



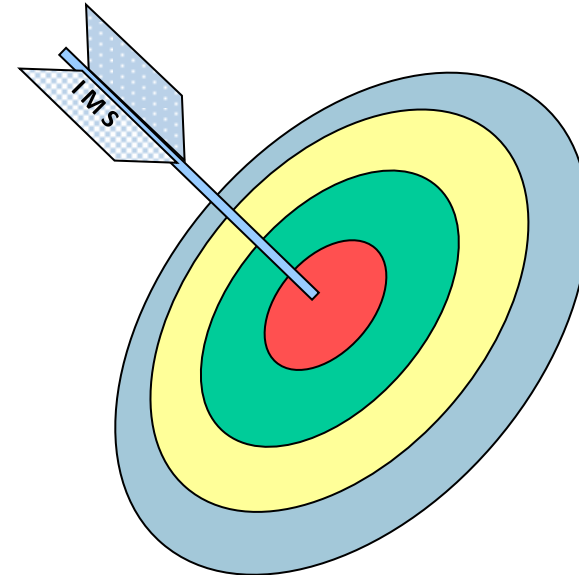
Introducing IMS Standardization

WANG XinLong
CAICT

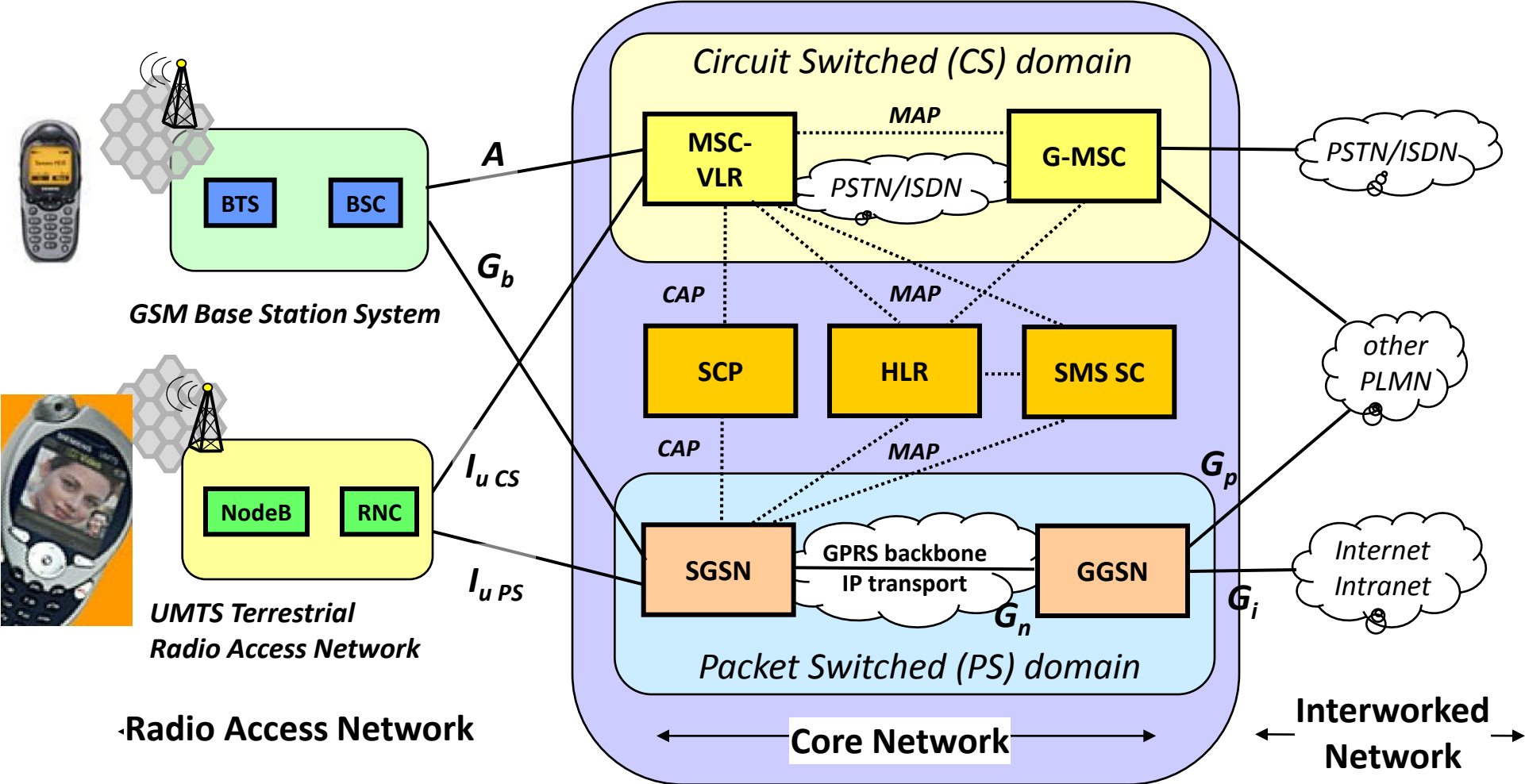
Contents



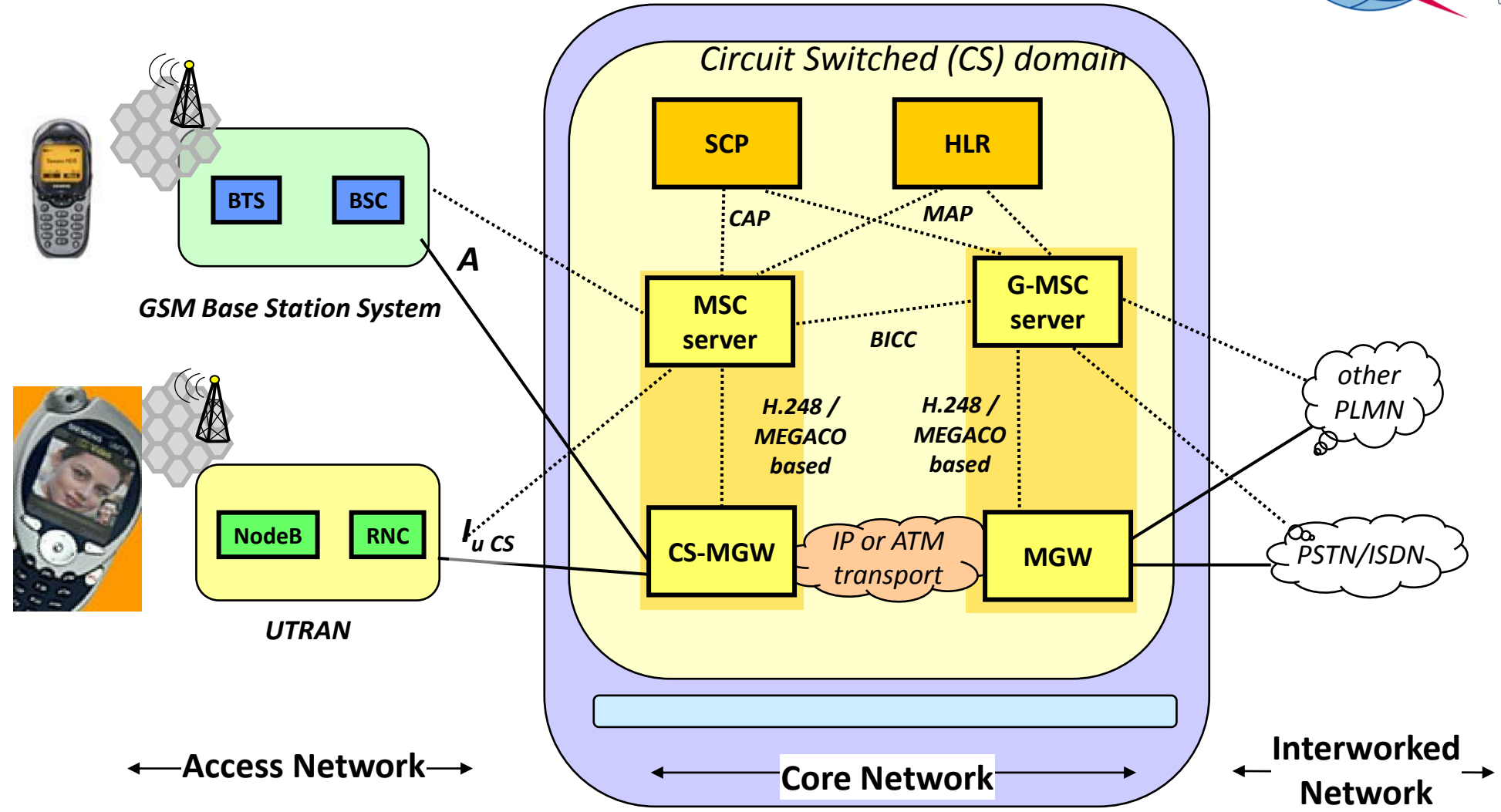
- IMS Summary
- International IMS Standards
- IMS Standards in China



