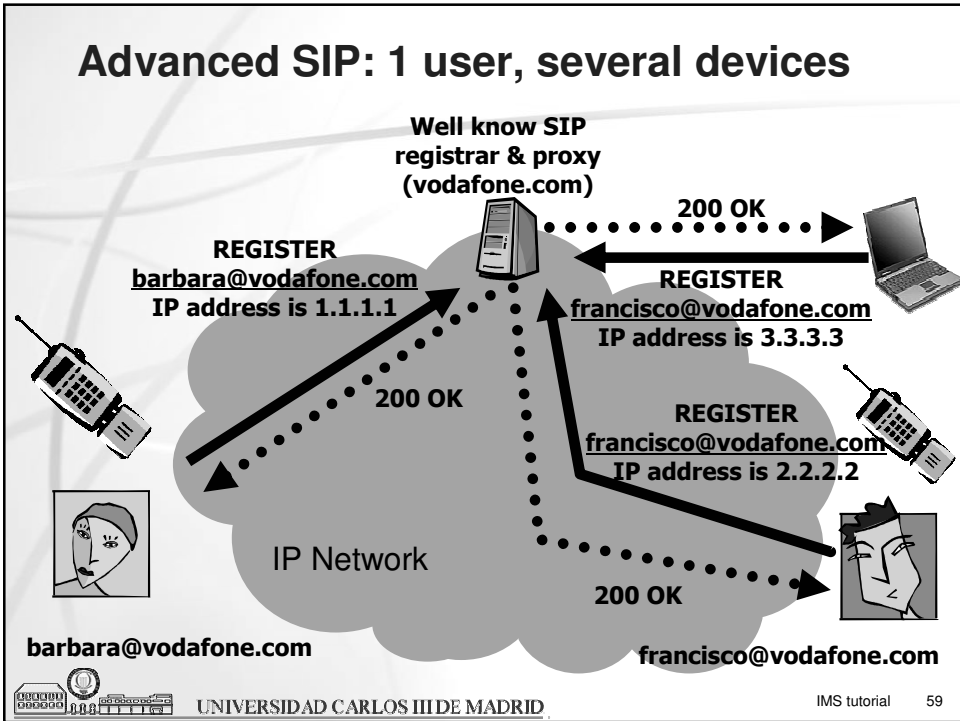
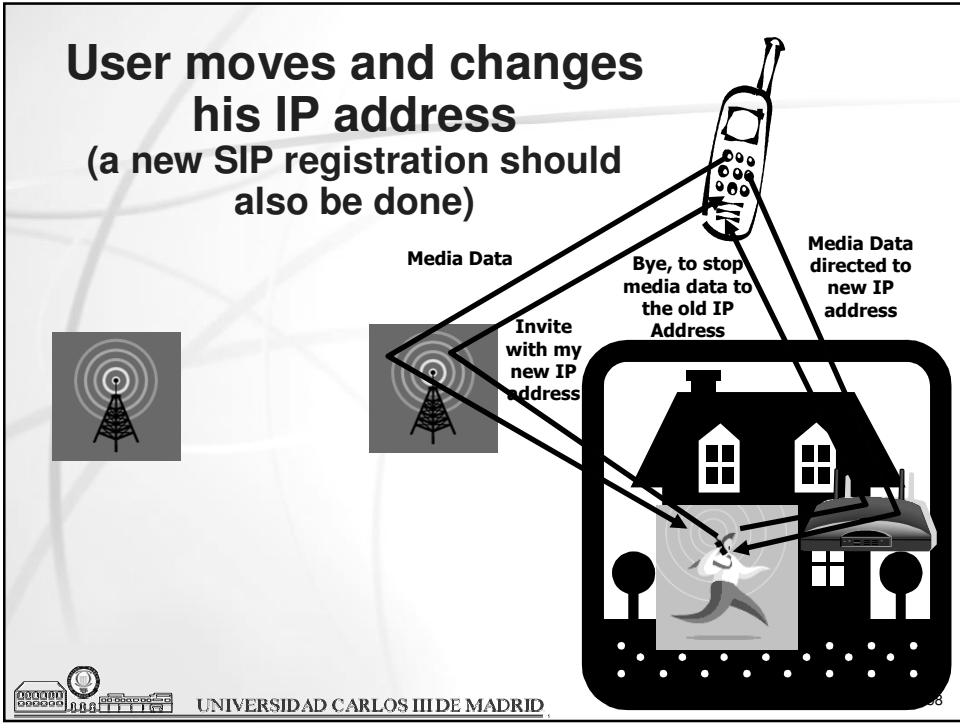
◆ Buddy lists

- ❖ User **SUBSCRIBE** to proxies where buddies are registered to, to receive updates about their state
- ❖ User **PUBLISH** the proxy of his status changes
- ❖ Proxies **NOTIFY** the user about the status changes they have **SUBSCRIBED** to.

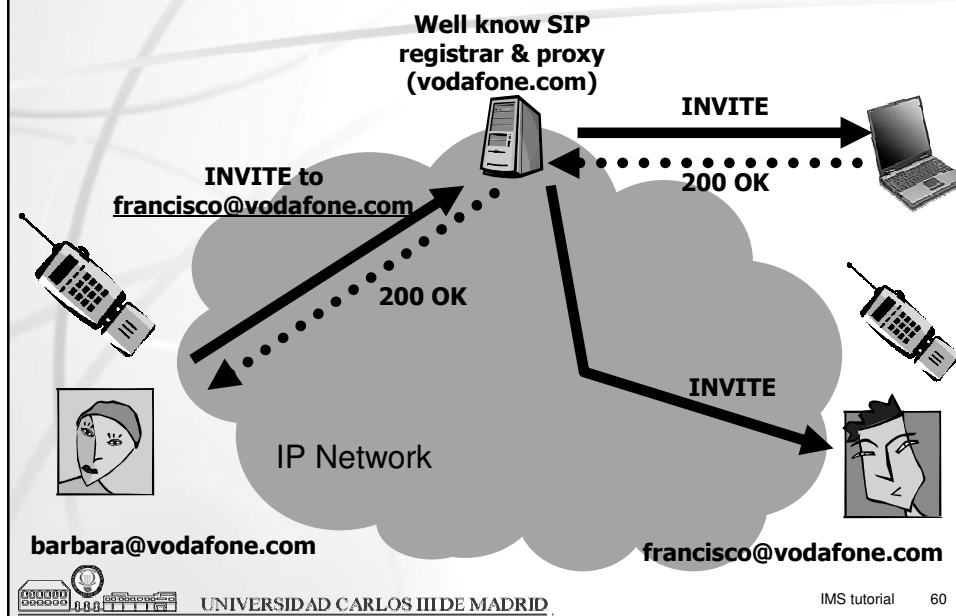


User moves and changes his IP address



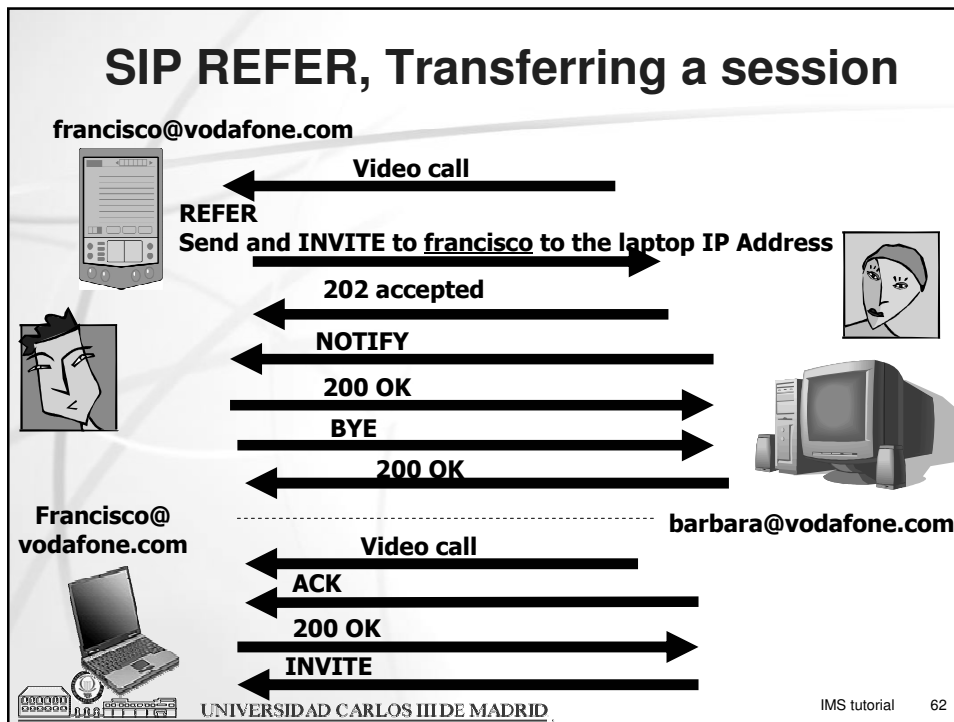


Advanced SIP: 1 user, several devices



Advanced SIP, more SIP messages

- ◆ Transferring a session from a terminal to another
 - ❖ I arrive to my office and transfer the video call from the PDA to the laptop.
 - ❖ The user is previously “logged” in both devices (he did a REGISTER)
 - ❖ REFER message



IP Address, IPv6, SIP and NATs

- ◆ As telephones have numbers, each device in the internet has 1 IP address (at least)
- ◆ Not enough IP addresses
- ◆ We use “private addresses” and NATs
- ◆ NAT works fairly well for client server applications but not for peer to peer... a node with a private address can not be called
- ◆ SIP is working on that
- ◆ Another solution is to employ IPv6 with many more addresses available

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- ◆ Does NOT use SIP, uses a proprietary protocol
- ◆ But it is the most popular VoIP application
- ◆ Solves many issues SIP is still trying to solve like “NAT traversal”
- ◆ Rather than a “proxy/registrar” centric solution, it employs a distributed architecture. Thus it scalable. Peer to peer SIP is a new research direction, imitating this idea



Index

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IMS... seen as a service platform.

- ◆ A service platform that enables SIP calls between users. Those calls are billed in the mobile network!
- ◆ AAA is done by the network operator => semi-walled garden business model
 - ❖ IMS is also owned by the network operator but, conceptually, this holds.
- ◆ SIP proxies form the core IMS, but it has many more nodes and interfaces towards the network operator
- ◆ Some call it “Network”
 - ❖ But I reserve the term of network to a telecommunications network routing data packets from an origin to a destination: The Internet is a network of routers



IMS as a merge of two worlds

- ◆ 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



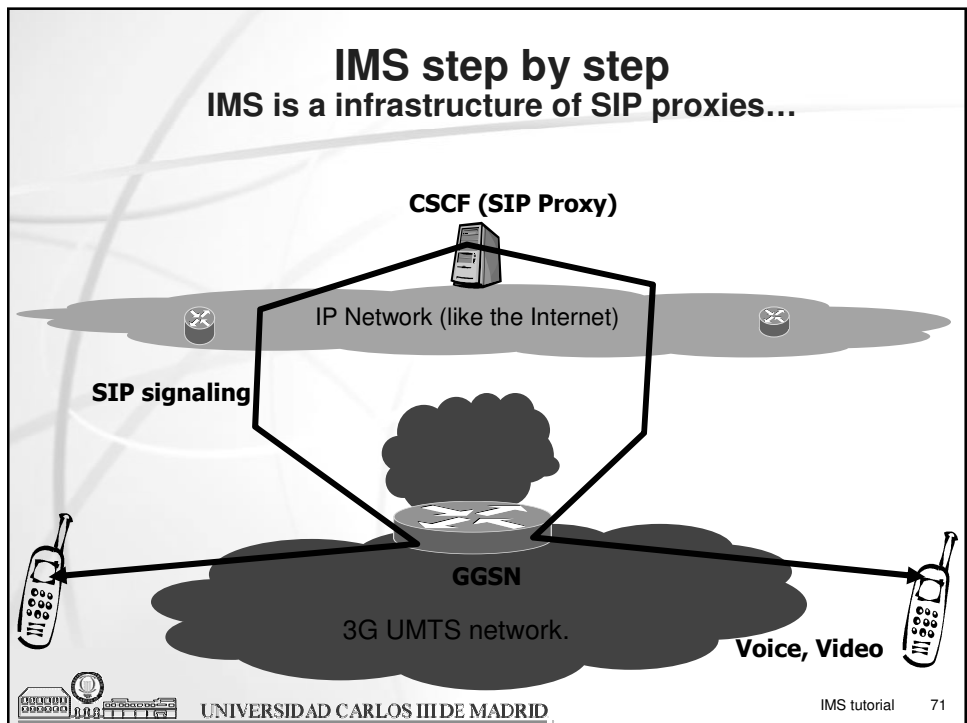
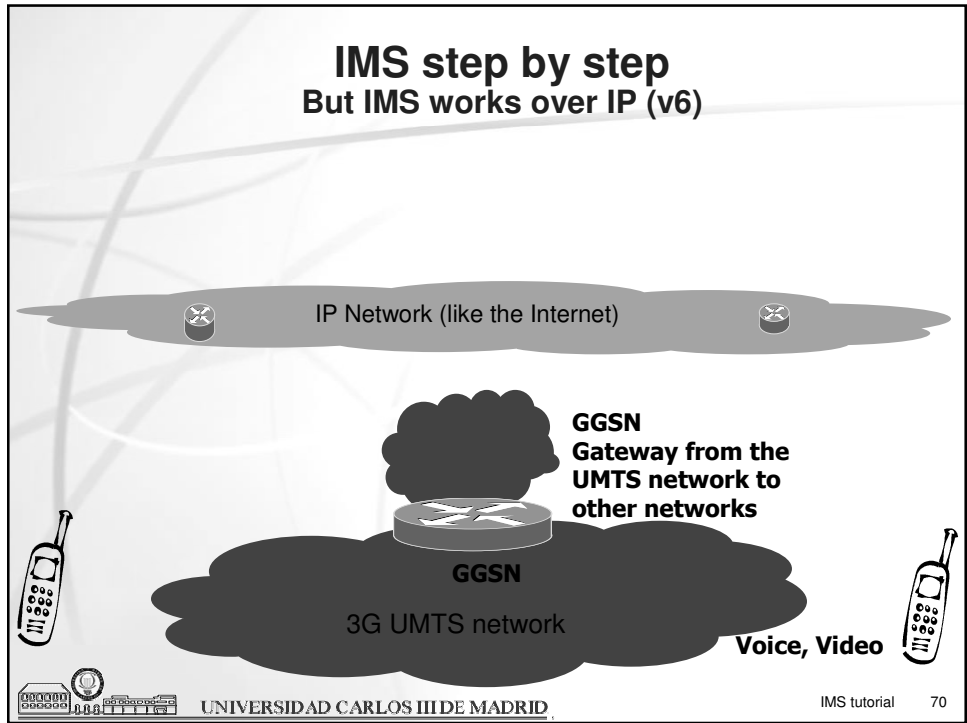
Other IMS actors

