Implementation of IMS-based PoC Service with Context-Aware Interaction

Jenq-Muh Hsu, Wei-Bin Lain, Chih-Chuan Chan, Yi-Ming Huang
Department of Computer Science and Information Engineering
National Chung Cheng University, Chiayi, Taiwan, R.O.C.
{hsujm; lwp95m,ccc96m;hym96m}@cs.ccu.edu.tw

Abstract

Push-to-Talk (PTT) is a half-duplex and one-to-many voice group communication. In past decades, PTT service has been widely adopted in various areas, including practical military, police, security, rescue, and emergency radio communication, etc. In addition, PTT service has also annunciated being an IP Multimedia Subsystem (IMS)-based service defined by Open Mobile Alliance (OMA), which is called Push-to-Talk over Cellular (PoC).Context-aware computing derived from the field of ubiquitous computing as a technique for imbuing application services with an awareness of users' surroundings and situations for achieving transparent interaction. Thus, a user can obtain some reasonable and proper services among context-aware interactions. In this paper we try combine the features of PoC and context-aware service to implement a context-aware PoC service based on the Open IMS core. The context-aware PoC service can be aware to filter context information and to form an applicable PoC session according to the current contexts of participant PoC users. By the way, our implemented context-aware PoC service can be realizedly used to play an applicable IMS application service in the next generation network (NGN).

1. Introduction

Push-to-talk (PTT) is a voice service performing a one-to-many and one-way multiparty group communication. PTT only allows a group member to speak and the others have to listen to the talk at one time during a PTT conversation. That is, a group member must ask for the talking privilege (the approval to speak) by pressing the PTT (talk) button before another group member starting to talk. PTT service has also been widely used in practical military, police, security, rescue, and emergency radio communications for many years. Figure 1 shows a conversational procedure of performing a PTT session in traditional radio communication.

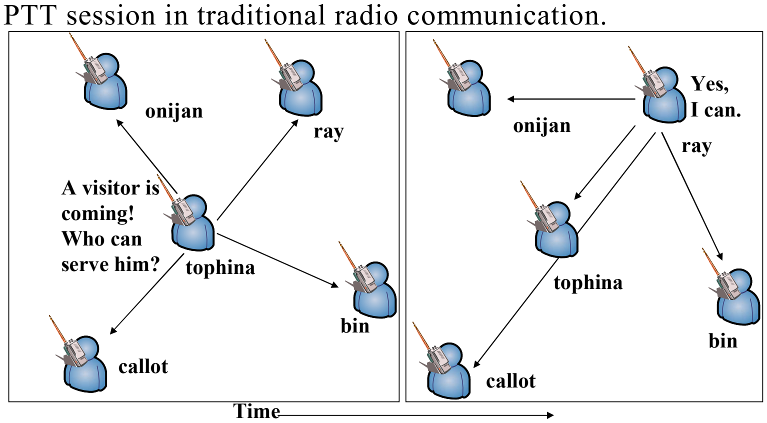


Figure 1. An example performing a PTT session.

Open Mobile Alliance (OMA) currently specifies a Push-to-Talk service, which is called Push-to-Talk over cellular (PoC)[1], as an IP Multimedia Subsystem (IMS) service[2]. Therefore, mobile users can easily use the PoC service to make a PTT conversation with multiple participants in mobile network. But some drawbacks of using PTT service can be investigated, such as unknowing current statuses of participating partners, wasting valuable bandwidth on unnecessary transmission, etc. Besides, the PoC service is not a face-to-face conversation. It is little difficult to acquire the context information of participating PoC users. Therefore, OMA combines a presence service with its defined PoC architecture. Each PoC entity can easily obtain the context information of the related PoC server, PoC users, and PoC sessions through presence service.

Presence is an information notification mechanism[3]. It involves making the entity status available to others and the status of others available to the entity respectively. An entity may be a person, a device, an environment, etc. That is, presence information may include various information types, such as terminal capability, personal preference, current activity, location, current available services, etc. Presence service can immediately respond the latest or newest subscribing context information. Therefore, persons and systems can make some proper decisions or provide reasonable services according to the presence information. We can imagine that presence-enabling applications or services will widely be applied into wide areas in the future.

Context-aware computing is an emerging computing technology[4]. It derived from the field of ubiquitous computing as a technique for imbuing application services with an awareness of users' surroundings and situations for achieving transparent interaction. It allows the users to interact with their located environments through intangible and tangible interactivities around them. Context-aware computing usually combines with presence service to design context-aware specific or enabling applications and services. They can make some proper decisions and adapted their providing services according to the gathering environmental contexts. For example, a PoC user has joined a PoC session. Once the user joins a significant meeting, but she/he forgets to turn off the PoC service, the meeting will be interfered by the unexpected PoC talk burst. Thus, context-aware service will automatically assist the user to turn off the PoC service while the meeting is ongoing. Once the meeting is closed, it will immediately re-enable the PoC service.

In this paper, we try to adopt context-aware mechanism and to design an IMS-based PoC service, which currently runs on Open IMS Core[5], in next generation network. The IMS-based PoC service also has combined with the capability of context-aware interaction. Thus, the PoC session will dynamically and automatically choose which members are available to join the PoC group communication according to the context statuses of group members. This service can apply to the mobile inter-vehicle commutation, mobile personal group communication, etc., to efficiently save communicating resource that wastes on unnecessary PTT voice transmission in mobile communication.

The remainder of this paper is organized as follows. Section 2 will describe some issues on IMS-based PoC service. In section 3 we will describe the design of the proposed IMS-based PoC service with context-aware interaction. Section 4 will illustrate an implementing prototype of the IMS-based PoC service with context-aware interaction playing on Open IMS Core. Finally, a conclusion will be made in Section 5.

2. Related works

In this section, we will briefly introduce IMS, Push-to-Talk, presence service, and context-aware technology including architectures, operations, and features.

2.1 The IP Multimedia Subsystem

The IP Multimedia Subsystem (IMS) primarily specified in 3GPP2[2,6] is a global, access independent and standard-based IP connectivity and service control architecture. It enables various types of multimedia services to end-users using common Internet-based protocols, such as Session Initiation Protocol (SIP), Realtime Transport Protocol (RTP), etc. Thus, IMS is a trend on network convergence of mobile and fixed network and provides uniform multimedia application services among various types of access networks in the next generation network for mobile users. Figure 2 shows generic 3GPP IMS architecture.

