IMS and PoC Strategy Workshop January 2005

Content

- **Standardisation bodies**
- **Work split of standardisation bodies**
- **Overview about relevant key standards**
- **Overview and key functions of IMS**
- **Role of IMS in case of Push-to-Talk-over-Cellular (PoC) application**
- **PoC from user perspective**
- **PoC Architecture overview**
  - Components: PoC, GLMS, Presence
  - Interfaces
  - Specific role of IMS
- **Some signalling flows for PoC**
- **Requirements from R&S**
- **Rohde&Schwarz Q&A**

Standardisation bodies

- **Key specification bodies**
  - IETF
  - 3GPP
  - MENSA
  - OMA
- **Additional standard sources**
  - ETSI
  - GSMA

Work split of standardisation bodies (1)

- **IETF**
  - Is providing protocols
  - SIP is native IETF SIP
  - Specific name spaces, event packages, format descriptions etc are defined by OMA and 3GPP
- **3GPP**
  - Is defining architectures by making use of IETF functions as B2BUA, proxies, etc
  - Although services are out of scope for 3GPP, in some instances 3GPP is defining applications directly, e.g. messaging
- **MENSA**
  - Is an industry consortium founded to define a fast track towards a PoC standard which can will be transferred to OMA
- **OMA**
  - Is focussing purely on applications

Work split of standardisation bodies (2)

- **ETSI**
  - Is dealing with IMS architectures from perspective of fix networks, fix mobile convergence and NGN architecture
  - TISPAN WG is working on general framework extending IMS towards FMC NGN architecture
- **GSMA**
  - Is working in several areas on application definition and interworking schemes, e.g. integrated messaging client and operator interworking/interoperator accounting

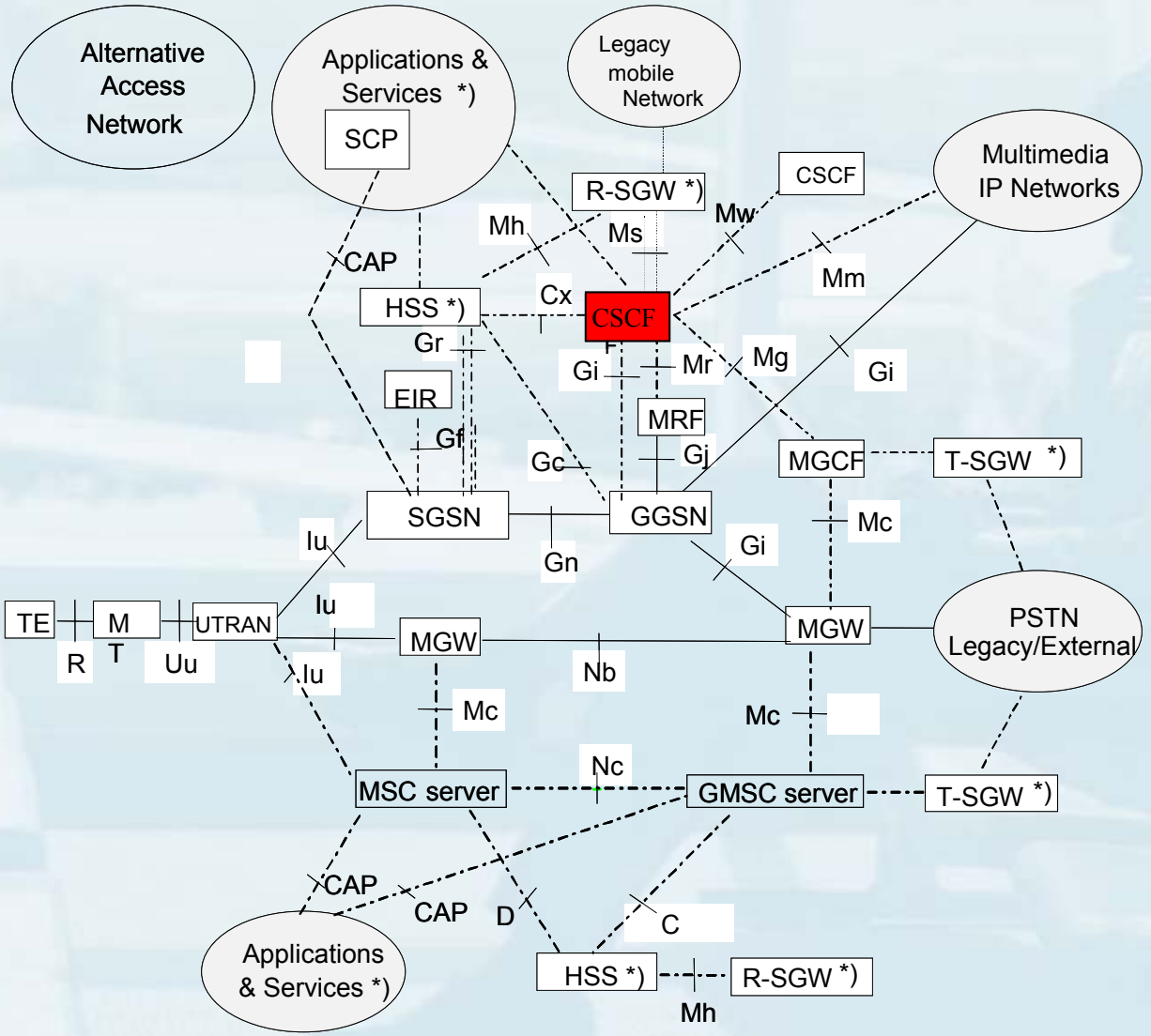
Overview about relevant key standards (1)

- **IETF**
  - 3261 SIP: Session Initiation Protocol and it‘s extensions (full list in backup)
  - 3761 The E.164 to Uniform Resource Identifiers (URI) Dynamic Delegation Discovery System (DDDS) Application (ENUM)
  - Diameter 3856 „Presence Event Package“ and 3857 „Watcher Information Event Template-Package“
  - XCAP is currently not in RfC status; draft-ietf-simple-xcap-05, proceeding of the SIMPLE WG should be closely monitored
- **3GPP**
  - 3GPP took over specifications from ETSI
  - 3GPP document index space includes ETSI documents (amended by leading 2 and 0 behind segregator; 03.60 => 23.060, 04.08 => 24.008)
  - Architecture description in 3GPP TS 23.228 V6.6.0 (2004-06), full list in backup

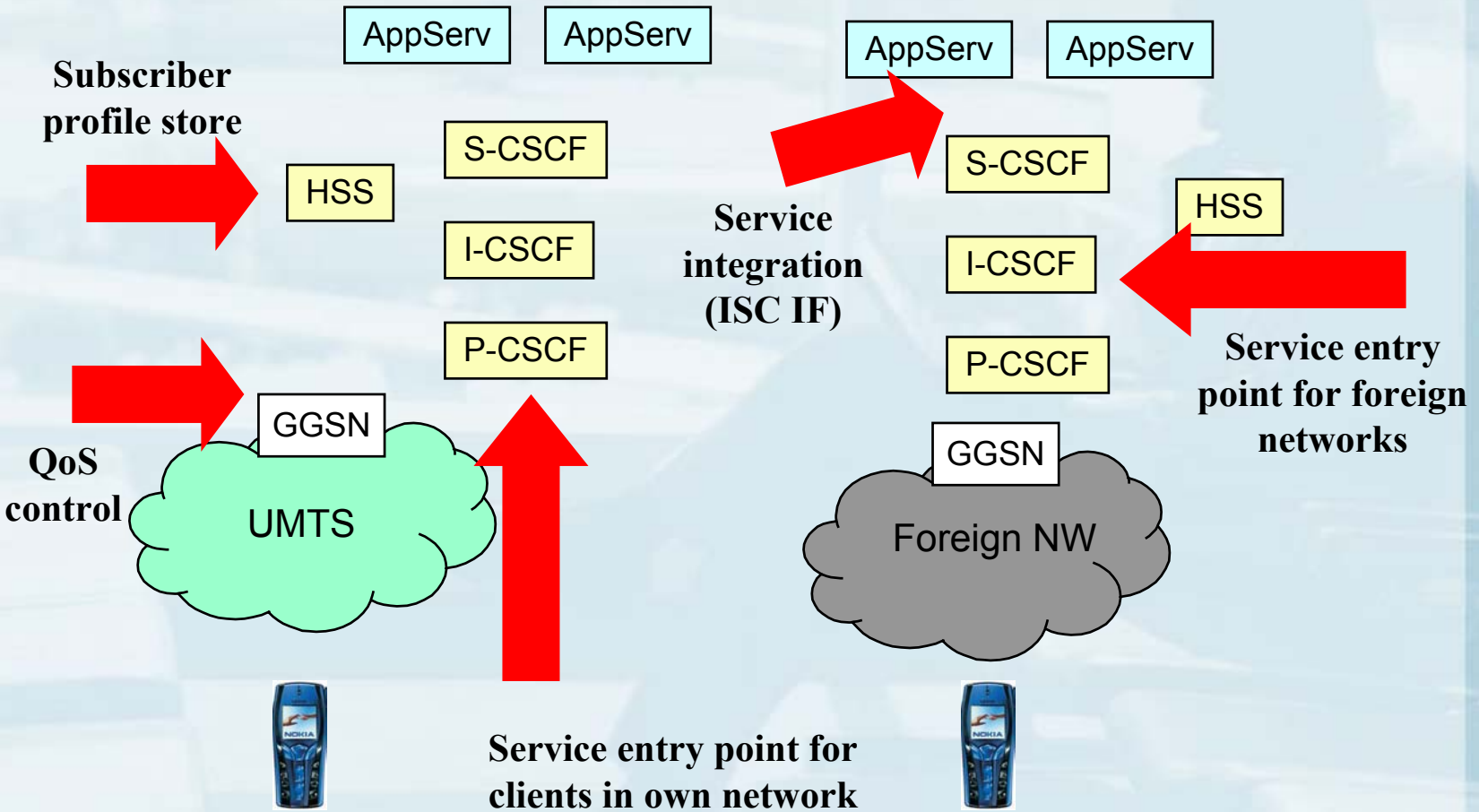
Overview about relevant key standards (2)

