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Conference Information Data Model for Centralized Conferencing (XCON)
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Abstract

This document defines an Extensible Markup Language (XML)-based conference information data model for centralized conferencing (XCON). A conference information data model is designed to convey information about the conference and about participation in the conference. The conference information data model defined in this document constitutes an extension of the data format specified in the Session Initiation Protocol (SIP) Event Package for Conference State.

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1. Introduction

There is a core data set of conference information that is utilized in any conference, independent of the specific conference media. This core data set called the 'conference information data model' is defined in this document using an Extensible Markup Language (XML)-based. The conference information data model defined in this document is logically represented by the conference object.

Conference objects are a fundamental concept in Centralized Conferencing, as described in the Centralized Conferencing Framework [RFC5239]. A conference object contains data that represents a conference during each of its various stages (e.g., created/creation, reserved/reservation, active/activation, completed/completion). A conference object can be manipulated using a conference control protocol at a conference server. The conference object represents a particular instantiation of a conference information data model. Consequently, conference objects follow the XML format defined in this document.

A conference object contains the core information of a conference (i.e., capabilities, membership, call control signaling, media, etc.) and specifies by whom, and in which way that information can be manipulated.

Figure 1 shows the logical functional elements of a conference server as defined by the Centralized Conferencing Framework [RFC5239]. They are a Conference Control Server, a Floor Control Server, a number of Foci, and a Notification Service. A conference control protocol provides the interface between a conference control client and the conference control server. A floor control protocol (e.g., BFCP [RFC4582]) provides the interface between a floor control client and the floor control server. A call signaling protocol (e.g., SIP, H.323, Q.931, ISUP, etc.) provides the interface between a call signaling client and a Focus. A notification protocol (e.g., SIP-based event notifications [RFC3265]) provides the interface between the conferencing client and the Notification Service. Within a conference, the conference control server, floor control server, and focus can modify the information in the conference object.

```
      ..............................................................
      . Conferencing Server                                        .
      .       +-----------------------------------------------+ .
      .       |      C o n f e r e n c e   o b j e c t         | .
      .     +-+-----------------------------------------------+| .
      .     |      C o n f e r e n c e   o b j e c t          || .
      .   +-+-----------------------------------------------+|| .
      .   |      C o n f e r e n c e   o b j e c t          ||| .
      .   | +-----------------------------------------------+||| .
      .   | | Conference Information Data Model              |||| .
      .   | | +-------------------------------------------+ |||| .
      .   | | | Conference description  (times, duration)   | |||| .
      .   | | +-------------------------------------------+ |||| .
      .   | | +-------------------------------------------+ |||| .
      .   | | | Host information                            | |||| .
      .   | | +-------------------------------------------+ |||| .
      .   | | +-------------------------------------------+ |||| .
      .   | | | Conference state                            | |||| .
      .   | | +-------------------------------------------+ |||| .
      .   | | +-------------------------------------------+ |||| .
      .   | | | Floor information                           | |||| .
      .   | | +-------------------------------------------+ |||| .
      .   | | +-------------------------------------------+ |||| .
      .   | | | Membership (users, capacity)                | |||| .
      .   | | +-------------------------------------------+ |||| .
      .   | | +-------------------------------------------+ |||| .
      .   | | | Sidebars, Etc.                              | |||| .
      .   | | +-------------------------------------------+ |||| .
      .   | | +-------------------------------------------+ |||| .
      .   | | | Etc.                                        | |||| .
      .   | | +-------------------------------------------+ |||+ .
      .   | +-----------------------------------------------+|+  .
      .   +----^------------------^-------------^--------|------+   .
      .        |                  |             |        |          .
      . +------v-------+ +--------v-----+ +-----v-+ +----v-------+  .
      . | Conference   | | Floor        | |       | |            |  .
      . | Control      | | Control      | |Foci   | |Notification|  .
      . | Server       | | Server       | |       | |Service     |  .
      . +-----^--------+ +---^----------+ +-^-----+ +------------+  .
      ........|..............|..............|..........|.............
              |Conference    |Floor         |Call      |Notification
              |Control       |Control       |Signaling |Protocol
              |Protocol      |Protocol      |Protocol  |
      ........v..............v..............v..........v.............
      .     C  o  n  f  e  r  e  n  c  i  n  g     C  l  i  e  n  t  .
      ..............................................................
```

Figure 1: Conference Server Architecture

The Session Initiation Protocol (SIP) Event Package for Conference State, specified in [RFC4575], already defines a data format for conferences. However, that model is SIP specific and lacks elements related to some of the functionality defined by the Centralized Conferencing Framework [RFC5239] (e.g., floor control). The data model defined in this document constitutes a superset of the data format defined in [RFC4575]. The result is a data format that supports more call signaling protocols besides SIP and that covers all the functionality defined in the Centralized Conferencing Framework [RFC5239].

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 RFC 2119 [RFC2119].

This document uses the terminology defined in the Centralized Conferencing Framework [RFC5239], the SIPPING conferencing framework [RFC4353] and the BFCP (Binary Floor Control Protocol) specification [RFC4582]. Readers of this document should be familiar with the terminology used in those documents.

3. Overview

The data model specified in this document is the result of extending the data format defined in [RFC4575] with new elements. Examples of such extensions include scheduling elements, media control elements, floor control elements, non-SIP URIs, and addition of localization extensions to text elements. This data model can be used by conference servers providing different types of basic conferences. It is expected that this data model can be further extended with new elements in the future in order to implement additional advanced features.

3.1. Data Model Format

A conference object document is an XML [W3C.REC-xml-20001006] document that MUST be well formed and SHOULD be valid. Conference object documents MUST be based on XML 1.0 and SHOULD be encoded using UTF-8.

3.2. Data Model Namespace

This specification defines a new namespace specification for identifying the elements defined in the data model. This namespace

is as follows:

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

3.3. The Conference Object Identifier

The conference object identifier (XCON-URI) can be viewed as a key to accessing a specific conference object. It can be used, for instance, by the conference control protocol to access, manipulate and delete a conference object. A conference object identifier is provided to the conferencing client by the conference notification service or through out-of-band mechanisms (e.g. E-Mail).

A conferencing system may maintain a relationship between the conference object identifiers and the identifiers associated with each of the complementary centralized conferencing protocols (e.g., call signaling protocols, BFCP, etc.). To facilitate the maintenance of these relationships, the conference object identifier acts as a top level identifier within the conferencing system for the purpose of identifying the interfaces for these other protocols. This implicit binding provides a structured mapping of the various protocols with the associated conference object Identifier. Figure 2 illustrates the relationship between the identifiers used for the protocols and the general conference object identifier (XCON-URI).

```
                          +--------------------------+
                          |       Conference         |
                          |         Object           |
                          |       Identifier         |
                          +--------------------------+
                          |  xcon:Ji092i@example.com |
                          +------+-------------------+
                                 |
                                 |
                                 |
                     +-----------------+---------------+
                     |                                 |
            +-----------+-----------+          +----------+---------+
            |   CSP Conference IDs  |          |BFCP 'Conference ID'|
            +-----------------------+          +--------------------+
            | h323:i092@example.com |          |        i092        |
            | tel:+44(0)2920930033  |          +----------+---------+
            | sip:i092@example.com  |                     |
            +-----------------------+             +-------+--------+
                                                  | BFCP 'Floor ID'|
                                                  +----------------+
                                                  |      543       |
                                                  |      236       |
                                                  +----------------+
```

Figure 2: Conference Object Mapping

In Figure 2, the conference object identifier acts as the top level key in the identification process. The call signaling protocols have an associated conference user identifier, often represented in the form of URIs. The binary floor control protocol, as defined in [RFC4582], defines the 'conference ID' identifier which represents a conference instance within floor control. When created within the conferencing system, the 'conference ID' has a 1:1 mapping to the unique conference object Identifier(XCON-URI). Operations associated with the conference control protocols are directly associated with the conference object, thus the primary identifier associated with these protocols is the conference object identifier(XCON-URI). The mappings between additional protocols/interface is not strictly 1:1 and does allow for multiple occurrences. For example, multiple call signaling protocols will each have a representation that is implicitly linked to the top level conference object identifier e.g. H323 and SIP URIs that represent a conference instance. It should be noted that a conferencing system is free to structure such relationships as required and this information is just included as a guideline that can be used.

Further elements can be added to the tree representation in Figure 2

to enable a complete representation of a conference instance within a conferencing system.

3.3.1. Conference Object URI Definition

```
XCON-URI = "xcon" ":" [conf-object-id "@"] host [ ":" port ]

 conf-object-id = 1*( unreserved / "+" / "=" / "/" )
```

host, port, and unreserved are defined in RFC3986[RFC3986]

XCON-URI is a URI conference identifier and even though its construction is similar to a URL, in this case, the XCON-URI can not be resolved to addresses and/or ports.

3.3.2. Normalization and Conference Object URI Comparison

In order to facilitate the comparison of the XCON-URI identifiers, all the components of the identifiers MUST be converted to lowercase. After normalizing the URI strings, the URIs comparison MUST applied a character-by-character basis as prescribed by RFC3986, Section 6.2.1.

3.4. Data Model Structure

The information in this data model is structured in the following manner. All the information related to a conference is contained in a <conference-info> element. The <conference-info> element contains the following child elements:

- o The <conference-description> element describes the conference as a whole. It has, for instance, information about the URI of the conference, maximum users allowed in the conference, media available in the conference, or the time the conference will start.
- o The <host-info> element contains information about the entity hosting the conference (e.g., its URI).
- o The <conference-state> element informs the subscribers about the changes in the overall conference information.
- o The <floor-information> element contains information about the status of the different floors in the conference.
- o The <users> element describes the membership information as a whole. The <users> element contains a set of <user> child elements, each describing a single participant in the conference.
- o If a participant in the main conference joins a sidebar, a new element is created in the conference referenced from the <sidebars-by-ref> element or under one of the <sidebars-by-val>

elements.

Note that some of the elements described above such <conference-info>, <conference-description>, <sidebars-by-ref>, or <sidebars-by-val> are not defined in the data model but are defined in the data format of [RFC4575]. We describe them here because they are part of the basic structure of the data model.

4. Data Model Definition

The following non-normative diagram shows the structure of conference object documents. The operator "!" preceding an element indicates that the element is mandatory in the data model. The operator "*" following an element indicates that the element is introduced and defined in this document. That is, elements without a "*" have already been defined in [RFC4575].

```
!<conference-info>
     |
     |--!<conference-description>
     |     |--<language>*
     |     |--<display-text>
     |     |--<subject>
     |     |--<free-text>
     |     |--<keywords>
     |     |--<allow-sidebars>*
     |     |--<cloning-parent>*
     |     |--<sidebar-parent>*
     |     |--<conference-time>*
     |     |      |--<entry>*
     |     |      |    |--<base>*
     |     |      |    |--<mixing-start-offset>*
     |     |      |    |--<mixing-end-offset>*
     |     |      |    |--<can-join-after-offset>*
     |     |      |    |--<must-join-before-offset>*
     |     |      |    |--<request-user>*
     |     |      |    |--<notify-end-of-conference>*
     |     |      |    |--<allowed-extend-mixing-end-offset>*
     |     |           ...
     |     |--<conf-uris>
     |     |      |--<entry>
     |     |      |    |--<uri>
     |     |      |    |--<display-text>
     |     |      |    |--<purpose>
     |     |      |    |--<conference-password>*
     |     |      ...
     |     |--<service-uris>
```

```
        |     |      |--<entry>
        |     |      |    |--<uri>
        |     |      |    |--<display-text>
        |     |      |    |--<purpose>
        |     |      ...
        |     |--<maximum-user-count>
        |     |      ...
        |     |--<available-media>
        |     |      |--!<entry>
        |     |      |     |--<display-text>
        |     |      |     |--<type>
        |     |      |     |--<status>
        |     |      |     |--<mixing-mode>*
        |     |      |     |--<codecs>*
        |     |      |     |    |--<codec>*
        |     |      |     |    |    |--<subtype>*
        |     |      |     |    |--<codec>*
        |     |      |     |    |    |--<subtype>*
        |     |      |     |    ...
        |     |      |     |--<controls>*
        |     |      |     |    |--<mute>*
        |     |      |     |    |--<gain>*
        |     |      |     |   ...
        |     |      |--<entry>
        |     |      |     |--<display-text>
        |     |      |     |--<type>
        |     |      |     |--<status>
        |     |      |     |--<mixing-mode>*
        |     |      |     |--<codecs>*
        |     |      |     |    |--<codec>*
        |     |      |     |    |    |--<subtype>*
        |     |      |     |    |--<codec>*
        |     |      |     |    |    |--<subtype>*
        |     |      |     |    ...
        |     |      |     |--<controls>*
        |     |      |     |    |--<pause-video>*
        |     |      |     |    |--<video-layout>*
        |     |      |     |   ...
        |     |      ...
        |
        |--<host-info>
        |     |--<display-text>
        |     |--<web-page>
        |     |--<uris>
        |     |     |--<entry>
        |     |     |    |--<uri>
        |     |     |    |--<display-text>
        |           ...
```

```
        |--<conference-state>
        |     |--<allow-conference-event-subscription>*
        |     |--<user-count>
        |     |--<active>
        |     |--<locked>
        |
        |--<floor-information>*
        |     |--<conference-ID>*
        |     |--<allow-floor-events>*
        |     |--<floor-request-handling>*
        |     |--<conference-floor-policy>*
        |     |     |--<floor>*
        |     |     |    |--!<media-label>*
        |     |     |    |--!<algorithm>*
        |     |     |    |--<max-floor-users>*
        |     |     |    |--<moderator-id>*
        |     |     |   ...
        |     |     ...
        |
        |--!<users>
        |     |--<join-handling>*
        |     |--<user-admission-policy>*
        |     |--<allowed-users-list>*
        |     |     |--<target>*
        |     |     |
        |     |     |--<persistent-list>*
        |     |     |     |--<user>*
        |     |     |     |     |-- <email>*
        |     |
        |     |--<deny-users-list>*
        |     |
        |     |--<user>
        |     |    |--<display-text>
        |     |    |--<associated-aors>
        |     |    |--<provide-anonymity>*
        |     |    |--<roles>
        |     |    |    |
        |     |    |   ...
        |     |    |--<languages>
        |     |    |--<cascaded-focus>
        |     |    |--<allow-refer-users-dynamically>*
        |     |    |--<allow-invite-users-dynamically>*
        |     |    |--<allow-remove-users-dynamically>*
        |     |    |--!<endpoint>
        |     |    |      |--<display-text>
        |     |    |      |--<referred>
        |     |    |      |--<status>
        |     |    |      |--<joining-method>
```

```
        |     |    |      |--<joining-info>
        |     |    |      |--<disconnection-method>
        |     |    |      |--<disconnection-info>
        |     |    |      |--<media>
        |     |    |      |    |--<type>
        |     |    |      |    |--<display-text>
        |     |    |      |    |--<label>
        |     |    |      |    |--<src-id>
        |     |    |      |    |--<status>
        |     |    |      |    |--<to-mixer>*
        |     |    |      |    |      |--<floor>*
        |     |    |      |    |      |--<controls>*
        |     |    |      |    |      |      |--<mute>*
        |     |    |      |    |      |      |--<gain>*
        |     |    |      |    |      |     ...
        |     |    |      |    |--<from-mixer>*
        |     |    |      |    |      |--<floor>*
        |     |    |      |    |      |--<controls>*
        |     |    |      |    |      |      |--<pause-video>*
        |     |    |      |    |      |     ...
        |     |    |      |   ...
        |     |    |      |--<call-info>
        |     |    |      |    |--<sip>
        |     |    |      |    |   |--<display-text>
        |     |    |      |    |   |--<call-id>
        |     |    |      |    |   |--<from-tag>
        |     |    |      |    |   |--<to-tag>
        |          ...    ...
        |--<sidebars-by-ref>
        |     |--<entry>
        |     |     |-- <user>
        |     |     |-- <display-text>
        |     |--<entry>
        |     |     |-- <user>
        |     |     |-- <display-text>
        |     ...
        |--<sidebars-by-val>
        |     |--<entry>
        |     |     |
        |     |    ...
        |     |--<entry>
        |     |     |
        |     ...   ...
```

Figure 3: Non-normative diagram

The following sections describe these elements in detail. The full

Relax NG schema is provided Section 5.

