



# **Push to Communicate for Public Safety Invocation Descriptor**

Approved Version 1.0 – 24 Jan 2017

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**Open Mobile Alliance**  
OMA-PCPS-TS-Invocation\_Descriptor-V1\_0-20170124-A

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# 1. Scope

The OMA PCPS Invocation Descriptor specification defines the syntax and semantics of the PoC Invocation Descriptor and also the behaviour of the UE when it receives a PoC Invocation Descriptor. The behaviour of the Web server is outside the scope of this document.

The provisioning of the security related parameters such as white list data for server authorization is out of scope. The intended audience of this specification are implementers of PoC Client and the content developers on the Web servers, as well as other people who have some in-depth interest in the PoC invocation from browsing. It is not intended to be a tutorial.

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## 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

1-1 PoC Session	A feature enabling a PoC User to establish a PoC Session with another PoC User.
Ad-hoc PoC Group Session	A PoC Group Session established by a PoC User to PoC Users listed on the invitation. The list includes PoC Users or PoC Groups or both.
Aggregation Proxy	A contact point to access XML documents stored in any XDMS.
Application Unique ID	A unique identifier that differentiates XCAP resources accessed by one application from XCAP resources accessed by another application. (Source: [RFC4825])
Browser	A piece of software in the User Equipment that accesses and displays files and other media data available on the Web server. When the HTTP is used for transport, the Browser is supposed to include the HTTP User Agent.
Chat PoC Group	A persistent PoC Group in which a PoC User individually joins to have a PoC Session with other joined PoC Users, i.e., the establishment of a PoC Session to a Chat PoC Group does not result in other PoC Users being invited.  NOTE: A Chat PoC Group is a persistent PoC Group where the <invite-members> element is set to "false" as specified in the [OMA-PCPS-Document-Mgmt] " <i>PoC Group</i> ".
Chat PoC Group Session	A PoC Session established to a Chat PoC Group.
Conference-Factory-URI	A Conference-Factory-URI for PoC service is a provisioned SIP URI that identifies the PoC service in the Home PoC Network.
Group	A predefined set of Users together with its policies and attributes. A Group is identified by a SIP URI.
Group XDMS	The Group XDMS is an XCAP Server that manages XML documents (e.g. PoC Groups), which are common to several enablers.
HTTP User Agent	An HTTP client which initiates an HTTP request (see [RFC7230]).
MIME Media Type	String to identify content types, content subtypes, character sets, access types, and conversion values of media as specified in [RFC2046].
On-demand Session	A PoC Session set-up mechanism in which all Media Parameters are negotiated at PoC Session establishment.
PoC Address	An address identifying a PoC User. The PoC Address can be used by one PoC User to request communication with other PoC Users. If SIP/IP Core is the 3GPP/3GPP2 IMS the PoC Address is a public user identity.
PoC Client	A functional entity that resides on the User Equipment that supports the PoC service.
PoC Group	A Group supporting the PoC service. PoC User uses PoC Groups e.g. to establish PoC Group Sessions.
PoC Group Identity	A SIP URI identifying a Pre-arranged PoC Group or a Chat PoC Group. A PoC Group Identity is used by the PoC Client e.g. to establish PoC Group Sessions to the Pre-arranged PoC Groups and Chat PoC Groups.
PoC Invocation Descriptor	An XML document containing the information for initiating a PoC Session. The detail is specified in this document.
PoC Server	A network element, which implements the 3GPP/3GPP2 IMS application level network functionality for the PoC service. A PoC Server can perform the role of the Controlling PoC Function or Participating PoC Function, or both at the same time.
PoC Session	A PoC Session is a SIP Session established by the procedures in [OMA-PCPS-CP]. The following types of PoC Sessions are supported: 1-1 PoC Session, Ad-hoc PoC Group Session, Pre-arranged PoC Group Session, or Chat PoC Group Session.



PoC User	A User of the PoC service. A PoC User can be the same person as a PoC Subscriber. A PoC User uses the PoC features through the User Equipment.
Pre-arranged PoC Group	A persistent PoC Group. The establishment of a PoC Session to a Pre-arranged PoC Group results in the members being invited.  NOTE: A Pre-arranged PoC Group is a persistent PoC Group, where the <invite-members> element is set to "true" as specified in the [OMA-PCPS-Document-Mgmt] " <i>PoC Group</i> ".
Pre-arranged PoC Group Session	A PoC Session established by a PoC User to a Pre-arranged PoC Group.
Pre-established Session	The Pre-established Session is a SIP Session established between the PoC Client and the Home PoC Server containing at least one Media Stream bound to a Media-floor Control Entity. The PoC Client establishes the Pre-established Session prior to making requests for PoC Sessions to other PoC Users. To establish a PoC Session based on a SIP request from the PoC User, the PoC Server conferences other PoC Servers/Users to the Pre-established Session so as to create an end-to-end connection.
SIP URI	From [RFC3261]: "A SIP or SIPS URI identifies a communications resource" and "follows the guidelines in [RFC2396]". PoC uses SIP URIs to identify PoC Clients, PoC Servers, and PoC Sessions, resource lists that point to URI lists, etc.
TEL URI	TEL URI describes resources identified by telephone numbers.
User	Any entity that uses the described features through the User Equipment.
User Equipment	A hardware device that supports a PoC Client e.g., a wireless phone.
Web	A hypertext system that operates over the internet, used for serving Web pages and transferring files.
XCAP User Identifier	A string, valid as a path element in an HTTP URI, that is associated with each user served by the XCAP Server.
XDM Server	An HTTP server that understands how to follow the naming and validation constraints defined in [RFC4825].

### 3.3 Abbreviations

<b>3GPP</b>	3rd Generation Partnership Project
<b>AUID</b>	Application Unique ID
<b>CSCSF</b>	Client Side Content Screening Framework
<b>GAA</b>	General Authentication Architecture
<b>HTTP</b>	Hypertext Transfer Protocol
<b>MIME</b>	Multipurpose Internet Mail Extensions
<b>OMA</b>	Open Mobile Alliance
<b>PCPS</b>	Push to Communicate for Public Safety
<b>PoC</b>	Push to talk over Cellular
<b>SIP</b>	Session Initiation Protocol
<b>SSL</b>	Secure Socket Layer
<b>TEL</b>	TELEphone
<b>TLS</b>	Transport Layer Security
<b>UE</b>	User Equipment
<b>URI</b>	Uniform Resource Identifier
<b>XCAP</b>	XML Configuration Access Protocol
<b>XDM</b>	XML Document Management
<b>XDMS</b>	XDM Server
<b>XML</b>	Extensible Markup Language
<b>XUI</b>	XCAP User Identifier

## 4. Introduction

The PCPS Enabler is intended to deliver a complete set of Push-to-Communicate for Public Safety application and service layer standards (for voice and data), hence the PCPS acronym. This enabler is an update from the PoC V2.1 Enabler.

### 4.1 Version 1.0

PCPS V1.0 has a limited scope, serving as a limited OMA PoC Enabler Update from the current version of PoC V2.1.

PCPS V1.0 updates PoC V2.1 to support 3GPP Release 12 LTE and relevant key features based upon completed 3GPP requirements up through Release 12.

