IP Multimedia Subsystem Application Servers
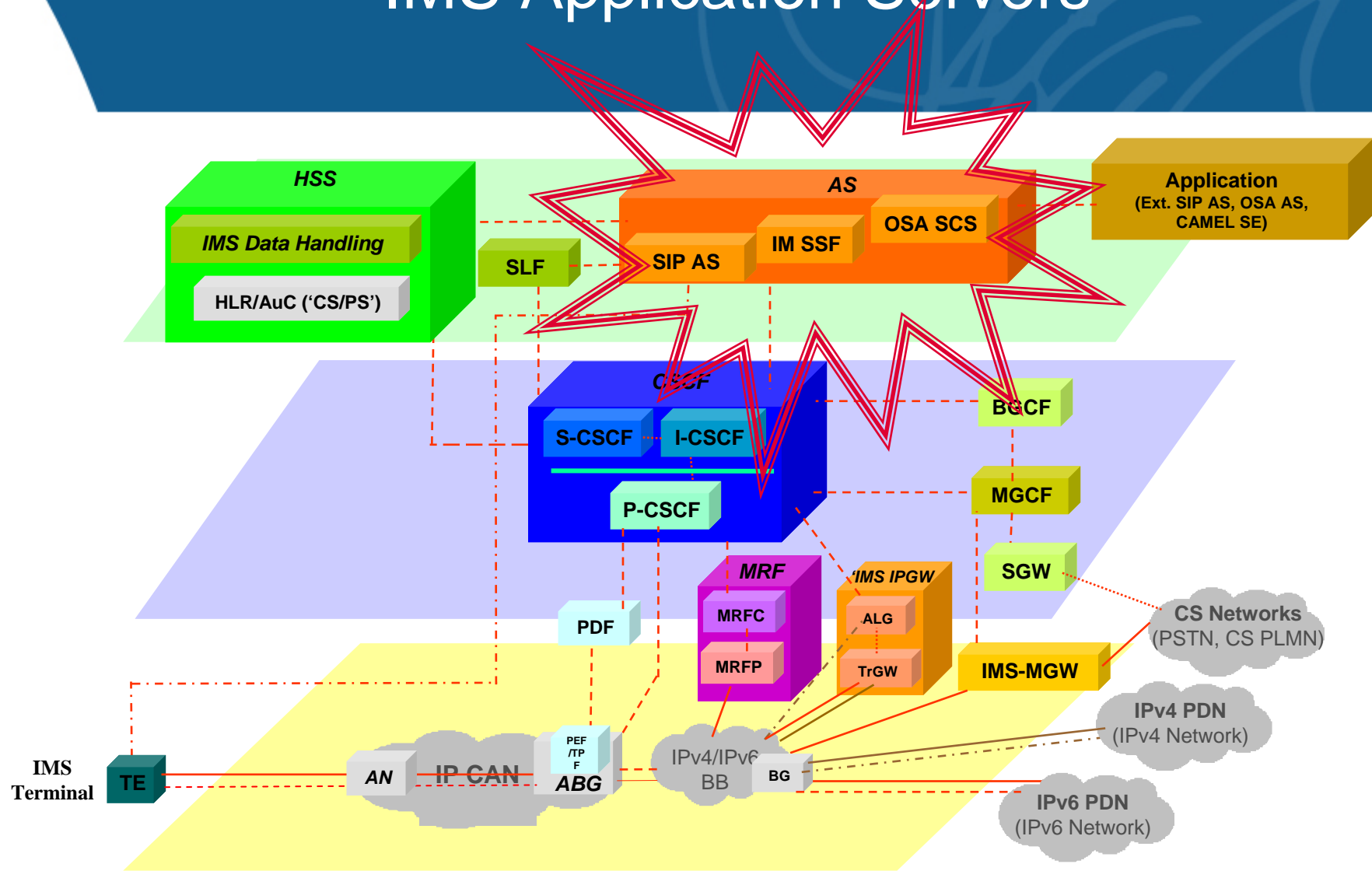
Second part of the project

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IMS Application Servers

HSS

IMS Data Handling

HLR/AuC ('CS/PS')

AS

SIP AS

IM SSF

OSA SCS

Application
(Ext. SIP AS, OSA AS, CAMEL SE)

SLF

CSCF

S-CSCF

I-CSCF

P-CSCF

BGCF

MGCF

SGW

MRF

MRFC

MRFP

IMS IPGW

ALG

TrGW

PDF

IMS-MGW

CS Networks
(PSTN, CS PLMN)

IPv4 PDN
(IPv4 Network)

IMS Terminal

TE

AN

IP CAN

PEF /TP F

ABG

IPv4/IPv6 BB

BG

IPv6 PDN
(IPv6 Network)

Application Server Layer

- Contains the application servers which provide the end-user service logic

- Support for a variety of telephony and non-telephony application servers

- Example: SIP standards have been developed for telephony & IM services

Telephony Application Server (TAS)

Support for multiple application servers for telephony services

A back-to-back SIP user agent that maintains the call state

Contains the service logic which provides the basic call processing services:

- Digit analysis
- Routing
- Call setup
- Call waiting
- Call forwarding
- Conferencing, etc.

