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              Conference Event Package Data Format Extension
                   for Centralized Conferencing (XCON)

Abstract

   This document specifies the notification mechanism for XCON
   (centralized conferencing). This mechanism reuses the SIP (Session
   Initiation Protocol) event package for conference state.
   Additionally, the notification mechanism includes support for the
   XCON data model and for partial notifications.

Status of This Memo

   This is an Internet Standards Track document.

   This document is a product of the Internet Engineering Task Force
   (IETF). It represents the consensus of the IETF community. It has
   received public review and has been approved for publication by the
   Internet Engineering Steering Group (IESG). Further information on
   Internet Standards is available in Section 2 of RFC 5741.

   Information about the current status of this document, any errata,
   and how to provide feedback on it may be obtained at
   http://www.rfc-editor.org/info/rfc6502.

Copyright Notice

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1. Introduction

   The XCON (Centralized Conferencing) framework [RFC5239] defines a
   notification service that provides updates about a conference
   instance's state to authorized parties using a notification protocol,
   as shown in Figure 1. This document specifies how to use the SIP
   (Session Initiation Protocol [RFC3261]) event package for conference
   state defined in [RFC4575] as a notification protocol between a
   client and a conference's notification server.

```
        ...........................
        .  Conferencing System    .
        .                         .
        .     +--------------+    .
        .     | Conf. object |    .
        .     |              |    .
        .     +--------------+    .
        .             |          .
        .             v          .
        . +-----------+          .
        . |Notification|         .
        . |Service    |          .
        . +-----------+          .
        .         ^              .
        .         |              .
        .........|................
                 |
                 |         Notification
                 |           Protocol
                 |(notifications following the
                 |       XCON data model)
                 |
        .........|............
        .        v           .
        . +-----------+      .
        . |Notification|     .
        . |   Client  |      .
        . +-----------+      .
        .                    .
        . Conferencing Client .
        ......................
```
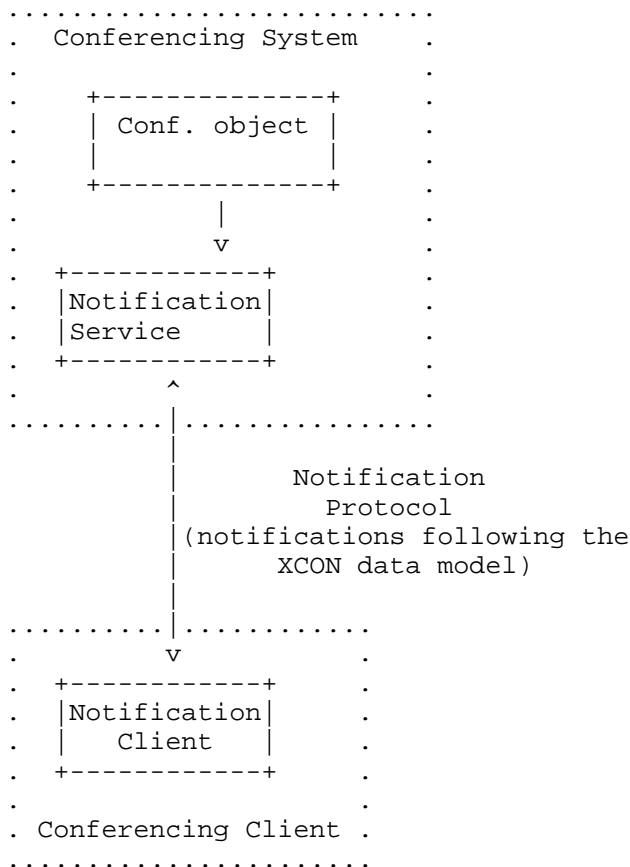
          Figure 1: Notification service and protocol in the XCON architecture

   In addition to specifying the SIP event package for conference state,
   [RFC4575] specifies a data format to be used with the event package.
   The XCON data model [RFC6501] extends that format with new elements
   and attributes so that the extended format supports more
   functionality (e.g., floor control). The notification protocol
   specified in this document supports all the data defined in the XCON
   data model (i.e., the data originally defined in [RFC4575] plus all
   the extensions defined in [RFC6501]) plus a partial notification
   mechanism based on XML patch operations [RFC5261].

2. Terminology

   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].

3. Notification Formats

   In order to obtain notifications from a conference server's
   notification service, a client subscribes to the 'conference' event
   package at the server as specified in [RFC4575]. Per [RFC4575],
   NOTIFY requests within this event package can carry an XML document
   in the "application/conference-info+xml" format. Additionally, per
   this specification, NOTIFY requests can also carry XML documents in
   the "application/xcon-conference-info+xml" and the "application/
   xcon-conference-info-diff+xml" formats.