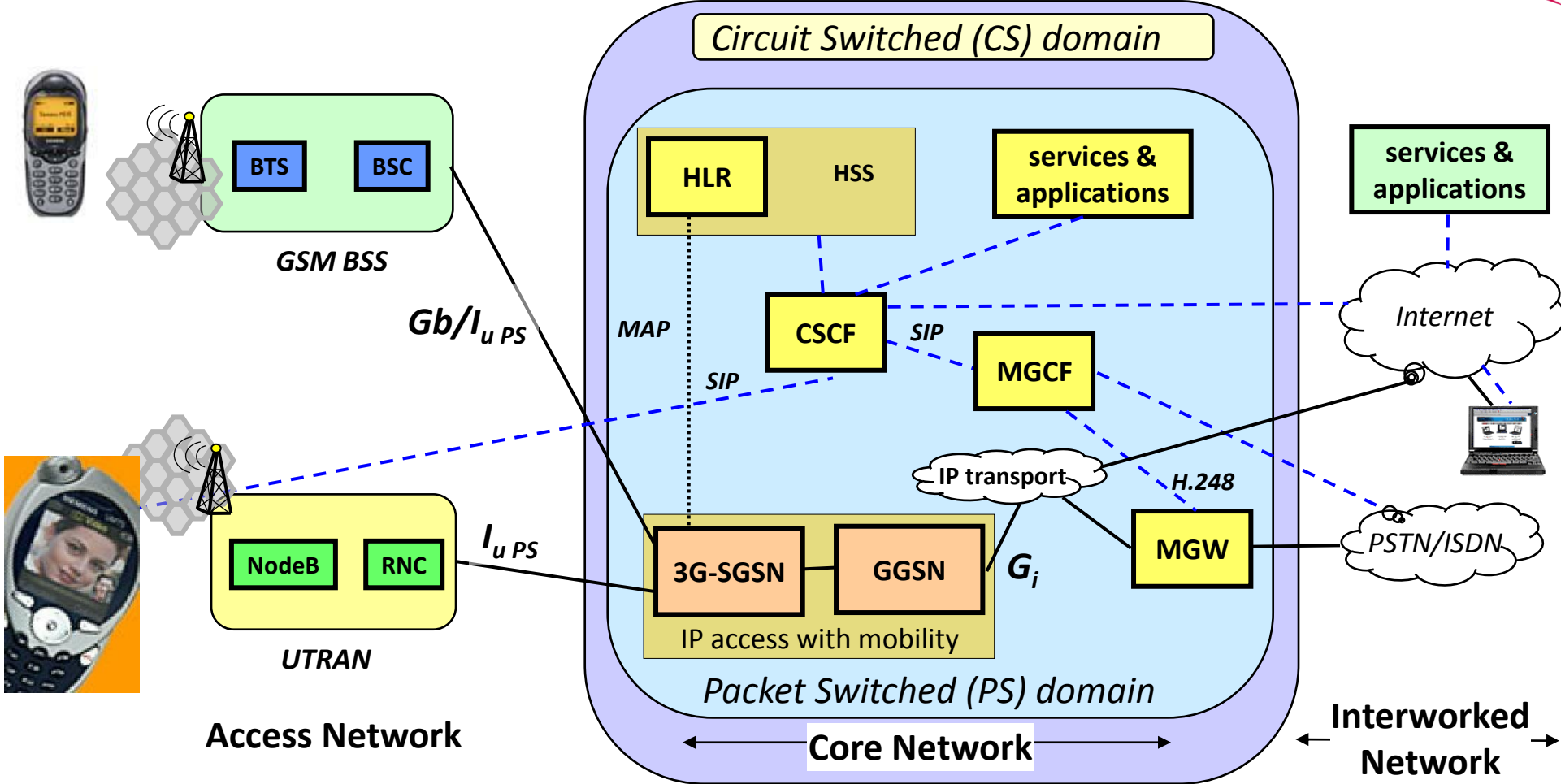
3GPP Release 99 Network architecture



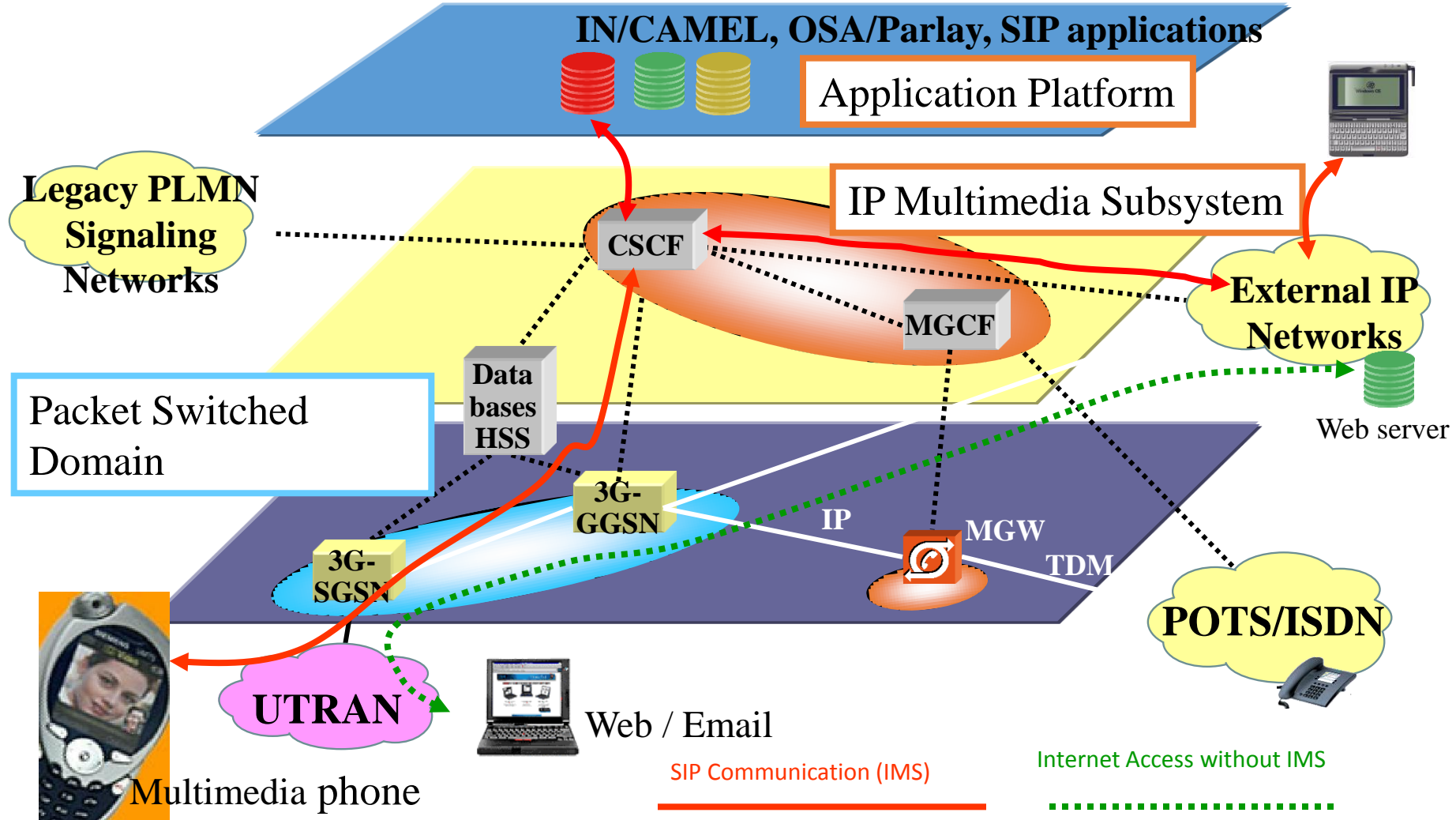
3GPP Release 4 Network architecture



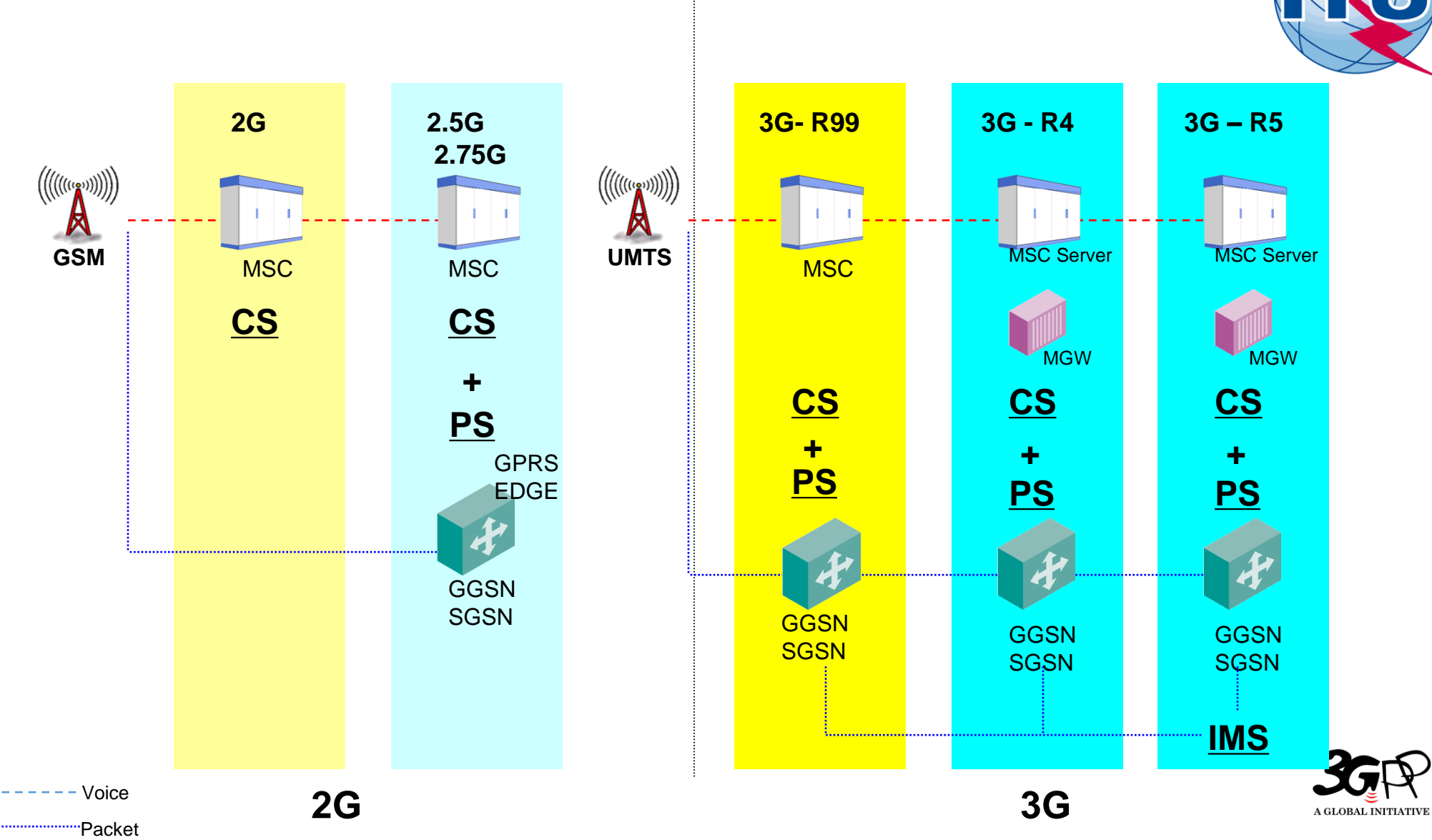
3GPP Release 5 Network architecture



3GPP Release 5 - Packet switched domain



Mobility Network Evolution



IP Multimedia Subsystem (IMS)