Telephony Application Server (TAS) … continued

- Provides the service logic for invoking the media servers to support the appropriate call progress tones and announcements

- If calls are originating or terminating on the PSTN: SIP signaling to the MGCF to instruct the media gateways to convert the PSTN TDM voice bit stream to an IP RTP stream and vice versa

- Provides the Advanced Intelligent Network (AIN) call trigger points

Telephony Application Server (TAS) … continued

A call progresses to a trigger point:

- TAS suspends call processing

- TAS checks the subscriber profile: Additional services should be applied to the call?

- If yes, invoking the relevant application server:

  - Formatting a SIP IP Multimedia Service Control (ISC) message
  - Passing call control to the appropriate application server

- This mechanism can be used to invoke legacy AIN services or to invoke new SIP based applications servers

Telephony Application Server (TAS) … continued

A single IMS can contain multiple TASs:

- One might provide the IP Centrex business features:
  - Private dialing plans
  - Shared directory numbers
  - Multiple call appearances
  - Automatic Call Distribution (ACD)
  - Attendant services, etc.

- One might support PBXs and provide advanced Virtual Private Network (VPN) services

- The multiple application servers can interwork using SIP-I signaling to complete calls between the different classes of endpoints.

Supplemental Telephony Application Servers

Stand-alone independent servers that provide services at the beginning of a call, at the end, or in the middle, via triggers.

Services:

- Click to dial

- Click to transfer

- Click to conference

- Voice mail services

- VoIP VPN services

- Prepaid billing services

- Inbound/outbound call blocking services, etc.

Non-Telephony Application Servers

Services such as IM and presence-enabled services

Possible to interwork telephony and non-telephony services to create new blended communication services, examples:

- Converged click-to-contact buddy list that displays end user's presence and availability information.

  - Provides a point and click interface across multiple communication services (telephony, IM and PTT)

- Use of a single pre-paid services account for telephony and VoD services

# IMS Service Invocation and Interaction

- Service triggers on initial SIP requests at SIP Proxy (S-CSCF)

- Service Proxy proxies request to corresponding AS based on triggers and Filters

- AS acts as user agents, proxy server or B2BUA

- Service Proxy maintains the states between dialogs sent to/from applications
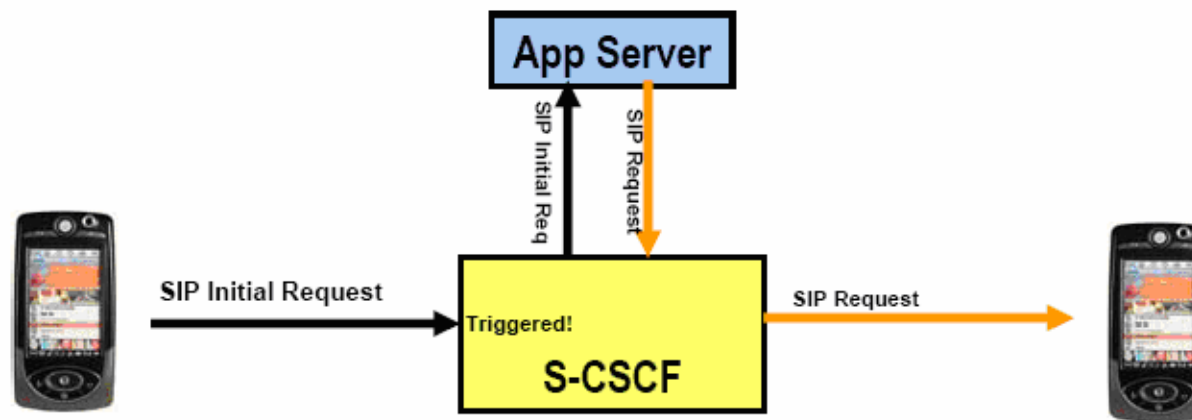
How does a SIP AS Provide Enhanced Services

- S-CSCF determines that a call requires enhanced service processing

  - Filtering defined by filtering criteria :
  SIP message type, header fields, etc.

- Based on filtering criteria, the S-CSCF determines the address of the Application server and relays the call to the AS function.