- **MENSA**
  - Industry consortium founded by **M**otorola, **E**ricsson, **N**okia, **S**iemens, **A**WS
  - Architecture description in Architecture V2.0.8 (2004-06), full list in backup
- **OMA**
  - IMS interworking described in OMA-AD_IMS-V1_0-20041117-D
  - PoC rchitecture description in OMA-AD-PoC-V1_0-20050105-D
  - Presence and Group Management described in OMA-AD_GM and OMA-AD_Presence

Overview and key functions of IMS – Architecture Overview



Overview and key functions of IMS – Functional Elements

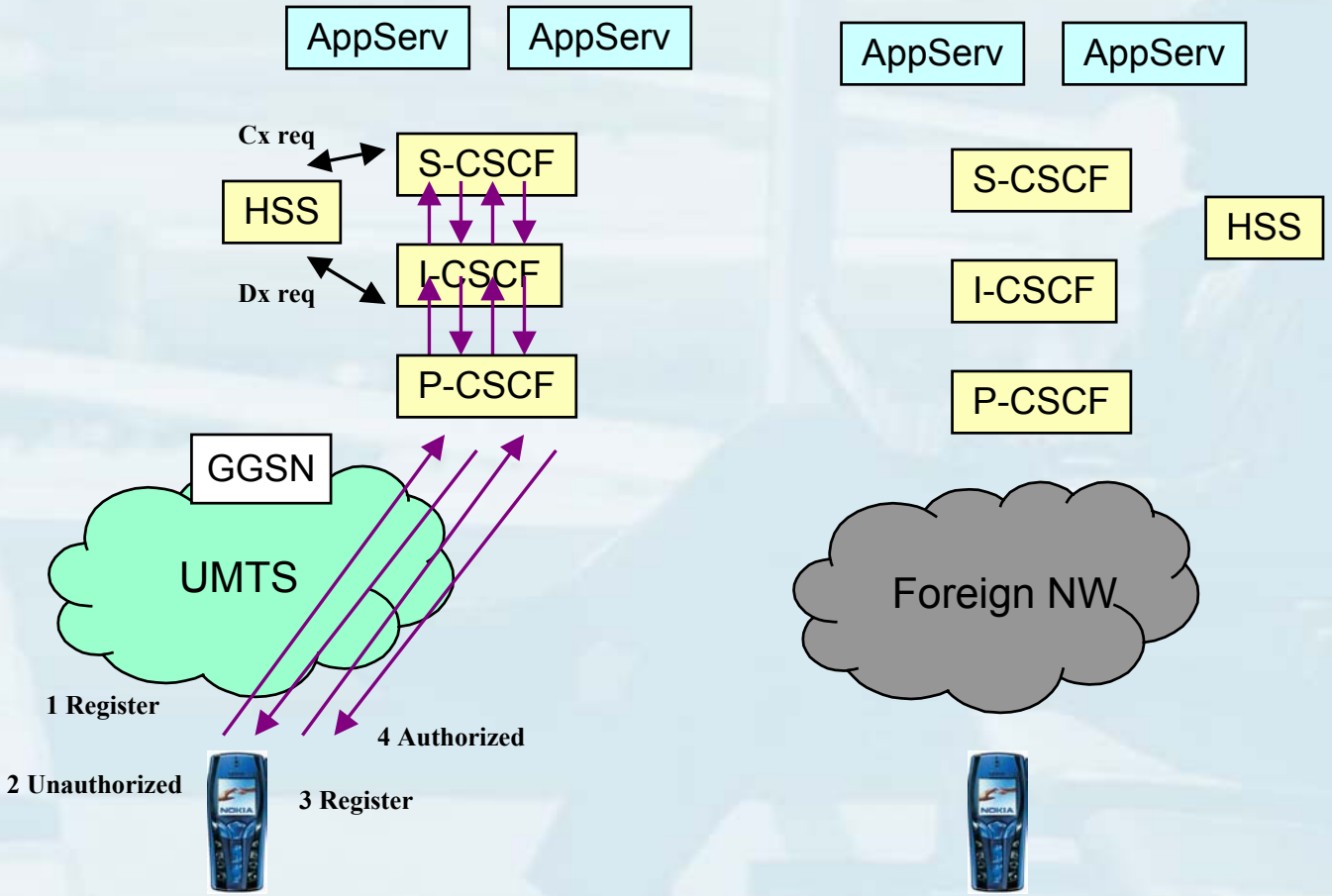


Overview and key functions of IMS – the SIP protocol (1)

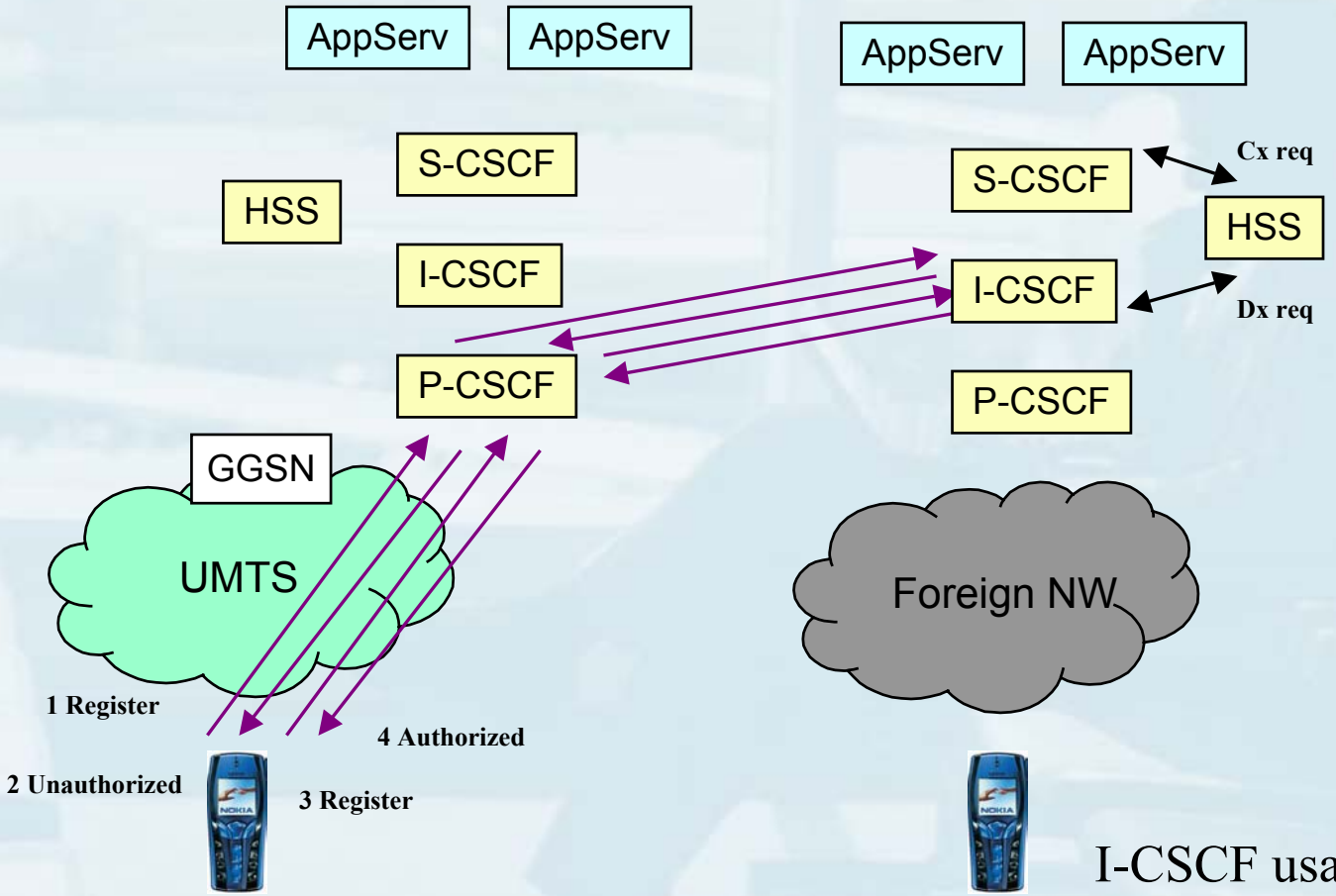
```
REGISTER sip:registrar.home1.net SIP/2.0
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd];comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 70
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
From: <sip:user1_public1@home1.net>;tag=4fa3
To: <sip:user1_public1@home1.net>
Contact: <sip:[5555::aaa:bbb:ccc:ddd];comp=sigcomp>;expires=600000
Call-ID: apb03a0s09dkjdfglkj49111
Authorization: Digest username="user1_private@home1.net", realm="registrar.home1.net",
nonce="", uri="sip:registrar.home1.net", response="",,
Security-Client: ipsec-3gpp; alg=hmac-sha-1-96; spi-c=23456789; spi-s=12345678; port-
c=2468; port-s=1357
Require: sec-agree
Proxy-Require: sec-agree
CSeq: 1 REGISTER
Supported: path
Content-Length: 0
```

