Presence Access Layer Specification

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1. Scope

This document provides the technical specification for the Presence Access Layer (PAL) Enabler. This includes the procedures of the PAL Client and PAL Server. This document also provides examples of detailed signalling flows between the PAL Client and the PAL Server.

2. References

2.1 Normative References

3GPP

[3GPP-TS_23.002]	3GPP TS 23.002 "Network architecture", URL: http://www.3gpp.org/ftp/Specs/archive/23_series/23.002/
[3GPP-TS_23.228]	3GPP TS 23.228 "IP Multimedia Subsystem (IMS); Stage 2", URL: http://www.3gpp.org/ftp/Specs/archive/23_series/23.228/
[3GPP-TS_24.109]	3GPP TS 24.109 "Bootstrapping interface (Ub) and network application function interface (Ua); Protocol details ; Stage 3", URL: http://www.3gpp.org/ftp/Specs/archive/24_series/24.109/
[3GPP-TS_24.229]	3GPP TS 24.229 "Internet Protocol (IP) multimedia call control protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP); Stage 3", URL: http://www.3gpp.org/ftp/Specs/archive/24_series/24.229/

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[PAL_AD]	"Presence Access Layer Architecture", Version 1.0, Open Mobile Alliance™, OMA-AD-PAL-V1_0, URL:http://www.openmobilealliance.org/
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[PAL_XDM]	"Presence Access Layer XDM Specification", Version 1.0, Open Mobile Alliance™, OMA-TS- PAL_XDM-V1_0, URL:http://www.openmobilealliance.org/
[PAP_Spec]	"Push Access Protocol", Version 2.2, Open Mobile Alliance™, OMA-TS-PAP-V2_2, URL:http://www.openmobilealliance.org/
[PAL_DDS]	"Presence Access Layer Data Specification", Version 1.0, Open Mobile Alliance™, OMA-DDS- PAL_Data_Ext-V1_0, URL: http://www.openmobilealliance.org/
[PRS_HSA]	"Home Subscription Agent (HSA) Specification", Version 1.0, Open Mobile Alliance™, OMA-TS- Presence_SIMPLE_HSA-V1_0, URL: http://www.openmobilealliance.org/
[PRS_RD]	"Presence SIMPLE Requirements", Version 2.0, Open Mobile Alliance™, OMA-RD- Presence_SIMPLE-V2_0, URL: http://www.openmobilealliance.org
[PRS_Spec]	"Presence SIMPLE Specification", Version 2.0, Open Mobile Alliance™, OMA-TS- Presence_SIMPLE-V2_0, URL:http://www.openmobilealliance.org/
[PUSH_AD]	"Push Architecture", Version 2.2, Open Mobile Alliance™, OMA-AD-Push-V2_2, URL: http://www.openmobilealliance.org/
[PUSH_CAI]	"Push Client - Application Interface", Version 1.0, Open Mobile Alliance™, OMA-TS-PushCAI-V1_0, URL: http://www.openmobilealliance.org/
[SCRRULES]	"SCR Rules and Procedures", Open Mobile Alliance™, OMA-ORG-SCR_Rules_and_Procedures, URL:http://www.openmobilealliance.org/
[XSD_palMessagePayload]	"XML Schema Definition: "PAL – Message Payload", Version 1.0, Open Mobile Alliance™, OMA-SUP-XSD_pal_messagePayloads-V1_0, URL: http://www.openmobilealliance.org/

IETF

[RFC2119]	"Key words for use in RFCs to Indicate Requirement Levels", S. Bradner, March 1997, URL: http://www.ietf.org/rfc/rfc2119.txt
[RFC2616]	"Hypertext Transfer Protocol -- HTTP/1.1", R. Fielding, June 1999, URL:http://www.ietf.org/rfc/rfc2616.txt

[RFC2617]	"HTTP Authentication: Basic and Digest Access Authentication", J. Franks, June 1999, URL:http://www.ietf.org/rfc/rfc2617.txt
[RFC3261]	"Session Initiaton Protocol (SIP)", J. Rosenberg, June 2002, URL:http://www.ietf.org/rfc/rfc3261.txt
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[RFC3862]	"Common Presence and Instant Messaging (CPIM): Message Format", G. Klyne, August 2004, URL:http://www.ietf.org/rfc/rfc3862.txt
[RFC3966]	"The tel URI for Telephone Numbers", H. Schulzrinne, December 2004, URL:http://www.ietf.org/rfc/rfc3966.txt
[RFC3986]	"Uniform Resource Identifier (URI): Generic Syntax", T. Berners-Lee, January 2005, URL:http://www.ietf.org/rfc/rfc3986.txt

2.2 Informative References

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[OMADICT]	"Dictionary for OMA Specifications", Version 2.8, Open Mobile Alliance™, OMA-ORG-Dictionary-V2_8, URL: http://www.openmobilealliance.org/
[PRS_AD]	"Presence SIMPLE Architecture", Version 2.0, Open Mobile Alliance™, OMA-AD-Presence_SIMPLE-V2_0, URL: http://www.openmobilealliance.org/
[XDM_AD]	"XML Document Management Architecture", Version 2.0. Open Mobile Alliance™. OMA-AD-XDM-V2_0, URL: http://www.openmobilealliance.org/
[XDM_Core]	"XML Document Management (XDM) Specification", Version 2.0, Open Mobile Alliance™, OMA-TS-XDM_Core-V2_0, URL:http://www.openmobilealliance.org/

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[RFC3265]	"Session Initiation Protocol (SIP)-Specific Event Notification", A. B. Roach, June 2002, URL:http://www.ietf.org/rfc/rfc3265.txt

3. Terminology and Conventions

3.1 Conventions

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [RFC2119].

All sections and appendixes, except "Scope" and "Introduction", are normative, unless they are explicitly indicated to be informative.

3.2 Definitions

Client	Use definition from [XDM_Core].
Class of Service	Use definition from [PAL_RD].
Delegated Subscription	Use definition from [PRS_RD].
Enabler	Use definition from [OMADICT].
Interface	Use definition from [OMADICT].
Logical Observer	Use definition from [PAL_RD].
Notifier	Use definition from [RFC3265].
PAL Client	Use definition from [PAL_RD].
PAL Policy	Use definition from [PAL_RD].
PAL Presence Parameters	Use definition from [PAL_RD].
PAL Profile	Use definition from [PAL_RD].
PAL Rules	Use definition from [PAL_RD].
PAL Server	Use definition from [PAL_RD].
PAL Service	Use definition from [PAL_RD].
Presence Aspect	Use definition from [PAL_RD].
Presence Aware Service	Use definition from [PAL_RD].
Presence Context	Use definition from [PAL_RD].
Presence Information	Use definition from [PRS_RD].
Presence List	Use definition from [PRS_AD].
Presence Service	Use definition from [PRS_RD].
Presence Trigger	Use definition from [PAL_RD].
Presentity	Use definition from [PRS_RD].
Primary Principal	Use definition from [XDM_Core].
Principal	Use definition from [XDM_Core].
Service XUI	Use definition from [PAL_XDM]
Subscriber	Use definition from [PRS_AD].
XDM Agent	A trusted XDMC as described in [XDM_AD] Section "*XDM Functional Entities*".
Watcher Information	Use definition from [PRS_RD].

3.3   Abbreviations

3GPP	3rd Generation Partnership Program
AS	Application Server
HSA	Home Subscription Agent
HTTP	Hypertext Transfer Protocol
IETF	Internet Engineering Task Force
IM	Instant Messaging
IMS	IP Multimedia Subsystem
MIME	Multipurpose Internet Mail Extensions
OMA	Open Mobile Alliance
OMNA	Open Mobile Naming Authority
PAL	Presence Access Layer
PS	Presence Server
SCR	Static Conformance Requirement
S-CSCF	Serving Call Session Control Function
SIP	Session Initiation Protocol
UE	User Equipment
URI	Uniform Resource Identifier
URL	Uniform Resource Locator
XCAP	XML Configuration Access Protocol
XDM	XML Document Management
XDMS	XDM Server
XML	eXtensible Markup Language
XSD	XML Schema Definition
XUI	XCAP User Identifier

4. Introduction

This technical specification provides the procedures for the Presence Access Layer (PAL) Enabler utilizing the PAL-1i Interface as described in [PAL_AD].

Presence Aware Services may provide enhanced and personalised functionality on behalf of subscribers. This includes adapting the Presence Aware Service to facilitate the ad-hoc nature of mobile communications (e.g. mobile device user is engaged with other parties or in other activities; a mobile device user is unwilling or unable to communicate because they are in a meeting, etc.). The Presence Access Layer Enabler is focused on providing both Presence Aware Services and Class of Services, with simplified and compact presence indications in the form of Presence Aspects.

The PAL Enabler provides IMS and non-IMS network protocol mappings for PAL specified Interfaces. This enables PAL Clients, whether deployed on a UE or an AS, to request and/or receive perspective views of Presence and/or Watcher Information relative to a Presence Aware Service or Class of Service. The PAL Enabler relies on PAL Rules to process Presence and/or Watcher Information received from OMA SIMPLE Presence. This ensures that PAL Clients are able to receive and project determinate and consistent presence status indicators for applications associated with a Presence Aware Service or Class of Service.

4.1 Version 1.0

The PAL version 1.0 specification comprises the basic functionality for providing PAL service, which includes specifying procedures for:

- PAL authorization;
- PAL Presence Context establishment for a Presence Aware Service or Class of Service;
- Request Presence Aspects for one or more Presentities associated with a Presence Context;
- Receiving the results of a Presence Trigger predefined action (e.g. an asynchronous notification); and
- Suspend and resume the request/receipt of Presence Aspects associated with a Presence Context.

5.   PAL Functional Components

The PAL Enabler consists of the following functional components as described in [PAL_AD] section "*PAL Functional Components and Interfaces*":

- •   PAL Client;

- •   PAL Server; and

- •   PAL XDMS.

5.1   PAL Client

A PAL Client is an entity that receives and makes use of Presence Context i.e. is context aware. A Presence Context provides a PAL Client with a perspective view of Presence and/or Watcher Information, to fulfill underlying functionality of an application associated with a Presence Aware Service or Class of Service. A PAL Client may be implemented in a UE, or within a network entity.

PAL Clients SHALL be identified as described in section 6.2.1.1 "*PALPresenceContextRequest*".

5.1.1   General

A PAL Client:

- •   SHALL request to establish or terminate a Presence Context based on a Presence Aware Service or Class of Service;

- •   SHALL request to receive and make use of, relative to a specified Presence Context, Presence Aspect values;

- •   SHALL request to suspend or resume receipt of Presence Aspect values associated with a Presence Context, where required;

- •   SHALL be able to receive the result of a predefined action based on a detected Presence Aspect value change, corresponding to a Presence Trigger; and

- •   SHALL be able to retrieve Presence Aspects and Presence Triggers.

5.1.2   Presence Context Establishment

A PAL Client SHALL support requesting the establishment of a Presence Context from a PAL Server. PAL Clients requesting establishment of a Presence Context SHALL include parameters in the Presence Context Establishment request as described in section 6.2.1.1 "*PALPresenceContextRequest*".

A successful Presence Context establishment request SHALL be received by a requesting PAL Client as described in section 6.2.1.2 "*PALPresenceContextResponse*".

5.1.3   Presence Context Termination

A PAL Client SHALL terminate a Presence Context from a PAL Server, when it no longer wishes to request or receive Presence Aspects for a given Presence Aware Service or Class of Service. PAL Clients requesting termination of a Presence Context SHALL include parameters in the Presence Context Termination request as described in section 6.2.2.1 "*PALPresenceContextTerminateRequest*".

A successful Presence Context termination request SHALL be received by a requesting PAL Client SHALL as described in section 6.2.2.2 "*PALPresenceContextTerminateResponse*". A Presence Context which is successfully terminated SHALL be undefined to a PAL Client. That is, a PAL Client SHALL not be able to request nor receive Presence or Watcher Information corresponding to a terminated Presence Context.

5.1.4   Requesting specific Presence and/or Watcher Information

PAL Clients requesting specific Presence and/or Watcher Information for one or more Presentities relative to a Presence Context, SHALL issue a Presence Aspect request to a PAL Server. A PAL Client requesting Presence Aspect values associated with a Presence Context SHALL include parameters in a Presence Aspect request as described in section 6.2.3.1 "*PALPresenceAspectRequest*".

A successful request for specific Presence and/or Watcher Information of one or more Presentities relative to a Presence Context SHALL be received by a requesting PAL Client as described in section 6.2.3.2 "*PALPresenceAspectResponse*".

5.1.5   Suspend receipt of Presence Aspects

PAL Clients requesting to suspend the receipt of Presence Aspect values associated with a Presence Context SHALL suspend a Presence Context to a PAL Server. PAL Clients suspending the receipt of Presence Aspect values associated with a Presence Context SHALL include parameters in the Presence Context suspend request as described in section 6.2.4.1 "*PALSuspendPCRequest*".

A Presence Context SHALL be suspended on behalf of a PAL Client based on a successful suspend request, as described in section 6.2.4.2 "*PALSuspendPCResponse*". A suspended Presence Context SHALL not permit a PAL Client to receive Presence Aspect values, in response to a PAL Presence Aspect request. Further, a suspended Presence Context SHALL suspend receipt of predefined actions corresponding to applicable Presence Triggers (e.g. a PAL Client receiving an asynchronous notification).