PCPS V1.0 is synchronized to 3GPP Release 12, specifically excluding the following in progress Release 12 work:

- Group Communication System Enablers for LTE (GCSE\_LTE)
- Proximity Services (ProSe)

PCPS V1.0 is synchronized to 3GPP Release 12, to specifically include the following:

- Adapt PoC V2.1 Multicast (currently using MBMS over UTRA) to use eMBMS over LTE
- Update PoC V2.1 SIP/IP Core operations to align with 3GPP Release 12 LTE architecture

Two aspects of the Invocation Descriptor usage are:

- (1) Facilitating PoC Group management

The Browser interface can be used to manage large PoC Group lists. This is especially effective when PCs with larger displays are used. A Web server having an XCAP interface to an XDMS allows such applications. It is noted that for such a Web based system, a Web front end system, can be developed within OMA PCPS specifications and no additional standardization is needed. A Web server having an XDM-3 interface point specified in [OMA-XDM\_AD] enables Browsers, on PCs or mobile UEs, to access XDMSs, with appropriate security mechanisms.

**Informational Note:** Facilitating group management is outside the scope of this document.

- (2) Invoking PoC Client and initiating 1-1 PoC Session, Ad-hoc PoC Group Session, Pre-arranged PoC Group Session, and Chat PoC Group Session

A Web server which has connections to the XDMS as well as other servers is able to present to the Browser on the mobile UE various information relative to PoC Groups. For example, a Web server can present particular information associated with the PoC Group that provides agenda for the PoC Group to talk about. While PoC Users are browsing such information and find agenda to talk about, the Browser enables the PoC Users to instantly invoke the PoC Client and initiate a 1-1 PoC Session, Ad-hoc PoC Group Session, Pre-arranged PoC Group Session or Chat PoC Group Session, with a single click of a link or button from the page that is presented on the Browser. Such automatic and seamless initiation while browsing enriches the user experience and increases traffic.

In order to enable this functionality, it is necessary to standardize a mechanism to invoke the PoC Client and initiate a 1-1 PoC Session, Ad-hoc PoC Group Session, Pre-arranged PoC Group or Chat PoC Group Session by clicking a link or button from a page that is presented on the Browser of a mobile device.

The document is structured in the following way:

Clause 5: "*PCPS Invocation Descriptor syntax and semantics*" defines the syntax and semantics of the PCPS Invocation Descriptor.

Appendix B: "*Static Conformance Requirements*" is a normative annex containing tables of mandatory and optional features.

Appendix C: "*Examples*" is an informative annex containing the use case of PoC Client invocation from Browser and the detailed signalling flow and message examples of PoC Invocation Descriptor usage for Ad-hoc PoC Group Session / 1-1 PoC Session and Pre-arranged Group Session / Chat PoC Group Session.

Appendix D: "*Security*" is an informative annex outlining security issues and potential solutions for the secure PoC Invocation Descriptor download.

## 5. PoC Invocation Descriptor syntax and semantics (Normative)

The PoC Invocation Descriptor is an XML document containing the information for PoC Session initiation. The defined elements and attributes allow the PoC Client to initiate the required PoC Session. For details regarding the initiation of a PoC Session within a Pre-established Session, refer to [OMA-PCPS-CP] "*Using Pre-established Session*". For details regarding the initiation of a PoC Session in case of On-demand Session, refer to [OMA-PCPS-CP] "*Establishment of an On-demand Session*".

### 5.1 PoC Invocation Descriptor

The PoC Invocation Descriptor is created by the Web server in response to the HTTP request and received by the HTTP User Agent. The HTTP User Agent SHALL use the MIME Media Type declared by the transport to identify a PoC Invocation Descriptor object. The MIME Media Type is defined in Section 5.3 "*MIME Media Type*".

NOTE 1: The complete PoC Invocation Descriptor is passed to the PoC Client.

A PoC Invocation Descriptor SHALL be compliant to the XML Schema specified in Section 5.4 "*XML Schema*". The received PoC Invocation Descriptor SHOULD be verified. If the received PoC Invocation Descriptor is not compliant to the XML Schema specified in Section 5.4 "*XML Schema*", a PoC Session SHALL NOT be initiated and an error message SHOULD be displayed to the PoC User.

NOTE 2: The HTTP User Agent and the Web server are expected to obey the standard HTTP content negotiation mechanisms. See [RFC7231] for details.

### 5.2 PoC Invocation Descriptor elements and attributes

This section defines only the semantics of the PoC Invocation Descriptor.

#### 5.2.1. The <invocation-descriptor> element

The PoC Invocation Descriptor SHALL include a <invocation-descriptor> element as its root element.

*Element attributes*

**"version"**

This attribute represents the version of PoC Invocation Descriptor specification that a PoC Invocation Descriptor document conforms to.

This specification defines the value of "PCPS\_1.0" for this attribute.

- If a PoC Invocation Descriptor document conforms to this specification, its value of this attribute SHALL be "PCPS\_1.0".
- If a PoC Invocation Descriptor document conforms to PoC 2.0, the value of this attribute SHALL be "2.0".
- If a PoC Invocation Descriptor document conforms to PoC 2.1, the value of this attribute SHALL be "2.1".

The <invocation-descriptor> element MAY contain any other attributes from any namespaces for the purpose of extensibility

*Element content*

The <invocation-descriptor> element SHALL contain exactly one <poc-session> element.

The <invocation-descriptor> element MAY contain any other elements from any other namespaces for the purpose of extensibility.

### 5.2.2. The <poc-session> element

The <poc-session> element determines the type of PoC Session to be used when initiating the PoC Session.

The <poc-session> element SHALL appear exactly one time in its parent <invocation-descriptor> element.

#### *Element attributes*

##### **"uri"**

This attribute represents the PoC Group Identity or the Conference-Factory-URI.

The value of this attribute when associated with a <poc-session> element SHALL be in the format of a SIP URI [RFC3261]. The value of this attribute SHALL be either a PoC Group Identity or Conference-Factory-URI.

If the value of the "uri" attribute is a Conference-Factory-URI and the PoC Client initiates a PoC Session, the PoC Session initiation SHALL be for an Ad-hoc PoC Group Session or a 1-1 PoC Session as specified in [OMA-PCPS-CP] "Procedures at the PoC Client" using the contents of the <entry> elements included in the <list> element.

If the value of the "uri" attribute is a PoC Group Identity and the PoC Client initiates a PoC Session, the PoC Session initiation SHALL be for a Pre-arranged PoC Group Session or a Chat PoC Group Session as specified in [OMA-PCPS-CP] "Procedures at the PoC Client" using the attribute value as PoC Group Identity.

**NOTE:** In this context, a URI is a Conference-Factory-URI if it matches one of the provisioned Conference-Factory-URI values. A URI that is not a Conference-Factory-URI is a PoC Group Identity.

The <poc-session> element MAY contain any other attributes from any namespaces for the purpose of extensibility.

#### *Element content*

The <poc-session> element MAY contain a <display-name> element.

When the value of the "uri" attribute is a Conference-Factory-URI, the <poc-session> element SHALL contain exactly one <list> element. When the value of the "uri" attribute is a PoC Group Identity, the <poc-session> element MAY contain one or zero <list> element.

When the value of the "uri" attribute is a PoC Group Identity, the <poc-session> element MAY contain an <invite-members> element. When the value of the "uri" attribute is a Conference-Factory-URI, the <poc-session> element SHALL NOT contain an <invite-members> element.

