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**Session Initiation Protocol (SIP) Recording Metadata
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Abstract

Session recording is a critical requirement in many communications environments such as call centers and financial trading. In some of these environments, all calls must be recorded for regulatory, compliance, and consumer protection reasons. Recording of a session is typically performed by sending a copy of a media stream to a recording device. This document describes the metadata model as viewed by Session Recording Server(SRS) and the Recording metadata format.

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Table of Contents

1.	Introduction	3
2.	Terminology	3
3.	Definitions	3
4.	Metadata Model	4
5.	Recording metadata Format	6
5.1.	XML data format	6
5.1.1.	Namespace	7
5.1.2.	recording	7
6.	Recording Metadata classes	7
6.1.	Recording Session	7
6.1.1.	Attributes	8
6.1.2.	Linkages	8
6.2.	Communication Session Group	8
6.2.1.	Attributes	9
6.2.2.	Linkages	9
6.3.	Communication Session	10
6.3.1.	Attributes	10
6.3.2.	Linkages	11
6.4.	CSRSAssociation	12
6.4.1.	Attributes	13
6.4.2.	Linkages	13
6.5.	Participant	13
6.5.1.	Attributes	14
6.5.2.	Linkages	14
6.6.	ParticipantCSAssociation	15
6.6.1.	Attributes	15
6.6.2.	Linkages	16
6.7.	Media Stream	16
6.7.1.	Attributes	17
6.7.2.	Linkages	17
6.8.	ParticipantStream Association	17
6.8.1.	Attributes	18
6.8.2.	Linkages	19
6.9.	associate-time/disassociate-time	19
6.10.	Unique ID format	19
6.11.	Metadata version Indicator	19
7.	Recording metadata snapshot Request format	20
8.	SIP Recording Metadata Example	20
8.1.	Complete SIP Recording Metadata Example	20

8.2.	Partial Update of Recording metadata XML body	22
9.	XML Schema definition for Recording metadata	23
10.	Security Considerations	27
11.	IANA Considerations	28
11.1.	SIP recording metadata Schema Registration	28
12.	Acknowledgement	28
13.	References	28
13.1.	Normative References	28
13.2.	Informative References	30
	Authors' Addresses	30

[1.](#) Introduction

Session recording is a critical requirement in many communications environments such as call centers and financial trading. In some of these environments, all calls must be recorded for regulatory, compliance, and consumer protection reasons. Recording of a session is typically performed by sending a copy of a media stream to a recording device. This document focuses on the Recording metadata which describes the communication session. The document describes a metadata model as viewed by Session Recording Server(SRS) and the Recording metadata format, the requirements for which are described in [[RFC6341](#)] and the architecture for which is described in [[RFC7245](#)].

[2.](#) Terminology

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [[RFC2119](#)]. This document only uses these key words when referencing normative statements in existing RFCs."

[3.](#) Definitions

Metadata Model: An abstract representation of metadata using a Unified Modelling Language(UML) class diagram.

Metadata classes: Each block in the model represents a class. A class is a construct that is used as a blueprint to create instances(called objects) of itself. The description of each class also has representation of its attributes in a second compartment below the class name.