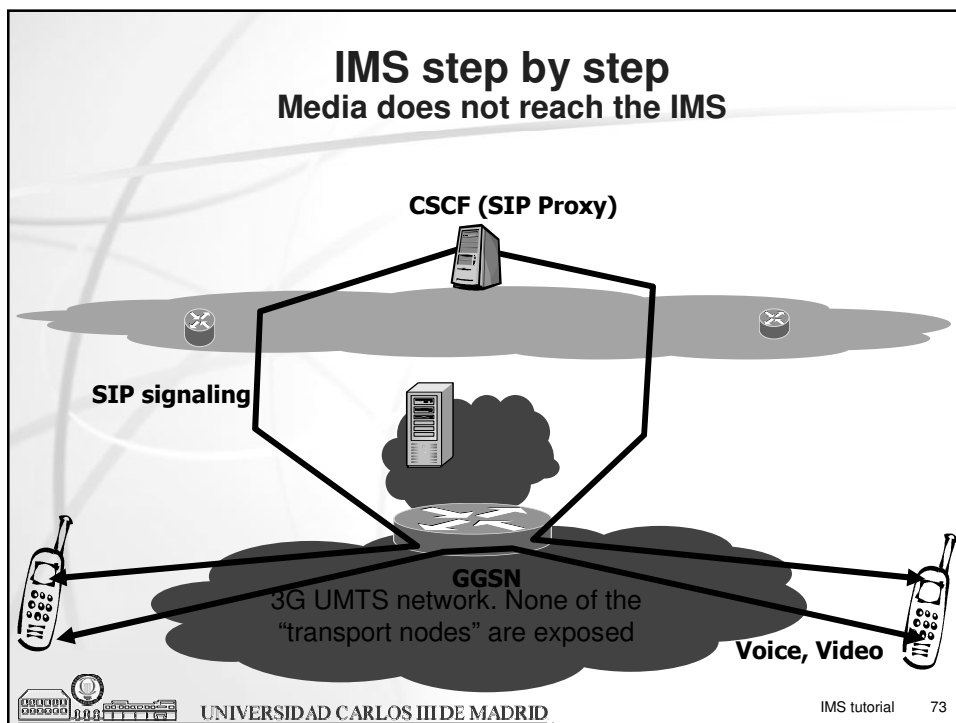
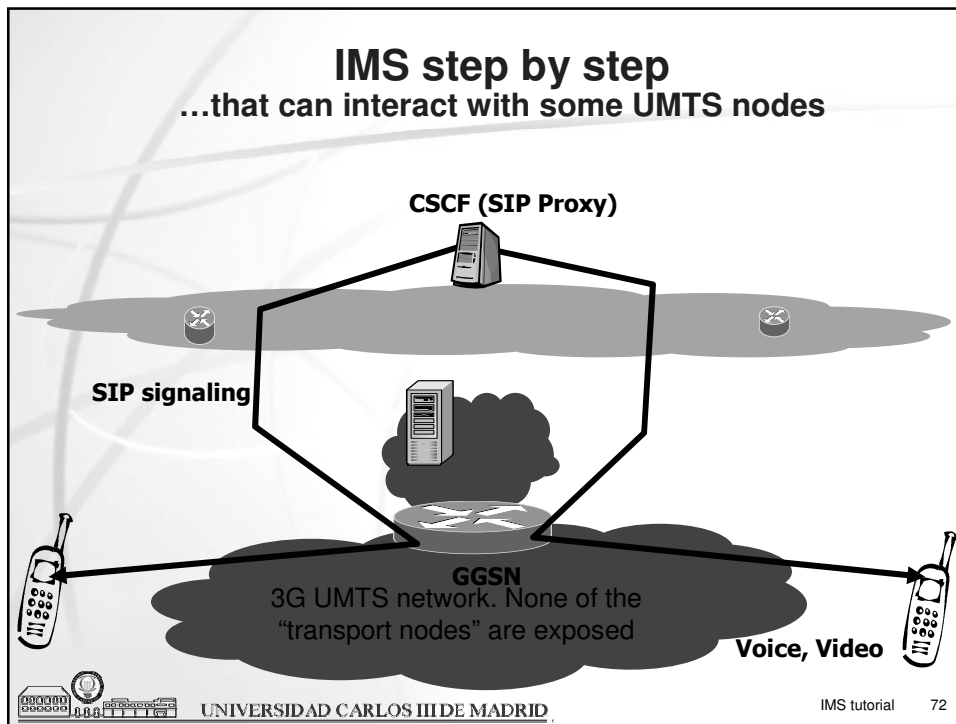
- ◆ **3GPP2 for IMS in 3G CDMA2000 networks**
 - ❖ Very similar to 3GPP IMS for 3G UMTS networks
- ◆ **ETSI TISPAN initiated the IMS, now devoted to porting it to NGN and other networks such as ADSL**
- ◆ **OMA: to define services over IMS**

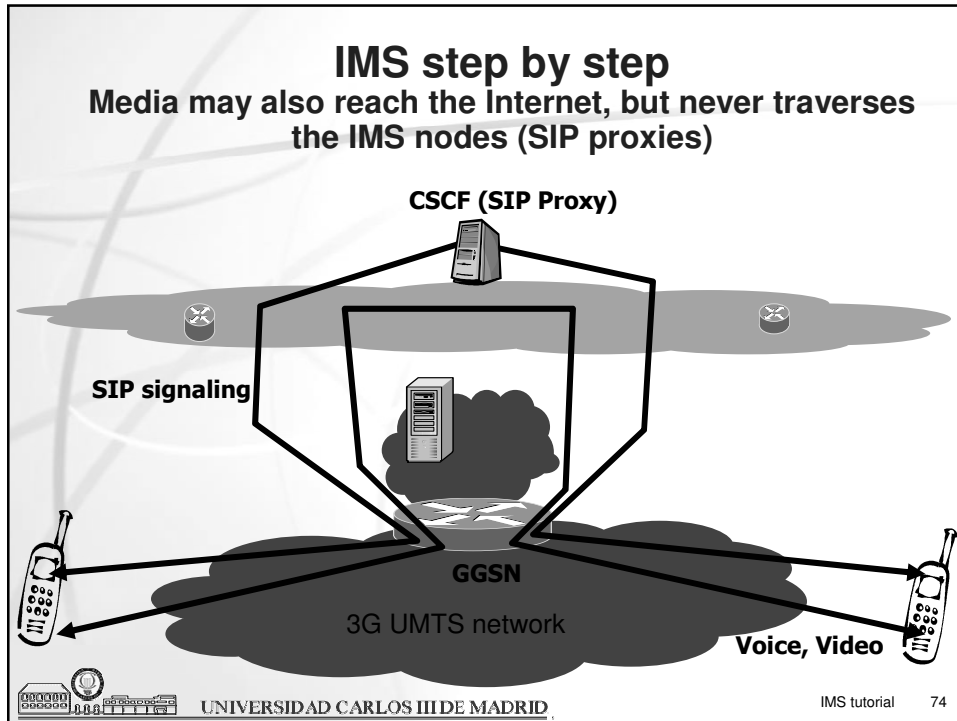


IMS step by step Designed for 3G UMTS networks



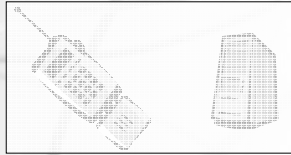






- ## In IMS, different types of SIP proxies
- ### P-CSCF
-
- ◆ IMS contact point for the user's SIP signaling
 - ◆ Several in a domain
 - ◆ Located in the visited domain
 - ◆ Terminals must know this proxy (e.g. DHCP used)
 - ◆ Compresses and decompresses SIP messages
 - ◆ Secures SIP messages
 - ◆ Assures correctness of SIP messages
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- IMS tutorial 75

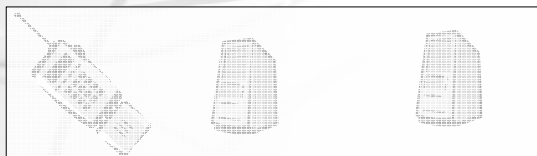
In IMS, different types of SIP proxies S-CSCF



- ◆ Controls the user's SIP Session
- ◆ 1 or a few in a domain
- ◆ Located in the home domain
- ◆ Is a SIP registrar (and proxy)

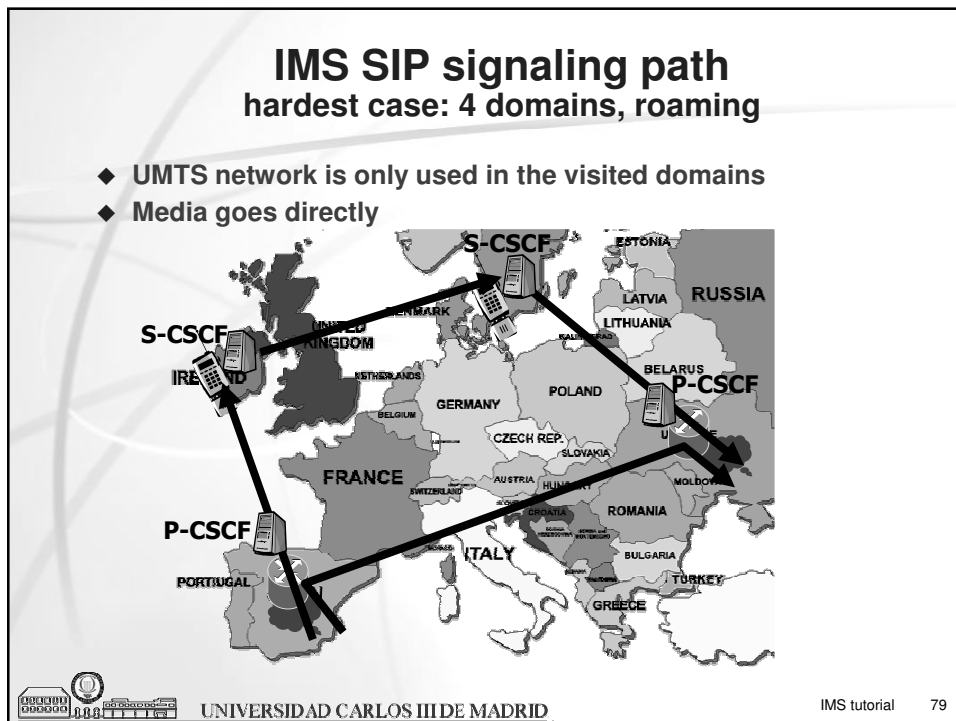
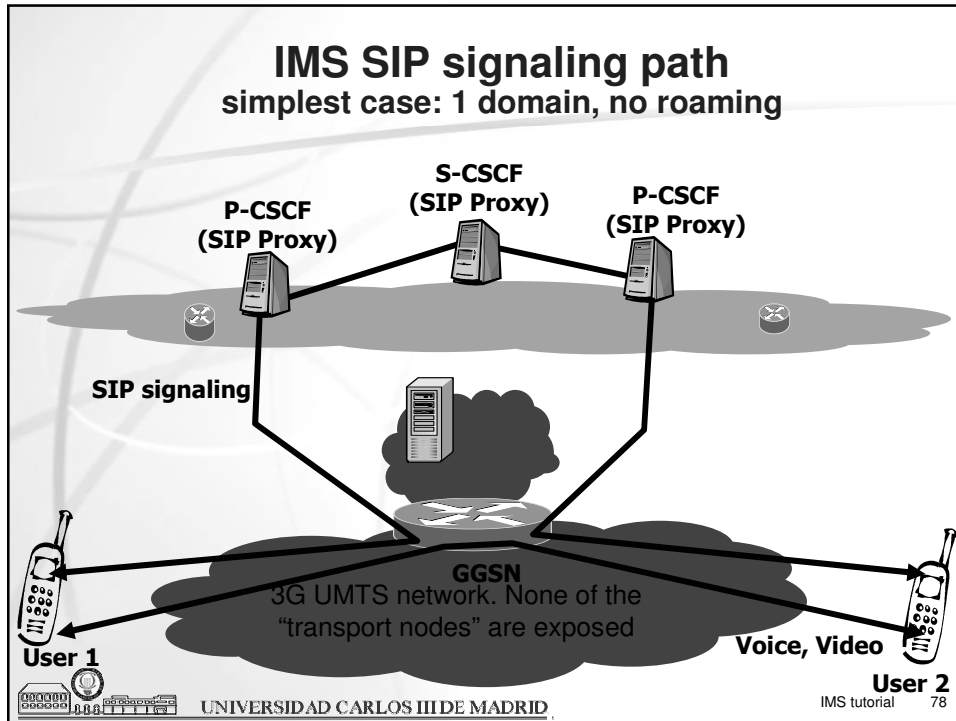


In IMS, different types of SIP proxies I-CSCF



- ◆ domain's contact point for inter-domain SIP signaling
- ◆ 1 or a few in the domain
- ◆ In case there are more than 1 S-CSCFs in the domain, locates which S-CSCF is serving a user





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- ◆ IMS Service Platform: signaling
- ◆ IMS Service Platform: extra features & services
- ◆ IMS Service Platform: current deployments
- ◆ Conclusion, IMS forecast



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



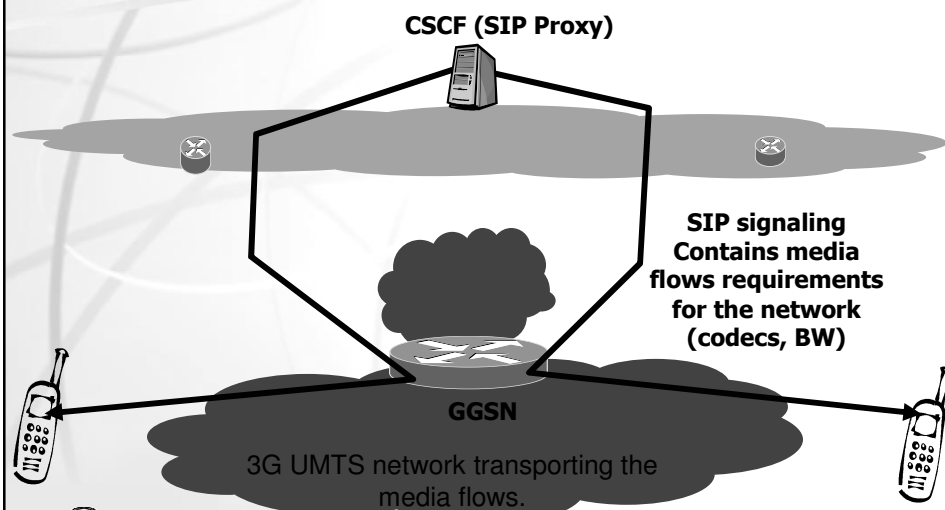
How the IMS can enjoy UMTS' QoS?

