The Open Source IMS Core

An Open Source IMS Initiative for the Research Community
Motivation for an Open Source IMS Core

• IMS is in trial phases with telco and cable operators worldwide
• R&D efforts for NGNs are gaining support
• While there are already many Open Source projects established in the plain VoIP area for
  – SIP clients
  – SIP proxies
  – SIP stacks
  – SIP (testing) tools
  around the standard, there are currently practically no Open Source projects with specific focus on the IMS
• FOKUS is aiming to fill this void
Call Session Control Functions

- **CSCF = SIP proxy to route and process the SIP signaling**

  - **Proxy-CSCF**
    - outbound proxy for User Endpoints – entry point in the IMS network
    - keep local registrar and firewall the core network
    - add important network/charging/etc information to the messages
    - bridge between access network (visited network) and user’s home network

  - **Interrogating-CSCF**
    - entry point in the Home Network
    - originating/terminating party assigned Serving-CSCF retrieval
    - stateless forwarding of messages

  - **Serving-CSCF**
    - local registrar for served users
    - authenticate the users
    - subscription server for registration status events
    - evaluate Initial Filter Criteria and route messages accordingly to Application Servers for service processing
HSS & SIP2IMS Gateway

- **Home Subscriber Server**
  - evolution of a Home Location Register to the all-IP core network
  - stores user profile, provisioning data
  - keeps registration status
  - keeps location information

- **SIP2IMS Gateway**
  - allows transformation of IETF SIP messages to IMS conformant messages
  - Translates MD5 authentication to IMS AKA authentication
Elements around the Open IMS Core

Functionality of the Open IMS Core can be verified with additional components

- **IMS UE**
  - must be capable of performing IMS AKA registration
  - IMS specific SIP behaviour e.g. subscription to own registration event

- **SIP client**
  - uses IETF SIP protocols without IMS extensions (e.g. Kphone, eyebeam)
  - attaches to IMS Core via SIP2IMS Gateway

- **Application Servers**
  - tested Service platforms for the Open IMS Playground
    - SIPSEE (SIP AS)
    - Open Communication Server (Parlay Gateway)
    - Open Communication Server X (Parlay X Gateway)
**CSCF Implementation**

- **SER = SIP Express Router**
  - a high-performance, carrier-grade, open source, configurable SIP server written in C
  - ported to Linux and Solaris
  - throughput thousands of CPS (calls per second) on a dual-CPU PC (capacity needed to cover San Francisco’s Bay Area) and hundreds of CPS on a Compaq iPaq
  - support for both IPv4 and IPv6
  - small footprint size: 300k core, all common modules around 600k
  - extended flexibility through script-like configuration

- **Each CSCF is implemented as a SER module**

- **Script usage example:**
  - Excerpt from the Proxy-CSCF configuration file
  - steps are applied in order in the routing script

```c
if (method=="INVITE" || method=="SUBSCRIBE" || method=="MESSAGE") {
    if (!P_is_registered("open-ims.org")) {
        sl_send_reply("403","Forbidden – You must register first");
        break;
    }
    P_add_P_Charging_Vector();
    P_add_P_Visited_Network_ID("Visited Network Number 1");
}
```
**HSS Implementation**

- Prototypical implementation of a Home Subscriber Server
  - Realized in Java
  - Based upon Open Source Software (e.g. MySQL, Tomcat)
- Pure IP-based interfaces
- Blends out all HLR related interfaces
- **Diameter** reference points supported so far
  - Cx for IMS registration processes (AKA with vector generation using MILENAGE)
  - Sh for IMS application platform support
- Compliant with 3GPP Rel. 6 specifications
- Web-based management interface
Specification Guidelines for the Open Source IMS Core

• IETF RFCs (selection)
  – SIP: Session Initiation Protocol – RFC 3261
  – Hypertext Transfer Protocol (HTTP) Digest Authentication Using Authentication and Key Agreement (AKA) - RFC 3310
  – SIP Private Header Extensions - RFC3455
  – Diameter Base Protocol – RFC 3588
  – SIP Event Package for Registration - RFC3680

• 3GPP IMS Release 6 Specifications (selection)
  – TS 23.228 – IMS Stage 2 (Rel.6)
  – TS 24.229 - IP Multimedia Call Control Protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP); Stage3 (Rel.6)
  – TS 29.228 – Cx and Dx Interfaces, Signalling flows and message contents (Rel.6)
  – TS 33.102 - 3G Security; Security architecture (Rel. 6)
  – TS 33.203 - Access security for IP-based services (Rel.6)
The Open Source IMS Core

• A version of the Open IMS Core is currently being developed and was already successfully tested with commercial IMS products. It
  – provides first time implementations of core IMS components
    • Call Session Control Functions
    • Home Subscriber Server
  – offers an Open Source IMS platform to make use of the ISC interface
  – can act as a tool for IMS services proof-of-concept
  – allows to test alpha/beta versions of commercial IMS products
  – does not intend to compete with carrier grade developments but wants to create an Open IMS community and to accelerates IMS adoption
  – release of the CSCFs scheduled for end of 2006 via the BerliOS (www.berlios.de) platform

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