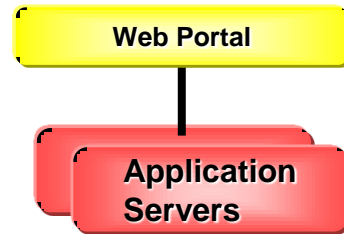
The IP Multimedia Subsystem (IMS)

- provides a standardised multimedia solution for 3G networks on top of the IP bearer provided by GPRS
- includes functionality for security, charging, roaming, and Quality of Service
- is regarded as the generic service enabler for future IP multimedia applications in 3GPP networks
 - Examples: Presence and Messaging Services will be standardised via IMS
- is based on IETF Protocols
 - SIP and SIP extensions
 - Diameter, COPS, ...

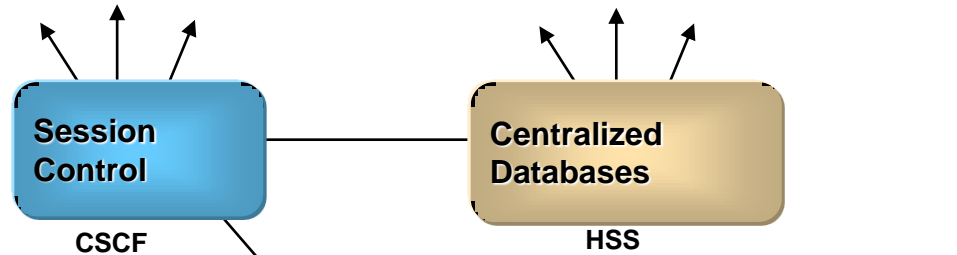
IMS



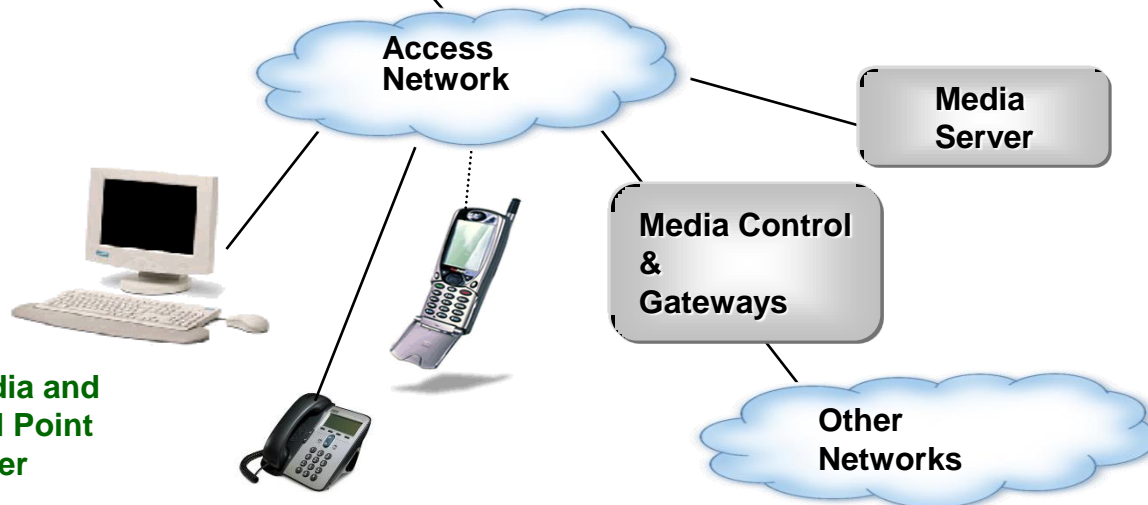
Application Layer



Session Control Layer



Media and End Point Layer



IMS is:

