


IR.3504 Convergent Services and Technologies

Telco Cloud technologies and IP Multimedia Subsystem

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Summary

At the end of this talk, you should be able to answer the following questions:

- How is Telco Cloud different from a regular Cloud ? What are the components ?
- What is the intelligent part of SDN ? What protocols does it use ?
- What does IMS stand for ? What is it used for ? Who are the Standard Developing Organizations (SDOs) involved ?
- Mention 4 of the main architectural components ?
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Summary

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2. Software Defined Networking (SDN)
3. IP Multimedia Subsystem (IMS)
4. IMS architecture
5. Session Initiation Protocol (SIP)
6. Evolution
7. Conclusion

Traditional cloud

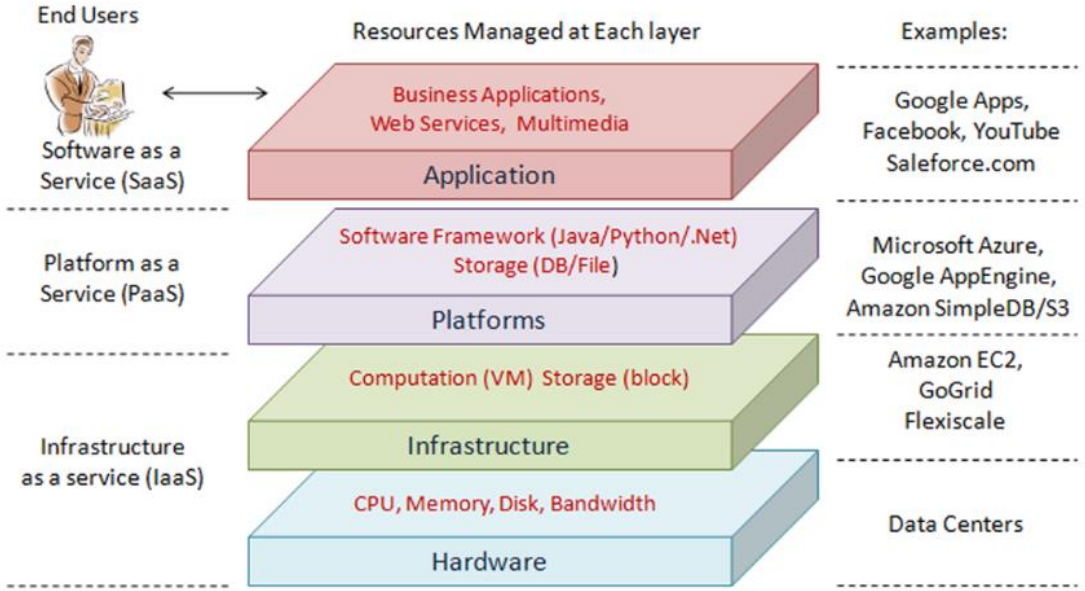
1. Cloud
   - Goal: move IT workloads to virtualized computes (virtual machines, containers, baremetal) to enable digital innovation and reduce costs by centralizing infrastructure purchase or outsourcing it
   - Deploy closer to the clients when it matters

2. ITIL for your datacenters
   - ITIL is a set of best practices for IT service management
   - e.g. You need to define a Service Level Agreement for availability/downtime duration per year (usually expressed by a percentage)

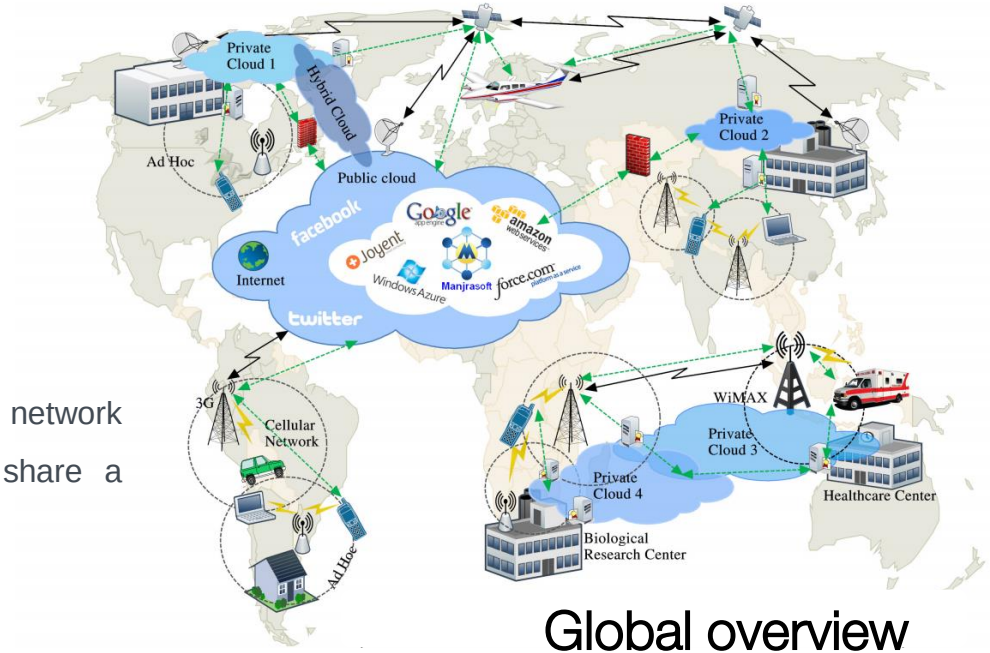
Availability %	Downtime per year	Downtime per month	Downtime per week	Downtime per day
90% ("one nine")	36.5 days	72 hours	16.8 hours	2.4 hours
99% ("two nines")	3.65 days	7.20 hours	1.68 hours	14.4 minutes
99.99% ("four nines")	52.56 minutes	4.38 minutes	1.01 minutes	8.64 seconds
99.999% ("five nines")	5.26 minutes	25.9 seconds	6.05 seconds	864.3 milliseconds

Types of clouds and services

1. **Types of services**
   - Infrastructure as a Service (IaaS)
   - Platform as a Service (PaaS)
   - Software as a Service (SaaS)
2. **Types of Cloud deployments**
   - Public clouds
   - Hybrid clouds
   - Private clouds
3. **General common characteristics**
   - Multi-tenancy and shared pool of resources
   - Geo-distributed and ubiquitous network access
   - Dynamic resource provisioning
   - Pay-per-use pricing model



Telco cloud



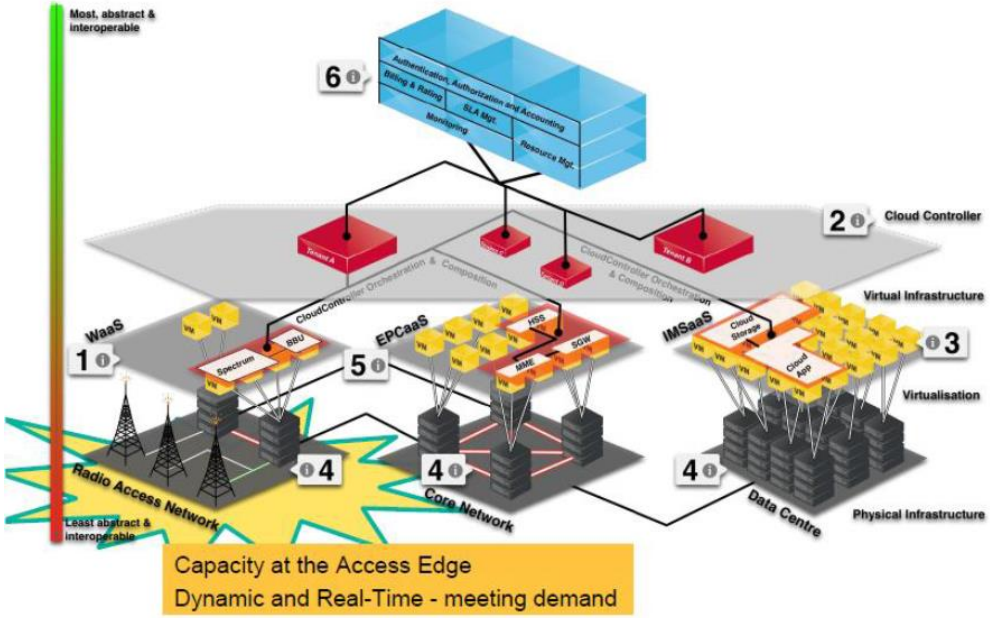
Global overview

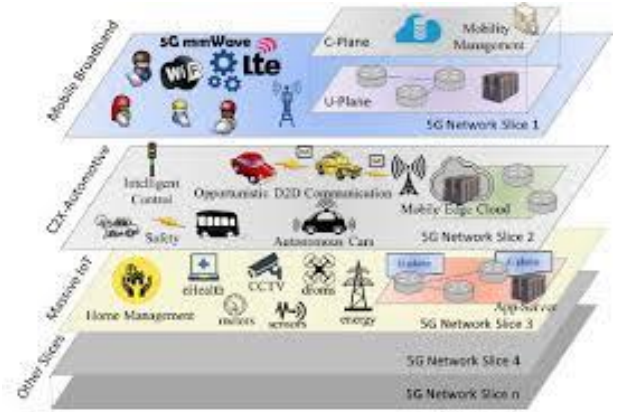
1. Definition:
   - Private clouds handled by operators to host the network and mobile infrastructure. Accepts tenants to share a subset of the resources (slices).
2. Components
   - **Compute**: based on Linux servers and virtualized workloads (no different from a regular cloud)
   - **Networking**: based on software. The software controls a set of regular “dumb” switches over fiber
   - **Network functions**: firewalls, NATs, DNS, caching, Deep Packet Inspection, Interception and monitoring
3. Centralized and Regional deployments are needed to modernize Central Offices in order to support localized VNF deployments (Broadband routers, Radio Access Network)

How a Telco Cloud introduces Multi-Tenancy for the Operator infrastructure

Telco cloud for 5G

1. With a Telco cloud, a network operator could deploy and redeploy Radio Access Infrastructure (except the radio part) on the fly





2. Slicing is a new 5G concept that allow Over The Top actors (Google, Airbus, SNCF, ADP) to share the operator's view of the network.
   2. OTT actors are called Tenants
   3. The operator is the owner of the infrastructure and a Tenant for his customers

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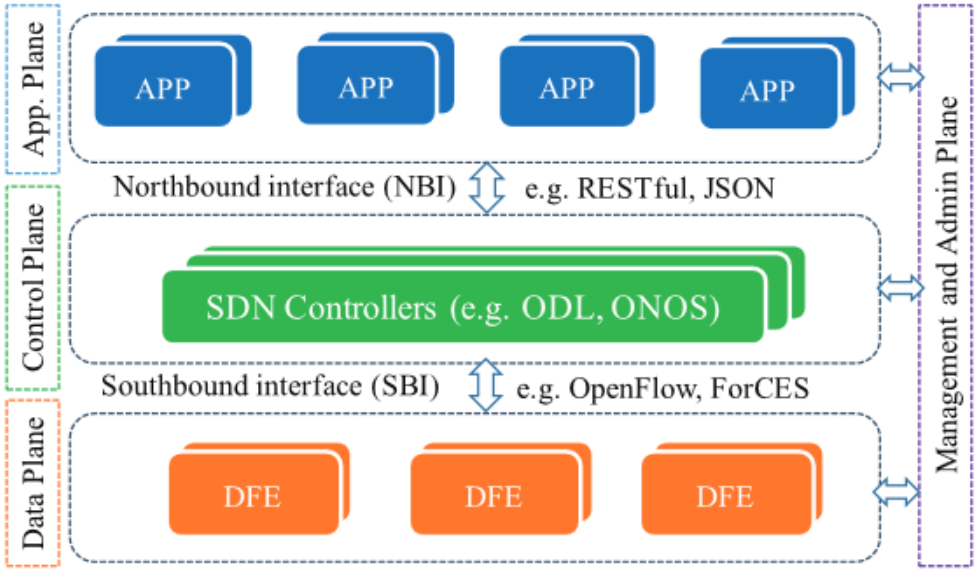
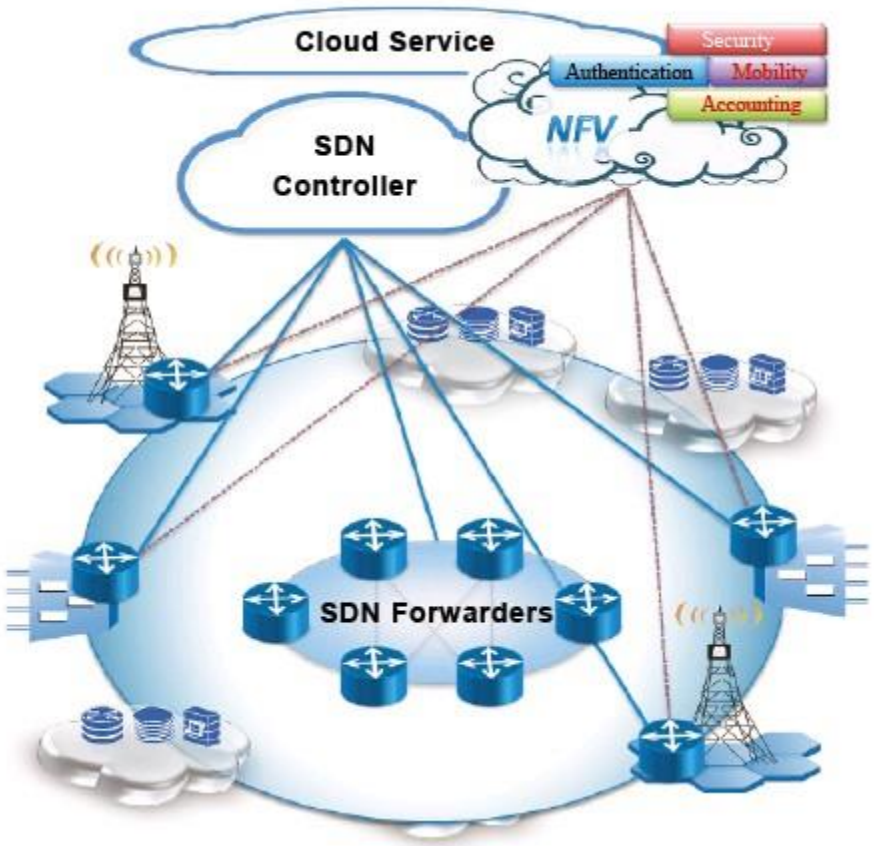
Software Defined Networking