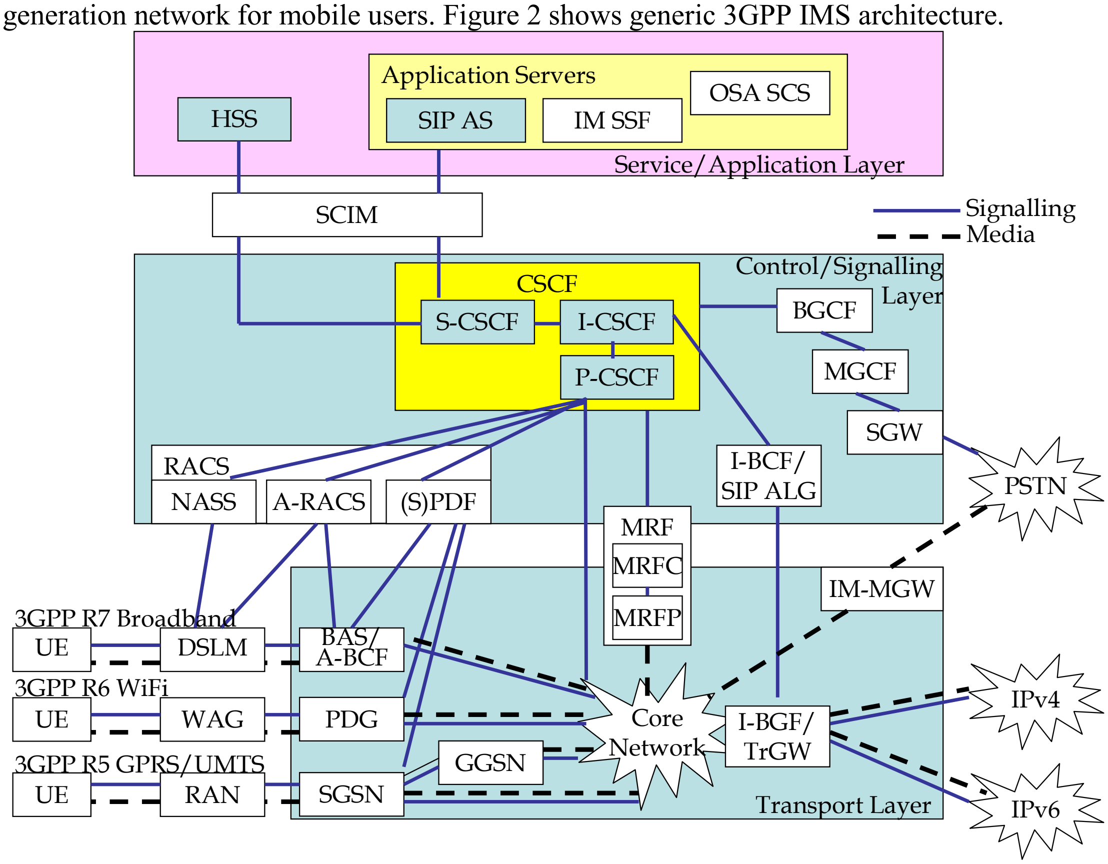


Figure 2. IMS Architecture.

From application service perspectives, the significant IMS components are Call Session Control Function (CSCF), Home Subscriber Server (HSS), and relevant Application Servers (AS). CSCF provides some management functions including user registration, session establishment and controlling, etc. There are three different kinds of CSCF: Proxy-CSCF (P-CSCF), Interrogating-CSCF (I-CSCF), and Serving-CSCF (S-CSCF). P-CSCF is the initial contact point between the users and the IMS. That is, all SIP signalling traffic from the users will be sent to P-CSCF and all terminating SIP signalling from the network is sent from P-CSCF to the users. I-CSCF is a contact point within an operator's network for all connections destined to a subscriber of the network operator. That is, it allows subscribers of the network operator, or roaming subscribers to register. S-CSCF is the focal point of the IMS for handling registration processes, making routing decisions and maintaining session states, and storing the service profiles. HSS is the main data storage for all subscriber and service-related data of IMS. It mainly stores user identities, registration information, access parameters, and service triggering information. HSS provides user-specific requirements for S-CSCF capabilities. AS is a critical element which provides the run time environment for hosting and deploying valued-added applications, and integrates with S-CSCF through defined interfaces using SIP. Therefore, if we want to we should deeply realize the operational procedures among CSCF, HSS, and AS and configure some specific filter criteria in order to ensure that designed application services can be workable in IMS.

2.2 A Generic Architecture of Push-to-Talk Service

Several PTT architectures are proposed[7,8,9]. A well-known PoC (PTT) architecture is defined by OMA[1]. It can cooperate with IP multimedia subsystem (IMS)[2,6]. OMA-based PoC architecture is very suitable to design context-aware PTT service. Figure 3 shows the main architecture of the OMA PoC service. In Figure 3, bold boxes identify PoC functional entities and dotted boxes identify logical grouping of function entities specifying the user equipment.

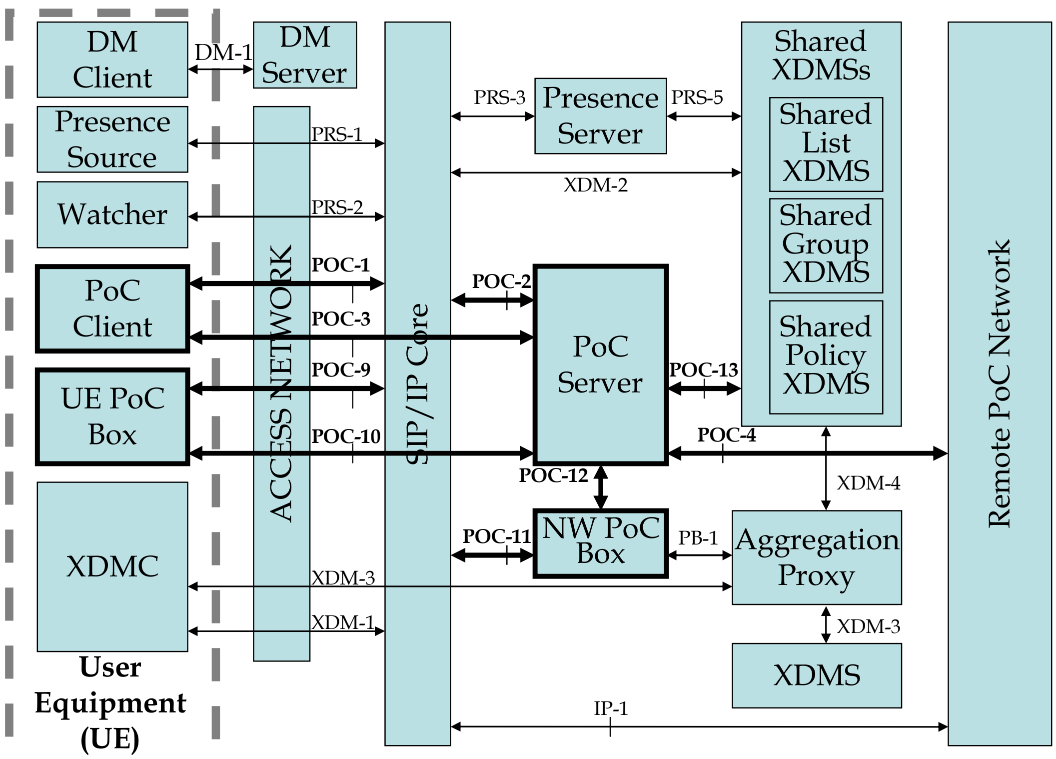


Figure 3. Components of PoC service defined by OMA.

The SIP/IP Core component is a fundamental IMS routing capability. It performs authentication, authorization, and session control functions for the end users. The detail of SIP/IP Core has been described in the previous subsection. The PoC XDMS (XML Document Management Server) stores PoC-related documents for maintaining group information and the PoC server can fetch the contact lists (e.g., the URIs of group members) from shared XDMS. A PTT user can communicate with the Aggregation Proxy for managing his/her group members and contact lists stored in PoC XDMS through XCAP (XML Configuration Access Protocol). The Aggregation Proxy is a proxy server for forwarding the PoC related requests to the PoC XDMS. XML Document Management Client (XDMC) is responsible for delivering XCAP signaling to the Aggregation Proxy. A PoC server handles PoC sessions and policy controls for PoC accesses. A Presence server is to gather and represent some context information for presence subscribers. It handles the some procedures to subscribe, publish, and notify presence information among presence entities. Besides, PoC Box is a new PoC functional entity where PoC session data and PoC session control data can be stored. Stored PoC session data may be retrieved using one of the deferred messaging enablers. That is, it is similar to voice mail service. It allows originating PoC users to leave a message to terminating users (TU) which are not available. From viewing the sketch of OMA PoC architecture, it is very easy to realize a PTT service with presence service due to the original combination of PoC and presence services in OMA, it is very easy to realize a PoC service with presence service. Therefore, we will adopt OMA PoC architecture to design an IMS-based PoC service with context-aware interaction for cooperating with the mobile and fixed All-IP communication in next generation network.