NOTE: Procedures relating to a subsequent suspend request, by a PAL Client, for a Presence Context already in the 'suspended' state are as described in section 5.2.8 "Presence Context Suspend Procedures".

5.1.6   Resume receipt of Presence Aspects

PAL Clients requesting to resume the receipt of Presence Aspect values associated with a Presence Context SHALL resume a Presence Context to a PAL Server. PAL Clients resuming receipt of Presence Aspect values associated with a Presence Context SHALL include parameters in the Presence Context resume request as described in section 6.2.4.3 "*PALResumePCRequest*".

A Presence Context SHALL be resumed on behalf of a PAL Client based on a successful resume request, as described in section 6.2.4.4 "*PALResumePCResponse*". A resumed Presence Context SHALL permit the PAL Client to receive Presence Aspect values, in response to a PAL Presence Aspect request. Further, a resumed Presence Context SHALL re-initiate the receipt of predefined actions corresponding to applicable Presence Triggers (e.g. a PAL Client receiving an asynchronous notification).

In scenarios whereby a suspended Presence Context has a finite suspend duration which has expired (i.e. a Presence Context is now in the 'active' state), a PAL Client SHALL be able to receive and process subsequent asynchronous notifications containing Presence Aspect values as a result of a Presence Trigger predefined action for the resumed Presence Context.

NOTE: Procedures relating to the subsequent resume request, by a PAL Client, for a Presence Context already in the 'active' state are as described in section 5.2.9 "Presence Context Resume Procedures".

5.1.7   Presence Trigger Predefined Action

PAL Clients SHALL be able to receive the result of an associated Presence Trigger predefined action e.g. receive an asynchronous notification containing a detected Presence Aspect value change.

Notifications received by a PAL Client as part of a Presence Trigger predefined action SHALL contain information as described in section 6.2.5.1 "*PALPresenceAspectNotify*".

5.2 PAL Server

A PAL Server is an entity that accepts requests and provides functions on behalf of a PAL Client e.g. providing Presence Aspect values relative to a given Presence Context.

A PAL Server SHALL be implemented within a core network as an AS.

If a core network corresponds with a 3GPP IMS network, a PAL Server SHALL be implemented in an AS as described in [3GPP-TS_23_002].

5.2.1 General

A PAL Server SHALL:

- Authenticate and authorize PAL Clients;

- Be able to function within the core network as an HSA;

- Resolve policy to support the consolidation of Presence and/or Watcher Information provided to a PAL Client;

- Provide an interface with which a PAL Client is able to establish and terminate a Presence Context based on a Presence Aware Service or Class of Service;

- Provide an interface with which a PAL Client is able to request and/or receive Presence Aspects i.e. as described in [PDE_DDS] Section "*Presence Aspect Definitions*", relative to a given Presence Context;

- Provide an interface with which a PAL Client is able to suspend or resume a given Presence Context; and

- Provide a mechanism for establishing and monitoring Presence Triggers applicable to a given Presence Context and for executing predefined actions when Presence Aspects corresponding to a Presence Trigger have changed.

5.2.2 Authentication and authorization

The PAL Enabler SHALL support authentication as described in section 6.3 "*Protocol Bindings*".

5.2.2.1 Authorization

A PAL Server SHALL authorize requests received by authenticated PAL Clients over the PAL-1i interface, as follows:

- Authorize the use of the Presence Service prior to initiating a subscription on behalf of authenticated PAL Clients as described in [PRS_HSA] Section "*Subscription Service Authorization*".

If authorization for a requestor fails, an appropriate protocol-level error response SHALL be sent by a PAL Server in response to the request as described in section 6.3 "*Protocol Bindings*".

5.2.3 PAL Server as an HSA

In the context of the PAL Enabler, a PAL Server SHALL be able to function as an HSA within the core network, as described in [PRS_HSA]. A PAL Server functioning as an HSA SHALL support the following capabilities:

- Authorize a Subscriber's service from PAL Clients;

- Initiate subscriptions on behalf of PAL Clients (i.e. Delegated Subscriptions);

- Limit the number of subscriptions for the Subscriber (i.e. on behalf of a PAL Client); and

- Request the Notifier (i.e. the PS) to regulate notification traffic.

5.2.4   PAL Policy Resolution

PAL Policy SHALL represent base (i.e. default) PAL Policy types/values for use by a PAL Server. A PAL Server SHALL apply base PAL Policy types/ values, while invoking PAL Rules, in order to consolidate Presence and/or Watcher Information. Consolidated Presence and/or Watcher Information provide PAL Clients with determinate, consistent Presence Aspects for a given Presence Aware Service or Class of Service. PAL Policy types and values are as described in [PAL_DDS] Section "*PAL Policy Definitions*".

A Logical Observer (e.g. a PAL Client) may be unable to correctly establish determinate Presence Aspect values, in scenarios whereby an entity (e.g. a Presentity) publishes Presence or Watcher Information to a PS as described in [PRS_Spec] Section "*Presence Information Processing*". Reasons for this may include one or more of the following:

- • Presentity or Watcher omits a publication (either in whole, or in part) when status changes;

- • Presentity or Watcher publishes correct Presence or Watcher Information, however resulting composite Presence or Watcher Information published to the PS, results in indeterminate states associated with a Presence Aspect; or

- • Authorization policy results in indeterminate Presence Information provided to a Logical Observer (e.g. a Watcher or PAL Client).

A PAL Server SHALL examine the following attributes to resolve base PAL Policy:

- • Presence Aware Service or Class of Service Identifier.

A PAL Server MAY optionally utilize other information to resolve base PAL Policy, including:

- • Presence Service description identifier (i.e. OMNA Presence <service-description> Registry as described in [OMNA_SVC]);

- • PAL Client identifier.

- • An arbitrary group identifier, to which a PAL Client is determined to be a member; or

- • A local timestamp associated with a Presence Context establishment request made by a PAL Client to a PAL Server.

    NOTE: The mechanisms used to resolve PAL Policy types/values is not in scope of the PAL Enabler.

5.2.5   Presence Context Establishment procedures

A PAL Server SHALL receive Presence Context establishment requests from PAL Clients. An appropriate Presence Context SHALL be established by a PAL Server on behalf of a PAL Client, for a specified Presence Aware Service or Class of Service.

During Presence Context establishment, a PAL Server:

1) SHALL authorize the PAL Client who initiated a Presence Context establishment request, as described in section 5.2.2 "*Authentication and authorization*";

2) SHALL process Presence Context establishment request parameters as described in section 6.2.1.1 "*PALPresenceContextRequest*";

3) SHALL generate a unique Presence Context identifier associated with the requesting PAL Client; and

4) SHALL establish Presence Context by resolving applicable PAL Presence Parameters contained within a PAL Profile for a Service XUI provided as part of the Presence Context establishment request:

   a) SHALL resolve applicable Presence Aspects as named aspects (e.g. 'contactable') and incorporate these into the Presence Context specified by the Presence Context identifier;

   b) SHALL resolve Presence Triggers and a monitoring duration, for each named Presence Aspect established in the previous step (e.g. 'onContactable' corresponding with Presence Aspect 'contactable') and incorporate

these into the Presence Context specified by the Presence Context identifier (i.e. the Presence Context represented by Presence Context identifier is considered monitoring capable);

    c)   SHALL refer to PAL Rules from within the Presence Context, required to support the evaluation of Presence Aspects, and Presence Triggers established in the previous step; and

    d)   SHALL resolve base policy as described in section 5.2.4 "*PAL Policy Resolution*", and associate resolved PAL Policy with the Presence Context specified by the Presence Context identifier.

5) SHALL incorporate, as part of the response, a Presence Context identifier corresponding to the established Presence Context, and if requested a verbose description of the resolved Presence Context, including resolved PAL Presence Parameters;

6) SHALL evaluate Presence Aspects as described in section 5.2.7 "*Requesting specific Presence Information - procedures*", if Presentities are provided by a PAL Client in the Presence Context establishment request;

7) SHALL incorporate any Presence Aspects evaluated as part of the Presence Context establishment response; and

8) SHALL provide a Presence Context response to the PAL Client as described in section 6.2.1.2 "*PALPresenceContextResponse*".

5.2.6   Presence Context Termination procedures

A PAL Server SHALL be able to receive Presence Context termination requests from PAL Clients. The corresponding Presence Context SHALL be terminated by a PAL Server on behalf of a requesting PAL Client.

During Presence Context termination, a PAL Server:

1) SHALL authorize the PAL Client who initiated the Presence Context termination request, as described in section 5.2.2 "*Authentication and authorization*";

2) SHALL process Presence Context termination request parameters as described in section 6.2.2.1 "*PALPresenceContextTerminateRequest*";

3) SHALL process and respond to appropriate outstanding PAL Client requests for an 'active' Presence Context being terminated;

4) SHALL place the corresponding Presence Context into a 'terminated' state (i.e. unable to process PAL Client requests, and unable to monitor and execute pre-defined actions associated with applicable Presence Triggers referred to by the terminated Presence Context for an indefinite period); and

5) SHALL acknowledge receipt to a PAL Client, of the associated Presence Context termination request as described in section 6.2.2.2 "*PALPresenceContextTerminateResponse*".

Requests to terminate a Presence Context SHALL take precedence over a Presence Context that is being placed or is currently in a 'suspended' state. Outstanding PAL Client requests for a Presence Context being terminated, that is already in the 'suspended' state SHALL be ignored (i.e. they are not processed, nor are they responded to, by a PAL Server).

5.2.7   Requesting specific Presence and/or Watcher Information - procedures

A PAL Server SHALL receive requests for specific Presence and/or Watcher Information in the form of Presence Aspects from PAL Clients, relative to a specified Presence Context.

A PAL Server, when processing a request for specific Presence and/or Watcher Information:

1. SHALL authorize the PAL Client who initiated the Presence Aspect request as described in section 5.2.2 "*Authentication and authorization*";

2. SHALL establish a level of QoS corresponding to the indicated Presence Context;

3. SHALL process requested Presence Aspect parameters as described in section 6.2.3.1 "*PALPresenceAspectRequest*":

   a) SHALL ensure requested Presence Aspects correspond to Presence Aspects defined as part of the indicated Presence Context; and

   b) SHALL identify any Presence Triggers corresponding to the requested Presence Aspects (i.e. the indicated Presence Context is now monitoring Presence Triggers), if the given Presence Context is determined to be monitoring capable.

4. SHALL prepare to establish a subscription towards a PS for the Presence and/or Watcher Information of indicated entities (e.g. a Presentity) as described in [PRS_Spec] Section "*Subscription to Presence Information*", including monitoring of applicable Presence Triggers, if the indicated Presence Context is determined to be monitoring capable (i.e. based on preceding steps). The PAL Server:

   a) SHALL evaluate parameter 'Duration' to establish the length of time a PAL Server monitors Presence Triggers for indicated Presentities - i.e. when establishing the subscription toward the PS, as described in [PRS_Spec] Section "*General Procedures*";

   b) SHALL evaluate parameter 'Priority' along with the established level of QoS to determine a frequency at which a PAL Server may receive notifications from a PS - i.e. when establishing the subscription toward the PS as described in [PRS_Spec] Section "*Event Notification Throttling*"; and

   c) SHALL evaluate parameter 'InterestLevel' along with the established level of QoS to determine the granularity of information (i.e. a level of detail) transmitted by a PS to a PAL Server – i.e. when establishing a subscription toward the PS, as described in [PRS_Spec] Section "Event Notification Filtering".

5. SHALL process resulting event notifications received from a PS as a result of one or more subscriptions established by the PAL Server in the preceding step, including:

   a) SHALL resolve applicable PAL Rules and Policy based on PAL Presence Parameters enumerated by by the specified Presence Context, and local PAL Rules and Policy corresponding to the requesting PAL Client.

6. SHALL invoke PAL Rules utilizing PAL Policy determined from the preceding step to evaluate and consolidate Presence and/or Watcher Information in the form of Presence Aspects; and

7. SHALL return consolidated Presence Aspects corresponding to a request for specific Presence and/or Watcher Information as part of a PAL Presence Aspect response.

During the evaluation of Presence Aspects, a PAL Server SHALL identify and resolve any conflicts in Presence and/or Watcher Information which may result in indeterminate or inconclusive Presence Aspect values. For example, a PAL Server during rules processing SHALL identify an inconclusive Presence Aspect value, and automatically resolve a Presence Aspect based on applicable PAL Policy.

A PAL Server which is monitoring a given Presence Context, and detects a change to a baseline Presence Aspect value corresponding to one or more applicable Presence Triggers SHALL perform the steps described in section 5.2.10 "*Presence Trigger predefined action procedures*".

5.2.8   Presence Context Suspend procedures

A PAL Server SHALL receive Presence Context suspend requests from PAL Clients as described in section 6.2.4.1 "*PALSuspendPCRequest*".

During Presence Context suspension, a PAL Server:

1) SHALL authorize a PAL Client who initiated the Presence Context suspend request, as described in section 5.2.2 "*Authentication and authorization*";

2) SHALL utilize local policy or configuration to determine how Presence and/or Watcher Information updates are to be treated by a PAL Server, on behalf of a PAL Client, during the Presence Context suspend period (i.e. while a Presence Context is in the 'suspended' state). A PAL Server SHOULD perform one of the following t steps:

a) Collect and update Presence Aspect values and queue predefined actions of applicable Presence Triggers which have been invoked, for a suspended Presence Context, based on Presence and/or Watcher Information received; or

b) Maintain existing Presence Aspect values and discard predefined actions of applicable Presence Triggers which have been invoked, for a suspended Presence Context, based on Presence and/or Watcher Information received.