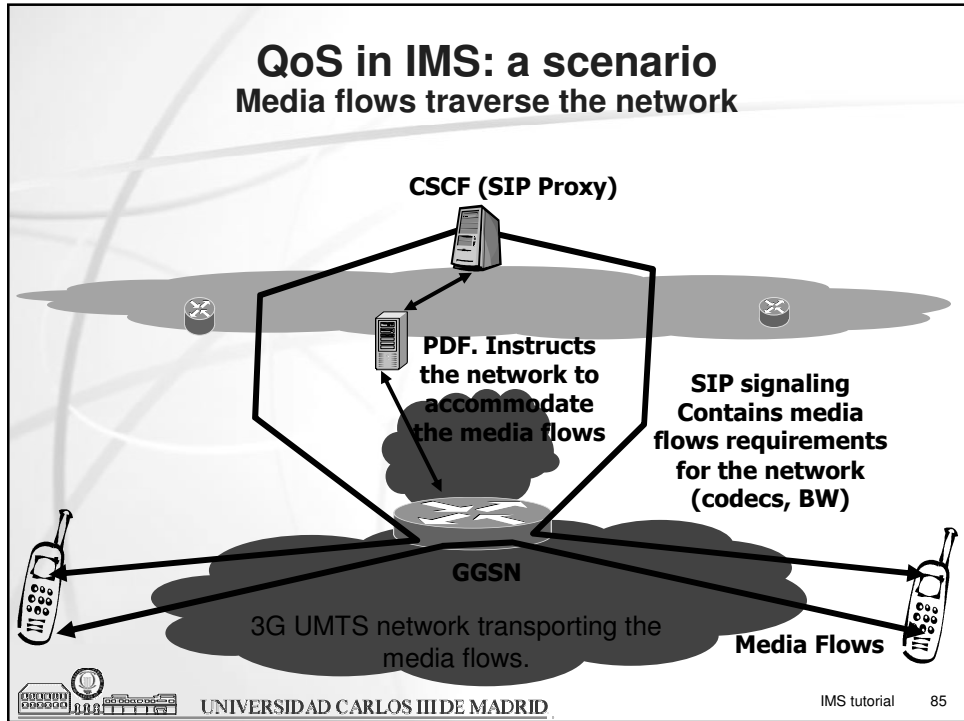
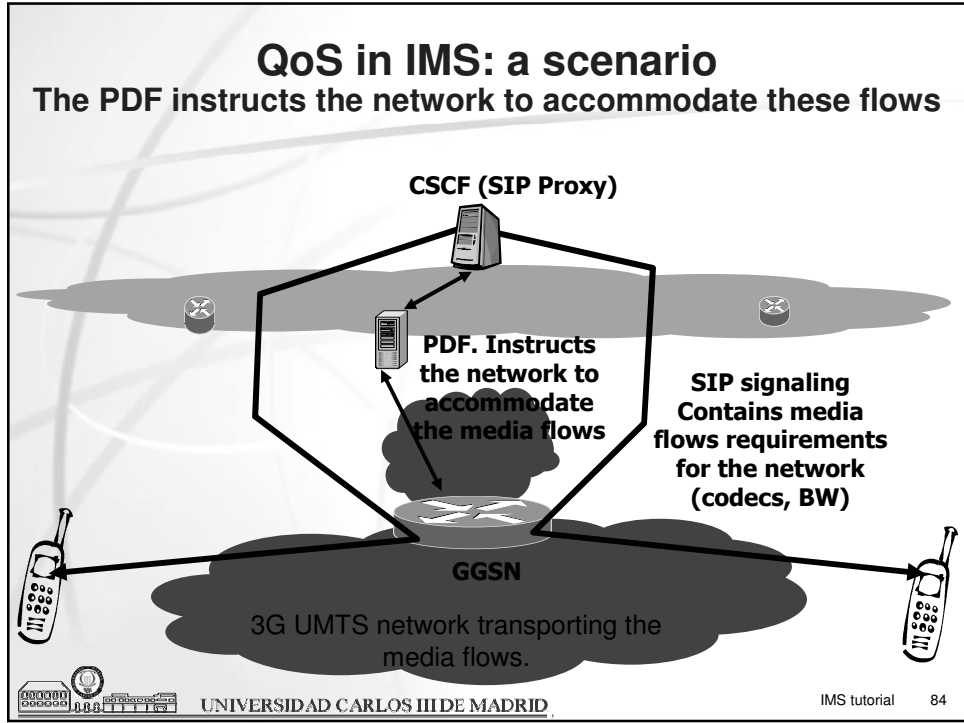
- ◆ As we know, IMS SCSFs (SIP Proxies) can influence the signaling and are aware of the QoS characteristics of the session to be setup
 - ❖ Those characteristics include the codecs used and their required B.W. and other requirements for the transport network
- ◆ But SIP Proxies can not influence the data/media flows, neither the network transporting them
- ◆ Need of an intermediary: The PDF



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 central role of the PDF

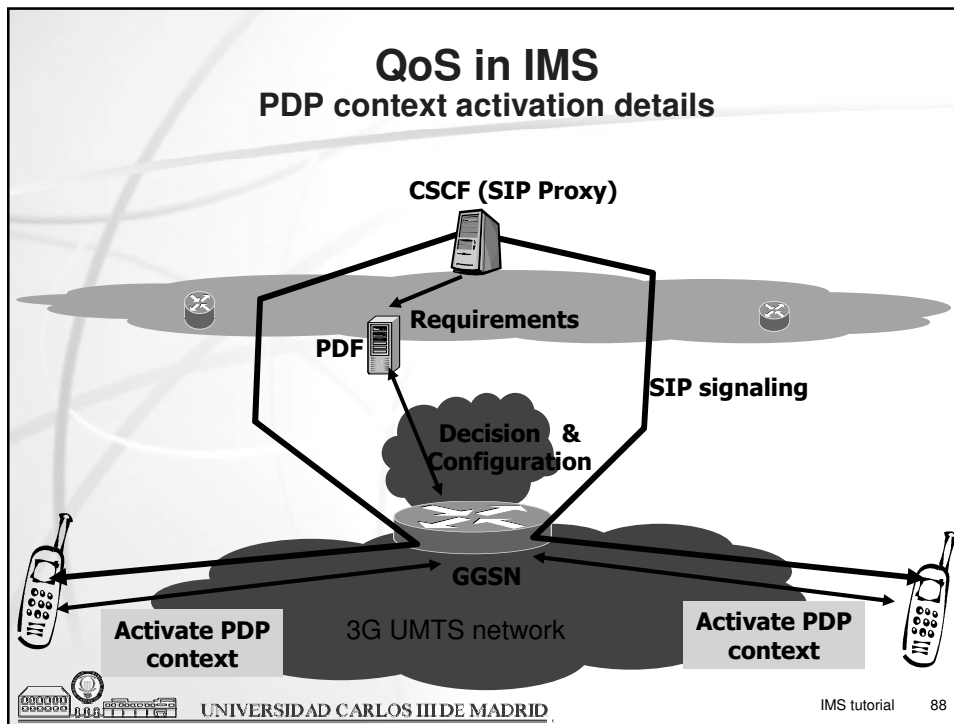
- ◆ The PDF is, for the service quality (QoS), like an intermediary between the QoS defined at the application level (IMS) and its actual enforcement at the network level (in 3G networks in the GGSN nodes).
- ◆ QoS is to be given in the access (visited) UMTS network, namely the GGSN
- ◆ PDF is located in the visited network.
- ◆ P-CSCFs are the CSCFs (SIP proxies) first contacting the user and located in the visited network
- ◆ Thus we have PDF to P-CSCF interaction



Details about PDP context

- ◆ A PDP context is “pre setup” for the SIP signaling.
- ◆ The exact procedure for activating PDP contexts for the media flows is described next
- ◆ When the session ends, those PDP contexts are deactivated





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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IMS tutorial 89

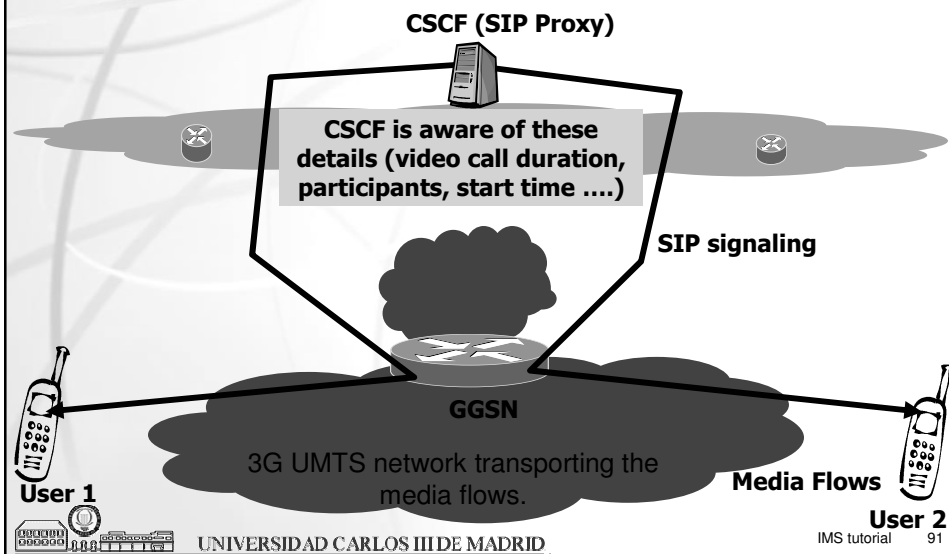
Charging in IMS a use case

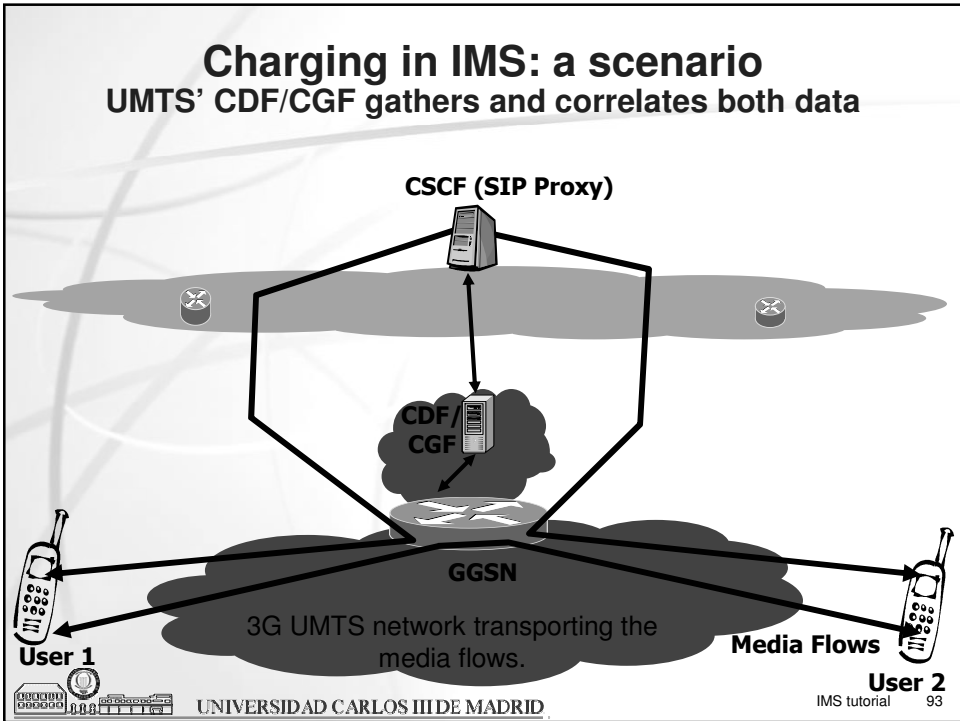
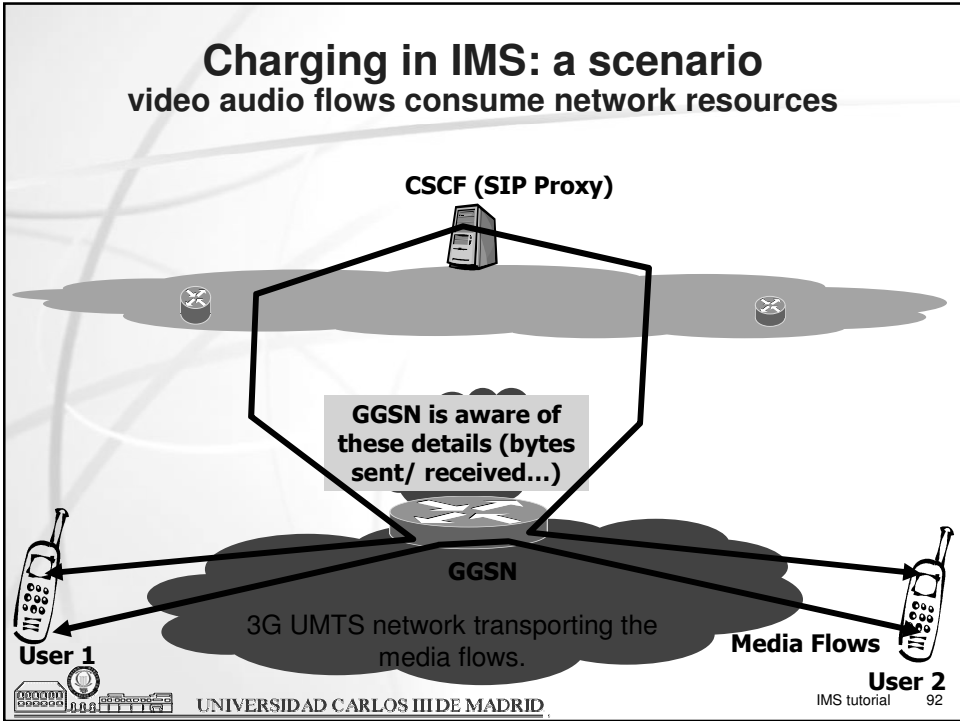
- ◆ People are used to pay for voice calls (not in the Internet!!)
- ◆ Voice calls are typical IMS sessions
- ◆ But we saw that IMS also influences the transport network resources
- ◆ Those resources need also to be accounted and influence the charging. They may not be billed
- ◆ Like in the previous scenario, a link must be done between the accounting and charging done at network and “IMS” levels



Charging in IMS: a scenario

Two users want to setup a video call. One is <18 years old, the other not. Time is 9 pm.





Where (in which domain) to perform accounting?