1. Definition
   - The management function in routers/switches is in a central entity called the controller
   - Separate the control plane from the data plane by making the switches “dumb” forwarding generic hardware and the conroller an intelligent software with per technology plugins
   - OpenFlow protocol for the control plane and forCES/Netconf for configuration
2. An important component of Telco clouds
   - Networking is a new service when it was “only” part of the infrastructure
   - e.g. You can set a new VPN for a client on top of existing network, set a specific QoS on certain links
3. A needed upgrade of traditional networking protocols for new growth scales
   - Networking is hardware independent and we can avoid vendor-lockin
   - Improve overall network performance and detect flaws in the network by software



SDN's centralized architecture

1. The controller is the central entity of any SDN architecture
   - It controls a set of forwarders (routers and switches)
   - It forwards the traffic according to policies set by the northbound applications through the API (packets are filtered)
2. The routers and switches are configured to listen to the controller's orders and consult it when a new packet arrives to an interface
3. How it works:
   - A new packet arrives to a switch interface
   - The switch does not have a flowtable entry that corresponds to this type of packet and does not know what to do
   - The packet is forwarded to the controller which returns the correct manner to treat the packet to the switch
   - The switch is now capable of processing the next similar packets



SDN's ecosystem

1. A new standard development organization: The Open Networking Foundation
   - A non-profit operator led consortium driving transformation of network infrastructure and carrier business models.
   - ONF defines the OpenFlow protocol , ONOS contoller, and the Mininet experimentation platform

2. OpenFlow protocol
   - Defined at ONF, it is a southbound protocol (Routers/Switches <-> Controllers)
   - Version 1.5.1 is the latest stable version available now (2017)
   - OpenvSwitch is opensource implementation of the protocol, installable on Linux

3. NetConf protocol
   - Proposed by the IETF
   - Soutchbound management protocol for configuration of network devices

4. Open source Controlers
   - OpenDayLight supported by Ericsson
   - ONOS supported by AT&T
   - Floodlight, Ryu

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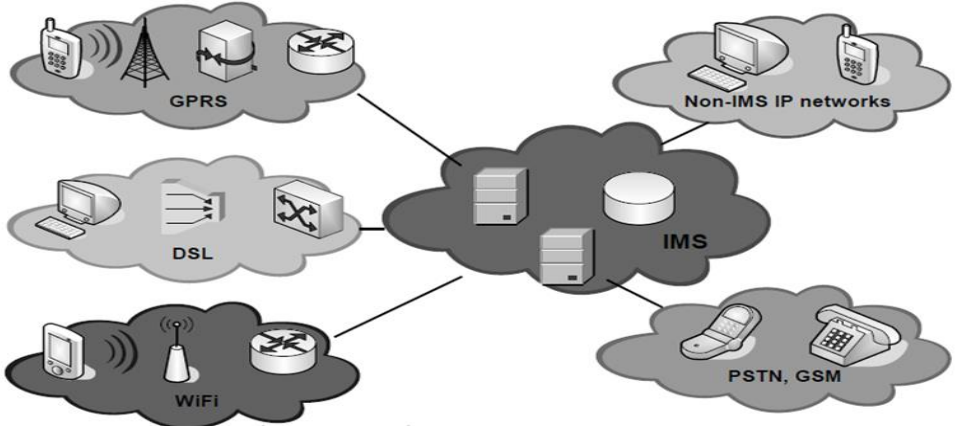
Defintion

1. IP Multimedia Subsystem (IMS) is a new network architecture, the closest to both IP world and Telecom.
2. IMS is parallel to existing network, and is aiming providing Multimedia services for:
   - ✓ Any kind of Access Network : WiMax, xDSL, PSTN, Wifi, Ethernet, UMTS, GSM, etc.
   - ✓ Any kind of terminal

Voice is only one of the IP advanced services



Objectives

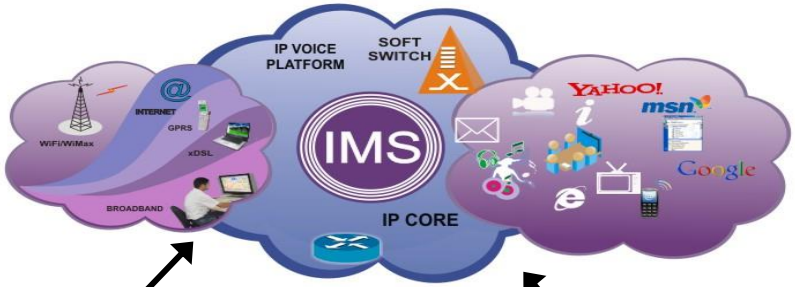
1. Operator Side
   - To converge all access Network to a single Core Network, in order to use same transport layers, data control and service access : Interoperability.
   - To propose news IP services, new Content to any kind of IP terminals, connected to any kind of access Network : Transverse and Service Oriented.

2. Customer side
   - To unify the different identities (professional, personal, mail, phone)
   - To unify the end terminals

History

1. 1998 : 3GPP creation (3rd Generation Partnership Project), in charge of UMTS standardization.
2. 2002 : OMA creation (Open Mobile Alliance), in charge of defining new advanced IP services.
3. 2002 : IMS introduction in 3GPP Release 5 de 3GPP (2G to 3G evolutions).
4. 2005 : introduction of interconnection between IMS and fixed Network (TISPAN)
5. 2006 : 3GPP Release 6 includes WLAN Networks.

Standardization



Core IMS architecture

3GPP A GLOBAL INITIATIVE

tispan

Architecture

oma Open Mobile Alliance

Applications

IETF

Technology

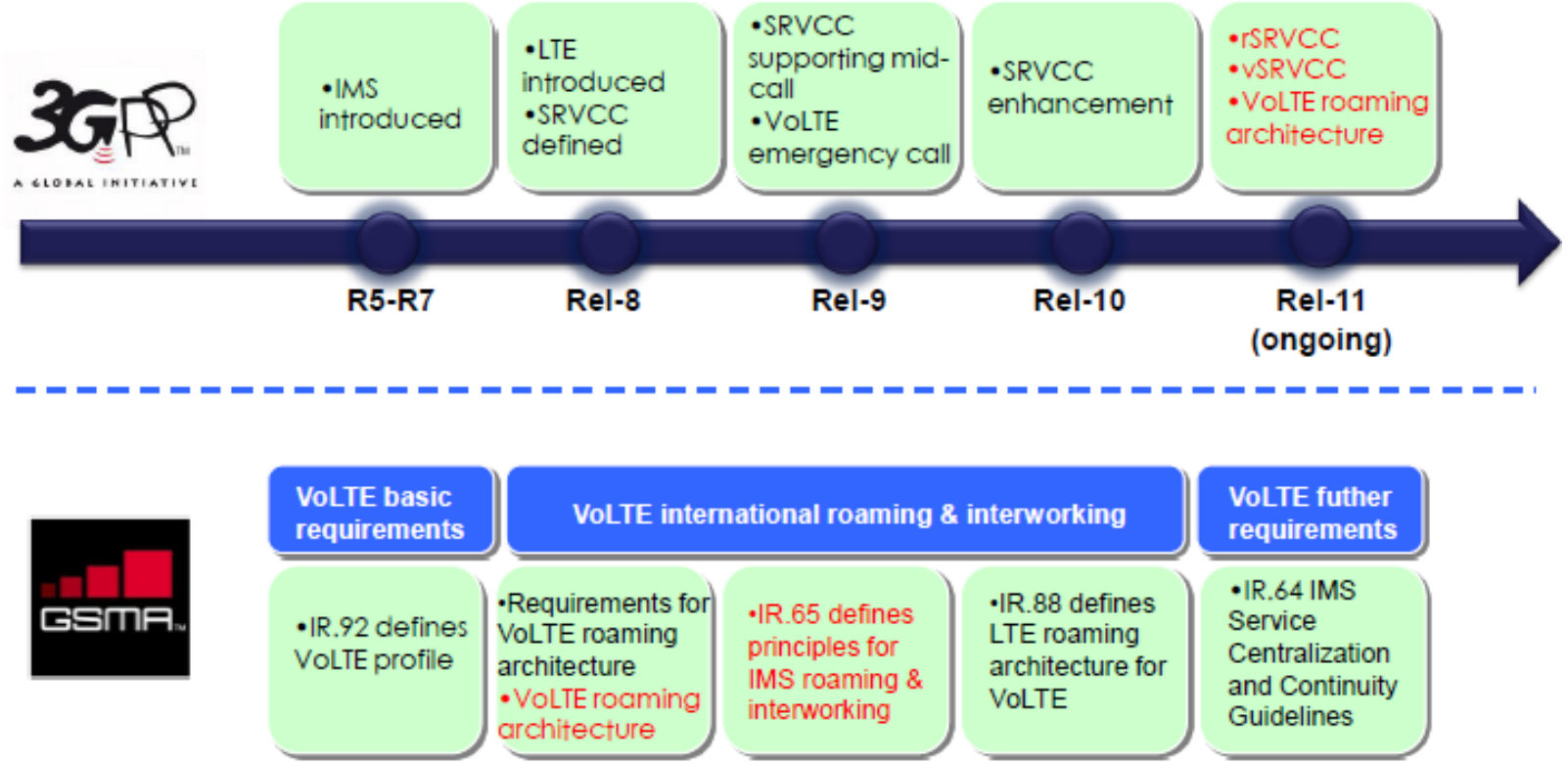
3GPP : 3rd Generation Partnership Project

Tispan : Telecoms & Internet converged Services & Protocols for Advanced Networks

OMA : Open Mobile Alliance

IETF : Internet Engineering Task Force

Standardization



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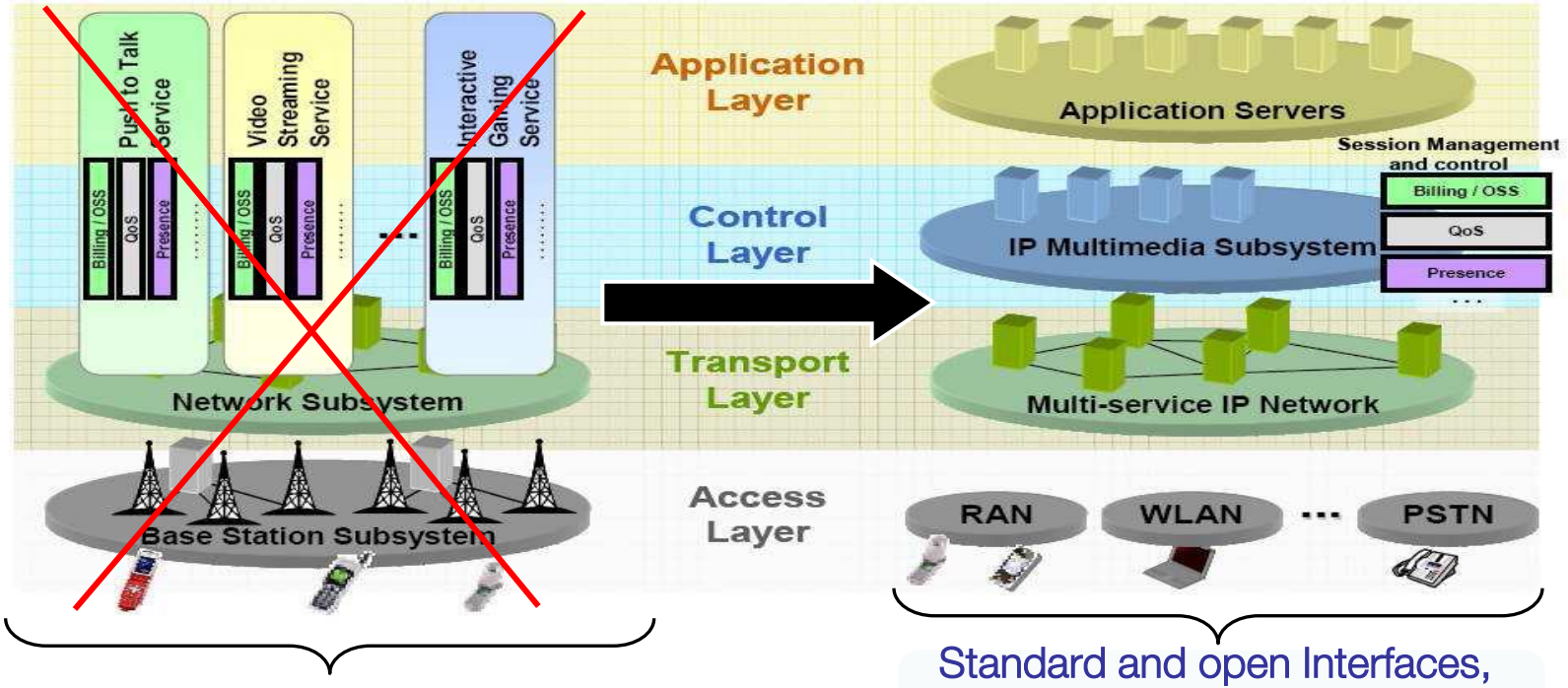
Concepts