The <poc-session> element MAY contain any other elements from any other namespaces for the purpose of extensibility.

### 5.2.3. The <list> element

The <list> element determines the entries to be used for Ad-hoc PoC Group Session or 1-1 PoC Session.

A syntactically valid <list> element with valid child <entry> element(s) MAY be present even if the value of the "uri" attribute of their parent <poc-session> element is a PoC Group Identity. However these elements are not required to initiate a Pre-arranged PoC Group Session or a Chat PoC Group Session, and SHALL be ignored by the PoC Client.

#### *Element content*

The <list> element SHALL contain one or more <entry> elements.

### 5.2.4. The <entry> element

The <entry> element determines a PoC User or PoC Group members to be invited to an Ad-hoc PoC Group Session or 1-1 PoC Session.

The <entry> element SHALL appear at least once in the <list> element. The <entry> element SHALL have a single mandatory attribute, "uri".

### *Element attributes*

#### **"uri"**

This attribute represents the PoC Address of a PoC User or the PoC Group Identity of a PoC Group. The value of this attribute when associated with a <entry> element SHALL be in the format of a SIP URI as specified in [RFC3261] or a TEL URI as defined in [RFC3966]. The value of the "uri" attribute in an <entry> element SHALL be unique amongst all other values of the "uri" attributes in <entry> elements within the same <list> element.

### *Element content*

The <entry> element MAY contain the <display-name> element.

## **5.2.5. The <display-name> element**

The <display-name> element specifies a human readable name of each parent's element as defined in [RFC4826].

When the parent element is the <poc-session> element, the <display-name> element determines the PoC Session name. When the parent element is the <entry> element, the <display-name> element determines the single PoC User name.

The usage of the <display-name> element is implementation specific.

### *Element attributes*

#### **"xml:lang"**

This attribute specifies the language of the display name.

## **5.2.6. The <invite-members> element**

The <invite-members> element SHALL indicate whether the PoC Invocation Descriptor is for a Pre-arranged PoC Group or for a Chat PoC Group when the value of the "uri" attribute of its parent <poc-session> element is a PoC Group Identity.

A syntactically valid <invite-members> element MAY be presented even if the value of the "uri" attribute of its parent <poc-session> element is a Conference-Factory-URI. However the <invite-members> element is not required in this case, and SHALL be ignored by the PoC Client.

### *Element content*

The possible values of the <invite-members> element are:

"false" represents a Chat PoC Group (see [OMA-PCPS-CP]). This SHALL be the default value taken in the absence of the element.

"true" represents a Pre-arranged PoC Group (see [OMA-PCPS-CP]).

## **5.3 MIME Media Type**

MIME Media Type for the PoC Invocation Descriptor is

"application/vnd.oma.pcps.invocation-descriptor+xml"

## **5.4 XML Schema**

The PoC Invocation Descriptor SHALL conform to the XML Schema described in [XSD\_POCID].

## **5.5 Security**

The security description for the PoC Invocation Descriptor download is described in Appendix D "*Security (Informative)*" as informative section.

## Appendix A. Change History

(Informative)

### A.1 Approved Version History

Reference	Date	Description
OMA-PCPS-TS-Invocation_Descriptor-V1_0-20170124-A	24 Jan 2017	Status changed to Approved by TP TP Ref # OMA-TP-2017-0001-INP_PCPS-V1_0_ERP_for_Final_Approval

## Appendix B. Static Conformance Requirements (Normative)

NOTE: This section is unchanged for PCPS V1.0. It contains the SCR from PoC v2.1.

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

- UE for PoC Invocation Descriptor

Each SCR table identifies a list of supported features as:

- Item: Identifier for a feature.
- Function: Short description of the feature.
- Reference: Section(s) of the specification(s) with more details on the feature.
- Requirement: Other features required by this feature, independent of whether those other features are mandatory or optional..

This section describes the dependency grammar notation to be used in the Requirement column of the SCR and CCR tables using ABNF [RFC5234].

```

TerminalExpression =   ScrReference
                      / NOT TerminalExpression
                      / TerminalExpression LogicalOperator TerminalExpression
                      / "(" TerminalExpression ")"

ScrReference =        ScrItem
                      / ScrGroup

ScrItem =             SpecScrName "-" GroupType "-" DeviceType "-" NumericId "-"
                      Status
                      / SpecScrName "-" DeviceType "-" NumericId "-" Status

ScrGroup =           SpecScrName ":" FeatureType
                      / SpecScrName "-" GroupType "-" DeviceType "-" FeatureType

SpecScrName = 1*Character; See "SpecScrName" in [SCR_RULES]
GroupType = 1*Character; See "GroupType" in [SCR_RULES]
DeviceType = "C" / "S"; C - Client, S - Server
NumericId = Number Number Number
Status = "M" / "O"; M - Mandatory, O - Optional
LogicalOperator = "AND" / "OR"; AND has higher precedence than OR and OR is
                  inclusive
FeatureType = "MCF" / "OCF" / "MSF" / "OSF"; See "FeatureType" in [SCR_RULES]
Character = %x41-5A ; A-Z
Number = %x30-39 ; 0-9

```

## B.1 UE for PoC Invocation Descriptor

Item	Function	Reference	Requirement
POCIDSPEC-PID-C-001-O	Support Browser-based PoC Client Invocation	5	POCIDSPEC-PID-C-002-O AND POCIDSPEC-PID-C-003-O AND POCIDSPEC-PID-C-004-O AND POCIDSPEC-PID-C-005-O AND POCIDSPEC-PID-C-006-O AND POCIDSPEC-PID-C-007-O
POCIDSPEC-PID-C-002-O	Access Web server using Browser (HTTP User Agent) to retrieve PoC Invocation Descriptor	5.1	POCIDSPEC-PID-C-001-O
POCIDSPEC-PID-C-003-O	Initiate Ad-hoc PoC Group Session based on a PoC Invocation Descriptor	5.1 5.2 5.4	POCIDSPEC-PID-C-001-O
POCIDSPEC-PID-C-004-O	Initiate 1-1 PoC Session based on a PoC Invocation Descriptor	5.1 5.2 5.4	POCIDSPEC-PID-C-001-O
POCIDSPEC-PID-C-005-O	Initiate Pre-arranged PoC Group Session based on a PoC Invocation Descriptor	5.1 5.2 5.4	POCIDSPEC-PID-C-001-O
POCIDSPEC-PID-C-006-O	Join Chat PoC Group Session based on a PoC Invocation Descriptor	5.1 5.2 5.4	POCIDSPEC-PID-C-001-O
POCIDSPEC-PID-C-007-O	Handle invalid PoC Invocation Descriptor	5.1 5.2 5.4	POCIDSPEC-PID-C-001-O