- ◆ Network resources are always consumed in the visited domain (may not consume network resources in home domain)
- ◆ Charging and billing to the user is done by the user's home domain. Accounting data must be sent there
- ◆ Visited operator may bill home operator for consuming network resources
- ◆ So, something is accounted in both visited and home domains, both for caller and callee

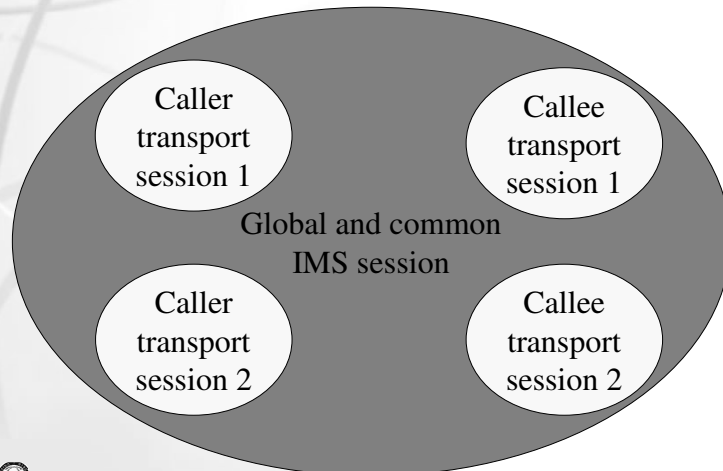


Apart from gathering different data from different sources, we need to correlate it

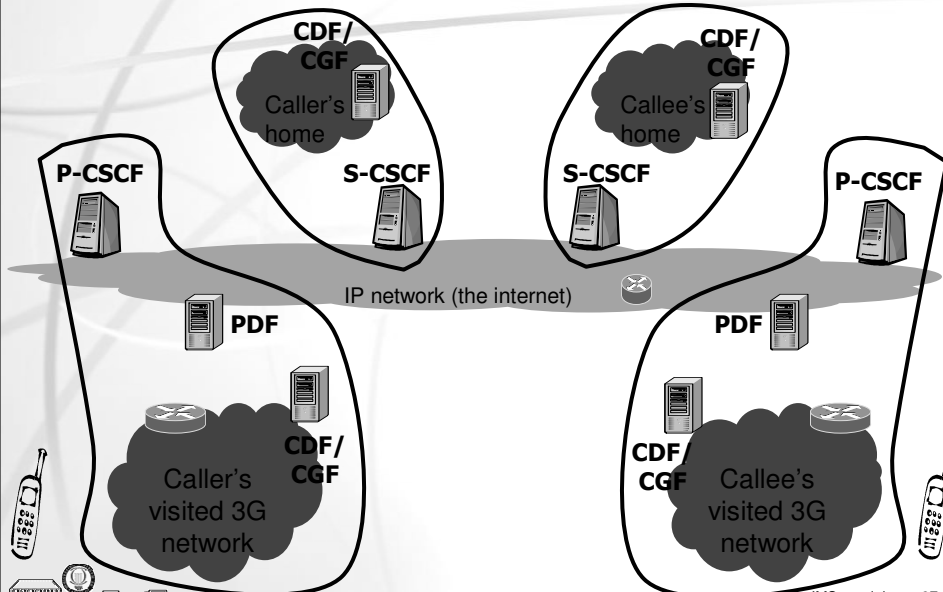
- ◆ accounting: is able to correlate the accounting at two levels:
 - ❖ Network usage (e.g. bytes sent/received)
 - ❖ Application characteristics
 - ✓ E.g. in a voice call, number of parties involved and duration
 - ✓ E.g. in streaming a movie, if it was done in prime time and type of movie (recent hits)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

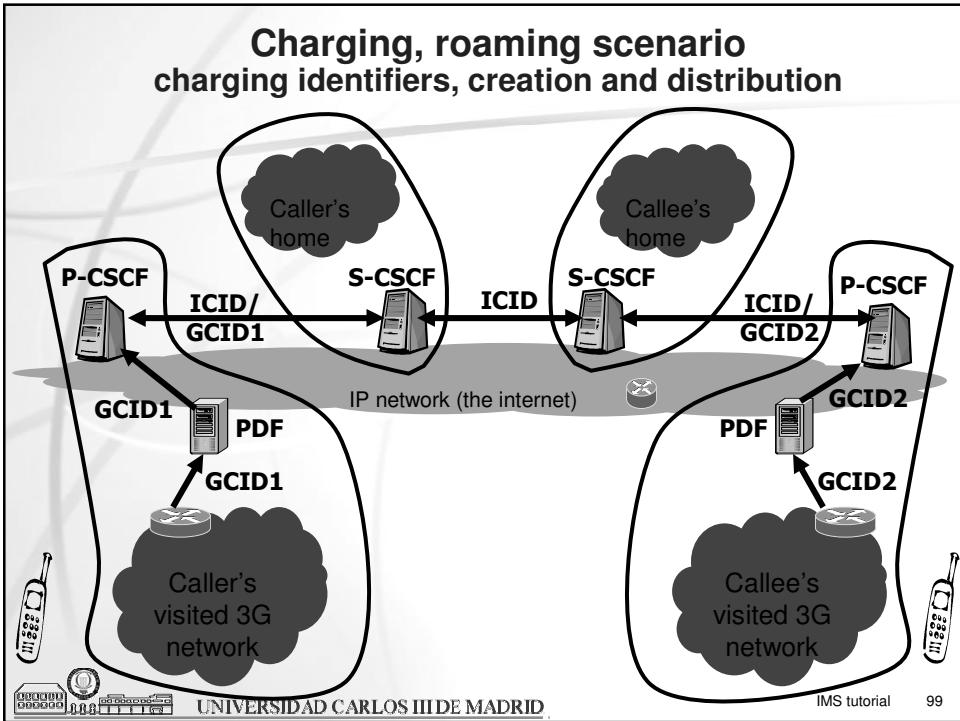
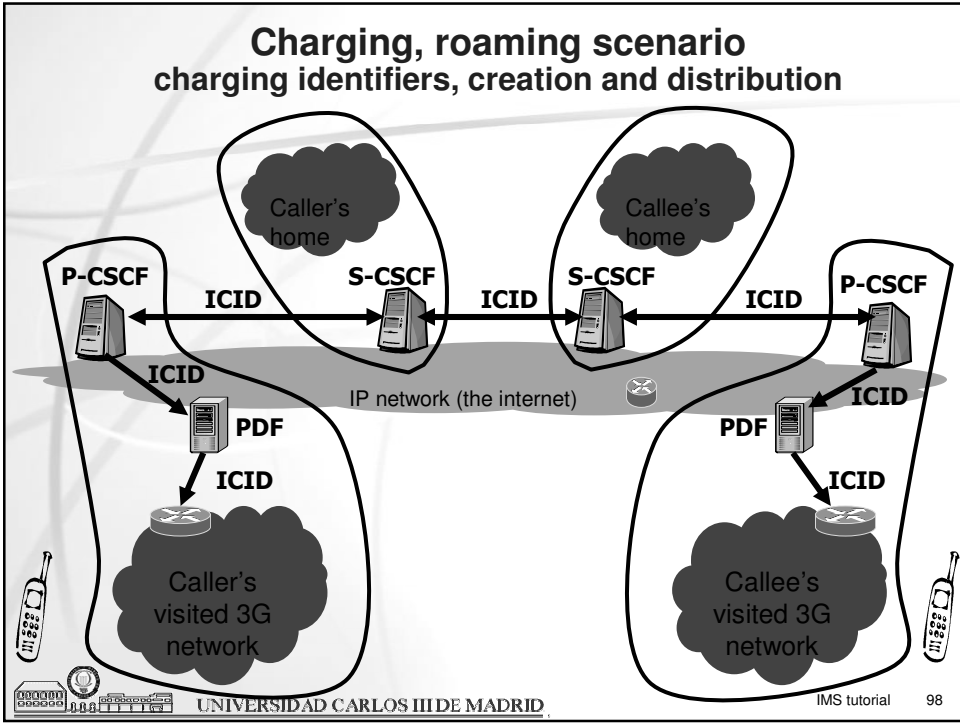


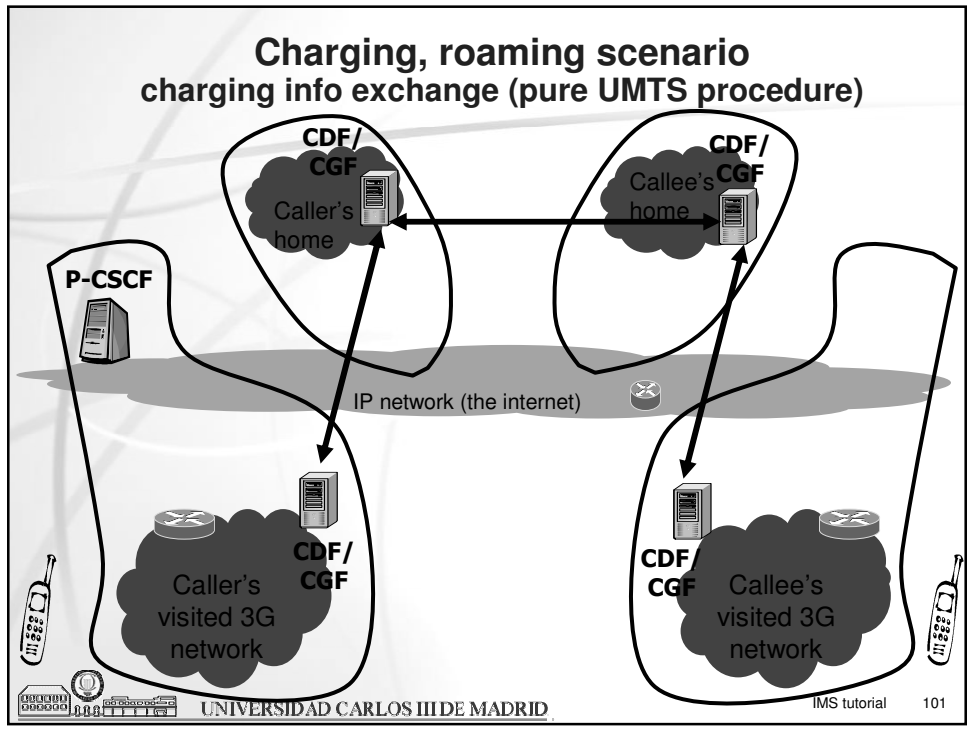
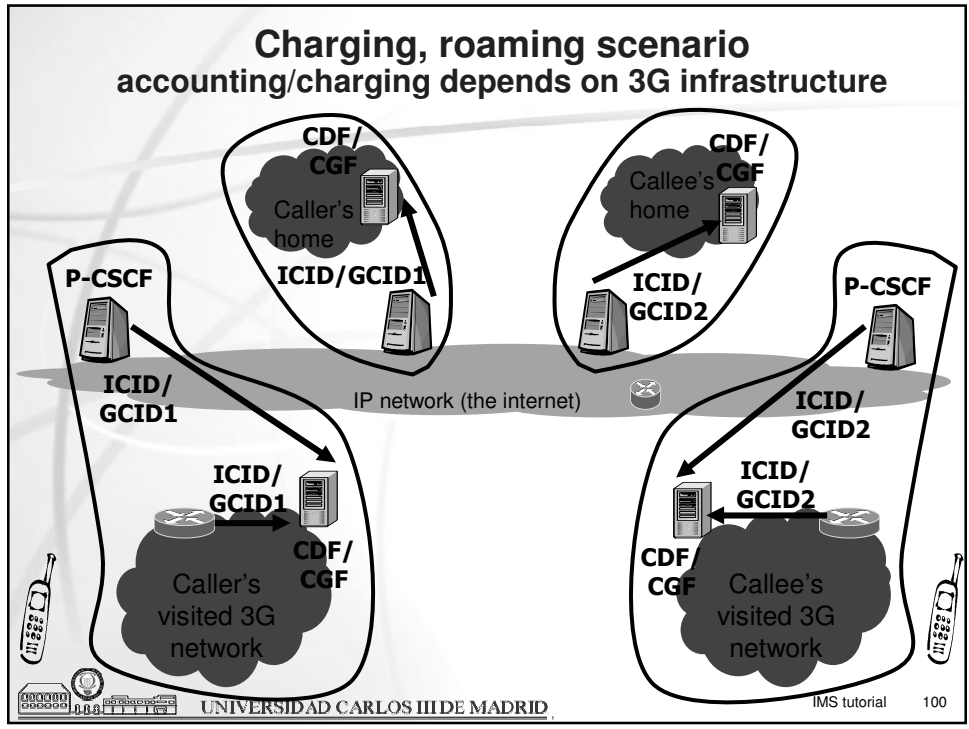
**Apart from gathering different data from different sources, we need to correlate it:
Charging identifiers**

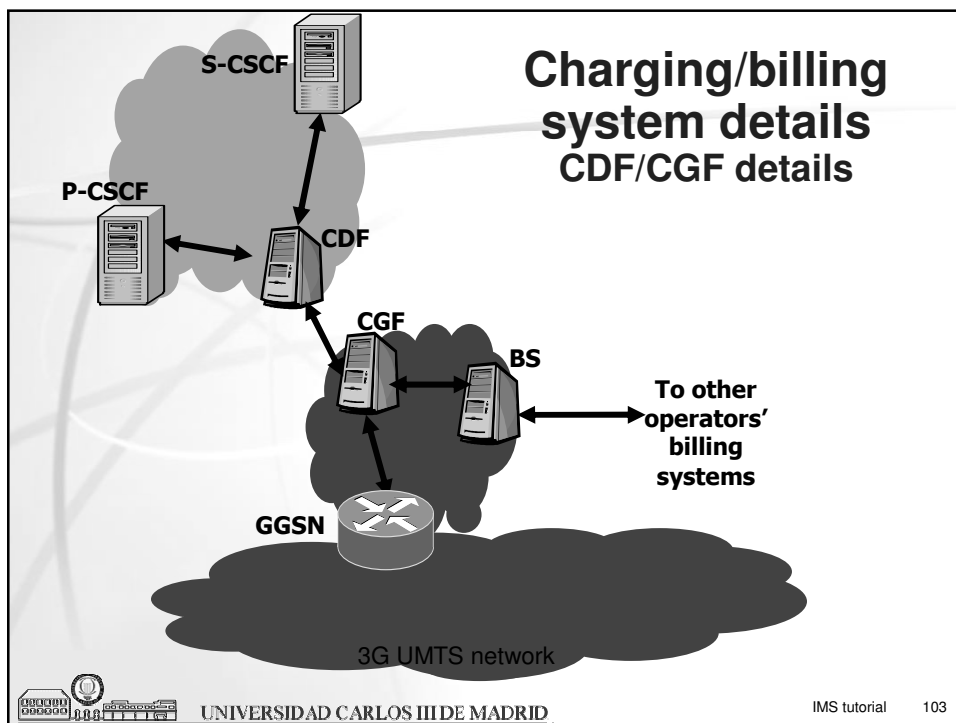
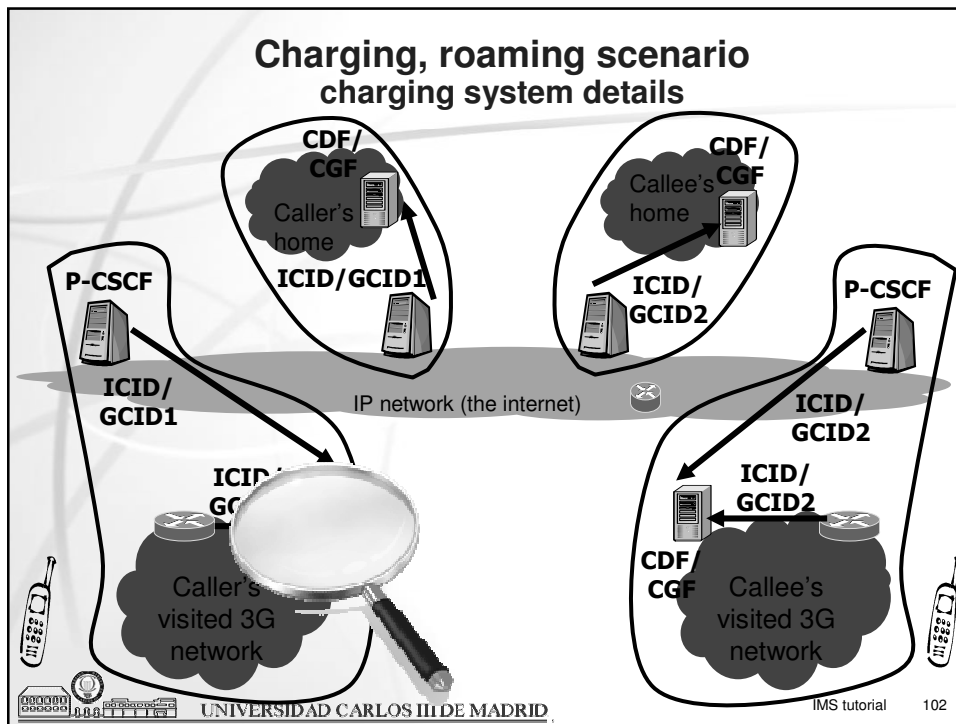