3) SHALL calculate an appropriate suspend duration for use with the Presence Context suspend duration timer, based on parameters provided as part of the suspend request;

4) SHALL initiate a Presence Context suspend duration timer corresponding to the suspend duration calculated in the preceding step; and,

5) SHALL acknowledge receipt to a PAL Client, of the associated Presence Context suspend request as described in section 6.2.4.2 "*PALSuspendPCResponse*".

NOTE: Local policy or configuration may be utilized by a PAL Server to aid in the establishment of a suspend duration for a Presence Context.

5.2.9   Presence Context Resume procedures

A PAL Server SHALL receive Presence Context resume requests from PAL Clients as described in section 6.2.4.3 "*PALResumePCRequest*".

A PAL Server SHALL automatically initiate resumption of a previously suspended Presence Context, without the receipt of a Presence Context resume request, when the Presence Context suspend duration timer has expired, as described in section 5.2.8 "*Presence Context Suspend Procedures*".

During Presence Context resumption, a PAL Server:

1) SHALL authorize the PAL Client who initiated a Presence Context resume request, as described in section 5.2.2 "*Authentication and authorization*";

2) SHALL verify that the indicated Presence Context is currently in the 'suspended' state;

3) SHALL acknowledge receipt to a PAL Client, of the associated Presence Context resume request as described in section 6.2.4.4 "*PALResumePCResponse*"; and

4) SHALL execute predefined actions of queued Presence Triggers corresponding to the active Presence Context, if so required.

A PAL Server that receives a Presence Context resume request from an authorized PAL Client which refers to a Presence Context already in the 'active' state SHALL issue an appropriate service error response to the PAL Client, as described in section 6.2.6 "*PAL-1i error processing*".

5.2.10   Presence Trigger predefined action procedures

A PAL Server, which has one or more 'monitoring' Presence Contexts and receives notifications from a PS on behalf of PAL Clients:

1) SHALL process resulting notifications received from a PS based on established subscriptions, as described in steps 4-6 of section 5.2.7 "*Requesting specific Presence Information - procedures*";

2) SHALL identify or reference, based on the results of the preceding step, 'non-terminated' Presence Contexts which are currently monitoring Presence Triggers, and for which we have evaluated updated Presence Aspect values. For each of these identified Presence Contexts, the PAL Server:

a) SHALL determine whether Presence Aspect values of applicable Presentities associated with the 'monitoring' Presence Context have changed (i.e. evaluated Presence Aspect values differ from currently established baseline Presence Aspects); and,

b) SHALL execute the predefined action corresponding to the Presence Trigger for Presence Aspects which are detected to have changed for Presentities associated with the 'monitoring' Presence Context (e.g. predefined action is to notifiy a PAL Client of changes to one or more Presence Aspects associated with the Presence Context, as described in section 6.3.4.2 "*PAL Server operating as a PI*").

3) SHALL re-evaluate each 'monitoring' Presence Context currently in a 'non-terminated' state to determine whether monitoring should continue, based on specific factors (e.g. duration, a 'monitoring' Presence Context has been requested to terminate, etc.); and,

4) SHALL repeat the procedure beginning at step 1, if the results of the preceding step identify the existence of one or more 'monitoring' Presence Contexts and notifications from a PS have been received. Otherwise, all currently 'non-terminated' Presence Contexts are considered non-monitoring (i.e. monitoring capable, but not actively monitoring) Presence Contexts.

NOTE: Monitoring Presence Triggers by a PAL Server proceeds for any Presence Context that is monitoring capable (i.e. has at least one Presence Trigger defined for a corresponding Presence Aspect within the Presence Context), and the Presence Context is currently in the 'active' or 'suspended' state.

6. PAL Client/Server Interaction

This section specifies the interaction between a PAL Client and PAL Server over PAL Interfaces described in [PAL_AD] Section "*PAL Functional Components and Interfaces*", including a detailed description of message parameters exchanged.

6.1   PAL-1i Message Parameters

The following table provides detailed descriptions of common PAL-1i interface message parameters included as part of supported request/response messages detailed in section 6.2 "*PAL-1i Interface*". These message parameters may also be referred to in other portions of this document.

Parameter name	Description
PresenceAspect	Used to identify a Presence Aspect, e.g. 'contactable' as described in [PDE_DDS] Section "*Presence Aspect Definitions*".
PresenceContextID	A canonical identifier (e.g. a URI) associated with a Presence Context. PresenceContextID uniquely identifies a Presence Aware Service or Class of Service instance to a requesting PAL Client, e.g. "sip:friendlychat@example.com/%7Bsip:bob@example.com%7D/:01".
PresenceTrigger	Used to identify a Presence Trigger, e.g. 'onContactable' as described in [PDE_DDS] Section "*Presence Trigger Definitions*".
Presentity	One or more logical entities as described in [PRS_RD] Section "*Definitions*" or an optional reference to a Presence List as described in [PRS_Spec] Section "*Subscription to a Presence List*".
PresentityContact	A contact address corresponding to a unique Presentity provided in the Presentity parameter of the corresponding PALPresenceAspectRequest. A contact address is equivalent to a <contact> element as described in [RFC3862] Section "*The Contact Element*". NOTE: Contact addresses are optional indicators. If two or more Presentities are included as part of a PALPresenceAspectResponse, and one or more of the associated Presentities chooses to hide their contact addresses, an empty or undefined contact placeholder corresponding to that Presentity SHALL be supplied by the PAL Server.
PresenceAspectValue	A unique Presence Aspect value (e.g. 'contactable', 'optIn', etc). NOTE: If two or more Presentities are included as part of a PALPresenceAspectResponse, and one or more of those Presentities does not provide a Presence Aspect value, then a Presence Aspect value placeholder SHALL be supplied by the PAL Server.

Table 1: PAL-1i Interface common message parameters

6.2   PAL-1i Interface

PAL-1i is an interface exposed by a PAL Server to a PAL Client.

The PAL-1i interface SHALL enable PAL Clients to:

- Establish and terminate a Presence Context based on a Presence Aware Service or Class of Service;

- Request to receive Presence Aspects relative to a given Presence Context;

- Request to suspend/resume the request or receipt of Presence Aspects associated with a Presence Context; and

- Receive the results of a predefined action corresponding to a Presence Trigger which has executed for a given Presence Context.

6.2.1 PAL-1i presence context establishment
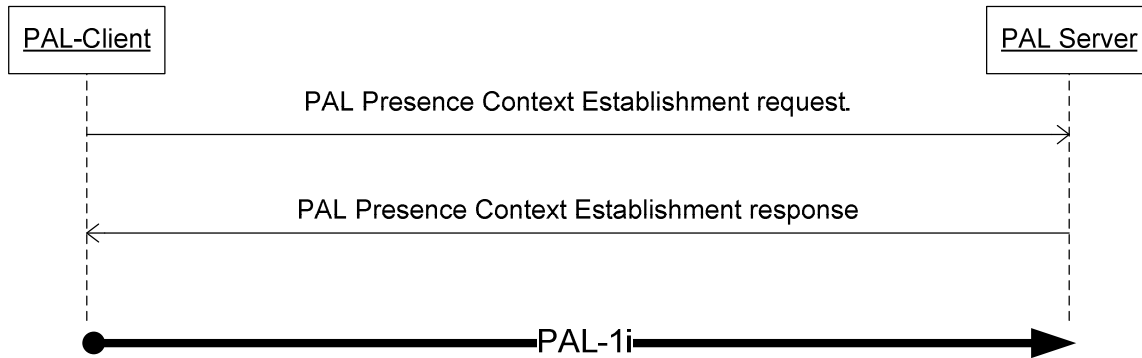
Figure 1: PAL-1i Presence Context Establishment message flow

Message	Direction
PALPresenceContextRequest	PAL Client → PAL Server
PALPresenceContextResponse	PAL Client ← PAL Server

Table 2: PAL Presence Context Message Elements & Direction

6.2.1.1 PALPresenceContextRequest

A PAL Client SHALL issue a 'PALPresenceContextRequest' via the PAL-1i Interface, in order to establish a Presence Context with a PAL Server.

The PAL Client SHALL provide request parameters corresponding to the PALPresenceContextRequest as described in the first column of Table 3, and request parameters SHALL be of the data type denoted in the second column of Table 3. The cardinality of each request parameter SHALL be supported as described in the third column of Table 3.

Parameter name	Data type	Parameter cardinality	Description
ServiceID	String	1	A Service XUI (e.g. Instant Messenger service "sip:friendlychat@example.com").
QualityOfService	String	0..1	A parameter which identifies a QoS associated with a Presence Context. Valid QoS parameter values SHALL include: • "Gold" – highest QoS; • "Silver" – medium QoS; or • "Bronze" – lowest QoS.

PALClientID	String	1	An identifier used to identify a PAL Client, e.g. "alice@example.com". The PALClientID is defined as a URI as described in [RFC3986]. NOTE: The creation of PALClientID is out of scope of this Enabler.
Presentity	String	0..N	See description in section 6.1 "*PAL-1i Interface*".
Verbose	Boolean	0..1	An indicator which when "true" provides as part of the response, a detailed list of PAL Presence Parameters incorporated as part of the established Presence Context. NOTE: If this flag is omitted, parameter 'Verbose' is assumed to be "false".
Presence Aspect	String	0..N	See description in section 6.1 "*PAL-1i Interface*".

Table 3: PALPresenceContextRequest parameters

6.2.1.2   PALPresenceContextResponse

'PALPresenceContextResponse' is a message sent to the PAL Client by a PAL Server via the PAL-1i Interface, in order to provide a Presence Context, in response to a 'PALPresenceContextRequest' (see section 6.2.1.1).

The PAL Server SHALL provide response parameters as described in the first column of Table 4, and response parameters SHALL be of the data type denoted in the second column of Table 4. The cardinality of each response parameter SHALL be supported as described in the third column of Table 4.

Parameter name	Data type	Parameter cardinality	Description
PresenceContextID	String	1	See description in section 6.1 "*PAL-1i Interface*".
Version	String	0..1	Version information associated with the Presence Aware Service or Class of Service represented by this Presence Context (e.g. 'v1.0').
PresenceAspect	String	0..N	If a corresponding PALPresenceContextRequest includes 'Verbose=true' then the PresenceAspect parameter SHALL include a list of Presence Aspects incorporated as part of the established Presence Context. If the PALPresenceContextRequest parameter 'Verbose' is set to "false" then the PresenceAspect list is omitted in the response. See description in section 6.1 "*PAL-1i*

			Interface"
PresenceTrigger	String	0..N	If a corresponding PALPresenceContextRequest includes 'Verbose=true' then the PresenceTrigger parameter SHALL include a list of Presence Triggers incorporated as part of the established Presence Context. If the PALPresenceContextRequest parameter 'Verbose' is set to "false" then the PresenceTrigger list is omitted in the response. See description in section 6.1 "*PAL-1i Interface*"
Presentity	String	0..N	See description in section 6.1 "*PAL-1i Interface*".
PresentityContact	String	0..N	See description in section 6.1 "*PAL-1i Interface*".
PresenceAspectValue	String	0..N	See description in section 6.1 "*PAL-1i Interface*".

Table 4: PALPresenceContextResponse parameters

6.2.2   PAL-1i presence context termination
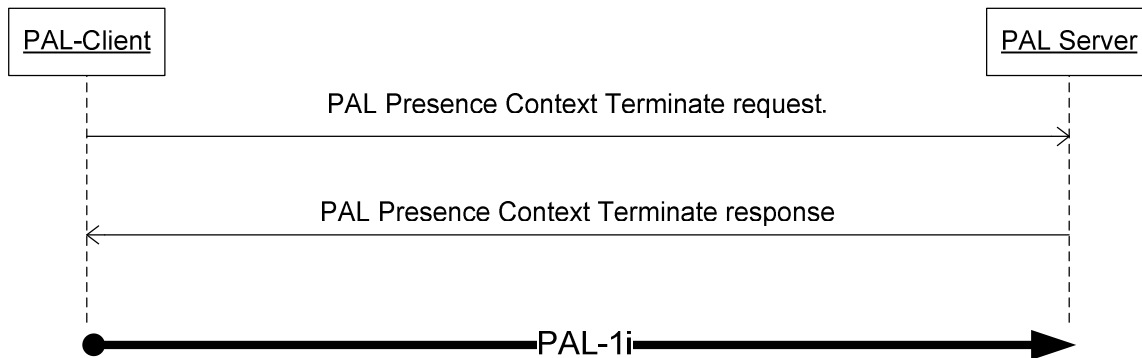
Figure 2: PAL-1i Presence Context Termination message flow

Message	Direction
PALPresenceContextTerminateRequest	PAL Client $\rightarrow$ PAL Server
PALPresenceContextTerminateResponse	PAL Client $\leftarrow$ PAL Server

Table 5: PAL Presence Context Termination Message Elements & Direction

6.2.2.1   PALPresenceContextTerminateRequest

A PAL Client SHALL issue a 'PALPresenceContextTerminateRequest' via the PAL-1i Interface, in order to terminate a Presence Context with a PAL Server. That is, a PAL Client SHALL be unable to request or receive Presence Aspects for a terminated Presence Context.

The PAL Client SHALL provide request parameters corresponding to the PALPresenceContextTerminateRequest as described in the first column of Table 6, and request parameters SHALL be of the data type denoted in the second column of Table 6. The cardinality of each request parameter SHALL be supported as described in the third column of Table 6.

