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G. Camarillo  
Ericsson  
S. Srinivasan

R. Even  
Gesher Erovo Ltd  
J. Urpalainen  
Nokia  
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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.

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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.

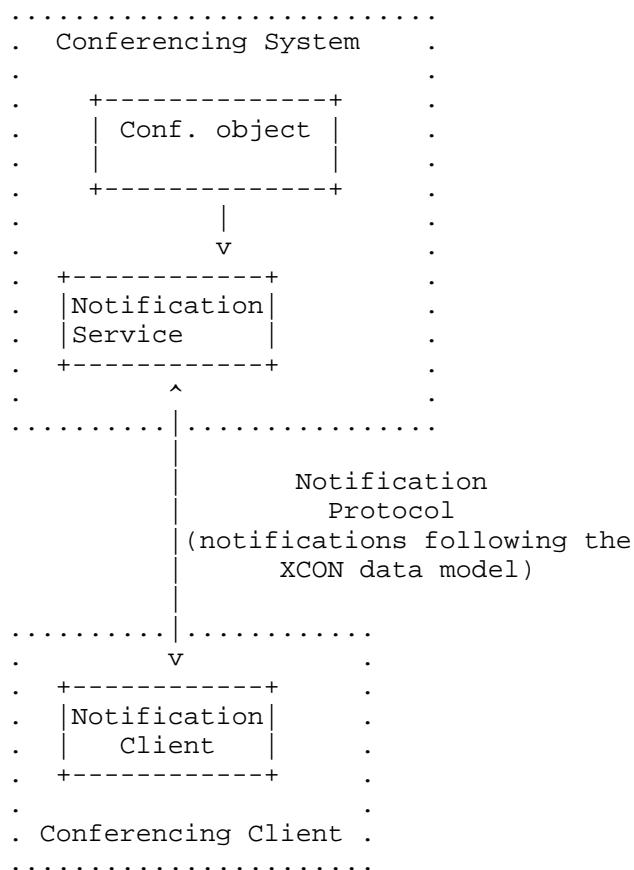


Figure 1: Notification service and protocol in the XCON architecture

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:ns: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:ns: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="conf123@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 SIPING 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:ns:xml:ns: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

- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997.
- [RFC3023] Murata, M., St. Laurent, S., and D. Kohn, "XML Media Types", RFC 3023, January 2001.
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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.

## Authors' Addresses

Gonzalo Camarillo  
Ericsson  
Hirsalantie 11  
Jorvas 02420  
Finland

EMail: [Gonzalo.Camarillo@ericsson.com](mailto:Gonzalo.Camarillo@ericsson.com)

Srivatsa Srinivasan

EMail: [srivatsa.srinivasan@gmail.com](mailto:srivatsa.srinivasan@gmail.com)

Roni Even  
Gesher Erove Ltd  
14 David Hamelech  
Tel Aviv 64953  
Israel

EMail: [ron.even.tlv@gmail.com](mailto:ron.even.tlv@gmail.com)

Jari Urpalainen  
Nokia  
Itamerenkatu 11-13  
Helsinki 00180  
Finland

EMail: [jari.urpalainen@nokia.com](mailto:jari.urpalainen@nokia.com)