## Appendix C. Examples

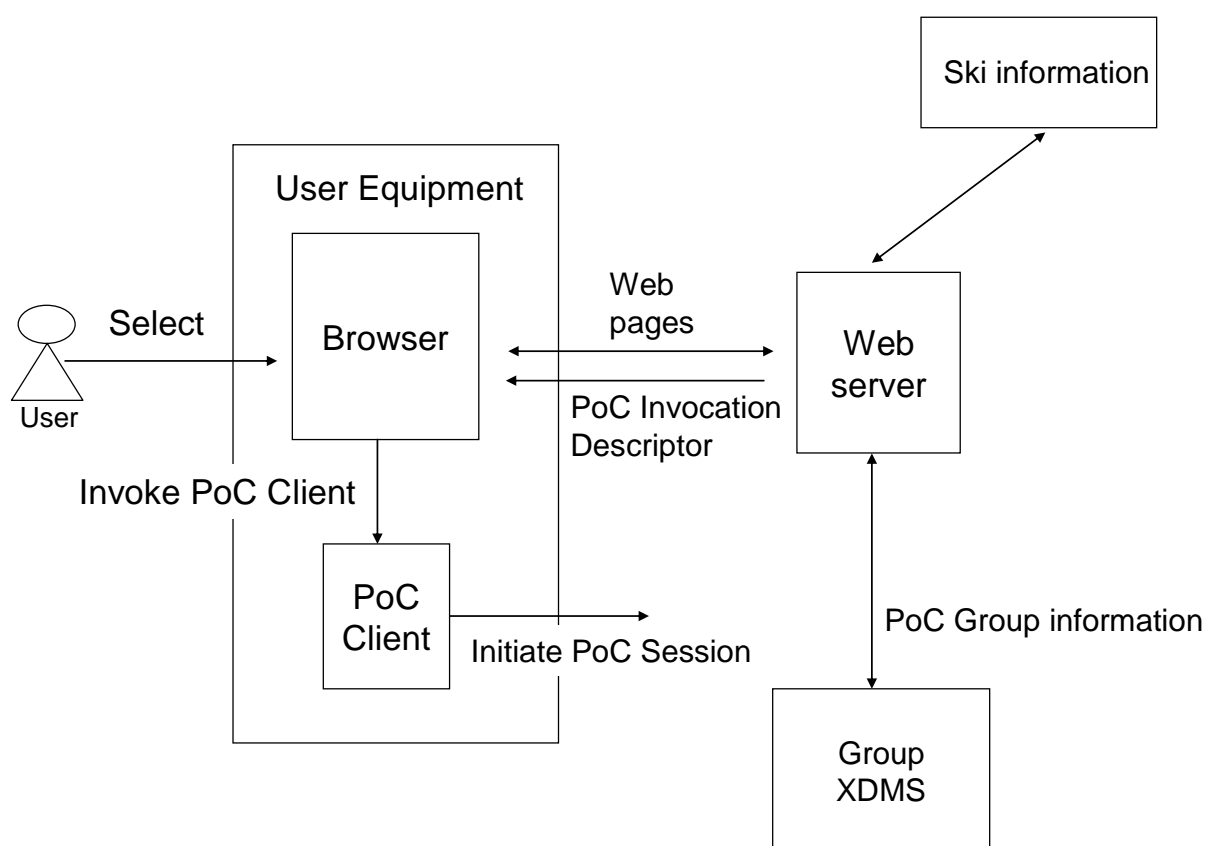
(Informative)

### C.1 Use case of PoC Client invocation from Browser

#### C.1.1 Usage example

Figure C.1 shows an example of a configuration where the Browser is used to;

- Present some information associated with the PoC Group (information on a ski resort in this example),
- Allow the PoC User to select the member(s) (in case of 1-1 PoC Session and Ad-hoc PoC Group Session) or PoC Group (in case of Pre-arranged PoC Group Session and Chat PoC Group Session) to call,
- Retrieve a PoC Invocation Descriptor, and
- Invoke the PoC Client to initiate a PoC Session.



**Figure C.1: An example of PoC Client invocation from Browser**

Assuming Alice, Bob, Carol, David and Edward are the PoC Users, the normal and alternative flows are as follows:

(1) Normal flow

- Alice request a Web page to the Web server using the Browser in her UE.
- The Web server authenticates Alice and returns the Web page requested to Alice's Browser.  
During this step the Web server accesses the Group XDMS using Alice's XUI [RFC4825] and obtains her PoC Group document using her access rights.
- The Web page generated by the Web server contains a list of the PoC Groups which Alice is a member of, and also contains other relevant information such as news, offers, etc.
- Alice selects one of her PoC Groups, e.g. Ski\_Buddies, on her Browser.

- The Browser presents a list of members of Ski\_Buddies as well as updates of certain ski resort. The updates contain such information as dates, time, current weather, forecast, wind, temperature, near real time pictures of the resort, etc.
- Since the conditions look perfect, using PoC, Alice decides to call Bob, Carol and David to discuss their trip to the ski resort tomorrow. Alice knows that Edward is not available due to his trip abroad and she does not attempt to call him.
- Alice selects Bob, Carol and David and clicks the "CALL" button on the Browser.
- The PoC Client is automatically invoked by clicking the "CALL" button and the invitation is sent to Bob, Carol and David. The four talk in the Ad-hoc PoC Group Session and discuss their ski trip tomorrow.

If Alice selects only one person, then the PoC Session becomes a 1-1 PoC Session.

(2) Alternative flow

- Instead of selecting each member whom Alice wants to talk to, Alice wants to talk to everyone. Alice selects the "CALL ENTIRE GROUP" button on the Browser.
- PoC Client is automatically invoked by clicking the "CALL ENTIRE GROUP" button and invitation is sent to everyone in the PoC Group. The participants talk in the Pre-arranged PoC Group Session and discuss their ski trip tomorrow.

If Ski\_Buddies is a Chat PoC Group, then the PoC Session becomes a Chat PoC Group Session.

### C.1.2 Sequence example

Figure C.2 depicts an example of the sequence of the PoC Invocation Descriptor.