2.3 Presence Service Subscription

Presence service provides some subscribing procedures for the presence users to subscribe their desired presence information. It can seem as information notification service[3,10]. Figure 4 depicts an instance of presence service subscription. It adopts three SIP methods, SUBSCRIBE, PUBLISH, and NOTIFY, to carry out the presence operations.

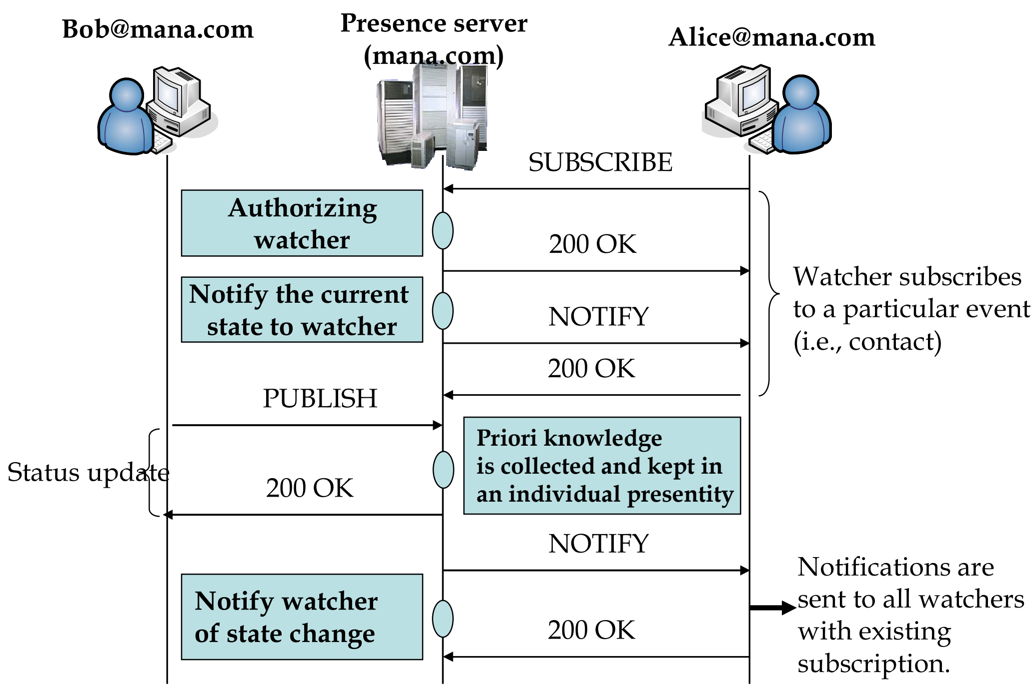


Figure 4. An instance of Presence subscription.

In Figure 4, it demonstrates two call flows: a subscription for presence information and a notification for updating presence information. The Presentity publishes the corresponding presence information to the presence server while its status is changed. The Watcher can subscribe presence information of particular subscribed users from presence server. Thus, presence server maintains all of presence information between subscribing and subscribed entities.

Presence information usually encodes into an XML-based extensible format, e.g., pidf+xml (a data format for presence using XML)[11]. It may contain arbitrary number of presence parameters (e.g., location, up-to-date user status, and maximum bandwidth usage of a given link). Therefore, it can combine presence service with PoC service to represent the conditions and situations of PoC users in IMS[12]. Thus, a PoC participant can use presence information to understand the newest statuses of other participating PoC partners and make some better and reasonable PoC conversations.

2.4 Context-Aware Computing

Context-aware computing[4,13,14] is derived ubiquitous computing paradigm in which application service can discover and take advantage of contextual information (such as user location, time of day, nearby people and devices, and user activity). Therefore, many researchers have studied this topic and built several context-aware applications and services to demonstrate the usefulness of this new technology. By the same way, context-aware computing can also apply into PoC service. Figure 5 shows a context-aware example applying to the PoC service. Assuming a PoC user enters the meeting room and makes a significant conference without interrupting by phone calls or other else conversations. Thus, A PoC talk burst will automatically be silenced or inhibit the PoC service during a meeting, if the system knows the location of the PoC user and the related meeting schedule.

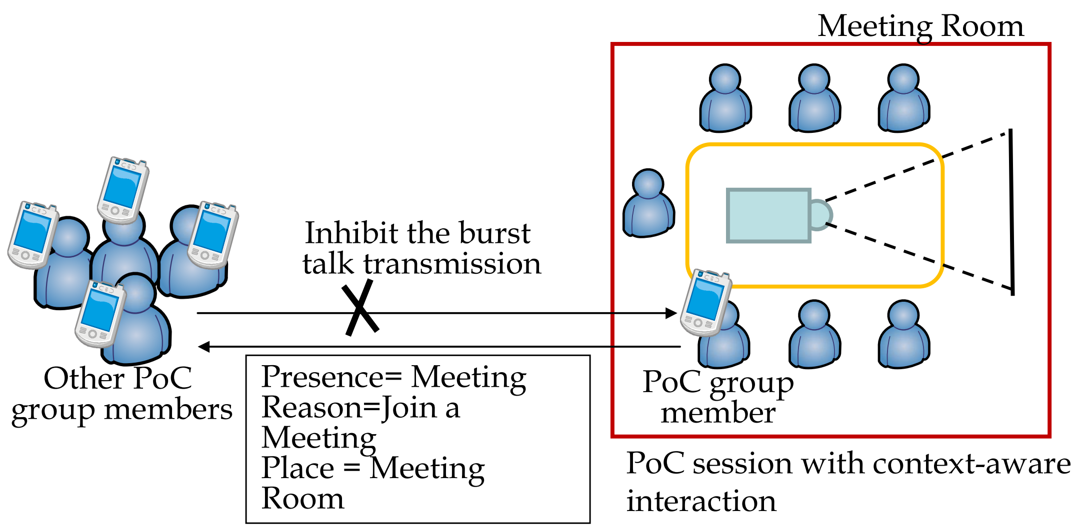


Figure 5. A Context-aware example for PoC service

It is an important issue to obtain reasonable context is an important issue. It is also a human-computer interaction problem. Some researchers adopt some sensing and interactive technologies, such as ultrasound[15,16], short and long range RFID[17,18], sensor devices[19], etc., to gather the reasonable context. Besides, the gathering context can also encapsulate into presence information. Presence service can immediately provide the latest context information to the presence subscribers. Thus, a context-aware presence service will be done well. Thus, context-awareness can widely apply into various applications and services. In this paper, we will try to integrate context-aware computing and presence service to design an IMS-based PoC Service with context-aware interaction. It hopes that the IMS-based PoC service not only plays an applicable service in next generation network, but also automatically adapts and provides a proper PoC conversation for PoC users according to context-aware information.

3. An IMS-based PoC Service with Context-Aware Interaction

In this paper, we will follow our previous research result, a context-aware PTT service, introduced in [20] to implement the IMS-based PoC service with context-aware interaction. We adopt the OMA PoC architecture and 3GPP IMS concept to design an IMS-based PoC service with context-aware interaction in order to closely cooperate with All-IP mobile network. We hope the proposed PoC service can work at the real mobile (telecommunication) and fixed networks. Figure 6 shows the architecture of our proposed IMS-based PoC service.