4.1. <conference-info>

A conference object document begins with the root element tag <conference-info>, which is defined in [RFC4575]. The <conference-info> attributes are described in [RFC4575]. Note that the <conference-info> element does not have the attributes 'state' and 'version' defined in [RFC4575] for this element because these attributes only apply to notification mechanisms.

In addition, [RFC4575] defines an 'entity' attribute that contains the conference object identifier (XCON-URI) that identifies the conference being described in the document.

The <conference-info> element contains the <conference-description>, <host-info>, <conference-state>, <floor-information>, <users>, <sidebars-by-ref>, and <sidebars-by-val> child elements. All these elements, except <floor-information>, are defined in [RFC4575]. A conference document MUST at least include the <conference-description> and <users> child elements.

4.2. <conference-description>

The <conference-description> element, which is defined in [RFC4575], describes the conference as a whole. It SHOULD have an attribute 'lang' to specify the language used in the contents of this element. It is comprised of <language>, <display-text>, <subject>, <free-text>, <keywords>, <allow-sidebars>, <cloning-parent>, <sidebar-parent>, <conference-time>, <conf-uris>, <service-uris>, <maximum-user-count>, and <available-media>.

The following sections describe these elements in more detail. Other child elements MAY be defined in the future to extend the <conference-description> element.

4.2.1. <language>

The <language> element indicates the predominant language that is expected to be employed within a conference. The possible values of this element are the values of the 'Subtag' column of the [RFC5646] defined in IANA [IANA-Lan]. This element is not enforcing the language of the conference, but only informs the participants about the desirable language that they should use in the conference. Participants are free to switch to other languages if they like.

4.2.2. <display-text>

The <display-text> element is described in section 5.3 of [RFC4575].

4.2.3. <subject>

The <subject> element is described in section 5.3 of [RFC4575].

4.2.4. <free-text>

The <free-text> element is described in section 5.3 of [RFC4575].

4.2.5. <keywords>

The <keywords> element is described in section 5.3 of [RFC4575].

4.2.6. <allow-sidebars>

The <allow-sidebars> element represents a boolean value. If set to TRUE, the conference is allowed to create sidebar conferences. If absent, or set to FALSE, the conference can not create sidebar conferences.

4.2.7. <cloning-parent>

When the <cloning-parent> is present, it indicates that the conference object is a child of a parent conference. The <cloning-parent> element contains the conference object Identifier (XCON-URI) (different from the main XCON-URI) of the parent.

4.2.8. <sidebar-parent>

When the <sidebar-parent> is present, it indicates that the conference object represents a sidebar of another conference. The <sidebar-parent> element contains the conference object Identifier (XCON-URI) (different from the main XCON-URI) of the parent.

4.2.9. <conference-time>

The <conference-time> element contains the information related to conference time, policy, and duration of a conference. The <conference-time> element contains one or more <entry> elements each defining the time and policy information specifying a single conference occurrence. The <conference-time> element differs from the iCalendar objects [RFC5545] in the possibility to define different policies (<can-join-after-offset>, <must-join-before-offset>) for the same conference at different times.

Every <entry> element contains the following child elements:

- o <base>: The <base> child element specifies the iCalendar object of the conference. The iCalendar object components are defined in [RFC5545].
- o <mixing-start-offset>: The <mixing-start-offset> child element specifies when the conference media mixing starts before the conference starts. If the <mixing-start-offset> element is not present, it indicates that the conference media mixing starts immediately. The <mixing-start-offset> has the mandatory 'required-participant' attribute. This attribute contains one of the following values: "none", "administrator", "moderator", "user", "observer", and "participant". The roles semantic definition is out of the scope of this document and is subject to future policy documents. More values can be specified in the future. The 'required-participant' attribute allows a privileged user to define when media mixing starts based on the latter of the mixing start time, and the time the first participant arrives. If the value is set to "none'", mixing starts according to the mixing start time.
- o <mixing-end-offset>: The <mixing-end-offset> child element specifies the time a conference media mixing stops after the conference stops. If the <mixing-end-offset> element is not present, it indicates that the conference occurrence is not bounded. The <mixing-end-offset> element has the mandatory 'required-participant' attribute. This attribute contains one of the following values: "none", "administrator", "moderator", "observer", "user", and "participant". More values can be specified in the future. The 'required-participant' attribute allows a privileged user to define when media mixing ends based on the earlier of the <mixing-end-offset>, and the time the last participant leaves. If the value is set to "none", mixing stops according to the <mixing-end-offset>. If the conference policy was modified so that last privileged user is now a normal conference participant, and the conference requires a privileged user to continue; that conference MUST terminate.
- o <can-join-after-offset>: An administrator can indicate the time when users can join a conference by populating the <can-join-after-offset> element.
- o <must-join-before-offset>: An administrator can define the time after which new users are not allowed to join the conference anymore.
- o <request-user>: It defines the time when users or resources on the <allowed-users-list> are requested to join the conference by using the <request-users> element.
- o <notify-end-of-conference>: The <notify-end-of-conference> element defines in seconds when the system MUST send a notification when the end of the conference is approaching. If the <notify-end-of-

conference> element is not present, it indicates that the system does not notify the users when the end of the conference is approaching.

- o <allowed-extend-mixing-end-offset>: The <allowed-extend-mixing-end-offset> element indicates if the conference is allowed to be extended. It has a boolean value.

4.2.10. <conf-uris>

The <conf-uris> element contains the identifiers to be used in order to access the conference by different signaling means. This element contains a set of <entry> child elements - each containing a new element, <conference-password>. This element contains the password(s) of the conference, for instance, PSTN conference will store the 'PIN code' in this element. All the other <conf-uris> child element are described in section 5.3.1 of [RFC4575].

The schema in Section 5 allows <conference-password> to appear anywhere uris-type is expanded. This document only provides meaning for <conference-password> appearing as a descendent of the <conf-uris> element. Future standardization may give meaning to <conference-password> appearing in other elements of type uris-type. In the absence of such standardization, <conference-password> MUST NOT appear in elements of type uris-type other than <conf-uris>.

4.2.11. <service-uris>

The <service-uris> describes auxiliary services available for the conference. The <service-uris> element is described in section 5.3.2 of [RFC4575].

4.2.12. <maximum-user-count>

The <maximum-user-count> contains the overall number of users allowed to join the conference. Note that this value is set by an administrator and can reflect any local policies such as network consumption, CPU processing power, and licensing rules.

4.2.13. <available-media>

The <available-media> element consists of a sequence of <entry> child elements. Each <entry> element contain the 'label' attribute that is the media stream identifier assigned by the conferencing server. The attribute 'label' is described in [RFC4575], section 5.3.4. Each <entry> element contains the following child elements:

- o The <type> element is described in section 5.3.4 of [RFC4575].
- o The <display-text> element is described in section 5.3.4 of [RFC4575].
- o The <status> element is described in section 5.3.4 of [RFC4575].
- o The child element <mixing-mode> describes a default scheduling policy by which the mixer will build the outgoing stream from the incoming streams. Note that this policy is different than the policy describing the floors for each media. The <mixing-mode> child element MUST contain one and only one of the "Moderator-controlled", "FCFS", and "Automatic" values indicating the default algorithm to use with every media stream. The "Moderator-controlled" value indicates that the moderator of the conference, controls the media stream policy. The "FCFS" value indicates a 'first-come-first-served' policy. The "Automatic" value means the mixer choose the best scheduling policy for the conference.
- o The <codecs> element specifies the allowed codecs in the conference. It has an attribute 'decision' that specifies if the focus decides the common codec automatically or needs the approval of the moderator of the conference ("automatic", "moderator-controlled"). The <codecs> element contains <codec> elements. A <codec> element can have the attribute 'name' and 'policy'. The 'name' attribute is a codec identifier assigned by the conferencing server. The 'policy' attribute contains the policy for that codec (allowed, or disallowed). The <codec> element has the child element <subtype> which stores the codec's name. The possible values of this element are the values of the 'subtype' column of the RTP Payload Format media types per [RFC4855] defined in IANA [IANA]. It is expected that future conferencing specifications will define corresponding schema extensions, as appropriate.
- o The <controls> element contains the basic audio and video global control elements for a conference. It is expected that for the majority of the basic conferences, these controls are sufficient. If the conference server wants to support more advanced controls, then it is recommended that an extension to the data model be used. In the <controls> element the schema is extensible, hence new control types can be added in the future. So moderator controls that affect all media output would go under the <available-media> element. The following controls elements are defined for <controls>:
  - * The <mute> element is used in conjunction with an audio stream to cease transmission of any audio from the associated stream. That means that for the entire duration where mute is applicable, all current and future participants of the conference are muted and will not receive any audio. It has a "boolean" value. If this control is not specified, access to the control is not available to the client.

* The <pause-video> element is used in conjunction with a video stream to cease transmission of associated media. It has a "boolean" value. If this control is not specified, the access to the control is not available to the client.
* The <gain> element is used in conjunction with a media output stream to indicate the amount of amplification of an audio stream. The value is an integer number that ranges from -127 to 127. If this control is not specified, access to the control is not available to the client.
* The <video-layout> element is used in conjunction with a video stream to specify how the video streams (of participants) are viewed by each participant. Only one layout type can be specified for each output stream. If there are fewer participants than panels in the specified layout, then blanking (black screen) MAY be mixed into the stream on the behalf of the missing input streams. If unspecified, the <video-layout> default type SHOULD be "single-view". The <video-layout> types are as follows, although any number of custom layouts may be specified in future extensions:
  + single-view: Only one stream is presented by the focus to all participants in one panel.
  + dual-view: This dual view option will present the video side-by-side in 2 panels and not alter the aspect ratio of the streams. This will require the focus to introduce blanking on parts of the overall image as viewed by the participants.
  + dual-view-crop: This side-by-side layout option instructs the focus to alter the aspect ratio of the streams (alter-aspect-ratio=TRUE) so that blanking is not necessary. The focus handles the cropping of the streams.
  + dual-view-2x1: This layout option instructs the focus to place one stream above the other, in essence with two rows and one column. In this option the aspect ratio is not altered and blanking is introduced.
  + dual-view-2x1-crop: This layout option also instructs the focus to place one stream above the other, in essence with two rows and one column. In this option the aspect ratio is altered and the video streams are cropped.
  + quad-view: Four equal-sized panels in a 2x2 layout is presented by the focus to all participants. Typically the aspect ratio of the streams are maintained (alter-aspect-ratio= FALSE).
  + multiple-3x3: Nine equal-sized panels in a 3x3 layout is presented by the focus to all participants. Typically the aspect ratio of the streams are preserved.
  + multiple-4x4: Sixteen equal-sized panels in a 4x4 layout is presented by the focus to all participants. Typically the aspect ratio of the streams are preserved.

+ multiple-5x1: This option refers to a 5x1 layout where one panel will occupy 4/9 of the mixed video stream while the others will each occupy 1/9 of the stream. Typically the aspect ratio of the streams is preserved.
+ automatic: This option allows the focus to add panels as streams are added.

4.3. <host-info>

The <host-info> element contains information about the entity hosting the conference. This information is usually set before conference activation, and is rarely changed during the conference lifetime. The <host-info> element and its child elements are described in [RFC4575], section 5.4. Future extensions to the <host-info> element may define new values.

4.4. <conference-state>

The <conference-state> is introduced in [RFC4575]. The <conference-state> element contains the <allow-conference-event-subscription>, <user-count>, <active>, and <locked> child elements.

4.4.1. <allow-conference-event-subscription>

The <allow-conference-event-subscription> element represents a boolean action. If set to TRUE, the focus is instructed to allow the subscription to conference state events, such as 'SIP Event Package for Conference State' [RFC4575]. If set to FALSE, the subscription to conference state events MUST be rejected. If this element is undefined it has a default value of TRUE, causing the subscription to conference state events to be accepted.

4.4.2. <user-count>

The <user-count> child element is explained in [RFC4575], section 5.5.1.

4.4.3. <active>

The <active> child element is explained in [RFC4575], section 5.5.2.

4.4.4. <locked>

The <locked> child element is explained in [RFC4575], section 5.5.3.

4.5. <floor-information>

The <floor-information> element contains the <conference-ID>, <allow-floor-events>, <floor-request-handling>, and <conference-floor-policy> child elements. Other elements from different namespaces MAY be present for the purposes of extensibility. The absence of this element from an XML document indicates that the conference does not have a floor.

4.5.1. <conference-ID>

The <conference-ID> represents a conference instance within floor control. When BFCP serves as the floor control protocol, the <conference-ID> is a 32-bit BFCP conference identifier defined in [RFC4582] section 5.1. Note that when created within the conferencing system, there is a 1:1 mapping between this <conference-ID> and the unique conference object Identifier (XCON-URI).

4.5.2. <allow-floor-events>

The <allow-floor-events> element represents a boolean action. If set to TRUE, the focus is instructed to accept the subscription to floor control events. If set to FALSE, the focus is instructed to reject the subscription. If this element is undefined, it has a default value of FALSE, causing the subscription to floor control events to be rejected.

A conference participant can subscribe himself to a floor control event in two different ways: one method is using an offer/answer exchange mechanism ([RFC3264]) using SIP INVITE and BFCP parameters in the SDP ([RFC4583]), the other method is a general authorization mechanism described in section 9 of [RFC4582] and in [RFC5018]. Future documentation may define additional connection mechanisms.

4.5.3. <floor-request-handling>

The <floor-request-handling> element defines the actions used by the conference focus to control floor requests. This element defines the action that the focus is to take when processing a particular request to a floor within a conference. This element defines values of:

- o "block": This action instructs the focus to deny the floor request. This action is the default action taken in the absence of any other actions.
- o "confirm": This action instructs the focus to allow the request. The focus then uses the defined floor algorithm to further allow or deny the floor. The algorithms used are outside the scope of

this document.

Note that this section discusses floor control information, therefore, the value "block" in a <floor-request-handling> element is not related with the "block" value in the <join-handling> element (see Section 4.6).

4.5.4. <conference-floor-policy>

The <conference-floor-policy> element has one or more <floor> child elements. Every <floor> child elements has an attribute 'id' which uniquely identifies a floor within a conference. In the case of BFCP [RFC4582], the 'id' attribute corresponds to the floor-id identifier defined in [RFC4582] section 5.2.2.

- o <media-label>: Every floor is identified for one or more mandatory <media-label> element. If the <available-media> information is included in the conference document, the value of this element MUST be equal to the 'label' value of the corresponding media stream <entry> in the <available-media> container. The number of those elements indicates how many floors the conference can have. A floor can be used for one or more media types;
- o <algorithm>: A floor can be controlled using many algorithms; the mandatory <algorithm> element MUST be set to any of the "moderator-controlled", "FCFS" or "random" values indicating the algorithm. The "Moderator-controlled" value indicates that the moderator of the conference controls the floor. The "FCFS" value states for 'first-come-first-served' floor control.
- o <max-floor-users>: The <max-floor-users> child element in the <floor> element is optional and, if present, dictates the maximum number of users who can have the floor at one time.
- o <moderator-id>: The optional <moderator-id> indicates the 'User ID' of the moderator(s). It MUST be set if the element <algorithm> is set to "Moderator-controlled" value. When the floor is created within the conferencing system, the XCON-User identifier MAY be used as the moderator-id. In the case of BFCP as the floor control protocol, the <moderator-id> is defined in [RFC4582] section 3. Note that [RFC4582] refers to the moderator role as a 'floor chair'.

4.6. <users>

The <users> element is described in [RFC4575] and contains the <join-handling>, <user-admission-policy>, <allowed-users-list> and <deny-users-list> defined in this document and <user> child elements defined in [RFC4575]. Note that the <users> element does not have the attribute 'state' defined in [RFC4575] for this element because this attribute only applies to notifications mechanism. The

following sections describe these elements in more detail. Other child elements and attributes can be used to extend <users> in the future.