SIP Register Message

Overview and key functions of IMS – Register Workflow

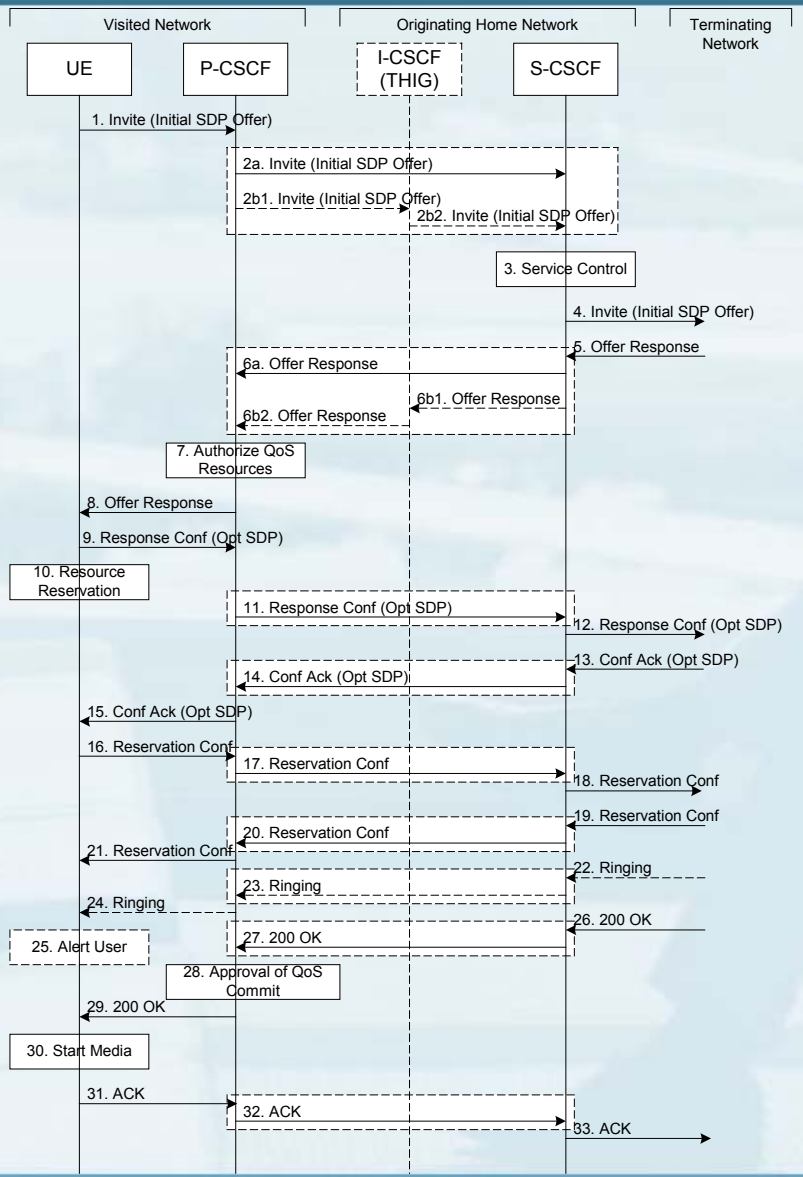


Overview and key functions of IMS – Register Workflow Roaming



I-CSCF usage is optional
(I-CSCF ⇔ THIG)

Overview and key functions of IMS – Session setup



Key steps

Invite →

Policy check

← Media response

QoS detection network side

Secondary PDP setup

← ringing →

Transport plane ready

← connect →

Overview and key functions of IMS – the SIP protocol (2)

```
INVITE tel:+1-212-555-2222 SIP/2.0
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 70
Route: <sip:pcscf1.visited1.net:7531;lr;comp=sigcomp>, <sip:scscf1.home1.net;lr>
P-Preferred-Identity: "John Doe" <sip:user1_public1@home1.net>
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
Privacy: none
From: <sip:user1_public1@home1.net>;tag=171828
To: <tel:+1-212-555-2222>
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 127 INVITE
Require: precondition, sec-agree
Proxy-Require: sec-agree
Supported: 100rel
Security-Verify: ipsec-3gpp; q=0.1; alg=hmac-sha-1-96; spi-c=98765432; spi-s=87654321; port-c=8642; port-s=7531
Contact: <sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp>
Allow: INVITE, ACK, CANCEL, BYE, PRACK, UPDATE, REFER, MESSAGE
Content-Type: application/sdp
Content-Length: (…)
```

SIP Header

Signalling plane, session and subscriber information

```
v=0
o=- 2987933615 2987933615 IN IP6 5555::aaa:bbb:ccc:ddd
s=-
c=IN IP6 5555::aaa:bbb:ccc:ddd
t=0 0
m=video 3400 RTP/AVP 98 99
b=AS:75
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos none remote sendrecv
a=rtpmap:98 H263
a=fmtp:98 profile-level-id=0
a=rtpmap:99 MP4V-ES
m=audio 3456 RTP/AVP 97 96
b=AS:25.4
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos none remote sendrecv
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
a=rtpmap:96 telephone-event
```

SDP body

Traffic plane, media information

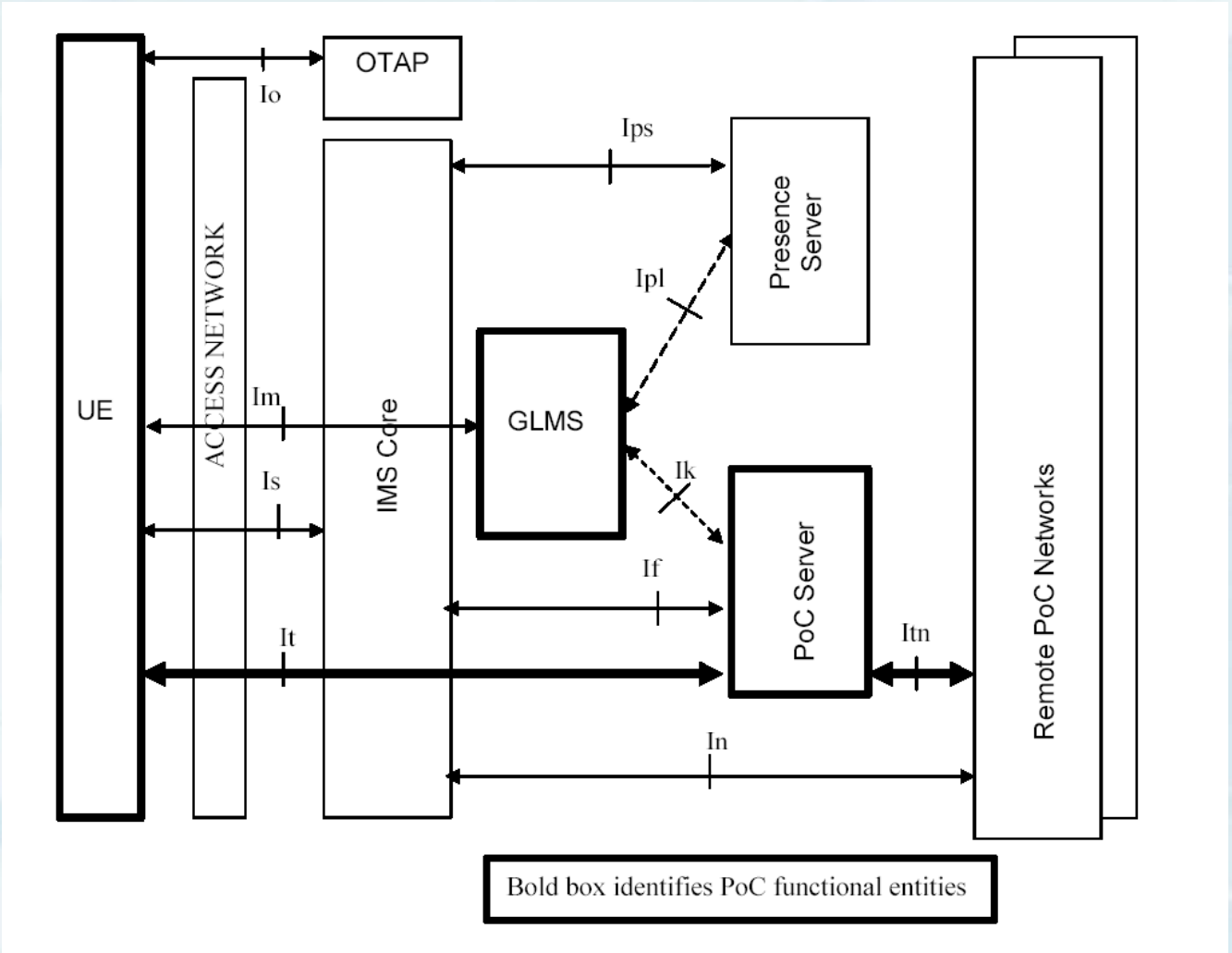
Role of IMS in case of Push-to-Talk-over-Cellular (PoC) application

- **IMS is the service platform for PoC**
- **Integration is done via subscriber profile management/authentication and ISC IF**
- **Used functions are**
  - Authentication
  - ISC interface
  - Message routing
  - Subscriber profile store
- **PoC uses SIP signalling for registration**
- **Sessions are handled based on SIP signalling**
- **Talk burst control is done based on traffic plane (RTCP)**

PoC from user perspective

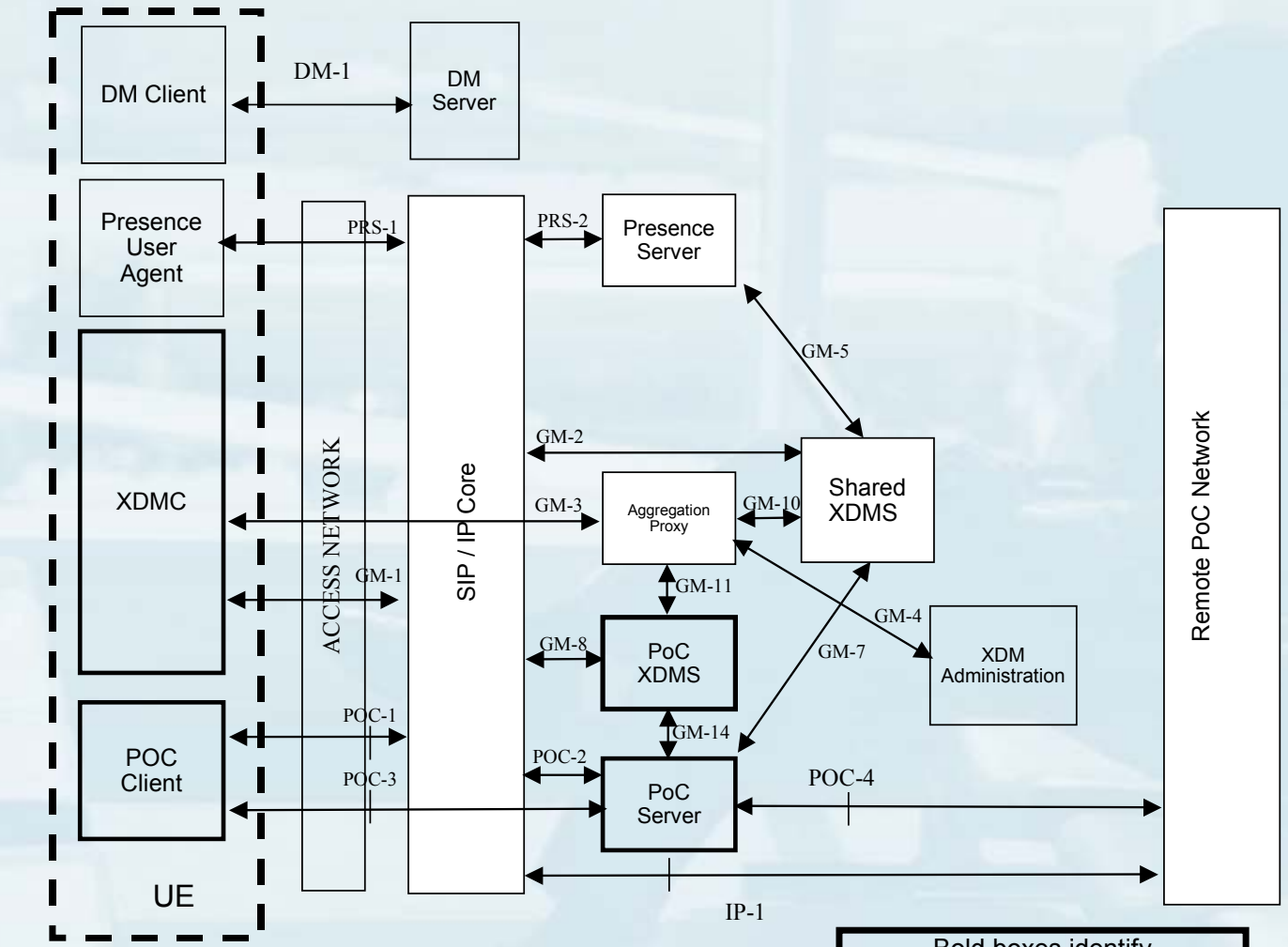
- **PoC is instantanous voice communication**
  - „One button, one push“
  - Half duplex
  - Immediate reachability and immediate response is key (presence information and delay!)
- **It is not messaging, it is not voice service**
- **User pushes a button and speaks, recipient hears immediately (depending of customizable settings with/without alert, mute, automatic callback, etc)**
- **PoC is closely integrated with Group Management and Presence Applications**
- **Possible „PoC-call“ forms**
  - 1-to-1
  - 1-to-many
  - Predefined and ad-hoc groups
- **Sessions**
  - Pre-established sessions
  - Ad-hoc sessions
  - (both types in combinations with groups)