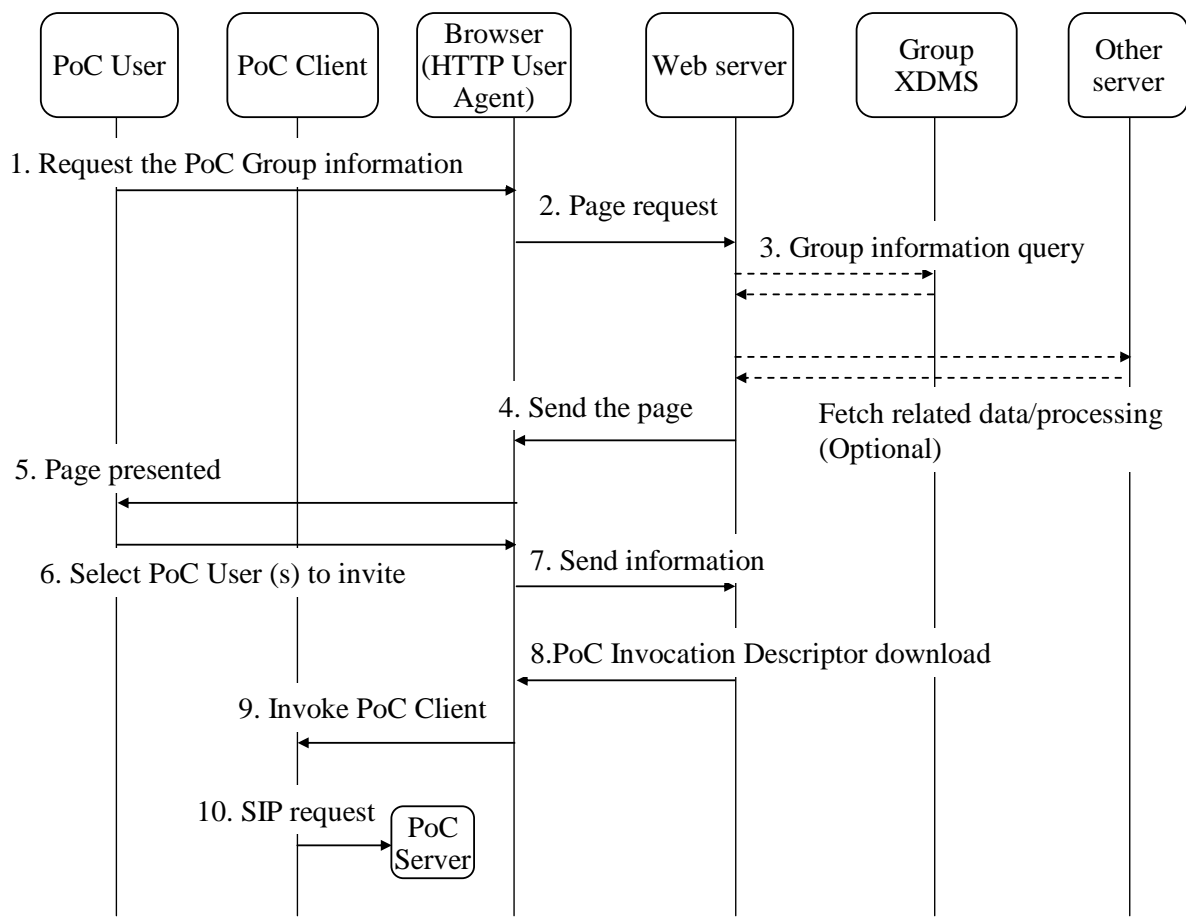


Figure C.2: An example sequence of PoC Invocation Descriptor

1. The PoC User request a Web page which includes the PoC Group information by clicking a link for example.
2. The Browser (HTTP User Agent) sends the HTTP request to the Web server to request the page for the PoC Group information.
3. The Web server queries the PoC Group information from the Group XDMS to compose the PoC Group information page by the procedures specified in [OMA-XDM\_SPEC] "*Procedures at the XDM Client*" with the security procedures specified in [OMA-XDM\_SPEC] "*Security Procedures*". The Web server receives the necessary information from the PoC User in advance for the user authorization by Group XDMS. The Web server obtains the related information from external information resources other than the Group XDMS.
4. The Web server sends the PoC Group information page to the Browser.
5. The PoC User inputs some additional information through the form interface such as choosing the individual PoC User(s) by the checkboxes.
6. The PoC User pushes the submit button after finishing the form input.
7. The Browser (HTTP User Agent) sends the information contained in the form to the Web server.
8. The Web server creates the PoC Invocation Descriptor compliant to the XML Schema specified in Section 5.4 "*XML Schema*" using the information contained in the HTTP request submitted by the Browser (HTTP User Agent).
9. The Browser (HTTP User Agent) analyzes the MIME Media Type [RFC2046] of the HTTP header, and passes the PoC Invocation Descriptor and the necessary information to the PoC Client to initiate the PoC Session.
10. PoC Client analyses the PoC Invocation Descriptor then sends the SIP request to the PoC Server to initiate the PoC Session according to the PoC Invocation Descriptor received from the Browser (HTTP User Agent).

## C.2 Detailed signalling flow and message examples

### C.2.1 Ad-hoc PoC Group Session / 1-1 PoC Session initiation

Figure C.3 describes how an Ad-hoc PoC Group Session or a 1-1 PoC Session is initiated using the PoC Invocation Descriptor.

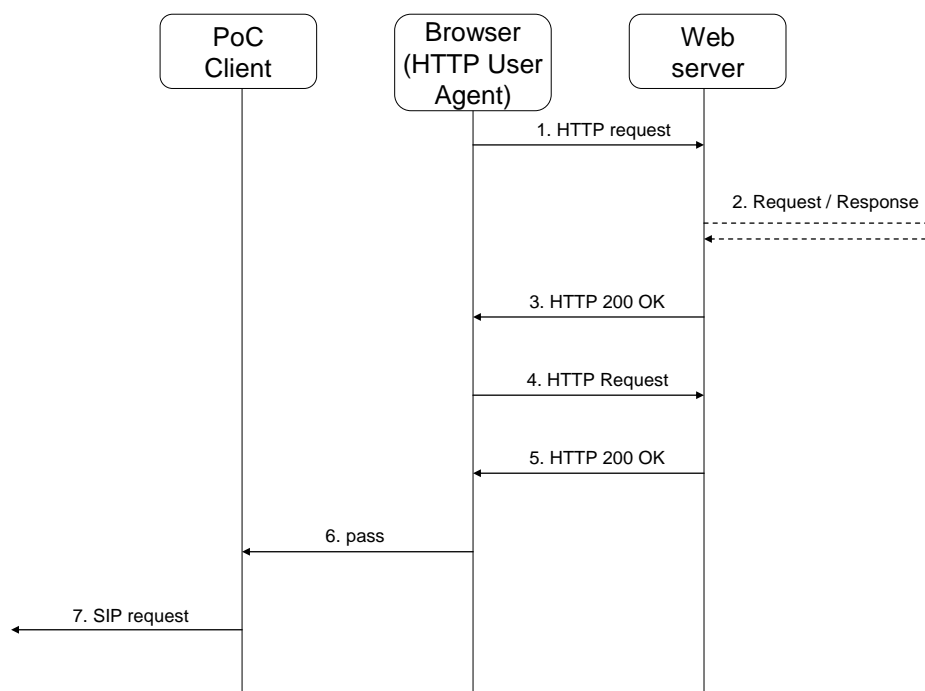


Figure C.3: Ad-hoc PoC Group Session / 1-1 PoC Session initiation signalling flow

The details of the flows are as follows:

- 1) Alice decides to access to her buddy list on the Web server. The Browser (HTTP User Agent) sends an HTTP request to the Web server. At this time, the Web server authenticates the UE, (the details of authentication are omitted here.)
- 2) In response to the HTTP request, the Web server generates a Web page. (At this time the Web server can retrieve some resources relating to the Web page from external entities, however this is completely implementation specific.)
- 3) After generating the Web page, the Web server returns an HTTP 200 OK response together with the generated Web page to the Browser (HTTP User Agent). This Web page is rendered on the Browser and then Alice is able to make use of her buddy list.
- 4) Alice selects her friend(s) to talk with in an Ad-hoc PoC Group Session or a 1-1 PoC Session from her buddy list, and submits the form to initiate the PoC Session. The Browser (HTTP User Agent) sends an HTTP request to the Web server to get the PoC Invocation Descriptor.

In this example, it is assumed that Alice now selects Bob, Carol and Dave to talk with from her buddy list.

- 5) In response to the HTTP request, the Web server generates a PoC Invocation Descriptor according to Section 5.4 "XML Schema", and returns an HTTP 200 OK response to the Browser (HTTP User Agent) together with the PoC Invocation Descriptor in its body.

In this example, the PoC Invocation Descriptor is for an Ad-hoc PoC Group Session, because the value of the "uri" attribute of the <poc-session> element is a Conference-Factory-URI, and 3 <entry> elements corresponding to Bob, Carol and Dave respectively are included under the <list> element.