4.6.1. <join-handling>

The <join-handling> element defines the actions used by the conference focus to control conference participation. This element defines the action that the focus is to take when processing a particular request to join a conference. This element defines values of:

- o "block": This action instructs the focus to deny access to the conference. This action is the default action taken in the absence of any other actions.
- o "confirm": This action instructs the focus to place the participant on a pending list (e.g., by parking the call on a music-on-hold server), awaiting moderator input for further actions.
- o "allow": This action instructs the focus to accept the conference join request and grant access to the conference within the instructions specified in the transformations of this rule.
- o "authenticate": This action instructs the focus that the user has to provide a combination of username/password.
- o "directed-operator": This action instructs the focus to direct the user to an operator.

4.6.2. <user-admission-policy>

The <user-admission-policy> is an element that lets an organizer (or a participant with appropriate rights) choose a policy for the conference that controls how users are authenticated into the conference, using a mechanism of the conference's choosing. Since a variety of signaling protocols are possible, a variety of authentication mechanism - determined by every individual conference servers - may need to be mapped from the different protocols. The specific types of authentication mechanism are beyond the scope of this document. The list of possible values are:

- o "closedAuthenticated": A 'closedAuthenticated' policy MUST have each conference participant in the allowed users list (listed under the <allowed-users-list> XML element) with each participant being sufficiently (up to local policy) authenticated. Conference join requests for users not in the allowed users list or participants not authenticated should be rejected unless a <join-handling> action of 'confirm' is selected in which case the user is placed on a pending list as indicated earlier. A 'closedAuthenticated' policy MUST NOT include a <deny-users-list>. If <deny-users-list> appears in the data model, it MUST be

ignored.

- o "openAuthenticated": An 'openAuthenticated' policy requires each conferencing participant to be sufficiently authenticated. Typically this implies that anyone capable of authenticating with the conferencing system may join the conference. The 'openAuthenticated' policy permits the specification of "banned" conferencing participants. Such banned users are prevented from re-joining the conference until they have been un-banned. An 'openAuthenticated' policy SHOULD have a deny users list (listed under the <deny-users-list> XML element) to support banning of conferencing participants from a conference. An 'openAuthenticated' policy MUST NOT include an <allowed-users-list>. If <allowed-users-list> appears in the data model, it MUST be ignored.
- o "anonymous": An 'anonymous' policy allows any join requests in and is the least restrictive policy. An 'anonymous' policy MUST NOT include either an <allowed-users-list> or a <deny-users-list>. If any of these lists appear in the data model, they MUST be ignored.

In all other cases, the appearance of an <allowed-users-list> and <deny-users-list> MUST be ignored. Future specifications describing the use of these lists must provide clear guidance on how to process the lists when they occur concurrently, especially when both lists contain the same user. For example, such specification could disallow both list from appearing at the same time similar to user-admission-policy values defined in this document.

4.6.3. <allowed-users-list>

The <allowed-users-list> child element contains a list of user URIs (e.g. SIP URI, xcon-userid defined in Section 4.6.5), roles (defined in Section 4.6.5.4), or domains (e.g.: *@example.com) that the focus uses to determine who can join the conference, who can be invited to join a conference, or who the focus needs to "refer to" the conference. The <allowed-users-list> element includes zero or more <target> child elements. This child element includes the mandatory 'uri' attribute and the mandatory 'method' attribute. The same 'uri' attribute with different method values can appear in the list more than once.

The 'method' attribute is a list with the following values:

- o "dial-in": The value "dial-in" is used by the focus to determine who can join the conference.
- o "dial-out": The value "dial-out" contains a list of resources that the focus will initiate a session with.

o "refer": The value "refer" is used by the focus to determine the resources that the focus needs to "refer to" the conference. In SIP, this is achieved by the focus sending a REFER request to those potential participants. In a different paradigm, this could also mean that the focus sends an SMS or an email to the referred user. This list can be updated during the conference lifetime so it can be used for mid-conference refers as well.

The "refer" value differs from the "dial-out" in that the resources on the "refer" value are expected to initiate the session establishment toward the focus themselves. It is also envisioned that different users will have different access rights to those lists and therefore a separation between the two is needed.

The <allowed-users-list> element has a <persistent-list> child element as well. Some chatroom systems allow -- and some require -- registration of detailed information about a user before they are allowed to join a chatroom. The <persistent-list> child element stores persistent information about users who are not actively part of an ongoing chatroom session. The <persistent-list> element stores the following information:

o user: The <user> element stores the name, nickname, the conference user identifier (XCON-USERID) and email address of a user. It has three attributes: 'name', 'nickname' and 'id' and an <email> element. Future extensions to this schema may define new elements for the <user> element.

Future extensions to this schema may define new elements for the <target> element.

4.6.4. <deny-users-list>

The <deny-users-list> child element contains a list of user URIs (e.g. SIP URI, xcon-userid defined in Section 4.6.5), roles (defined in Section 4.6.5.4), or domains (e.g.: *@example.com) that the focus uses to determine who has been 'banned' from the conference. Such banned users are prevented from re-joining the chatroom until they have been un-banned.

4.6.5. <user> and Its <user> Sub-elements

The element <user> is described in [RFC4575] and describes a single participant in the conference. The <user> element has an attribute 'entity'. Note that the <user> element does not have the attribute 'state' defined in [RFC4575] for this element because this attribute only applies to notifications mechanism.

The attribute 'entity' contains a unique conference user identifier (XCON-USERID) within the scope of the conference. The URI format of this identifier is as follow:

```
XCON-USERID = "xcon-userid" ":" conf-user-id

conf-user-id = 1*(unreserved)
```

[unreserved is defined in RFC3986]

In order to facilitate the comparison of the XCON-USERID identifiers, all the components of the identifiers MUST be converted to lowercase. After normalizing the URI strings, the URIs comparison MUST applied a character-by-character basis as prescribed by RFC3986, Section 6.2.1.

Other user identifiers can be associated with this conference user identifier and enable the conferencing system to correlate and map these multiple authenticated user identities to a single global user identifier. Figure 4 illustrates an example using the conference user identifier in association with the user identity defined for BFCP, SIP, and H323 user identity. It should be noted that a conferencing system is free to structure such relationships as required and this information is just included as a guideline.

```
                        +----------------+
                        |   Conference   |
                        |      User      |
                        |   Identifier   |
                        +----------------+
                        |xcon-userid:John|
                        +-------+--------+
                                |
                                |
                                |
        +-----------------------+-------------------------+
        |                       |                         |
+-------+--------+ +-----------+-----------+ +-----------+-----------+
|  BFCP User ID  | |      SIP User URI     | |     H323 User URI     |
+----------------+ +-----------------------+ +-----------------------+
|      543       | |sip:851221@example.com | |h323:taeduk@example.com|
+----------------+ +-----------------------+ +-----------------------+
```

Figure 4: Conference User Mapping

The element <user> element contains the <display-text>, <associated-

aors>, <provide-anonymity>, <roles>, <languages>, <cascaded-focus>, <allow-refer-users-dynamically>, <allow-invite-users-dynamically>, <allow-remove-users-dynamically>, and <endpoint>. The following sections describe these elements in more detail.

4.6.5.1. <display-text>

The <display-text> child element is explained in [RFC4575], section 5.6.1.

4.6.5.2. <associated-aors>

The <associated-aors> child element is explained in [RFC4575], section 5.6.2.

4.6.5.3. <provide-anonymity>

The <provide-anonymity> element specifies what level of anonymity the server should provide to the user. In this case, the focus provides to the rest of the participants an anonymous identity for that user, for example anonymousX, or it does not provide any information for that user such that other users can not see he is a participant in the conference. This element only affects the way the user information is provided to the other participants. The real information about the user is still stored in the data model. This can be achieved by using the <provide-anonymity> element. This element has three values: 'private', 'semi-private' and 'hidden'. The 'private' value specifies that this user is completely anonymous in the conference. 'semi-private' value specifies that this user is anonymous to all users with equal or lesser permissions (determined by local policy) in the conference. 'hidden' value specifies that other users can not see this participant in the conference.

4.6.5.4. <roles>

A role provides the context for the set of conference operations that a participant can perform. This element can contain one or more of the following values: "administrator", "moderator", "user", "participant", "observer", and "none". The roles semantic definition is out of the scope of this document and is subject to future policy documents. This element can be extended with new roles in future documents.

4.6.5.5. <languages>

The <languages> child element is explained in [RFC4575], section 5.6.4.

4.6.5.6. <cascaded-focus>

The <cascaded-focus> child element is explained in [RFC4575], section 5.6.5.

4.6.5.7. <allow-refer-users-dynamically>

The <allow-refer-users-dynamically> element represents a boolean value. If set to TRUE, a participant is allowed to instruct the focus to refer a user to the conference without modifying the <allowed-users-list> (in SIP terms, a participant is allowed to send a REFER request [RFC3515] to the focus which results in the focus sending a REFER request to the user the referrer wishes to join the conference). If set to FALSE, the refer request is rejected. If this element is undefined it has a value of FALSE, causing the refer to be rejected.

4.6.5.8. <allow-invite-users-dynamically>

The <allow-invite-users-dynamically> element represents a boolean action. If set to TRUE, a participant is allowed to instruct the focus to invite a user to the conference without modifying the <allowed-users-list> list (in SIP terms, a participant is allowed to send a REFER request [RFC3515] to the focus which results in the focus sending an INVITE request to the user the referrer wishes to join the conference). If set to FALSE, the refer request is rejected. If this element is undefined it has a value of FALSE, causing the refer to be rejected.

4.6.5.9. <allow-remove-users-dynamically>

The <allow-remove-users-dynamically> element represents a boolean action. If set to TRUE, a participant is allowed to instruct the focus to remove a user from the conference without modifying the ruleset (in SIP terms, a participant is allowed to send a REFER request [RFC3515] to the focus which results in the focus sending an BYE request to the user the referrer wishes to leave the conference). If set to FALSE, the refer request is rejected. If this element is undefined it has a value of FALSE, causing the refer to be rejected.

4.6.5.10. <endpoint>

The <endpoint> child element is identical to the element with the same name in [RFC4575] except that the 'state' attribute is not included. The 'state' attribute only applies to notification mechanisms. The <endpoint> element can provide the desired level of detail about the user's devices and their signaling sessions taking part in the conference.

The <endpoint> element has the following child elements: <display-text>, <referred>, <status>, <joining-method>, <joining-info>, <disconnection-method>, <disconnection-info>, <media>,and <call-info>. All the <endpoint> child elements are defined in [RFC4575] with the exception of the <to-mixer> element, and the <from-mixer> element.

The <endpoint>/<media> element has two other child elements defined in this document, the <to-mixer>, and the <from-mixer>:

- o <from-mixer>, <to-mixer>: These are controls that apply to a user's media stream being sent from the mixer to the participants endpoint or to the mixer from the participants endpoint. The <to-mixer> element details properties associated with the incoming streams to the mixer (streams sent to the mixer from the participant). The <from-mixer> element details properties associated with the outgoing streams from the mixer (sent from the mixer to the participant). Both of these elements have the attribute 'name'. The 'name' attribute has the values "VideoIn", "VideoOut", "AudioOut", and "AudioIn". The "VideoOut" and "AudioOut" media streams detail properties associated with the outgoing video and audio from the mixer. The "VideoIn" and "AudioIn" media stream details properties associated with the incoming video and audio to the mixer. Both of these elements can have the <floor> child element defined:
  - * The <floor> element refers to the floor assigned to a certain participant in the conference. If a participant, for instance, needs to talk in the conference, it first needs to get the floor from the chair of the conference. The <floor> element has an attribute 'id' which uniquely identifies a floor within a conference. The 'id' attribute corresponds to the floor-id identifier defined in [RFC4582] section 5.2.2. The <floor> element has a "Boolean" value. A value of FALSE indicates that this user does not hold the floor in this moment. If this control is not specified, this user SHOULD NOT specify the floor option.

  The <to-mixer> and <from-mixer> elements can have the <controls> child element:
  - * Controls that apply to a specific user would appear under the <controls> element.
- o More values can be defined in the future.

4.7. <sidebars-by-ref>

The <sidebars-by-ref> element contains a set of <entry> child elements. This element is described in [RFC4575], 5.9.1. Note that the <sidebars-by-ref> element does not have the attribute 'state' defined in [RFC4575] for this element because this attribute only

applies to notifications mechanism.

4.8. <sidebars-by-val>

The <sidebars-by-val> element contains a set of <entry> child elements each containing information about a single sidebar. This element is described in [RFC4575], 5.9.2. Note that the <sidebars-by-val> element does not have the attribute 'state' defined in [RFC4575] for this element because this attribute only applies to notifications mechanism.

5. RELAX NG Schema

In accordance with the Centralized Conferencing Framework document [RFC5239], the Conference Object is a logical representation of a conference instance. The conference information schema contains core information that is utilized in any conference. It also contains the variable information part of the Conference Object.