- The Application Server receives the call and invokes the appropriate service logic

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# Service Platform Interfaces
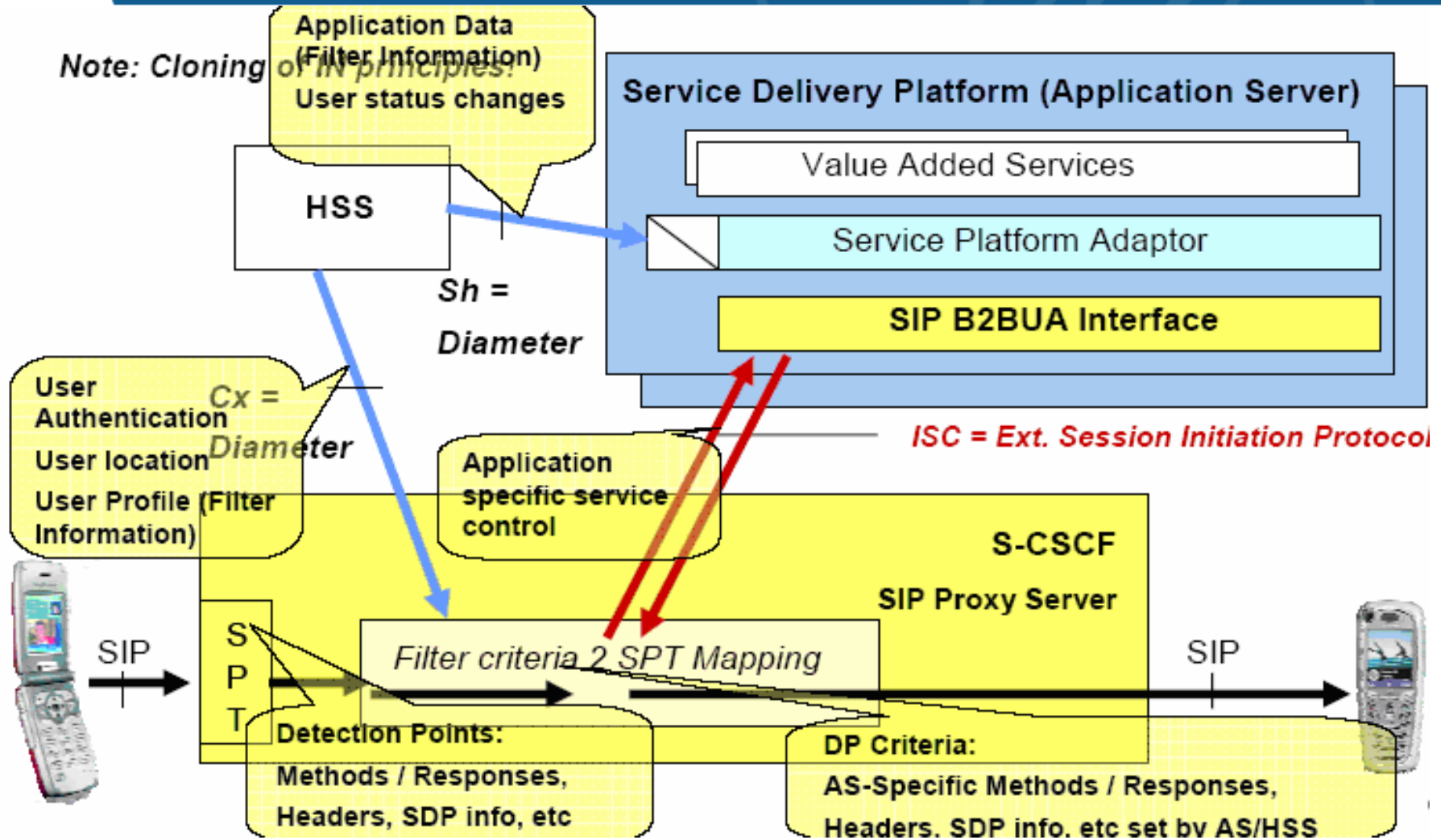
Service Platform Interfaces

- Cx Interface: Between S-CSCF and HSS to:
  - Exchange location information
  - Authorize a user to access the IMS
  - Exchange authentication information
  - Download and handle changes in the user data stored in the server

- Dx Interface: Between I-CSCF and the Subscription Locator Function
  – In case of HSS look-up

- Sh interface: Between HSS and AS to :
  - Download and update transparent and non-transparent user data
  - Request and send notifications on changes on user data

IMS Filter Criteria (IFC)

- IFC Contents:

1) Trigger Point
   (Contains one or more Service Triggers linked via the logical expressions: AND, OR, NOT, EQUAL)

2) Service/AS Identifier
   (SIP URI format e.g. sip:As1@as.operator.com)

- Service Trigger includes:

1) Request URI content

2) SIP Method, eg. INVITE, REGISTER ...