(If the value of the "uri" attribute of the <poc-session> element is a Conference-Factory-URI, and only 1 <entry> element is included under the <list> element, then the PoC Invocation Descriptor is for a 1-1 PoC Session.)

```
HTTP/1.1 200 OK
...
Content-Type: application/vnd.oma.pcps.invocation-descriptor+xml

<?xml version="1.0" encoding="UTF-8" ?>
<invocation-descriptor version="PCPS_1.0"
  xmlns="urn:oma:xml:pcps:session-invocation-descriptor"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">

  <poc-session uri="sip:conferencefactory@example.com">
    <list>
      <entry uri="sip:bob@example.com">
        <display-name xml:lang="en">Bob</display-name>
      </entry>
      <entry uri="sip:carol@example.com">
        <display-name xml:lang="en">Carol</display-name>
      </entry>
      <entry uri="sip:dave@example.com">
        <display-name xml:lang="en">Dave</display-name>
      </entry>
    </list>
  </poc-session>
</invocation-descriptor>
```

- 6) When the Browser (HTTP User Agent) receives the HTTP 200 OK response from the Web server, the body of which contains a PoC Invocation Descriptor, this PoC Invocation Descriptor is passed from the Browser (HTTP User Agent) to the PoC Client.

```
<?xml version="1.0" encoding="UTF-8" ?>
<invocation-descriptor version="PCPS_1.0"
  xmlns="urn:oma:xml:pcps:session-invocation-descriptor"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">

  <poc-session uri="sip:conferencefactory@example.com">
    <list>
      <entry uri="sip:bob@example.com">
        <display-name xml:lang="en">Bob</display-name>
      </entry>
      <entry uri="sip:carol@example.com">
        <display-name xml:lang="en">Carol</display-name>
      </entry>
      <entry uri="sip:dave@example.com">
        <display-name xml:lang="en">Dave</display-name>
      </entry>
    </list>
  </poc-session>
</invocation-descriptor>
```

```

    </entry>
  </list>
</poc-session>
</invocation-descriptor>

```

7) When the PoC Client receives the PoC Invocation Descriptor, the PoC Client can send a SIP request to initiate a PoC Session.

In this example, the SIP request is for an Ad-hoc PoC Group Session because the value of the "uri" attribute of the <poc-session> element is a Conference-Factory-URI and 3 <entry> elements are included under the <list> element within the PoC Invocation Descriptor.

(If the value of the "uri" attribute of the <poc-session> element is a Conference-Factory-URI and only 1 <entry> element is included under the <list> element, then the SIP request is for a 1-1 PoC Session.)

Then the SIP request is generated and sent as specified in [OMA-PCPS-CP] "PoC Client initiates an Ad-hoc PoC Group Session and 1-1 PoC Session".

### C.2.2 Pre-arranged PoC Group Session / Chat PoC Group Session initiation

Figure C.4 describes how a Pre-arranged PoC Group Session or Chat PoC Group Session is initiated using the PoC Invocation Descriptor.

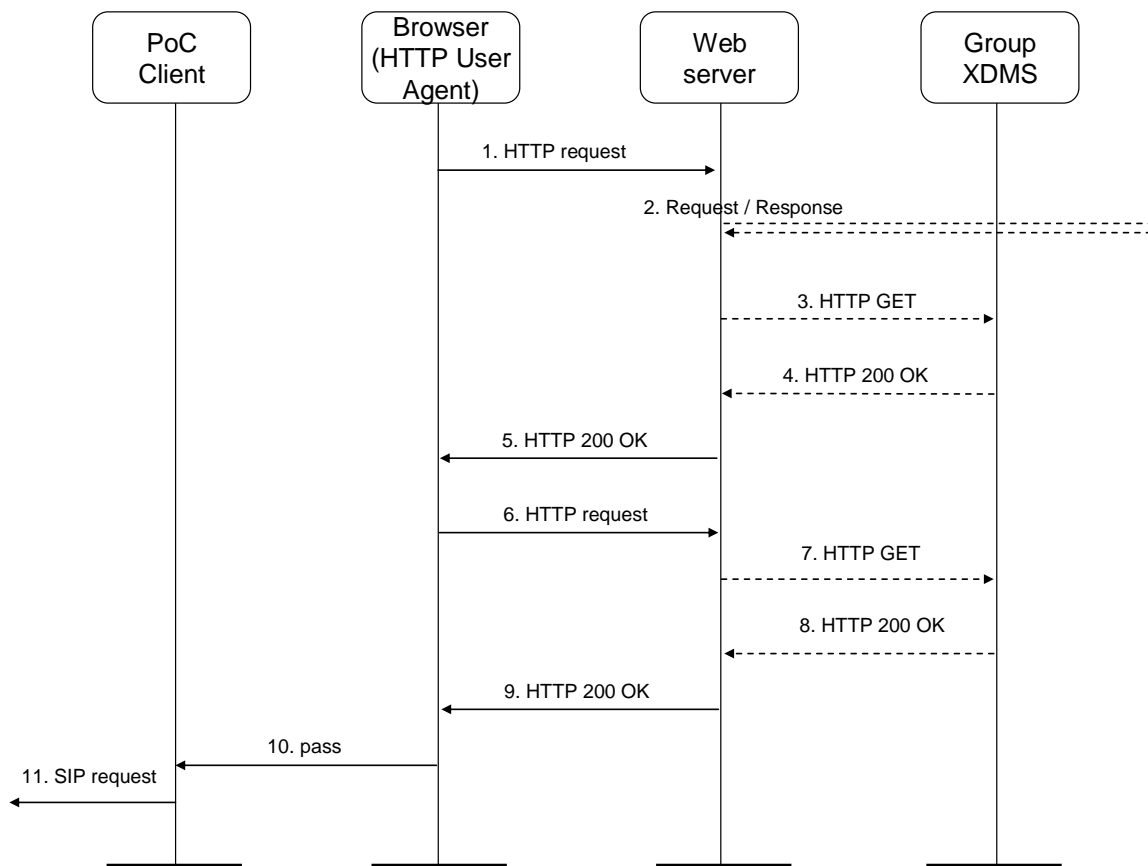


Figure C.4: Pre-arranged PoC Group Session / Chat PoC Group Session initiation signalling flow

The details of the flows are as follows:

- 1) Alice decides to access to her PoC Group list on the Web server. The Browser (HTTP User Agent) sends an HTTP request to the Web server. At this time, the Web server authenticates the UE, (the details of authentication are omitted here.)

- 2) In response to the HTTP request, the Web server generates a Web page. (At this time the Web server can retrieve some resources relating to the Web page from external entities, however this is completely implementation specific.)
- 3) The Web server can attempt to access the Group XDMS to retrieve information about Alice's directory using her XUI to prepare a list of PoC Group document(s) belonging to her using the AUID of Group document defined in [OMA-PCPS-Document-Mgmt] "PoC Group". Then the Web server sends an HTTP GET request to the Group XDMS according to [OMA-XDM\_SPEC] "Procedures at the XDM Client" and "XML Documents Directory" using the AUID of XCAP directory defined in [OMA-XDM\_SPEC] "XML Documents Directory".
- 4) The Web server receives an HTTP 200 OK response containing the list of PoC Group document(s) belonging to Alice from the Group XDMS.
- 5) The Web server generates a Web page according to Alice's directory information in the HTTP 200 OK response. After generating the Web page, the Web server returns an HTTP 200 OK response together with the generated Web page to the Browser (HTTP User Agent). This Web page is rendered on the Browser and then Alice is able to make use of her PoC Group list.
- 6) Alice selects her PoC Group to initiate a Pre-arranged PoC Group Session or Chat PoC Group Session from her PoC Group list, and submits the form to initiate the PoC Session. The Browser (HTTP User Agent) sends an HTTP request to the Web server to get the PoC Invocation Descriptor.