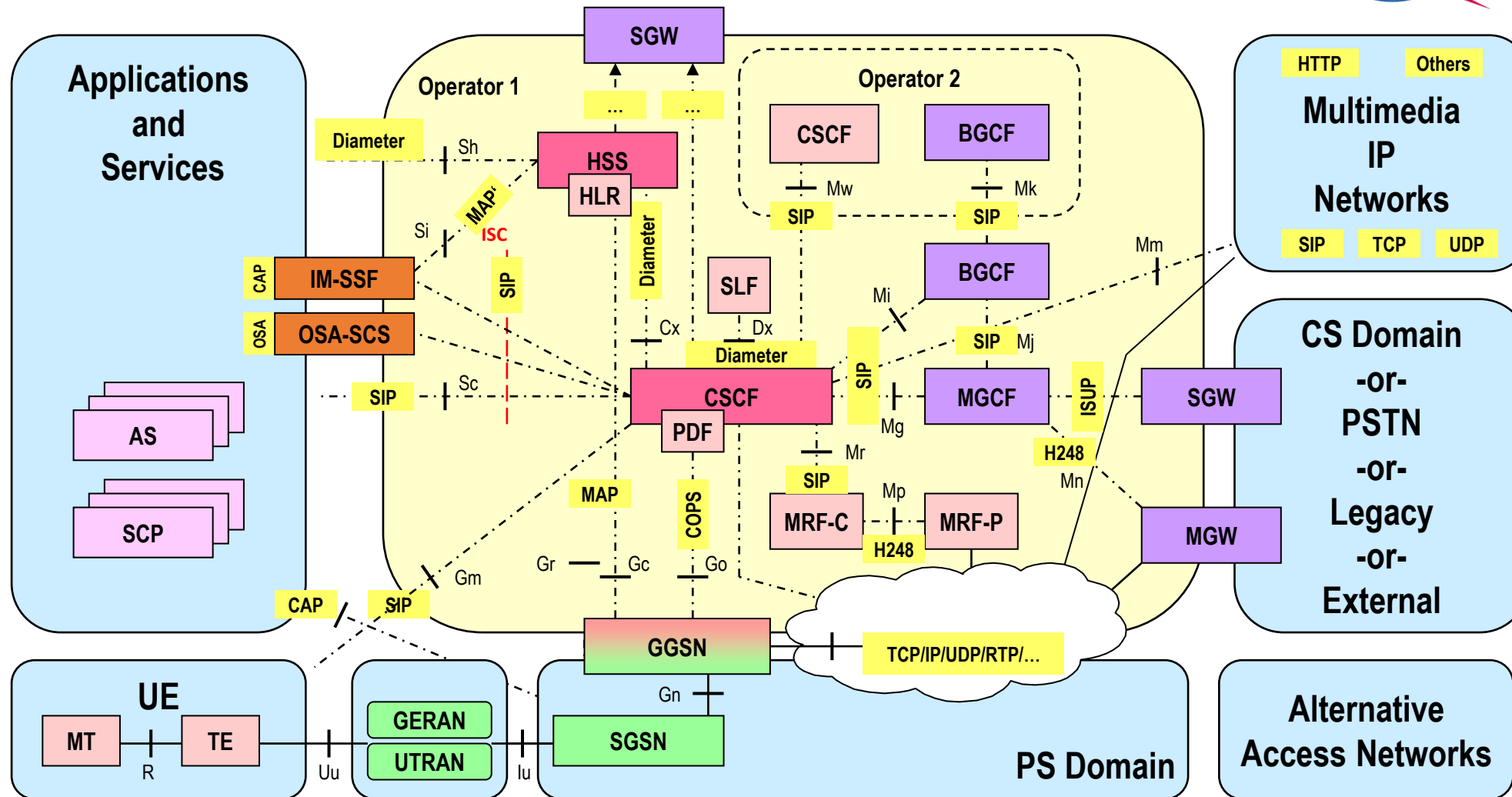
- Home control service infrastructure
- A VoIP Telephony and Multimedia Services Architecture
- Defined with Open Standard Interfaces -> 3GPP and 3GPP2
- Based on IETF Protocols (SIP, Diameter, RTP...)
- Applicable for Both Wireless and Wireline Networks
- A Solution for Service Transparency
- Capable of Interworking with PSTN/PLMN and Legacy IN Based Services

IMS: Key Principles



- SIP as the single , Call Control“ Protocol for IP Multimedia Services
- Use IPv6
 - all IMS Network Entities including the mobile terminal use IPv6
- Access Independence
 - the IMS is designed independent of the underlying IP connectivity network
 - specifications re-used by 3GPP2 for CDMA2000 systems
 - access via WLAN will be defined
- Allow Binding between SIP Dialogue and the GPRS Media Session via Go interface
 - in particular for QoS and Charging

IMS: Network entity and protocol



IMS: Network entity



- CSCF (Call Session Control Function)
- HSS (Home Subscriber Server)
- PCRF (Policy Decision Function)
- SLF (Subscription Locator Function)
- MRF (Multimedia Resource Function)
- BGCF (Breakout Gateway Control Function)
- MGCF (Media Gateway Control Function)
- MGW (Media Gateway)
- SGW (Signalling Gateway)
- AS (Application Server)
- IM-SSF (IP Multimedia Service Switching Function)
- OSA-SCS (Service Capability Server)

Additionally:

- QoS Entities
- Charging Entities
- Security Entities
- Presence Service Entities
- Location Service Entities
- Push Service Entities
- OAM and NM Entities
- Firewalls, NAT, IPv4/v6, ...
- DNS, DHCP, ...