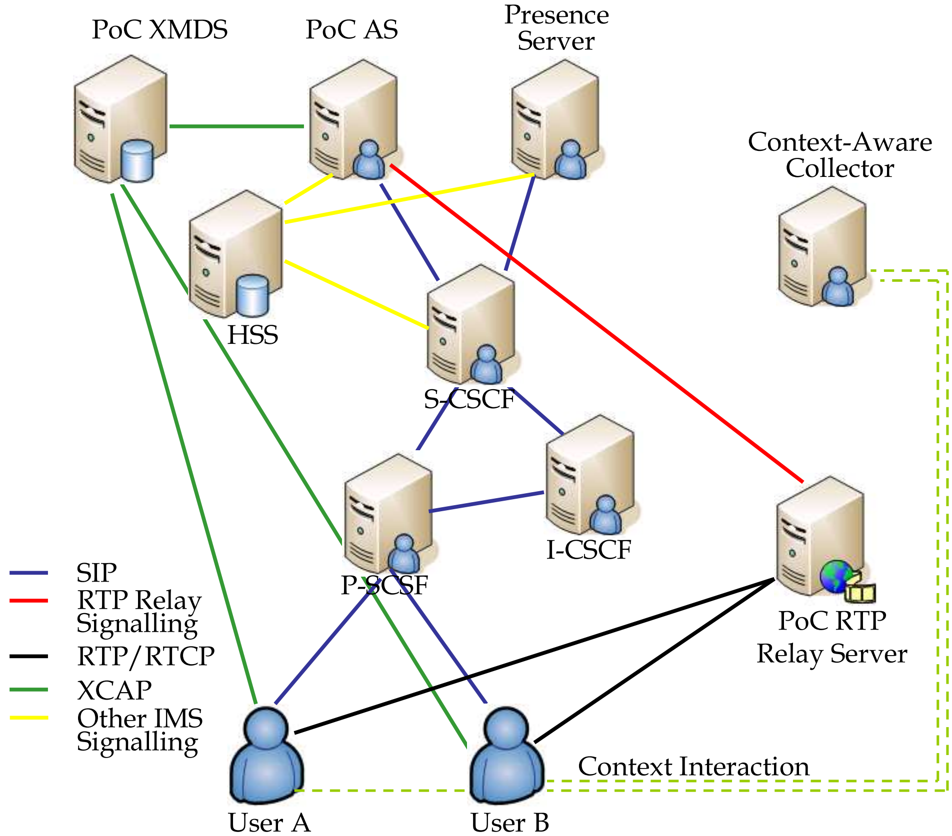


Figure 6. System Architecture of IMS-based PoC Service with Context-Aware Interaction.

There are five related SIP and non-SIP application servers, a context collector, a series of CSCF components, and a HSS in our designed PoC service with context-aware interaction. These servers and the collector use SIP, RTP/RCTP, and XCAP protocols to collaborate with others. Once a mobile user is on-line, he/she can register and acquire PoC service through a series of operational procedures among P-CSCF, I-CSCF, P-CSCF, HSS, and PoC AS according specific configuration of filter criteria for PoC service.

Presence server is responsible for handling presence subscription, publishing, and notification among presence entities. PoC XMDS stores some information for managing PoC group lists. PoC AS handles PoC sessions and their floor controls. We separate the signalling process and voice transmission of the PoC service. Thus, an additional media gateway, PoC relay server, is necessary. It can receive, duplicate, and forward the one-way PoC media streams between a PoC talker and other PoC listeners during a PoC session.

Context-aware collector is responsible for interacting with PoC users and associated entities. It gathers the newest context information after some context-aware actions, and then reports them to the users and devices. Presentity entities associated with the users and devices will update their context states and publish them to the presence server. Presence server provides the context information to PoC AS. And then PoC AS adapts its PoC service according to some context filtering rules. Figure 7 depicts a context-aware procedure in a PoC session.

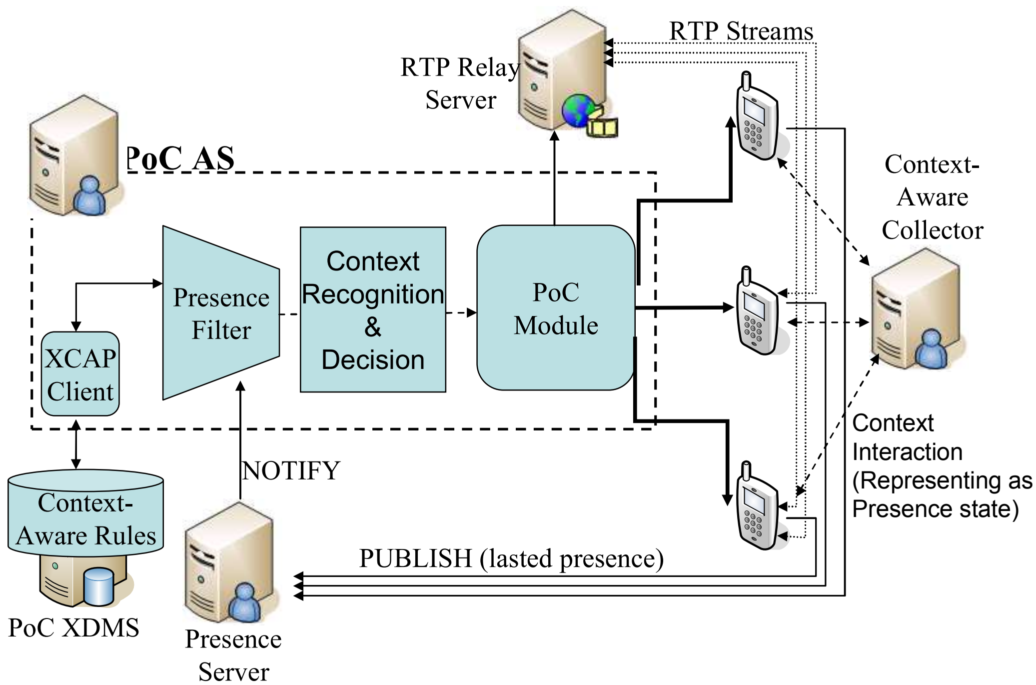


Figure 7. Context-aware procedure in IMS-basd PoC service.

Presence Filter module in PoC AS is to filter associated presence information along some context-aware rules and to make a reasonable decision to adapt the PoC service. A context-aware rule contains condition and action parts to represent context reference. For examples, if a PoC user is busy now (condition), he/she will not join a PoC session (action). If a PoC user has joined a PoC session and moves to a meeting room (condition), the talk burst will be muted (action). Thus, PoC service can apply the rules to filter out unnecessary procedures and save unnecessary media transmission for the talk burst according the decision resulting from context recognition and decision module. A PoC user can define his/her own preferred rules, and the PoC service also defines some universal rules for convenient PoC management. In order to conveniently manage context rules, the rules are formed in XML formats, stored in PoC XDMS, and accessed through XCAP. Figure 8 depicts an example of context-aware rule specified in XML format. Thus, PoC user and PoC system can configure and access the context-aware rules to make context-aware interaction during a PoC session

```xml
<?xml version="1.0" encoding="utf-8" ?>
<services>
 <service type="PoC">
  <rules>
   <rule>
    <condition>
     <who>ANY</who>
     <where>Meeting Room</where>
     <when>ANY</when>
    </condition>
    <action>
     <adaption>Temporality Stopped</adaption>
     <state>OnMeeting</state>
    </action>
   </rule>
  </rules>
 </service>
</services>
```

Figure 8. A context-aware rule speificied in XML format.

As mentioned above, context-awareness indeed assists the PoC AS to make a proper PoC service under particular contextual environments as mentioned above. Next, a brief description of implementing an IMS-based PoC service with context-aware interaction will be illustrated.

4. A Prototype Implementation of IMS-based PoC Service

In order to support IMS, we adopt the Open IMS Core [5] to be an IMS testbed in order to meet a real IMS emulating environment. At first, we installed and configure related servers, including P-CSCF, S-CSCF, I-CSCF, and HSS, from Open IMS Core. And then we implemented an IMS PoC service with context-aware interaction which contains a set of related servers and the PoC client depicted in Figure 6.