3) SIP Header content

4) Session Mode (originating, terminating)

5) SDP content

IMS Initial Filter Criteria

- The IFC is the key point for service provisioning in IMS

- The S-CSCF downloads the IFC's for a particular user from HSS and has the ability to forward SIP messages to an appropriate Application Server

- AS application/service invocation is triggered as a result of a pattern matching on any SIP header or body
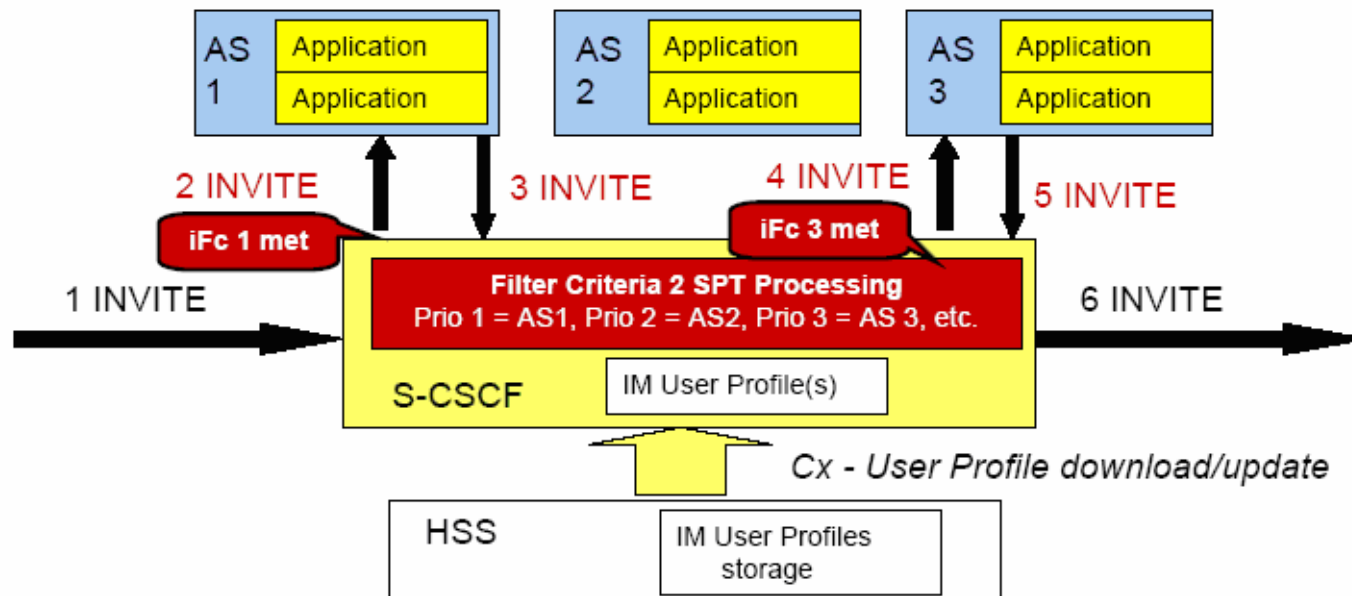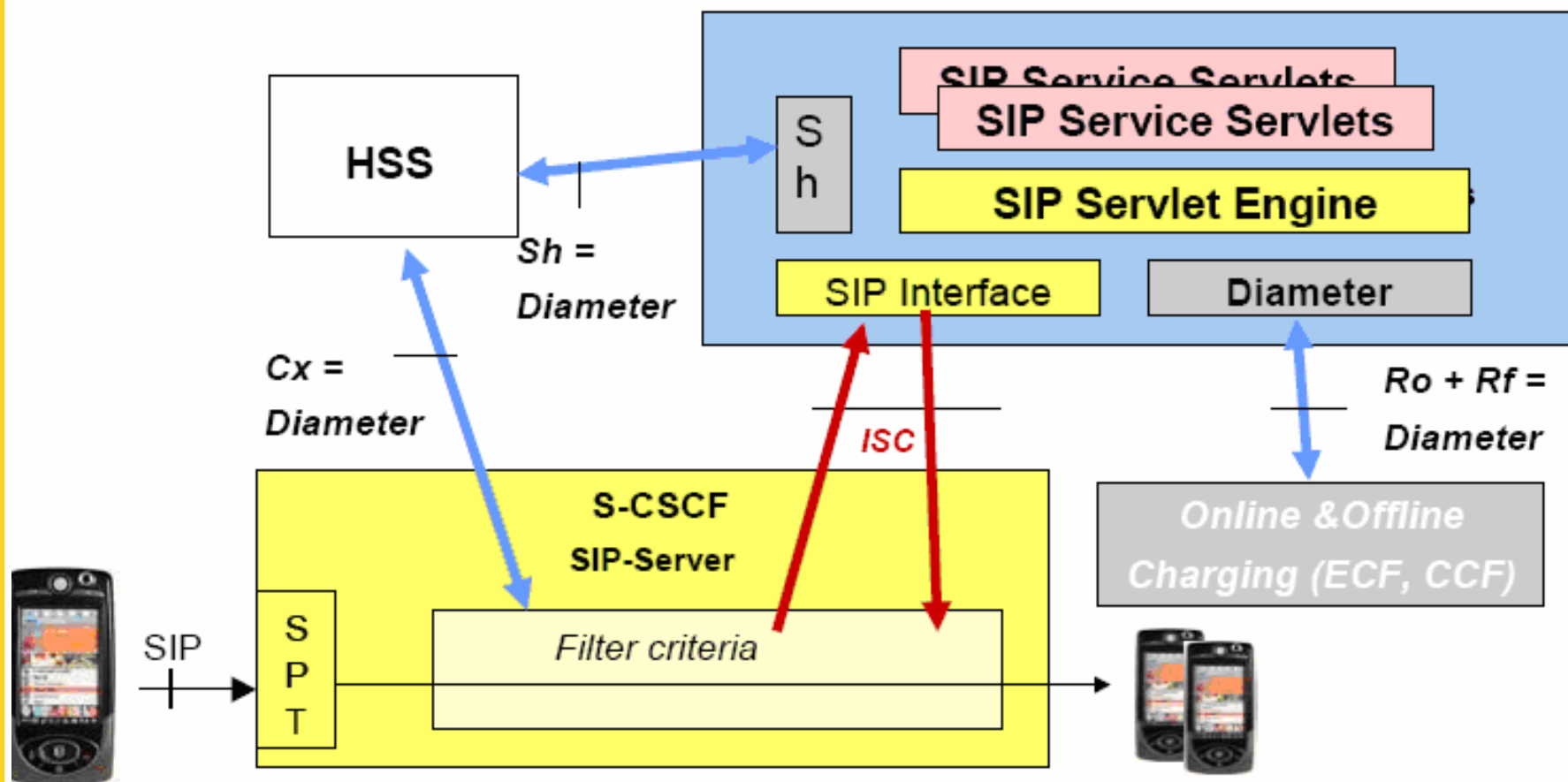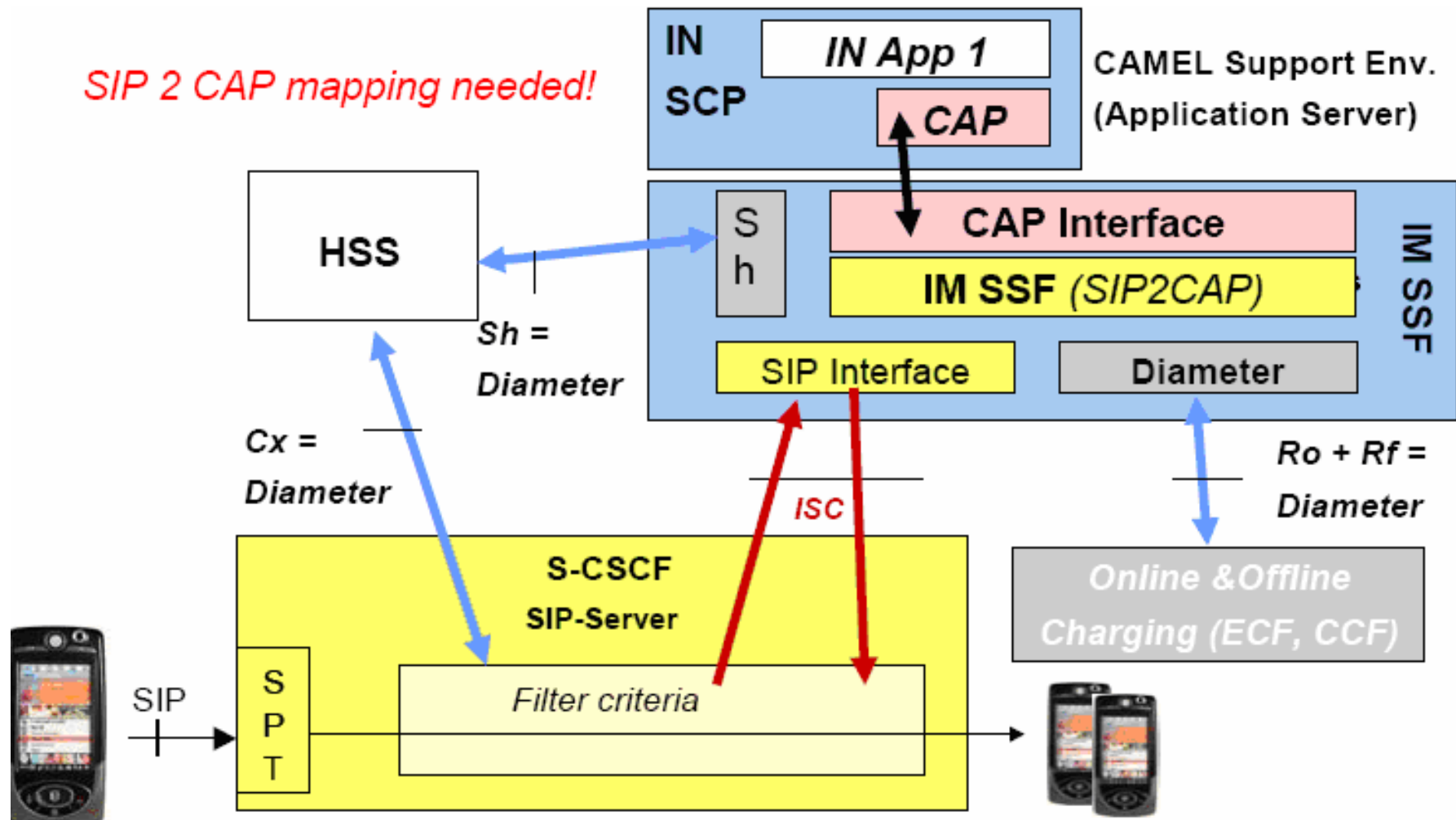
IMS Application Server Options
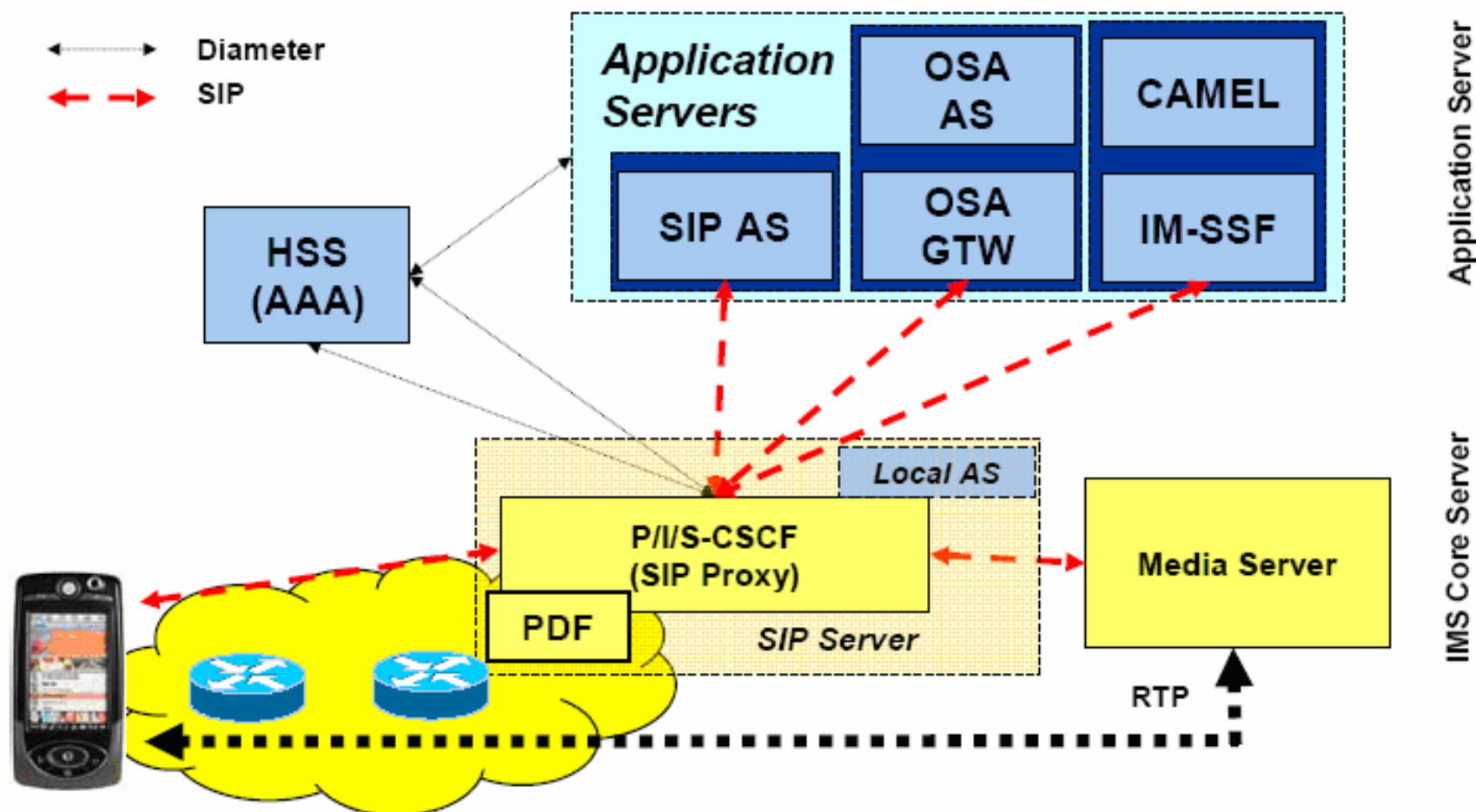
AS Alternatives