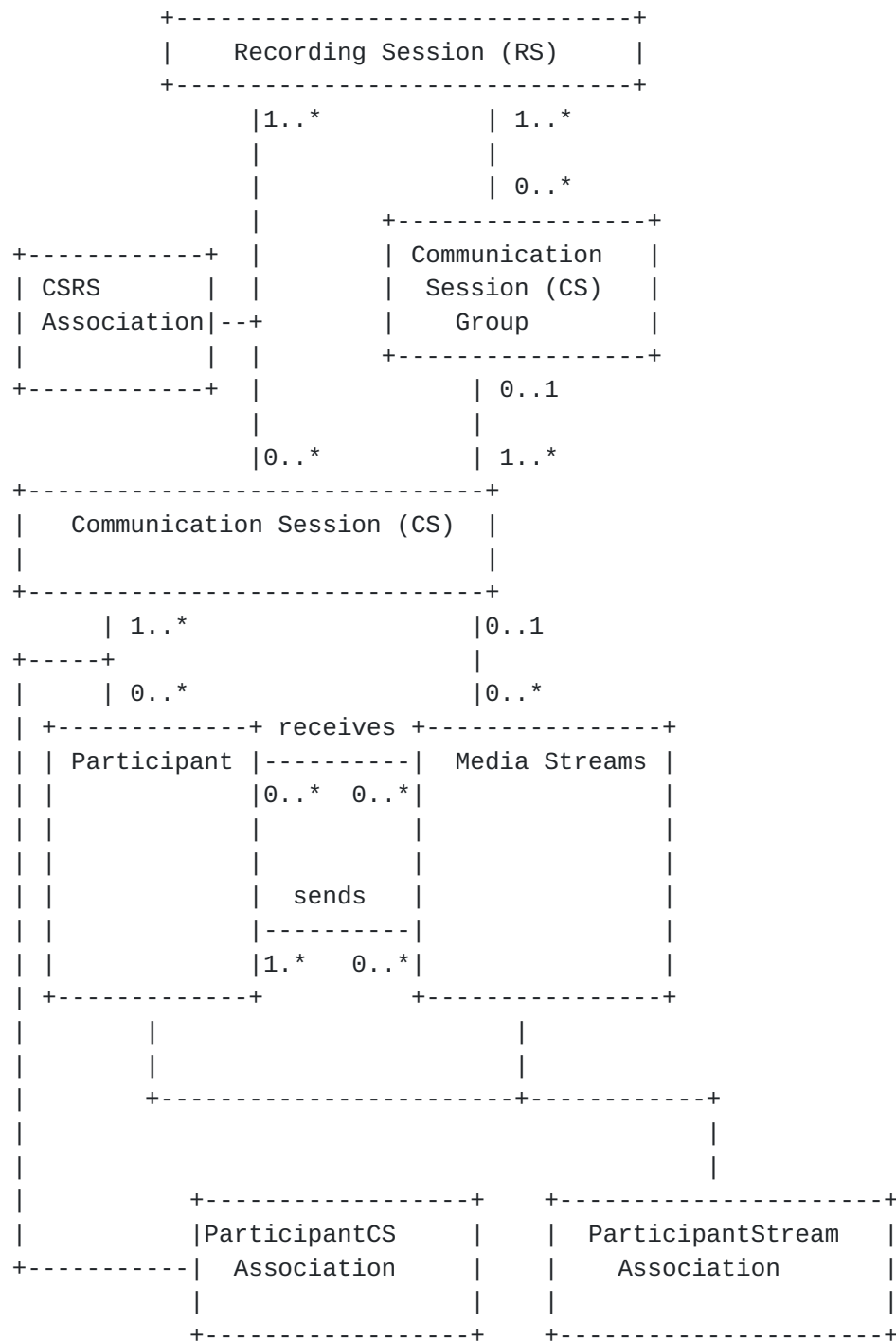
Attributes: Attributes represent the elements listed in each of the classes. The attributes of a class are listed in the second compartment below the class name. Each instance of class conveys values for these attributes which adds to the recording's metadata.

Linkages: Linkages represent the relationship between the classes in the model. Each represents a logical connection between classes(or objects) in class diagrams(or object diagrams). The linkages used in the metadata model of this document are associations.

This document also refers to the terminology defined in [[RFC6341](#)].

4. Metadata Model

Metadata is the information that describes recorded media and the Communication Session(CS) to which they relate. The diagram below shows a model for metadata as viewed by a SRS.



The metadata model is a class diagram in Unified Modelling Language(UML). The model describes the structure of metadata in general by showing the classes, their attributes, and the relationships among the classes. Each block in the model above represents a class. The linkages between the classes represent the

relationships which can be associations or composition. The metadata is conveyed from SRC to SRS.

The model allows the capture of a snapshot of a recording's metadata at a given instant in time. Metadata changes to reflect changes in what is being recorded. For example, if a participant joins a conference, then the SRC sends the SRS a snapshot of metadata having that participant information (with attributes like name/AoR pair and associate-time.)

Some of the metadata is not required to be conveyed explicitly from the SRC to the SRS, if it can be obtained contextually by the SRS(e.g., from SIP or SDP signalling).

5. Recording metadata Format

This section gives an overview of the Recording metadata format. Some data from the metadata model is assumed to be made available to the SRS through Session Description Protocol (SDP)[[RFC4566](#)], and therefore this data is not represented in the XML document format specified in this document. SDP attributes describe different media formats like audio, video. The other metadata attributes, such as participant details, are represented in a new Recording specific XML document of type 'application/rs-metadata+xml'. The SDP label attribute [[RFC4574](#)] provides an identifier by which a metadata XML document can refer to a specific media description in the SDP sent from the SRC to the SRS.