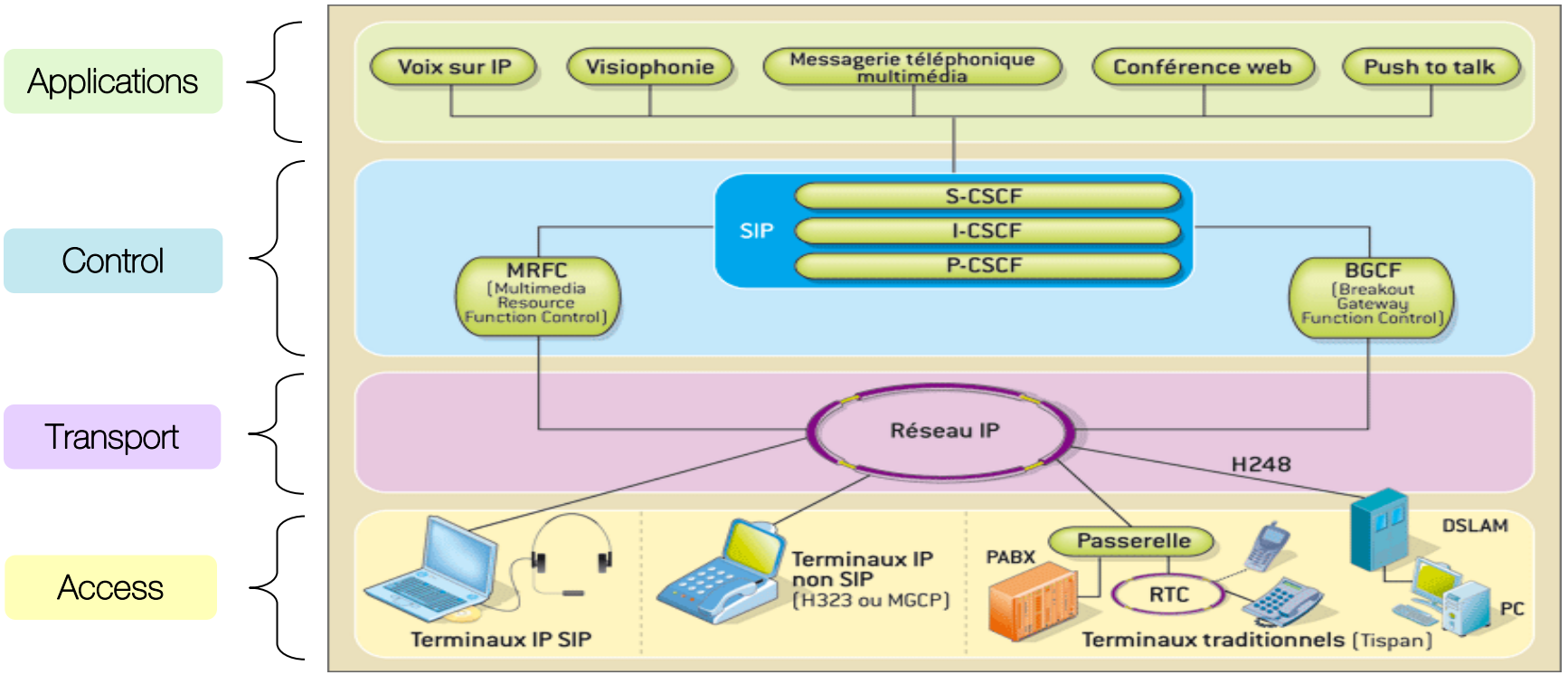


Non-standard Interfaces
Slow introduction of new services

Standard and open Interfaces,
Simplified access and introduction of new services

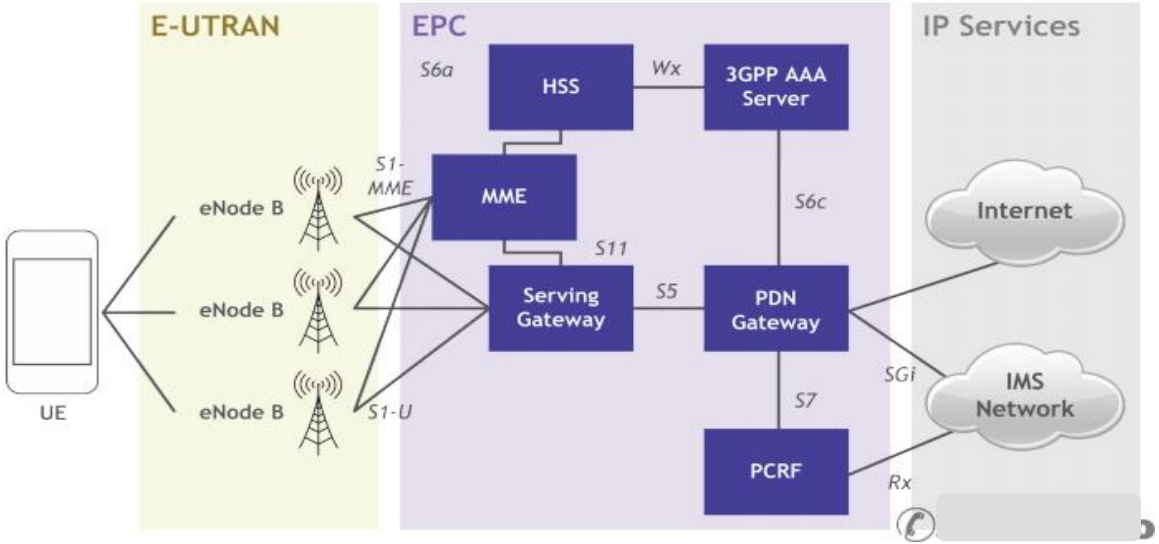
« Any Service, Any Device, Anywhere »

Concepts: a layered model

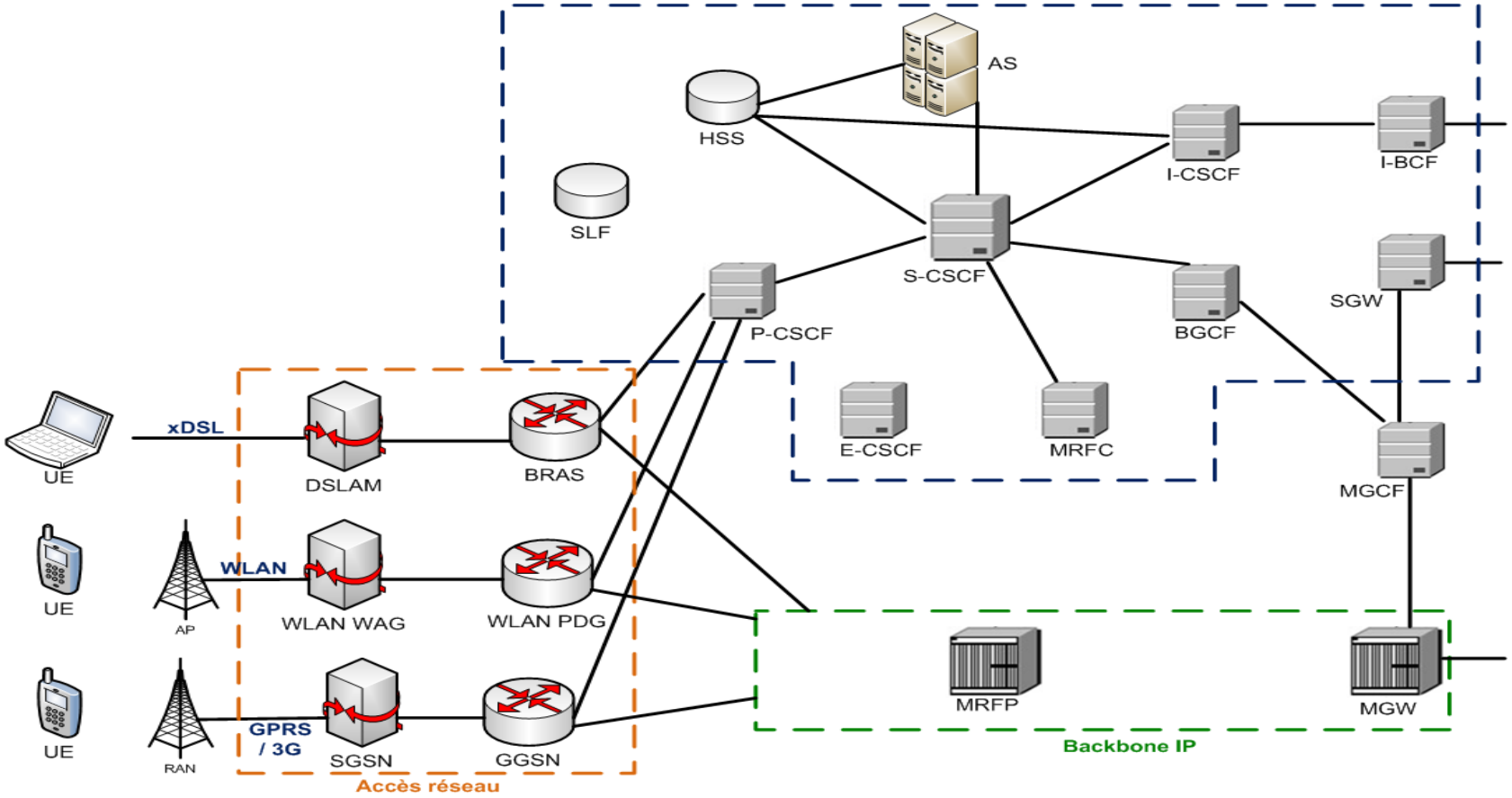


IMS and LTE architecture

1. IMS is a new service integrated with LTE to offer the possibility to pass voice calls and multimedia sessions based on the SIP and RTP/RTCP protocols
2. VoLTE and VoWiFi are the commercial names for IMS susbsystem