P-CSCF (Proxy CSCF)



First contact point of an operator's network (within IMS CN subsystem)

- Forwarding of SIP messages between UE and CN
- Generation of charging records
- Translation of IDs other than SIP URIs into SIP URIs (e.g. E.164 numbers)
- Authorisation of bearer resources and QoS management

I-CSCF (Interrogating CSCF)



First contact point of an operator's network (for other operators)

- Forwarding of SIP messages (proxy functionality)
- Assignment of a S-CSCF
- Generation of charging records
- Hiding of internal network configuration/capacity/topology

S-CSCF (Serving CSCF)



Performs session control and service triggering

- Acts as a registrar
- May behave as a Proxy Server, i.e. it accepts requests and services or forwards them on.
- May behave as a User Agent, i.e. it may terminate and independently generate SIP transactions.
- Interaction with service platform(s)
- Generation of charging records
- Authentication

HSS



Database for subscriber related information

- User Profile
- User Identification, Numbering and addressing information (SIP, Mail, E.164, Labels, IMSI, ...)
- User authentication support
- Call control support
- Access authentication support
- Service authorization support
- Service provisioning support

BGCF (Breakout Gateway Control Function)



- Selects the network in which PSTN breakout is to occur
 - Forwards the session to a MGCF (selected by the BGCF) in the same network
 - Forwards the session to an other BGCF (or MGCF) in a foreign network
- Receives request from S-CSCF to select appropriate PSTN break out point for the session
- Generation of charging records

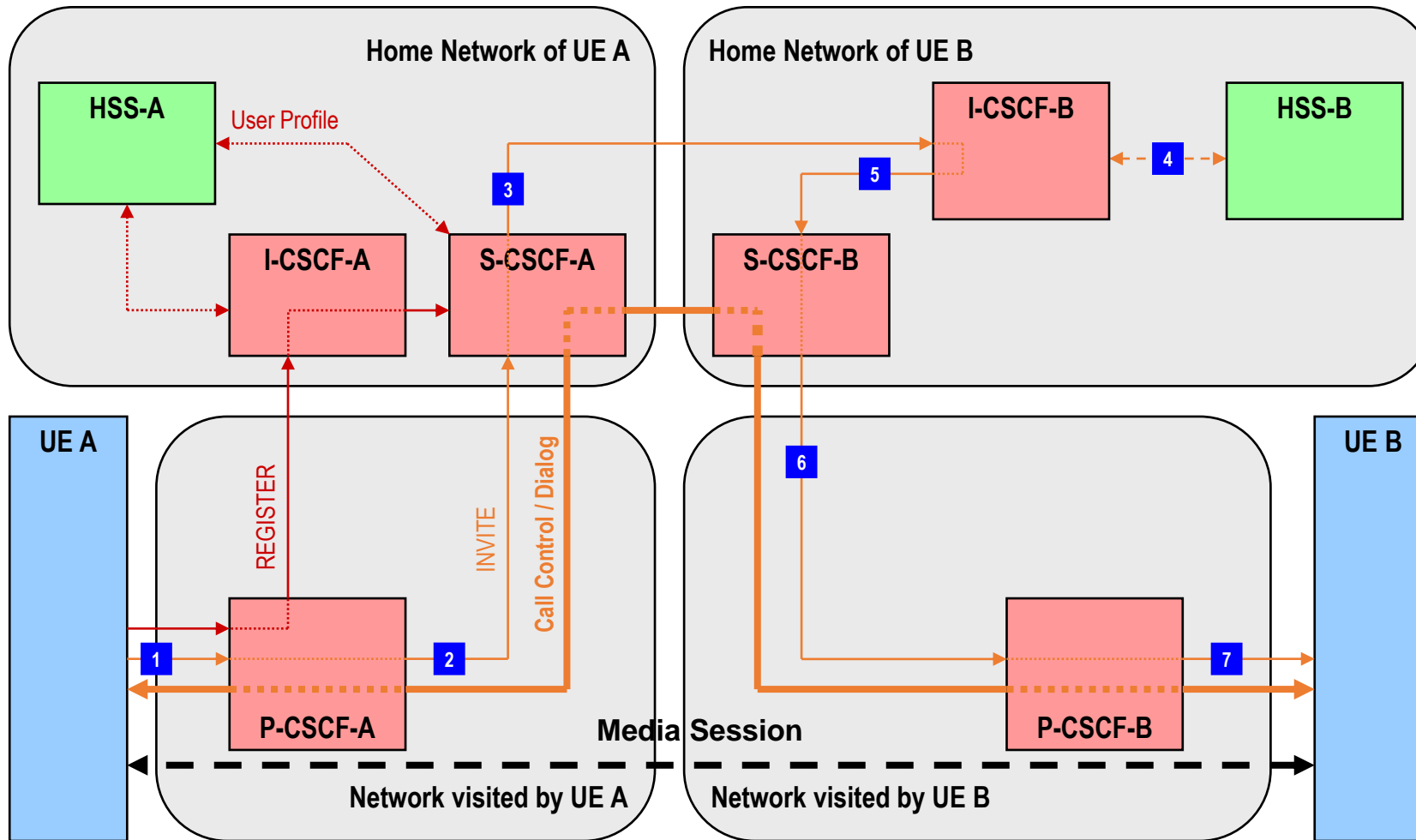
MRF



The MRF is split into Multimedia Resource Function Controller (MRFC) and Multimedia Resource Function Processor(MRFP). It is mainly for conferencing and announcements.