The XML document format can be used to represent either the complete metadata or a partial update to the metadata. The latter includes only elements that have changed compared to the previously reported metadata.

5.1. XML data format

Every recording metadata XML document MUST contain a <recording> element. The <recording> element acts as a container for all other elements in this XML document.

A recording object is an XML document. It MUST have the XML declaration and it SHOULD contain an encoding declaration in the XML declaration, e.g., "<?xml version='1.0' encoding='UTF-8'?>". If the charset parameter of the MIME content type declaration is present and it is different from the encoding declaration, the charset parameter takes precedence.

Every application conforming to this specification MUST accept the UTF-8 character encoding to ensure the minimal interoperability.

Syntax and semantic errors in an XML document should be reported to the originator using application specific mechanisms.

5.1.1. Namespace

The namespace URI for elements defined by this specification is a Uniform Resource Namespace (URN) [[RFC2141](#)], using the namespace identifier 'ietf' defined by [[RFC2648](#)] and extended by [[RFC3688](#)].

The URN is: urn:ietf:params:xml:ns:recording:1

5.1.2. recording

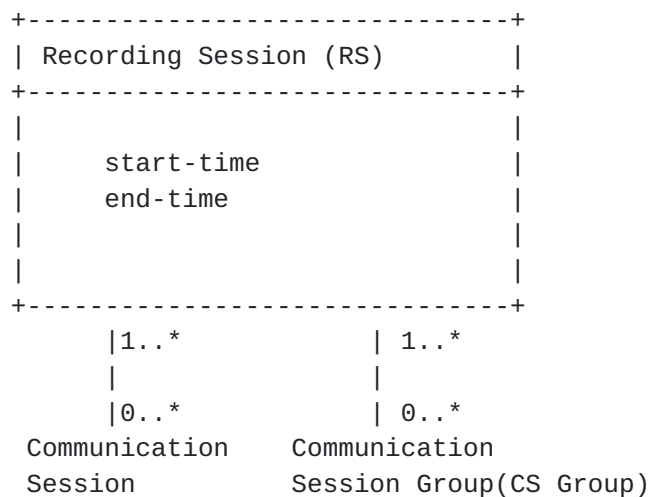
The <recording> element MUST contain an xmlns namespace attribute with value as urn:ietf:params:xml:ns:recording:1. One recording element MUST be present in every recording metadata XML document.

A recording element MAY contain a <dataMode> element indicating whether the XML document is a complete document or a partial update. If no <dataMode> element is present then the default value is "complete".

6. Recording Metadata classes

This section describes each class of the metadata model, and the attributes of each class. This section also describes how different classes are linked and the XML element for each of them.

6.1. Recording Session



Each instance of a Recording Session(RS) class namely the Recording Session Object represents a SIP session created between an SRC and SRS for the purpose of recording a Communication Session.

RS object is represented in XML schema using <recording> element. That in turn relies on the SIP/SDP session with which the XML document is associated to provide the attributes of the RS element.

6.1.1. Attributes

A RS class has the following attributes:

- o start-time - Represents the start time of a Recording Session object.
- o end-time - Represents the end time of a Recording Session object.

start-time and end-time attribute values are derivable from Date header(if present in SIP message) in RS. In cases where Date header is not present, start-time is derivable from the time at which SRS receives the notification of SIP message to setup RS and end-time is derivable from the time at which SRS receives disconnect on the RS SIP dialog.

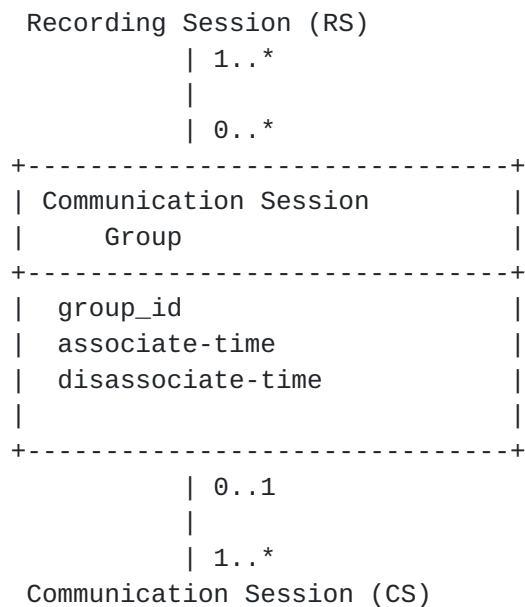
6.1.2. Linkages

Each instance of RS has:

- o Zero or more instances of Communication Session Group (CSG).
- o Zero or more instances of Communication Session(CS) objects.