The Kphone software[21] is a open-souce SIP-based VoIP application. It has widely used to be an experimental SIP user agent (UA) or user equipment (UE) in various communicating networks. Thus, we adopt the Kphone being PoC client and IMS registration functions are inserted into the Kphone to perform a normal IMS-based user registration. Besides, we need to configure some settings, including initial filter criteria (iFC), trigger pointers, application servers, and service profiles, in HSS for creating Presence and PoC services and maintaining user profiles. Figure 9 shows a screenshot configuring PoC iFC via web interface on FOKUS HSS and Figure 10 depicts SIP message flow of a normal user registration among Kphone (PoC Client), Open IMS core, and PoC AS, respectively. SIP Express Router (SER) is an open-source SIP proxy[22]. It is also a very popular SIP server being different-type CSCFs, e.g., FOKUS open IMS core playground[23]. SER has a modular design concept, it is very easy to insert user-defined modules and provide new services. Thus, we adopt the SER to implement the Presence server, and PoC AS.

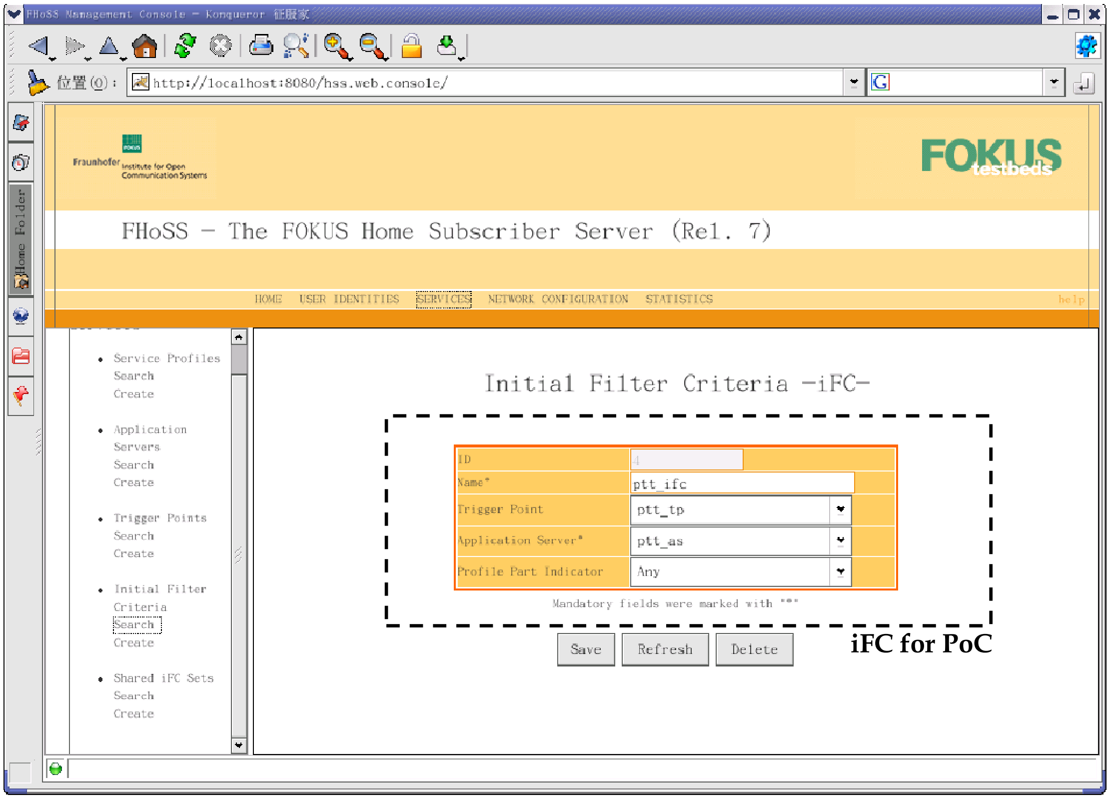


Figure 9. A Screenshot of configuring PoC iFC on FOKUS HSS.

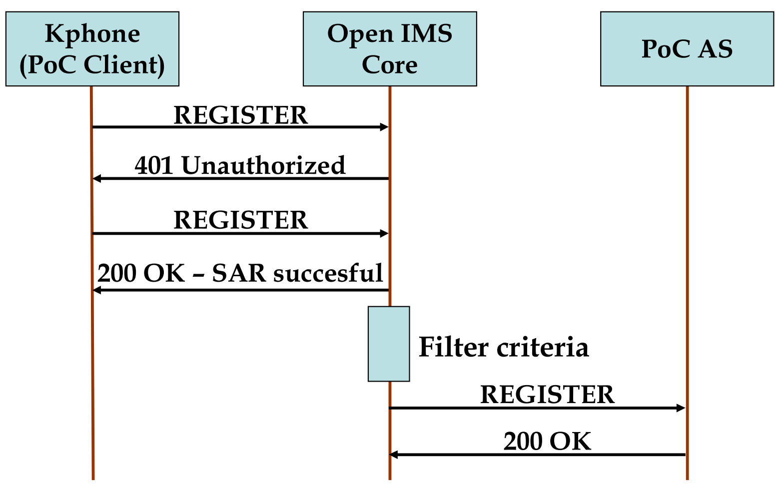


Figure 10. SIP Message Flow of a normal user registration in IMS.

We also implemented other functions such as PoC, XCAP, presence, and context-awareness abilities, to support the PoC service with context-aware interaction. Figure 11 shows a screenshot of the modified KPhone interface. It displays some PoC group information on the left (group list) window and right (presence state) window shows the latest presence state of related PoC users. The bottom buttons are used to manage the PoC groups. Besides, RTP relay server is a media gateway forwarding voice packets among PoC clients. We write a multiple socket program to support RTP delivering the duplicated media streams to participating PoC clients during PoC sessions. We have also defined some particular signals for PoC AS to control the forwarding procedures of RTP relay server in order to provide a normal PoC behavior within one-to-many and one-way voice conversation.

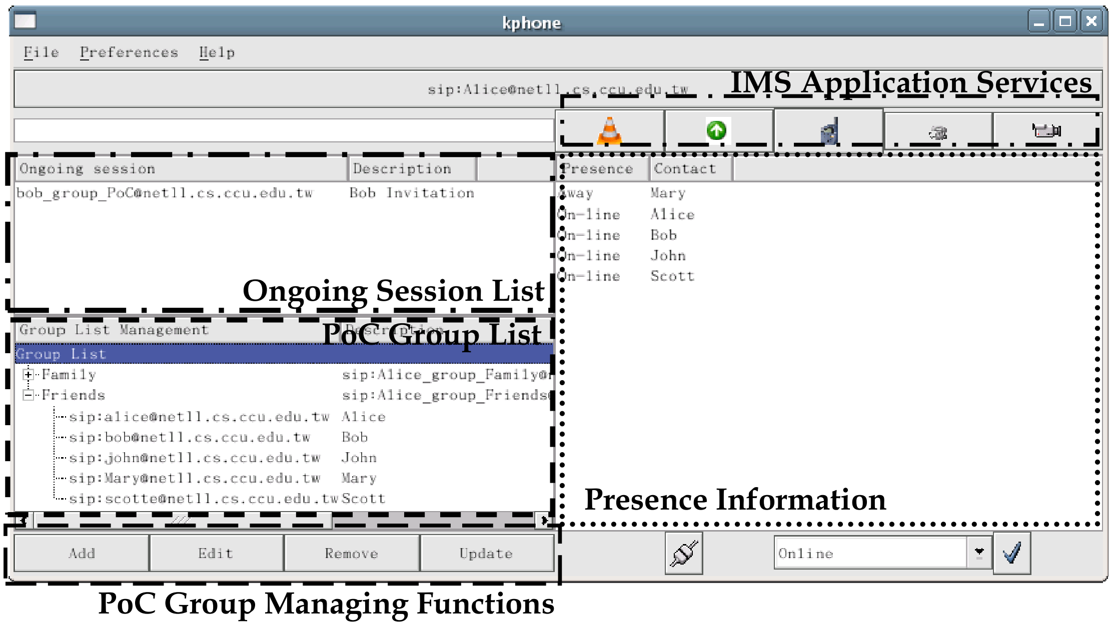
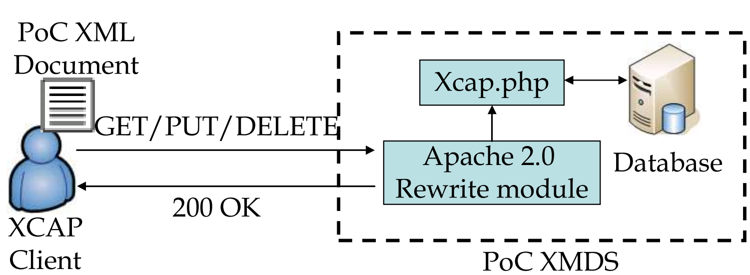


Figure 11. A screenshot of the modified Kphone interface supporting IMS.