Parameter name	Data type	Parameter cardinality	Description
PresenceContextID	String	1..N	See description in section 6.1 "*PAL-1i Interface*".

Table 6: PALPresenceContextTerminateRequest parameters

6.2.2.2   PALPresenceContextTerminateResponse

'PALPresenceContextTerminateResponse' is a message sent to a PAL Client by a PAL Server via the PAL-1i Interface to acknowledge termination of a Presence Context identified by a PresenceContextID. That is, this message is sent in response to a 'PALPresenceContextTerminateRequest' (see section 6.2.2.1).

The PAL Server SHALL provide response parameters as described in the first column of Table 7, and response parameters SHALL be of the data type denoted in the second column of Table 7. The cardinality of each response parameter SHALL be supported as described in the third column of Table 7.

Parameter name	Data type	Parameter cardinality	Description
PresenceContextID	String	1..N	See description in section 6.1 "*PAL-1i Interface*". NOTE: Each Presence Context which is acknowledged to have been successfully terminated by a PAL Server for the corresponding PALPresenceContextTerminateRequest, is provided within the response.

Table 7: PALPresenceContextTerminateResponse parameters

6.2.3 PAL-1i Presence Aspect request
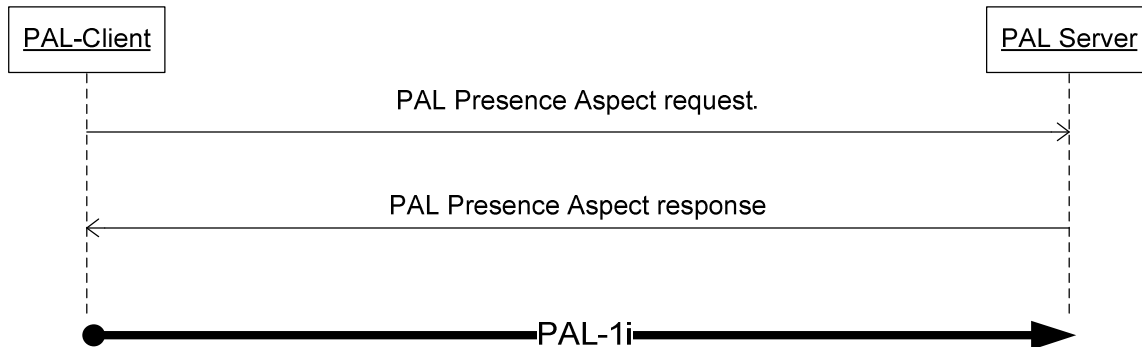
Figure 3: PAL-1i Presence Aspect message flow

Message	Direction
PALPresenceAspectRequest	PAL Client → PAL Server
PALPresenceAspectResponse	PAL Client ← PAL Server

Table 8: PAL Presence Aspect Message Elements & Direction

6.2.3.1 PALPresenceAspectRequest

The PAL Client SHALL issue a 'PALPresenceAspectRequest' via the PAL-1i Interface, to request one or more Presence Aspect values from a PAL Server.

The PAL Client SHALL provide request parameters corresponding to a PALPresenceAspectRequest as described in the first column of Table 9, and request parameters SHALL be of the type denoted in the second column of Table 9. The cardinality of each request parameter SHALL be supported as described in the third column of Table 9.

Parameter name	Data type	Parameter cardinality	Description
PresenceContextID	String	1	See description in section 6.1 "*PAL-1i Interface*".
InterestLevel	String	0..N	A parameter which identifies a level of interest by a Logical Observer for a Presentity being observed given requested Presence Aspect values. Valid InterestLevel values provided by a Logical Observer SHALL include: • "VeryInterested" – high interest in Presentity; • "ModeratelyInterested" – medium interest in Presentity; or • "LessInterested" – low interest in Presentity.
Priority	String	0..N	A parameter which identifies a priority

				level associated with a Logical Observer corresponding to Presence Aspect values requested associated with a Presentity. Valid Priority values provided by a Logical Observer SHALL include: • "High" – Logical Observer requests high priority updates; • "Medium" – Logical Observer requests medium priority updates; • Low – Logical Observer request low priority updates.
Duration	Integer	0..N	A parameter which establishes a length of time (in seconds) a PAL Server monitors Presence Triggers for indicated Presentities. NOTE: A duration value of "0" is a one-shot monitoring duration (i.e. fetch Presence Aspect, no monitoring). A duration value of "-1" specifies an indefinite monitoring duration.
Presentity	String	1..N	See description in section 6.1 "*PAL-1i Interface*".
PresenceAspect	String	1..N	See description in section 6.1 "*PAL-1i Interface*".

Table 9: PALPresenceAspectRequest parameters

6.2.3.2   PALPresenceAspectResponse

'PALPresenceAspectResponse' is a message sent to a PAL Client by a PAL Server via the PAL-1i Interface, in order to convey Presence Aspect values for a given Presence Context, in response to a 'PALPresenceAspectRequest' (see section 6.2.3.1).

The PAL Server SHALL provide response parameters as described in the first column of Table 10, and response parameters SHALL be of the type denoted in the second column of Table 10. The cardinality of each request parameter SHALL be supported as described in the third column of Table 10.

Parameter name	Data type	Parameter cardinality	Description
PresenceContextID	String	1	See description in section 6.1 "*PAL-1i Interface*".
Presentity	String	1..N	See description in section 6.1 "*PAL-1i Interface*".
PresentityContact	String	0..N	A contact address corresponding to a unique Presentity provided in the Presentity parameter of the

			corresponding PALPresenceAspectRequest. A contact address is equivalent to a \<contact\> element as described in [RFC3862] Section "*The Contact Element*". NOTE: Contact addresses are optional indicators. If two or more Presentities are included as part of a PALPresenceAspectResponse, and one or more of the associated Presentities chooses to hide their contact addresses, an empty or undefined contact placeholder corresponding to that Presentity SHALL be supplied by the PAL Server.
PresenceAspectValue	String	1..N	A unique Presence Aspect value (e.g. 'contactable', 'optIn', etc). NOTE: If two or more Presentities are included as part of a PALPresenceAspectResponse, and one or more of those Presentities does not provide a Presence Aspect value, then a Presence Aspect value placeholder SHALL be supplied by the PAL Server.

Table 10: PALPresenceAspectResponse parameters

6.2.4   PAL-1i suspend/resume receipt of Presence Aspects
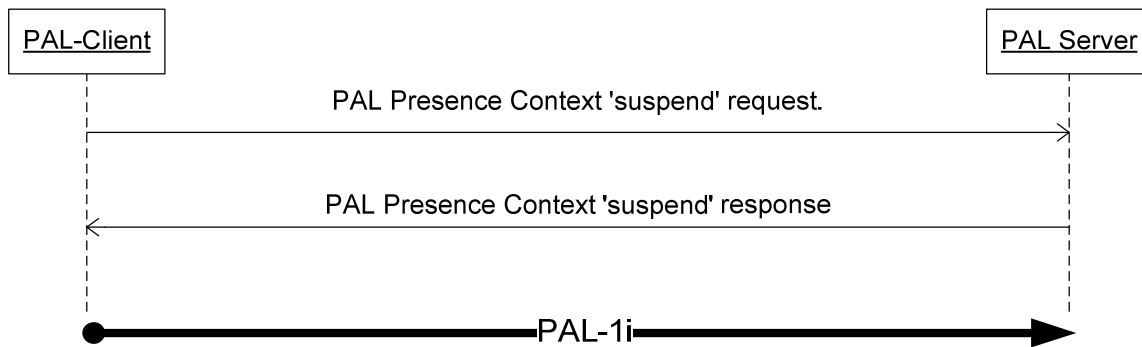
Figure 4: PAL-1i Presence Context suspend receipt of presence info message flow

Message	Direction
PALSuspendPCRequest	PAL Client → PAL Server
PALSuspendPCResponse	PAL Client ← PAL Server

Table 11: PAL Suspend Presence Context Message Elements & Direction

6.2.4.1   PALSuspendPCRequest

The PAL Client SHALL issue a 'PALSuspendPCRequest' via the PAL-1i Interface, in order to request a PAL Server suspend the request/receipt of Presence and/or Watcher Information e.g. in the form of Presence Aspects associated with a given Presence Context.

The PAL Client SHALL provide request parameters corresponding to the PALSuspendPCRequest as described in the first column of Table 12, and the request parameters SHALL be of the type denoted in the second column of Table 12. The cardinality of each request parameter SHALL be supported as described in the third column of Table 12.

Parameter name	Data type	Parameter cardinality	Description
PresenceContextID	String	1..N	See description in section 6.1 "*PAL-1i Interface*".
SuspendDuration	Integer	1..N	A value which specifies a PAL Presence Context suspend duration (in seconds), e.g. "0", "3600". A value of "0" indicates that the suspend duration is indefinite, i.e. a PAL Presence Context resume request must be received prior to resuming the indefinitely suspended Presence Context. NOTE: If two or more Presence Contexts are specified within a single PALPresenceContextSuspend request, a corresponding SuspendDuration SHALL be associated with each of them.

Table 12: PALSuspendPCRequest parameters

6.2.4.2   PALSuspendPCResponse

'PALSuspendPCResponse' is a message sent to the PAL Client by the PAL Server via the PAL-1i Interface, in order to acknowledge receipt of a corresponding 'PALSuspendPCRequest' (see section 6.2.4.1).

The PAL Server SHALL provide response parameters as described in the first column of Table 13, and response parameters SHALL be of the type denoted in the second column of Table 13. The cardinality of each request parameter SHALL be supported as described in the third column of Table 13.

Parameter name	Data type	Parameter cardinality	Description
PresenceContextID	String	1..N	See description in section 6.1 "*PAL-1i Interface*".
ResolvedSuspendDuration	Integer	1..N	A suspend duration time period (in seconds) which corresponds to the resolved suspend duration timer for the given Presence Context.

			A value of "0" indicates that the suspend duration is indefinite, i.e. a PAL Presence Context resume request must be received prior to resuming the indefinitely suspended Presence Context. A positive value which is non-zero indicates a finite suspend duration in seconds.
SuspendEventHandling	String	0..1	An optional suspend event notification handling indicator associates the manner in which event notifications received from a PS are handled by a PAL Server, relative to a suspended Presence Context. Valid suspend event notification handling values provided by a PAL Server SHALL include: • "Capture" – PAL Server evaluates, and maintains applicable Presence Aspects for a suspended Presence Context, based on event notifications received from a PS; • "Ignore" – PAL Server evaluates, and discards applicable Presence Aspects for a suspended Presence Context, based on event notifications received from a PS.

Table 13: PALSuspendPCResponse parameters
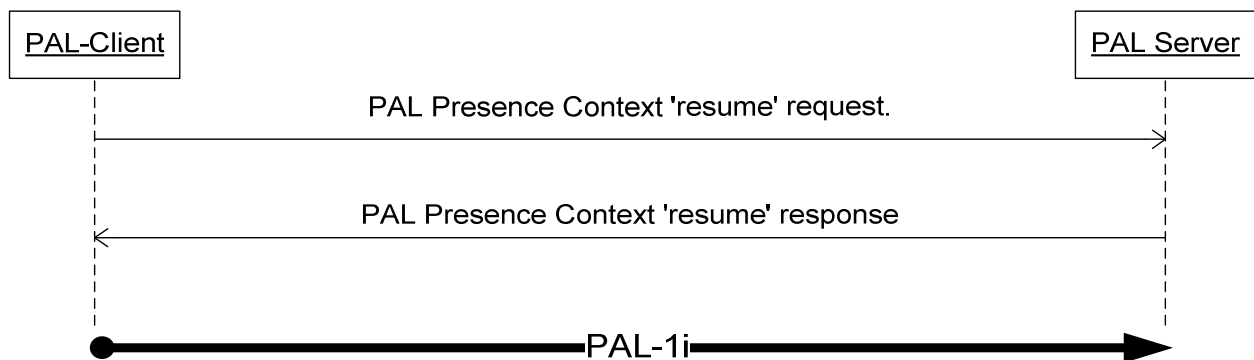
Figure 5: PAL-1i Presence Context resume receipt of presence info message flow

Message	Direction
PALResumePCRequest	PAL Client → PAL Server

Message	Direction
PALResumePCResponse	PAL Client ← PAL Server

Table 14: PAL Resume Presence Context Message Elements & Direction

6.2.4.3   PALResumePCRequest

The PAL Client SHALL issue a 'PALResumePCRequest' via the PAL-1i Interface, in order to request the PAL Server resume the request/receipt of Presence and/or Watcher Information e.g. in the form of Presence Aspects.

The PAL Client SHALL provide request parameters corresponding to the PALResumePCRequest as described in the first column of Table 15, and request parameters SHALL be of the type denoted in the second column of Table 15. The cardinality of each request parameter SHALL be supported as described in the third column of Table 15.

Parameter name	Data type	Parameter cardinality	Description
PresenceContextID	String	1..N	See description in section 6.1 "*PAL-1i Interface*".

Table 15: PALResumePCRequest parameters

6.2.4.4   PALResumePCResponse

'PALResumePCResponse' is a message sent to the PAL Client by the PAL Server via the PAL-1i Interface, in order to acknowledge receipt of a corresponding 'PALResumePCRequest' (see section 6.2.4.3).

The PAL Server SHALL return response parameters as described in the first column of Table 16, and response parameters SHALL be of the type denoted in the second column of Table 16. The cardinality of each request parameter SHALL be supported as described in the third column of Table 16.