CSs and CSGs are optional to accommodate persistent recording, where there may sometimes be none.

6.2. Communication Session Group



One instance of a Communication Session Group(CS-Group) class namely the Communication Session Group object provides association or linking of Communication Sessions.

CS-Group object is represented in XML schema using <group> element.

6.2.1. Attributes

A CS-Group has the following attributes:

- o group_id - This is to group different CSs that are related. SRC (or SRS) is responsible for ensuring the uniqueness of group_id in case multiple SRC interacts with the same SRS. The mechanism by which SRC groups the CS is outside the scope of SIPREC.
- o associate-time - This is the time when a grouping is formed. The rules that determine how a grouping of different CS objects is done by SRC is outside the scope of SIPREC.
- o disassociate-time - disassociate-time for CS-Group is calculated by SRC as the time when the grouping ends.

6.2.2. Linkages

The linkages between CS-Group class and other classes are associations. A CS-Group is associated with RS and CS in the following manner:

- o There are one or more RS objects per CS-Group.

- o Each CS-Group object has to be associated with one or more RS. Here each RS can be setup by the potentially different SRCs.
- o There are one or more CSs per CS-Group (for example, in case where the call is transferred).

6.3. Communication Session

Recording Session	Communication Session Group(CS Group)
1..*	0..1
0..*	1..*
+-----+	
Communication Session (CS)	
+-----+	
session_id	
sipSessionID	
reason	
group-ref	
start-time	
stop-time	
+-----+	
0..*	0..1
0..*	0..*
Participant	Media Stream

A Communication Session(CS) class and its object in the metadata model represents a Communication Session and its properties needed as seen by SRC.

CS object is represented in XML schema using <session> element.

6.3.1. Attributes

A CS class has the following attributes:

- o session_id - This attribute is used to uniquely identify an instance of CS object namely the session XML element with in the metadata XML document. session_id is generated using the rules mentioned in [Section 6.10](#).

- o reason - This represents the reason why a CS was terminated. The value for this attribute is derived from SIP Reason header [[RFC3326](#)] of CS. There MAY be multiple instances of the reason XML element inside a session element. The reason XML element has 'protocol' as an attribute, which indicates the protocol from which the reason string is derived. The default value for protocol attribute is "SIP". The reason element can be derived from a SIP Reason header in the CS.
- o sipSessionID - This attribute carries sip Session-ID defined in [[I-D.ietf-insipid-session-id](#)]. Each CS object can have zero or more sipSessionID elements. More than one sipSessionID may be present in a CS for Conference flows. For example, if three participants A, B and C are in a conference that has a focus acting as SRC, the metadata sent from the SRC to the SRS will likely have three sipSessionID elements that correspond to the SIP dialogs the focus has with each of the three participants.
- o group-ref - A group-ref attribute MAY be present to indicate the group to which the enclosing session belongs.
- o start-time - This optional attribute represents start time of CS as seen by SRC.
- o Stop-time - This optional attribute represents stop time of CS as seen by SRC.

This document does not specify attributes relating to what should happen to a recording of a CS after it has been delivered to the SRS (E.g., how long to retain the recording, what access controls to apply.) The SRS is assumed to behave in accordance with its local policy. The ability for the SRC to influence this policy is outside the scope of this document. However if there are implementations where SRC desires to specify its own policy preferences, this could be sent as extension data attached to the CS.

6.3.2. Linkages

A CS is linked to CS-Group, Participant, Media Stream and RS classes using the association relationship. Association between CS and Participant allows:

- o CS to have zero or more participants
- o Participant is associated with zero or more CSs. This includes participants who are not directly part of any CS. An example of such a case is participants in a premixed media stream. The SRC may have knowledge of such participants, yet not have any

signaling relationship with them. This might arise if one participant in CS is a conference focus. To summarize, even if the SRC does not have direct signalling relationships with all participants in a CS, it should nevertheless create a participant object for each participant that it knows about.

