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Interoperability of different versions of the session initiation protocol

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Agenda

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2. Session initiation protocol
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   - Support of new features
   - SIP extensions
3. IP Multimedia Subsystem
   - UMTS and IMS Architecture
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4. Interoperability
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Goals of the thesis

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This Thesis was done in Siemens OY to investigate what are the technical issues that might restrict the interoperability of IMS (IP Multimedia Subsystem) and the other applications of SIP.

Because of the nature of the IMS network, a group of additional SIP extensions might be expected to be necessary. On the other hand, these extensions might lead to interoperability problems with other SIP networks and applications.

Basic functionalities of SIP

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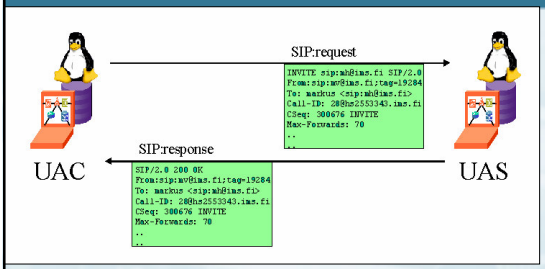

SIP is a request-response –protocol and its operation resembles a great deal operation of the HTTP

HTTP = HyperText Transfer Protocol

SDP = Session Description Protocol

SIP is a text based end-to-end signalling protocol, defined by IETF for initiating multimedia sessions over IP networks. Core protocol (RFC 3261) supports for example:

- User mobility
- User registration
- Session Initiation and termination with SDP
- Native support for new extensions

SIP support for new features

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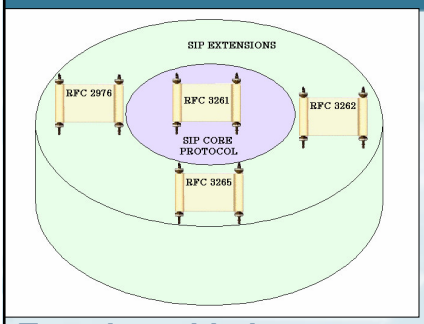

The whole SIP protocol consists of the SIP core protocol RFC 3261 and all the approved extensions to the core protocol, such as RFC 3428 ”SIP extension for instant messaging”

Together with the approved extensions SIP can be used for presence, instant messaging, media sharing, PSTN interworking..

Thus SIP provides a good starting point to be used as a signalling protocol in the IMS, allthough a group of new features was required.

SIP extensions

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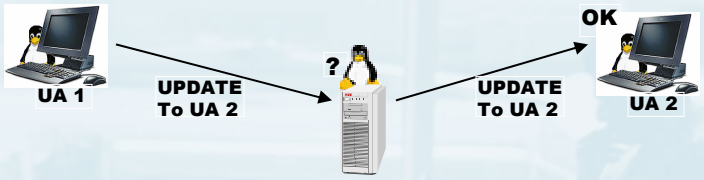

The relaying network elements do not have to support all the SIP extensions

- Clients can negotiate the required and supported SIP extensions
- If the network elements between the user agents receive extended SIP messages, which they can not understand, they simply forward the message as it was received
- It it up to the receiving party to fullfil the functionality of the extension

Intelligence is concetrated on the egdes of the network!

UMTS architecture

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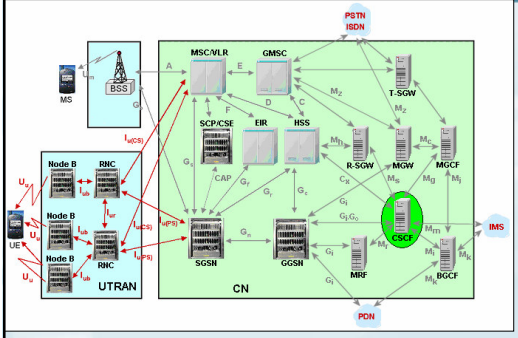

Main network elements of the UMTS release 5 architecture

3GPP = 3rd Generation Partneship Project

- Standardized by the 3GPP
- User Equipment
- Radio Access Network
- Circuit- and packet switched core network
- IMS is connected to the packet switched UMTS core network using the Gi-interface.