We adopt apache web server to implement the PoC XDMS due to the design concept of XCAP based on HTTP[24]. In order to support multiple accesses, we apply dynamic webpage and rewrite module supporting apache server to design the URL redirect function for realizing the XCAP functions. Figure 12 shows the implementing architecture of PoC XDMS and XCAP URL representation.



http://hostname/xcap/services/AUID/users/User_URI/group_list.xml

AUID：org.openmobilealliance.poc-groups
User_URI：sip:user1@hostname

Figure 12. PoC XMDS Architecture and XCAP URL representation.

Our modified Kphone eventually has two VoIP communicating functions: one is a traditional one-to-one and two-way traditional VoIP service, and the other is a one-to-many and one-way particular PoC service. But these two services can not simultaneously execute due to the operating monopoly of sound device. In order to identify these two services, we follow the definitions of OMA PoC user plane and control plane in order to distinguish them. In PoC service, it embeds a specific SIP header "Accept-Context" and appends a particular suffix into the end of the "Context" header in SIP INVITE message. Figure 12 shows an example of the appending information identifying the PoC service. If the user uses the normal one-to-one VoIP service, the SIP INVIET message will not appear these particular header and suffix.

```
INVITE sip:group1@net11.cs.ccu.edu.tw SIP/2.0
Via: SIP/2.0/UDP 140.123.105.126;branch=z9hG4bK986CA7D
CSeq: 3358 INVITE
To: <sip:group1@net11.cs.ccu.edu.tw>
…
Content-Length: 231
Accept-Contact: *;+g.poc.talkburst;require;explicit
User-Agent: kphone/4.2
Contact: "Bob" <sip:Bob@140.123.105.126;transport=udp>;+g.poc.talkburst

v=0
o=username 0 0 IN IP4 140.123.105.126
s=The PoC Flow
c=IN IP4 140.123.105.126
t=0 0
```

Figure 12. Initialize a PoC session using the SIP INIVTE message.

We utilize the SIP INFO message to handle the floor control of a PoC session. We encapsulate the control signal, e.g., "Talk Burst Request (Request)", "Talk Burst Confirm Response (Granted)", and "Talk Burst Reject (Reject)", etc., into the body of SIP INFO message. Thus, PoC AS governs which one can talk or not through exchanging SIP INFO messages among related PoC clients. Figure 13 shows an example that user "Bob" gets the talk permission via SIP INFO message. Besides, we also use the SIP MESSAGE method to carry on-going PoC sessions to PoC clients due to OMA PoC service supporting ah-hoc PoC session. That is, a PoC client can actively join an established PoC session to participate PoC conversation with other PoC clients. Figure 14 illustrates a PoC user "Mary" receives a SIP MESSAGE message carrying a ongoing PoC session named "bob_group_PoC@net11.cs.ccu.edu.tw". This PoC session allows anonymity to join without any restriction. After above illustration, a complete SIP flow of PoC invitation captured by network packet analyzer (wireshark) in our proposed IMS-based PoC service is depicted in Figure 15. In Figure 15, PoC Client 1 invites PoC Client 2 to join a PoC session. After finishing PoC invitation, PoC Clients will get SIP MESSAGE messages to obtain the group list information of ongoing PoC sessions.

```
INFO sip:Mary@net11.cs.ccu.edu.tw;transport=udp SIP/2.0
Via: SIP/2.0/UDP 140.123.105.111;branch=z9hG4bKd124.7262a761.0
To: "Mary" <sip:Mary@net11.cs.ccu.edu.tw>;tag=1F452764
From: <sip:Alice_group_Friends@net11.cs.ccu.edu.tw>;tag=a6a1c5f60fa
CSeq: 1 INFO
Call-ID: 1622065351@140.123.105.126
Content-Length: 111
User-Agent: Sip EXpress router(0.9.4 (i386/linux))
```

Floor Control of Talking Token

Control Token

```
<?xml version="1.0" encoding="iso-8859-1"?>
<poc_tbcp>
 <token>Taken</token>
 <speaker img="Bob@net11.cs.ccu.edu.tw.png">Bob</speaker>
 <list>
  <member name="Bob" token="Granted"/>
  <member name="Mary" token="Taken"/>
  <member name="John" token="Taken"/>
 </list>
</poc_tbcp>
```

POC users in the same session

Figure 13. A SIP INFO message containing the PoC "Granted" token and a list of group members.

```
MESSAGE sip:Mary@net11.cs.ccu.edu.tw SIP/2.0
Via: SIP/2.0/UDP 140.123.105.116:4060;branch=z9hG4bK9e5c.08f69b92.0
Via: SIP/2.0/UDP 140.123.105.116:6060;rport=6060;branch=z9hG4bK9e5c.8128aa2.0

…

CSeq: 6290 MESSAGE
To: <sip:Mary@net11.cs.ccu.edu.tw>
Accept-Contact: *;+g.poc.talkburst;require;explicit
Content-Type: text/plain;charset=UTF-8
From: <sip:net11.cs.ccu.edu.tw>;tag=6BCBF8B3
Call-ID: 622449533@140.123.105.116
Content-Length: 70
User-Agent: kphone/4.2
Contact:<sip:net11.cs.ccu.edu.tw;transport=udp>
```

PoC OnGoing Session List

```
<?xml version="1.0" encoding="iso-8859-1"?>
<Ongoing_session>
 <list>
  <session name = "bob_group_PoC@open-ims.test"  allow_anonymity = "true"/>
</list>
</Ongoing_session>
```

Figure 14. A SIP Message message carrying the ongoing PoC session information.