The normative schema is backwards compatible with the [RFC5239], in other words, valid [RFC5239] instance documents are also valid according to this RELAX NG schema [RELAX]. In addition to approximately similar RELAX NG [RELAX] definitions of the [RFC5239], this schema contains extension elements in the "urn:ietf:params:xml:ns:xcon-conference-info" namespace.

```
default namespace = "urn:ietf:params:xml:ns:conference-info"
namespace xcon = "urn:ietf:params:xml:ns:xcon-conference-info"

start = element conference-info { conference-type }
# CONFERENCE TYPE
conference-type =
  attribute entity { text }
  & anyAttribute
  & conference-description-type?
  & element host-info { host-type }?
  & element conference-state { conference-state-type }?
  & element users { users-type }?
  & element sidebars-by-ref { uris-type }?
  & element sidebars-by-val { sidebars-by-val-type }?
  & element xcon:floor-information { floor-information-type }?
  & anyElement*
# CONFERENCE DESCRIPTION TYPE
conference-description-type =
  element conference-description {
    attribute xml:lang { xsd:language }?
    & anyAttribute
```

```
    & element display-text { text }?
    & element subject { text }?
    & element free-text { text }?
    & element keywords {
        list { xsd:string* }
      }?
    & element conf-uris { uris-type }?
    & element service-uris { uris-type }?
    & element maximum-user-count { xsd:int }?
    & element available-media { conference-media-type }?
    & element xcon:language { xsd:language }?
    & element xcon:allow-sidebars { xsd:boolean }?
    & element xcon:cloning-parent { xsd:anyURI }?
    & element xcon:sidebar-parent { xsd:anyURI }?
    & element xcon:conference-time { conferencetime-type }?
    & anyElement*
  }
# HOST TYPE
host-type =
  element display-text { text }?
  & element web-page { xsd:anyURI }?
  & element uris { uris-type }?
  & anyElement*
  & anyAttribute
# CONFERENCE STATE TYPE
conference-state-type =
  anyAttribute
  & element user-count { xsd:unsignedInt }?
  & element active { xsd:boolean }?
  & element locked { xsd:boolean }?
  & element xcon:allow-conference-event-subscription { xsd:boolean }?
  & anyElement*
# CONFERENCE MEDIA TYPE
conference-media-type =
  anyAttribute
  & element entry { conference-medium-type }*
  & anyElement*
# CONFERENCE MEDIUM TYPE
conference-medium-type =
  attribute label { text }
  & anyAttribute
  & element display-text { text }?
  & element type { text }?
  & element status { media-status-type }?
  & element xcon:mixing-mode { mixing-mode-type }?
  & element xcon:codecs { codecs-type }?
  & element xcon:controls { control-type }?
  & anyElement*
```

```
# URIs TYPE
uris-type =
  anyAttribute
  & element entry { uri-type }*
  & anyElement*
# URI TYPE
uri-type =
  element uri { xsd:anyURI }
  & element display-text { text }?
  & element purpose { text }?
  & element modified { execution-type }?
  & element xcon:conference-password { text }*
  & anyElement*
  & anyAttribute
# USERS TYPE
users-type =
  anyAttribute
  & element user { user-type }*
  & element xcon:join-handling { join-handling-type }?
  & element xcon:user-admission-policy { user-admission-policy-type }?
  & element xcon:allowed-users-list { allowed-users-list-type }?
  & element xcon:deny-users-list { deny-user-list-type }?
  & anyElement*
# USER TYPE
user-type =
  attribute entity { xsd:anyURI }
  & anyAttribute
  & element display-text { text }?
  & element associated-aors { uris-type }?
  & element roles {
      element entry { single-role-type }+
    }?
  & element languages {
      list { xsd:language }
    }?
  & element cascaded-focus { xsd:anyURI }?
  & element endpoint { endpoint-type }*
  & element xcon:provide-anonymity { provide-anonymity-type }?
  & element xcon:allow-refer-users-dynamically { xsd:boolean }?
  & element xcon:allow-invite-users-dynamically { xsd:boolean }?
  & element xcon:allow-remove-users-dynamically { xsd:boolean }?
  & anyElement*
# ENDPOINT TYPE
endpoint-type =
  attribute entity { text }
  & anyAttribute
  & element display-text { text }?
  & element referred { execution-type }?
```

```
  & element status { endpoint-status-type }?
  & element joining-method { joining-type }?
  & element joining-info { execution-type }?
  & element disconnection-method { disconnection-type }?
  & element disconnection-info { execution-type }?
  & element media { media-type }*
  & element call-info { call-type }?
  & anyElement*
# ENDPOINT STATUS TYPE
endpoint-status-type =
  "pending"
  | "dialing-out"
  | "dialing-in"
  | "alerting"
  | "on-hold"
  | "connected"
  | "muted-via-focus"
  | "disconnecting"
  | "disconnected"
  | free-text-extension
# JOINING TYPE
joining-type =
  "dialed-in" | "dialed-out" | "focus-owner" | free-text-extension
# DISCONNECTION TYPE
disconnection-type =
  "departed" | "booted" | "failed" | "busy" | free-text-extension
# EXECUTION TYPE
execution-type =
  element when { xsd:dateTime }?
  & element reason { text }?
  & element by { xsd:anyURI }?
  & anyAttribute
# CALL TYPE
call-type =
  element sip { sip-dialog-id-type }
  & anyElement*
  & anyAttribute
# SIP DIALOG ID TYPE
sip-dialog-id-type =
  element display-text { text }?
  & element call-id { text }
  & element from-tag { text }
  & element to-tag { text }
  & anyElement*
  & anyAttribute
# MEDIA TYPE
media-type =
  attribute id { xsd:int }
```

```
  & anyAttribute
  & element display-text { text }?
  & element type { text }?
  & element label { text }?
  & element src-id { text }?
  & element status { media-status-type }?
  & element xcon:to-mixer { mixer-type }?
  & element xcon:from-mixer { mixer-type }?
  & anyElement*
# MEDIA STATUS TYPE
media-status-type =
  "recvonly"
  | "sendonly"
  | "sendrecv"
  | "inactive"
  | free-text-extension
# SIDEBARS-BY-VAL TYPE
sidebars-by-val-type =
  anyAttribute
  & element entry { conference-type }*
  & anyElement*
# CONFERENCE TIME
conferencetime-type =
  anyAttribute
  & element xcon:entry {
      element xcon:base { text },
      element xcon:mixing-start-offset {
        time-type,
        attribute required-participant { single-role-type },
        anyAttribute
      }?,
      element xcon:mixing-end-offset {
        time-type,
        attribute required-participant { single-role-type },
        anyAttribute
      }?,
      element xcon:can-join-after-offset { time-type }?,
      element xcon:must-join-before-offset { time-type }?,
      element xcon:request-user { time-type }?,
      element xcon:notify-end-of-conference { xsd:int }?,
      element xcon:allowed-extend-mixing-end-offset { xsd:boolean }?,
      anyElement*
    }*
# TIME TYPE
time-type = xsd:dateTime { pattern = ".+T.+Z.*" }
# SINGLE ROLE TYPE
single-role-type =
  xsd:string "none"
```

```
  | xsd:string "administrator"
  | xsd:string "moderator"
  | xsd:string "user"
  | xsd:string "observer"
  | xsd:string "participant"
  | free-text-extension
# MIXING MODE TYPE
mixing-mode-type =
  xsd:string "moderator-controlled"
  | xsd:string "FCFS"
  | xsd:string "automatic"
  | free-text-extension
# CODECS TYPE
codecs-type =
  attribute decision { decision-type }
  & anyAttribute
  & element xcon:codec { codec-type }*
  & anyElement*
# CODEC TYPE
codec-type =
  attribute name { text }
  & attribute policy { policy-type }
  & anyAttribute
  & element xcon:subtype { text }?
  & anyElement*
# DECISION TYPE
decision-type =
  xsd:string "automatic"
  | xsd:string "moderator-controlled"
  | free-text-extension
# POLICY TYPE
policy-type =
  xsd:string "allowed" | xsd:string "disallowed" | free-text-extension
# CONTROL TYPE
control-type =
  anyAttribute
  & element xcon:mute { xsd:boolean }?
  & element xcon:pause-video { xsd:boolean }?
  & element xcon:gain { gain-type }?
  & element xcon:video-layout { video-layout-type }?
  & anyElement*
# GAIN TYPE
gain-type = xsd:int { minInclusive = "-127" maxInclusive = "127" }
# VIDEO LAYOUT TYPE
video-layout-type =
  xsd:string "single-view"
  | xsd:string "dual-view"
  | xsd:string "dual-view-crop"
```

```
  | xsd:string "dual-view-2x1"
  | xsd:string "dual-view-2x1-crop"
  | xsd:string "quad-view"
  | xsd:string "multiple-3x3"
  | xsd:string "multiple-4x4"
  | xsd:string "multiple-5x1"
  | xsd:string "automatic"
  | free-text-extension
# FLOOR INFORMATION TYPE
floor-information-type =
  anyAttribute
  & element xcon:conference-ID { xsd:unsignedLong }?
  & element xcon:allow-floor-events { xsd:boolean }?
  & element xcon:floor-request-handling { floor-request-type }?
  & element xcon:conference-floor-policy { conference-floor-policy }?
  & anyElement*
# FLOOR REQUEST TYPE
floor-request-type =
  xsd:string "block" | xsd:string "confirm" | free-text-extension
# CONFERENCE FLOOR POLICY
conference-floor-policy =
  anyAttribute
  & element xcon:floor {
      attribute id { text }
      & anyAttribute
      & element xcon:media-label { xsd:nonNegativeInteger }+
      & element xcon:algorithm { algorithm-type }?
      & element xcon:max-floor-users { xsd:nonNegativeInteger }?
      & element xcon:moderator-id { xsd:nonNegativeInteger }?
      & anyElement*
    }+
# ALGORITHM POLICY
algorithm-type =
  xsd:string "moderator-controlled"
  | xsd:string "FCFS"
  | xsd:string "random"
  | free-text-extension
# USERS ADMISSION POLICY
user-admission-policy-type =
  xsd:string "closedAuthenticated"
  | xsd:string "openAuthenticated"
  | xsd:string "anonymous"
  | free-text-extension
# JOIN HANDLING TYPE
join-handling-type =
  xsd:string "block"
  | xsd:string "confirm"
  | xsd:string "allow"
```

```
  | xsd:string "authenticate"
  | xsd:string "directed-operator"
  | free-text-extension
# DENY USERLIST
deny-user-list-type =
  anyAttribute
  & element xcon:target {
      attribute uri { xsd:anyURI },
      anyAttribute
    }*
  & anyElement*
# ALLOWED USERS LIST TYPE
allowed-users-list-type =
  anyAttribute
  & element xcon:target { target-type }*
  & element xcon:persistent-list { persistent-list-type }?
  & anyElement*
# PERSISTENT LIST TYPE
persistent-list-type =
  element xcon:user {
    attribute name { text }
    & attribute nickname { text }
    & attribute id { text }
    & anyAttribute
    & element xcon:e-mail { text }*
    & anyElement*
  }*
  & anyElement*
# TARGET TYPE
target-type =
  attribute uri { xsd:anyURI },
  attribute method { method-type },
  anyAttribute
# METHOD TYPE
method-type =
  xsd:string "dial-in"
  | xsd:string "dial-out"
  | xsd:string "refer"
  | free-text-extension
# ANONYMITY TYPE
provide-anonymity-type =
  "private" | "semi-private" | "hidden" | free-text-extension
# MIXER TYPE
mixer-type =
  attribute name { mixer-name-type }
  & anyAttribute
  & element xcon:controls { control-type }*
  & element xcon:floor {
```

```
      attribute id { text },
      anyAttribute,
      xsd:boolean
    }*
  & anyElement*
# MIXER NAME TYPE
mixer-name-type =
  "VideoIn" | "VideoOut" | "AudioOut" | "AudioIn" | free-text-extension

# FREE TEXT EXTENSION
#

free-text-extension = text

# *********************************
# EXTENSIBILITY OF THE SCHEMA
# *********************************

# EXTENSIBILITY ELEMENTS
#

anyElement =
  element * - (conference-description
               | host-info
               | conference-state
               | users
               | sidebars-by-ref
               | sidebars-by-val
               | display-text
               | subject
               | free-text
               | keywords
               | conf-uris
               | service-uris
               | maximum-user-count
               | available-media
               | web-page
               | uris
               | uri
               | user-count
               | active
               | locked
               | entry
               | type
               | status
               | purpose
               | modified
               | user
```

```
                  | associated-aors
                  | roles
                  | languages
                  | cascaded-focus
                  | endpoint
                  | referred
                  | joining-method
                  | joining-info
                  | disconnection-method
                  | disconnection-info
                  | media
                  | call-info
                  | when
                  | reason
                  | by
                  | sip
                  | call-id
                  | from-tag
                  | to-tag
                  | label
                  | src-id
                  | xcon:conference-password
                  | xcon:mixing-mode
                  | xcon:codecs
                  | xcon:controls
                  | xcon:language
                  | xcon:allow-sidebars
                  | xcon:cloning-parent
                  | xcon:sidebar-parent
                  | xcon:allow-conference-event-subscription
                  | xcon:to-mixer
                  | xcon:provide-anonymity
                  | xcon:allow-refer-users-dynamically
                  | xcon:allow-invite-users-dynamically
                  | xcon:allow-remove-users-dynamically
                  | xcon:from-mixer
                  | xcon:join-handling
                  | xcon:user-admission-policy
                  | xcon:allowed-users-list
                  | xcon:deny-users-list
                  | xcon:floor-information
                  | xcon:conference-time
                  | xcon:provide-anonymity
                  | xcon:floor
                  | xcon:entry
                  | xcon:mixing-start-offset
                  | xcon:mixing-end-offset
                  | xcon:can-join-after-offset
```

```
                | xcon:must-join-before-offset
                | xcon:request-user
                | xcon:notify-end-of-conference
                | xcon:allowed-extend-mixing-end-offset
                | xcon:codec
                | xcon:subtype
                | xcon:mute
                | xcon:pause-video
                | xcon:gain
                | xcon:video-layout
                | xcon:conference-ID
                | xcon:allow-floor-events
                | xcon:floor-request-handling
                | xcon:conference-floor-policy
                | xcon:media-label
                | xcon:algorithm
                | xcon:max-floor-users
                | xcon:moderator-id
                | xcon:target
                | xcon:persistent-list
                | xcon:e-mail
                | xcon:user) { anyExtension }
anyExtension =
  (attribute * { text }
   | any)*
any =
  element * {
    (attribute * { text }
     | text
     | any)*
  }

# EXTENSIBILITY ATTRIBUTES
#

anyAttribute =
  attribute * - (xml:lang
                 | entity
                 | required-participant
                 | label
                 | decision
                 | name
                 | policy
                 | uri
                 | method
                 | id
                 | nickname) { text }*
```

6. XML Schema Extensibility

The Conference Information Data Model defined in this document is meant to be extensible toward specific application domains. Such extensions are accomplished by defining elements, child elements and attributes that are specific to the desired application domain. The IETF MAY extend the data model schema with unqualified attributes or extension elements from the "urn:ietf:params:xml:ns:" "sub-namespace" in the future. Other instances are free to define extension elements or attributes under other namespaces.

Elements or attributes from unknown namespaces MUST be ignored.