Charging, roaming scenario domains and nodes









Authorization and Authentication. Single sign on

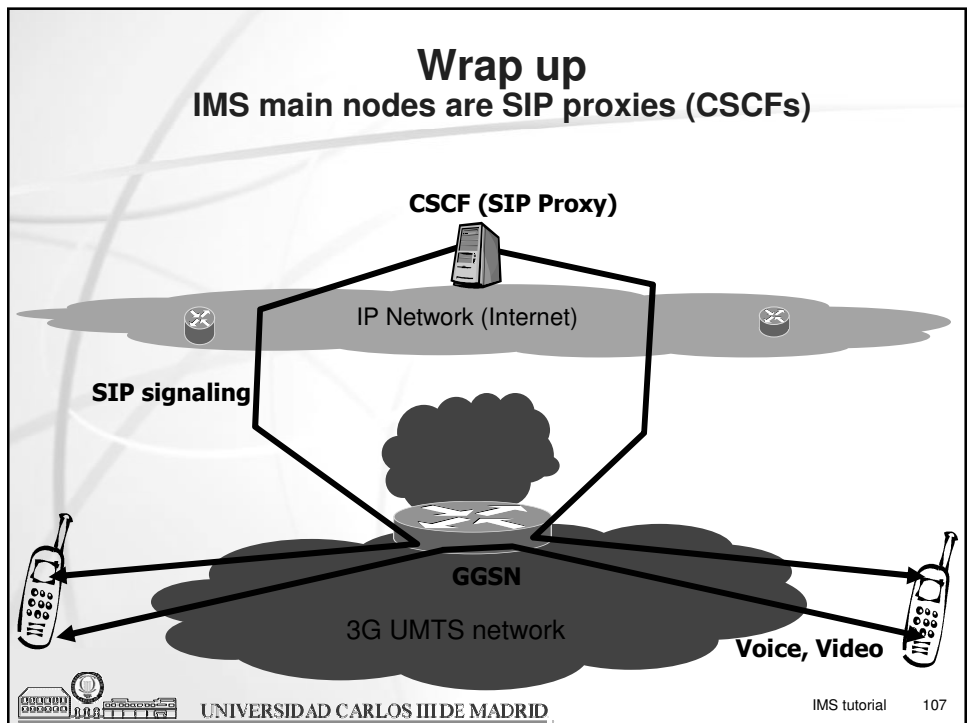
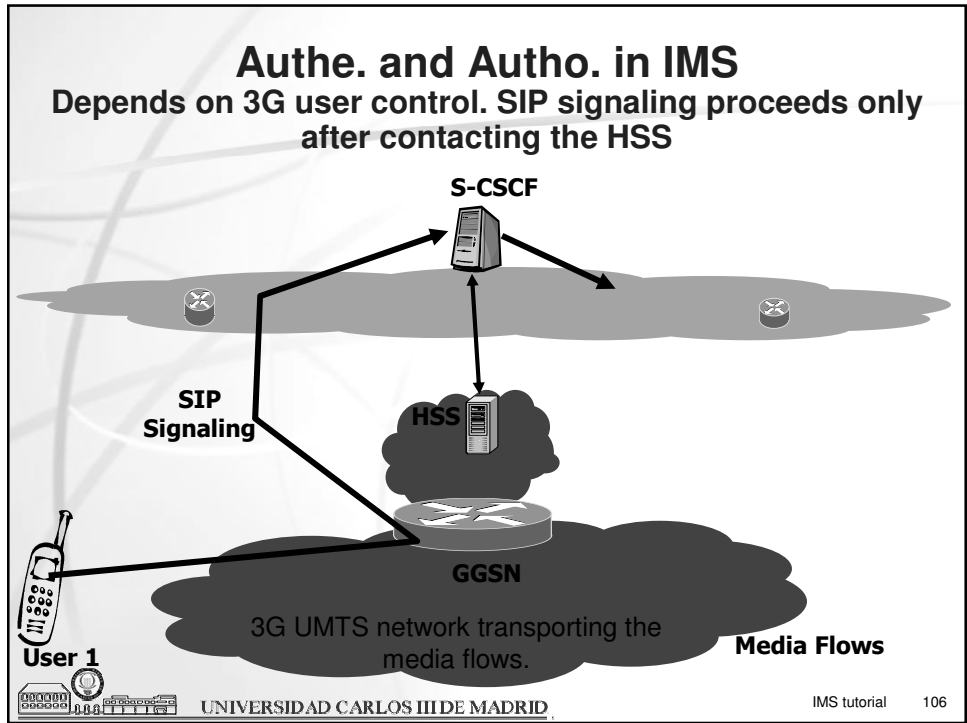
- ◆ If we account resources we need to authenticate the billed users and authorize them
- ◆ Again a centralizing entity: the network operator, its 3G UMTS infrastructure
- ◆ **PRIOR TO ANYTHING:** user logs into the 3G UMTS network, using a UMTS logging procedure, non IMS related.

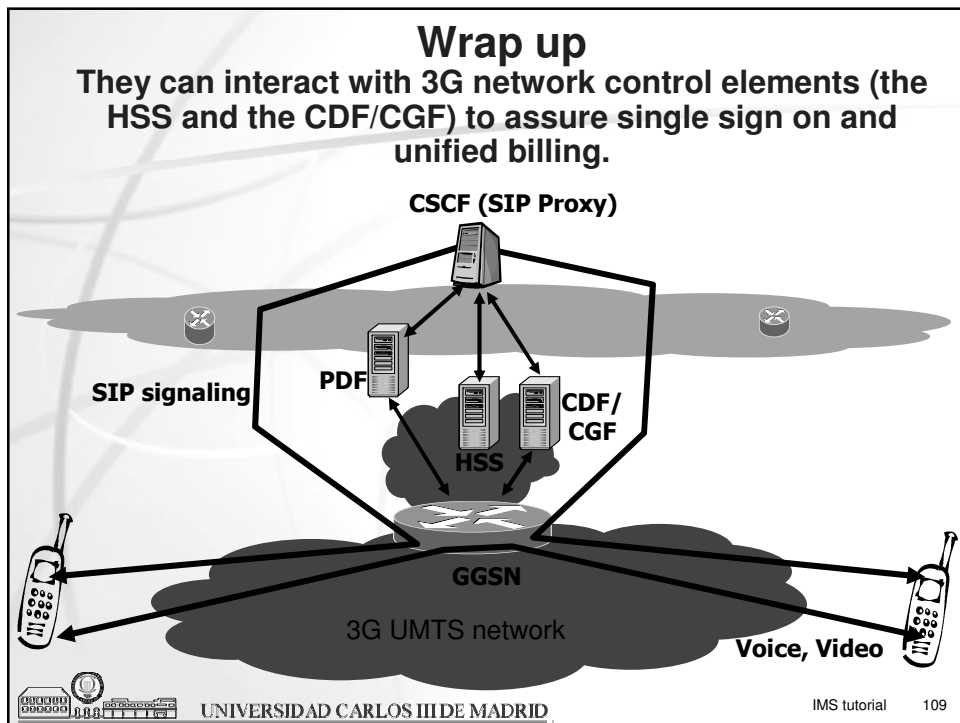
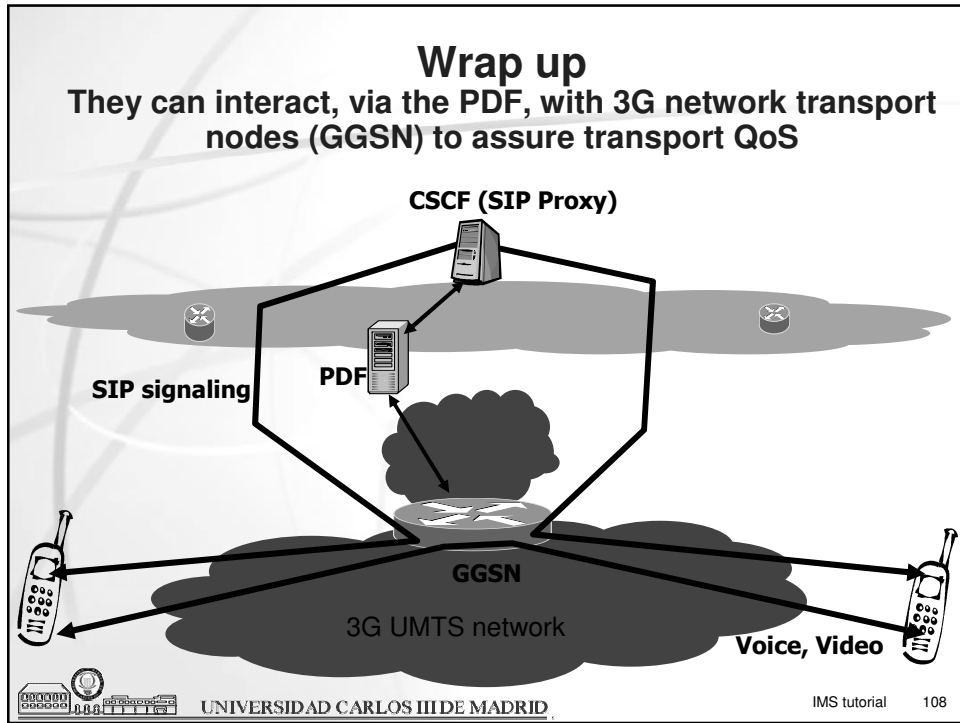


Authorization and Authentication. Single sign on

- ◆ IMS has no user database, neither user control
- ◆ Depends on 3G UMTS user database and on user registration there.
- ◆ **Authentication:** done in IMS-SIP registration. This procedure needed prior to any other IMS procedure
- ◆ When registering, authenticate and authorize the user to register
- ◆ Authentication delivers user profile stored in the UMTS databases to the IMS' S-CSCF so that it may perform itself further authorization (otherwise it may relay on UMTS user databases for this task)








Index

- ◆ Introduction, Disruptions in Telco business
- ◆ Service platforms and business models
- ◆ SIP protocol and VoIP
- ◆ IMS Service Platform: SIP Proxies
- ◆ IMS Service Platform: key feature, enabling business models
- ◆ **IMS Service Platform: signaling**
- ◆ IMS Service Platform: extra features & services
- ◆ IMS Service Platform: current deployments
- ◆ Conclusion, IMS forecast



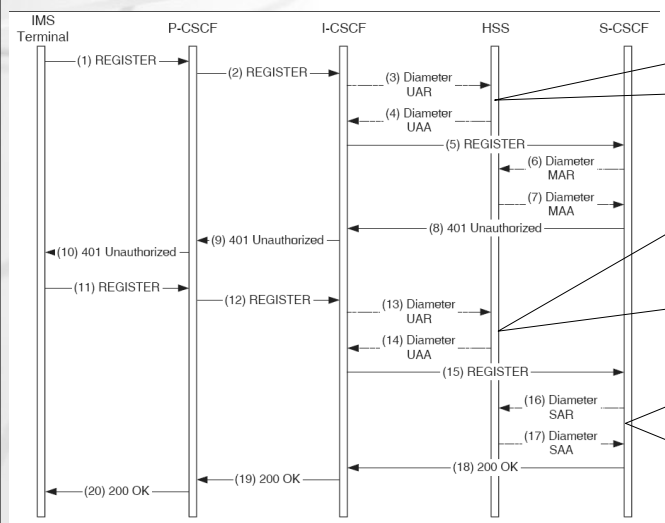
IMS SIP Preconditions

- ◆ With all that nodes interacting you can already fear that signaling will be complicated...
- ◆ And... we have preconditions!!! 
- ◆ In SIP, INVITE and “200 OK” are enough for the parties to know which codecs can be employed
- ◆ In IMS we need to know which codec_ will be employed to activate the PDP context
- ◆ We also need to know when this context is ready



Registration to the IMS

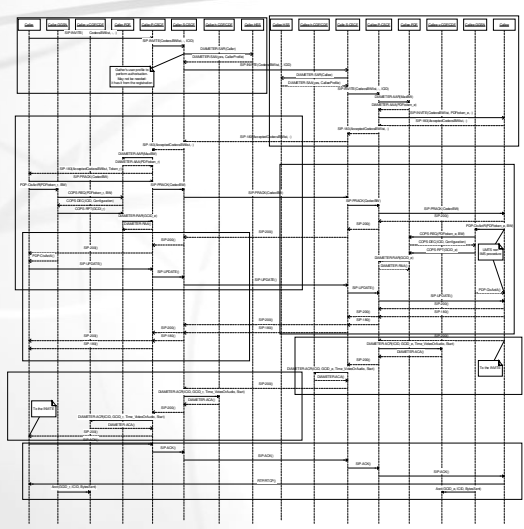
*previously the user registered to HSS (using a 3G, non-IMS procedure)
 *needed prior any other IMS procedure



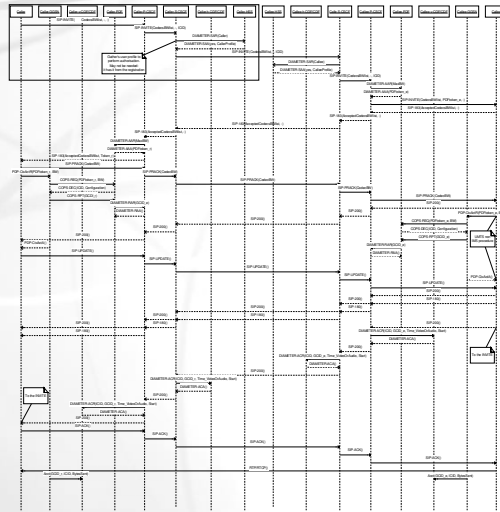
If there are several S-CSCFs, to know to which one is the user associated to