   A document in the "application/xcon-conference-info+xml" format
   provides the user agent with the whole state of a conference
   instance. A document in the "application/
   xcon-conference-info-diff+xml" format provides the user agent with
   the changes the state of the conference instance has experienced
   since the last notification sent to the user agent.

4. Full Notifications

   Subscribers signal support for full notifications by including the
   "application/xcon-conference-info+xml" format in the Accept header
   field of the SUBSCRIBE requests they generate. If a client
   subscribing to the 'conference' event package generates an Accept
   header field that includes the MIME type "application/
   xcon-conference-info+xml", the server has the option of returning
   documents that follow the XML format specified in [RFC6501] and are
   carried in "application/xcon-conference-info+xml" message bodies.

4.1. Backwards Compatibility

   Conference servers that implement the SIP event package for
   conference state and support the "application/
   xcon-conference-info+xml" MIME type MUST also support the
   "application/conference-info+xml" MIME type. This way, legacy
   clients, which only support "application/conference-info+xml", are
   able to receive notifications in a format they understand.

   Clients that implement the SIP event package for conference state and
   support the "application/xcon-conference-info+xml" MIME type SHOULD
   also support the "application/conference-info+xml" MIME type. This
   way, these clients are able to receive notifications from legacy
   servers, which only support "application/conference-info+xml", in a
   format they understand.

5. Partial Notifications

   The conference state reported by this event package may contain many
   elements. When the "xcon-conference-info+xml" format is used and
   there is a change in the state of an element, the server generates a
   notification with the whole conference state. Generating large
   notifications to report small changes does not meet the efficiency
   requirements of some bandwidth-constrained environments. The partial
   notifications mechanism specified in this section is a more efficient
   way to report changes in the conference state.

   The SIP event package for conference state defined a partial
   notification mechanism based on <state> elements. Servers compliant
   with this specification MUST NOT use that partial notification
   mechanism. Instead, they MUST use the mechanism specified in this
   section.

   Subscribers signal support for partial notifications by including the
   "application/xcon-conference-info-diff+xml" format in the Accept
   header field of the SUBSCRIBE requests they generate. If a client
   subscribing to the 'conference' event package generates an Accept
   header field that includes the MIME type "application/
   xcon-conference-info-diff+xml", the server has the option of
   returning documents that follow the XML format specified in
   Section 5.4 and are carried in "application/
   xcon-conference-diff-info+xml" message bodies.

5.1. Generation of Partial Notifications

   Once a subscription is accepted and installed, the server MUST
   deliver full state in its first notification. To report full state,
   the server MUST set the Content-Type header field to the value
   "application/xcon-conference-info+xml".

   In order to deliver a partial notification, the server MUST set the
   Content-Type header field to the value "application/
   xcon-conference-info-diff+xml". When the server generates a partial
   notification, the server SHOULD only include the information that has
   changed compared to the previous notification. It is up to the
   server's local policy to determine what is considered as a change to
   the previous state.

   The server MUST construct partial notifications according to the
   following logic: all the information that has been added to the
   document is listed inside <add> elements. All information that has
   been removed from the document is listed inside <remove> elements,
   and all information that has been changed is listed under <replace>
   elements.

The server MUST NOT send a new NOTIFY request with a partial
notification until it has received a final response from the
subscriber for the previous one or the previous NOTIFY request has
timed out.

When the server receives a SUBSCRIBE request (refresh or termination)
within the associated subscription, it SHOULD send a NOTIFY request
containing the full document using the 'application/
xcon-conference-info+xml' content type.

If the server has used a content type other than 'application/
xcon-conference-info+xml' in notifications within the existing
subscription and changes to deliver partial notifications, the server
MUST deliver full state using the 'application/
xcon-conference-info+xml' content type before generating its first
partial notification.

5.2. Processing of Partial Notifications

When a subscriber receives the first notification containing full
state in a 'application/xcon-conference-info+xml' MIME body, the
subscriber MUST store the received full document as its local copy.

When the subscriber receives a subsequent notification, the
subscriber MUST modify its locally stored information according to
the following logic:

o If the notification carries an 'application/
   xcon-conference-info+xml' document, the subscriber MUST replace
   its local copy of the document with the document received in the
   notification.

o If the notification carries an 'application/
   xcon-conference-info-diff+xml' document, the subscriber MUST apply
   the changes indicated in the received 'application/
   xcon-conference-info-diff+xml' document to its local copy of the
   full document.