Parameter name	Data type	Parameter cardinality	Description
PresenceContextID	String	1..N	See description in section 6.1 "*PAL-1i Interface*".

Table 16: PALResumePCResponse parameters

6.2.5   PAL-1i Presence Trigger predefined action
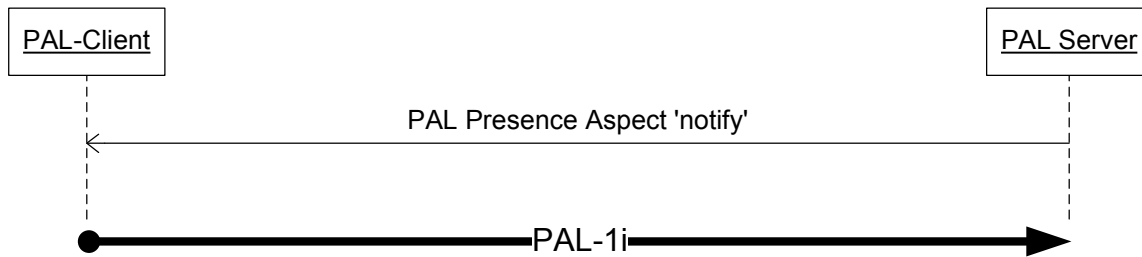
Figure 6: PAL-1i Presence Trigger predefined action (Presence Aspect notification)

Message	Direction
PALPresenceAspectNotify	PAL Client ← PAL Server

Table 17: PAL Presence Trigger Predefined Action Message Elements & Direction

6.2.5.1   PALPresenceAspectNotify

The PAL Server SHALL send a 'PALPresenceAspectNotify' to notify a PAL Client that a Presence Aspect value associated with a Presence Trigger has changed.

The PAL Server SHALL provide notification parameters as described in the first column of Table 18, and notification parameters SHALL be of the type denoted in the second column of Table 18. The cardinality of each notification parameter SHALL be supported as described in the third column of Table 18.

Parameter name	Data type	Parameter cardinality	Description
PresenceContextID	String	1	See description in section 6.1 "*PAL-1i Interface*".
Presentity	String	1..N	See description in section 6.1 "*PAL-1i Interface*".
PresentityContact	String	1..N	See description in section 6.1 "*PAL-1i Interface*".
PresenceAspectValue	String	1..N	See description in section 6.1 "*PAL-1i Interface*". NOTE: The Presence Aspect value provided SHALL be the detected value change associated with a Presence Trigger as described in [PDE_DDS] Section "*Presence Trigger Definitions*".

Table 18: PALPresenceAspectNotify parameters

6.2.6   PAL-1i error processing

A PAL Server interracting with one or more PAL Clients over the PAL-1i interface supports two types of errors:

1. Protocol errors – these error types result in a protocol-level response being issued (e.g. authorization fails); and

2. Service errors – these indicators result in a specific PAL Service error being issued (e.g. a PAL Server is unable to establish a Presence Context for an authenticated PAL Client).

A PAL Server SHALL issue a protocol error in response to PAL Client requests, for scenarios described in section 6.3 "*Protocol Bindings*".

A PAL Server SHALL issue an appropriately formed service error in response to a PAL Client request when a PAL Service error has been detected. A PAL Server SHALL issue a server error in lieu of the normal PAL Client response. A PAL Service error response SHALL be defined as follows:

Parameter name	Data type	Parameter cardinality	Description
PALClientID	String	1	See description in section 6.1 "*PAL-1i Interface*".
PresenceContextID	String	0..1	See description in section 6.1 "*PAL-1i Interface*".
StatusCode	Integer	1	A status indicator which identifies a specific type of PAL Service error indication.
Message	String	1	The message which provides further details relating to a PAL Service error.

Table 19: PAL error response parameters

6.3   Protocol Bindings

This section specifies PAL-1i protocol bindings for use with the PAL Enabler.

6.3.1   Overview

The PAL Enabler SHALL ensure that PAL request/responses issued using supported protocol bindings correctly correspond to each other.

6.3.2   SIP Protocol Bindings

The PAL Enabler when realized within an IMS network SHALL support SIP protocol bindings as specified in [3GPP-TS_24.229]. A PAL Client and PAL Server SHALL make use of the PAL-1 reference point as described in [PAL_AD] Section "*PAL deployment - 3GPP IMS network*".

NOTE: Informative message flows between a PAL Client and PAL Server utilizing SIP protocol bindings over the PAL-1 reference point are described in Appendix C.1.

6.3.2.1   PAL Client Procedures using SIP

A PAL Client SHALL perform registration upon connecting to a SIP/IP Core network as described in [**Error! Reference source not found.**] and [3GPP-TS_24.229].

6.3.2.1.1   PAL Client Interaction with a PAL Server using SIP

A registered PAL Client, interacting with a PAL Server utilizing SIP protocol bindings over the PAL-1 reference point, SHALL construct PAL Enabler requests (i.e. as described in section 6.2 "*PAL-1i Interface*"), based on SIP MESSAGE requests described in [RFC3428]. PAL Client SIP MESSAGE requests SHALL be constructed using the following clarifying steps:

1. Set the Request-URI of the SIP MESSAGE with the value of a PAL Service (i.e. as a SIP URI).

2. Set the To header field of the SIP MESSAGE with the value of a Presence Aware Service or Class of Service (i.e. a Service XUI);

3. Set the From header field to a PAL Client identity (i.e. a SIP URI corresponding to the requesting PAL Client);

4. Set the Accept header field to a value mutually established (i.e. during resource negotiation) with a PAL Server, as described in section 6.3.2.1 "*PAL Client Procedures using SIP*";

5. Set an appropriate Content-type header field to a valid PAL MIME-type as described in section 6.4 "*PAL MIME Types*";

6. Set a message payload corresponding to the particular PAL Enabler request as described in [XSD_palMessagePayload]; and

7. Set the Content-length header field to the length of the message body described in the preceding step.

6.3.2.2   PAL Server procedures using SIP

A PAL Server SHALL authenticate all incoming SIP requests utilizing the underlying SIP/IP Core network. When the SIP/IP Core corresponds with a 3GPP IMS network, the authentication mechanism SHALL:

• authenticate the SIP request originator (i.e. PAL Client) as described in [3GPP-TS_24.229] Section "*User identity verification at the AS*";

• authorize the PAL Client as described in [3GPP-TS_24.229] Section "*Request authorization*"; and

• follow applicable procedures as described in [3GPP-TS_24.229] Section "*Application Server (AS) performing 3rd party call control*".

6.3.2.2.1   PAL Server Interaction with a PAL Client using SIP

A PAL Server interacting with a PAL Client utilizing SIP protocol bindings over the PAL-1 reference point, SHALL construct PAL Enabler responses, as described in section 6.2 "*PAL-1i Interface*", based on SIP MESSAGE requests described in [RFC3428]. PAL Server SIP MESSAGE responses SHALL be constructed using the following clarifying steps:

1. Set the Request-URI and To header fields of the SIP MESSAGE to a PAL Client identity (i.e. as received in the Contact header of the corresponding PAL Client request);

2. Set the From header field with the value of a Presence Aware Service or Class of Service (i.e. a Service XUI);

3. Set the Accept header field to a value mutually established (i.e. during resource negotiation) with a PAL Client, as described in section 6.3.2.1 "*PAL Client Procedures using SIP*";

4. Set an appropriate Content-Type header field to a valid PAL MIME-type as described in section 6.4 "*PAL MIME Types*";

5. Set a message payload corresponding to the particular PAL Enabler response as described in [XSD_palMessagePayload]; and

6. Set the Content-Length header field to the length of the message body described in the preceding step.

6.3.3 Other Protocol Bindings

6.3.3.1 HTTP Protocol Bindings

The PAL Enabler SHALL support HTTP protocol bindings as described in [RFC2616] over the PAL-1i interface as described in [PAL_AD] Section "*PAL-1i Interface*".

A PAL Client operating within an IMS network MAY utilize HTTP protocol bindings as described in [PAL_AD] Section "*PAL deployment - 3GPP IMS network*".

A PAL Client operating within a non-IMS network MAY use HTTP protocol bindings.

Procedures relating to identity assertion and mutual authentication using the HTTP protocol are described in section 6.3.3.1.1 "*Identity Assertion and Mutual Authentication using HTTP*".

NOTE: Informative message flows between a PAL Client and PAL Server utilizing HTTP protocol bindings over the PAL-1i interface are described in Appendix C.2.

6.3.3.1.1 Identity Assertion and Mutual Authentication using HTTP

A PAL Client and PAL Server SHALL mutually authenticate each other, prior to issuing or responding to PAL Enabler requests as described in section 6.2 "*PAL-1i Interface*".

A PAL Client utilizing HTTP protocol bindings SHALL support Digest authentication with a PAL Server upon connecting to a PAL Server, as described in [RFC2617] with the following clarifications:

1. The PAL Enabler SHOULD support frequently changing nonce values - i.e. a PAL Server periodically changes the "nonce" value as part of a Digest exchange to defeat potential replay-attacks between a PAL Client and PAL Server by a 3rd party;

2. The PAL Enabler SHOULD support the "rspauth" parameter - i.e. a PAL Server includes parameter "rspauth" as part of a Digest authentication challenge to indicate support for mutual authentication between a PAL Client and PAL Server; and

3. The PAL Enabler SHOULD support Digest message integrity - i.e. a PAL Server provides the "qop=auth-int" directive described in [RFC2617], as part of PAL request/responses exchanged between a PAL Client and Server.

An HTTP "403 Forbidden" error response SHALL be sent by a PAL Server to a PAL Client after one or more failed responses to a Digest authentication challenge. The exact number of failed challenges may be determined by local policy.

A PAL Client utilizing HTTP protocol bindings MAY insert the X-3GPP-Intended-Identity header as described in [3GPP-TS_24.109] to HTTP requests, in order to deliver its preferred identity for PAL Client identity assertion.

6.3.3.1.2 PAL Client Interaction with a PAL Server using HTTP

A mutually authenticated PAL Client using HTTP protocol binding SHALL construct PAL Enabler requests, as described in section 6.2 "*PAL-1i Interface*" based on the HTTP POST method as described in [RFC2616]. PAL Client HTTP POST messages SHALL be constructed with the following clarifications:

1. Set the Request-URI of the HTTP POST request with the value of a Presence Aware Service or Class of Service (i.e. a Service XUI);

2. Set the Host header field to the value of a PAL Service (i.e. an HTTP URL as described in [RFC2616] section "*Host*"), with which a PAL Client has mutually authenticated;

3. Establish Accept and Content-Type header fields using a valid PAL MIME-type as described in section 6.4 "*PAL MIME Types*";

4. Set a message payload corresponding to a particular PAL Enabler request as described in [XSD_palMessagePayload]; and

5. Set the Content-Length header field to the length of the message body described in the preceding step.

6.3.3.1.3   PAL Server Interaction with a PAL Client using HTTP

A PAL Server interacting with mutually authenticated PAL Clients over HTTP SHALL construct PAL Enabler responses, as described in section 6.2 "*PAL-1i Interface*" based on HTTP response messages described in [RFC2616]. The PAL Server SHALL perform the following steps in case of a successful HTTP response:

1. Create an HTTP response containing a status-code, a reason-phrase and possibly other headers, as described in [RFC2616] Section "*Status Code Definitions*", based on the received PAL Client request type:

    a.   A "201 Created" for a succesful PALPresenceContextRequest; or

    b.   A "200 OK" for all other successfully processed PAL Client requests.

2. Include a timestamp which indicates the time at which the response was originated from a PAL Server;

3. Establish the Content-Type header field using a valid PAL MIME-type as described in section 6.4 "*PAL MIME Types*";

4. Set a message payload corresponding to a particular PAL Enabler response as described in [XSD_palMessagePayload];

5. Set the Content-Length header field to the length of the message body described in the preceding step; and

6. Send the HTTP response to a mutually authenticated PAL Client.

6.3.4   Generic Network Considerations

The following sub-section details general network considerations applicable to the PAL Enabler.

6.3.4.1   PAL Client operating as a push application

Once a PAL Client and Server are mutually authenticated, a PAL Client SHALL perform a PAL application registration request to an appropriate PUSH Client as described in [PUSH_CAI] Section "*Push Application Registration*". As part of a PAL application registration request, a PAL Client SHALL:

1. provide a pushApplicationID equivalent to the PAL application resource identifier described in section 6.5 "*Push Application identifier*";

2. include a whitelist containing the addresses of one or more mutually authenticated PAL Servers; and

3. provide an accept string containing supported PAL MIME types as described in section 6.4 "*PAL MIME Types*".

A PAL Client deployed in a non-IMS network which has mutually authenticated and performed a successful PAL application registration SHALL be able to interact with a PAL Server utilizing the PAL-1i interface.

6.3.4.2   PAL Server operating as a PI

A PAL Server SHALL function as a PI and communicate with an associated PPG to support the delivery of predefined actions (e.g. an asynchronous notification) to a mutually authenticated PAL Client for a corresponding Presence Trigger, utilizing the PAP protocol as described in [PAP_Spec].

A PAL Server (i.e. functioning as a PI) and a PPG MAY optionally support a shared secret between them based on network information as described in [PUSH_AD] Section "*Authenticating a Push Initiator*".