IMS detailed architecture



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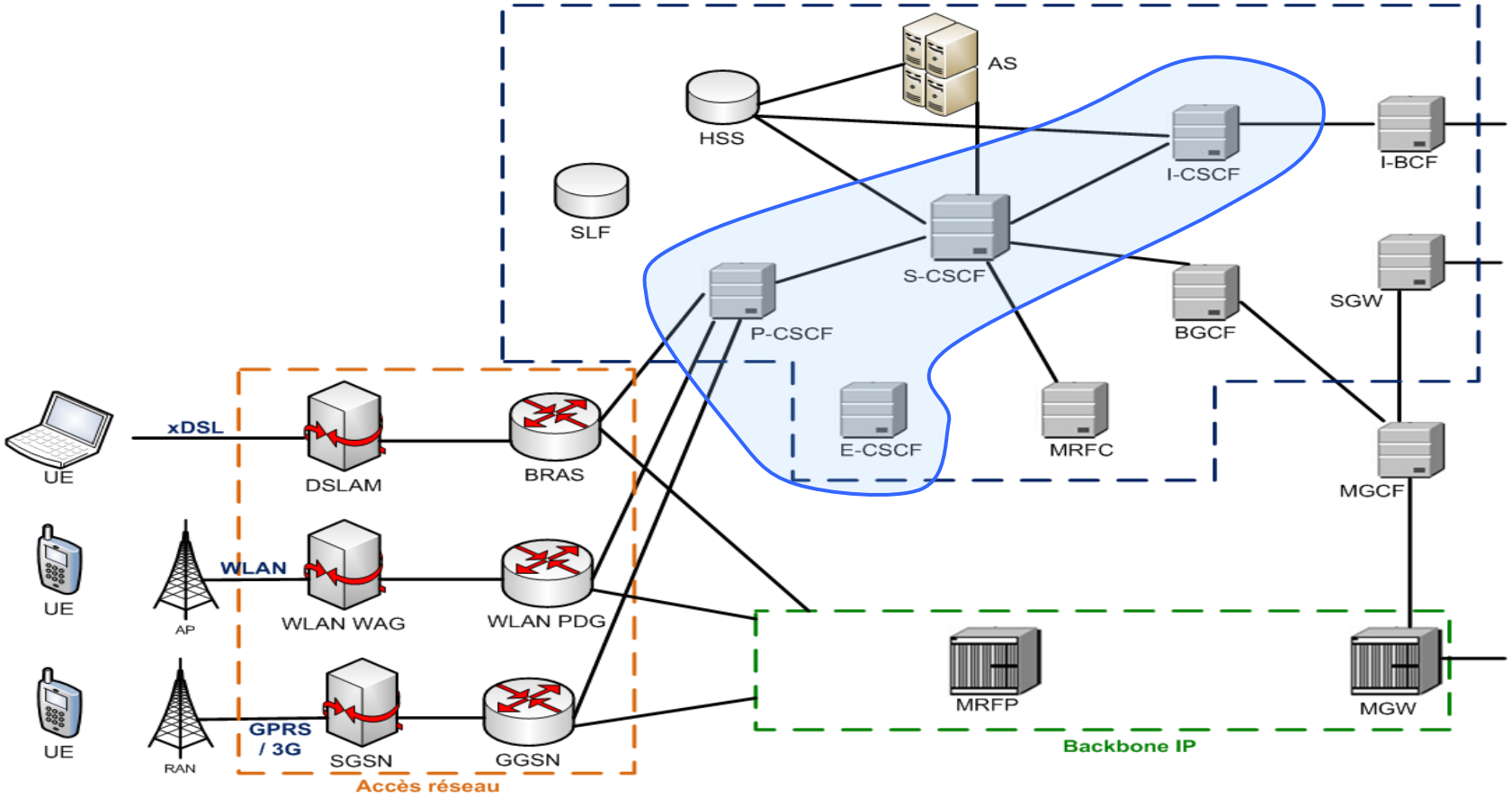
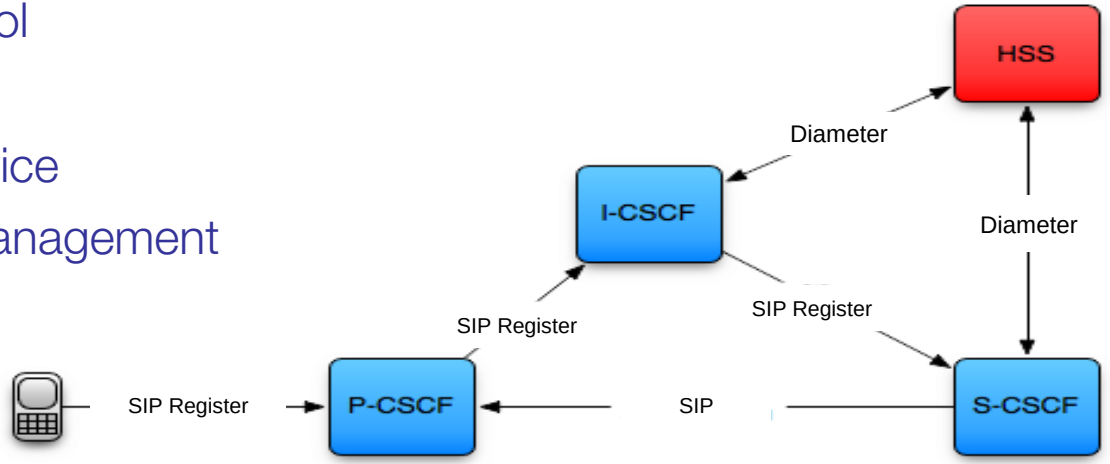


CSCFs: Call session control functions

- **IMS functionalities are concentrated in 3 CSCF (Call Session Control Function) using SIP protocol.**

- **Functionalities of CSCF servers :**
  - User Authentication
  - Session Control
  - Calls routing
  - Quality of Service
  - Credentials management



The Proxy CSCF

P-CSCF : Proxy Call Session Control Function

- **Unique Entry Point into IMS Network**
- **P-CSCF hide all other servers to IMS terminal**
- **All SIP signaling is routed to P-CSCF**
- **P-CSCF is located in the Visited Operator Network (which handle the Access Network).**
- **P-CSCF routes all requests and responses between IMS terminal and S-CSCF**
- **P-CSCF compresses and decompresses (when activated) SIP messages.**

The Interrogating CSCF

I-CSCF : Interrogating Call Session Control Function

- **Entry Point of operator Network**
- **Does not process any SIP request**
- **S-CSCF is selected by I-CSCF, depending on user IMS parameters**

The Serving CSCF

S-CSCF : Serving Call Session Control Function

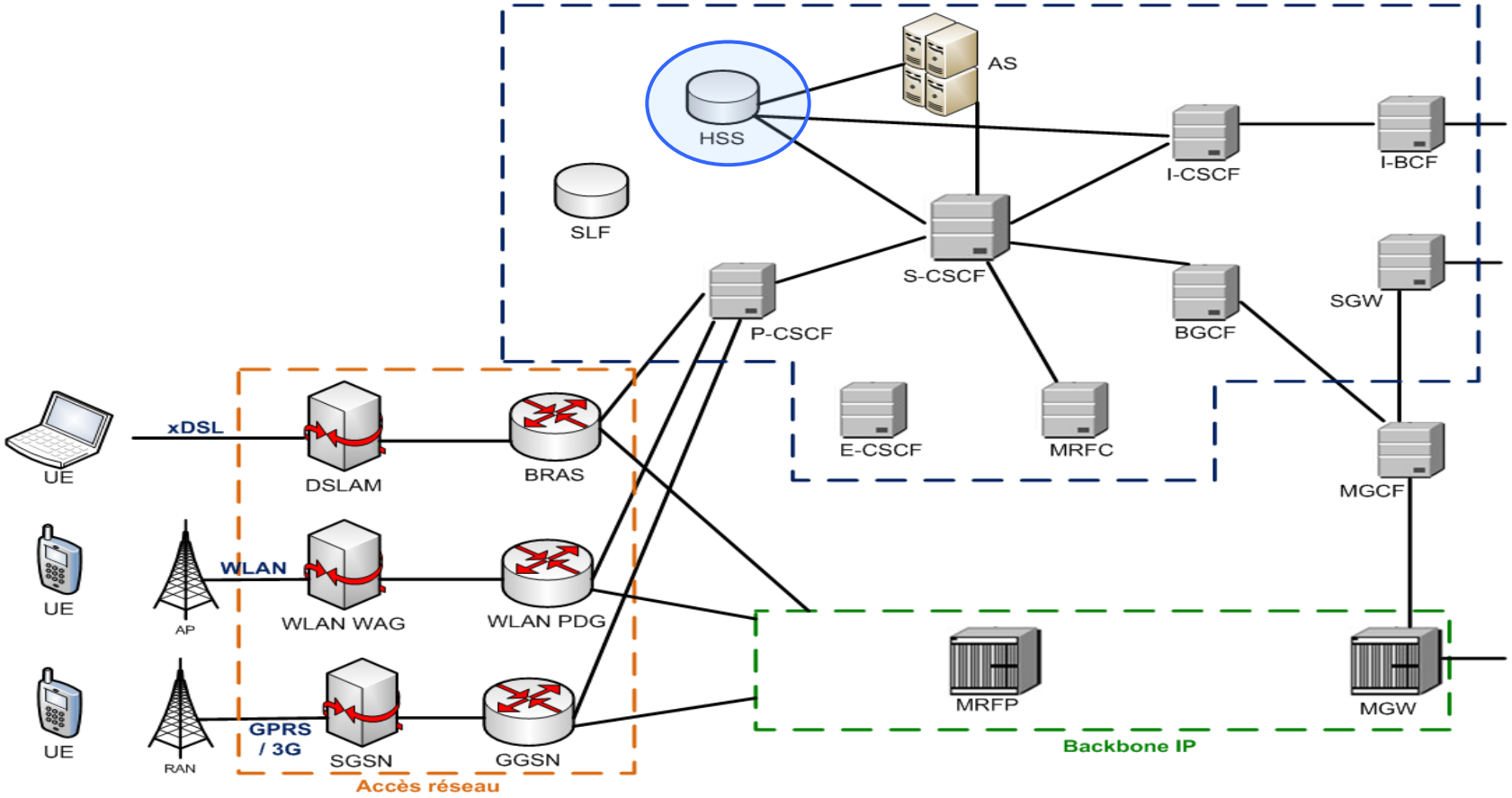
- **Core of IMS architecture**
- **Is located in user IMS Operator**
- **The S-CSCF :**
  - Manages and responds to all requests from IMS user
  - Manages IMS user sessions
  - Routes SIP requests
  - The interface to all application servers
- **All SIP messages sent or received by the IMS terminal have been routed by S-CSCF**
- **S-CSCF has been selected by I-CSCF**

The Emergency CSCF

E-CSCF : Emergency Call Session Control Function

- **Always located in the same Network as P-CSCF**
- **Manages user Location in case of emergency call**
- **Routes emergency call to emergency services**

IMS detailed architecture



HSS: Home Subscriber Server

HSS : Home Subscriber Server

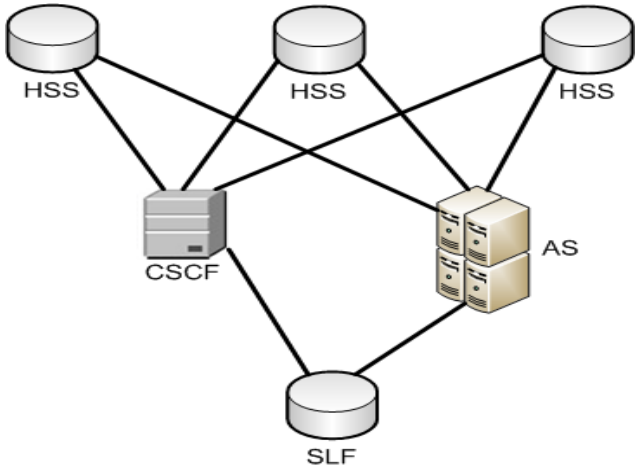
- **HSS centralized the IMS user Database :**
  - Location of IMS terminals
  - User Identities (Public and Private)
  - Authentication Parameters
  - IMS services subscribed by the IMS user
  - IMS service preferences (call redirection, call forward…)

- **Multiple HSS may be implemented in IMS Network**

HSS – Subscription Locator Function

SLF : Subscription Locator Function

- **SLF Server is implemented when multiple HSS are deployed**
- **SLF Server is used by I-CSCF, S-CSCF, or Application Servers to retrieve the HSS which stored user Data**



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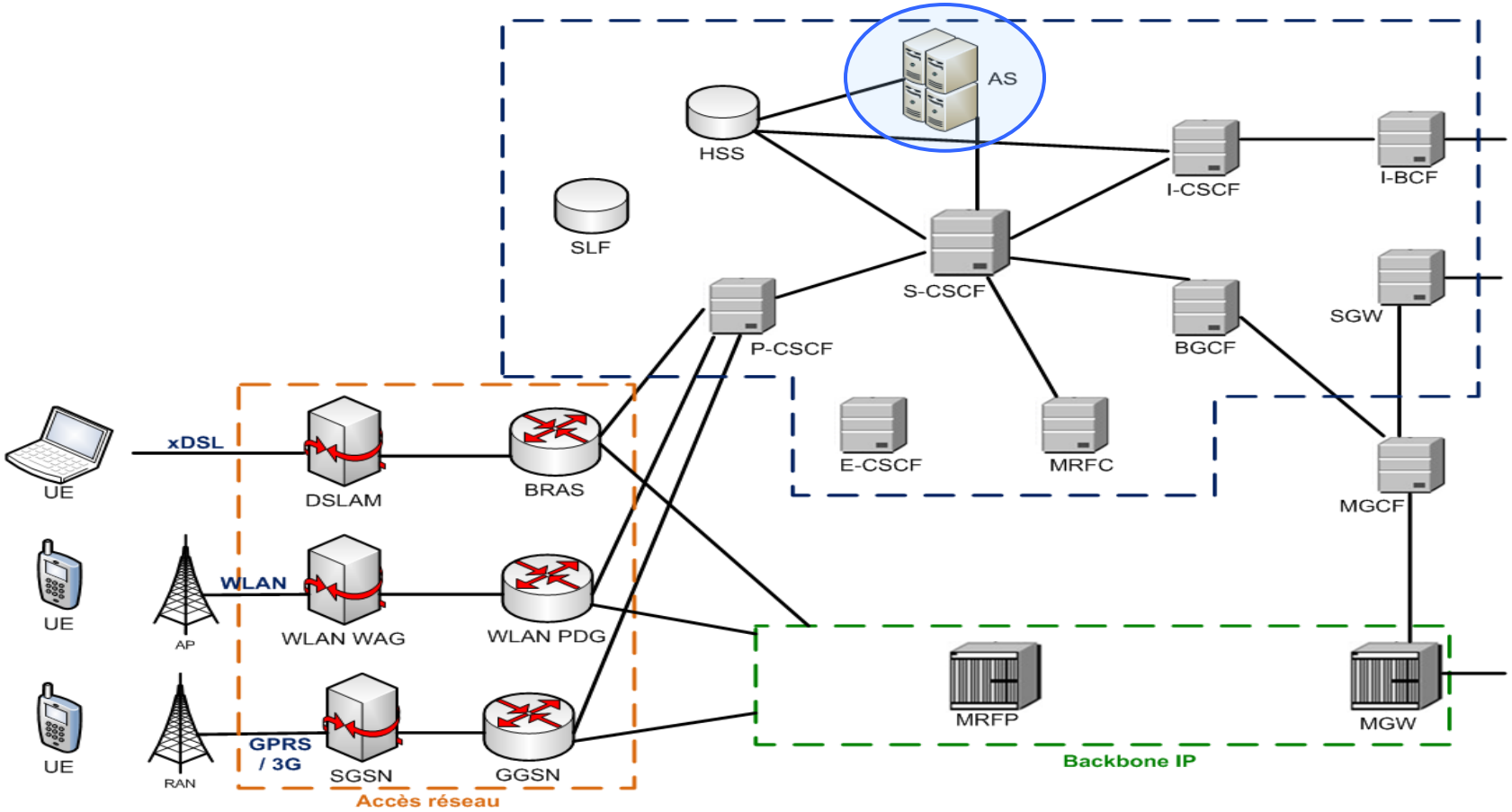
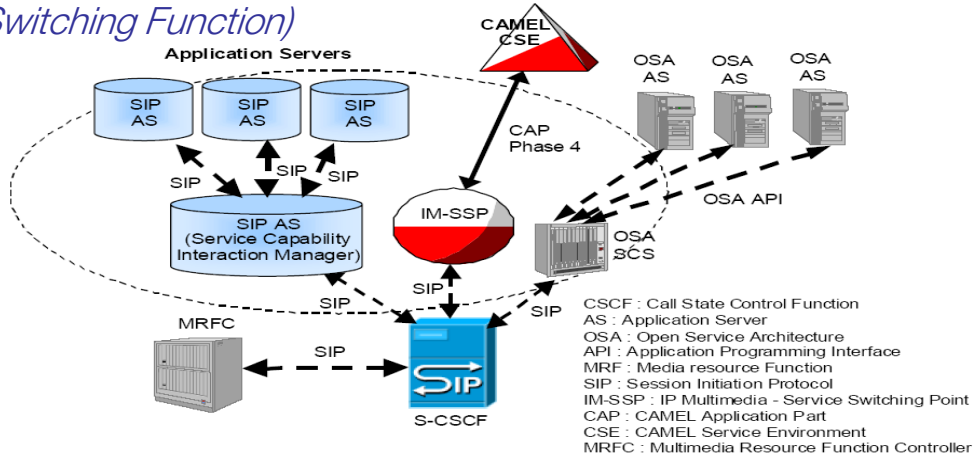