In this example, it is assumed that Alice now selects "chatting.xml", which conforms to [OMA-PCPS-Document-Mgmt] "PoC Group", as the PoC Group to be invited from her PoC Group list.

- 7) In response to the HTTP request, the Web server attempts to retrieve the PoC Group document "chatting.xml" specified by Alice using her XUI. The Web server sends an HTTP GET request to the Group XDMS according to [OMA-XDM\_SPEC] "Procedures at the XDM Client" using the AUID of Group document defined in [OMA-PCPS-Document-Mgmt] "PoC Group".
- 8) The Web server receives an HTTP 200 OK response containing the content of the PoC Group document "chatting.xml" specified by Alice from the Group XDMS.
- 9) Based on the PoC Group document "chatting.xml" within the HTTP 200 OK response, the Web server generates a PoC Invocation Descriptor according to Section 5.4 "XML Schema" and returns an HTTP 200 OK response to the Browser (HTTP User Agent) together with the PoC Invocation Descriptor in its body.

In this example, the PoC Invocation Descriptor is for a Pre-arranged PoC Group Session, because the value of the "uri" attribute of the <poc-session> element is a PoC Group Identity, and the <invite-members> element exists, and contains the text "true".

(If the value of the "uri" attribute of the <poc-session> element is a PoC Group Identity, and the <invite-members> element is omitted or exists and contains the text "false", then the PoC Invocation Descriptor is for a Chat PoC Group Session.)

```
HTTP/1.1 200 OK
...
Content-Type: application/vnd.oma.pcps.invocation-descriptor+xml

<?xml version="1.0" encoding="UTF-8" ?>
<invocation-descriptor version="PCPS_1.0"
  xmlns="urn:oma:xml:pcps:session-invocation-descriptor"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">

  <poc-session uri="sip:myconference@example.com">
    <display-name xml:lang="en">Chatting</display-name>
    <list>
      <entry uri="sip:bob@example.com" />
      <entry uri="sip:carol@example.com" />
      <entry uri="sip:dave@example.com" />
      <entry uri="sip:ellen@example.com" />
      <entry uri="sip:frank@example.com" />
    </list>
    <invite-members>true</invite-members>
  </poc-session>
</invocation-descriptor>
```

- 10) When the Browser (HTTP User Agent) receives the HTTP 200 OK response from the Web server, whose body contains a PoC Invocation Descriptor, this PoC Invocation Descriptor is passed from the Browser (HTTP User Agent) to the PoC Client.

```
<?xml version="1.0" encoding="UTF-8" ?>
<invocation-descriptor version="PCPS_1.0"
  xmlns="urn:oma:xml:pcps:session-invocation-descriptor"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">

  <poc-session uri="sip:myconference@example.com">
    <display-name xml:lang="en">Chatting</display-name>
    <list>
      <entry uri="sip:bob@example.com" />
      <entry uri="sip:carol@example.com" />
      <entry uri="sip:dave@example.com" />
      <entry uri="sip:ellen@example.com" />
      <entry uri="sip:frank@example.com" />
    </list>
    <invite-members>true</invite-members>
  </poc-session>
</invocation-descriptor>
```

- 11) When the PoC Client receives the PoC Invocation Descriptor, the PoC Client can send a SIP request to initiate a PoC Session.

In this example, the SIP request is for a Pre-arranged PoC Group Session because the value of the "uri" attribute of the <poc-session> element is a PoC Group Identity, and the <invite-members> element exists and contains the text "true".

(If the value of the "uri" attribute of the <poc-session> element is a PoC Group Identity, and the <invite-members> element is omitted or exists and contains the text "false", then the SIP request is for a Chat PoC Group Session.)

Then the SIP request is generated and sent as specified in [OMA-PCPS-CP] *"PoC Client initiates a Pre-arranged PoC Group Session or joins a Chat PoC Group Session"*.

## Appendix D. Security (Informative)

### D.1 Risks

For the secure PoC Invocation Descriptor download, there are two areas where security risks exist: between the Web server and the UE for the PoC Client; and between the Web server and the Group XDMS for PoC Group information.

#### D.1.1 Risks for PoC Client protection

The followings are the typical risks for PoC Client protection

- an unsolicited PoC Session is initiated when a PoC Invocation Descriptor is downloaded other than the one intended by the PoC User, and
- PoC service invites unintended/undesirable PoC User(s) by downloading a PoC Invocation Descriptor which includes unsolicited/inappropriate entities.

The first risk case is categorized as server authentication/authorization issue and the second risk includes not only server authentication and server authorization issues but also confidentiality and integrity issue.

Thus, the risks for PoC Client Protection are categorized as followings,

- Browser (HTTP User Agent) authentication
- Server authentication
- Server authorization
- Confidentiality and integrity protection

#### D.1.2 Risks for PoC Group information protection

The followings are the typical risks for PoC Group information

- An unauthorized server obtains PoC Group information from the Group XDMS and utilizes the information for unauthorized purposes.
- An unauthorized server overwrites the data stored in the Group XDMS for illegal purposes for example to include addresses of premium rate services

### D.2 Proposed solutions

#### D.2.1 Proposed solutions for PoC Client protection

##### D.2.1.1 Browser (HTTP User Agent) authentication

When a PoC Invocation Descriptor is downloaded from the Web server to the Browser (HTTP User Agent), secure Browser (HTTP User Agent) authentication is enforced by the Web server. The typical Browser (HTTP User Agent) authentication is the HTTP Digest authentication [RFC2617]. If the HTTP Digest authentication is implemented in accordance to the 3GPP UE implementations, the HTTP Digest authentication is performed as specified in 3GPP GAA [3GPP TS 33.222] specifications.

##### D.2.1.2 Server authentication

When a PoC Invocation Descriptor is downloaded from the Web server to the Browser (HTTP User Agent), the Browser (HTTP User Agent) supports at least one server authentication method such as TLS1.2 [RFC5246] or SSL3.0 [RFC6101] transport layer server authentication. When HTTPS is used to indicate the need for Server Authentication, HTTPS implementations conform to RFC2818 [RFC2818].