- IMS services on SIP-Application Server

- IMS services directly on the CSCF (similar to SIP AS):
  – SIP-AS co-located on the CSCF
  – Seems to be useful for simple services.
  – Beneficial for the Service Availability and the Service Performance.

- CAMEL Services via Camel Support Environment (CSE):
  – intended for the support of existing IN Services (provides service continuation).

- OSA Services via Open Service Access Service Capability Server:
  – Intended for the support of 3rd Party Application Providers.
  – OSA SCS provides access and resource control.

SIP Application Server (Servlets)

CAMEL Reuse within IMS

SIP 2 CAP mapping needed!

IN SCP
IN App 1
CAP

CAMEL Support Env.
(Application Server)

HSS

Sh

CAP Interface

IM SSF (SIP2CAP)

IM SSF

Sh = Diameter

SIP Interface

Diameter

Cx = Diameter

ISC

Ro + Rf = Diameter

S-CSCF
SIP-Server

SPT

SIP

Filter criteria
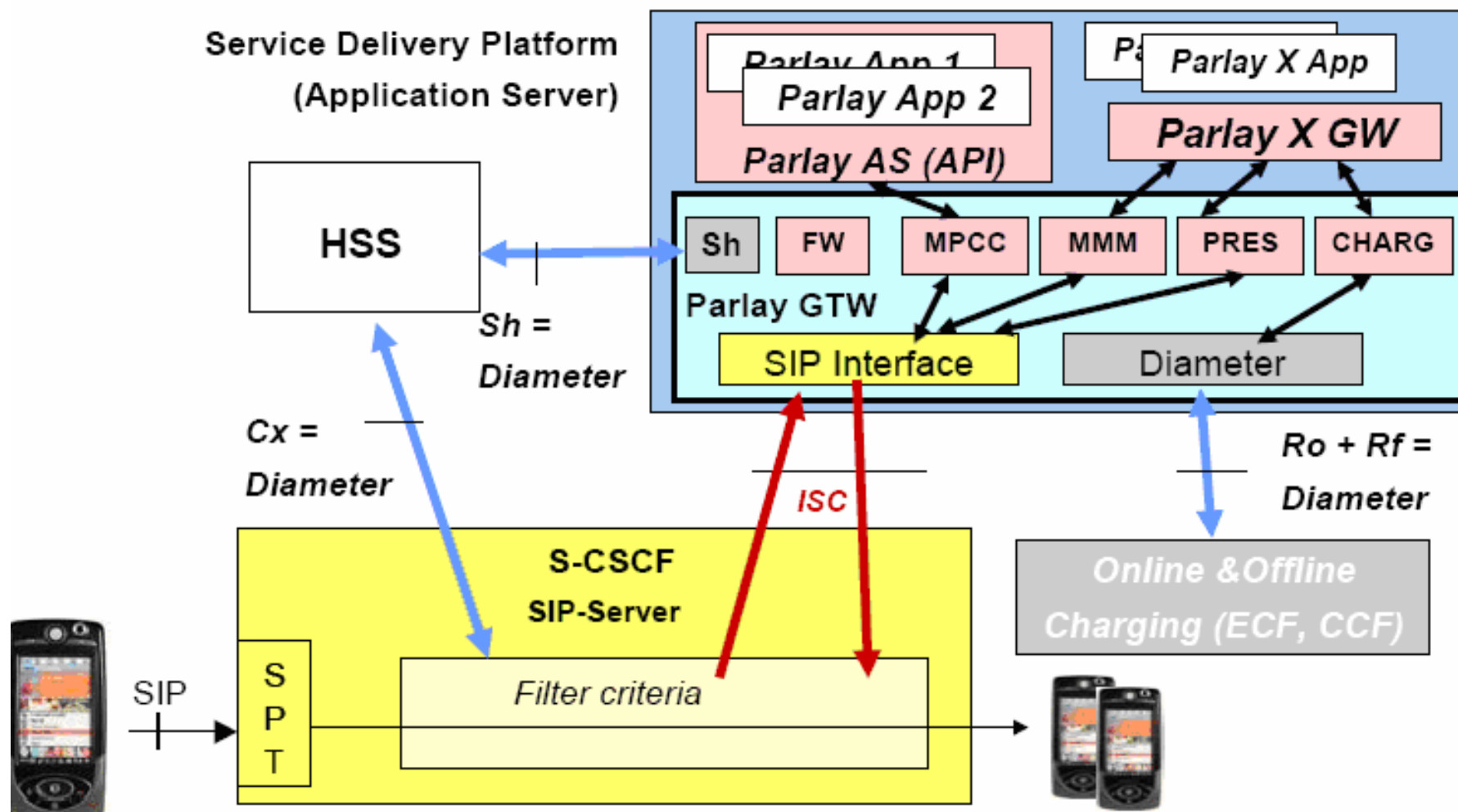
Online &Offline Charging (ECF, CCF)

IP Multimedia – Services Switching Function (IM-SSF)

Provides the interworking of the SIP message to the corresponding CAMEL messages.

This interworking allows the IP Phones supported by IMS to access services such as:

- Calling name services

- 800 services

- Local Number Portability (LNP) services and more.