To deliver the results of a predefined action associated with a Presence Trigger to a PAL Client a PAL Server SHALL formulate a PAP push submission toward a PPG as described in [PAP_Spec] Section "*Push Submission*".

The control portion of a PAP push submission SHALL be constructed by a PAL Server, on behalf of a PAL Client as follows:

1. Attribute "push-id" of element <push-message> is set to the address of the PAL Server as part of the message identifier (e.g. "pal.example.com/123");

2. Attribute "source-reference" of element <push-message> is set to the string constant "pal.as";

3. <push-message> child element <address> is set to each applicable PAL Client receiving the results of a predefined action (i.e. the attribute "address-value" of element <address> set to the value of a PAL Client); and

4. <push-message> child element <quality-of-service> is set to indicate that a specified bearer is to be utilized (i.e. the attribute "bearer-required" set to the value "true", and attribute "bearer" set as described in [PAP_Spec] Section "*The quality-of-service Element*".

If QoS is specified as part of Presence Context associated with the applicable Presence Trigger, then the control portion of a PAP push submission SHALL be constructed taking into consideration the Presence Context QoS value.

The content portion of the PAP <push-message> element SHALL be constructed by a PAL Server, on behalf of a PAL Client as follows:

1. The Content-Type set to a PAL MIME-type as described in section 6.4 "*PAL MIME Types*"; and

2. The content body based on a valid XML message body as described in [XSD_palMessagePayload].

6.4 PAL MIME Types

The PAL Enabler SHALL support the "application/vnd.oma.pal+xml" MIME type over the PAL-1i interface, for the following request/response messages:

PAL Request/Response	Description
PALPresenceContextRequest	Message body of Presence Context establishment request as described in section 6.2.1 "*PAL-1i presence context establishment*".
PALPresenceContextResponse	Message body of non-verbose/verbose Presence Context responses as described in 6.2.1 "*PAL-1i presence context establishment*".
PALPresenceContextTerminateRequest	Message body of Presence Context termination request as described in section 6.2.2 "*PAL-1i presence context termination*".
PALPresenceContextTerminateResponse	Message body of Presence Context termination acknowledgement as described in section 6.2.2 "*PAL-1i presence context termination*".
PALPresenceAspectRequest	Message body of Presence Aspect request as described in section 6.2.3 "*PAL-1i requesting specific Presence Information*".
PALPresenceAspectResponse	Message body of Presence Aspect response as described in section 6.2.3 "*PAL-1i requesting specific Presence Information*".
PALSuspendPCRequest	Message body of Presence Aspect suspend request as

	described in sections 6.2.4 "*PAL-1i suspend/resume receipt of Presence Aspects*".
PALSuspendPCResponse	Message body of Presence Context suspend acknowledgement as described in section 6.2.4 "*PAL-1i suspend/resume receipt of Presence Aspects*".
PALResumePCRequest	Message body of Presence Aspect resume request as described in sections 6.2.4 "*PAL-1i suspend/resume receipt of Presence Aspects*".
PALResumePCResponse	Message body of Presence Context resume acknowledgement as described in section 6.2.4 "*PAL-1i suspend/resume receipt of Presence Aspects*".
PALPresenceAspectNotify	Message body of a Presence Trigger pre-defined action as described in section 6.2.5 "*PAL-1i Presence Trigger predefined action*".

Table 20: PAL-1i Interface request/response messages utilizing 'application/vnd.oma.pal+xml' MIME type.

6.5   Push Application identifier

The PAL Enabler SHALL make use of the "x-oma-application:pal.ua" Push Application identifier when asynchronous notifications (e.g. as a result of a Presence Trigger predefined action) are sent (i.e. pushed) by a PAL Server to a PAL Client using the Push Enabler.

Appendix A.   Change History   (Informative)

A.1   Approved Version 1.0 History

Reference	Date	Description
OMA-TS-PAL-V1_0-20120320-A	20 Mar 2012	Status changed to Approved by TP: OMA-TP-2012-0117-INP_PAL_V1_0_ERP_for_Final_Approval

Appendix B.   Static Conformance Requirements   (Normative)

The notation used in this appendix is specified in [SCRRULES].

The SCR's defined in the following tables include SCR's for:

- PAL Client;
- PAL Server;
- PAL-1i Interface.

The following tags are used in the Function column to identify the release of the PAL Enabler that the requirement was introduced:

- PALv1.0 – Requirement was introduced in PAL 1.0.

B.1   SCR for PAL Client

Item	Function	Reference	Requirement
PAL-CTX-001-M	Request the establishment of a Presence Context for a given Presence Aware Service or Class of Service (PALv1.0)	Section 5.1.2	
PAL-CTX-003-M	Request the termination of a Presence Context for a given Presence Aware Service or Class of Service (PALv1.0)	Section 5.1.3	PAL-CTX-001-M AND PAL-CTX-002-M
PAL-CTX-005-M	Request the receipt of consolidated Presence Aspect values for a given Presence Context (PALv1.0)	Section 5.1.4	PAL-CTX-001-M AND PAL-CTX-002-M
PAL-CTX-007-M	Request to suspend a Presence Context (PALv1.0)	Section 5.1.5	PAL-CTX-001-M AND PAL-CTX-002-M
PAL-CTX-009-M	Request to resume a Presence Context (PALv1.0)	Section 5.1.6	PAL-CTX-007-M
PAL-SRV-001-M	Receive a protocol error response after failing to correctly respond to an authentication challenge from a PAL Server (PALv1.0)	Section 6.3.3.1.1	PAL-CTX-001-M
PAL-SRV-002-O	Receive results of a predefined action corresponding to a detected change for an applicable Presence Aspect value (PALv1.0)	Section 5.1.7	PAL-CTX-001-M AND PAL-SRV-001-M

B.2 SCR for PAL Server

Item	Function	Reference	Requirement
PAL-CTX-001-M	Establish Presence Context on behalf of a PAL Client (PALv1.0)	Section 5.2.5	
PAL-CTX-003-M	Terminate Presence Context on behalf of a PAL Client (PALv1.0)	Section 5.2.6	PAL-CTX-001-M AND PAL-CTX-002-M
PAL-CTX-005-M	Return consolidated Presence Aspect values on behalf of a PAL Client (PALv1.0)	Section 5.2.7	PAL-CTX-001-M AND PAL-CTX-002-M
PAL-CTX-007-M	Suspend the delivery of Presence Aspect values on behalf of a PAL Client (PALv1.0)	Section 5.2.8	PAL-CTX-001-M AND PAL-CTX-002-M
PAL-CTX-009-M	Resume delivery of Presence Aspect values including applicable Presence Triggers, on behalf of a PAL Client (PALv1.0)	Sections 5.2.9, 5.2.10	PAL-CTX-005-M AND PAL-CTX-007-M
PAL-SRV-001-M	Return an appropriate protocol error when a PAL Client fails to respond to one or more authentication challenges by a PAL Server (PALv1.0)	Section 6.3.3.1.1	PAL-CTX-001-M
PAL-SRV-002-O	Monitor applicable Presence Aspect values for a given Presence Context and execute a predefined action when a change is detected (PALv1.0)	Section 5.2.10	PAL-CTX-001-M AND PAL-CTX-002-M AND PAL-CTX-005-M

B.3 SCR for PAL-1i Interface

Item	Function	Reference	Requirement
PAL-CTX-001-M	PALPresenceContextRequest (PALv1.0)	Section 6.2.1.1	
PAL-CTX-002-M	PALPresenceContextResponse (PALv1.0)	Section 6.2.1.2	PAL-CTX-001-M
PAL-CTX-003-M	PALPresenceTerminateRequest (PALv1.0)	Section 6.2.2.1	PAL-CTX-001-M AND PAL-CTX-002-M
PAL-CTX-004-M	PALPresenceTerminateResponse (PALv1.0)	Section 6.2.2.2	PAL-CTX-003-M
PAL-CTX-005-M	PALPresenceAspectRequest (PALv1.0)	Section 6.2.3.1	PAL-CTX-001-M AND PAL-CTX-002-M
PAL-CTX-006-M	PALPresenceAspectResponse (PALv1.0)	Section 6.2.3.2	PAL-CTX-005-M
PAL-CTX-007-M	PALSuspendPCRequest (PALv1.0)	Section 6.2.4.1	PAL-CTX-001-M AND PAL-CTX-002-M
PAL-CTX-008-M	PALSuspendPCResponse (PALv1.0)	Section 6.2.4.2	PAL-CTX-007-M
PAL-CTX-009-M	PALResumePCRequest (PALv1.0)	Section 6.2.4.3	PAL-CTX-008-M
PAL-CTX-010-M	PALResumePCResponse (PALv1.0)	Section 6.2.4.4	PAL-CTX-009-M
PAL-CTX-011-O	PALPresenceAspectNotify (PALv1.0)	Section 6.2.5.1	PAL-CTX-001-M AND PAL-CTX-002-M AND PAL-CTX-006-M
PAL-CTX-012-M	PALErrorResponse (PALv1.0)	Section 6.2.6	PAL-CTX-001-M OR PAL-CTX-003-M OR PAL-CTX-005-M OR PAL-CTX-007-M OR PAL-CTX-009-M

Appendix C.   PAL Message Flows   (Informative)

The following sub-section provides PAL Enabler example message flows which may occur between a PAL Client and PAL Server, utilizing protocol mappings supported by the PAL Enabler.

> NOTE: The following sub-section illustrates a sequence of PAL Enabler message flows in a trusted domain. Additional PAL Client/Server message flows (e.g. PAL Presence Context termination, etc.) may be extrapolated from the examples given below.

C.1   IMS Network

C.1.1   PAL Client Registration

Upon connection to a SIP/IP Core network, a PAL Client performs the registration procedure as described in section 6.3.2.1 "*PAL Client Procedures using SIP*".

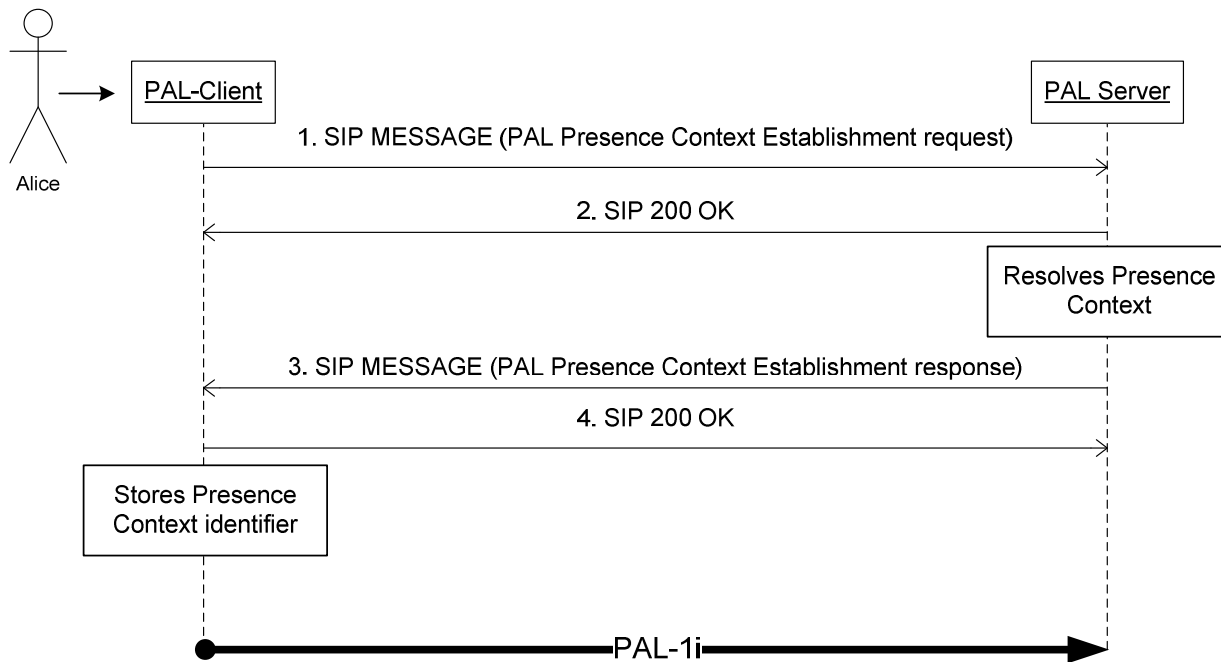## C.1.2   PAL Client Presence Context Establishment

Figure 7: PAL Presence Context establishment procedures within IMS network.