Application Servers (AS)

AS : Application Server

- **Application Servers are connected to S-CSCF**
- **AS are providing IMS services to users**
- **3 different Application Servers :**
  - SIP AS *(SIP Application Server)*
  - OSA SCS *(Open Service Architecture - Service Capability Server)*
  - IM-SSF *(IP Multimedia - Service Switching Function)*



Application Servers (AS)

- SIP AS (SIP Application Server)

SIP Application Servers implement native SIP services (SIP presence, SIP push-to-talk,…)

- OSA SCS (Open Service Architecture - Service Capability Server)

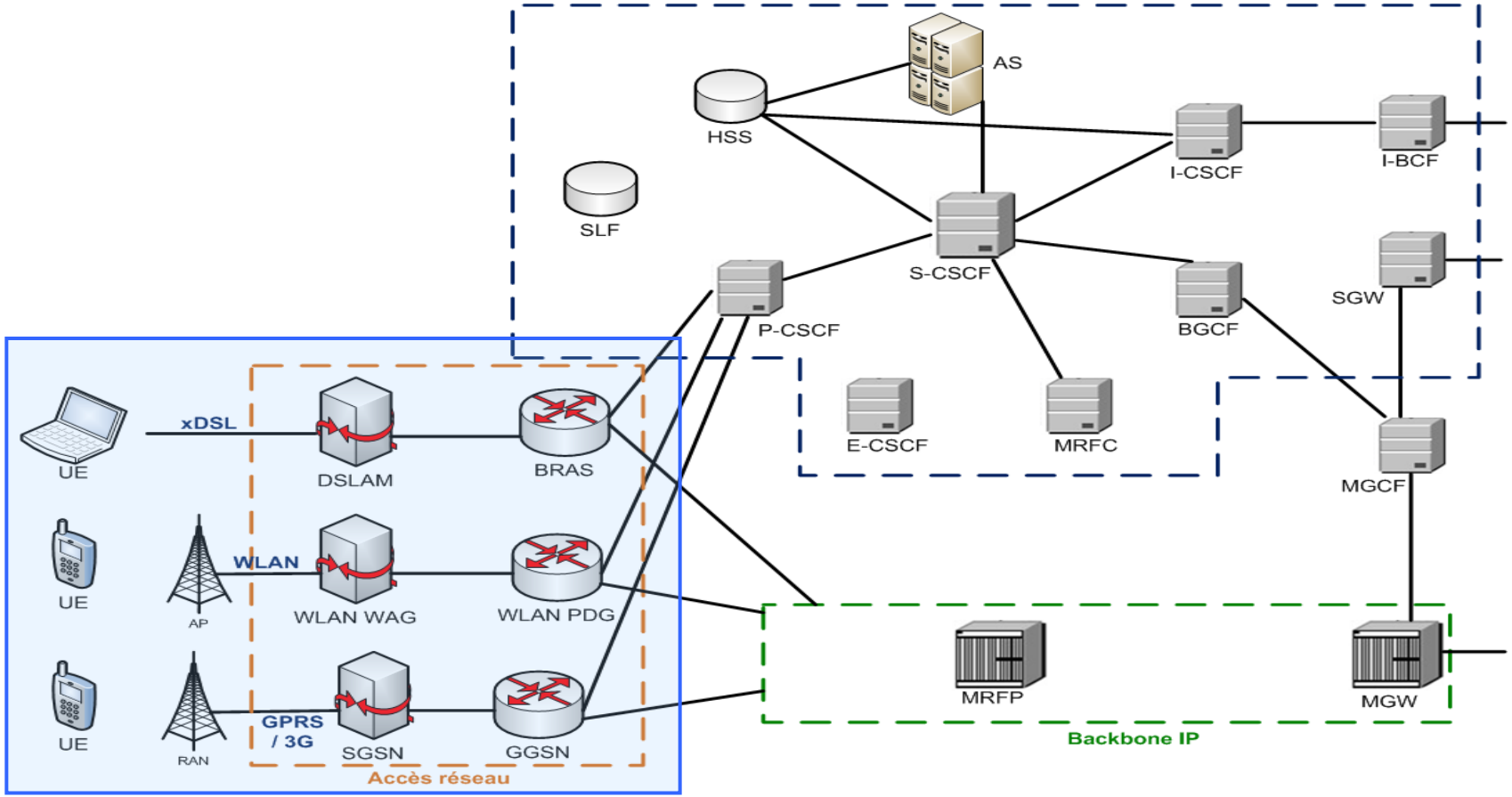
This is a service Management Architecture defined by 3GPP and ETSI to facilitate IMS new services development through standardized API

OSA SCS is the interface between S-CSCF and the AS

- IM-SSF (IP Multimedia - Service Switching Function)

IM-SSF guaranties IMS Services access to user in mobility situation. It is a Gateway between S-CSCF and distant AS.

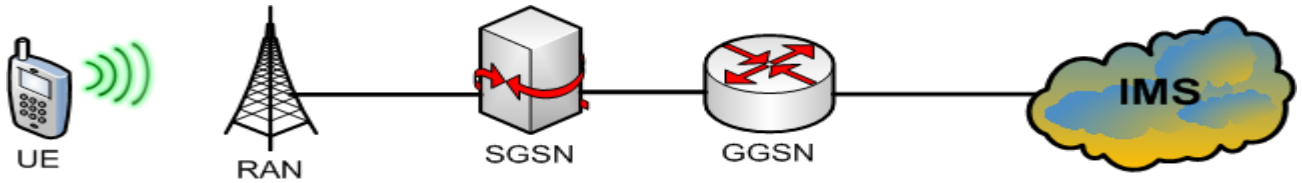
IMS detailed architecture



Access Network Interconnection (GPRS/3G)

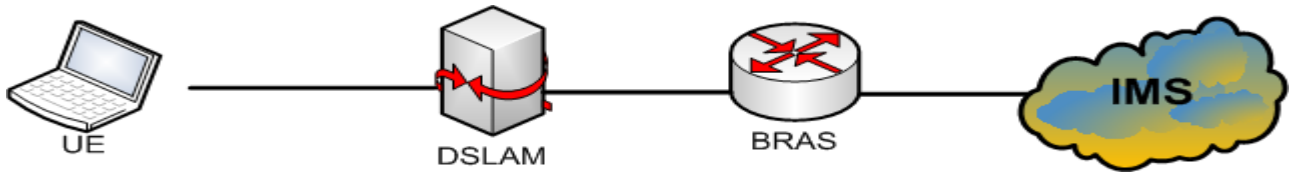
- GGSN **(Gateway GPRS Support Node)**
  - Interconnected with external networks (Internet, …)
  - Routes IP Packets from terminal to P-CSCF

- SGSN **(Serving GPRS Support Node)**
  - Interconnection between RAN (Radio Access Network) and 3G Core Network
  - Manages user mobility (location, authentication)
  - Manages sessions (3G resources, …)
  - Manages traffic (Quality of Service, …)



Access Network Interconnection (xDSL)

- DSLAM **(Digital Subscriber Line Access Multiplexor)**
  - Centralize DSL Local Loop in fixed Network
- BRAS **(Broadband Remote Access Server)**
  - Routes Data streams
  - Access Network Authentication

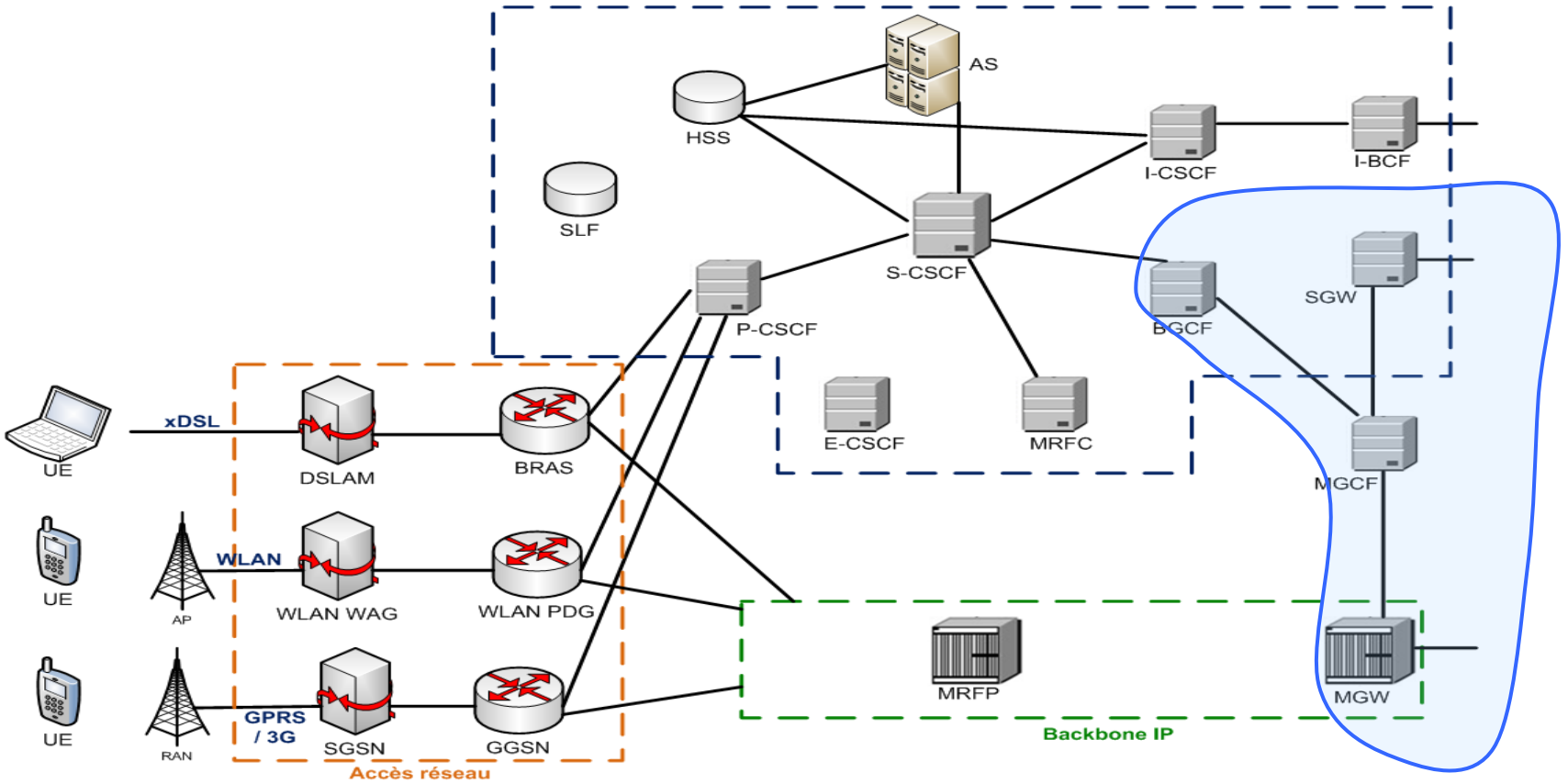


Access Network Interconnection (WLAN)

- WLAN WAG **(Wireless Access Gateway)**
  - Aggregates Data stream to IMS
  - Routes Packets to PDG

- WLAN PDG **(Packet Data Gateway)**
  - Routes packets from IMS to WLAN User
  - Generates Credentials

Access Network Interconnection (PSTN)



Access Network Interconnection (PSTN)