OSA / Parlay AS within IMS

Open Service Access – Gateway (OSA-GW)

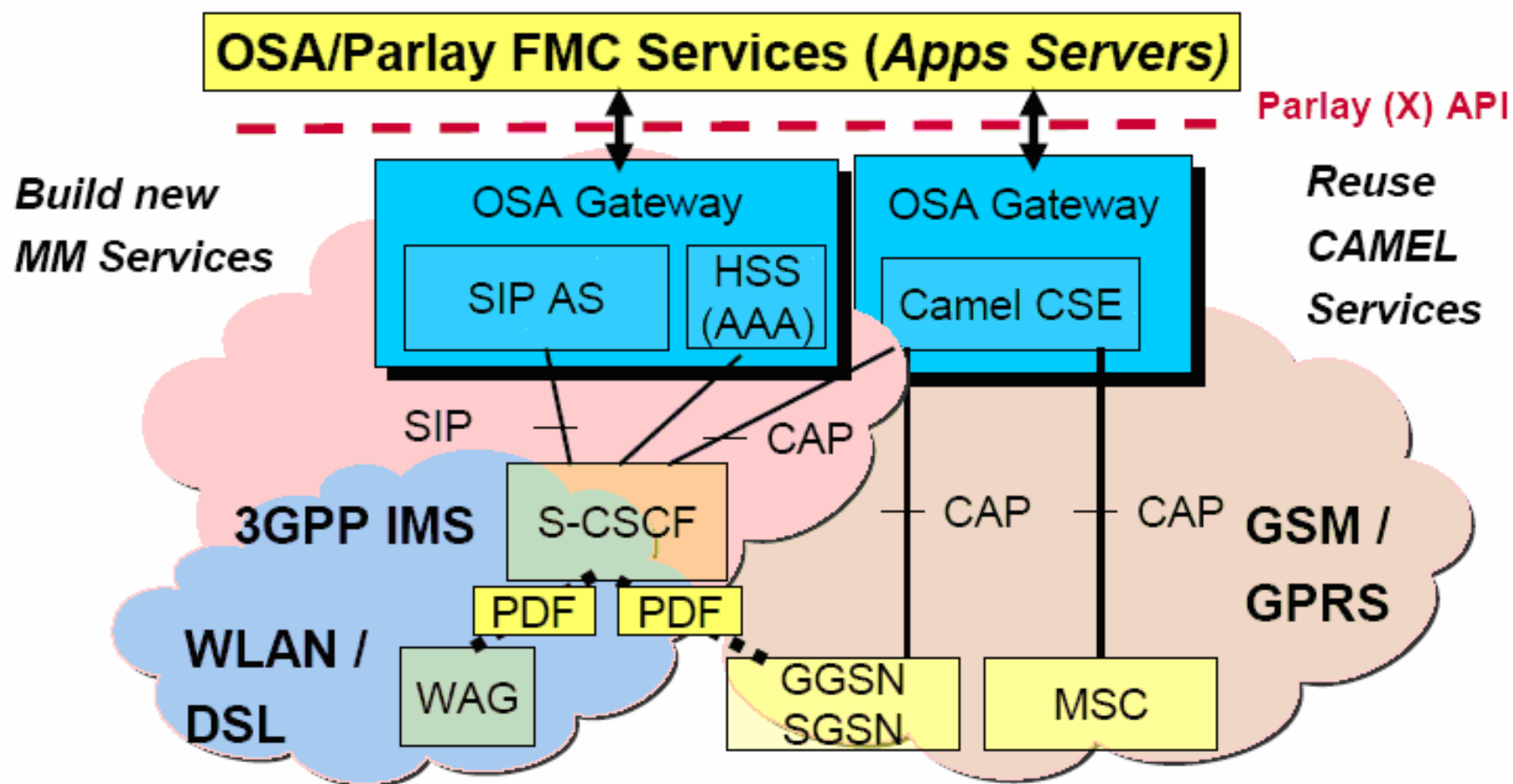Interworking between SIP and the Parlay API

Allows the enterprise-based Parlay applications to access:

- Presence and call state information

- Set up and tear down sessions

- Manipulate legs of a call.

The OSA-GW implements the Parlay Framework.

SIP AS vs. CAMEL vs. OSA/Parlay

Seamless NGN Services (opt. by 3rd Parties)

OSA/Parlay FMC Services (*Apps Servers*)

Parlay (X) API

Build new MM Services

Reuse CAMEL Services

OSA Gateway — SIP AS — HSS (AAA)

OSA Gateway — Camel CSE

3GPP IMS — S-CSCF

SIP — CAP — CAP — CAP

GSM / GPRS

WLAN / DSL — WAG — PDF — PDF

GGSN SGSN — MSC

SIP AS vs. CAMEL vs. OSA/Parlay

- CAMEL supports:
  - legacy IN services in 2G and 3G networks
  - Services based on proven and reliable IN technology
  - But CAMEL is expensive and limited in evolution

- SIP AS supports:
  - Multimedia conferencing services, integrated with http
  - Exploitation of cheaper internet technology
  - Easier service creation, but not yet proven for carrier grade services

- OSA is an API which could be mapped to both CAMEL and SIP
  - Proven technology (reuse of existing services in NGN)
  - Best support of 3rd parties

Thank you for your attention …