- o The model also allows participants in CS that are not participants in the media. An example is the identity of a Third Party Call Control(3pcc) that has initiated a CS to two or more participants of the CS. Another example is the identity of a conference focus. Of course a focus is probably in the media, but since it may only be there as a mixer, it may not report itself as a participant in any of the media streams.

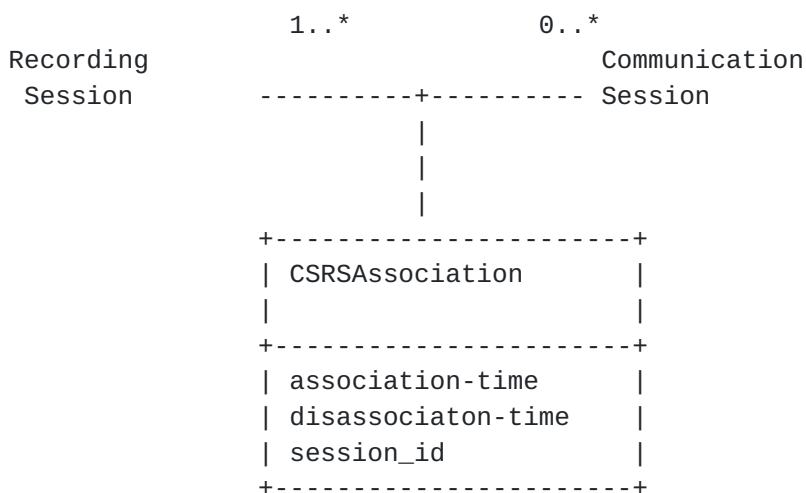
Association between CS and Media Stream allows:

- o A CS to have zero or more streams
- o A stream can be associated with at most one CS. A stream in a persistent RS is not required to be associated with any CS before the CS is created and hence the zero associationa is allowed.

Association between CS and RS allows:

- o Each instance of RS has Zero or more instances of CS objects.
- o Each CS has to be associated with one more RS. Each RS can be potentially setup by different SRCs.

[6.4.](#) CSRSAssociation



The CSRSAssociation class describes the association of a CS to an RS for a period of time. A single CS may be associated with different RSs (perhaps by different SRCs) and may be associated and dissociated several times.

The CSRSAssociation is represented in XML using sessionrecordingassoc XML element.

6.4.1. Attributes

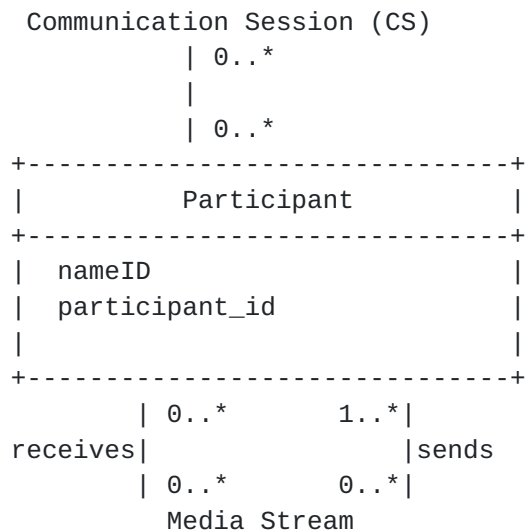
CSRSAssociation class has the following attributes:

- o associate-time - associate-time is calculated by SRC as the time it sees a CS is associated to a RS
- o disassociate-time- disassociate-time is calculated by SRC as the time it see a CS disassociate from a RS.
- o session_id - Each instance of this class MUST have session_id attribute that identifies the the CS to which this association belongs to.

6.4.2. Linkages

CSRSAssociation class is linked to CS and RS classes.

6.5. Participant



A Participant class and its objects has information about a device that is part of a CS and/or contributes/consumes media stream(s) belonging to a CS.

Participant object is represented in XML schema using <participant> element.