1. PAL Client (Alice) requests a Presence Context from the PAL Server on behalf of Presence Aware Service (e.g. 'MyFriendlyChat' with SIP URI 'sip:friendlychat@example.com' and PAL Client identifier 'alice@example.com'). The following example PAL Presence Context request omits the optional Presentity parameter:

```
MESSAGE sip:pal@example.com SIP/2.0
Via: SIP/2.0/UDP alice.example.com:5060;branch=z9hG4bKn3ashds735
Max-Forwards: 70
To: <sip:friendlychat@example.com>
From: "Alice" <sip:alice@example.com>;tag=456348234
Call-ID: 843817637684230@3248sd23asdh09234
CSeq: 126 MESSAGE
P-Preferred-Identity: "Alice Smith" <sip:alice@example.com>
Supported: gruu
Accept: application/vnd.oma.pal+xml
Contact: <sip:alice@example.com;gr=urn:uuid:f81d4fae-7dec-11d0-a765-00a0c91e6bf6>
Expires: 720
Content-Length: 160
Content-Type: application/vnd.oma.pal+xml

<?xml version="1.0" encoding="UTF-8"?>
<p1:pal-message xmlns:p1="urn:oma:xml:prs:pal:payloads:1.0">
   <p1:pal-request>
      <p1:pal-establish-pres-context service-id="sip:friendlychat@example.com" pal-
client-id="sip:alice@example.com" quality-of-service="Gold"/>
   </p1:pal-request>
</p1:pal-message>
```

2. A PAL Server confirms receipt of the PAL Client request by sending a 200 OK response to the PAL Client.

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP alice.example.com:5060;branch=z9hG4bKn3ashds735
To: <sip:friendlychat@example.com>;tag=98798799
From: "Alice" <sip:alice@example.com>;tag=456348234
Call-ID: 843817637684230@3248sd23asdh09234
CSeq: 126 MESSAGE
Supported: gruu
Content-Length: 0
```

3. The PAL Server establishes an appropriate PAL Presence Context on behalf of the requesting PAL Client. A PAL Server realized within an IMS network may utilize OMA PUSH as described in [PUSH_SIP] to provide a PAL Presence Context Response to a PAL Client:

```
MESSAGE sip:alice@example.com;gr=urn:uuid:f81d4fae-7dec-11d0-a765-00a0c91e6bf6 SIP/2.0
Via: SIP/2.0/UDP pal.example.com:5060;branch=z9hG4bKn3ashaa7223
From: sip:friendlychat@example.com;tag=495834
To: <sip:alice@example.com;gr=urn:uuid:f81d4fae-7dec-11d0-a765-00a0c91e6bf6>
CSeq: 1 MESSAGE
P-Asserted-Identity: "Alice Smith" <sip:alice@example.com>
Call-ID: 843817637684230@998sdasdh092349
Accept-Contact: *; +g.3gpp.icsi_ref="urn%3Aurn-xxx%3A3gpp-service.ims.icsi.omapush",
+g.oma.pusheventapp="pal.ua"
Supported: gruu
Content-Length: 160
Content-Type: application/vnd.oma.pal+xml

<?xml version="1.0" encoding="UTF-8"?>
<p1:pal-message xmlns:p1="urn:oma:xml:prs:pal:payloads:1.0">
 <p1:pal-response>
    <p1:pal-bpres-context
            presence-context-
id="sip:friendlychat@example.com/%7Bsip:alice@example.com%7D/:01" version="1.0"/>
 </p1:pal-response>
</p1:pal-message>
```

4. A PAL Client receives and may store the Presence Context identifier and subsequently send a 200 OK to a PAL Server in order to acknowledge receipt of the Presence Context identifier.

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pal.example.com:5060;branch=z9hG4bKn3ashaa7223
From: sip:friendlychat@example.com;tag=495834
To: sip:alice@example.com;tag=98769876
CSeq: 1 MESSAGE
Call-ID: 843817637684230@998sdasdh092349
Supported: gruu
Content-Length: 0
```

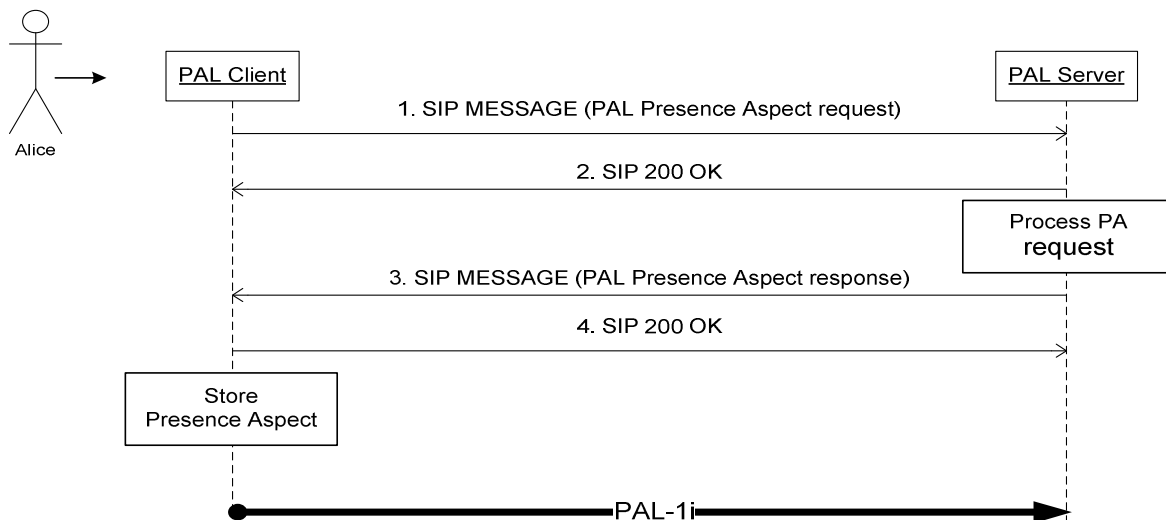## C.1.3   PAL Client requesting specific Presence Information

Figure 8: PAL requesting Presence Aspect values within IMS network.

1. A PAL Client (Alice) within an IMS network realization requests Presence Aspects associated with an established Presence Context (e.g. all applicable Presence Aspects associated with service 'MyFriendlyChat') from a PAL Server:

```
MESSAGE sip:pal@example.com SIP/2.0
Via: SIP/2.0/UDP alice.example.com:5060;branch=z9hG4bss3ashds726
Max-Forwards: 70
To: <sip:friendlychat@example.com>
From: "Alice" <sip:alice@example.com>;tag=4563482435
Call-ID: 843817637684230@3248sd23242554
Accept: application/vnd.oma.pal+xml
CSeq: 136 MESSAGE
P-Preferred-Identity: "Alice Smith" <sip:alice@example.com>
Supported: gruu
Contact: <sip:alice@example.com;gr=urn:uuid:f81d4fae-7dec-11d0-a765-00a0c91e6bf6>
Expires: 720
Content-Length: 591
Content-Type: application/vnd.oma.pal+xml


<?xml version="1.0" encoding="UTF-8"?>
<p1:pal-message xmlns:p1="urn:oma:xml:prs:pal:payloads:1.0"
                xmlns:p2="urn:oma:xml:xdm:pal-profile:1.0"
                xmlns:p3="urn:oma:xml:prs:pal:aspect">
    <p1:pal-request>
        <p1:pres-aspect presence-context-
id="sip:friendlychat@example.com/%7Bsip:alice@example.com%7D/:01">
            <p1:aspectPresentity pres-list="oma_buddylist"
interestLevel="VeryInterested"/>
            <p1:aspectValueRequest aspect="oma:prs:pal:aspect:allApplicable"/>
        </p1:pres-aspect>
    </p1:pal-request>
</p1:pal-message>
```

2. A PAL Server confirms receipt of the request by sending a 200 OK response to the PAL Client.

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP alice.example.com:5060;branch=z9hG4bss3ashds726
To: <sip:friendlychat@example.com>;tag=098987987
From: "Alice" <sip:alice@example.com>;tag=4563482435
CSeq: 136 MESSAGE
Call-ID: 843817637684230@3248sd23242554
Supported: gruu
Content-Length: 0
```

3. The PAL Server establishes values of all applicable Presence Aspect values on behalf of PAL Client (Alice) for her entire buddy list, and sends the resulting Presence Aspect values utilizing the following PAL Presence Aspect response:

```
MESSAGE sip:alice@example.com;gr=urn:uuid:f81d4fae-7dec-11d0-a765-00a0c91e6bf6 SIP/2.0
Via: SIP/2.0/UDP pal.example.com:5060;branch=z9hG4bKn3ashaa7223
From: sip:friendlychat@example.com;tag=49583
To: <sip:alice@example.com;gr=urn:uuid:f81d4fae-7dec-11d0-a765-00a0c91e6bf6>
CSeq: 2 MESSAGE
P-Asserted-Identity: "Alice Smith" <sip:alice@example.com>
Call-ID: 843817637684230@998sdasdh0945
Accept-Contact: *; +g.3gpp.icsi_ref="urn%3Aurn-xxx%3A3gpp-service.ims.icsi.omapush",
+g.oma.pusheventapp="pal.ua"
Supported: gruu
Content-Length: 1070
Content-Type: application/vnd.oma.pal+xml

<?xml version="1.0" encoding="UTF-8">
<p1:pal-message
   xmlns:p1="urn:oma:xml:prs:pal:payloads:1.0"
   xmlns:p2= "urn:ietf:params:xml:ns:pidf"
   xmlns:p3="urn:oma:xml:prs:pal:aspect">
   <p1:pal-response>
      <p1:pres-aspect-resp presence-context-
id="sip:sip:friendlychat@example.com/%7Bsip:alice@example.com%7D/:01">
         <p1:entity uri="sip:bob@example.com">
            <p1:item aspect="oma:prs:pal:aspect:optIn">open,7200</p1:item>
            <p1:item aspect="oma:prs:pal:aspect:contactable">closed</p1:item>
         </p1:entity>
         <p1:entity uri="sip:jane@example.com">
            <p2:contact priority="0.9">sip:jane_fc@example.com</p2:contact>
            <p1:item aspect="oma:prs:pal:aspect:optIn">open,Indefinite</p1:item>
            <p1:item
aspect="oma:prs:pal:aspect:contactable">open,Indefinite</p1:item>
         </p1:entity>
         <p1:entity uri="sip:chris@example.com">
            <p1:item aspect="oma:prs:pal:aspect:optIn">closed,7200</p1:item>
            <p1:item aspect="oma:prs:pal:aspect:contactable">closed</p1:item>
         </p1:entity>
      </p1:pres-aspect-resp>
   </p1:pal-response>
</p1:pal-message>
```

4. Alice's PAL Client stores or relays the received Presence Aspect values associated with Alice's buddy list relative to Presence Aware Service (e.g. 'MyFriendlyChat') running on Alice's client. Alice's PAL Client sends a 200 OK in response to the PAL Server.

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pal.example.com:5060;branch=z9haabKn3ashds7224
From: sip:friendlychat@example.com;tag=49583
To: sip:alice@example.com;tag=9876876
CSeq: 2 MESSAGE
Call-ID: 843817637684230@998sdasdh0945
Supported: gruu
Content-Length: 0
```

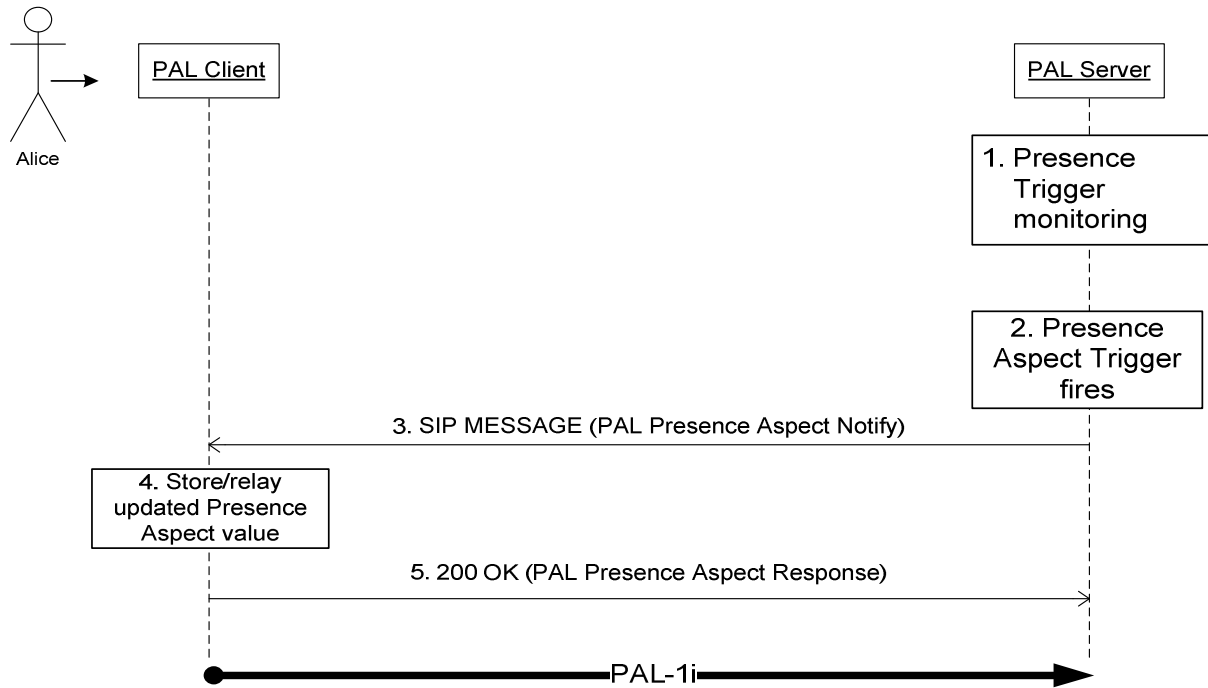## C.1.4   PAL Enabler Presence Trigger Predefined Action

Figure 9: PAL Client receiving result of predefined action corresponding to a Presence Trigger

1.   The PAL Server, based on an established Presence Context monitors specified Presence Triggers e.g. 'onContactable' on behalf of PAL Client Alice.

2.   PAL Server detects a change in Presence Aspect value 'contactable' for one of Alice's Presentities e.g. 'Bob' is now 'contactable'. A Presence Trigger fires which executes a corresponding predefined action (action="notify").