7. XML Example

The following is an example of a conference information document. The conference starts on October 17, 2007, at 10:30 AM in New York City and finishes the same day at 12:30 PM every week. In this example, there are currently 3 participants in a conference, one administrator, one moderator, and one participant. Sidebars are allowed in this conference and ,consequently, there is one sidebar in the conference. In addition, Alice and Carol are using a floor in the main conference to manage the audio and video resources. At the moment, Alice is assigned to use the floor.

```
<?xml version="1.0" encoding="UTF-8"?>
<conference-info
        xmlns="urn:ietf:params:xml:ns:conference-info"
        xmlns:xcon="urn:ietf:params:xml:ns:xcon-conference-info"
        entity="conference123@example.com">
        <!--
            CONFERENCE DESCRIPTION
        -->
        <conference-description xml:lang="en-us">
            <display-text>Discussion of Formula-1 racing</display-text>
            <subject>Sports:Formula-1</subject>
            <free-text>This is a conference example</free-text>
            <keywords>Formula-1 cars</keywords>
            <!--

                CONFERENCE UNIQUE IDENTIFIERS
            -->
            <conf-uris>
                <entry>
                    <uri>tel:+3585671234</uri>
                    <display-text>Conference Bridge</display-text>
                    <purpose>participation</purpose>
```

```
                <xcon:conference-password
                 >5678</xcon:conference-password>
            </entry>
            <entry>
                <uri>http://www.example.com/live.ram</uri>
                <purpose>streaming</purpose>
            </entry>
        </conf-uris>
        <!--
            SERVICE URIS
        -->
        <service-uris>
            <entry>
                <uri>mailto:bob@example.com</uri>
                <display-text>email</display-text>
            </entry>
        </service-uris>
        <!--
            MAXIMUM USER COUNT
        -->
        <maximum-user-count>50</maximum-user-count>
        <!--
            AVAILABLE MEDIA
        -->
        <available-media>
            <entry label="10234">
                <display-text>main audio</display-text>
                <type>audio</type>
                <status>sendrecv</status>
                <xcon:mixing-mode>automatic</xcon:mixing-mode>
                <xcon:codecs decision="automatic">
                    <xcon:codec name="122" policy="allowed">
                       <xcon:subtype>PCMU</xcon:subtype>
                    </xcon:codec>
                </xcon:codecs>
                <xcon:controls>
                    <xcon:mute>true</xcon:mute>
                    <xcon:gain>50</xcon:gain>
                </xcon:controls>
            </entry>
            <entry label="10235">
                <display-text>main video</display-text>
                <type>video</type>
                <status>sendrecv</status>
                <xcon:mixing-mode>automatic</xcon:mixing-mode>
                <xcon:codecs decision="automatic">
                    <xcon:codec name="123" policy="allowed">
                       <xcon:subtype>H.263</xcon:subtype>
```

```
                        </xcon:codec>
                    </xcon:codecs>
                    <xcon:controls>
                        <xcon:video-layout
                          >single-view</xcon:video-layout>
                    </xcon:controls>
                </entry>
            </available-media>

            <xcon:language>En-us</xcon:language>

            <xcon:allow-sidebars>true</xcon:allow-sidebars>
            <!--
                CONFERENCE TIME
            -->

            <xcon:conference-time>
                <xcon:entry>
                    <xcon:base>BEGIN:VCALENDAR
  PRODID:-//LlamaSpinner Inc.//NONSGML CamelCall//EN
  VERSION:2.0
  BEGIN:VEVENT
  DTSTAMP:20071003T140728Z
  UID:20071003T140728Z-345FDA-carol@example.com
  ORGANIZER:MAILTO:carol@example.com
  DTSTART:20071017T143000Z
  RRULE:FREQ=WEEKLY
  DTEND:20071217T163000Z
  END:VEVENT
  END:VCALENDAR</xcon:base>
                    <xcon:mixing-start-offset
                        required-participant="moderator"
                       >2007-10-17T14:29:00Z</xcon:mixing-start-offset>
                    <xcon:mixing-end-offset
                        required-participant="participant"
                       >2007-10-17T16:31:00Z</xcon:mixing-end-offset>
                    <xcon:must-join-before-offset
                       >2007-10-17T15:30:00Z
                       </xcon:must-join-before-offset>
                </entry>
            </xcon:conference-time>

        </conference-description>
        <!--
            HOST INFO
        -->
        <host-info>
            <display-text>Formula1</display-text>
```

```
            <web-page>http://www.example.com/formula1/</web-page>
            <uris>
                <entry>
                    <uri>sip:alice@example.com</uri>
                </entry>
                <entry>
                    <uri>sip:carol@example.com</uri>
                </entry>
            </uris>
        </host-info>
        <!--
            CONFERENCE STATE
        -->
        <conference-state>
            <user-count>3</user-count>
            <active>true</active>
            <locked>false</locked>
            <xcon:allow-conference-event-subscription
              >true</xcon:allow-conference-event-subscription>

       </conference-state>
        <!--
            USERS
        -->
        <users>
            <!--
                USER BOB
            -->
            <user entity="xcon-userid:bob534">
                <display-text>Bob Hoskins</display-text>
                <associated-aors>
                    <entry>
                        <uri>mailto:bob@example.com</uri>
                        <display-text>email</display-text>
                    </entry>
                </associated-aors>
                <roles>
                    <entry>participant</entry>
                </roles>
                <languages>en-us</languages>

                <!--
                    ENDPOINTS
                -->
                <endpoint entity="sip:bob@example.com">
                    <display-text>Bob's Laptop</display-text>
                    <referred>
                        <when>2007-10-17T14:00:00Z</when>
```

```
                        <reason>expert required</reason>
                        <by>sip:alice@example.com</by>
                    </referred>
                    <status>connected</status>
                    <joining-method>dialed-out</joining-method>
                    <joining-info>
                        <when>2007-10-17T14:00:00Z</when>
                        <reason>invitation</reason>
                        <by>sip:alice@example.com</by>
                    </joining-info>
                    <!--
                        MEDIA
                    -->
                    <media id="1">
                        <type>video</type>
                        <label>10235</label>
                        <src-id>432424</src-id>
                        <status>sendrecv</status>
                        <xcon:to-mixer name="VideoIn">
                            <xcon:controls>
                                <xcon:video-layout
                                   >single-view</xcon:video-layout>
                            </xcon:controls>
                        </xcon:to-mixer>
                    </media>
                    <!--
                        CALL INFO
                    -->
                    <call-info>
                        <sip>
                            <display-text>full info</display-text>
                            <call-id>hsjh8980vhsb78</call-id>
                            <from-tag>vav738dvbs</from-tag>
                            <to-tag>8954jgjg8432</to-tag>
                        </sip>
                    </call-info>
                </endpoint>
                <xcon:provide-anonymity
                 >semi-private</xcon:provide-anonymity>
                 <xcon:allow-refer-users-dynamically
                    >false</xcon:allow-refer-users-dynamically>
                <xcon:allow-invite-users-dynamically
                    >false</xcon:allow-invite-users-dynamically>
                <xcon:allow-remove-users-dynamically
                    >false</xcon:allow-remove-users-dynamically>
            </user>

            <!--
```

```
                USER ALICE
            -->
            <user entity="xcon-userid:alice334">
                <display-text>Alice Kay</display-text>
                <associated-aors>
                    <entry>
                        <uri>mailto:alice@example.com</uri>
                        <display-text>email</display-text>
                    </entry>
                </associated-aors>
                <roles>
                    <entry>moderator</entry>
                </roles>
                <languages>en-us</languages>
                <!--
                    ENDPOINTS
                -->
                <endpoint entity="sip:alice@example.com">
                    <display-text>Alice's Desktop</display-text>
                    <status>connected</status>
                    <joining-method>dialed-in</joining-method>
                    <joining-info>
                        <when>2007-10-17T13:35:08Z</when>
                        <reason>invitation</reason>
                        <by>sip:conference@example.com</by>
                    </joining-info>
                    <!--
                        MEDIA
                    -->
                    <media id="1">
                        <type>video</type>
                        <label>10235</label>
                        <src-id>432424</src-id>
                        <status>sendrecv</status>
                        <xcon:to-mixer name="VideoIn">
                         <xcon:controls>
                            <xcon:video-layout
                              >single-view</xcon:video-layout>
                         </xcon:controls>
                        </xcon:to-mixer>
                    </media>
                    <media id="2">
                        <type>audio</type>
                        <label>10234</label>
                        <src-id>532535</src-id>
                        <status>sendrecv</status>
                        <xcon:to-mixer name="AudioIn">
                          <xcon:controls>
```

```
                        <xcon:gain>50</xcon:gain>
                      </xcon:controls>
                    </xcon:to-mixer>
                    <xcon:from-mixer name="AudioOut">
                      <xcon:controls>
                          <xcon:gain>50</xcon:gain>
                      </xcon:controls>
                    </xcon:from-mixer>
                </media>
                <!--
                    CALL INFO
                -->
                <call-info>
                    <sip>
                        <display-text>full info</display-text>
                        <call-id>truy45469123478</call-id>
                        <from-tag>asd456cbgt</from-tag>
                        <to-tag>3456jgjg1234</to-tag>
                    </sip>
                </call-info>
                <xcon:floor id="345">true</xcon:floor>
            </endpoint>
            <xcon:provide-anonymity>private</xcon:provide-anonymity>
            <xcon:allow-refer-users-dynamically
                >true</xcon:allow-refer-users-dynamically>
            <xcon:allow-invite-users-dynamically
                >true</xcon:allow-invite-users-dynamically>
            <xcon:allow-remove-users-dynamically
                >true</xcon:allow-remove-users-dynamically>
        </user>

        <!--
            USER CAROL
        -->
        <user entity="xcon-userid:carol233">
            <display-text>Carol More</display-text>
            <associated-aors>
                <entry>
                    <uri>mailto:carol@example.com</uri>
                    <display-text>email</display-text>
                </entry>
            </associated-aors>
            <roles>
                <entry>administrator</entry>
            </roles>
            <languages>en-us</languages>
            <!--
                ENDPOINTS
```

```
                -->
                <endpoint entity="sip:carol@example.com">
                    <display-text>Carol's Computer</display-text>
                    <status>connected</status>
                    <joining-method>dialed-in</joining-method>
                    <joining-info>
                        <when>2007-10-17T13:30:05Z</when>
                        <reason>invitation</reason>
                        <by>sip:conference@example.com</by>
                    </joining-info>
                    <!--
                        MEDIA
                    -->
                    <media id="1">
                        <type>video</type>
                        <label>10235</label>
                        <src-id>432424</src-id>
                        <status>sendrecv</status>
                        <xcon:to-mixer name="VideoIn">
                            <xcon:controls>
                                <xcon:video-layout
                              >single-view</xcon:video-layout>
                             </xcon:controls>
                        </xcon:to-mixer>
                    </media>
                    <media id="2">
                        <type>audio</type>
                        <label>10234</label>
                        <src-id>532535</src-id>
                        <status>sendrecv</status>
                        <xcon:to-mixer name="AudioIn">
                            <xcon:controls>
                                <xcon:gain>50</xcon:gain>
                            </xcon:controls>
                        </xcon:to-mixer>
                        <xcon:from-mixer name="AudioOut">
                            <xcon:controls>
                                <xcon:gain>50</xcon:gain>
                              </xcon:controls>
                        </xcon:from-mixer>
                    </media>
                    <!--
                        CALL INFO
                    -->
                    <call-info>
                        <sip>
                            <display-text>full info</display-text>
                            <call-id>wevb12562321894</call-id>
```

```
                        <from-tag>asw456wedf</from-tag>
                        <to-tag>2365dfrt3497</to-tag>
                    </sip>
                </call-info>

                <xcon:floor id="345">false</xcon:floor>
            </endpoint>

            <xcon:provide-anonymity>private</xcon:provide-anonymity>
            <xcon:allow-refer-users-dynamically
                >true</xcon:allow-refer-users-dynamically>
            <xcon:allow-invite-users-dynamically
                >true</xcon:allow-invite-users-dynamically>
            <xcon:allow-remove-users-dynamically
                >true</xcon:allow-remove-users-dynamically>

        </user>

        <xcon:join-handling>allow</xcon:join-handling>
        <xcon:user-admission-policy
           >openAuthenticated</xcon:user-admission-policy>
        <!--
            ALLOWED USERS LIST
        -->
        <xcon:allowed-users-list>
            <xcon:target uri="sip:bob@example.com"
                method="dial-out"/>
            <xcon:target uri="sip:alice@example.com"
                method="dial-out"/>
            <xcon:target uri="sip:carol@example.com"
                method="dial-out"/>
            <xcon:target uri="sip:john@example.com"
                method="refer"/>
        </xcon:allowed-users-list>
        <!--
            DENY USERS LIST
        -->
        <xcon:deny-users-list>
            <xcon:target uri="sip:charlie@example.com"/>
        </xcon:deny-users-list>
    </users>
    <!--
        SIDEBARS BY REFERENCE
    -->
    <sidebars-by-ref>
        <entry>
            <uri>xcon:conf223</uri>
            <display-text>private with Bob</display-text>
```

```
            </entry>
        </sidebars-by-ref>
        <!--
            SIDEBARS BY VALUE
        -->
        <sidebars-by-val>
            <entry entity="conf223">
                <users>
                    <user entity="xcon-userid:bob534"/>
                    <user entity="xcon-userid:carol233"/>
                </users>
            </entry>
        </sidebars-by-val>
        <!--
            FLOOR INFORMATION
        -->
        <xcon:floor-information>
            <xcon:conference-ID>567</xcon:conference-ID>
            <xcon:allow-floor-events>true</xcon:allow-floor-events>
            <xcon:floor-request-handling
             >confirm</xcon:floor-request-handling>

            <xcon:conference-floor-policy>
                <xcon:floor id="345">
                    <xcon:media-label>10234</xcon:media-label>
                    <xcon:media-label>10235</xcon:media-label>
                    <xcon:algorithm
                     >moderator-controlled</xcon:algorithm>
                    <xcon:max-floor-users>1</xcon:max-floor-users>
                    <xcon:moderator-id>234</xcon:moderator-id>
                </xcon:floor>
            </xcon:conference-floor-policy>
        </xcon:floor-information>

    </conference-info>
```

Note that due to RFC formatting conventions, this documents splits lines whose content would exceed 72 characters.

8. Security Considerations

There are numerous security considerations for this document. This section discusses them. Overall, the The security considerations for authentication (Section 11) described in the centralized conferencing framework [RFC5239] applies to this document.

This specification defines a data model for conference objects.

Different conferencing systems may use different protocols to provide access to these conference objects. This section contains general security considerations for the conference objects and for the protocols. The specification of each particular protocol needs to discuss how the specific protocol meets the security requirements provided in this section.

A given conferencing system usually supports different protocols in order to implement different functions (e.g., SIP for session control and BFCP for floor control). Each of these protocols may use their own authentication mechanism. In cases where a user is authenticated using multiple authentication mechanisms, it is up to the conferencing system to map all the different authentications to the same user. Discussing the specifics of different authentication mechanism is beyond the scope of this document.

Futhermore, users may use different namespaces to access to a conference as explained in Section 4.6.5. These different namespaces can be associated with a unique conference user identifier (XCON-USERID). A mapping database is used to map all these authenticated user namespaces to the XCON-USERID. There are several threats against this database. In order to minimize these threats, the administrator of the conferencing system MUST ensure that only authorized users can connect to this database (e.g., by using access control rules). In particular, the integrity of the database MUST be protected against unauthorized modifications.

The confidentiality of the database SHOULD be protected from unauthorized users, given that the data model contains a set of sensitive elements (e.g., passwords). Therefore, in addition to implementing access control, as discussed above, it is RECOMMENDED that administrators of conferencing systems only provide access to the database over encrypted channels (e.g., using TLS encryption) in order to avoid eavesdroppers. Administrators of conferencing systems SHOULD also avoid disclosing information to unauthorized parties when a conference is being cloned or when a sidebar is being created.

The security considerations for authentication (Section 11.1) described in the centralized conferencing framework [RFC5239] also apply to this document. Similarly, the security considerations for authorization (Section 5.2) described in the Session Initiation Protocol (SIP) REFER Method [RFC3515] apply to this document as well.

9. IANA Considerations

9.1. Relax NG Schema Registration

This specification registers a schema. The schema can be found as the sole content of Section 5.

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

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

Relax NG Schema: The Relax NG schema to be registered is contained in Section 5. Its first line is

```
default namespace = "urn:ietf:params:xml:ns:conference-info"
```

and its last line is

```
anyAttribute = attribute * - (xml:lang | entity
               | required-participant | label | decision | name
               | policy | uri | method | id | nickname) { text }*
```

9.2. XML Namespace Registration

This section registers a new XML namespace.

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

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

XML:

```
BEGIN
<?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> Centralized Conferencing Namespace</title>
</head>
<body>
  <h1>Namespace for Centralized Conferencing</h1>
  <h2>urn:ietf:params:xml:ns:xcon-conference-info</h2>
<p>See <a href="[URL of published RFC]">RFCXXXX
    [NOTE TO IANA/RFC-EDITOR:
     Please replace XXXX with the RFC number of this
    specification.]</a>.</p>
</body>
</html>
END
```

9.3. Conference Object Identifier Registration

The IANA is requested to register the following URI scheme under the Permanent URI Schemes registry.

```
XCON-URI = "xcon" ":" [conf-object-id "@"] host [ ":" port ] [RFC xxxx]

 conf-object-id = 1*( unreserved / "+" / "=" / "/" )
```

host, port, and unreserved are defined in RFC3986[RFC3986]

[Note to the RFC Editor: replace xxxx with the number this RFC gets assigned.]

```
Subject: Request for XCON-URI Registration
Person & email address to contact for further information:
     Oscar Novo <oscar novo_at_ericsson.com>
Specification: RFC XXXX
Author/Change Controller: IESG
Comments:
    Identifies the Conference
```

9.4. Conference User Identifier Registration

The IANA is requested to register the following URI scheme under the Permanent URI Schemes registry.

```
XCON-USERID = "xcon-userid" ":" conf-user-id  [ RFC xxxx ]

conf-user-id = 1*(unreserved)
```

unreserved is defined in RFC3986[RFC3986]

[Note to the RFC Editor: replace xxxx with the number this RFC gets assigned.]

```
Subject: Request for XCON-USERID Registration
Person & email address to contact for further information:
     Oscar Novo <oscar novo_at_ericsson.com>
Specification: RFC XXXX
Author/Change Controller: IESG
Comments:
    Identifies the User in the conference
```

10. Acknowledgements

This document is really a distillation of many ideas discussed over a long period of time. These ideas were contributed by many different drafts in the XCON working group and the SIPPING working group. We would like to thank Orit Levin, Roni Even, Adam Roach, Mary Barnes, Chris Boulton, Umesh Chandra, Hisham Khartabil, Petri Koskelainen, Aki Niemi, Rohan Mahy, Jonathan Lennox, Sean Duddy, Richard Barnes, and Henning Schulzrinne for their comments. Also, we would like to thank Mary Barnes, and Chris Boulton for letting us use the conference and user identifier information of their xcon drafts. Last but not least, we would like to express our gratitude to all

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11. References

11.1. Normative References

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

[RFC4582] Camarillo, G., Ott, J., and K. Drage, "The Binary Floor Control Protocol (BFCP)", RFC 4582, November 2006.

[RFC4583] Camarillo, G., "Session Description Protocol (SDP) Format for Binary Floor Control Protocol (BFCP) Streams", RFC 4583, November 2006.

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

[RFC5545] Desruisseaux, B., "Internet Calendaring and Scheduling Core Object Specification (iCalendar)", RFC 5545, September 2009.

11.2. Informative References

[IANA] "IANA registry for RTP Payload Types" "http://www.iana.org/assignments/rtp-parameters".

[IANA-Lan] "IANA Language Subtag Registry" "http://www.iana.org/assignments/language-subtag-registry".

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[RFC3265] Roach, A., "Session Initiation Protocol (SIP)-Specific Event Notification", RFC 3265, June 2002.

[RFC3515] Sparks, R., "The Session Initiation Protocol (SIP) Refer Method", RFC 3515, April 2003.