6.5.1. Attributes

Participant has a single defined attribute:

- o nameID - This attribute is a list of Name/AoR tuples. An AoR can be one of SIP/SIPS/TEL URI, FQDN or IP address. The AoR MAY be drawn from From header or P-Asserted-Identity header or Remote-Party-ID header. SRCs local policy MAY also be used to decide on where to draw the AoR from. Name represents participant name(SIP display name) or dialed number (DN) (when known). Multiple tuples are allowed for cases where a participant has more than one AoR. (For example a P-Asserted-identity header [[RFC3325](#)] can have both SIP and TEL URIs.)
- o participant_id - This attribute is used to identify the participant XML element with in the XML document. It is generated using the rules mentioned in [Section 6.10](#). This attribute MUST be used for all references to a participant within a CSG, and MAY be used to reference the same participant more globally.

This document does not specify other attributes relating to participant e.g. participant role, participant type. An SRC which has information of these attributes can indicate the same as part of extension data to participant from SRC to SRS.

6.5.2. Linkages

The participant class is linked to MediaStream (MS) and CS class using association relationship. The association between participant and MS allows:

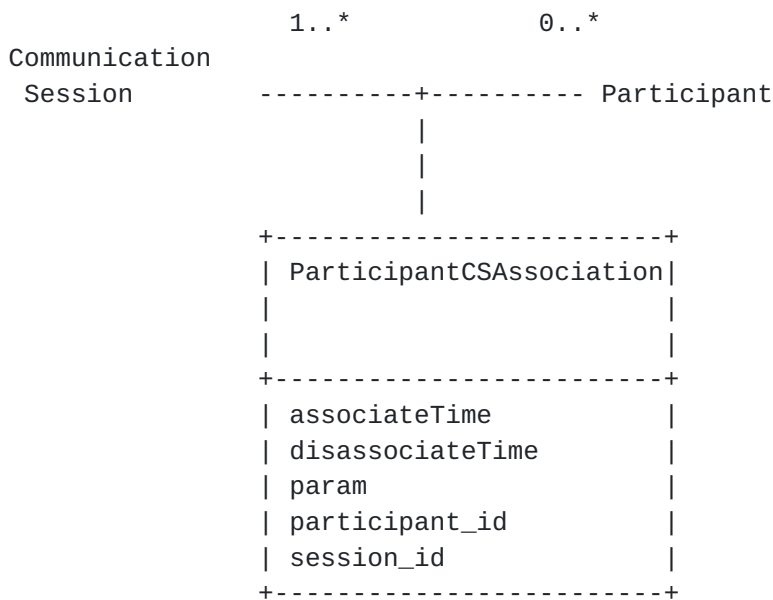
- o participant to receive zero or more media streams
- o participant to send zero or more media streams. (Same participant provides multiple streams e.g. audio and video)
- o media stream to be received by zero or more participants. Its possible, though perhaps unlikely, that a stream is generated but sent only to the SRC and SRS, not to any participant. E.g. In conferencing where all participants are on hold and the SRC is

collocated with the focus. Also a media stream may be received by multiple participants (e.g. Whisper calls, side conversations).

- o media stream to be sent by one or more participants (pre-mixed streams).

Example of a case where a participant receives zero or more streams - a supervisor may have side conversation with agent, while agent converses with customer.

6.6. ParticipantCSAssociation



The ParticipantCSAssociation class describes the association of a participant to an CS for a period of time. A participant may be associated and dissociated from a CS several times. (For example, connecting to a conference, then disconnecting, then connecting again.)

ParticipantCSAssociation object is represented in XML schema using <participantsessionassoc> element.

6.6.1. Attributes

ParticipantCS association class has the following attributes:

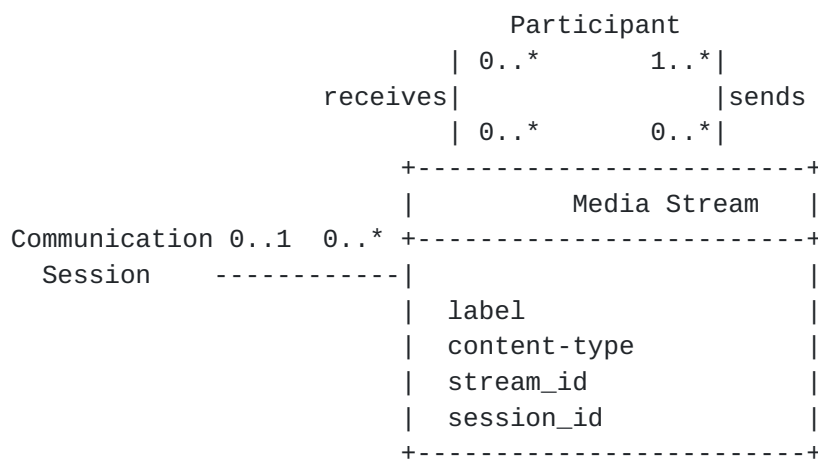
- o associate-time - associate-time is calculated by SRC as the time it sees a participant is associated to CS

