IP Multimedia Subsystem
Application Servers

Second part of the project

Presented by:
Masood Khosroshahy

June 2006

Project supervisor:
Prof. Elie Najm
IMS Application Servers

- IMS-MGW
- IPv6 PDN (IPv6 Network)
- MGCF
- MRFC
- MRFP
- IPv4/IPv6 PDN (IPv4 Network)
- IPv6 PDN (IPv6 Network)
- CS Networks (PSTN, CS PLMN)
- IMS IPGW
- ALG
- TrGW
- HSS
- IMS Data Handling
- HLR/AuC ('CS/PS')
- SLF
- SIP AS
- IM SSF
- OSA SCS
- (Ext. SIP AS, OSA AS, CAMEL SE)
- CSCF
- S-CSCF
- I-CSCF
- P-CSCF
- BGCF
- MGCF
- SGW
- P-EPS/TP
- AN
- ABG
- IMS Terminal
- TE
- IPv4 PDN (IPv4 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.
• 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
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
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
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!
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
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)

Build new MM Services

3GPP IMS

WLAN / DSL

SIP AS

HSS (AAA)

Camel CSE

Parlay (X) API

Reuse CAMEL Services

GSM / GPRS

OSA Gateway

S-CSCF

PDF

WAG

GGSN

SGSN

MSC

CAP

CAP

CAP
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 ...