[RFC3986] Berners-Lee, T., Fielding, R., and L. Masinter, "Uniform Resource Identifier (URI): Generic Syntax", STD 66, RFC 3986, January 2005.

[RFC4353] Rosenberg, J., "A Framework for Conferencing with the Session Initiation Protocol (SIP)", RFC 4353, February 2006.

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[W3C.REC-xml-20001006]
Sperberg-McQueen, C., Bray, T., Paoli, J., and E. Maler, "Extensible Markup Language (XML) 1.0 (Second Edition)", World Wide Web Consortium FirstEdition REC-xml-20001006, October 2000, <http://www.w3.org/TR/2000/REC-xml-20001006>.

Appendix A. Non-Normative RELAX NG Schema in XML Syntax

```
<?xml version="1.0" encoding="UTF-8" ?>
   <grammar
          ns="urn:ietf:params:xml:ns:conference-info"
          xmlns="http://relaxng.org/ns/structure/1.0"
          xmlns:xcon="urn:ietf:params:xml:ns:xcon-conference-info"
          datatypeLibrary="http://www.w3.org/2001/XMLSchema-datatypes">
          <start>
           <element name="conference-info">
            <ref name="conference-type"/>
           </element>
          </start>
          <!--
              CONFERENCE TYPE
          -->
          <define name="conference-type">
           <interleave>
           <attribute name="entity">
            <text/>
```

```
            </attribute>
            <ref name="anyAttribute"/>
            <optional>
             <ref name="conference-description-type"/>
            </optional>
            <optional>
             <element name="host-info">
              <ref name="host-type"/>
             </element>
            </optional>
            <optional>
             <element name="conference-state">
              <ref name="conference-state-type"/>
             </element>
            </optional>
            <optional>
             <element name="users">
              <ref name="users-type"/>
             </element>
            </optional>
            <optional>
             <element name="sidebars-by-ref">
              <ref name="uris-type"/>
             </element>
            </optional>
            <optional>
             <element name="sidebars-by-val">
              <ref name="sidebars-by-val-type"/>
             </element>
            </optional>
            <optional>
             <element name="xcon:floor-information">
              <ref name="floor-information-type"/>
             </element>
            </optional>
            <zeroOrMore>
             <ref name="anyElement"/>
            </zeroOrMore>
            </interleave>
           </define>
           <!--
               CONFERENCE DESCRIPTION TYPE
           -->
           <define name="conference-description-type">
            <element name="conference-description">
             <interleave>
             <optional>
              <attribute name="xml:lang">
```

```
                <data type="language"/>
               </attribute>
              </optional>
              <ref name="anyAttribute"/>
              <optional>
               <element name="display-text">
                <text/>
               </element>
              </optional>
              <optional>
               <element name="subject">
                <text/>
               </element>
              </optional>
              <optional>
               <element name="free-text">
                <text/>
               </element>
              </optional>
              <optional>
               <element name="keywords">
                <list>
                 <zeroOrMore>
                  <data type="string"/>
                 </zeroOrMore>
                </list>
               </element>
              </optional>
              <optional>
               <element name="conf-uris">
                <ref name="uris-type"/>
               </element>
              </optional>
              <optional>
               <element name="service-uris">
                  <ref name="uris-type"/>
               </element>
              </optional>
              <optional>
               <element name="maximum-user-count">
                <data type="int"/>
               </element>
              </optional>
              <optional>
               <element name="available-media">
                <ref name="conference-media-type"/>
               </element>
              </optional>
```

```
              <optional>
               <element name="xcon:language">
                <data type="language"/>
               </element>
              </optional>
              <optional>
               <element name="xcon:allow-sidebars">
                <data type="boolean"/>
               </element>
              </optional>
              <optional>
              <element name="xcon:cloning-parent">
               <data type="anyURI"/>
              </element>
              </optional>
              <optional>
              <element name="xcon:sidebar-parent">
               <data type="anyURI"/>
              </element>
              </optional>
              <optional>
               <element name="xcon:conference-time">
                <ref name="conferencetime-type"/>
               </element>
              </optional>
              <zeroOrMore>
               <ref name="anyElement"/>
              </zeroOrMore>
              </interleave>
             </element>
            </define>
            <!--
                HOST TYPE
            -->
            <define name="host-type">
             <interleave>
             <optional>
              <element name="display-text">
               <text/>
              </element>
             </optional>
             <optional>
              <element name="web-page">
               <data type="anyURI"/>
              </element>
             </optional>
             <optional>
              <element name="uris">
```

```
              <ref name="uris-type"/>
             </element>
            </optional>
            <zeroOrMore>
             <ref name="anyElement"/>
            </zeroOrMore>
            <ref name="anyAttribute"/>
            </interleave>
           </define>
           <!--
               CONFERENCE STATE TYPE
           -->
           <define name="conference-state-type">
            <interleave>
            <ref name="anyAttribute"/>
            <optional>
             <element name="user-count">
              <data type="unsignedInt"/>
             </element>
            </optional>
            <optional>
             <element name="active">
              <data type="boolean"/>
             </element>
            </optional>
            <optional>
             <element name="locked">
              <data type="boolean"/>
             </element>
            </optional>
            <optional>
             <element name="xcon:allow-conference-event-subscription">
              <data type="boolean"/>
             </element>
            </optional>
            <zeroOrMore>
             <ref name="anyElement"/>
            </zeroOrMore>
            </interleave>
           </define>
           <!--
               CONFERENCE MEDIA TYPE
           -->
           <define name="conference-media-type">
            <interleave>
            <ref name="anyAttribute"/>
            <zeroOrMore>
             <element name="entry">
```

```
              <ref name="conference-medium-type"/>
             </element>
            </zeroOrMore>
            <zeroOrMore>
             <ref name="anyElement"/>
            </zeroOrMore>
            </interleave>
           </define>
           <!--
               CONFERENCE MEDIUM TYPE
           -->
           <define name="conference-medium-type">
            <interleave>
            <attribute name="label">
             <text/>
            </attribute>
            <ref name="anyAttribute"/>
            <optional>
             <element name="display-text">
              <text/>
             </element>
            </optional>
            <optional>
             <element name="type">
              <text/>
             </element>
            </optional>
            <optional>
             <element name="status">
              <ref name="media-status-type"/>
             </element>
            </optional>
            <optional>
             <element name="xcon:mixing-mode">
              <ref name="mixing-mode-type"/>
             </element>
            </optional>
            <optional>
             <element name="xcon:codecs">
              <ref name="codecs-type"/>
             </element>
            </optional>
            <optional>
             <element name="xcon:controls">
              <ref name="control-type"/>
             </element>
            </optional>
            <zeroOrMore>
```

```
              <ref name="anyElement"/>
             </zeroOrMore>
             </interleave>
            </define>
            <!--
                URIs TYPE
            -->
            <define name="uris-type">
             <interleave>
             <ref name="anyAttribute"/>
             <zeroOrMore>
              <element name="entry">
               <ref name="uri-type"/>
              </element>
             </zeroOrMore>
             <zeroOrMore>
              <ref name="anyElement"/>
             </zeroOrMore>
             </interleave>
            </define>
            <!--
                URI TYPE
            -->
            <define name="uri-type">
             <interleave>
             <element name="uri">
              <data type="anyURI"/>
             </element>
             <optional>
              <element name="display-text">
               <text/>
              </element>
             </optional>
             <optional>
              <element name="purpose">
               <text/>
              </element>
             </optional>
             <optional>
              <element name="modified">
               <ref name="execution-type"/>
              </element>
             </optional>
             <zeroOrMore>
              <element name="xcon:conference-password">
               <text/>
              </element>
             </zeroOrMore>
```

```
             <zeroOrMore>
              <ref name="anyElement"/>
             </zeroOrMore>
             <ref name="anyAttribute"/>
            </interleave>

            </define>
            <!--
                USERS TYPE
            -->
            <define name="users-type">
             <interleave>
             <ref name="anyAttribute"/>
             <zeroOrMore>
              <element name="user">
               <ref name="user-type"/>
              </element>
             </zeroOrMore>
             <optional>
              <element name="xcon:join-handling">
               <ref name="join-handling-type"/>
              </element>
             </optional>
             <optional>
              <element name="xcon:user-admission-policy">
               <ref name="user-admission-policy-type"/>
              </element>
             </optional>
             <optional>
              <element name="xcon:allowed-users-list">
               <ref name="allowed-users-list-type"/>
              </element>
             </optional>
             <optional>
              <element name="xcon:deny-users-list">
               <ref name="deny-user-list-type"/>
              </element>
             </optional>
             <zeroOrMore>
              <ref name="anyElement"/>
             </zeroOrMore>
             </interleave>
            </define>
            <!--
                USER TYPE
            -->
            <define name="user-type">
             <interleave>
```

```
            <attribute name="entity">
             <data type="anyURI"/>
            </attribute>
            <ref name="anyAttribute"/>
            <optional>
             <element name="display-text">
              <text/>
             </element>
            </optional>
            <optional>
             <element name="associated-aors">
               <ref name="uris-type"/>
             </element>
            </optional>
            <optional>
             <element name="roles">
              <oneOrMore>
               <element name="entry">
                <ref name="single-role-type"/>
               </element>
              </oneOrMore>
             </element>
            </optional>
            <optional>
             <element name="languages">
              <list>
               <data type="language"/>
              </list>
             </element>
            </optional>
            <optional>
             <element name="cascaded-focus">
              <data type="anyURI"/>
             </element>
            </optional>
            <zeroOrMore>
             <element name="endpoint">
              <ref name="endpoint-type"/>
             </element>
            </zeroOrMore>
            <optional>
             <element name="xcon:provide-anonymity">
              <ref name="provide-anonymity-type"/>
             </element>
            </optional>
           <optional>
             <element name="xcon:allow-refer-users-dynamically">
              <data type="boolean"/>
```

```
             </element>
            </optional>
            <optional>
             <element name="xcon:allow-invite-users-dynamically">
              <data type="boolean"/>
             </element>
            </optional>
            <optional>
             <element name="xcon:allow-remove-users-dynamically">
              <data type="boolean"/>
             </element>
            </optional>
             <zeroOrMore>
             <ref name="anyElement"/>
            </zeroOrMore>
            </interleave>
           </define>
           <!--
               ENDPOINT TYPE
           -->
           <define name="endpoint-type">
            <interleave>
            <attribute name="entity">
             <text/>
            </attribute>
            <ref name="anyAttribute"/>
            <optional>
             <element name="display-text">
              <text/>
             </element>
            </optional>
            <optional>
             <element name="referred">
               <ref name="execution-type"/>
             </element>
            </optional>
            <optional>
             <element name="status">
              <ref name="endpoint-status-type"/>
             </element>
            </optional>
            <optional>
             <element name="joining-method">
              <ref name="joining-type"/>
             </element>
            </optional>
            <optional>
             <element name="joining-info">
```

```
              <ref name="execution-type"/>
             </element>
            </optional>
            <optional>
             <element name="disconnection-method">
              <ref name="disconnection-type"/>
             </element>
            </optional>
            <optional>
             <element name="disconnection-info">
              <ref name="execution-type"/>
             </element>
            </optional>
            <zeroOrMore>
             <element name="media">
              <ref name="media-type"/>
             </element>
            </zeroOrMore>
            <optional>
             <element name="call-info">
              <ref name="call-type"/>
             </element>
            </optional>
            <zeroOrMore>
             <ref name="anyElement"/>
            </zeroOrMore>
            </interleave>
           </define>
           <!--
               ENDPOINT STATUS TYPE
           -->
           <define name="endpoint-status-type">
            <choice>
             <value>pending</value>
             <value>dialing-out</value>
             <value>dialing-in</value>
             <value>alerting</value>
             <value>on-hold</value>
             <value>connected</value>
             <value>muted-via-focus</value>
             <value>disconnecting</value>
             <value>disconnected</value>
             <ref name="free-text-extension"/>
            </choice>
           </define>
           <!--
               JOINING TYPE
           -->
```

```
<define name="joining-type">
 <choice>
  <value>dialed-in</value>
  <value>dialed-out</value>
  <value>focus-owner</value>
  <ref name="free-text-extension"/>
 </choice>
</define>
<!--
    DISCONNECTION TYPE
-->
<define name="disconnection-type">
 <choice>
  <value>departed</value>
  <value>booted</value>
  <value>failed</value>
  <value>busy</value>
  <ref name="free-text-extension"/>
 </choice>
</define>
<!--
    EXECUTION TYPE
-->
<define name="execution-type">
 <interleave>
 <optional>
  <element name="when">
   <data type="dateTime"/>
  </element>
 </optional>
 <optional>
  <element name="reason">
   <text/>
  </element>
 </optional>
 <optional>
  <element name="by">
   <data type="anyURI"/>
  </element>
 </optional>
 <ref name="anyAttribute"/>
 </interleave>
</define>
<!--
    CALL TYPE
-->
<define name="call-type">
 <interleave>
```

```
              <element name="sip">
               <ref name="sip-dialog-id-type"/>
              </element>
              <zeroOrMore>
               <ref name="anyElement"/>
              </zeroOrMore>
              <ref name="anyAttribute"/>
             </interleave>
            </define>
            <!--
                SIP DIALOG ID TYPE
            -->
            <define name="sip-dialog-id-type">
             <interleave>
             <optional>
             <element name="display-text">
              <text/>
             </element>
             </optional>
             <element name="call-id">
              <text/>
             </element>
             <element name="from-tag">
              <text/>
             </element>
             <element name="to-tag">
              <text/>
             </element>
             <zeroOrMore>
              <ref name="anyElement"/>
             </zeroOrMore>
             <ref name="anyAttribute"/>
             </interleave>
            </define>
            <!--
                MEDIA TYPE
            -->
            <define name="media-type">
             <interleave>
             <attribute name="id">
              <data type="int"/>
             </attribute>
             <ref name="anyAttribute"/>
             <optional>
              <element name="display-text">
               <text/>
              </element>
             </optional>
```

```
            <optional>
             <element name="type">
              <text/>
             </element>
            </optional>
            <optional>
             <element name="label">
              <text/>
             </element>
            </optional>
            <optional>
             <element name="src-id">
              <text/>
             </element>
            </optional>
            <optional>
             <element name="status">
              <ref name="media-status-type"/>
             </element>
            </optional>
            <optional>
             <element name="xcon:to-mixer">
              <ref name="mixer-type"/>
             </element>
            </optional>
            <optional>
             <element name="xcon:from-mixer">
              <ref name="mixer-type"/>
             </element>
            </optional>
            <zeroOrMore>
             <ref name="anyElement"/>
            </zeroOrMore>
            </interleave>
           </define>
           <!--
               MEDIA STATUS TYPE
           -->
           <define name="media-status-type">
