CONFERENCING FRAMEWORKS
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Overview

- Conferencing is a communication session with multiple participants, multi-party communication.
- There are two framework definitions for how a conferencing can occur.
- These frameworks describes the architecture, terminology and protocol components needed for conferencing.
- These frameworks are:
  - SIPPING Conferencing Framework.
  - XCON Conferencing Framework.

Models of Multi-party Communications

![Diagram of Models of Multi-party Communications]

- **Tightly coupled conference**
  - Central endpoint
  - Participant 1
  - Participant 3
  - Participant 4

- **Loosely coupled model**
  - Participant 1
  - Participant 2
  - Participant 3
  - Participant 4
  - Multicast

- **Fully distributed multiparty**
  - Participant 1
  - Participant 2
  - Participant 3
  - Participant 4
The SIPPING Conferencing Framework

Focus

- The central component in a SIP conference
- Focus is a SIP User Agent that is address by a unique URI (i.e. sip: discussion-on-cats@example.com)
- Maintains a SIP signalling relationship with each participant in the conference
- Implements conference policies and enforce those policies
- Manipulates the media session through the use of mixers
Conference Policy Server

- Logical function which can store and manipulate the conference policy
- Participants communicate with the conference policy server using non-SIP-specific mechanism
- Conference-aware participant: can communicate with the conference policy server. It has access to advanced functionality through additional protocol interfaces.
- Conference-unaware participant:

Conference Notification Service

- Logical function provided by the focus
- Notify subscribers about changes in the conference state (i.e. participant leaves the conference, participant join the conference...
Conference Policy

- The complete set of rules governing a particular conference
- It can be a simple access list that defines the set of allowed participants in a conference
- It can also be a incredible complex set of rules (i.e. specifying time-of-day based rules)

Example: Overview of Common conferencing operations

**Adding Participant (third party)**

- Create Policy for Bob (2)
- Approve (4)
- Refer (1)
- Invite (3)
- New participant (5)

Moderator | Bob | Alice
Conference Notification Service

Example

```xml
<?xml version="1.0" encoding="UTF-8"?>
<conference-info
  xmlns="urn:ietf:params:xml:ns:conference-info"
  entity="sips:conf233@example.com" state="full" version="1">
  <conference-description>
    <subject>Agenda: This month's goals</subject>
    <service-uris>
      <entry>
        <uri>http://sharepoint/salesgroup</uri>
        <purpose>web-page</purpose>
      </entry>
    </service-uris>
    <conference-description>
      <user-count>33</user-count>
    </conference-description>
    <conference-state>
      <user-count>33</user-count>
    </conference-state>
    <users>
      <user entity="sip:bob@example.com" state="full">
        <display-text>Bob Hoskins</display-text>
        <endpoint entity="sip:bob@pc33.example.com">
          <media id="1">
            <display-text>main audio</display-text>
            <type>audio</type>
            <label>34567</label>
            <src-id>432424</src-id>
            <status>sendrecv</status>
          </media>
        </endpoint>
      </user>
    </users>
  </conference-info>
</conference-info>
```

Physical Instantiation of the SIPPING Conference Framework
The XCON Conferencing Framework

Conference Object

- Logical representation of a Conference Instance at a certain stage that is addressed by a unique URI
- A conference instance represents the internal implementation of a conference
- It is divided in two components:
  - Common Conference Information: contain the core information that is used in any conference
  - Conference Template: represents the variable information of the conference object
- Conference Policy controls the right and permission of the operations that are performed in a Conference Object
Call Control Signalling

- Protocol uses between a participant and a Focus (i.e. SIP, h.323, Jabber, HTML, PSTN signalling, …)
- Participants interface with the focus using a call control signalling

Conference Notification Service

- Provides updates about the Conference Instance state
- It can filter the notification information that is allowed to be sent to that user
Conference Control Protocol

- Control the state of a Conference Object
- XCON working group defines several protocols:
  - Centralized Conferencing Control Protocol (CCCP) is a semantic-oriented protocol
  - Conference State Change Protocol (CSCP) is a client server protocol used to change the state of a conference object. CSCP is an extension of the BFCP.
  - CCMP/COMP is based on the Simple Object Access Protocol (SOAP) and re-uses SOAP libraries, servers and other infrastructure.

Centralized Conferencing Control Protocol (CCCP)

- CCCP is a transaction client-server protocol. This protocol is not implemented yet
- Types of operations: Request and response
- Some primitives (GetTemplate, GetActiveConference...)

Example (Add user BOB and DIAL OUT to its PC4 with main audio only):

```xml
<conference-request request-id="8797">
  <content entity="sips:conf233@example.com">
    <user entity="sip:bob@example.com">
      <operator><code>add</code></operator>
      <display-text>Bob Hoskins</display-text>
      <endpoint entity="sip:bob@pc4.example.com">
        <display-text>Bob’s Laptop</display-text>
        <joining-method>dialed-out</joining-method>
        <media entity="1">
          <display-text>main audio</display-text>
          <proto>audio</proto>
        </media>
      </endpoint>
    </user>
  </content>
</conference-request>
```
SOAP

- SOAP protocol intended to exchanging structure information in a distributed environment.
- It uses XML technologies to define an extensible messaging framework.

Example (SOAP message containing a SOAP header block and a SOAP body):

```
<env:Envelope xmlns:env="http://www.w3.org/2003/05/soap-envelope">
  <env:Header>
    <n:alertcontrol xmlns:n="http://example.org/alertcontrol"> 
      <n:priority>1</n:priority>
      <n:expires>2001-06-22T14:00:00-05:00</n:expires>
    </n:alertcontrol>
  </env:Header>
  <env:Body>
    <m:alert xmlns:m="http://example.org/alert"> 
      <m:msg>Pick up Mary at school at 2pm</m:msg>
    </m:alert>
  </env:Body>
</env:Envelope>
```

Conference State Change Protocol (CSCP)

- Extends the Binary Floor Control Protocol (BFCP) and add new primitives (get, set, add, and delete field) and new attributes (ELEMENT-ID, NAME, VALUE).
- Example of a format of an Adding Element primitives:

```
0  1  2  3  4  5  6  7  8  9  0  1  2  3  4  5  6  7  8  9  0  1
0  0 1 0 0 1 1 0 0 0 1 1 0 0 0 1 1 0 0 0 1
  ID  RESERVED  COMMON HEADER  ELEMENT-ID  NAME
```

- Example of a format of an ELEMENT-ID attribute:

```
0  1  2  3  4  5  6  7  8  9  0  1  2  3  4  5  6  7  8  9  0  1
0  0 1 0 0 1 1 0 0 0 1 1 0 0 0 1 1 0 0 0 1
  ID  RESERVED  COMMON HEADER  ELEMENT-ID  NAME
```
Floor Control

- Floor is a set of resources associated with a Conference Instance.
- Floor Chair is a client who is authorized to manage access to one floor (grants, denies, revokes a floor). It does not have to be a participant.
- It is not a mandatory mechanism for a conferencing system.

Example: Conference Scenario Realization

**Media manipulation**
Relationship Between SIPPING and XCON Framework

- XCON Framework is compatible with the SIPPING Framework
- SIPPING Framework illustrates how SIP can be used as a signalling means
- SIPPING Framework does not define new conference control protocols to be used by the conferencing system
- XCON Framework achieve interoperability between the XCON entities from different vendors