IMS architecture

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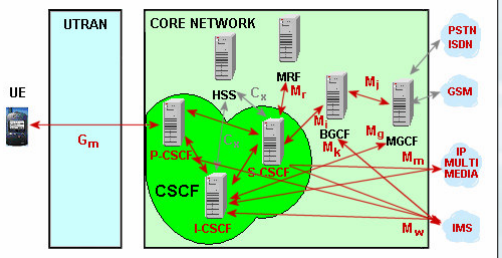

Main IMS network elements that use SIP signalling

CSCF = Call State Control Function

HSS = Home Subscriber Service

MRF = Multimedia Resource Function

BGCF/MGCF= Breakout/Media Gateway Control Function

- CSCF is the center of IMS SIP signalling
- HSS provides subscriber data information
- MRF is responsible for reserving resources for example in multiparty scenarios
- BGCF and MGCF take care of the interworking with the legacy networks

IMS services

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IMS uses SIP to offer such basic services as

- User registration
- SIP based Sessions with the INVITE method
- Instant messaging
- Presence services

IMS also provides the possibility to create more advanced services with the help of application servers. An application Server is comparable to a IETF SIP server that is connected to the IMS via the ISC-interface.

An application server can be maintained by a third party operator, who only receives revenue from the use of the service.

S-SCCF = Serving-CSCF

ISC = IMS Service Control

IMS functionalities

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Functionalities that need to be implemented to the IMS include:

- Roaming
- Charging
- Subscriber control
- Laful interception
- Location information

The above-mentioned functionalities also require new extensions to be made on SIP.

Interoperability 1

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According to the study I made between the SIP recommendations of IETF and the technical specifications of 3GPP, all the differences I found on the SIP usage are related to the previously mentioned features.

Unfortunately, most of the modifications to SIP were added to 3GPP specifications before they were introduced to the IETF

Some of the modifications are in contradiction with the existing IETF specifications and, thus can cause interoperability problems.

Interoperability 2

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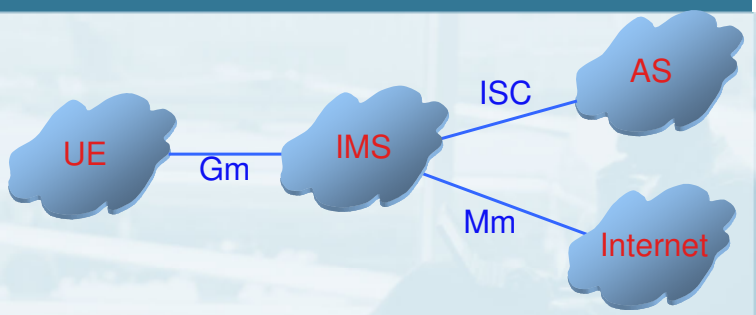

UE = User Equipment

AS = Application Server

From SIP Interoperability point of view the essential interfaces are:

- Gm-interface (UE – IMS)
- ISC-interface (IMS – AS)
- Mm-interface (IMS – Other SIP networks)

Interoperability 3

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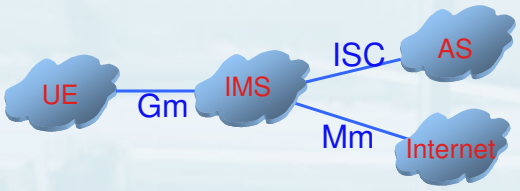

The main issues of SIP Interoperability in the IMS:

Can the already available SIP clients be used to access the IMS services?

Can the already available SIP servers be used as application servers in the IMS?

Can IMS interwork with other networks that use SIP, such as the Internet?

Interoperability 4

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The study I made proved that the software in the SIP client and in the SIP server need to be modified, if they are to be used in the IMS network.

Likewise the study showed that currently the interoperability of IMS and other networks that use SIP can not be achieved without adaptation from one version to the other.

However, the standardization of the Mm-interface from IMS to other SIP networks is still an ongoing process.

Interoperability 5

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The main problems of interoperability are:

- SIP end-to-end encryption contradicts with the IMS lawful interception
- Various new header fields in SIP messages
- Additional signalling procedures, not supported by IETF compliant SW
- Increased values in SIP timers lead to additional signalling load

Conclusions and future prospects

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With current specifications of IETF and 3GPP interoperability is difficult to achieve.

Both of the SIP client and server software must be modified if they are to be used in IMS network.

Interoperability between the IMS and the Internet would mean a possibility of multimedia sessions between the Internet users and the IMS users.

Allthough the interoperability is a delicate matter, IETF and 3GPP have started to work in close collaboration in order to achieve it.

However, IMS and the Internet are partially competing against each other and thus the actual barriers of interoperability might turn out to be other than the technical ones.

Thank you!

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Questions?

"*Beware of the man who won't be bothered with details*"
William Feather, Sr.