



IP Multimedia Subsystem

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Agenda:

- Identification in IMS
- ISIM
- Application Server
 - User Profile
 - Filter Criteria

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Identification in the IMS (1)

- Users have to be identified uniquely
- In IMS we distinguish public and private user identities
- Public User Identities
 - IMS user has one or more Public User Identity
 - Either a SIP URI or a TEL URI
sip: +43-8323546@mobilkom.at; user=phone
tel: +43-664-8323546
 - TEL URIs are required to make calls between IMS/PSTN
 - Endvision: at least one TEL URI and one SIP URI per user

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Identification in the IMS (2)

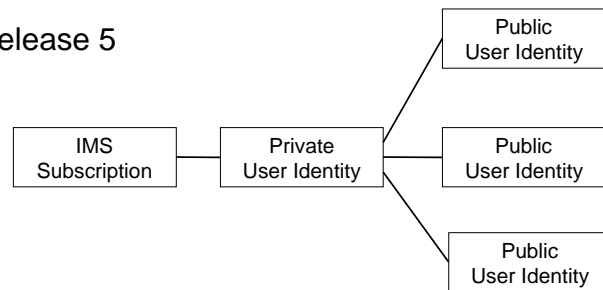
- Private User Identities
 - IMS user has one Private User Identity
 - Have the format of a Network Access Identifier (NAI, RFC 2486)
 - stadler@mobilkom.at
 - Not used for routing SIP messages
 - Used only for subscription identification and authentication
 - Similar function for IMS as the IMSI (International Mobile Subscriber Identification) for GSM
 - Stored at the Subscriber Identity Module (SIM) card

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Relationship Public- Private User Identification (1)

Release 5

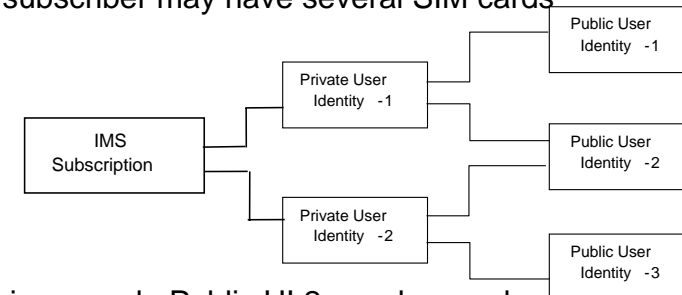


TS 23.228 V6.6.0

Relationship Public- Private User Identification (2)

Release 6

One SIM card includes only one private user identity
But subscriber may have several SIM cards



In this example Public UI 2 may be used
from two different terminals simultaneously

TS 23.228 V6.6.0



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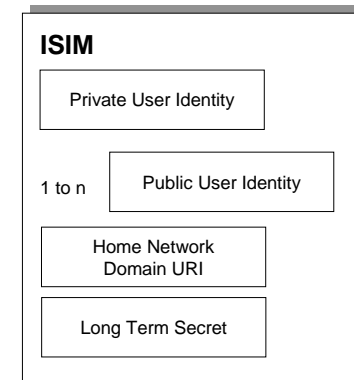
SIM, USIM and ISIM in 3GPP

- UMTS terminals include a Universal Integrated Circuit Card (UICC)
- Stores subscription information, authentication keys, phonebook and messages
- Without UICC the user can make only emergency calls
- Contains several logical applications such as
 - Subscriber Identity Module (SIM),
 - Universal Subscriber Identity Module (USIM) and
 - IP Multimedia Service Identity Module (ISIM)

ISIM (1)

- Application on the UICC
- Standardized in TS 31.103
- Contains the IMS parameters for
 - User authentication
 - User identification
 - Terminal configuration
- ISIM can coexist with SIM, USIM or both of them

ISIM (2)



ISIM (3)

- Private User Identity
 - Only one private user identity
- Public User Identity
 - One or more SIP URIs allocated to the user
- Home Network Domain URI
 - SIP URI that contains the home network domain name
 - Used to find the address of the home network during registration procedure
 - Only one home network domain
- Long term secret
 - Used for authentication and for calculating CK and IK
 - IMS terminal uses IK to protect SIP messages to/from P-CSCF
 - IMS terminal uses CK to encrypt SIP messages to/from P-CSCF