If the subscriber encounters a processing error while processing an
'application/xcon-conference-info-diff+xml' encoded document, the
subscriber SHOULD renew its subscription. A subscriber can fall back
to normal operations by not including the "application/
xcon-conference-info-diff+xml" format in a new SUBSCRIBE request.

If the server changes the content type used in notifications within
the existing subscription, the subscriber MUST discard all the
previously received information and process the new content as
specified for that content type.

5.3. Partial Notification Format

   An xcon-conference-info-diff document is an XML
   [W3C.REC-xml-20081126] document that MUST be well-formed and SHOULD
   be valid. The namespace URI for the <conference-info-diff> root
   document element is defined in [RFC6501]:

      urn:ietf:params:xml:ns:xcon-conference-info

   The root document element <conference-info-diff> has a single
   mandatory attribute, "entity". The value of this attribute is the
   conference object identifier (XCON-URI) that identifies the
   conference being described in the document.

   The content of the <conference-info-diff> element is an unordered
   sequence of <add>, <replace>, and <remove> elements followed by
   elements from other namespaces for the purposes of extensibility.
   Any such unknown elements MUST be ignored by the client. The <add>,
   <replace>, and <remove> elements can contain other extension
   attributes than what are defined in the corresponding base types of
   [RFC5261].

5.4. XML Schema for Partial Notifications

   This is the XML schema for the "application/
   xcon-conference-info-diff+xml" data format. The
   "urn:ietf:params:xml:schema:xml-patch-ops" schema is defined in
   [RFC5261].

   <?xml version="1.0" encoding="UTF-8"?>
   <xs:schema
    targetNamespace="urn:ietf:params:xml:ns:xcon-conference-info"
    xmlns="urn:ietf:params:xml:ns:xcon-conference-info"
    xmlns:xs="http://www.w3.org/2001/XMLSchema"
    elementFormDefault="qualified">

    <!-- include patch-ops type definitions -->
    <xs:include
     schemaLocation="urn:ietf:params:xml:schema:patch-ops"/>
    <!-- partial updates -->
    <xs:element name="conference-info-diff">
     <xs:complexType>
      <xs:sequence minOccurs="0" maxOccurs="unbounded">
       <xs:choice>
        <!-- add some content -->
        <xs:element name="add">
         <xs:complexType mixed="true">
          <xs:complexContent>

```
            <xs:extension base="add">
             <xs:anyAttribute processContents="lax"/>
            </xs:extension>
           </xs:complexContent>
          </xs:complexType>
         </xs:element>
         <!-- remove some content -->
         <xs:element name="remove">
          <xs:complexType>
           <xs:complexContent>
            <xs:extension base="remove">
             <xs:anyAttribute processContents="lax"/>
            </xs:extension>
           </xs:complexContent>
          </xs:complexType>
         </xs:element>
         <!-- replace some content -->
         <xs:element name="replace">
          <xs:complexType mixed="true">
           <xs:complexContent>
            <xs:extension base="replace">
             <xs:anyAttribute processContents="lax"/>
            </xs:extension>
           </xs:complexContent>
          </xs:complexType>
         </xs:element>
         <!-- allow extension elements from other namespaces -->
         <xs:any namespace="##other" processContents="lax"/>
        </xs:choice>
       </xs:sequence>
       <xs:attribute name="entity" type="xs:anyURI" use="required"/>
       <xs:anyAttribute processContents="lax"/>
      </xs:complexType>
     </xs:element>
    </xs:schema>
```

5.5. Examples

   The following is an 'application/xcon-conference-info-diff+xml'
   partial update document:

```
   <?xml version="1.0" encoding="UTF-8"?>
   <conference-info-diff
    xmlns="urn:ietf:params:xml:ns:xcon-conference-info"
    entity="conference123@example.com">
```

```
   <add
    sel="*/users/allowed-users-list">  <target
    uri="sip:john@example.com" method="refer"/>
    </add>

   <replace sel="*/conference-state/user-count/text()">5</replace>

   </conference-info-diff>
```

6. IANA Considerations

   There are four IANA considerations associated with this
   specification.

6.1. MIME type Registration: application/xcon-conference-info+xml

   This section registers the 'application/xcon-conference-info+xml'
   MIME type.

   MIME media type name: application

   MIME subtype name: xcon-conference-info+xml

      Mandatory parameters: none

   Optional Parameters: Same as charset parameter application/xml as
      specified in [RFC3023].

   Encoding considerations: Same as encoding considerations of
      application/xml as specified in [RFC3023].

   Security considerations: Security considerations: See Section 10 of
      [RFC3023].