            <choice>
             <value>recvonly</value>
             <value>sendonly</value>
             <value>sendrecv</value>
             <value>inactive</value>
             <ref name="free-text-extension"/>
            </choice>
           </define>
           <!--
```

```
                SIDEBARS-BY-VAL TYPE
            -->
            <define name="sidebars-by-val-type">
             <interleave>
             <ref name="anyAttribute"/>
             <zeroOrMore>
              <element name="entry">
               <ref name="conference-type"/>
              </element>
             </zeroOrMore>
             <zeroOrMore>
              <ref name="anyElement"/>
             </zeroOrMore>
             </interleave>
            </define>
            <!--
                CONFERENCE TIME
            -->
            <define name="conferencetime-type">
             <interleave>
             <ref name="anyAttribute"/>
             <zeroOrMore>
              <element name="xcon:entry">
               <element name="xcon:base">
                <text/>
               </element>
               <optional>
                <element name="xcon:mixing-start-offset">
                  <ref name="time-type"/>
                  <attribute name="required-participant">
                   <ref name="single-role-type"/>
                  </attribute>
                 <ref name="anyAttribute"/>
                </element>
               </optional>
               <optional>
                <element name="xcon:mixing-end-offset">
                 <ref name="time-type"/>
                 <attribute name="required-participant">
                  <ref name="single-role-type"/>
                 </attribute>
                 <ref name="anyAttribute"/>
                </element>
               </optional>
               <optional>
                <element name="xcon:can-join-after-offset">
                 <ref name="time-type"/>
                </element>
```

```
              </optional>
              <optional>
               <element name="xcon:must-join-before-offset">
                <ref name="time-type"/>
               </element>
              </optional>
              <optional>
               <element name="xcon:request-user">
                <ref name="time-type"/>
               </element>
              </optional>
              <optional>
               <element name="xcon:notify-end-of-conference">
                <data type="int"/>
               </element>
              </optional>
              <optional>
               <element name="xcon:allowed-extend-mixing-end-offset">
                <data type="boolean"/>
               </element>
              </optional>
              <zeroOrMore>
               <ref name="anyElement"/>
              </zeroOrMore>
             </element>
            </zeroOrMore>
            </interleave>
           </define>
           <!--
               TIME TYPE
           -->
           <define name="time-type">
             <data type="dateTime">
               <param name="pattern">.+T.+Z.*</param>
             </data>
           </define>
           <!--
               SINGLE ROLE TYPE
           -->
           <define name="single-role-type">
            <choice>
             <value type="string">none</value>
             <value type="string">administrator</value>
             <value type="string">moderator</value>
             <value type="string">user</value>
             <value type="string">observer</value>
             <value type="string">participant</value>
             <ref name="free-text-extension"/>
```

```
 </choice>
</define>
<!--
    MIXING MODE TYPE
-->
<define name="mixing-mode-type">
 <choice>
  <value type="string">moderator-controlled</value>
  <value type="string">FCFS</value>
  <value type="string">automatic</value>
  <ref name="free-text-extension"/>
 </choice>
</define>
<!--
    CODECS TYPE
-->
<define name="codecs-type">
 <interleave>
 <attribute name="decision">
  <ref name="decision-type"/>
 </attribute>
 <ref name="anyAttribute"/>
 <zeroOrMore>
  <element name="xcon:codec">
   <ref name="codec-type"/>
  </element>
 </zeroOrMore>
 <zeroOrMore>
  <ref name="anyElement"/>
 </zeroOrMore>
 </interleave>
</define>
<!--
    CODEC TYPE
-->
<define name="codec-type">
 <interleave>
 <attribute name="name">
  <text/>
 </attribute>
 <attribute name="policy">
  <ref name="policy-type"/>
 </attribute>
 <ref name="anyAttribute"/>
 <optional>
  <element name="xcon:subtype">
   <text/>
  </element>
```

```
 </optional>
 <zeroOrMore>
  <ref name="anyElement"/>
 </zeroOrMore>
 </interleave>
</define>
<!--
    DECISION TYPE
-->
<define name="decision-type">
 <choice>
  <value type="string">automatic</value>
  <value type="string">moderator-controlled</value>
  <ref name="free-text-extension"/>
 </choice>
</define>
<!--
    POLICY TYPE
-->
<define name="policy-type">
 <choice>
  <value type="string">allowed</value>
  <value type="string">disallowed</value>
  <ref name="free-text-extension"/>
 </choice>
</define>
<!--
    CONTROL TYPE
-->
<define name="control-type">
 <interleave>
 <ref name="anyAttribute"/>
 <optional>
  <element name="xcon:mute">
   <data type="boolean"/>
  </element>
 </optional>
 <optional>
  <element name="xcon:pause-video">
   <data type="boolean"/>
  </element>
 </optional>
 <optional>
  <element name="xcon:gain">
   <ref name="gain-type"/>
  </element>
 </optional>
 <optional>
```

```
              <element name="xcon:video-layout">
               <ref name="video-layout-type"/>
              </element>
             </optional>
             <zeroOrMore>
              <ref name="anyElement"/>
             </zeroOrMore>
             </interleave>
            </define>
            <!--
                GAIN TYPE
            -->
            <define name="gain-type">
              <data type="int">
                <param name="minInclusive">-127</param>
                <param name="maxInclusive">127</param>
              </data>
            </define>
            <!--
                VIDEO LAYOUT TYPE
            -->
            <define name="video-layout-type">
               <choice>
                <value type="string">single-view</value>
                <value type="string">dual-view</value>
                <value type="string">dual-view-crop</value>
                <value type="string">dual-view-2x1</value>
                <value type="string">dual-view-2x1-crop</value>
                <value type="string">quad-view</value>
                <value type="string">multiple-3x3</value>
                <value type="string">multiple-4x4</value>
                <value type="string">multiple-5x1</value>
                <value type="string">automatic</value>
                <ref name="free-text-extension"/>
               </choice>
            </define>
            <!--
                FLOOR INFORMATION TYPE
            -->
            <define name="floor-information-type">
             <interleave>
             <ref name="anyAttribute"/>
             <optional>
              <element name="xcon:conference-ID">
               <data type="unsignedLong"/>
              </element>
             </optional>
             <optional>
```

```
              <element name="xcon:allow-floor-events">
               <data type="boolean"/>
              </element>
             </optional>
             <optional>
              <element name="xcon:floor-request-handling">
               <ref name="floor-request-type"/>
              </element>
             </optional>
             <optional>
              <element name="xcon:conference-floor-policy">
               <ref name="conference-floor-policy"/>
              </element>
             </optional>
             <zeroOrMore>
              <ref name="anyElement"/>
             </zeroOrMore>
             </interleave>
            </define>
            <!--
                FLOOR REQUEST TYPE
            -->
            <define name="floor-request-type">
             <choice>
              <value type="string">block</value>
              <value type="string">confirm</value>
              <ref name="free-text-extension"/>
             </choice>
            </define>
            <!--
                CONFERENCE FLOOR POLICY
            -->
            <define name="conference-floor-policy">
             <interleave>
             <ref name="anyAttribute"/>
             <oneOrMore>
              <element name="xcon:floor">
               <interleave>
               <attribute name="id">
                <text/>
               </attribute>
               <ref name="anyAttribute"/>
               <oneOrMore>
                <element name="xcon:media-label">
                 <data type="nonNegativeInteger"/>
                </element>
               </oneOrMore>
               <optional>
```

```
                <element name="xcon:algorithm">
                 <ref name="algorithm-type"/>
                </element>
               </optional>
               <optional>
                <element name="xcon:max-floor-users">
                 <data type="nonNegativeInteger"/>
                </element>
               </optional>
               <optional>
                <element name="xcon:moderator-id">
                 <data type="nonNegativeInteger"/>
                </element>
               </optional>
               <zeroOrMore>
                <ref name="anyElement"/>
               </zeroOrMore>
               </interleave>
              </element>
             </oneOrMore>
             </interleave>
            </define>
            <!--
                ALGORITHM POLICY
            -->
            <define name="algorithm-type">
             <choice>
              <value type="string">moderator-controlled</value>
              <value type="string">FCFS</value>
              <value type="string">random</value>
              <ref name="free-text-extension"/>
             </choice>
            </define>
            <!--
                USERS ADMISSION POLICY
            -->
            <define name="user-admission-policy-type">
             <choice>
              <value type="string">closedAuthenticated</value>
              <value type="string">openAuthenticated</value>
              <value type="string">anonymous</value>
              <ref name="free-text-extension"/>
             </choice>

            </define>
            <!--
                JOIN HANDLING TYPE
            -->
```

```
<define name="join-handling-type">
 <choice>
  <value type="string">block</value>
  <value type="string">confirm</value>
  <value type="string">allow</value>
  <value type="string">authenticate</value>
  <value type="string">directed-operator</value>
  <ref name="free-text-extension"/>
 </choice>
</define>
<!--
    DENY USERLIST
-->
<define name="deny-user-list-type">
 <interleave>
 <ref name="anyAttribute"/>
 <zeroOrMore>
  <element name="xcon:target">
   <attribute name="uri">
    <data type="anyURI"/>
   </attribute>
   <ref name="anyAttribute"/>
  </element>
 </zeroOrMore>
 <zeroOrMore>
  <ref name="anyElement"/>
 </zeroOrMore>
 </interleave>
</define>
<!--
    ALLOWED USERS LIST TYPE
-->
<define name="allowed-users-list-type">
 <interleave>
 <ref name="anyAttribute"/>
 <zeroOrMore>
  <element name="xcon:target">
   <ref name="target-type"/>
  </element>
 </zeroOrMore>
 <optional>
  <element name="xcon:persistent-list">
   <ref name="persistent-list-type"/>
  </element>
 </optional>
 <zeroOrMore>
  <ref name="anyElement"/>
 </zeroOrMore>
```

```
 </interleave>
</define>
<!--
    PERSISTENT LIST TYPE
-->
<define name="persistent-list-type">
 <interleave>
   <zeroOrMore>
    <element name="xcon:user">
     <interleave>
     <attribute name="name">
      <text/>
     </attribute>
     <attribute name="nickname">
      <text/>
     </attribute>
     <attribute name="id">
      <text/>
     </attribute>
     <ref name="anyAttribute"/>
     <zeroOrMore>
      <element name="xcon:e-mail">
       <text/>
      </element>
     </zeroOrMore>
     <zeroOrMore>
      <ref name="anyElement"/>
     </zeroOrMore>
     </interleave>
    </element>
  </zeroOrMore>
  <zeroOrMore>
   <ref name="anyElement"/>
  </zeroOrMore>
 </interleave>
</define>
<!--
    TARGET TYPE
-->
<define name="target-type">
 <attribute name="uri">
  <data type="anyURI"/>
 </attribute>
 <attribute name="method">
  <ref name="method-type"/>
 </attribute>
 <ref name="anyAttribute"/>
</define>
```

```
<!--
    METHOD TYPE
-->
<define name="method-type">
 <choice>
  <value type="string">dial-in</value>
  <value type="string">dial-out</value>
  <value type="string">refer</value>
  <ref name="free-text-extension"/>
 </choice>
</define>
<!--
    ANONYMITY TYPE
-->
<define name="provide-anonymity-type">
   <choice>
    <value>private</value>
    <value>semi-private</value>
    <value>hidden</value>
    <ref name="free-text-extension"/>
   </choice>
</define>
<!--
    MIXER TYPE
-->
<define name="mixer-type">
 <interleave>
 <attribute name="name">
  <ref name="mixer-name-type"/>
 </attribute>
 <ref name="anyAttribute"/>
 <zeroOrMore>
  <element name="xcon:floor">
   <attribute name="id">
    <text/>
   </attribute>
   <ref name="anyAttribute"/>
   <data type="boolean"/>
  </element>
 </zeroOrMore>
 <zeroOrMore>
  <element name="xcon:controls">
   <ref name="control-type"/>
  </element>
 </zeroOrMore>
 <zeroOrMore>
  <ref name="anyElement"/>
 </zeroOrMore>
```

```
 </interleave>
</define>
<!--
    MIXER NAME TYPE
-->
<define name="mixer-name-type">
  <choice>
   <value>VideoIn</value>
   <value>VideoOut</value>
   <value>AudioOut</value>
   <value>AudioIn</value>
   <ref name="free-text-extension"/>
  </choice>
</define>
<!--
    FREE TEXT EXTENSION
-->
<define name="free-text-extension">
 <text/>
</define>

<!--
 *********************************
 EXTENSIBILITY OF THE SCHEMA
 *********************************
-->
<!--
    EXTENSIBILITY ELEMENTS
-->
<define name="anyElement">
 <element>
  <anyName>
   <except>
    <name>conference-description</name>
    <name>host-info</name>
    <name>conference-state</name>
    <name>users</name>
    <name>sidebars-by-ref</name>
    <name>sidebars-by-val</name>
    <name>display-text</name>
    <name>subject</name>
    <name>free-text</name>
    <name>keywords</name>
    <name>conf-uris</name>
    <name>service-uris</name>
    <name>maximum-user-count</name>
    <name>available-media</name>
    <name>web-page</name>
```

```
<name>uris</name>
<name>uri</name>
<name>user-count</name>
<name>active</name>
<name>locked</name>
<name>entry</name>
<name>type</name>
<name>status</name>
<name>purpose</name>
<name>modified</name>
<name>user</name>
<name>associated-aors</name>
<name>roles</name>
<name>languages</name>
<name>cascaded-focus</name>
<name>endpoint</name>
<name>referred</name>
<name>joining-method</name>
<name>joining-info</name>
<name>disconnection-method</name>
<name>disconnection-info</name>
<name>media</name>
<name>call-info</name>
<name>when</name>
<name>reason</name>
<name>by</name>
<name>sip</name>
<name>call-id</name>
<name>from-tag</name>
<name>to-tag</name>
<name>label</name>
<name>src-id</name>
<name>xcon:conference-password</name>
<name>xcon:mixing-mode</name>
<name>xcon:codecs</name>
<name>xcon:controls</name>
<name>xcon:language</name>
<name>xcon:allow-sidebars</name>
<name>xcon:cloning-parent</name>
<name>xcon:sidebar-parent</name>
<name>xcon:allow-conference-event-subscription</name>
<name>xcon:to-mixer</name>
<name>xcon:provide-anonymity</name>
<name>xcon:allow-refer-users-dynamically</name>
<name>xcon:allow-invite-users-dynamically</name>
<name>xcon:allow-remove-users-dynamically</name>
<name>xcon:from-mixer</name>
<name>xcon:join-handling</name>
```

```
            <name>xcon:user-admission-policy</name>
            <name>xcon:allowed-users-list</name>
            <name>xcon:deny-users-list</name>
            <name>xcon:floor-information</name>
            <name>xcon:conference-time</name>
            <name>xcon:provide-anonymity</name>
            <name>xcon:floor</name>
            <name>xcon:entry</name>
            <name>xcon:mixing-start-offset</name>
            <name>xcon:mixing-end-offset</name>
            <name>xcon:can-join-after-offset</name>
            <name>xcon:must-join-before-offset</name>
            <name>xcon:request-user</name>
            <name>xcon:notify-end-of-conference</name>
            <name>xcon:allowed-extend-mixing-end-offset</name>
            <name>xcon:codec</name>
            <name>xcon:subtype</name>
            <name>xcon:mute</name>
            <name>xcon:pause-video</name>
            <name>xcon:gain</name>
            <name>xcon:video-layout</name>
            <name>xcon:conference-ID</name>
            <name>xcon:allow-floor-events</name>
            <name>xcon:floor-request-handling</name>
            <name>xcon:conference-floor-policy</name>
            <name>xcon:media-label</name>
            <name>xcon:algorithm</name>
            <name>xcon:max-floor-users</name>
            <name>xcon:moderator-id</name>
            <name>xcon:target</name>
            <name>xcon:persistent-list</name>
            <name>xcon:e-mail</name>
            <name>xcon:user</name>
           </except>
          </anyName>
          <ref name="anyExtension"/>
         </element>
        </define>

        <define name="anyExtension">
         <zeroOrMore>
          <choice>
           <attribute>
            <anyName/>
           </attribute>
           <ref name="any"/>
          </choice>
         </zeroOrMore>
```

```
          </define>

          <define name="any">
           <element>
            <anyName/>
            <zeroOrMore>
             <choice>
              <attribute>
               <anyName/>
              </attribute>
              <text/>
              <ref name="any"/>
             </choice>
            </zeroOrMore>
          </element>
          </define>

          <!--
              EXTENSIBILITY ATTRIBUTES
          -->

          <define name="anyAttribute">
           <zeroOrMore>
            <attribute>
             <anyName>
              <except>
               <name ns="http://www.w3.org/XML/1998/namespace">lang
               </name>
               <name ns="">entity</name>
               <name ns="">required-participant</name>
               <name ns="">label</name>
               <name ns="">decision</name>
               <name ns="">name</name>
               <name ns="">policy</name>
               <name ns="">uri</name>
               <name ns="">method</name>
               <name ns="">id</name>
               <name ns="">nickname</name>
              </except>
             </anyName>
            </attribute>
           </zeroOrMore>
          </define>
         </grammar>
```

Appendix B. Non-Normative W3C XML Schema

The non-normative W3C XML schema defines extension elements in the "urn:ietf:params:xml:ns:xcon-conference-info" namespace. Note that <xs:any> extensions in this schema are stricter than in the normative RELAX NG schema [RELAX], and the normative RELAX NG schema [RELAX] allows unordered child elements unlike this schema (and the [RFC4575] schema). Also note that this schema allows also otherwise valid extension elements to appear in the non-allowed positions. Likewise the cardinalities of these extension elements can not be constrained with this schema.