Registration with USIM

- Maybe terminal is equipped with UICC without ISIM
 - E.g. acquired before IMS service came into operation
- User is nevertheless able to use IMS
- Problems
 - No Private User Identity, Public User Identity and Home Network Domain
- Terminal has USIM containing IMSI (15 decimal digits)
 - Identity of subscriber (including country and operator)
 - 3 digits Mobile Country Code (MCC)
 - 2 or 3 digits Mobile Network Code (MNC)
 - Remainder Mobile Subscriber Identification Number (MSIN)
- Solution: build the 3 missing parameters out of IMSI

Temporary Private User Identity

- Private User Identity: username@realm
- Username
 - Complete IMSI as username
- Realm:
 - First subrealm is the MNC
 - Second subrealm is the MCC
 - Remainder: fixed string: ".imsi.3gppnetwork.org"
- Example: IMSI: 2483235551235
- Temporary Private User Identity:
 - 2483235551235@323.248.imsi.3gppnetwork.org

Temporary Public User Identity

- Public User Identity: sip: user@domain
- User
 - Complete IMSI as user
- domain:
 - First subdomain is the MNC
 - Second subdomain is the MCC
 - Remainder: fixed string: ".imsi.3gppnetwork.org"
- Example: IMSI: 2483235551235
- Temporary Public User Identity:
 - sip: 2483235551235@323.248.imsi.3gppnetwork.org

Registration with USIM (contd.)

- Address and identity management
 - HSS stores user-profile for given Temporary Private User Identity
 - Several further Public User Identities (Aliases) may be provisioned at HSS
- Registration
 - Temporary Public User Identity recommended to be "banned" for public usage (TS 23.228 section E.3.1)
 - should be only used for Registration
 - should not be used for further actions due to hard readable syntax
 - Alias(es) of Public User Identity sent to terminal
 - Implicit Registration of Alias(es)

Home Network Domain URI

- For registering with the home network when only a USIM is available in the terminal:
- Make usage of the Temporary Public User Identity without user part
- Example:
 - sip: 323.248.imsi.3gppnetwork.org



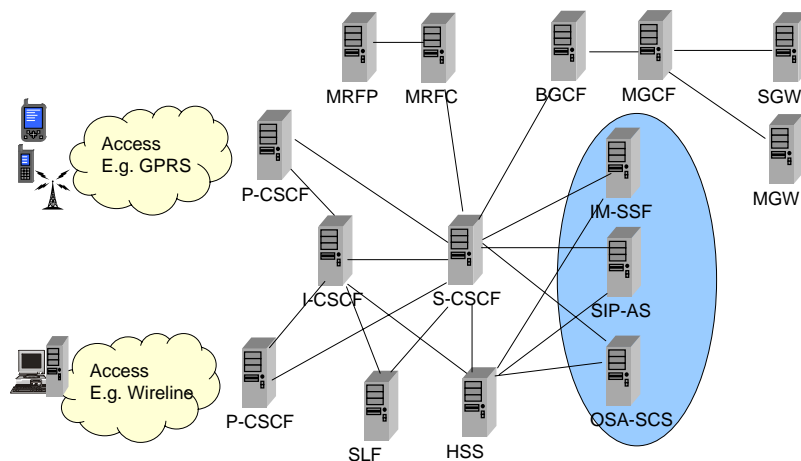
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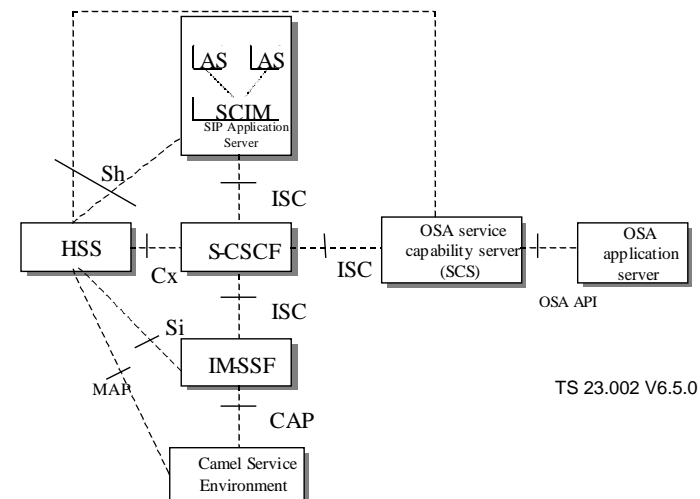
Application Server