- MRFC-- Control the media stream resources in the MRFP
- MRFP-- Provide resources to be controlled by the MRFC and Media stream processing (e.g. audio transcoding, media analysis)

IMS: Register and session setup



CSCF = Call Session Control Function
(I = Interrogating,
P= Proxy,
S = Serving)

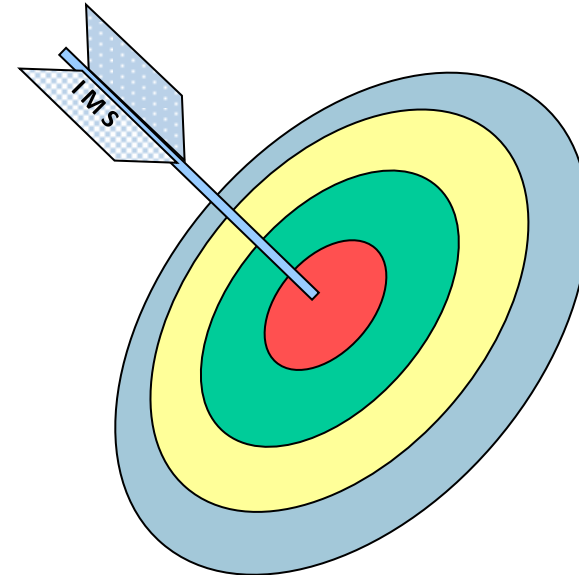
HSS = Home Subscriber Server

UE = User Equipment

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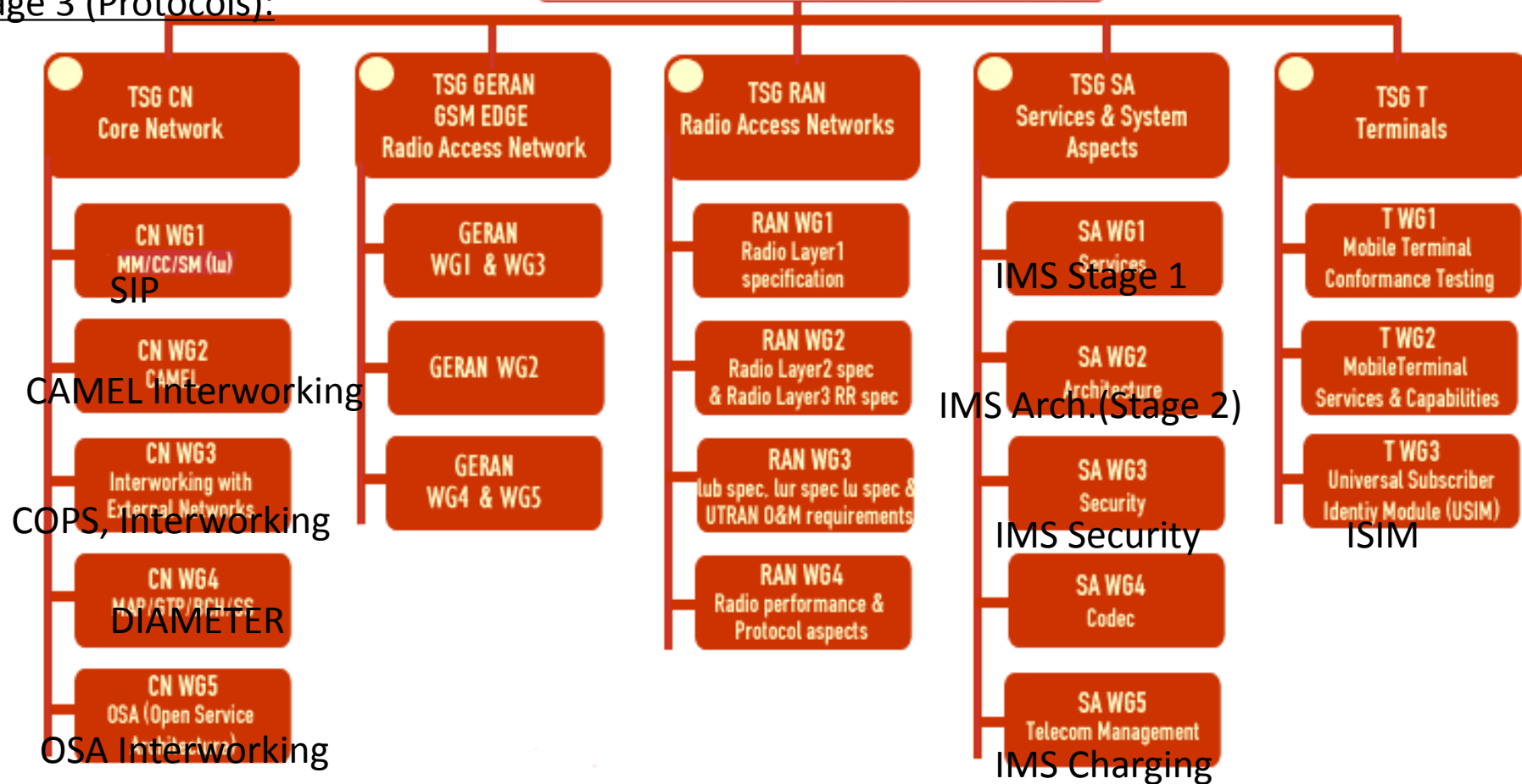
3GPP organization structure



TSG ORGANIZATION

Project Co-ordination Group (PCG)

Stage 3 (Protocols):



IMS Release 5 specification(一)



- IMS Stage 1
 - 3GPP TS 22.228: IP multimedia subsystem; Stage 1
- IMS Stage-2/3
 - 3GPP TS 23.228: IP Multimedia Subsystem (IMS); Stage 2
 - 3GPP TS 24.229: IP Multimedia Call Control Protocol based on SIP and SDP; Stage 3
 - 3GPP TS 29.228: IP Multimedia (IM) Subsystem Cx Interface; Signalling flows and message contents
 - 3GPP TS 29.229: Cx Interface based on the Diameter protocol; Protocol details
 - Others are TS 23.218, 29.229, 29.328, 29.329

IMS Release 5 specification(二)



- 3GPP requirements and architecture
 - 3GPP TS 23.002, 23.003, 23.008, 23.221, 27.060
- 3GPP QoS management and Service Based Local Policy for IMS
 - 3GPP TS 23.207, 29.207, 29.208
- 3GPP Charging and Billing for IMS
 - 3GPP TS 32.200, 32.225
- 3GPP Security for IMS
 - 3GPP TS 33.203, 33.210
- Signalling Flows for IMS
 - 3GPP TS 24.228: Signalling flows for the IP multimedia call control based on SIP and SDP; Stage 3
- CAMEL Support for IMS
 - 3GPP TS 23.278, 29.278