3.   A predefined action for Presence Trigger 'onContactable' is to generate a SIP MESSAGE (e.g. utilizing OMA PUSH) Presence Aspect Notification to Alice's PAL Client:

```
MESSAGE sip:alice@example.com;gr=urn:uuid:f81d4fae-7dec-11d0-a765-00a0c91e6bf6 SIP/2.0
Via: SIP/2.0/UDP pal.example.com:5060;branch=z9hG4bKn3ashee7223
From: sip:friendlychat@example.com;tag=49583
To: <sip:alice@example.com;gr=urn:uuid:f81d4fae-7dec-11d0-a765-00a0c91e6bf6>
CSeq: 1 MESSAGE
P-Asserted-Identity: "Alice Smith" <sip:alice@example.com>
Call-ID: 843817637684230@998sdasdh55234
Accept-Contact: *; +g.3gpp.icsi_ref="urn%3Aurn-xxx%3A3gpp-service.ims.icsi.omapush",
+g.oma.pusheventapp="pal.ua"
Supported: gruu
Content-Length: 621
Content-Type: application/vnd.oma.pal+xml


<?xml version="1.0" encoding="UTF-8">
<p1:pal-message
   xmlns:p1="urn:oma:xml:prs:pal:payloads:1.0"
   xmlns:p2="urn:ietf:params:xml:ns:pidf"
```

```
   xmlns:p3="urn:oma:xml:prs:pal:aspect">
   <p1:pal-response>
      <p1: pres-trigger-async-notify presence-context-
id="sip:sip:friendlychat@example.com/%7Bsip:alice@example.com%7D/:01">
         <p1:entity uri="sip:bob@example.com">
            <p2:contact priority="0.6">sip:bob_fc@example.com</p2:contact>
            <p1:item
aspect="oma:prs:pal:aspect:contactable=">open,Indefinite</p1:item>
         </p1:entity>
      </p1:pres-trigger-async-notify>
   </p1:pal-response>
</p1:pal-message>
```

4. Alice's PAL Client stores or relays the received Presence Aspect value associated with a Presentity (i.e. Bob is now contactable for an indefinite period of time relative to the receipt of the trigger action) for a given Presence Aware Service (e.g. 'MyFriendlyChat') running on the client.

5. Alice's PAL Client sends a 200 OK in response to the PAL Server.

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pal.example.com:5060;branch=z9hG4bKn3ashee7223
From: sip:friendlychat@example.com;tag=49583
To: sip:alice@example.com
CSeq: 1 MESSAGE
Call-ID: 843817637684230@998sdasdh55234
Supported: gruu
Content-Length: 0
```

C.2   Non-IMS Network

C.2.1   PAL Client authentication

A PAL Client, when connecting to a non-IMS network (e.g. in order to establish and make use of a Presence Context) is challenged to identify itself and mutually authenticate with a PAL Server, as described in section 6.3.3 "*Other Protocol Bindings*".

1. PAL Client (Alice) requests the establishment of a Presence Context from the PAL Server on behalf of Presence Aware Service 'MyFriendlyChat':

```
POST /pal HTTP/1.1
HOST: www.example.com
From: alice@example.com
X-3GPP-Intended-Identity: alice@example.com
Content-Type: application/vnd.oma.pal+xml
Content-Length: 704


<?xml version="1.0" encoding="UTF-8"?>
<p1:pal-message
     xmlns:xml="http://www.w3.org/XML/1998/namespace"
     xmlns:p1="urn:oma:xml:prs:pal:payloads:1.0"
     xmlns:p2="urn:oma:xml:prs:pal:aspect"
     xmlns:p3="urn:ietf:params:xml:ns:pidf">
 <p1:pal-request>
    <p1:establish-pres-context service-id="friendlychat@example.com" pal-client-
id="alice@example.com" quality-of-service="Gold">
       <p1:presentity>
          <p1:aspectPresentity pres-list="oma_buddylist"
interestLevel="VeryInterested" priority="High"/>
          <p1:aspectValueRequest aspect="oma:prs:pal:aspect:allApplicable"/>
       </p1:presentity>
    </p1:establish-pres-context>
 </p1:pal-request>
</p1:pal-message>
```

2. The PAL Server does not have an authenticated HTTP session established with Alice's PAL Client, and therefore requests her PAL Client to identify itself and mutually authenticate by issuing an HTTP Digest challenge:

```
HTTP/1.1 401 Unauthorized
WWW-Authenticate: Digest
    realm="auth_clients@example.com",
    qop="auth-int",
    domain="pNode",
    algorithm="MD5",
    nonce="MTIvMDMvMjAxMDphMTIzNDpQQUxJc0dyZWF0IQ==",
    opaque="T3BlbiBNb2JpbGUgQWxsaWFuY2UgUEFMIEVuYWJsZXIgVjEuMA=="
```

3. Alice's PAL Client receives the HTTP Digest challenge, and proceeds to obtain an appropriate username and password (e.g. by reading information from a smart card inserted into Alice's UE). Alice's PAL Client generates an appropriate challenge response which contains the original request described in step 1:

```
POST /pal HTTP/1.1
HOST: www.example.com
From: alice@example.com
X-3GPP-Intended-Identity: alice@example.com
Authorization: Digest username="alice",
    realm="auth_clients@example.com",
    qop="auth-int",
    algorithm="MD5",
    nonce="MTIvMDMvMjAxMDphMTIzNDDpQQUxJc0dyZWF0IQ==",
    opaque="T3BlbiBNb2JpbGUgQWxsaWFuY2UgUEFMIEVuYWJsZXIgVjEuMA=="
    uri="/pal",
    nc="0001",
    cnonce="82c875dc",
    response="27e0e3b0be7861e20e6968bcc9b38956"
Content-Type: application/vnd.oma.pal+xml
Content-Length: 704

<?xml version="1.0" encoding="UTF-8"?>
<p1:pal-message
     xmlns:xml="http://www.w3.org/XML/1998/namespace"
     xmlns:p1="urn:oma:xml:prs:pal:payloads:1.0"
     xmlns:p2="urn:oma:xml:prs:pal:aspect"
     xmlns:p3="urn:ietf:params:xml:ns:pidf">
 <p1:pal-request>
    <p1:establish-pres-context service-id="friendlychat@example.com" pal-client-
id="alice@example.com" quality-of-service="Gold">
       <p1:presentity>
         <p1:aspectPresentity pres-list="oma_buddylist"
interestLevel="VeryInterested" priority="High"/>
         <p1:aspectValueRequest aspect="oma:prs:pal:aspect:allApplicable"/>
       </p1:presentity>
    </p1:establish-pres-context>
 </p1:pal-request>
</p1:pal-message>
```

4. The PAL Server receives the challenge response, and authenticates the requesting PAL Client of Alice. The following HTTP response is sent from the PAL Server to Alice's PAL Client, including the completion of mutual authentication (with the PAL Client) and the aspect values corresponding to Alice's "oma_buddylist".

```
HTTP/1.1 201 Created
Authentication-Info: Digest
    qop="auth-int",
    rspauth="f6e6664df36e61ec97efec46b5f386d3",
    cnonce="82c875dc",
    nc="0002"
Location: http://www.example.com/pal=%27friendlychat@example.com%7Balice@example.com%7D/:01%27
Content-Type: application/vnd.oma.pal+xml
Content-Length: 1241
```

```
<?xml version="1.0" encoding="UTF-8"?>
<p1:pal-message
      xmlns:xml="http://www.w3.org/XML/1998/namespace"
      xmlns:p1="urn:oma:xml:prs:pal:payloads:1.0"
      xmlns:p2="urn:oma:xml:prs:pal:aspect"
      xmlns:p3="urn:ietf:params:xml:ns:pidf">
 <p1:pal-response>
   <p1:bpres-context
      presence-context-id="friendlychat@example.com%7Balice@example.com%7D/:01">
      <p1:aspect-response>
         <p1:entity uri="bob@example.com">
            <p1:item aspect="oma:prs:pal:aspect:optIn">open,Indefinite</p1:item>
            <p1:item aspect="oma:prs:pal:aspect:contactable">closed</p1:item>
         <p1:entity>
         <p1:entity uri="jane@example.com">
            <p2:contact priority="0.9">sip:jane_fc@example.com</p2:contact>
            <p1:item aspect="oma:prs:pal:aspect:optIn">open,3600</p1:item>
            <p1:item aspect="oma:prs:pal:aspect:contactable">open,3600</p1:item>
         <p1:entity>
         <p1:entity uri="chris@example.com">
            <p2:contact priority="0.9">sip:jane_fc@example.com</p2:contact>
            <p1:item aspect="oma:prs:pal:aspect:optIn">closed,7200</p1:item>
            <p1:item aspect="oma:prs:pal:aspect:contactable">closed</p1:item>
         <p1:entity>
      </p1:aspect-response>
   </p1:bpres-context>
 </p1:pal-response>
</p1:pal-message>
```

C.2.2   PAL Client suspend/resume Presence Context

A PAL Client utilizing Presence Context to request and be asynchronously notified of Presence Aspect values for Presentities of interest, may wish to suspend and later resume a Presence Context (e.g. the user is turning off their UE for the evening, and will resume receiving updates in the morning). This permits a PAL Server to continue to monitor and process Presence Aspects (e.g. for applicable Presence Triggers) on behalf of a Logical Observer, even when those observers may not wish to immediately receive or be notified of updates.

   NOTE: Ongoing HTTP Digest headers have been *excluded* in this example, to aid in readability.

1. PAL Client (Alice) requests the suspension of a previously established Presence Context (e.g. for Presence Aware Service 'MyFriendlyChat') for a period of 10 hours from the time the PAL Server receives the request:

```
POST /pal HTTP/1.1
HOST: www.example.com
From: alice@example.com
X-3GPP-Intended-Identity: alice@example.com
Content-Type: application/vnd.oma.pal+xml
Content-Length: 424

<?xml version="1.0" encoding="UTF-8"?>
<p1:pal-message
     xmlns:xml="http://www.w3.org/XML/1998/namespace"
     xmlns:p1="urn:oma:xml:prs:pal:payloads:1.0">
 <p1:pal-request>
    <p1:suspend-pres-context>
       <p1:pcEntry
         presence-context-id="friendlychat@example.com%7Balice@example.com%7D/:01"
          duration="36000" suspend-event-handling="Capture"/>
    </p1:suspend-pres-context>
 </p1:pal-request>
</p1:pal-message>
```

2. The PAL Server receives the suspension request for Presence Aware Service 'MyFriendlyChat' and suspends the corresponding Presence Context for PAL Client 'Alice'. The PAL Server acknowledges this request by sending a suitable PALSuspendPCResponse to Alice's PAL Client:

```
HTTP/1.1 200 OK
Content-Type: application/vnd.oma.pal+xml
Content-Length: 465

<?xml version="1.0" encoding="UTF-8"?>
<p1:pal-message any_attribute="any_value"
     xmlns:xml="http://www.w3.org/XML/1998/namespace"
     xmlns:p1="urn:oma:xml:prs:pal:payloads:1.0">
 <p1:pal-response>
    <p1:suspend-pres-context-acksuspend-pres-context-ack>
       <p1:pcEntry
         presence-context-id="friendlychat@example.com%7Balice@example.com%7D/:01"
          requestAckduration="36000true" suspend-event-handling="Capture"/>
    </p1:suspend-pres-context-ack>
 </p1:pal-response>
</p1:pal-message>
```

3. At this point, the Presence Context corresponding to Alice's PAL Client is effectively suspended. However, a PAL Server (where applicable) can continue to process asynchronous events on behalf of a PAL Client, while the Presence Context is in the 'suspended' state.

4. After 10 hours, the 'suspended' Presence Context in this example is automatically resumed by the PAL Server on behalf of Alice's PAL Client.

5. During the 'suspend' period a Presence Trigger, applicable to Alice's Presence Context for 'MyFriendlyChat' is detected and a predefined action executed (e.g. an asynchronous notification). This results in a push notification containing a view of the detected Presence Aspect value change transmitted by the PAL Server to an OMA PPG. This resulted in the PAL Client (acting in the role of a Push enabled application) receiving the following event notification from a corresponding OMA Push Client on Alice's UE:

   • Content-type: `application/vnd.oma.pal+xml`

   • Content:

```
<?xml version="1.0" encoding="UTF-8"?>
<p1:pal-message
     xmlns:xml="http://www.w3.org/XML/1998/namespace"
     xmlns:p1="urn:oma:xml:prs:pal:payloads:1.0"
     xmlns:p2="urn:oma:xml:prs:pal:aspect"
     xmlns:p3="urn:ietf:params:xml:ns:pidf">
 <p1:pal-response>
    <p1: pres-trigger-async-notify presence-context-
id="sip:sip:friendlychat@example.com/%7Bsip:alice@example.com%7D/:01">
       <p1:entity uri="sip:bob@example.com">
          <p1:contact priority="0.9">sip:bob_fx@example.com</p1:contact>
          <p1:item aspect="oma:prs:pal:aspect:contactable">open,7200</p1:item>
       </p1:entity>
       <p1:entity uri="chris@example.com">
          <p1:item aspect="oma:prs:pal:aspect:optIn">open,Indefinite</p1:item>
       </p1:entity>
    </p1:pres-trigger-async-notify>
  </p1:pal-response>
</p1:message>
```

NOTE: OMA Push, when utilizing Push CAI, does not enforce a particular protocol be utilized between a Push enabled application (i.e. a PAL Client) and a Push Client. Therefore, protocol specifics between PAL and Push Clients have been omitted.