   Interoperability considerations: none

   Published specification: RFC 6502

   Applications that use this media type: This document type has been
      defined to support centralized conferencing applications.

   Additional Information:

   Magic Number: none

   File extension: .xml

   Macintosh file type code: "TEXT"

      Personal and email address for further information: IETF XCON
         Working Group <xcon@ietf.org>

      Intended usage: COMMON

      Author/Change controller: The IETF.

6.2. MIME type Registration: application/xcon-conference-info-diff+xml

   This section registers the 'application/
   xcon-conference-info-diff+xml' MIME type.

      MIME media type name: application

      MIME subtype name: xcon-conference-info-diff+xml

         Mandatory parameters: none

      Optional Parameters: Same as charset parameter application/xml as
         specified in [RFC3023].

      Encoding considerations: Same as encoding considerations of
         application/xml as specified in [RFC3023].

      Security considerations: Security considerations: See Section 10 of
         [RFC3023].

      Interoperability considerations: none

      Published specification: RFC 6502

      Applications that use this media type: This document type has been
         defined to support partial notifications in centralized
         conferencing applications.

      Additional Information:

      Magic Number: none

      File extension: .xml

      Macintosh file type code: "TEXT"

      Personal and email address for further information: IETF XCON
         Working Group <xcon@ietf.org>

      Intended usage: COMMON

   Author/Change controller: The IETF.

6.3. URN Sub-Namespace Registration: xcon-conference-info-diff

   This section registers a new XML namespace per the procedures in
   [RFC3688].

   URI: urn:ietf:params:xml:ns:xcon-conference-info-diff

   Registrant Contact: IETF SIPPING working group <sipping@ietf.org>,
   Gonzalo Camarillo <Gonzalo.Camarillo@ericsson.com>

   XML:

```
<?xml version="1.0"?>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML Basic 1.0//EN"
          "http://www.w3.org/TR/xhtml-basic/xhtml-basic10.dtd">
<html xmlns="http://www.w3.org/1999/xhtml">
<head>
  <meta http-equiv="content-type"
     content="text/html;charset=iso-8859-1"/>
  <title>Partial Notifications in Centralized Conferencing</title>
</head>
<body>
  <h1>Namespace for Partial Notifications in</h1>
  <h1>Centralized Conferencing</h1>
  <h2>urn:ietf:params:xml:ns:xcon-conference-info-diff</h2>
  <p>See <a href="http://www.rfc-editor.org/rfc/rfc6502.txt">
     RFC 6502</a>.</p>
 </body>
</html>
```

6.4. XML Schema Registration

   This section registers an XML schema per the procedures in [RFC3688].

   URI: urn:ietf:params:xml:schema:xcon-conference-info-diff

   Registrant Contact: IETF XCON working group, <xcon@ietf.org>, Gonzalo
   Camarillo <Gonzalo.Camarillo@ericsson.com>

   The XML for this schema can be found in Section 5.4.

7. Security Considerations

   This document specifies how to deliver notifications using the SIP
   event package for conference state in two new formats. The fact that
   notifications are encoded in a different format does not have

security implications. Section 8 of [RFC4575] contains security
considerations related to the use of the event package. Implementers
of the event package need to follow those considerations regardless
of the format used to encode their notifications.

8. References

8.1. Normative References

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               Schooler, "SIP: Session Initiation Protocol", RFC 3261,
               June 2002.

   [RFC4575]   Rosenberg, J., Schulzrinne, H., and O. Levin, "A Session
               Initiation Protocol (SIP) Event Package for Conference
               State", RFC 4575, August 2006.

   [RFC5261]   Urpalainen, J., "An Extensible Markup Language (XML) Patch
               Operations Framework Utilizing XML Path Language (XPath)
               Selectors", RFC 5261, September 2008.

   [RFC6501]   Novo, O., Camarillo, G., Morgan, D., and J. Urpalainen,
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   [W3C.REC-xml-20081126]
               Bray, T., Paoli, J., Sperberg-McQueen, C., Maler, E., and
               F. Yergeau, "Extensible Markup Language (XML) 1.0 (Fifth
               Edition)", World Wide Web Consortium Recommendation REC-
               xml-20081126, November 2008,
               <http://www.w3.org/TR/2008/REC-xml-20081126>.

8.2. Informative References

   [RFC3688]   Mealling, M., "The IETF XML Registry", BCP 81, RFC 3688,
               January 2004.

   [RFC5239]   Barnes, M., Boulton, C., and O. Levin, "A Framework for
               Centralized Conferencing", RFC 5239, June 2008.

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