- BGCF **(Breakout Gateway Control Function) :**
  - identify the most appropriate PSTN Gateway.
- **SGW (Signaling Gateway) :**
  - Handles transport conversion of ISUP signaling between commutation and MGCF.
  - ISUP signaling is transported :
    - On SS7 between commutation and the SGW
    - On SIGTRAN between the SGW and the MGCF
- **MGCF (Media Gateway Control Function) :**
  - Handles SIP to ISUP conversion (and vice versa)
  - Selects the I-CSCF for incoming calls
  - Controls MGW (establish, maintain, break sessions)
- **MGW (Media Gateway) :**
  - Transports IP streams to PSTN
  - Codes and Decodes media streams (G.729 over IP et G.711 over PSTN)
  - Resources control

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Public Identities

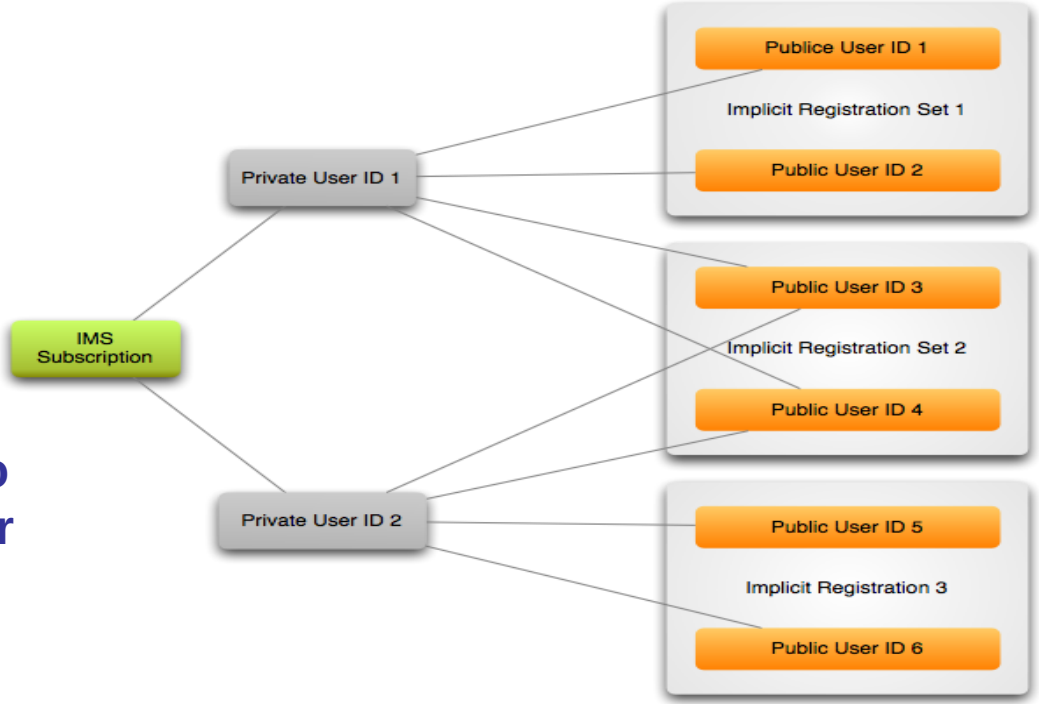
- **Every IMS user has one private and potentially several public identities.**
- **Public identities are used in order to communicate with other IMS user (and its public user identity)**
- **Public identities :**
  - SIP URI : sip:utilisateur@domaine
  - tel URI : tel:+33-123456789 (mostly used to connect to PSTN)
- **When one identity is registered (public or private), all identities are registered.**

Private Identities

- **Every IMS user has a single private identity**
- **This identity is an identifier to access to IMS Network (NAI : Network Access Identifier) : nomutilisateur@orange.fr**
- **Identify the subscribed IMS services, and not the user.**
- **Private identity is used during registering**
- **Private identity is :**
  - permanent,
  - Stored in ISIM,
  - Activated during all registering process (from registration to deregistration)
- **Private identity is stored in HSS.**

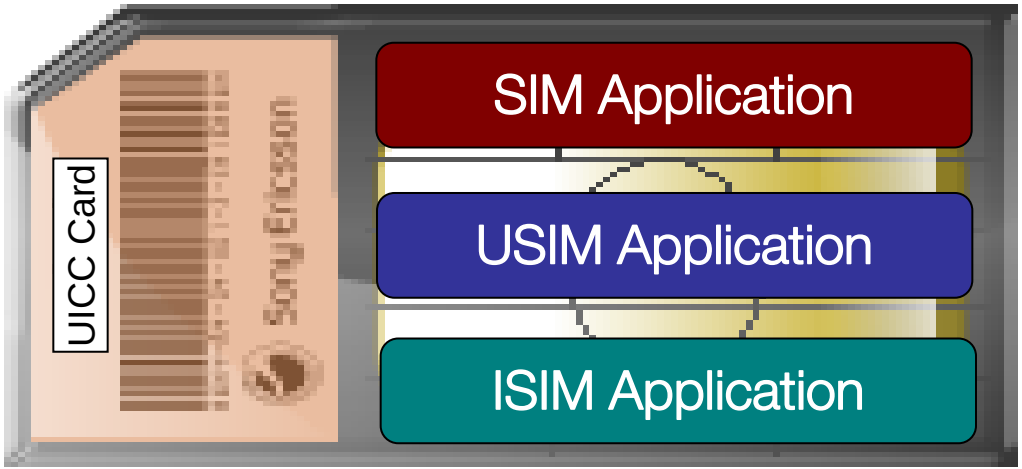
Identity management

- An IMS user can have several public user identities, linked to a single private identity.
- An IMS user can also have several public identities linked to different private identities on 1 or several IMS devices.



Identity management

- All IMS devices have UICC (Universal Integrated Circuit Card), handling all user data.
- 3 different applications are running on UICC :



Identity management

- SIM **(Subscriber Identity Module) :**

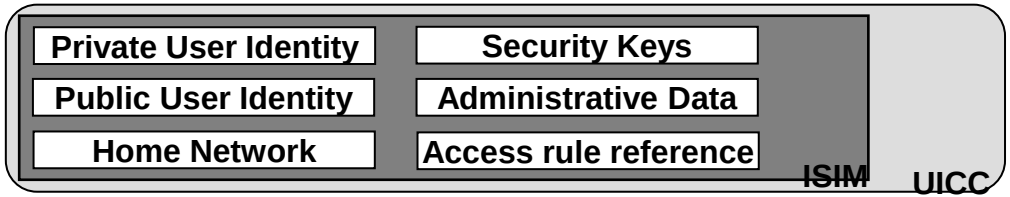
Application used in GSM Network. Handle user information, like operator, identity, preferences, authentication parameters, storage parameters, Address Book etc.

- USIM **(Universal Subscriber Identity Module) :**

Application used in 3G Network.

- ISIM **(IP Multimedia Services Identity Module) :**

Application used in IMS :stores public and private identities, Domain Name, and private key used for security needs and authentication.



Summary

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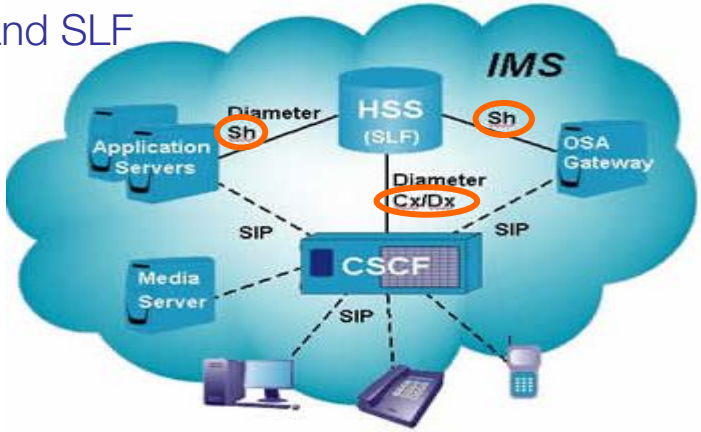
IMS protocols (all at the IETF)

- **Diameter: handles the security protocol part for IMS. Works with extensions (similar to plugins).**
- **RTP/RTCP: Real-Time Transport Protocol and Real-Time Transport Control Protocol transport of real-time applications (e.g. audio).**
- **SIP: is a text-based protocol for registration, subscription, notification and initiation of sessions.**
- **SDP: The Session Description Protocol is a text-based protocol for negotiating session parameters like media type, codec type, bandwidth, IP address and ports, and for media stream setup.**

Diameter

- **IMS is also based on DIAMETER protocol, derived from well known Radius (AAA) for user authentication.**
- **Diameter is used between HSS servers and I-CSCF & S-CSCF servers with specific commands.**
  - *Examples of commands :*
    - ✓ Sh : interface used between HSS & AS
    - ✓ Cx : interface used between HSS & I-CSCF or S-CSCF
    - ✓ Dx : Interface used between I-CSCF or S-CSCF and SLF



Diameter

- **Diameter improve security, reliability, evolution and flexibility, thanks to :**
  - Connection and sessions management
    - Example : session starts when registering, and stops when deregistering
  - Access Control : user authentication and negotiation capabilities
  - Billing services

Session Initiation Protocol

- **IMS signalling is based on SIP protocol, with same synthax (based on IETF RFC 3261), adding specific extension for special IMS services requirements.**

- **The extensions begin with P « - » in IMS environment. They indicate private utilization of SIP conventional extensions defined in IETF RFC 3325 & RFC 3455.**

Frequently used extensions with SIP

- P-Associated-URI allows the operator to retrieve all URI of a user
- P-Asserted-Identity allows P-CSCF to precise the public identity of the caller user.
- P-Preferred-Identity allows P-CSCF to know the preferred public identity of the caller.
- P-Associated-Uri allows the operator to retrieve all user URI.
- P-Access-Network-Info allows IMS device to give information on the access network used.
- P-Visited-Network-ID allows the operator to know the visited network used by the mobility user.
- P-Charging-Vector allows the operator to have billing information, depending on the IMS services subscribed.

SIP messages and responses

- **REGISTER:** allows Clients to register their current location (one or more addresses)
- **INVITE:** is used to initiate a call.
- **ACK:** is sent by a client to confirm that it has received a final response from a server, such as 200 OK.
- **BYE:** is sent either by the calling agent or by the caller agent to abort a call
- **CANCEL:** can be sent to abort a request that was sent previously as long as the server has not yet sent a final response.
- **OPTIONS:** allows clients to learn server's capabilities. The server will send back a list of the methods it supports.

- **SUBSCRIBE:** starts or stops session or user supervision (event monitoring)
- **NOTIFY:** informs subscribed entity about occurred events
- **PUBLISH:** enables an entity to modify presence information
- **MESSAGE:** allows sending an instant message
- **REFER:** informs a recipient to contact a dedicated SIP user (e.g. MWI)
- **PRACK:** Provisional Acknowledgement
- **UPDATE:** Change of media (SDP) during session setup
- **INFO:** Exchange of any application layer information (e.g. DTMF)

Code	Description Examples (SIP message)	Example
1xx	Informational – Request received, continuing to process request.	180 Ringing 181 Call Forwarded 183 Session in progress
2xx	Success –Action was successfully received, understood and accepted.	200 OK
3xx	Redirection – Further action needs to be taken in order to complete the request	300 Multiple Choices 302 Moved Temporarily
4xx	Client Error – Request contains bad syntax or cannot be fulfilled at this server.	401 Unauthorized 404 Not Found 408 Request Timeout
5xx	Server Error – Server failed to fulfill an apparently valid request.	503 Service Unavailable 505 Version Not Supported
6xx	Global Failure – Request is invalid at any server. 600 Busy Everywhere	603 Decline