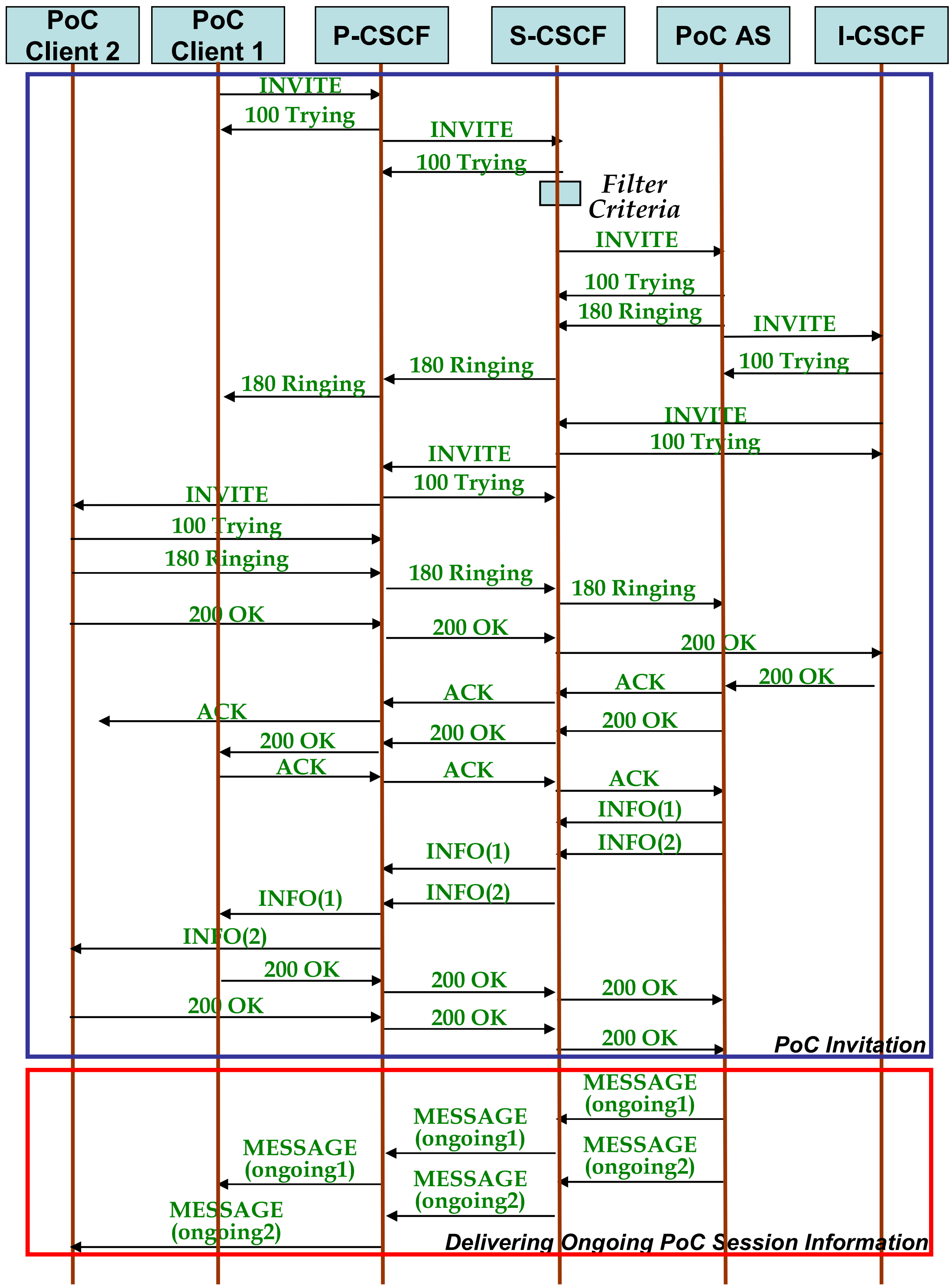


Figure 15. A complete SIP flow of PoC Invitation in our implemented IMS-based PoC .

Context-aware collector is responsible for handling context-aware interaction for the PoC service. Therefore, we adopt the long-range and active RFID solution manufactured by ActiveWave Inc.[25] to emulate the context-aware interaction. Each PoC user belts an active wristband RFID tag, and some active field generators and RFID readers are placed into the surroundings among PoC users. Context-aware collector can gather particular context states on their RFID sensing interactions to realize the context information collection according to the inference of context-aware collector. Figure 16 shows an example applying the active RFID to be a context-aware interaction.

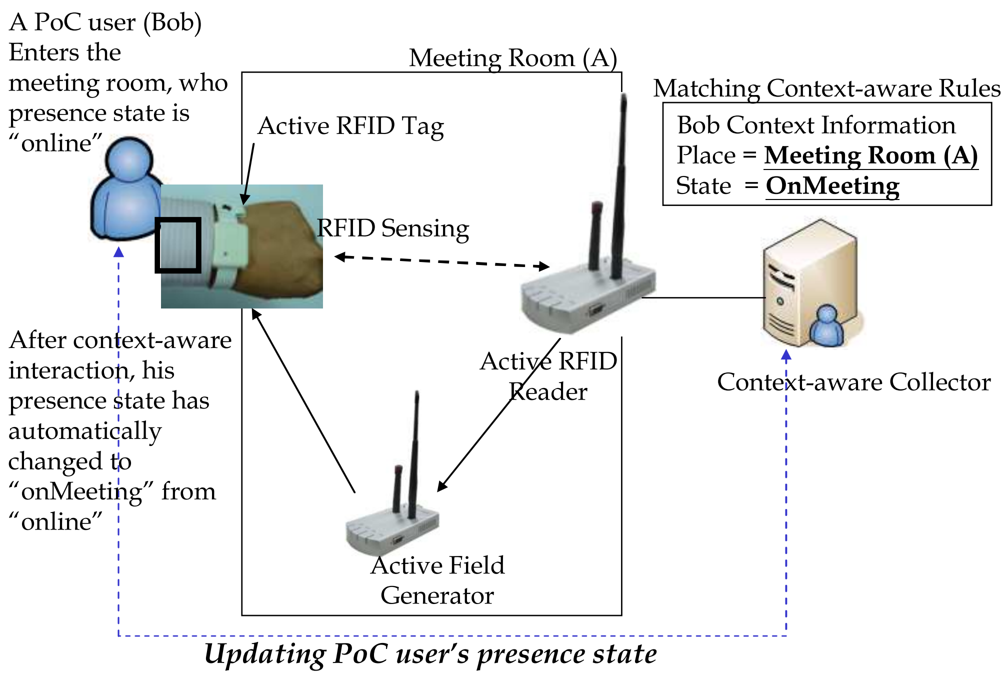


Figure 16. Using RFID to form the context-aware interaction.

In order to explain the combination of context-aware interaction and presence service, an context-aware interaction example describes in Figure 17. There are four PoC users, named PoC1, PoC2, PoC3, and PoC4. PoC1 wants to invite UA2, UA3, and UA4 to make a PTT session, but PoC4 is busy now. After context-aware interaction, PoC AS will automatically skip the PoC4 invitation according to its collecting presence information. Thus, PoC4 will not be invited to make a PoC session in order to avoid disturbing PoC4.

Finally, Figure 18 shows a screenshot of the modified Kphone interface that executes PoC service. In this PoC session, it contains five PoC members, but two members (John and Mary) will temporarily reject to join the PoC session according to their presence states ("Away" and "Meeting") shown. PoC AS will suspend and skip the associated floor control and media transmission for these two members to save some valuable bandwidth and floor controls on unnecessary PoC handling. After a while time, a PoC user (John) finishes his meeting and leaves the meeting room. Context-aware collector autonomously obtains the changes of the PoC user's context state according to the context-aware interaction. PoC user's presence information will automatically change to "online" state without his manual setting. And then the PoC user will rejoin to the previous PoC session. The result is shown in Figure 19. In additions, we also implemented a picture-based feature located at the right side of Kphone PoC interface (in Figure 18 and Figure 19) to represent who is talking now in order to realize who guy is talking in a PoC session. This way can quickly and easily assist PoC users to understand who is talking.

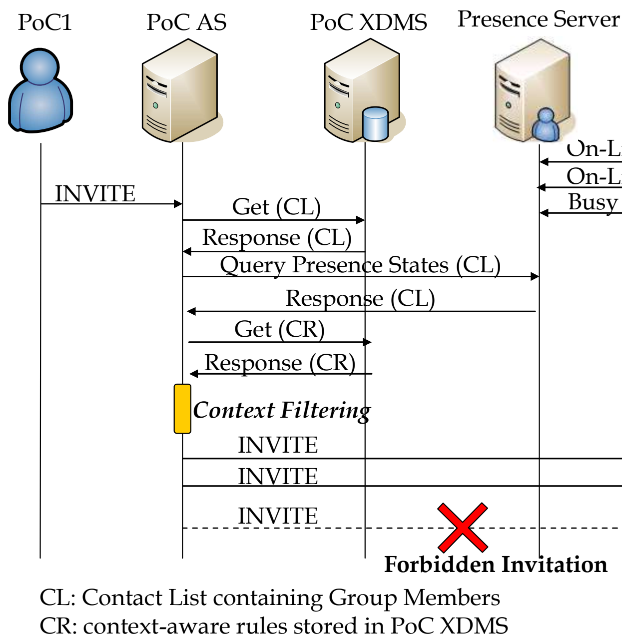


Figure 17. SIP flow for context-aware processing in PoC invitation.