MENSA PoC Architecture overview



MENSA PoC Architecture

OMA PoC Architecture overview



OMA PoC Architecture

OMA PoC Architecture – Reference Points (1)

- **PoC 1,2,3:**
  - Sip related registration and signalling
  - Signalling between PoC client and server
  - Presence settings
  - Media transport
- **PoC 4:**
  - Interoperator interworking
  - Media transport, talk burst arbitration, media quality
- **GM1,2,3,4,5,6,7,8,9,10,11,14:**
  - Distribution of XCAP information with various interworking interfaces
- **PRS 1,2,3:**
  - Subscription and publishing of presence information
  - Watcher communication

OMA PoC Architecture – Reference Points (2)

- **IP 1:**
  - Traffic plane between IMS/PoC network domains
- **C 5:**
  - Transmission of harging information
- **DM 1:**
  - Transmission of device management information

OMA PoC – External Entities and Tasks

- **IMS**
  - Routing of SIP signalling
  - Discovery and address resolution
  - Compression (SIGCOMP)
  - AAA
  - Registration state handling
  - Privacy support (Priv/PubID linking)
  - Lawful interception
- **Shared XDMS**
  - Managing of all lists required for PoC service, e.g. Presence settings, Group Lists and Address Books
- **Aggregation Proxy**
  - Single contact point for XDMS
  - Routing of XCAP requests
- **Presence Service**
  - Provides presence service logic and presentity
- **Device Management**
  - Provisions and maintains all PoC parameters
  - SW updates and security relevant configuration tasks
- **Charging**

OMA PoC – System Concepts (1)

- **Identification**
  - One or more addresses
  - SIP-URI or tel-URI
  - IMS PrivID shall be used for ifentification
  - Group IDs either static or ad-hoc (generated by the XDMS)
- **Addressing**
  - PubID shall be E.164 number
- **Talker detection**
  - ID transmitted in the talk burst arbitration message
- **Registration**
  - Registration with the IMS as described in 3GPP/2
  - Registration propagated in ISC IF
- **Session establishment**
  - As described in 3GPP/2
  - IMS core is required for session handling and signalling message routing

OMA PoC – System Concepts (2)

- **Security**
  - Authentication as described in 3GPP/2
  - Access level security as described in 3GPP/2 (integrity protection by IPsec in transport mode
  - USIM/ISIM is not mandatory (proprietary authentication mechanisms)
  - AirIF encryption as provided by carrier network
- **Privacy**
  - Is requested by the clients
  - Controlling server retains information
- **Talk burst arbitration**
  - Controlling server entity is in charge
  - Talk permission handling depends on queing capability of the client
  - Basic case: permission is granted if no client occupies the channel and the queue is empty
- **Media Quality and codecs**
  - Sender and receiver are replying with quality reports
  - Codecs from 3GPP/2 (GSM 06.13, AMR)

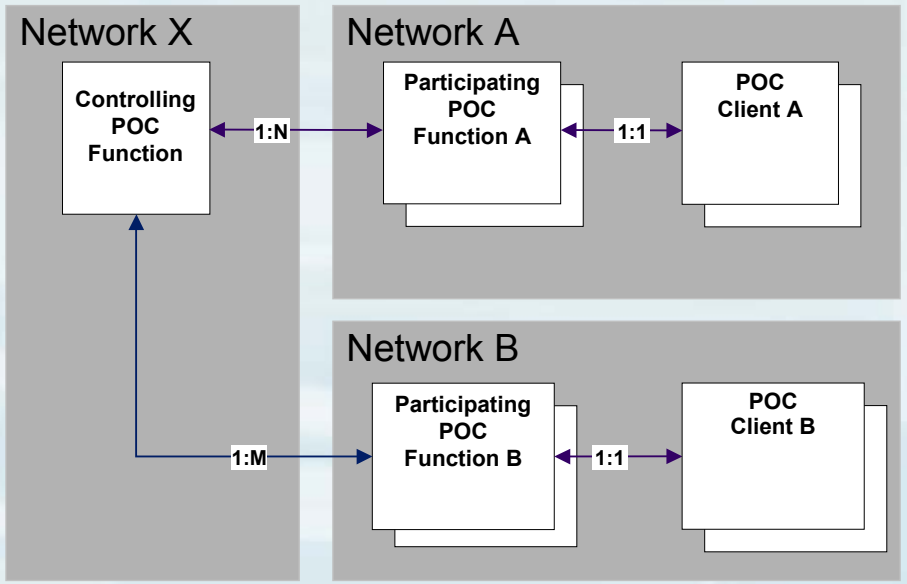
OMA PoC – System Concepts (3)

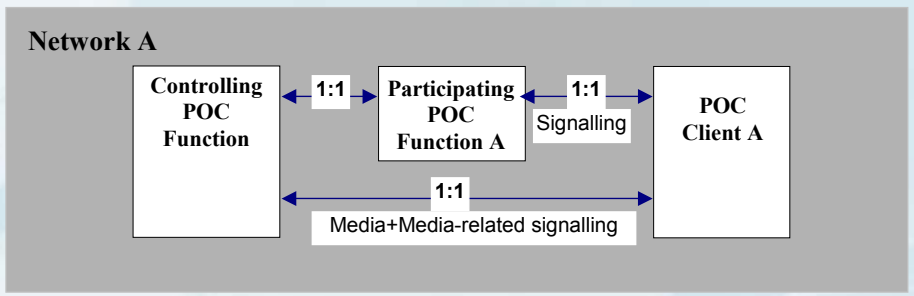
- **Signalling compression**
  - Signalling compression according to IETF shall be used
- **Charging**
  - CDRs are transmitted to the charging infrastructure
  - Prepaid is supported by hotbilling
- **Roaming**
  - Shall be fully supported
- **Presence**
  - PoC client serves as watcher
  - Publishing to the Presence server is optional, both server and client may publish

OMA PoC – System Concepts (4)

- **User policy settings**
  - User can black/whitelist users and groups
  - User can set for all users and groups auto answer mode or not
  - Incoming sesions can be barred
  - Instant personal alerts can be barred
  - Incoming talk burst can be set to „mute“ (server involvement)
  - Talk burst can be assigned with priority (four predefined levels are available)
  - Service setting provide predefined answer mode, incoming session barring, incoming alert barring
- **Provisioning**
  - Done by the device management, based on SyncML
- **Communication topologies**
  - 1-to-1
  - 1-to-many
  - 1-to-many-to-1

OMA PoC Interworking Scheme





•**Control Function:**
session handling,
media distribution,
SIP session handling,
talk burst control,
talk burst control protocol,
charging information,
group session policy control,
user plane adaption and
transcoding (optional)

„The central control entity“

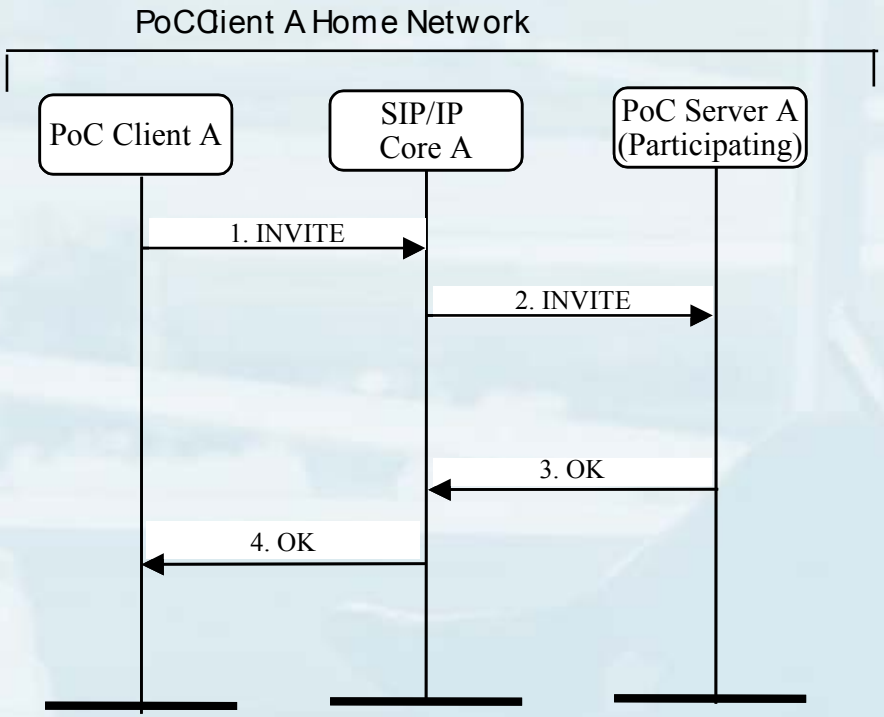
•**Participating Function:**
session handling,
SIP session handling,
talk burst control message relay,
talk burst control protocol,
charging information,
group session policy control,
local settings for the clients