It's the UMTS' HSS (and not the IMS) that authenticates and authorizes the user to register to the IMS. It also distributes user profile to CSCF so that they can take authorization decisions further on

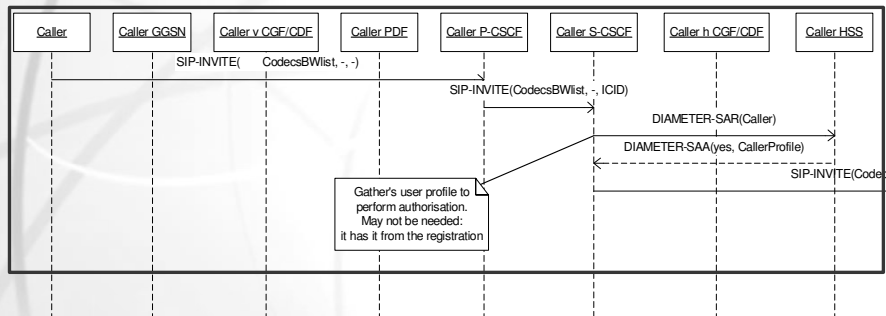
Signaling, setting up a session



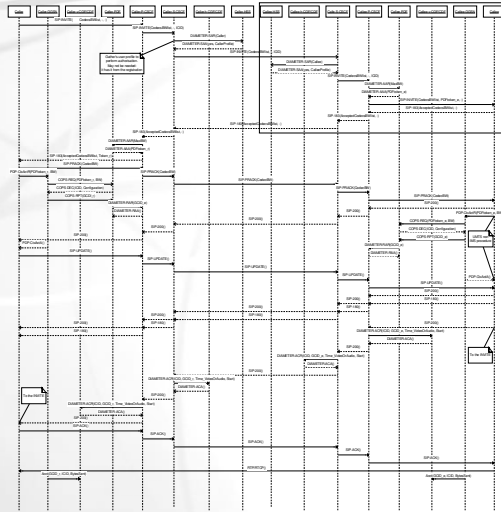
Invite and authorization



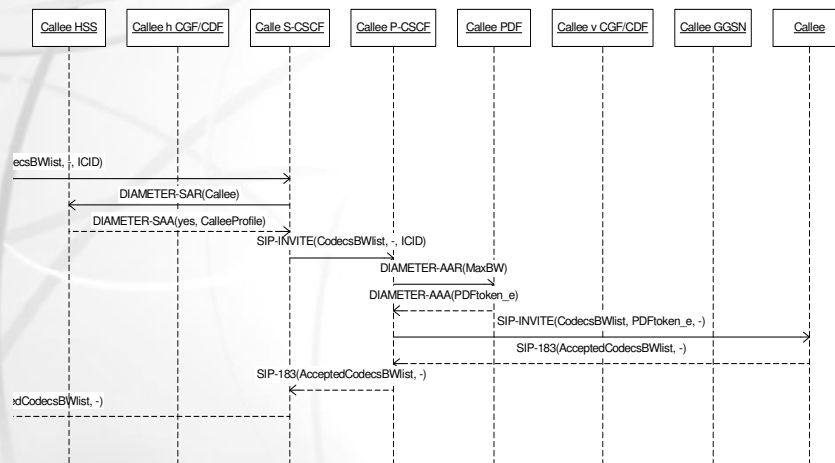
Invite and authorization



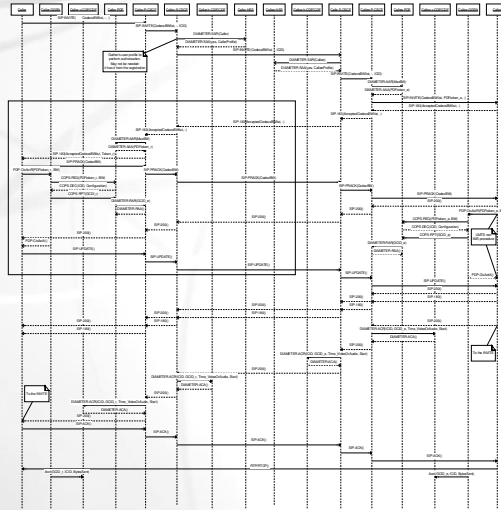
Invite, authorization and answer to the invite



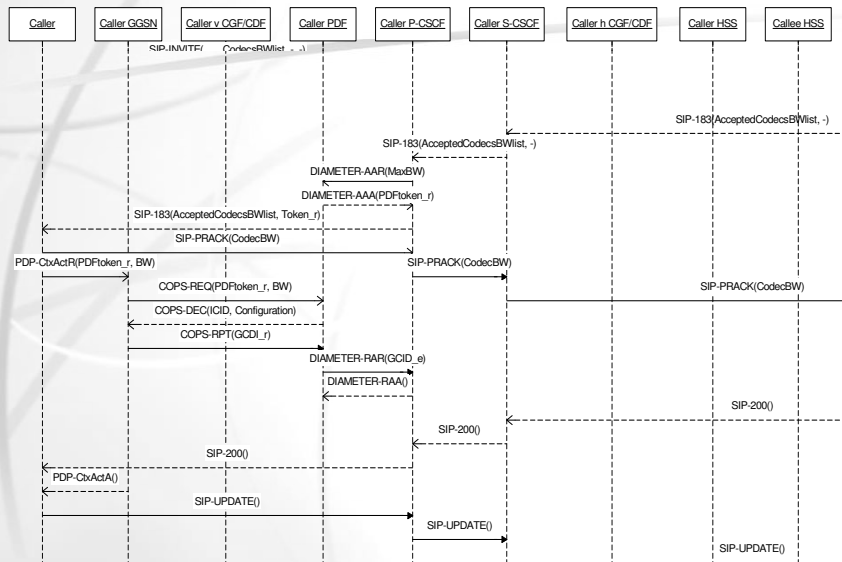
Invite, authorization and answer to the invite



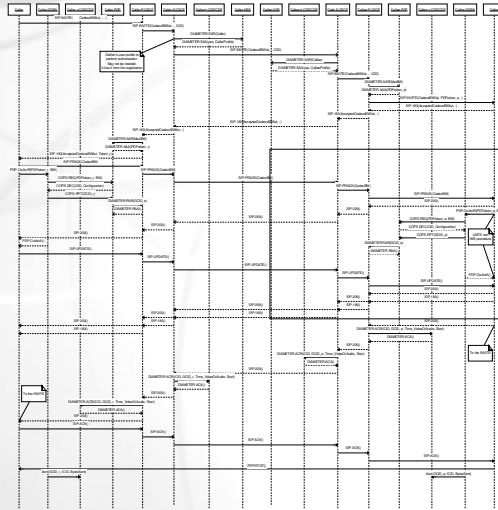
Answer to the invite (2), 3rd offer, PDP context activation



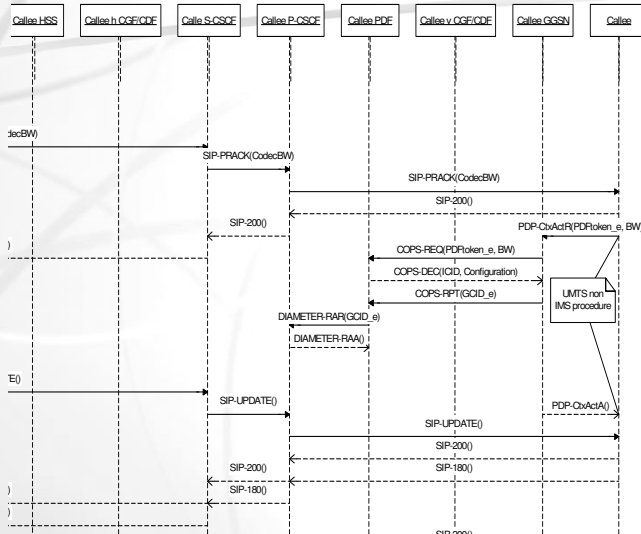
Answer to the invite (2), 3rd offer, PDP context activation



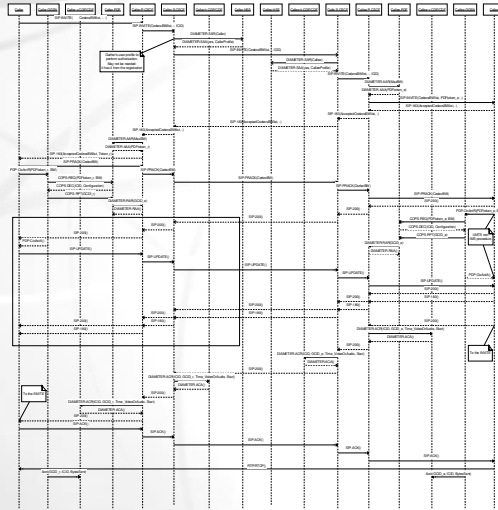
3rd offer (2), answer to 3rd offer, PDP context activation, ringing (ringing should be ACKed –PRACK 200 OK-)



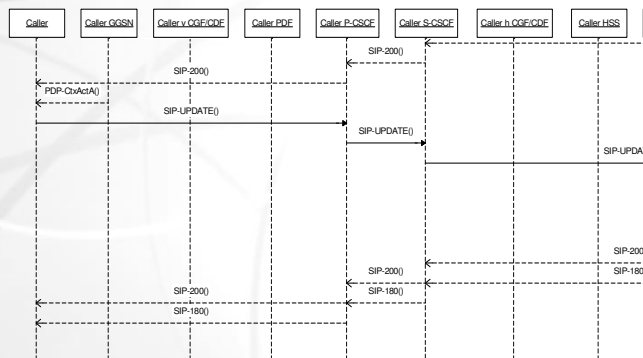
3rd offer (2), answer to 3rd offer, PDP context activation, ringing



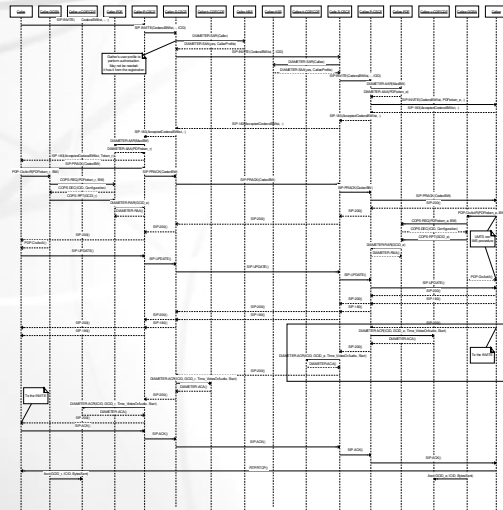
answer to 3rd offer (2), PDP context activation, ringing (2)



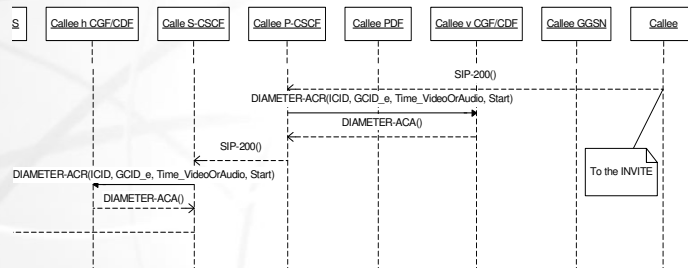
answer to 3rd offer (2), PDP context activation, ringing (2)



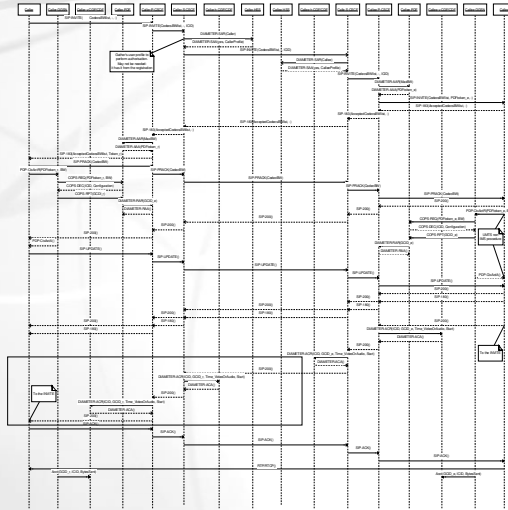
200 OK to the INVITE and accounting



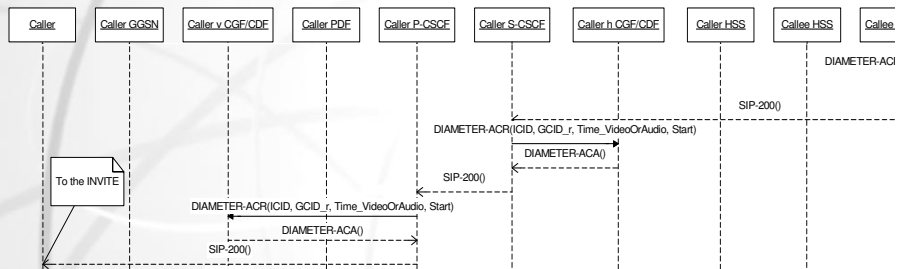
200 OK to the INVITE and accounting



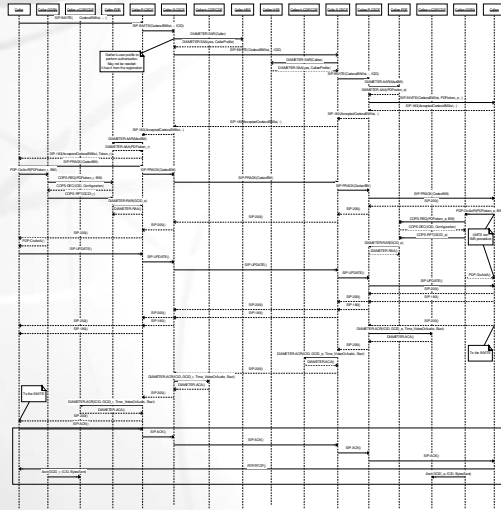
200 OK to the INVITE (2) and accounting



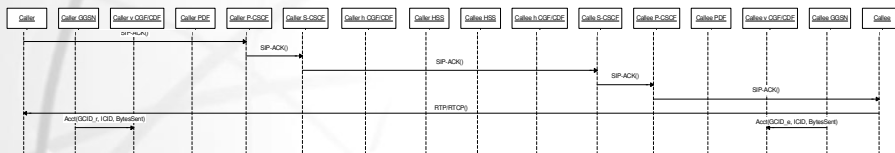
200 OK to the INVITE (2) and accounting



ACK, media flows and accounting



ACK, media flows and accounting



Signaling, tearing down a session

- ◆ SIP signaling is far simpler: BYE and 200 OK
- ◆ PDP contexts for the media flows are released
- ◆ Accounting ends at the “SIP level” and at the flow level