- Networks may contain more than one application server
- Application server may be specialized to certain services
- In IMS all application servers have the same interface
- ISC (IMS Service Control)
- ISC makes use of SIP
- Currently ISC uses pure SIP like other IMS interfaces
- But: Future changes should not affect them
- Application server can be in the own network or in third party networks
- Additionally, AS can implement other protocols like HTTP or WAP (e.g. for configuration purposes)

IMS Application Servers

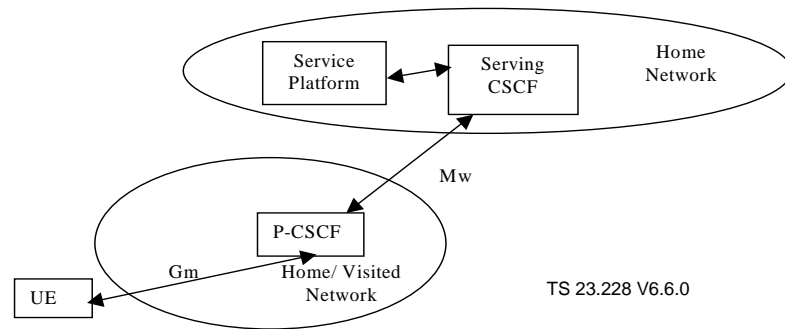


The Application Servers - Interfaces

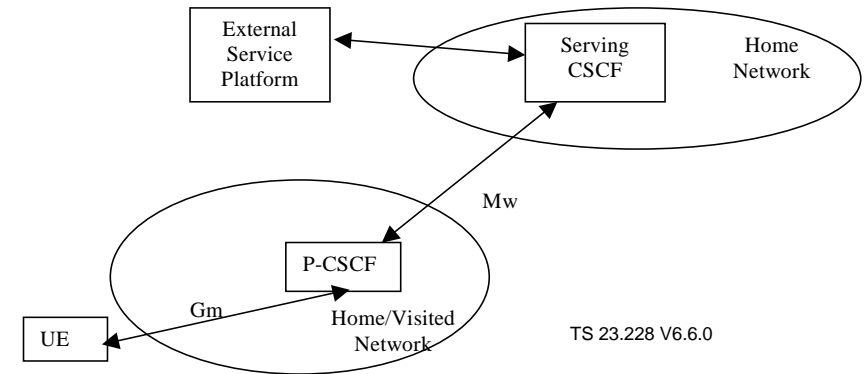


TS 23.002 V6.5.0

AS in Home Network



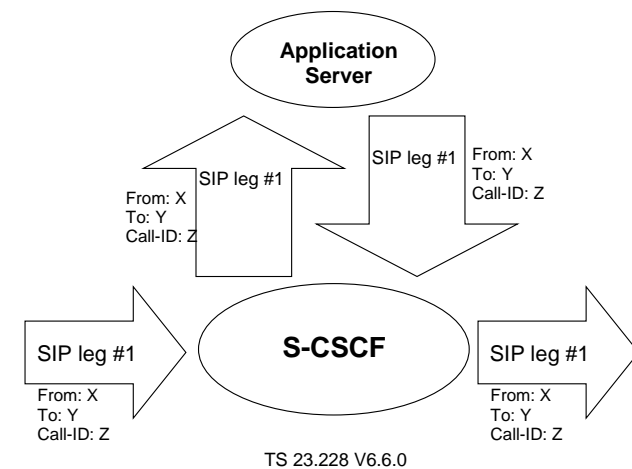
AS in Remote Network



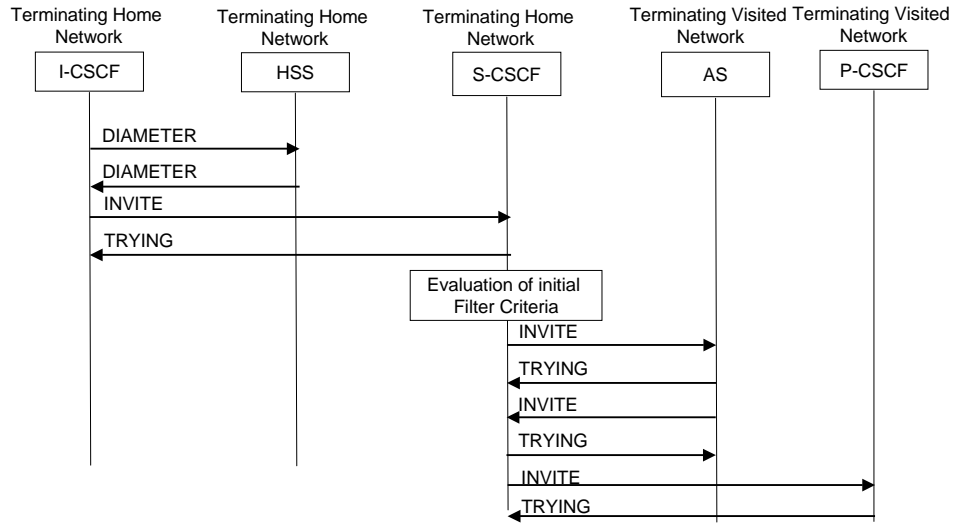
Session Setup via Application Servers

- AS can either act as originating UA, terminating UA, SIP proxy, SIP redirect server or B2B UA.
- Functionality of proxy depends on situation, parameters and configuration as well as on application itself
- AS may or may not remain in signalling path (depending on situation too)
- Most important scenario is the proxy scenario (many applications and most important characteristic of signalling)
- AS interaction can take place either in the home network of the caller as well as in the home network of the callee

AS in Proxy Mode



AS in Proxy Mode – Terminating Network



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Procedure

- S-CSCF checks filter criteria
- Once the AS has been identified..