„The local operators control entity“

•**Participating Function on the media path:**
media relay, talk burst control relay, optionally transcoding and media handling

„The local operators single server“

OMA PoC – Signalling Flows (1)

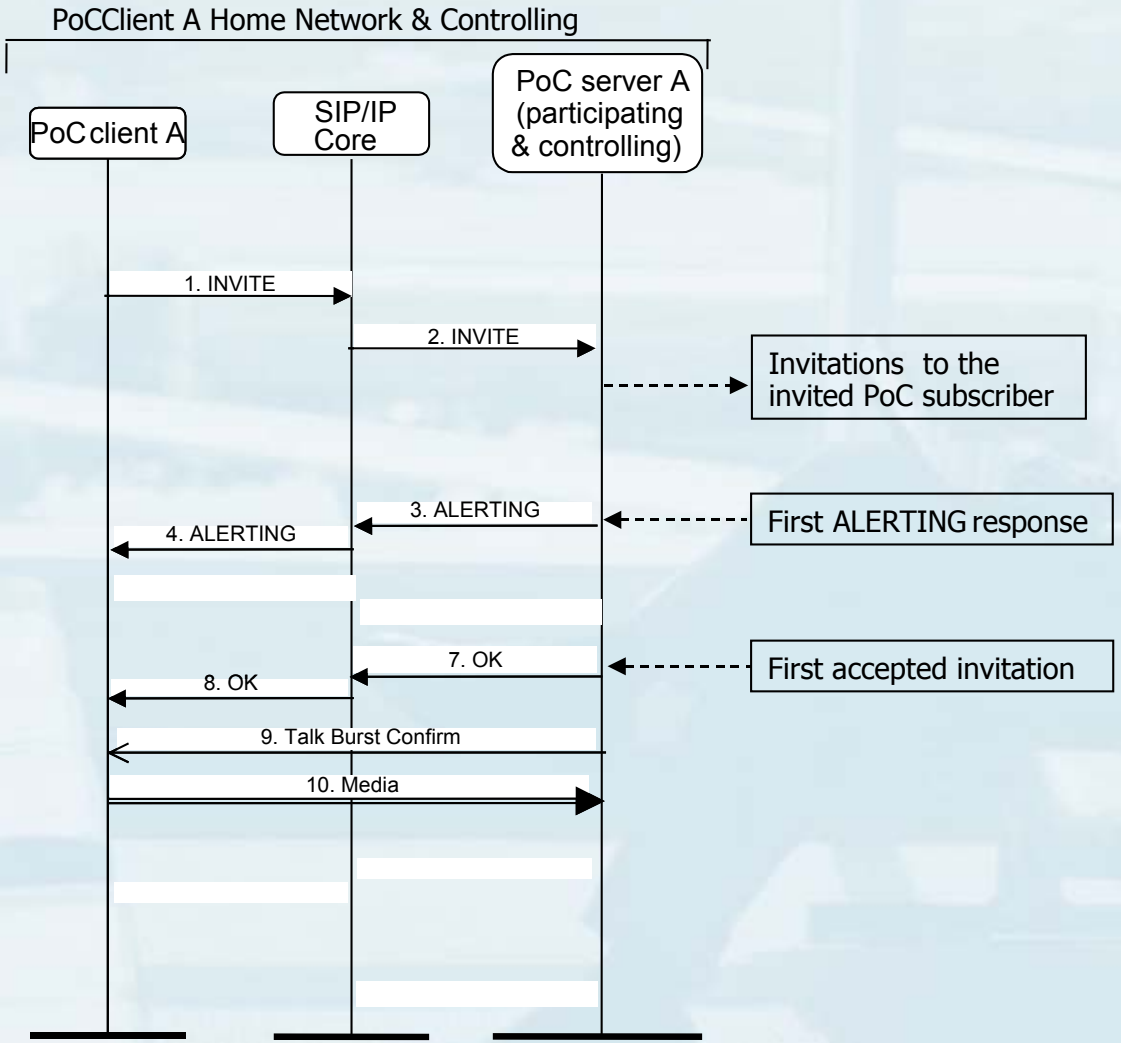


•**INV:**
media parameters,
PoC user client address,
talk burst control regime

•**OK:**
accepted media parameters,
URI identifying pre-established sessions
accepted talk burst control regime

Establishing a session in one network (pre-established session)

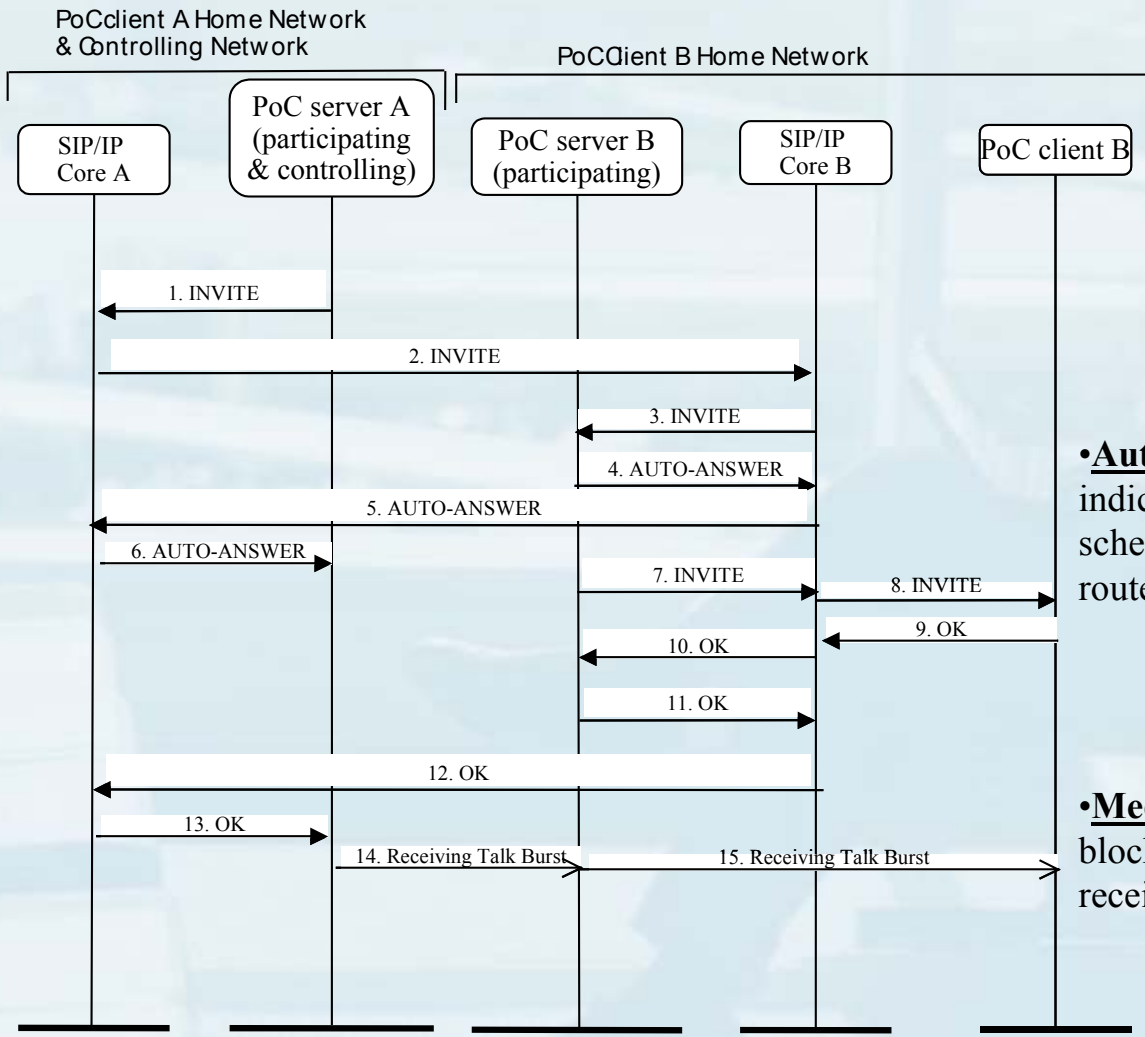
OMA PoC – Signalling Flows (2)



- **INV:**
  as for pre-established session
- **Alerting:**
  as soon as alerting response from callee is received, it's forwarded to caller
- **OK:**
  as for pre-established session forwarded upon first „accept„ from callee
- **Talk burst and media response**

Establishing session „with" talk burst („on demand session") for 1-to-1 commuciation

OMA PoC – Signalling Flows (3)