Index

- ◆ Introduction, Disruptions in Telco business
- ◆ Service platforms and business models
- ◆ SIP protocol and VoIP
- ◆ IMS Service Platform: SIP Proxies
- ◆ IMS Service Platform: key feature, enabling business models
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SIP online charging

- ◆ There are two kinds of charging: offline and online
- ◆ We saw before offline charging
- ◆ In offline charging, the user is debited at the end of the service consumption. The user often has a contract and the amount is deducted from his account. Charging can just occur at the end of the session
- ◆ In online charging, the user is debited while the service is consumed. The user has often a prepaid amount. If his remaining credit is not enough the service is interrupted. Charging must be performed regularly while the session is running



SIP online charging

- ◆ Diameter is also the base protocol in online charging. We use its credit control application, designed for online charging
- ◆ IMS online charging architecture is far more complicated than the offline one. A common main feature exists: correlation of charging at application (SIP sessions) level and at network level



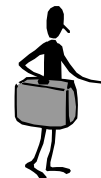
Mobility (Terminal)

- ◆ IPv6 (used in IMS) allows mobility
- ◆ SIP also allows mobility
- ◆ 3G networks also allow mobility
- ◆ Which to employ in IMS?
 - ❖ Still under discussion



IMS Identity, User Profile(s)

- ◆ IMS uses SIP identity: SIP URIs e.g. sip:antonio.cuevas@vodafone.com
- ◆ UMTS uses phone numbers
- ◆ Integration based on having several public identities associated to a single private identity
- ◆ Users can classify their public identities: business, family, friends, ...
- ◆ The private identity has a NAI format e.g. acuevas@vodafone.com
- ◆ Private entity is not employed to “contact” the user, they are just used for subscription management



IMS Identity, User Profile(s)

- ◆ The private entity (and at least one public entity) are stored in the smart card.
 - ❖ Note: the smart card includes the SIM, USIM and ISIM. It has a shared secret (password)
- ◆ The HSS stores and correlates the private identity and all the public identities. It bulks them to the S-CSCF. The HSS also stores the password



IMS Identity, User Profile(s)

- ◆ The user profile assures personalization. It is
 - ❖ the private entity
 - ❖ N public identities and service profiles
- ◆ It is stored in the HSS and bulked to the S-CSCF
 - ❖ Assures that personalization is accessible anywhere with any device
- ◆ A service profile contains
 - ❖ a list of public entities they apply to
 - ❖ Service authorization e.g. for conversation service the user is not allowed to employ video. This is used by the S-CSCF to perform authorization
 - ❖ a list of filter criteria

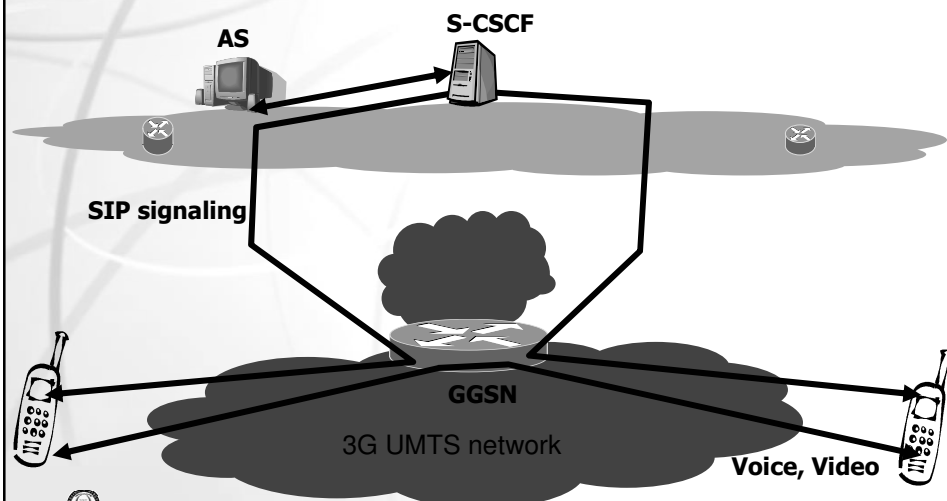


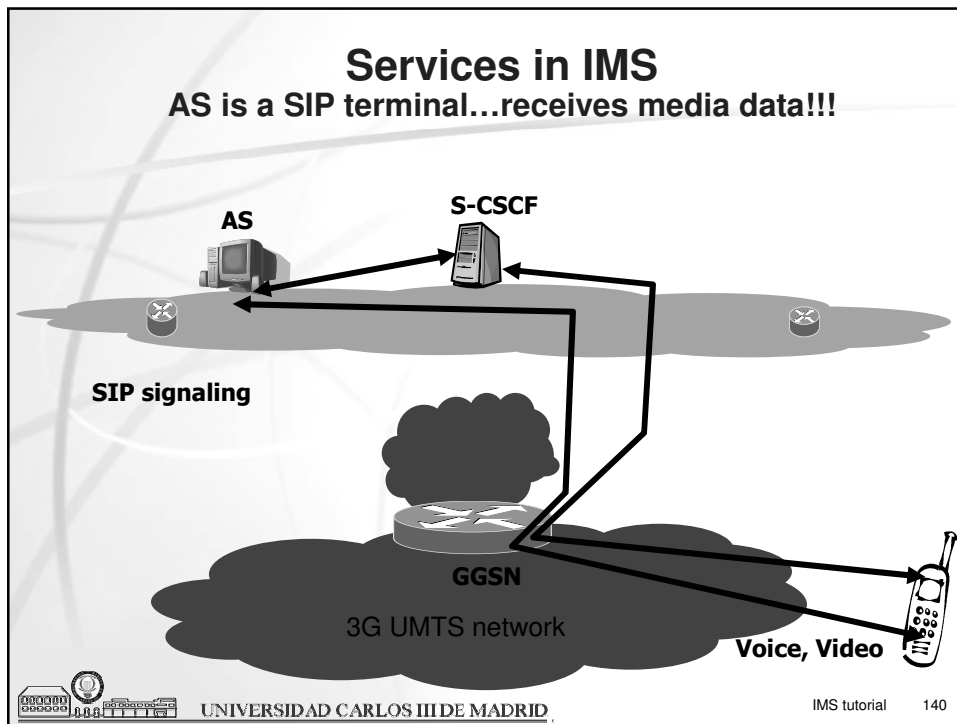
Services in IMS

- ◆ **IMS is an advanced infrastructure enabling services. But the services are in the end points or peers (calls, etc.), not in the IMS**
 - ❖ So, pure IMS is few more than Skype
- ◆ **AS are the key part to endow IMS with services**
- ◆ **AS are not owned by the network operator (≠ IMS)**
- ◆ **AS offered services enjoy all IMS advantages**
- ◆ **AS interact –using SIP- with the S-CSCF (which controls user’s SIP session)**
- ◆ **AS can behave as another SIP proxy or as a SIP UA (terminal), in this case they also receive and send media!!!**



Services in IMS AS is SIP proxy





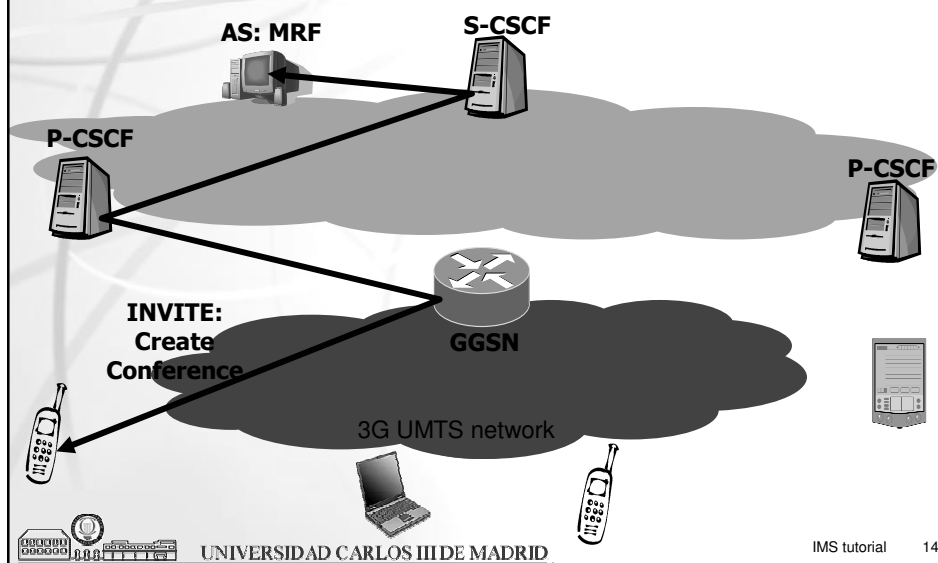
- ## Services in IMS
- ### filter rules
- ◆ When are AS engaged?? “Filter criteria” in S-CSCF: they analyze the SIP signaling and decide when to divert it to AS (i.e. involve them)
 - ◆ In user’s profile, each of its personalized services has (among others) a set of filter criteria
 - ❖ To allow disambiguation, each has a priority
 - ❖ The AS where to direct the SIP messages when the filter rules are met is specified
- UNIVERSIDAD CARLOS III DE MADRID
- IMS tutorial 141

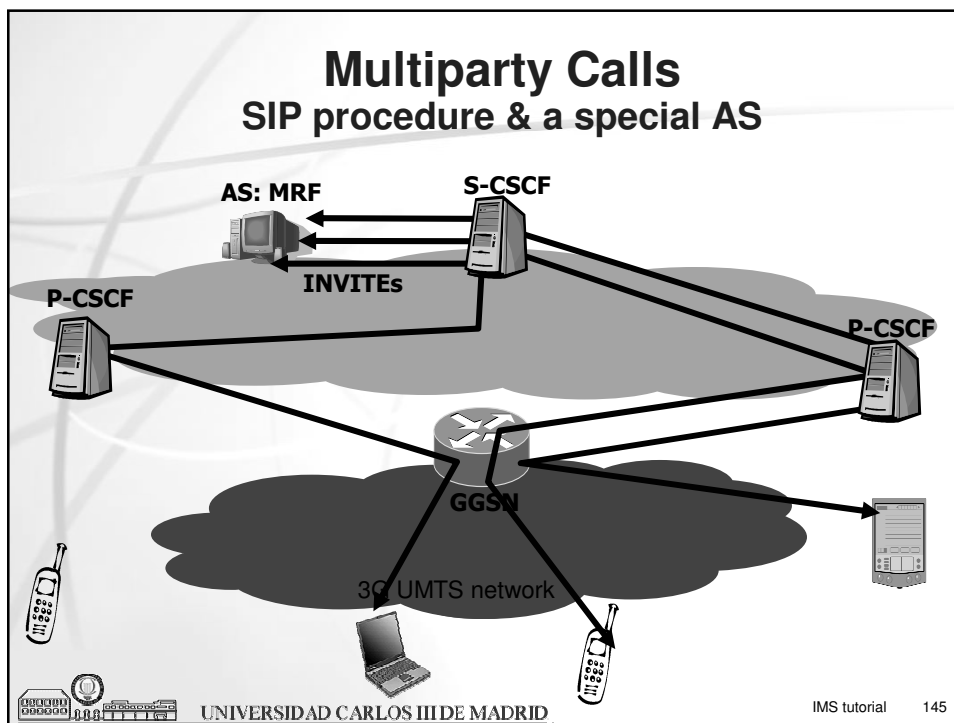
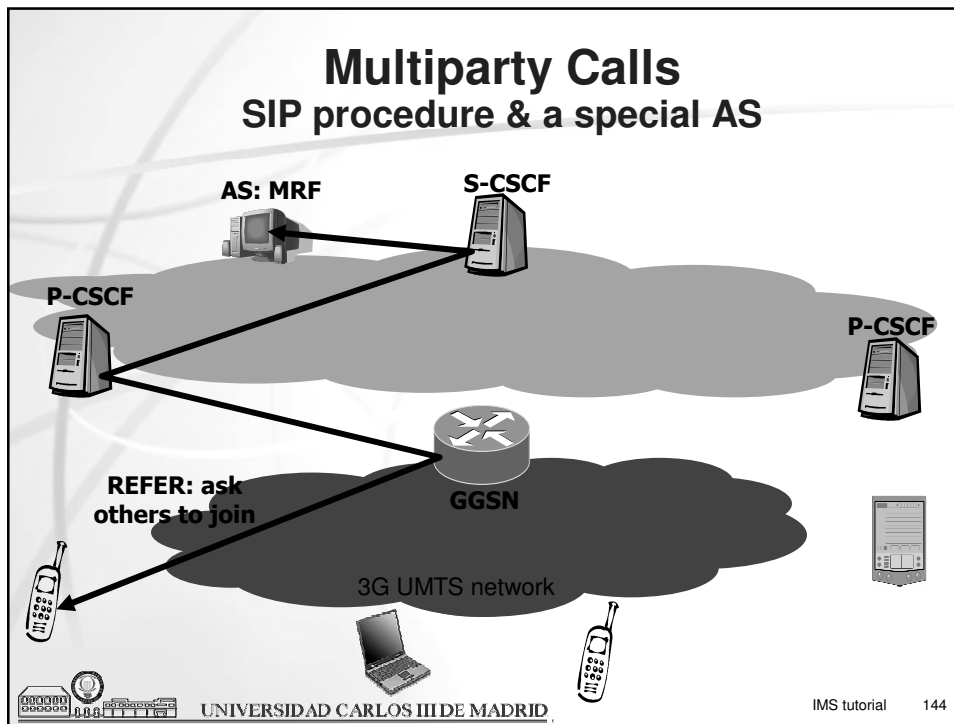
Example of filter rule

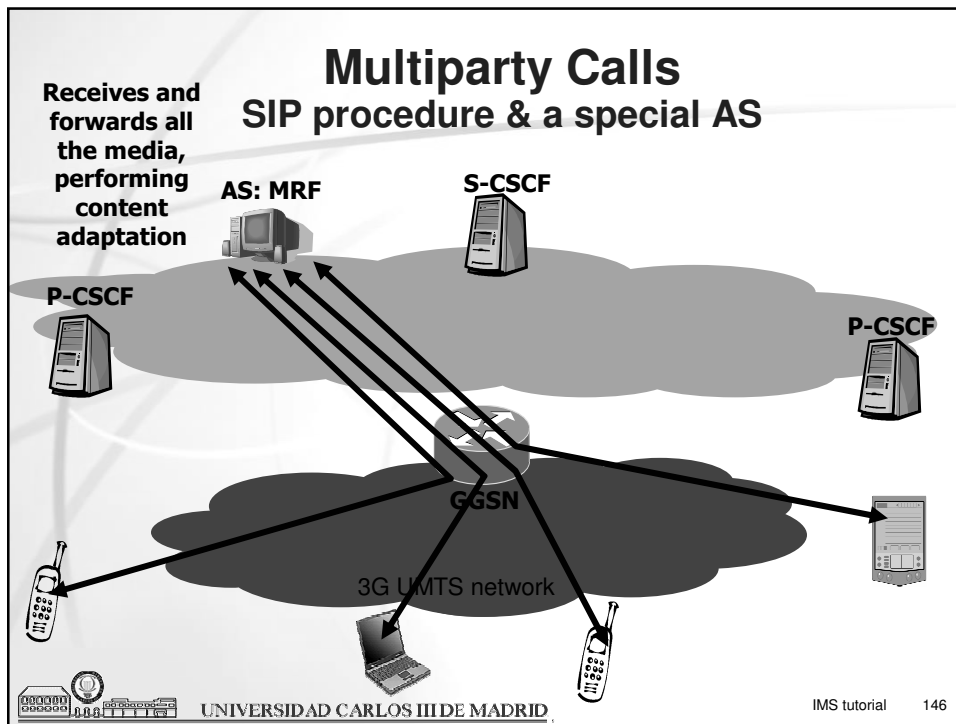
- ◆ User A wants to divert all calls from boss to an answering machine (the AS)
(method=INVITE) AND
(P-Asserted-Identity = boss@vodafone.es) AND
(Session Case = Terminating) -message is addressed to user A-