- S-CSCF creates Route header to forward message to AS
- Additionally, the S-CSCF places itself to the Route header to get back the message afterwards
- In the user part of the SIP URI of this own Route entry the S-CSCF may enter some state information to understand, that it already received and processed this message (other ways of providing state are possible)
- Example:
Route: <sip: as22.home2.com;lr>, <sip: state112@scscf1.home2.net;lr>

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Filter Criteria (1)

- Contain collection of user related information
- Help S-CSCF to decide about AS interaction
- Most important filter criteria are so called "Initial Filter Criteria"
- They are evaluated when receiving initial request in a dialog (INVITE, SUBSCRIBE) or a standalone request (MESSAGE, OPTIONS...)
- S-CSCF does not evaluate on PRACK, NOTIFY, UPDATE or BYE
- Filter criteria for subscriber are stored in HSS => in user profile

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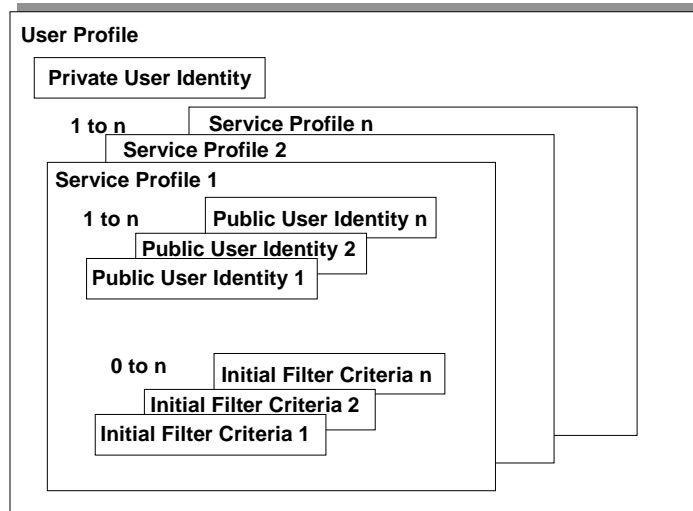
Filter Criteria (2)

- On registration the S-CSCF receives user profile from HSS
- Filter criteria determine the services that are applicable to the collection of Public User Identities of the profile
- S-CSCF assesses the criteria in the order of their priority
- Filter criteria contain trigger points, which are boolean conditions
- If the trigger point fires the request goes to the corresponding AS
- After receiving back the request the next criteria is checked