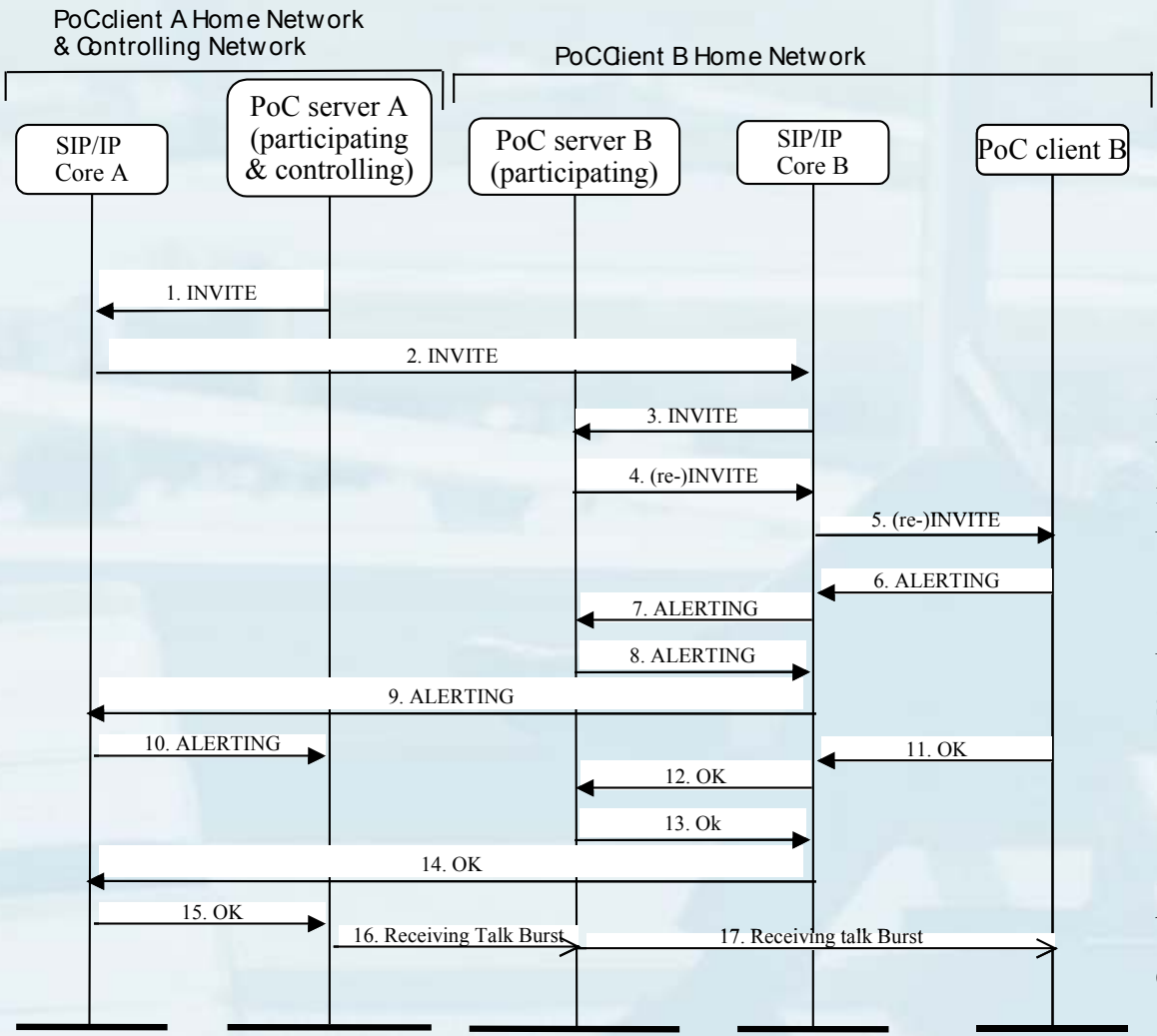


•**Auto answer:**
indication that automatic answer scheme is used by the callee is routed back to the home network

•**Media:**
block floor (auto answer confirm received)

Auto answer using on demand session

OMA PoC – Signalling Flows (4)



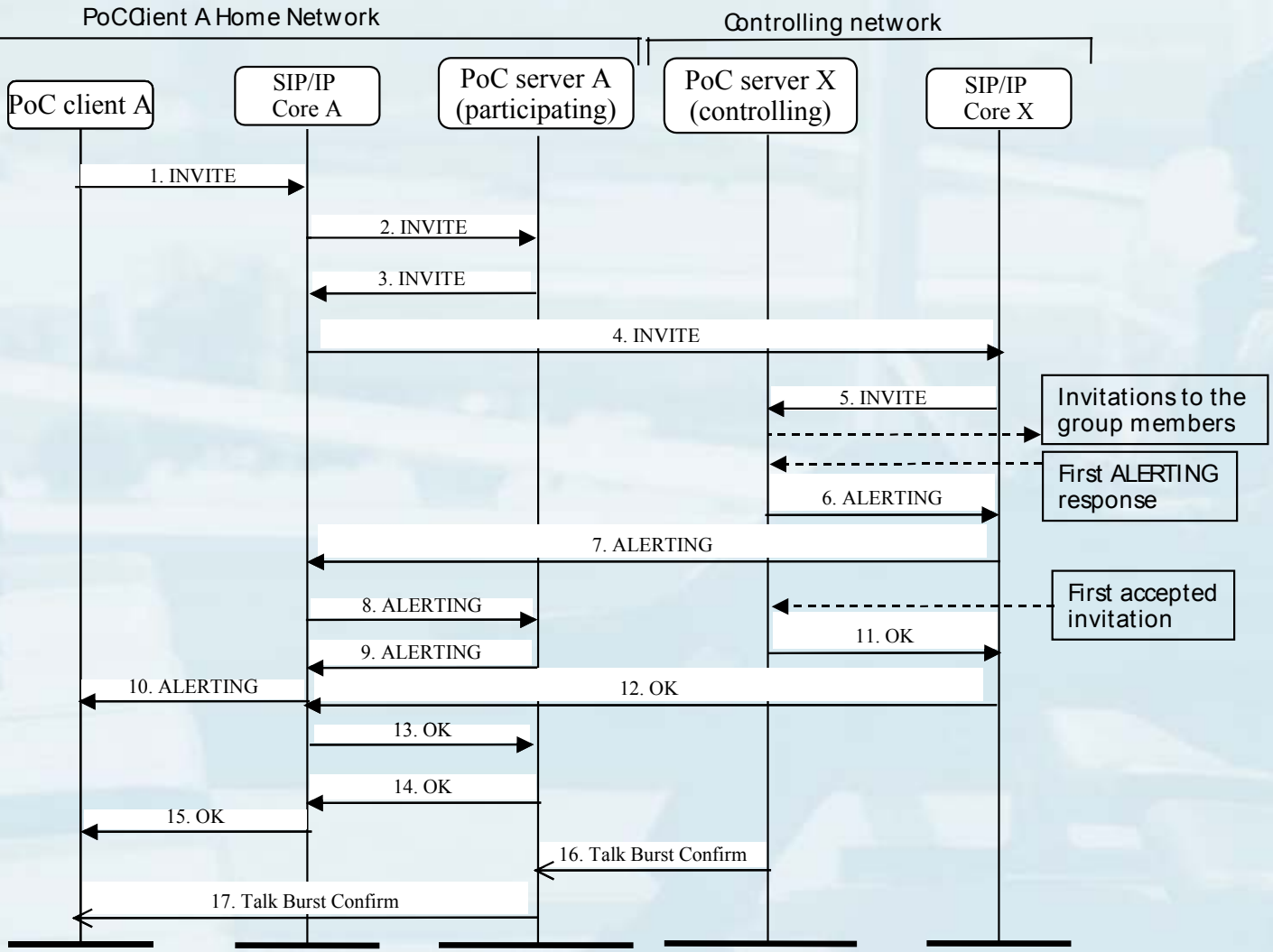
Manual answer using on demand session

- **INV/re-INV:**
in case on demand session is used, PoC server B be sends INV in case pre-established session is used re-INIV

- **Alerting:**
user is prompted and alert is send back

- **Media:**
block floor (auto answer confirm received)

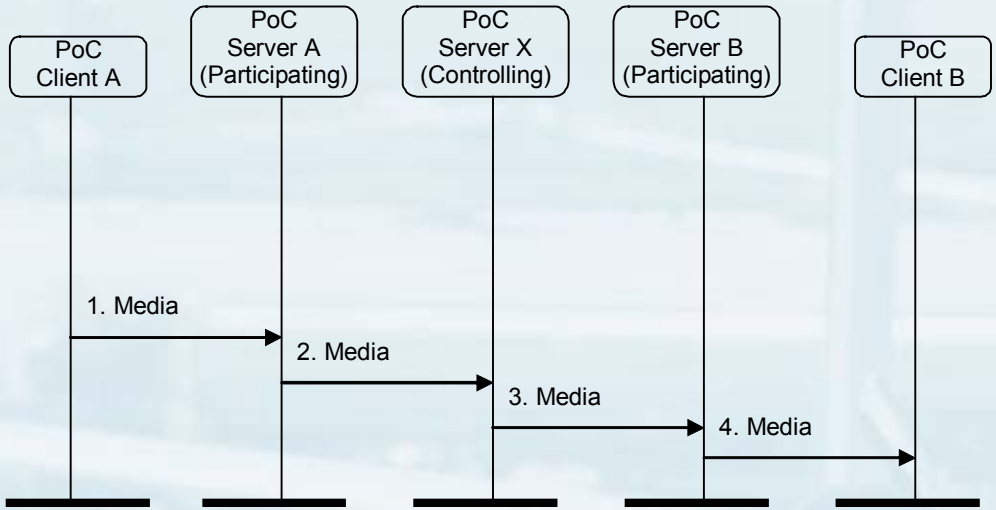
OMA PoC – Signalling Flows (5)



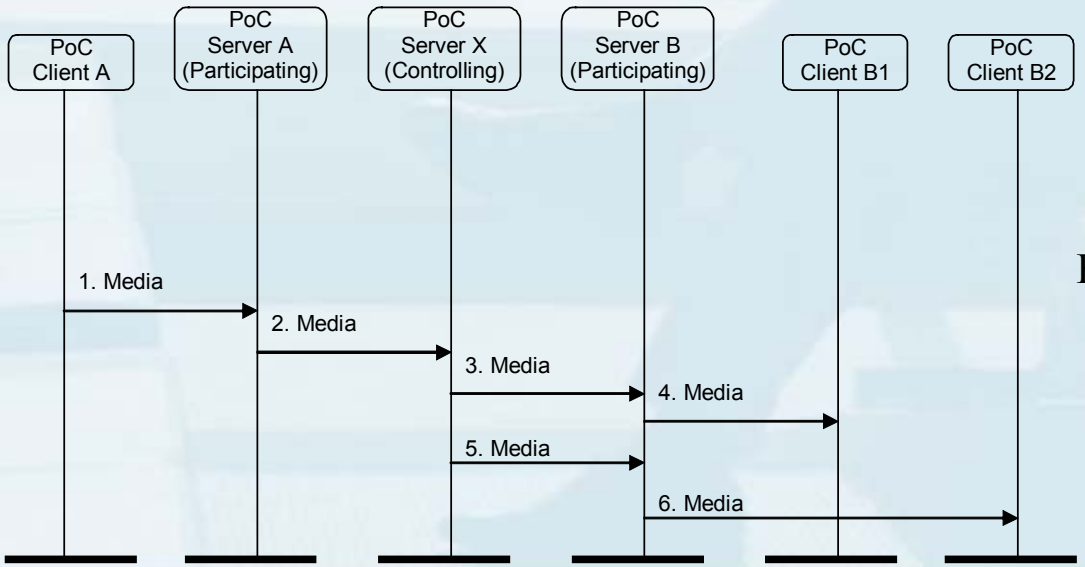
Pre-arranged Group Session Setup, Originating part