Multiparty Calls SIP procedure & a special AS





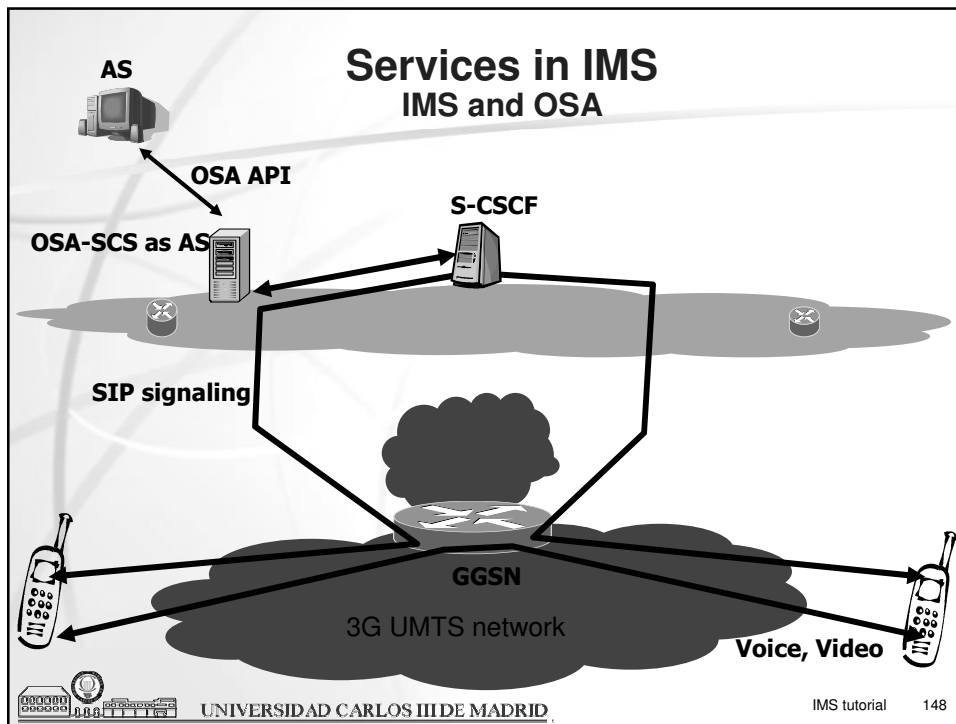


IMS and OSA

- ◆ Still ASs in IMS do not offer many services
- ◆ Remember that we have other services platforms. OSA is also standardized by 3GPP and deals with a complimentary range of services than IMS: content distribution
- ◆ IDEA: integrate IMS and OSA: This is done via de AS.

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IMS tutorial 147



Index

- ◆ Introduction, Disruptions in Telco business
- ◆ Service platforms and business models
- ◆ SIP protocol and VoIP
- ◆ IMS Service Platform: SIP Proxies
- ◆ IMS Service Platform: key feature, enabling business models
- ◆ IMS Service Platform: signaling
- ◆ IMS Service Platform: extra features & services
- ◆ **IMS Service Platform: current deployments**
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IMS tutorial 149

Is IMS too complex?

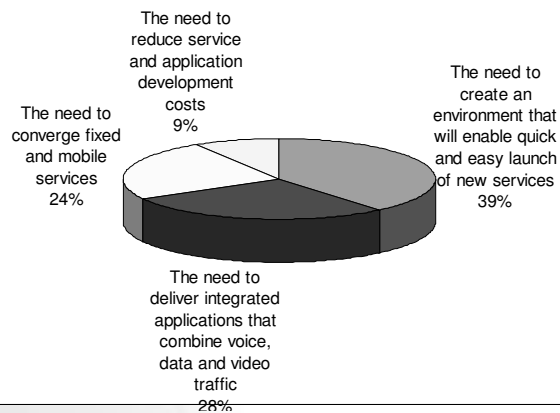
- ◆ Yes, but it is worth it, brings added value (other networks, Content Adaptation)
- ◆ Scalability thanks to the possible replication of IMS elements
 - ❖ Skype is more scalable (distributed concept)



IMS current deployment

source: FOKUS IMS Workshop, Berlin, Germany, November 2006
Dr. Stefan Growe & Light Reading IMS strategies survey

What is the most important factor driving IMS deployment in your company?



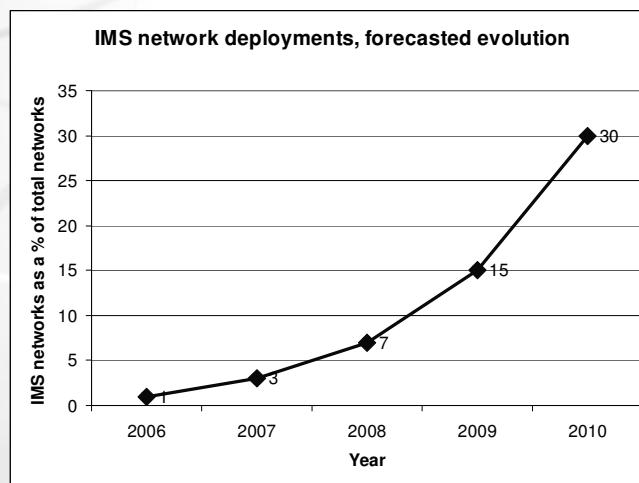
IMS current deployments

- ◆ Recent (early 2007) deployments (source IMS Vision)
<http://www.informatm.com/newt/l/imsvision>
 - ❖ AT&T (formerly Cingular) brings first 'IMS service' to U.S. 2006
 - ✓ AT&T's wireless video share service is one of the earliest 'IMS services' to come to market.
 - ❖ IMS network trials will begin in Latin America's emerging markets this year with real IMS adoption picking up in 2008-2009
 - ❖ Ericsson brings first IMS network to China for China Netcom's Beijing Branch (Beijing Netcom)
- ◆ Already deployed
 - ❖ Telefonica in Spain
 - ❖ KPN in the Netherlands
 - ❖ ...
- ◆ Main problem is the lack of IMS-enabled terminals



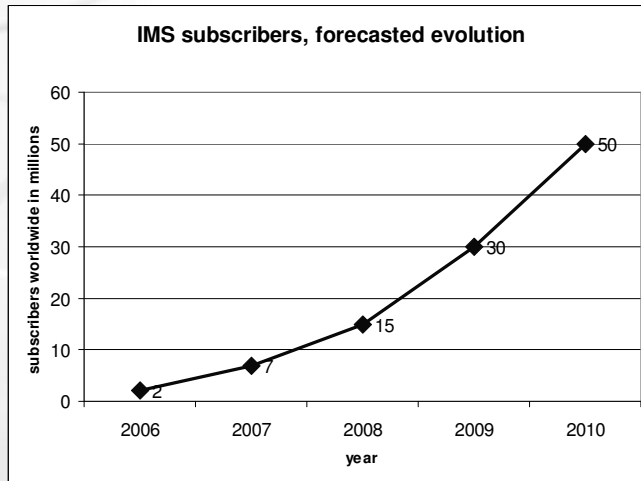
IMS deployment forecast

source: FOKUS IMS Workshop, Berlin, Germany, November 2006
Tutorial 1. Prof. Dr. Thomas Magedanz & vision gain

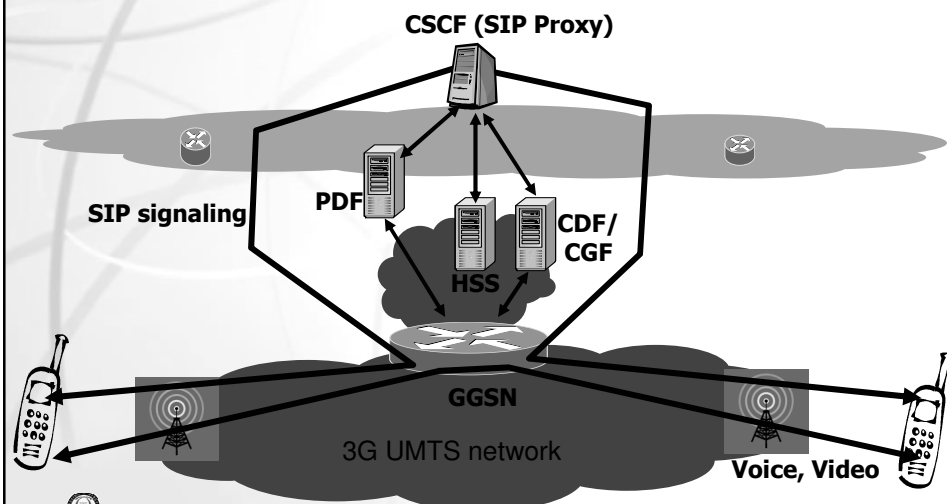


IMS subscribers forecast

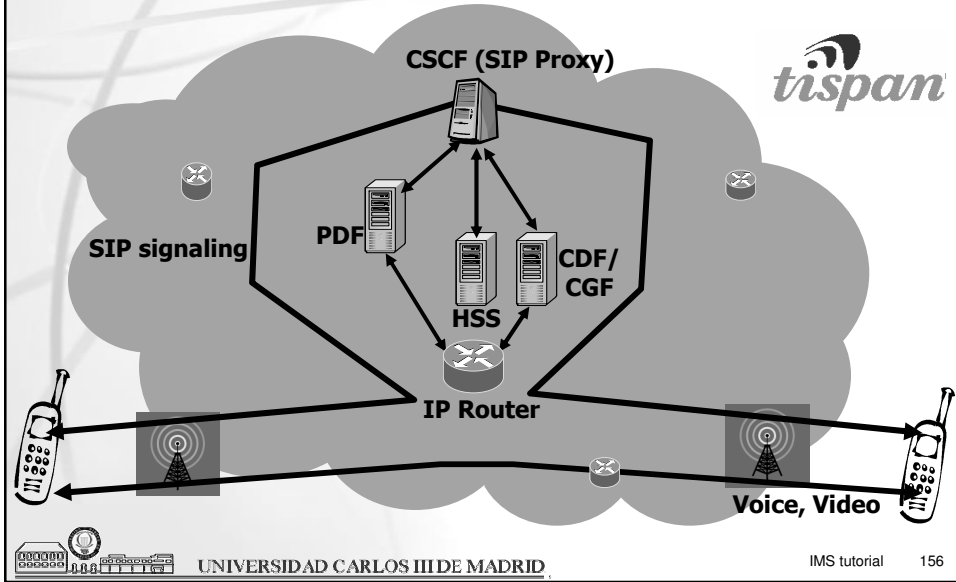
source: FOKUS IMS Workshop, Berlin, Germany, November 2006
Tutorial 1. Prof. Dr. Thomas Magedanz & vision gain



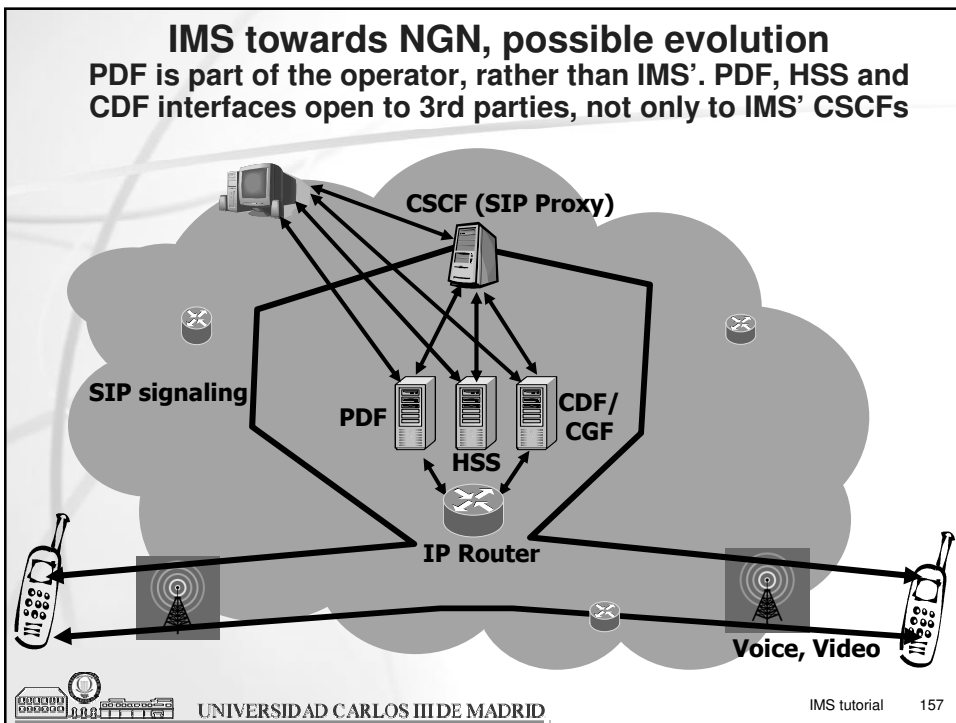
IMS towards NGN, possible evolution



IMS towards NGN, possible evolution
 3G network disappears, all is IP. No PDP context activation but
 RSVP. IMS open to all technologies (WiFi, ADSL, ...)



IMS towards NGN, possible evolution
 PDF is part of the operator, rather than IMS'. PDF, HSS and
 CDF interfaces open to 3rd parties, not only to IMS' CSCFs



Index

- ◆ Introduction, Disruptions in Telco business
- ◆ Service platforms and business models
- ◆ SIP protocol and VoIP
- ◆ IMS Service Platform: SIP Proxies
- ◆ IMS Service Platform: key feature, enabling business models
- ◆ IMS Service Platform: signaling
- ◆ IMS Service Platform: extra features & services
- ◆ IMS Service Platform: current deployments
- ◆ **Conclusion, IMS forecast**



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!!!
- ◆ Plain IMS good to compete in... Price ☹ . Useful if operator wants to keep user control



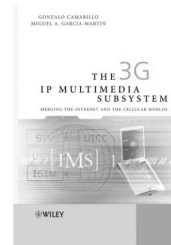
IMS forecast

- ◆ 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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Thank you for your attention

Questions?



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IMS tutorial 164