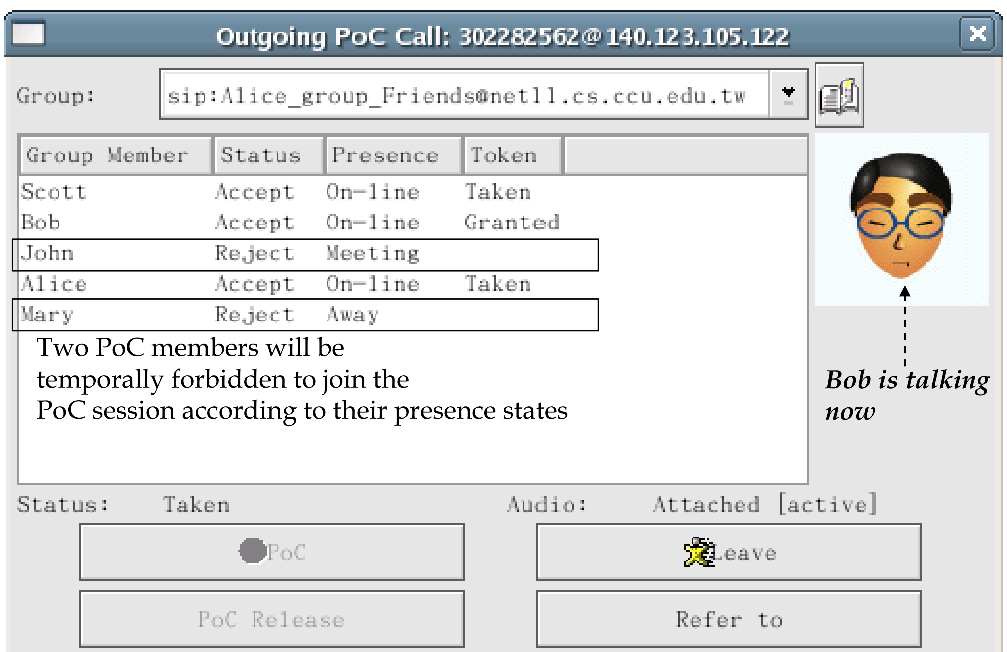


Figure 18. A screenshot of IMS-based PoC Service with Context-Aware Interaction.

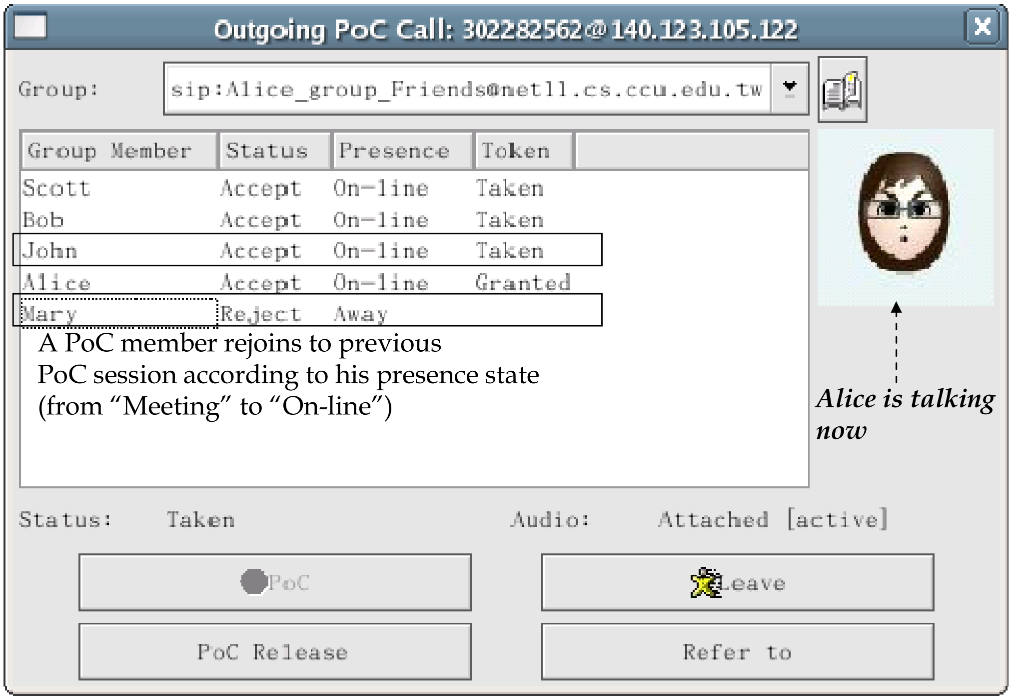


Figure 19. Another screenshot of IMS-based PoC Service with Context-Aware Interaction.

5. Conclusion

Push-to-talk is an efficient, one-way, and one-to-many multiparty voice communication. It has been widely applied in various area. It also has been a recommended standard IMS application service. Context-aware computing derived from the field of ubiquitous computing as a technique for imbuing application services with an awareness of users' surroundings and situations for achieving transparent interaction. In this paper, we have implemented an IMS-based PoC service playing on the Open IMS Core. We have also applied RFID-based context-aware interaction to realize an IMS-based PoC service with context-aware interaction. Thus, our proposed PoC service can be aware to filter context information and to form an applicable PoC session according to the current contexts of participant PoC users. By the way, our implemented context-aware PoC service can be realizedly used to play an applicable IMS application service in NGN. In the future, we hope to combine our work with the relevant VoIP and PoC functions, such as call forwarding, PoC Box, etc., in order to providing more complete context-aware functions for IMS-based PoC communication.

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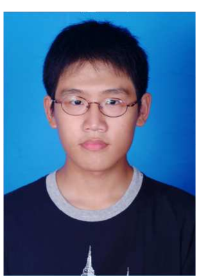
Authors

Jenq-Muh Hsu Received his M.S. and Ph.D. degrees in computer science and information engineering from National Cheng-Kung University, Taiwan, in 1993 and 1998, respectively. He joined the Department of Computer Science and Information Engineering, National Chung-Cheng University, Chia-Yi, Taiwan, in 2000, where he is now an Assistant Professor. His research interests include IMS-based application services, ubiquitous computing, and e-learning.

Wei-Bin Lain received a B.S. degree in Computer Science from Tamkang University, Tamsui, Taiwan, R.O.C, 2006. He also received a M.S. degree in Computer Science and Information Engineering, National Chung Cheng University, R.O.C, 2008. His research interests include Vehicle Mobile Network, IP Multimedia Subsystem, and Multimedia Application Service Design.

Yi-Ming Huang received the B.S. degree in Computer Science and Information Engineering from National Chung Cheng University, Chiayi, Taiwan, R.O.C., in 2007. He is currently working toward the M.S. degree in Computer Science and Information Engineering from National Chung Cheng University. His major research interests are in the area multimedia network service on IP multimedia subsystem(IMS).



Chih-Chuan Chan received the B.S. degree in computer science from National Chung Cheng University, Chia-Yi, Taiwan, R.O.C., in 2007. Currently, he is working toward the M.S. degree in Computer Science and Information Engineering at National Chung Cheng University. His research interests are in the areas of social networks and services on 3G IP multimedia network subsystem(IMS).