- **INV:**
  includes group ID as assigned
  group is not hosted in network A
  SIP core X routes INV based on group ID
- **Group:**
  either user is added (established group) or other members are invited
- **Alerting:**
  alert is send back to caller upon first accept
- **OK:**
  session is established
- **Media:**
  floor is granted to PoC client A

OMA PoC – Media Flows (1)



Basic media flow 1-to-1

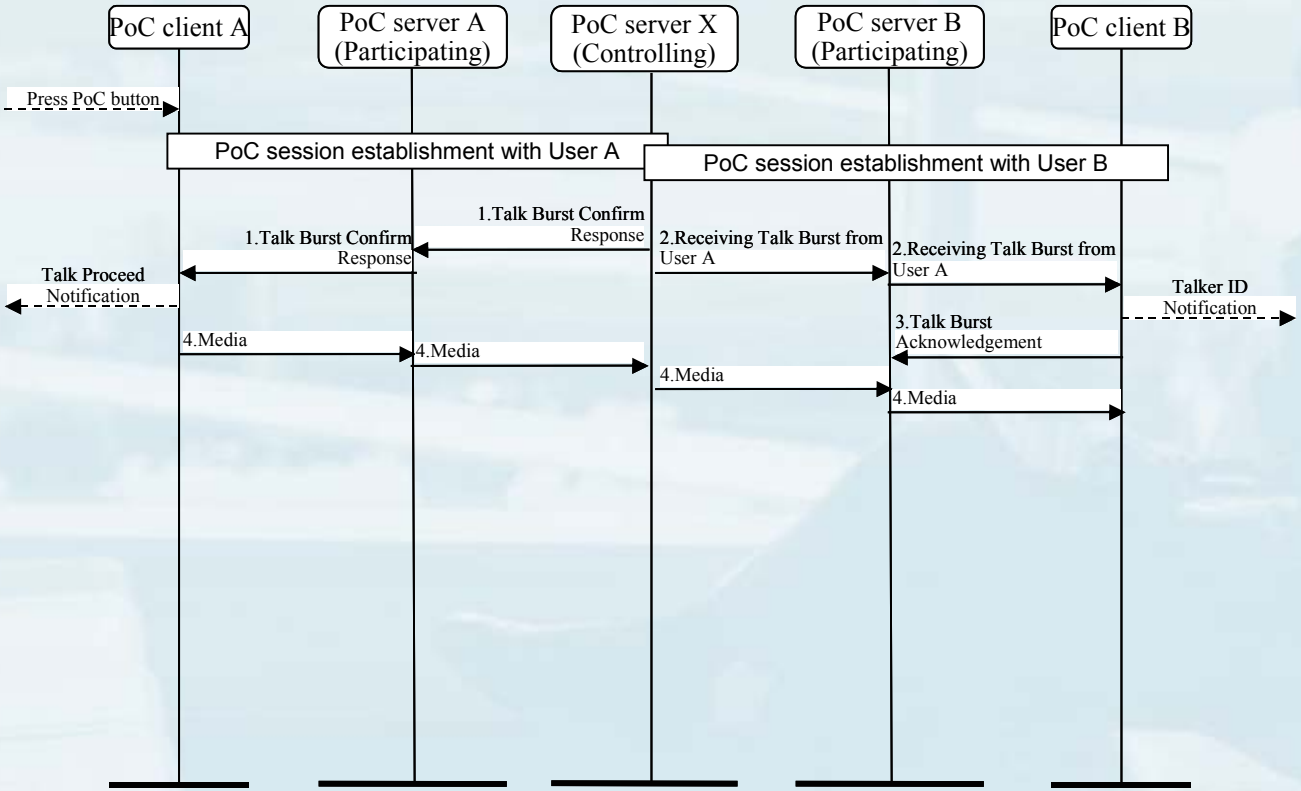


Basic media flow 1-to-many

OMA PoC – Media Flows (2)

- **Inband signalling messages for Talk Burst Control**
  - Talk Burst Request
  - Talk Burst Confirm Response
  - Talk Burst Reject
  - Talk Burst Complete
  - No Talk Burst
  - Receiving Talk Burst
  - Stop Talk Burst
  - Talk Burst Acknowledgement

OMA PoC – Media Flows (3)



Talk Burst request procedure at PoC Session initialization

- **Session:**
establishement successfully finished

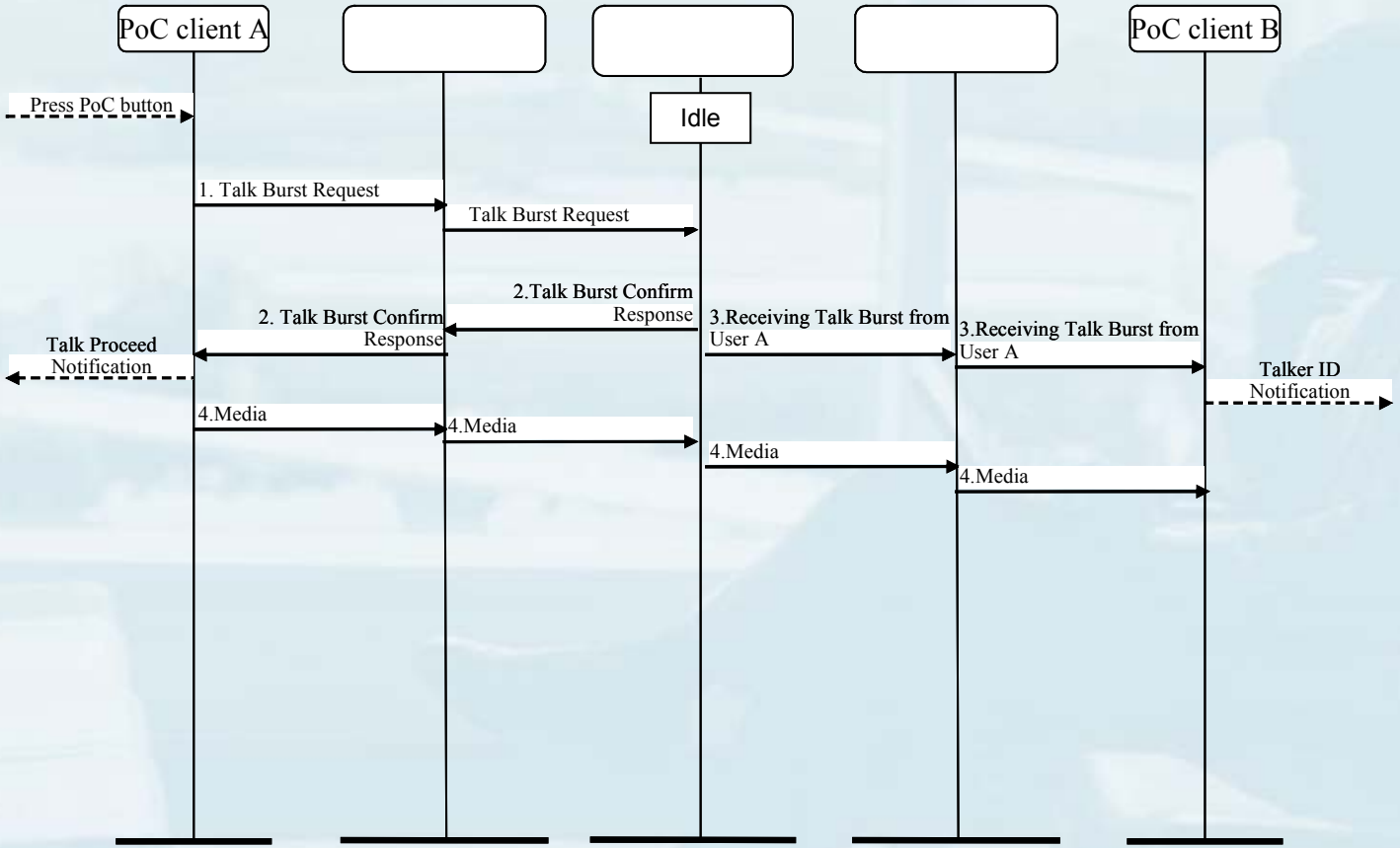
- **Receiving:**
floor granted to user A indication

- **Confirm:**
floor ois granted to speaker (user A)

- **Acknowledgement:**
floor control (assignment to user A) is confirmed

- **Media:**
User A initates flow

OMA PoC – Media Flows (4)



Talk Burst request confirmed procedure during a PoC Session

- **Request:**
  User A requests floor
- **Confirm:**
  floor ois granted to speaker (user A)
- **Receiving:**
  floor granted to user A indication
- **Media:**
  User A initates flow


Thank you for your attention

!!!Backup!!!

Key SIP RfCs (protocol mechanisms and message content)

- 3261 SIP: Session Initiation Protocol (!!!)
- 2976 The SIP INFO Method
- 3263 Session Initiation Protocol (SIP): Locating SIP Servers
- 3265 Session Initiation Protocol (SIP)-Specific Event Notification
- 3311 The Session Initiation Protocol (SIP) UPDATE Method
- 3326 The Reason Header Field for the Session Initiation Protocol (SIP)
- 3329 Security Mechanism Agreement for the Session Initiation Protocol (SIP)
- 3361 Dynamic Host Configuration Protocol (DHCP-for-IPv4) Option for Session Initiation Protocol (SIP) Servers
- 3372 Session Initiation Protocol for Telephones (SIP-T)
- 3398 Integrated Services Digital Network (ISDN) User Part (ISUP) to Session Initiation Protocol (SIP) Mapping
- 3428 Session Initiation Protocol (SIP) Extension for Instant Messaging
- 3455 Private Header (P-Header) Extensions to the Session Initiation Protocol (SIP) for the 3rd-Generation Partnership Project (3GPP)
- 3485 The Session Initiation Protocol (SIP) and Session Description Protocol (SDP) Static Dictionary for Signaling Compression (SigComp)
- 3486 Compressing the Session Initiation Protocol (SIP)
- 3515 The Session Initiation Protocol (SIP) Refer Method
- 3891 The Session Initiation Protocol (SIP) "Replaces" Header
- 3892 The Session Initiation Protocol (SIP) Referred-By Mechanism
- 3911 The Session Initiation Protocol (SIP) "Join" Header
- 3427 Change Process for the Session Initiation Protocol (SIP)

Please note that RfC importance is selected accoring to general criterias. The impact of single RfCs depends on the concrete problem to be solved. Starting point is RfC 3261.