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

    <xs:import namespace="urn:ietf:params:xml:ns:conference-info"
      schemaLocation="rfc4575.xsd"/>

    <xs:import namespace="http://www.w3.org/XML/1998/namespace"
      schemaLocation="http://www.w3.org/2001/03/xml.xsd"/>

    <xs:element name="mixing-mode" type="mixing-mode-type"/>
    <xs:element name="codecs" type="codecs-type"/>
    <xs:element name="conference-password" type="xs:string"/>
    <xs:element name="controls" type="controls-type"/>
    <xs:element name="language" type="xs:language"/>
    <xs:element name="allow-sidebars" type="xs:boolean"/>
    <xs:element name="cloning-parent" type="xs:anyURI"/>
    <xs:element name="sidebar-parent" type="xs:anyURI"/>
    <xs:element name="conference-time" type="conference-time-type"/>
    <xs:element name="allow-conference-event-subscription"
      type="xs:boolean"/>
    <xs:element name="to-mixer" type="mixer-type"/>
    <xs:element name="provide-anonymity"
      type="provide-anonymity-type"/>
    <xs:element name="allow-refer-users-dynamically"
      type="xs:boolean"/>
    <xs:element name="allow-invite-users-dynamically"
      type="xs:boolean"/>
    <xs:element name="allow-remove-users-dynamically"
      type="xs:boolean"/>
    <xs:element name="from-mixer" type="mixer-type"/>
    <xs:element name="join-handling" type="join-handling-type"/>
```

```
    <xs:element name="user-admission-policy"
      type="user-admission-policy-type"/>
    <xs:element name="allowed-users-list"
      type="allowed-users-list-type"/>
    <xs:element name="deny-users-list" type="deny-users-list-type"/>
    <xs:element name="floor-information" type="floor-information-type"/>

    <!-- CONFERENCE TIME -->

    <xs:complexType name="conference-time-type">
      <xs:sequence>
        <xs:element name="entry"
          minOccurs="0" maxOccurs="unbounded">
          <xs:complexType>
            <xs:sequence>
              <xs:element name="base"
                type="xs:string" minOccurs="1"/>
              <xs:element name="mixing-start-offset" minOccurs="0">
                <xs:complexType>
                  <xs:simpleContent>
                    <xs:extension base="time-type">
                     <xs:attribute name="required-participant"
                       type="role-type" use="required"/>
                      <xs:anyAttribute namespace="##any"
                        processContents="lax"/>
                    </xs:extension>
                  </xs:simpleContent>
                </xs:complexType>
              </xs:element>
              <xs:element name="mixing-end-offset" minOccurs="0">
                <xs:complexType>
                  <xs:simpleContent>
                    <xs:extension base="time-type">
                      <xs:attribute name="required-participant"
                        type="role-type" use="required"/>
                      <xs:anyAttribute namespace="##any"
                        processContents="lax"/>
                    </xs:extension>
                  </xs:simpleContent>
                </xs:complexType>
              </xs:element>
              <xs:element name="can-join-after-offset" type="time-type"
                minOccurs="0"/>
              <xs:element name="must-join-before-offset"
                type="time-type" minOccurs="0"/>
              <xs:element name="request-user" type="time-type"
                minOccurs="0"/>
              <xs:element name="notify-end-of-conference"
```

```
                type="xs:integer" minOccurs="0"/>
              <xs:element name="allowed-extend-mixing-end-offset"
                type="xs:boolean" minOccurs="0"/>
              <xs:any namespace="##other" processContents="lax"
                minOccurs="0" maxOccurs="unbounded"/>
            </xs:sequence>
          </xs:complexType>
        </xs:element>
        <xs:any namespace="##other" processContents="lax"
          minOccurs="0" maxOccurs="unbounded"/>
      </xs:sequence>
      <xs:anyAttribute namespace="##any" processContents="lax"/>
    </xs:complexType>

    <!-- TIME TYPE -->

     <xs:simpleType name="time-type">
      <xs:restriction base="xs:dateTime">
        <xs:pattern value=".+T.+Z.*"/>
       </xs:restriction>
     </xs:simpleType>

    <!-- ROLE-TYPE -->

    <xs:simpleType name="role-type">
     <xs:restriction base="xs:string">
      <xs:pattern value="none"/>
      <xs:pattern value="administrator"/>
      <xs:pattern value="moderator"/>
      <xs:pattern value="user"/>
      <xs:pattern value="observer"/>
      <xs:pattern value="participant"/>
      <xs:pattern value=".+"/>
     </xs:restriction>
    </xs:simpleType>

    <!-- MIXING MODE TYPE -->

    <xs:simpleType name="mixing-mode-type">
      <xs:restriction base="xs:string">
        <xs:pattern value="moderator-controlled"/>
        <xs:pattern value="FCFS"/>
        <xs:pattern value="automatic"/>
        <xs:pattern value=".+"/>
      </xs:restriction>
    </xs:simpleType>

    <!-- CODECS TYPE -->
```

```
    <xs:complexType name="codecs-type">
      <xs:sequence>
        <xs:element name="codec" type="codec-type"/>
        <xs:any namespace="##other" processContents="lax"
          minOccurs="0" maxOccurs="unbounded"/>
      </xs:sequence>
      <xs:attribute name="decision"
        type="decision-type" use="required"/>
      <xs:anyAttribute namespace="##any" processContents="lax"/>
    </xs:complexType>

    <!-- CODEC TYPE -->

    <xs:complexType name="codec-type">
      <xs:sequence>
        <xs:element name="subtype" type="xs:string" minOccurs="0"/>
        <xs:any namespace="##other" processContents="lax"
          minOccurs="0" maxOccurs="unbounded"/>
      </xs:sequence>
      <xs:attribute name="name"
        type="xs:string" use="required"/>
      <xs:attribute name="policy"
        type="policy-type" use="required"/>
      <xs:anyAttribute namespace="##any" processContents="lax"/>
    </xs:complexType>

    <!-- DECISION TYPE -->

    <xs:simpleType name="decision-type">
      <xs:restriction base="xs:string">
        <xs:pattern value="automatic"/>
        <xs:pattern value="moderator-controlled"/>
        <xs:pattern value=".+"/>
      </xs:restriction>
    </xs:simpleType>

    <!-- POLICY TYPE -->

     <xs:simpleType name="policy-type">
      <xs:restriction base="xs:string">
        <xs:pattern value="allowed"/>
        <xs:pattern value="disallowed"/>
        <xs:pattern value=".+"/>
      </xs:restriction>
     </xs:simpleType>

    <!-- CONTROL TYPE -->
```

```
    <xs:complexType name="controls-type">
      <xs:sequence>
        <xs:element name="mute"
          type="xs:boolean" minOccurs="0"/>
        <xs:element name="pause-video"
          type="xs:boolean" minOccurs="0"/>
        <xs:element name="gain"
          type="gain-type" minOccurs="0"/>
        <xs:element name="video-layout"
          type="video-layout-type" default="single-view" minOccurs="0"/>
        <xs:any namespace="##other" processContents="lax"
          minOccurs="0" maxOccurs="unbounded"/>
      </xs:sequence>
      <xs:anyAttribute namespace="##any" processContents="lax"/>
    </xs:complexType>

    <!-- GAIN TYPE -->

    <xs:simpleType name="gain-type">
      <xs:restriction base="xs:integer">
        <xs:minInclusive value="-127"/>
        <xs:maxInclusive value="127"/>
      </xs:restriction>
    </xs:simpleType>

    <!-- VIDEO LAYOUT TYPE -->

    <xs:simpleType name="video-layout-type">
      <xs:restriction base="xs:string">
        <xs:pattern value="single-view"/>
        <xs:pattern value="dual-view"/>
        <xs:pattern value="dual-view-crop"/>
        <xs:pattern value="dual-view-2x1"/>
        <xs:pattern value="dual-view-2x1-crop"/>
        <xs:pattern value="quad-view"/>
        <xs:pattern value="multiple-3x3"/>
        <xs:pattern value="multiple-4x4"/>
        <xs:pattern value="multiple-5x1"/>
        <xs:pattern value="automatic"/>
        <xs:pattern value=".+"/>
      </xs:restriction>
    </xs:simpleType>

    <!-- FLOOR INFORMATION TYPE -->

    <xs:complexType name="floor-information-type">
      <xs:sequence>
        <xs:element name="conference-ID"
```

```
          type="xs:unsignedLong" minOccurs="0"/>
        <xs:element name="allow-floor-events"
          type="xs:boolean" default="false" minOccurs="0"/>
        <xs:element name="floor-request-handling"
          type="floor-request-handling-type" minOccurs="0"/>
        <xs:element name="conference-floor-policy"
          type="conference-floor-policy" minOccurs="0"/>
        <xs:any namespace="##other" processContents="lax"
          minOccurs="0" maxOccurs="unbounded"/>
      </xs:sequence>
      <xs:anyAttribute namespace="##any" processContents="lax"/>
    </xs:complexType>

    <!-- FLOOR REQUEST TYPE -->

    <xs:simpleType name="floor-request-handling-type">
      <xs:restriction base="xs:string">
        <xs:pattern value="block"/>
        <xs:pattern value="confirm"/>
        <xs:pattern value=".+"/>
      </xs:restriction>
    </xs:simpleType>

    <!-- CONFERENCE FLOOR POLICY -->

    <xs:complexType name="conference-floor-policy">
      <xs:sequence>
        <xs:element name="floor" maxOccurs="unbounded">
          <xs:complexType>
            <xs:sequence>
              <xs:element name="media-label"
                type="xs:string" minOccurs="1" maxOccurs="unbounded"/>
              <xs:element name="algorithm"
                type="algorithm-type" minOccurs="0"/>
              <xs:element name="max-floor-users"
                type="xs:nonNegativeInteger" minOccurs="0"/>
              <xs:element name="moderator-id"
                type="xs:nonNegativeInteger" minOccurs="0"/>
                <xs:any namespace="##other" processContents="lax"
                  minOccurs="0" maxOccurs="unbounded"/>
            </xs:sequence>
            <xs:attribute name="id" type="xs:string" use="required"/>
            <xs:anyAttribute namespace="##any" processContents="lax"/>
          </xs:complexType>
        </xs:element>
      </xs:sequence>
      <xs:anyAttribute namespace="##any" processContents="lax"/>
    </xs:complexType>
```

```
    <!-- ALGORITHM TYPE -->

    <xs:simpleType name="algorithm-type">
      <xs:restriction base="xs:string">
        <xs:pattern value="moderator-controlled"/>
        <xs:pattern value="FCFS"/>
        <xs:pattern value="random"/>
        <xs:pattern value=".+"/>
      </xs:restriction>
    </xs:simpleType>

    <!-- USER ADMISSION POLICY TYPE -->

    <xs:simpleType name="user-admission-policy-type">
      <xs:restriction base="xs:string">
        <xs:pattern value="closedAuthenticated"/>
        <xs:pattern value="openAuthenticated"/>
        <xs:pattern value="anonymous"/>
        <xs:pattern value=".+"/>
      </xs:restriction>
    </xs:simpleType>

    <!-- JOIN HANDLING TYPE -->

    <xs:simpleType name="join-handling-type">
      <xs:restriction base="xs:string">
        <xs:pattern value="block"/>
        <xs:pattern value="confirm"/>
        <xs:pattern value="allow"/>
        <xs:pattern value="authenticate"/>
        <xs:pattern value="directed-operator"/>
        <xs:pattern value=".+"/>
       </xs:restriction>
    </xs:simpleType>

   <!-- DENY USER LIST TYPE -->

    <xs:complexType name="deny-users-list-type">
      <xs:sequence>
        <xs:element name="target" minOccurs="0" maxOccurs="unbounded">
          <xs:complexType>
            <xs:attribute name="uri" use="required" type="xs:anyURI"/>
            <xs:anyAttribute namespace="##any" processContents="lax"/>
          </xs:complexType>
        </xs:element>
        <xs:any namespace="##other" processContents="lax"
          minOccurs="0" maxOccurs="unbounded"/>
      </xs:sequence>
```

```
      <xs:anyAttribute namespace="##any" processContents="lax"/>
    </xs:complexType>

     <!-- ALLOWED USERS LIST TYPE -->

    <xs:complexType name="allowed-users-list-type">
      <xs:sequence>
        <xs:element name="target" type="target-type"
          minOccurs="0" maxOccurs="unbounded">
        </xs:element>
        <xs:element name="persistent-list"
          type="persistent-list-type"
          minOccurs="0"/>
        <xs:any namespace="##other" processContents="lax"
          minOccurs="0" maxOccurs="unbounded"/>
      </xs:sequence>
      <xs:anyAttribute namespace="##any" processContents="lax"/>
    </xs:complexType>

    <!-- PERSISTENT LIST TYPE -->

    <xs:complexType name="persistent-list-type">
      <xs:sequence>
        <xs:element name="user" minOccurs="0" maxOccurs="unbounded">
          <xs:complexType>
            <xs:sequence>
              <xs:element name="email" type="xs:string"
                minOccurs="0" maxOccurs="unbounded"/>
              <xs:any namespace="##other" processContents="lax"
                minOccurs="0" maxOccurs="unbounded"/>
            </xs:sequence>
            <xs:attribute name="name"
              use="required" type="xs:anyURI"/>
            <xs:attribute name="nickname"
              use="required" type="xs:string"/>
            <xs:attribute name="id"
              use="required" type="xs:string"/>
            <xs:anyAttribute namespace="##any" processContents="lax"/>
          </xs:complexType>
        </xs:element>
        <xs:any namespace="##other" processContents="lax"
          minOccurs="0" maxOccurs="unbounded"/>
      </xs:sequence>
      <xs:anyAttribute namespace="##any" processContents="lax"/>
    </xs:complexType>

    <!-- TARGET TYPE -->
```

```
    <xs:complexType name="target-type">
      <xs:attribute name="uri" use="required"
        type="xs:anyURI"/>
      <xs:attribute name="method" use="required"
        type="method-type"/>
      <xs:anyAttribute namespace="##any" processContents="lax"/>
    </xs:complexType>

    <!-- METHOD TYPE -->

    <xs:simpleType name="method-type">
      <xs:restriction base="xs:string">
        <xs:pattern value="dial-in"/>
        <xs:pattern value="dial-out"/>
        <xs:pattern value="refer"/>
        <xs:pattern value=".+"/>
      </xs:restriction>
    </xs:simpleType>

    <!-- ANONYMITY TYPE -->

    <xs:simpleType name="provide-anonymity-type">
      <xs:restriction base="xs:string">
        <xs:pattern value="private"/>
        <xs:pattern value="semi-private"/>
        <xs:pattern value="hidden"/>
        <xs:pattern value=".+"/>
      </xs:restriction>
    </xs:simpleType>

    <!-- MIXER TYPE -->

    <xs:complexType name="mixer-type">
      <xs:sequence>
        <xs:element name="floor">
          <xs:complexType>
            <xs:simpleContent>
              <xs:extension base="xs:boolean">
                <xs:attribute name="id" type="xs:string"
                  use="required"/>
                <xs:anyAttribute namespace="##any"
                  processContents="lax"/>
              </xs:extension>
            </xs:simpleContent>
          </xs:complexType>
        </xs:element>
        <xs:element name="controls" type="controls-type"
          minOccurs="0" maxOccurs="unbounded"/>
```

```
        <xs:any namespace="##other" processContents="lax"
          minOccurs="0" maxOccurs="unbounded"/>
      </xs:sequence>
      <xs:attribute name="name" type="mixer-name-type"
        use="required"/>
      <xs:anyAttribute namespace="##any" processContents="lax"/>
    </xs:complexType>

    <!-- MIXER NAME TYPE -->

    <xs:simpleType name="mixer-name-type">
      <xs:restriction base="xs:string">
        <xs:pattern value="VideoIn"/>
        <xs:pattern value="VideoOut"/>
        <xs:pattern value="AudioOut"/>
        <xs:pattern value="AudioIn"/>
        <xs:pattern value=".+"/>
      </xs:restriction>
    </xs:simpleType>

  </xs:schema>
```

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