IMS Release 6 specification



- Interoperability and Commonality – support for use of the IMS core by other access technologies
- IMS Local Services – support for access to services in visited network
- IMS to PS Interworking – support for interworking with IP endpoints including IPv4/IPv6 interworking...
- IMS to CS Interworking – support for SIP/ISUP interworking and CS roaming scenarios
- IMS Conferencing – support for IMS based conference provision and control

IMS Release 6 specification



- SIP Capabilities Enhancements – support for enhanced SIP capabilities such as forking
- QoS and Service Based Local Policy Enhancements – support for Gq interface and non-IMS applications
- WLAN Interworking – support for WLAN
- Presence Capability – support for presence
- Generic User Profile – support for user data management

3GPP IMS Recommendations



- 3GPP TS 23.002: Technical Specification Group Services and Systems Aspects; Network Architecture
 - An overview of mobility network, including CS, PS and IMS
 - Brief introduction to mobility network architecture & configuration
 - Section 4.a.7 and 5.5 defines IMS
- 3GPP TS 22.228: Service requirements for the Internet Protocol (IP) multimedia core network subsystem (IMS); Stage 1
 - Defines service requirements from users' and operators' perspective for the support of IP multimedia applications.
 - It defines the support of IP multimedia applications, not the applications themselves
- 3GPP TS 23.228: IP Multimedia Subsystem (IMS); Stage 2
 - Overall technical description of IMS. (more detailed than 22.228)
 - Divided into concept and procedure sections.
 - Concept section gives definition of services, UE naming, etc.
 - Procedure section gives an high-level procedures needed to setup a session.

3GPP IMS Recommendations (cont.)



- 3GPP TS 23.218: IP Multimedia (IM) session handling; IM call model; Stage 2
 - Functional requirement of CSCF
 - Functional requirement of HSS
 - Functional requirement of MRFC
 - IMS Session handling for Application servers
- 3GPP TS 24.228: Signaling flows for the IP multimedia call control based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP); Stage 3
- 3GPP TS 24.229: Internet Protocol (IP) multimedia call control protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP); Stage 3 Overall technical description of IMS.

Major SIP related RFCs in IMS



- RFC 3261 - (base) SIP protocol
- RFC 3262 - Reliability of provisional responses in SIP
- RFC 3265 - SIP specific event notification
- RFC 3312 - Integration of resource management and SIP
- RFC 3313 - Private SIP extensions for media authorization
- RFC 3323 - Privacy mechanism for SIP
- RFC 3325 - Private SIP extensions for network asserted identity
- RFC 3327 - SIP extension header field for registering contacts
- RFC 3428 - SIP extension for instant messaging
- RFC 3455 - Private header extensions to SIP for 3GPP
- RFC 3608 – SIP extension header field for service route discovery
- RFC 3680 – SIP event package for registrations
- RFC 3311 – SIP UPDATE method
- RFC 3515 – SIP REFER method
- RFC 2976 – SIP INFO method
- RFC 3326 – Reason Header for SIP

How IMS uses SIP



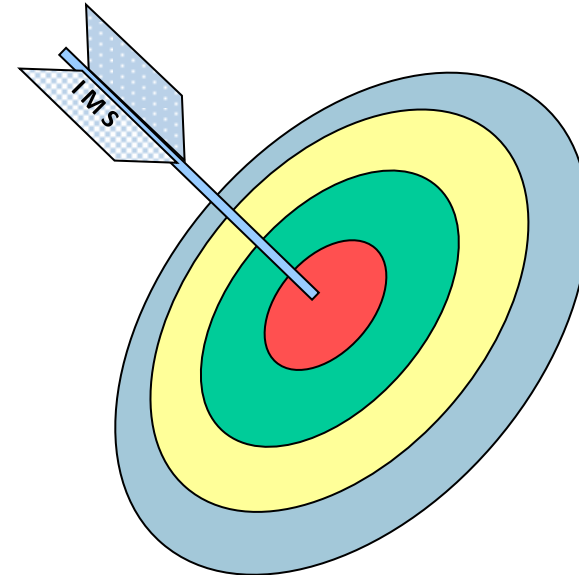
IMS defines extensions to headers and parameters to address specific needs

- **auth-param:** Allows passing of Integrity Key and Cipher Key during the registration process
- **tokenized-by:** Allows carrying of encrypt/decrypt strings within the SIP headers to implement the I-CSCF THIG function.
- **P-Asserted-Identity:** Allows the network (e.g. P-CSCF) to assert a public user identity for identifying the calling user.
- **P-Called-Party-ID:** Allows the terminating UE to learn dialed public user identity that triggered the call.
- **P-Access-Network-Info:** Allows the UE to provide information related to the access network it is using (e.g. cell ID).
- **P-Visited-Network-ID:** Allows the home network to discover, via registration, the identities of other networks utilized by the user.
- **P-Associated-URI:** Allows the home network (e.g. S-CSCF) to return a set of URIs associated with the public user identity under registration.
- **P-Charging-Function-Addresses:** Allows for distributing addresses of charging function entities.
- **P-Charging-Vector:** Allows for sharing of charging correlation information (e.g. ICID).

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CCSA TC5 (China Communications Standards Association) IMS Standardization



- Technical Requirements for IMS system device
- Test Method for IMS system device
- Technical Requirements for IMS system - Cx/Dx/Sh Interface
- Test Method for IMS system - Cx/Dx/Sh Interface
- Technical Requirements for IMS system - Mg/Mi/Mj/Mk/Mw/Gm Interface
- Test Method for IMS system - Mg/Mi/Mj/Mk/Mw/Gm Interface
- Technical Requirements for IMS system - ISC/Ma Interface
- Test Method for IMS system - ISC/Ma Interface

CCSA TC5 (China Communications Standards Association) IMS Standardization (cont.)



- General Technical Requirements of Voice over LTE (VoLTE)
- Technical requirements for network equipments of Voice over LTE (VoLTE)
- Test Method for network equipments of Voice over LTE (VoLTE)
- Technical Specification for User Equipment of voice over LTE (VoLTE)
- Test Method for User Equipment of voice over LTE (VoLTE)
- Part I: Function and Performance Test
- Test Method for User Equipment of voice over LTE (VoLTE) Part2: Conformance Test



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Thank you for your attention

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