Interesting SIP RfCs (similiar functions existing in 3GPP or taken over in 3GPP)

- 2806 URLs for Telephone Calls
- 2848 The PINT Service Protocol: Extensions to SIP and SDP for IP Access to Telephone Call Services
- 3050 Common Gateway Interface for SIP
- 3087 Control of Service Context using SIP Request-URI
- 3262 Reliability of Provisional Responses in Session Initiation Protocol (SIP)
- 3325 Private Extensions to the Session Initiation Protocol (SIP) for Asserted Identity within Trusted Networks
- 3327 Session Initiation Protocol (SIP) Extension Header Field for Registering Non-Adjacent Contacts
- 3351 User Requirements for the Session Initiation Protocol (SIP) in Support of Deaf, Hard of Hearing and Speech-impaired Individuals
- 3578 Mapping of Integrated Services Digital Network (ISDN) User Part (ISUP) Overlap Signalling to the Session Initiation Protocol (SIP)
- 3581 An Extension to the Session Initiation Protocol (SIP) for Symmetric Response Routing
- 3665 Session Initiation Protocol (SIP) Basic Call Flow Examples
- 3666 Session Initiation Protocol (SIP) Public Switched Telephone Network (PSTN) Call Flows
- 3764 enumservice registration for Session Initiation Protocol (SIP) Addresses-of-Record
- 3824 Using E.164 numbers with the Session Initiation Protocol (SIP)
- 3840 Indicating User Agent Capabilities in the Session Initiation Protocol (SIP)
- 3841 Caller Preferences for the Session Initiation Protocol (SIP)
- 3842 A Message Summary and Message Waiting Indication Event Package for the Session Initiation Protocol (SIP)

Please note that RfC importance is selected accoring to general criterias. The impact of single RfCs depends on the concrete problem to be solved. Starting point is RfC 3261.

Other SIP RfCs (not of direct relevance for IMS)

- 3603 Private Session Initiation Protocol (SIP) Proxy-to-Proxy Extensions for Supporting the PacketCable Distributed Call Signaling Architecture
- 3725 Best Current Practices for Third Party Call Control (3pcc) in the Session Initiation Protocol (SIP)
- 3853 S/MIME Advanced Encryption Standard (AES) Requirement for the Session Initiation Protocol (SIP)
- 3893 Session Initiation Protocol (SIP) Authenticated Identity Body (AIB) Format
- 3312 Integration of Resource Management and Session Initiation Protocol (SIP)
- 3313 Private Session Initiation Protocol (SIP) Extensions for Media Authorization
- 3319 Dynamic Host Configuration Protocol (DHCPv6) Options for Session Initiation Protocol (SIP) Servers
- 3323 A Privacy Mechanism for the Session Initiation Protocol (SIP)
- 3487 Requirements for Resource Priority Mechanisms for the Session Initiation Protocol (SIP)
- 3608 Session Initiation Protocol (SIP) Extension Header Field for Service Route Discovery During Registration
- 3680 A Session Initiation Protocol (SIP) Event Package for Registrations
- 3702 Authentication, Authorization, and Accounting Requirements for the Session Initiation Protocol (SIP)

Please note that RfC importance is selected accoring to general criterias. The impact of single RfCs depends on the concrete problem to be solved. Starting point is RfC 3261.

ENUM RfCs

- **Key RfCs**
  - 3761 The E.164 to Uniform Resource Identifiers (URI) Dynamic Delegation Discovery System (DDDS) Application (ENUM)
  - 3764 enumservice registration for Session Initiation Protocol (SIP) Addresses-of-Record
- **Not of high impact**
  - 3762 Telephone Number Mapping (ENUM) Service Registration for H.323
  - 3026 Liaison to IETF/ISOC on ENUM
  - 3245 The History and Context of Telephone Number Mapping (ENUM) Operational Decisions: Informational Documents Contributed to ITU-T Study Group 2

Please note that RfC importance is selected accoring to general criterias. The impact of single RfCs depends on the concrete problem to be solved.

To understand ENUM in it‘s impact to IMS, the according 3GPP specification should be considered.

Diameter RfCs (relevant for IMS)

- **Key RfCs**
  - 3588 Diameter Base Protocol
- **Not of high impact**
  - <void>

SIMPLE RfCs (relevant for IMS)

- **Key RfCs**
  - 3856 A Presence Event Package for the Session Initiation Protocol (SIP)
  - 3857 A Watcher Information Event Template-Package for the Session Initiation Protocol (SIP)
  - 3858 An Extensible Markup Language (XML) Based Format for Watcher Information
- **Not of high impact (basic rules)**
  - 2778 A Model for Presence and Instant Messaging
  - 2779 Instant Messaging / Presence Protocol Requirements

Please note that RfC importance is selected accoring to general criterias. The impact of single RfCs depends on the concrete problem to be solved.

XCAP Draft (relevant for IMS and PoC)

- **General**
  - XCAP is currently not in RfC status
  - Proceeding of the SIMPLE WG should be closely monitored
- **Internet Drafts**
  - draft-ietf-simple-xcap-05 - The Extensible Markup Language (XML) Configuration Access Protocol (XCAP)
  - draft-ietf-simple-xcap-package-02 - An Extensible Markup Language (XML) Document Format for Indicating Changes in XML Configuration Access Protocol (XCAP) Resources
  - draft-ietf-simple-xcap-pidf-manipulation-usage-02 - An Extensible Markup Language (XML) Configuration Access Protocol (XCAP) Usage for Manipulating Presence Document Contents

Please note that internet draft importance is selected accoring to general criterias. The impact of single drafts depends on the concrete problem to be solved.

OMA PoC Documents

- **Architecture**
  - OMA-AD-PoC-V1_0-20050105-D
- **Specifications**
  - OMA-WISPR_0043-PoC-V1_0_8-20040817-D
  - OMA-WID_0043-PoC-V1_0_2-20031010-A
  - OMA-UP-PoC-V1_0_10-20041103-D
  - OMA-TS-PoC_UserPlane-V1_0_13-20050112-D
  - OMA-TS-PoC_ERELD-V1_0-20041116-D
  - OMA-TS-PoC_ControlPlane-V1_0-20041117-D
  - OMA-POC-AD-RR-V1_0_2-20041020-D
  - OMA-ETR-PoC-V1_0-20041117-D
  - OMA-ERELD-PoC-V1_0_1-20050112-D
  - OMA-CP-POC-V1_0_4-20041005-D
  - OMA-CONRR-PoC-V1_0-20041129-D
- **Minor Importance**
  - OMA-Charter-PoC-V1_1-20040930-A

Please note that OMA documentation is not released so far and thus still subject to change

Other OMA Documents

- **OMA IMS connection points**
  - OMA-AD_IMS-V1_0-20041117-D.doc
- **OMA Presence Architecture**
  - OMA-PAG-SIMPLE-AD-V1_1_0-20041030-D.doc
- **OMA Group Management Architecture**
  - OMA-AD_GM

Please note that OMA documentation is not released so far and thus still subject to change

MENSA PoC Documents

- **Architecture**
  - Architecture V2.0.8 (2004-06), Push-to-talk over Cellular (PoC); Architecture; PoC Release 2.0
- **Specifications**
  - UE Provisioning V2.0.7 (2004-06), Push-to-talk over Cellular (PoC); UE Provisioning; PoC Release 2.0
  - Signaling Flows (NNI) V 2.0.7 (2004-06), Push-To-Talk over Cellular (PoC); Signaling Flows - Network to Network interface (NNI); PoC Release 2.0;
  - User Requirements V2.0.6 (2004-06), Push-to-talk over Cellular (PoC); User Requirements; PoC Release 2.0
  - Presence Service V2.0.9 (2004-06), Push-to-talk over Cellular (PoC); Presence Service; PoC Release 2.0
  - Signaling Flows (UNI) V 2.0.6 (2004-06), Push-To-Talk over Cellular (PoC); Signaling Flows - UE to Network Interface (UNI); PoC Release 2.0
  - Transport Protocols V2.0.6 (2004-06), Push-to-Talk over Cellular (PoC) User Plane; Transport Protocols; PoC Release 2.0;
- **Minor importance**
  - Cover Letter for Push-to-Talk over Cellular (PoC) Phase 2

Please note that MENSA specifications are not maintained by a common standardisation body

3GPP Specifications

- **General**
  - 3GPP took over specifications from ETSI
  - 3GPP document index space includes ETSI documents (amended by leading 2 and 0 behind segregator; 03.60 => 23.060, 04.08 => 24.008)
- **Architecture**
  - 3GPP TS 23.228 V6.6.0 (2004- 06)Specifications
- **Important Specification documents**
  - 3GPP TS 24.228 V5.9.0 (2004-06), Signalling flows for the IP multimedia call control based on SIP and SDP
  - 3GPP TS 29.228 V6.4.0 (2004-09), IP Multimedia (IM) Subsystem Cx and Dx interfaces;Signalling flows and message contents
  - 3GPP TS 24.229 V6.4.0 (2004-09), IP Multimedia Call Control Protocol based on session Initiation Protocol (SIP) and Session Description Protocol (SDP)
  - 3GPP TS 29.229 V6.2.0 (2004-09), Cx and Dx interfaces based on the Diameter protocol;Protocol details
  - QoS control: 3GPP TS 23.207, 3GPP TS 29.207, 3GPP TS 29.208

Please note that the list of importance specification documents is a recommendation for readers who are not aquainted with IMS. It does not give any hierarchy or completness criteria