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- What is the difference between SIP and RTP/RTCP protocols ?
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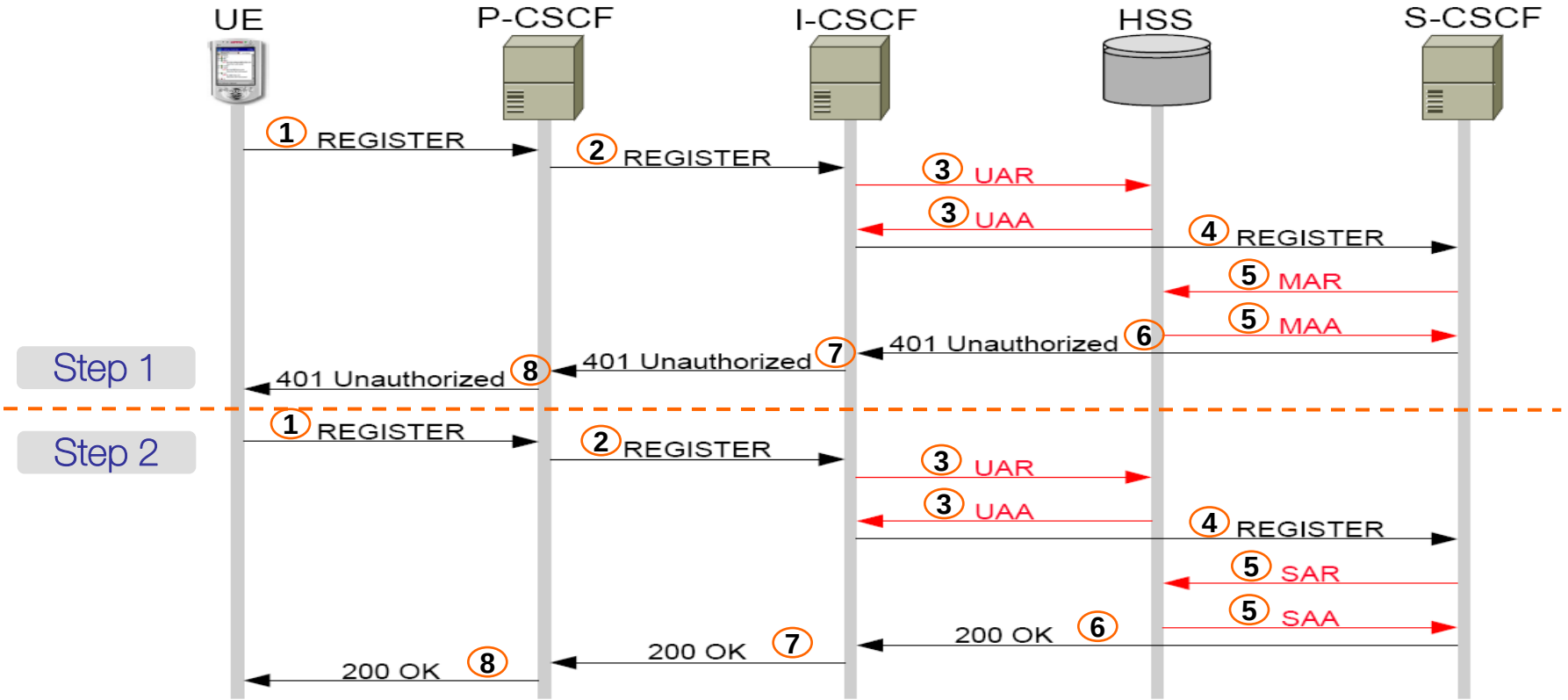
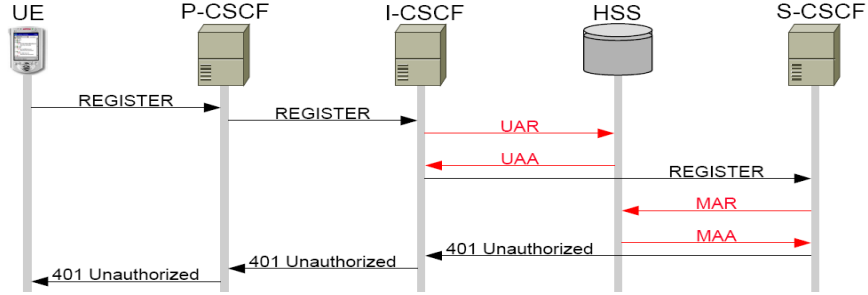
Registration to IMS

- **Registration is the first process used by IMS device.**
- **Authentication can be required during registration. In this case, registration requires 2 steps.**
- **Registration operations :**
  - IMS services authorization,
  - User and network authentication and authorization
  - IMS network managed public user identities

Registration to IMS

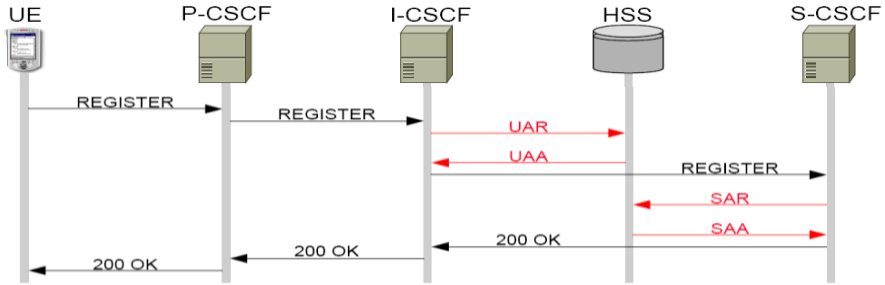


Registration – step 1



1. **The IMS device send registration request to P-CSCF :** REGISTER
2. Location of I-CSCF **:** REGISTER
   - If I-CSCF is unknown from P-CSCF, DNS request is sent thanks to Domain Name of the user.
3. I-CSCF registration **: I-CSCF sends authentication request to HSS using** DIAMETER UAR :
   - When first connection, HSS sends S-CSCFs list to I-CSCF : DIAMETER UAA
   - REGISTER request is forwarded to S-CSCF.
4. S-CSCF allocation **: S-CSCF sends** DIAMETER MAR **request to HSS to retrieve user information**
5. HSS authentication **: HSS sends all user information to S-CSCF using** DIAMETER MAA **.**
6. **When user authentication is activated, S-CSCF sends « Challenge » request to authenticate the IMS user :** 401 Unauthorized**.**

Registration – step 2



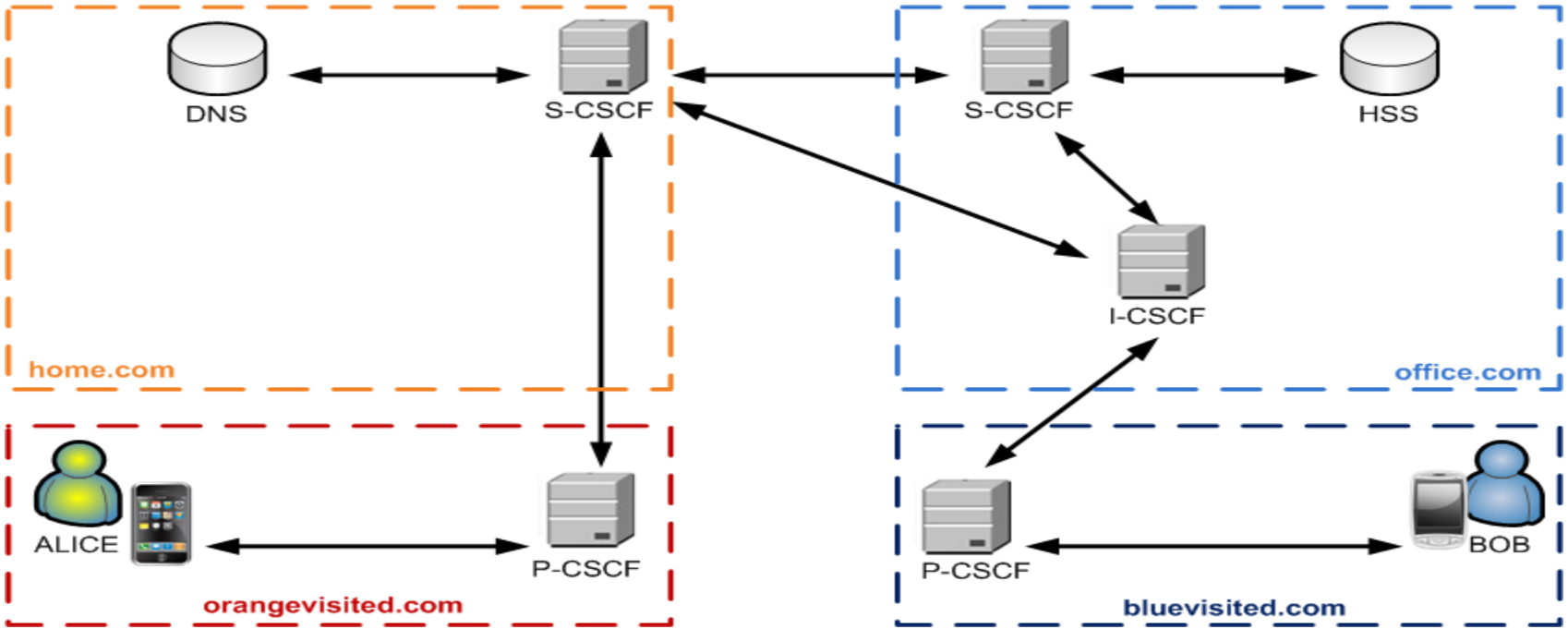
- IMS device **: sends a new** REGISTER **to P-CSCF, containing information stored in UICC, and the response to the « Challenge ».**
- P-CSCF **: forward the** REGISTER **request to I-CSCF.**
- I-CSCF **:**
  - Sends **DIAMETER UAR** to HSS to retrieve S-CSCF and HSS responds with **DIAMETER UAA**
  - Forwards **REGISTER** to S-CSCF.
- S-CSCF **:**
  - Sends **DIAMETER SAR** to HSS to retrieve all parameters used for authentication.
  - When receiving **DIAMETER SAA**, S-CSCF check authentication parameters (compare information received from HSS and REGISTER).
  - When authentication process is completed, user is registered.

Session establishment

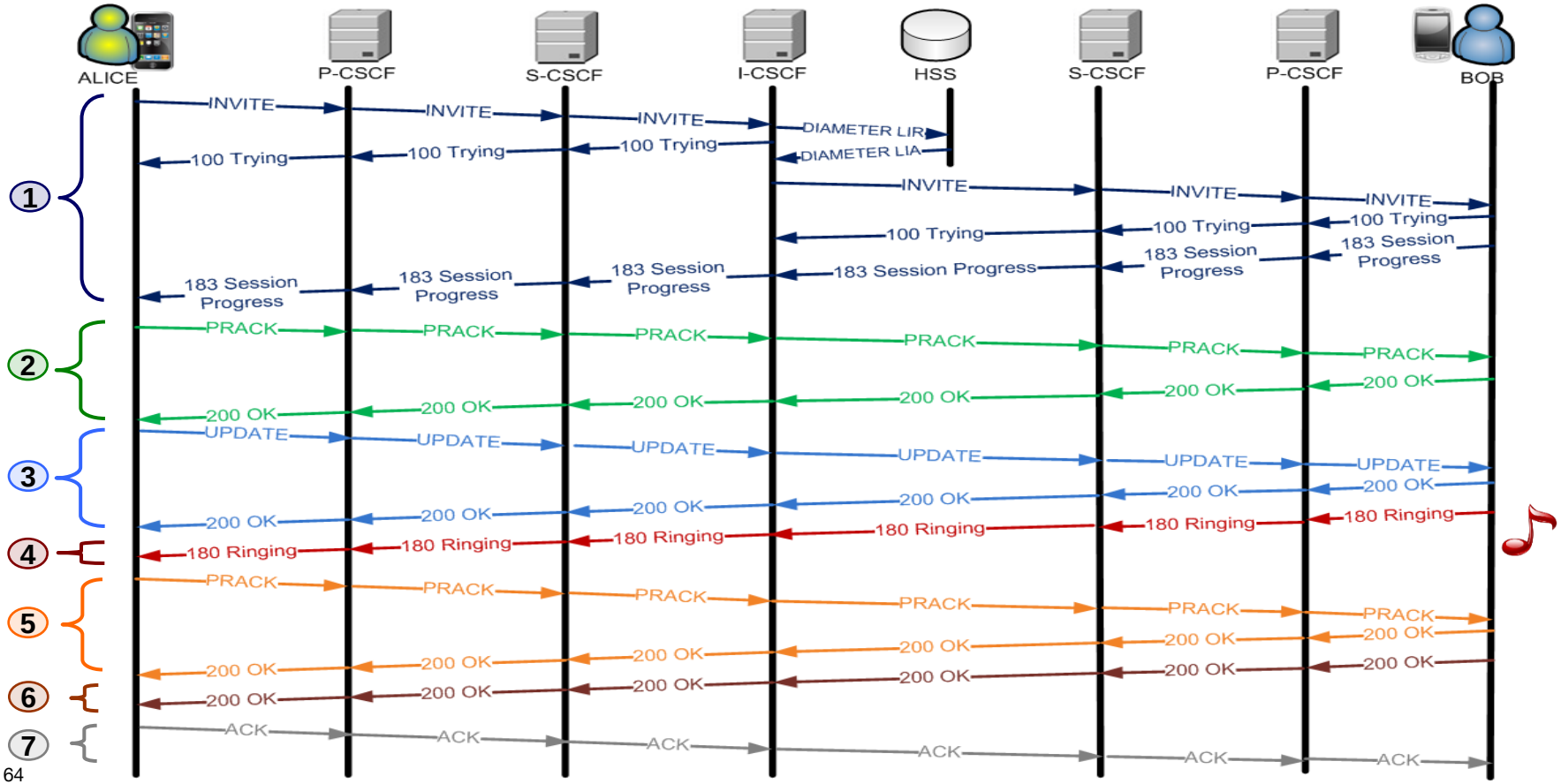
- **Alice (alice@home.com) wants to initiate IMS multimedia (Voice, Video, etc.) session with Bob (bob@office.com).**