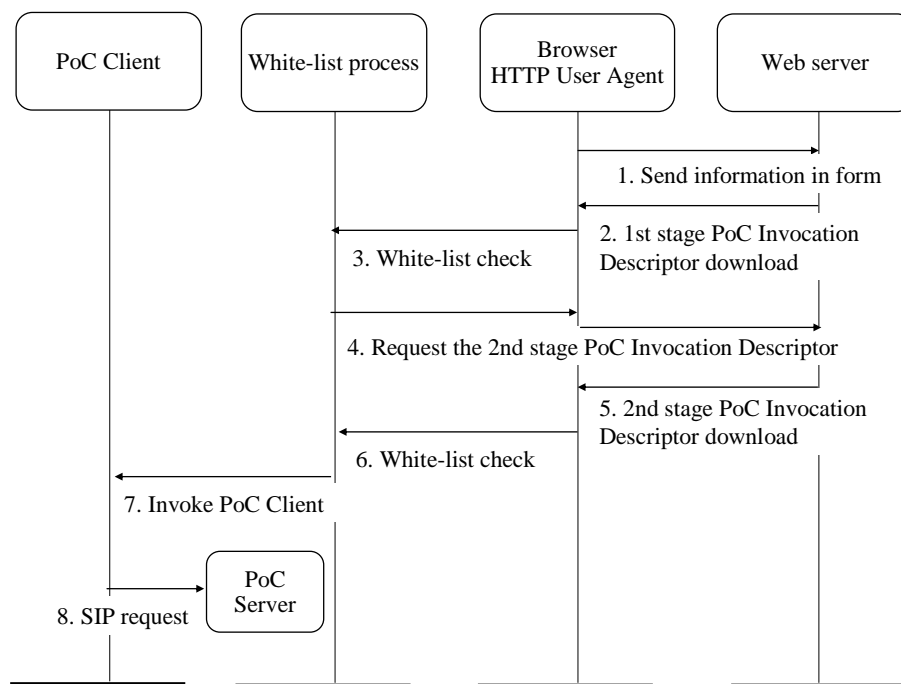
If the Web server switches from TLS/SSL to an insecure protocol during a session, the Browser (HTTP User Agent) can terminate the communication.



### D.2.1.3 Server authorization

The white-list process can use the configured white-list data (the addresses of each authorized Web server) for server authorization. If no white-list data is configured, the white-list process requests confirmation from the PoC User.

Though white-list process is implementation specific, the Browser is assumed to be modified to have a new interface to pass the Web server IP address or URI to the white-list process, or the white-list process is assumed to have a new capability to intercept the Web server IP address or URI. OMA Client Side Content Screening Framework [OMA-CSCSF] is one of the possible solutions in this category. In the case where it is not possible to modify the Browser or create the interception mechanism, the following two stage PoC Invocation Descriptor download introducing extended child elements of the <invocation-descriptor> element can be used to realize the security.



**Figure D.1: An example of the two stage PoC Invocation Descriptor downloads sequence**

This section introduces an example namespace name "othersn" and some example elements belonging to the example namespace. The example namespace name and the example elements are not defined in this specification.

1. The PoC User clicks the subscribe button and the necessary information is sent from the Browser (HTTP User Agent) to the Web server.
2. For the first stage PoC Invocation Descriptor download, the Web server creates a PoC Invocation Descriptor according to the following conditions:
  - the <othersn:responding-web-server> element as a child element of the <invocation-descriptor> element contains the Web server's URI
  - the <othersn:request-path> element as a child element of the <invocation-descriptor> element contains the path of the second stage PoC Invocation Descriptor relative to the root directory
  - the <othersn:one-time-credit> as a child element of the <invocation-descriptor> element contains a download identifier used to match the second stage download to the first stage download

The first stage PoC Invocation Descriptor is downloaded by the Browser (HTTP User Agent) then passed to the white-list process.

The first stage PoC Invocation Descriptor includes the <poc-session> element as a child element of the <invocation-descriptor> element. However the <poc-session> element and its content are ignored in the white-list process.

3. The white-list process checks that the value of the Web server's URI in the <others:responding-web-server> element is authorized
4. If the authorization is successful then the second stage PoC Invocation Descriptor access path is constructed by concatenating the value of the <others:responding-web-server> element with the value of the <others:request-path> element, and the white-list process invokes the HTTP User Agent to send an HTTP request to the authorized server. The white-list process retains the values of the <others:responding-web-server> and <others:one-time-credit> elements for further checking after receipt of the second stage PoC Invocation Descriptor.
5. The Web server receives the HTTP request and constructs a second stage PoC Invocation Descriptor with values of the <others:responded-web-server> and <others:consumed-credit> elements corresponding to the values of the <others:responding-web-server> and <others:one-time-credit> elements in the first stage PoC Invocation Descriptor and this is downloaded by the HTTP User Agent.
6. The white-list process compares the values of the <others:responded-web-server> and <others:consumed-credit> elements (child elements of the <invocation-descriptor> element) with the retained values of the <others:responding-web-server> and <others:one-time-credit> elements from the first stage PoC Invocation Descriptor.
7. If the white-list process succeeds in matching the second stage PoC Invocation Descriptor to the first stage PoC Invocation Descriptor, then the white-list process invokes the PoC Client and passes the second stage PoC Invocation Descriptor to the PoC Client.
8. The PoC Client sends a SIP request to the PoC Server based on the <poc-session> element and its content of the the second stage PoC Invocation Descriptor.

#### D.2.1.4 Confidentiality and integrity protection

When TLS is used to provide Web server authentication, the authenticated PoC Invocation Descriptor download also is confidentiality and integrity protected using the mechanisms defined in the TLS specification [RFC5246].

NOTE: The TLS protocol has a negotiating mechanism which enables compatibility with versions of the protocol preceding the version 1.2 specified in [RFC5246].

When SSL is used to provide Web server authentication, the authenticated PoC Invocation Descriptor download also is confidentiality and integrity protected using the mechanisms defined in the SSL specification [RFC6101].

## D.2.2 Proposed solutions for PoC Group information protection

The access to the PoC Group information is processed via the Aggregation Proxy using XDM-3 reference point as specified in [OMA-XDM\_AD] "*Reference Point XDM-3: XDM Client – Aggregation Proxy*". For the PoC Group information protection, the Web server supports the security procedure specified in [OMA-XDM\_SPEC] "*Security Procedures*".

The Web server can not expose PoC Users' private information such as a PoC Invocation Descriptor generated for the PoC User or PoC Group document obtained from the Group XDMS to other users unauthorized to see this information.

## Appendix E. Documentation of Media Types for IANA registration

This appendix contains the information needed for IANA registration. The registration is done on <http://www.iana.org/cgi-bin/mediatypes.pl>.

### E.1 PoC Invocation Descriptor

**MIME media type name:** Application

**MIME subtype name:** Vendor Tree - vnd.oma.pcps.invocation-descriptor+xml

**Required parameters:** none

**Optional parameters:** none

**Encoding considerations:** 8bit

The UTF-8 char set is used in the content of this XML-based media type.

**Security considerations:**

This content type contains the information for initiating a PoC Session.

The vnd.oma.pcps.invocation-descriptor+xml typed content itself does not provide either privacy or integrity protection.

This media type does not contain executable content.

**Interoperability considerations:**

This content type provides a format for exchanging information for initiating a PoC Session.

**Published specification:**

The OMA Push to Communicate for Public Safety Invocation Specification is published at <http://www.openmobilealliance.org/>.

**Applications which use this media:**

Applications that support OMA Push to Communicate for Public Safety (PCPS) service.

Additional information:

1. Magic number(s): none
2. File extension(s): none
3. Macintosh file type code: none
4. Object Identifiers: none

**Intended usage:** Common

This content type provides a format for exchanging information for initiating a PoC Session.

**Person to contact for further information:**

1. Name: OMA Push to Communicate for Public Safety (PCPS) Work Area.
2. Email: technical-comments@mail.openmobilealliance.org

**Author/Change controller:**

The OMA PoC specifications are a work item of the OMA Push to Communicate for Public Safety (PCPS) Work Area. The Open Mobile Alliance has change control over these specifications, with mailing list address [technical-comments@mail.openmobilealliance.org](mailto:technical-comments@mail.openmobilealliance.org)