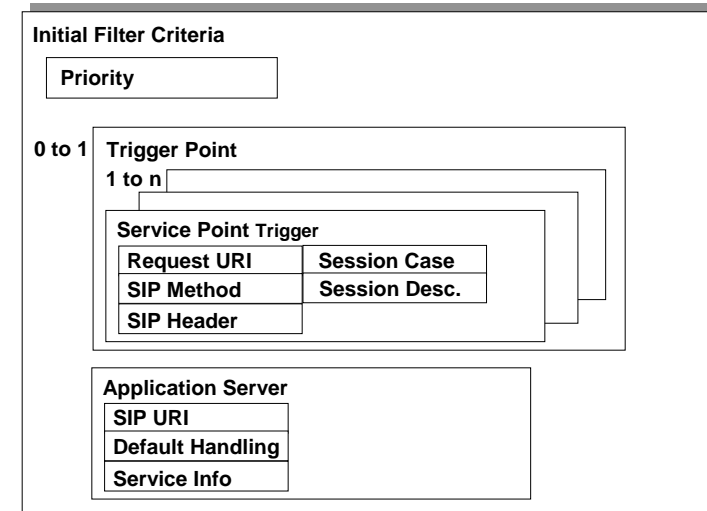
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User Profile



Initial Filter Criteria



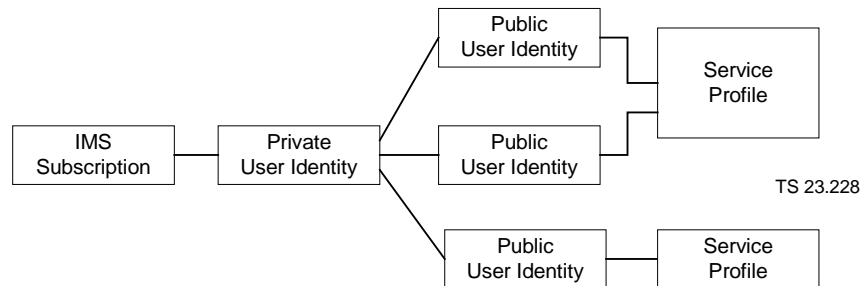
Terms (1)

- Priority: the lower the number the higher the priority
- Trigger Point: Boolean expression => to AS (y/n)
- Service Point Trigger: a logical condition based on a characteristic of a SIP message (e.g. method...)
- Trigger Point: a collection of a number of service point triggers
- Boolean operators: AND, OR, NOT
- E.g.: (Method=INVITE) AND (Request-URI=fred@home.at)...two SPT=> one TP
- When no trigger point is defined => unconditional forwarding

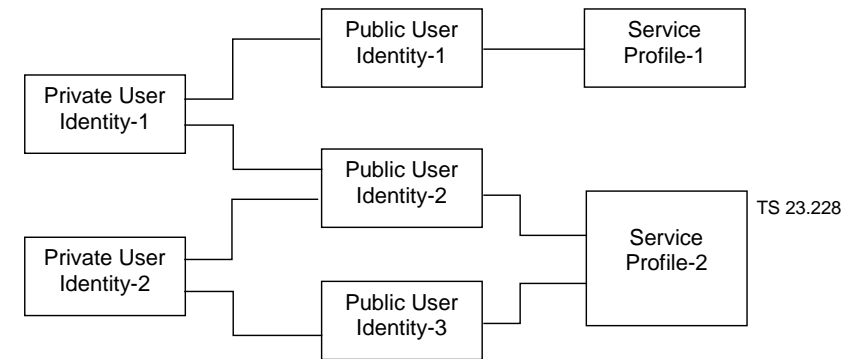
Terms (2)

- After trigger points the AS is expressed
- SIP URI: SIP address of the application server
- Default Handling: action to take when contact to AS is not possible
- Service Information: contains transparent data (transparent to HSS and S-CSCF), only allowed when S-CSCF acts as SIP client (e.g. REGISTER) because info is added to message in body (not allowed for proxies)
- User profile is encoded as XML File
- XML scheme is defined in TS 29.228

Relationship: Subscription, Identity, Service (1)



Relationship: Subscription, Identity, Service (2)



Summary

- Private & Public User Identity definition
- More than one Private User Identity per IMS Subscription
- ISIM contains User Identification, Network Reference and Security Parameters
- ISIM can be substituted by USIM
- Flexible AS concept
- Application Provisioning via User Profile on HSS
- Filter Criteria define the applications to deal with, the sequence and the trigger conditions
- Service Profile belongs to Public User Identity



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