- **Both users are located in different visited networks (worse case)**

Session routing



Session establishment message flow

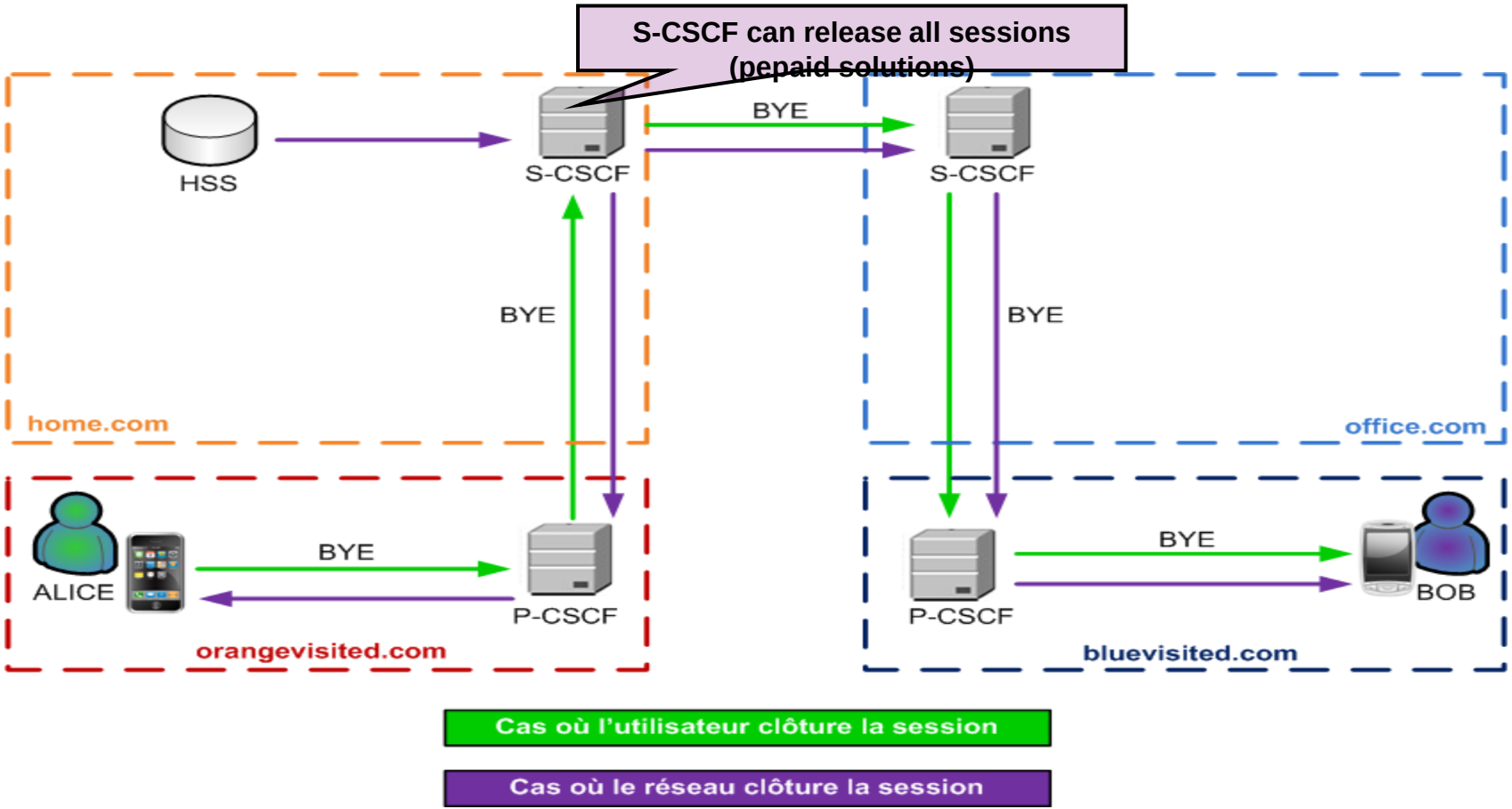


Session establishment message flow

1. Alice sends **INVITE** to Bob and receives 2 responds :
   - **100 Trying** (acknowledgment of initial request)
   - **183 Session in Progress** (negociation process)

   Bob is located by I-CSCF with **DIAMETER** request sent to HSS.
2. Alice sends **PRACK** to Bob to ack 183 and start ressource reservation. Bob responds **200 OK** and initiates ressources reservation.
3. When Alice ressources are reserved, Alice device sends **UPDATE** When Bob ressources are reserved, and Update request is received, Bob device sends **200 OK**.
4. Bob device is ringing : **180 Ringing**
5. Alice sends **PRACK** to Bob ack Ringing and Bob validate with **200 OK**.
6. Bob hangup and sends **200 OK** to Alice.
7. Alice sends **ACK** to start multimedia communiction.

Session tearoff (stop session)



See how it looks on wireshark

- **Basic call flows (with Wireshark) :**
  - Register
  - Invite

SIP trace.rar

- **Also available here:**

https://drive.google.com/open?id=0BzbivnzUyTDtNzZPLVRVc0N0eXc

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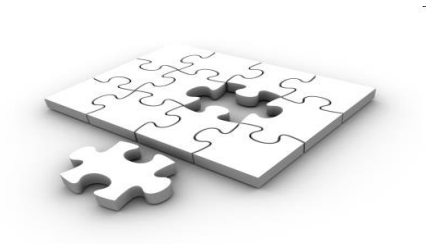
Added value

- **Internet still available for 3G users.**
- **IMS brings :**

QoS

Unique Billing



Services

Benefits

- **Unique Platform capable of managing multiple multimedia applications.**
- **Performed QoS on top of fixed and mobile networks.**
- **IMS allows IP convergence because it is independent of access Network (Radio, Fixed, Wlan).**
- **Simple integration of new Multimedia applications.**
- **Strong mutual authentication (User and Network)**
- **Simple and central billing.**

Drawbacks

- IPv6 migration **: expensive migration**
- Deployment : **Huge delays because of the interconnection of several elements.**
- Fixed access Network interconnection is very
- Complexity of new protocols not yet mature like SIP
- A new billing process to be setup
- Lots of IMS standards :
  - IETF, 3GPP, TISPAN, OMA, GSMA.
- **Competition with pure Internet Players : Google, Facebook etc.**
  - Usually they win ☹

Some commercial deployments...

- **Orange spain has deployed VoWiFi**
- **Orange Poland has also done the deployment**

Headlines of the Day

Orange Poland Adds More Devices Supporting VOLTE, Wifi Calling
August 01, 2017

Orange Poland added devices supporting VoLTE and WiFi to its offering and reports that a total 21 phone models support VoLTE and 17 models support WiFi Calling. VoLTE has more than 430,000 users. The operator did not specify the number of WiFi Calling users but said it is less than VoLTE. Orange expects that the WiFi Calling service will have more users after the

- **Orange France has deployed VoWiFi**

Orange France activates WiFi calls (VoWiFi) on the latest iPhones

With **WiFi calling (Voice Over WiFi, or VoWiFi)**, Orange France customers can place a phone call if they have a WiFi connection in an area with **poor or no cellular coverage** (eg indoor).
This service was enabled by an evolution of the access infrastructure : an **evolved Packet Data Gateway** was introduced to interconnect the 4G mobile core network to untrusted WiFi networks.

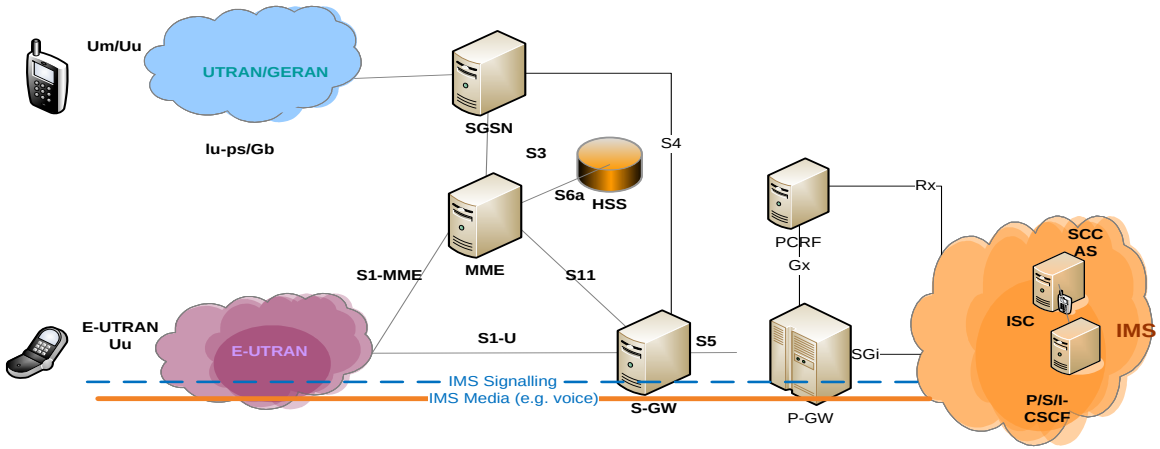
Some commercial deployments on specific phones

- **Devices need to support the IMS protocol also (SIP, RTP/RTCP)**
- **Non-exhaustive list of devices supported by Orange Spain and France**
  - Basically the most recent expensive ones

- Samsung J3 2017.
- Samsung J5 2017.
- Samsung J7 2017.
- Samsung Galaxy A5 2017.
- Samsung Galaxy A3 2017.
- Samsung Xcover 4.
- Samsung Galaxy Note 8.
- Sony Xperia X, XA1, XZ y XZ1 adquirido a través de Orange, con software específico homologado para
- Sony Xperia XZ Premium y XZ1 adquiridos a través de Orange, con software específico homologado pa
- Orange Dive Dive 71, Orange Neva y Orange Rise 52.
- LG K10, G5 y LG G6 adquiridos a través de Orange, con software específico homologado para este serv
- Alcatel U5 adquirido a través de Orange, con software específico homologado para este servicio.

- iPhone 8.
- iPhone 8 Plus.
- iPhone 7.
- iPhone 7 Plus.
- iPhone 6s.
- iPhone 6s Plus.
- iPhone 6 Plus.
- iPhone SE.
- Samsung Galaxy GS7 Edge.
- Samsung Galaxy S8.
- Samsung Galaxy S8+.
- Samsung Galaxy Note 8.

IMS PS VoIP over LTE: Architecture

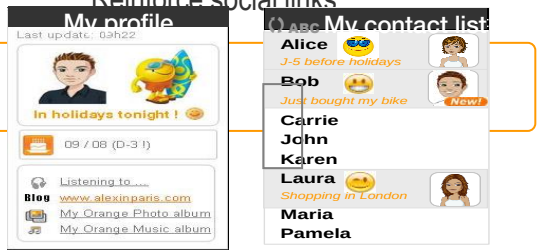


- **VoIP traffic is composed of** signaling and media **flow**
- **IMS supports the management of multimedia sessions including** origination, termination, transfer, and release **of IMS multimedia calls**
- Mobile VoIP signaling bearer
  - IMS signaling can use the default bearer established by the attach or a new default bearer for IMS
  - IMS signaling can use a new default bearer for IMS, activated by the UE using the "UE requested PDN connectivity" procedure
- Mobile VoIP media bearer
  - Dedicated bearer with Guaranteed Bit Rate (GBR)
- APN
  - Usage of a dedicated APN for IMS, then a we have default bearer for IMS signaling and one dedicated bearer for each type of media traffic (RTP/RTCP flow, MSRP flow, RTSP flow…..) including VoIP
  - Usage of a default APN, then we have a default EPS bearer for IMS signaling and dedicated EPS bearer each type of media traffic (RTP/RTCP flow, MSRP flow, RTSP flow…..) including VoIP media traffic

RCS product overview

Rich phonebook

Reinforce social links

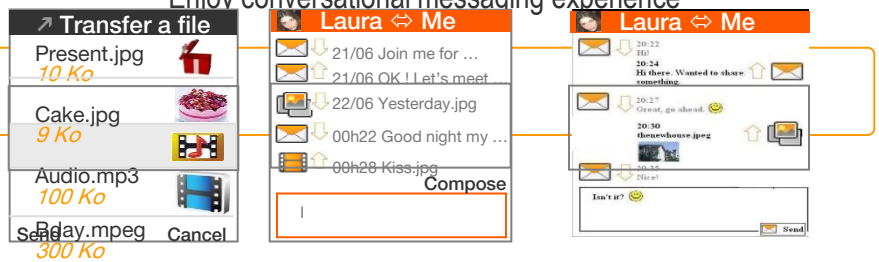


Rich call

Share content

Rich messaging

Enjoy conversational messaging experience



Presence | **History** | **Capability** | **Call** | **Multimedia sharing** | **Multimedia sending** | **Enhanced messaging**

- **Take advantage of a phonebook enriched dynamically with**
  - ✓ **profile with photo, mood, links updated by my contacts**
  - ✓ **communication capabilities features**

- **Share content and emotion instantaneously during a call**
  - ✓ **video, photo, etc.**
  - ✓ **live-captured**

- **Benefit from enriched messaging services**
  - ✓ **file transfer as music**
  - ✓ **thread of communications per contact**
  - ✓ **improved text message features (SMS/MMS)**
  - ✓ **smart messaging interface based directly on phonebook**

DIFFERENTIATOR

For v0, the main Orange differentiator will be the smooth interface unity :

- ✓ **very good integration in Orange Signature**
- ✓ **intuitive and convivial ergonomics**
- ✓ **contact centric architecture**

Smart, Simple, Optimized

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Go further

IMS in a box: do your own deployment using my github page

- https://github.com/sofianinho/clearwater-docker

SIP Description :

- http://www.efort.com/r_tutoriels/SIP_EFORT.pdf

IMS Description :

- http://www.efort.com/r_tutoriels/IMS_EFORT.pdf
- http://www.efort.com/r_tutoriels/AUTHENTIFICATION_IMS_EFORT.pdf

Open source projects:

- http://www.projectclearwater.org/