- o disassociate-time- disassociate-time is calculated by the SRC as the time it sees a participant disassociate from a CS. It is possible that a given participant can have multiple associate/disassociate times within given communication session.
- o param - An optional attribute describing the capabilities of a participant in a CS, as defined in [RFC3840]. The capabilities are represented using param XML element in the metadata. The 'param' XML element encoding defined in [RFC4235] is used to represent the capabilities attributes in metadata. Each participant may have zero or more capabilities. A participant may use different capabilities depending on the role it plays at a particular instance. For example if a participant moves across different CSs (e.g., due to transfer) or is simultaneously present in different CSs with different roles.
- o participant_id - This attribute identifies the participant to which this association belongs to.
- o session_id - This attribute identifies the session to which this association belongs to.

6.6.2. Linkages

The participantCSAssociation class is linked to participant and CS classes.

6.7. Media Stream



A MS class (and its objects) has the properties of media as seen by SRC and sent to SRS. Different snapshots of a media stream object

may be sent whenever there is a change in media (e.g. direction change like pause/resume and/or codec change and/or participant change.).

MS object is represented in XML schema using <stream> element.

6.7.1. Attributes

A MS class has the the following attributes:

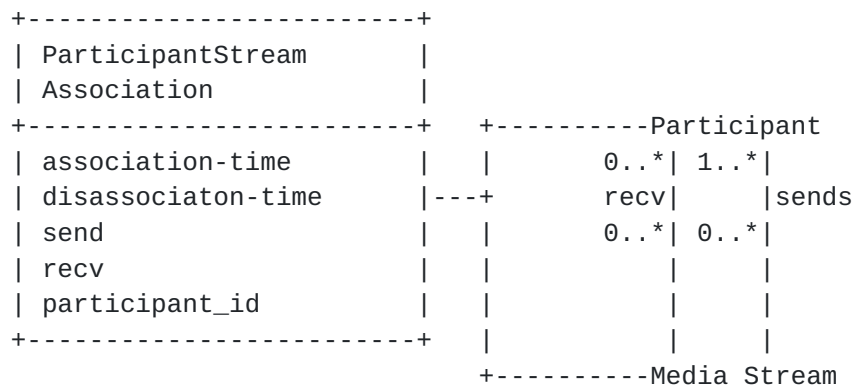
- o label - The label attribute within the stream XML element references an SDP "a=label" attribute that identifies an m-line within the RS SDP. That m-line carries the media stream from the SRC to the SRS.
- o content-type - The content of an MS element will be described in terms of value from the [[RFC4796](#)] registry. If the SRC wishes to convey the Content-type to the SRS, it does so by including an 'a=content' attribute with the m-line in the RS SDP.
- o stream_id - Each stream element has unique 'stream_id' attribute which helps to uniquely identify stream. This identifier is generated using the rules mentioned in [Section 6.10](#).
- o session_id - This attribute associates the stream with a specific session element.

The metadata model should include media streams that are not being delivered to the SRS. Examples include cases where SRC offered certain media types but SRS chooses to accept only a subset of them OR an SRC may not even offer a certain media type due it its restrictions to record

6.7.2. Linkages

A MS class is linked to participant and CS classes using the association relationship. The details of association with the Participant are described in the Participant class section. The details of association with CS is mentioned in the CS section.

6.8. ParticipantStream Association



A ParticipantStream association class describes the association of a Participant to a Media Stream for a period of time, as a sender or as a receiver, or both.

This class is represented in XML using <participantstreamassoc> element.

[6.8.1.](#) Attributes

A ParticipantStream association class has the following attributes:

- o associate-time: This attribute indicates the time a participant started contributing to a Media Stream
- o disassociate-time: This attribute indicates the time a participant stopped contributing to a Media Stream
- o send: This attribute indicates whether a participant is contributing to a stream or not. This attribute has a value which points to stream represented by its unique_id. The presence of this attribute indicates that a participant is contributing to a stream represented by the Unique_id. If due to changes in CS if a participant stops contributing to a stream, a snapshot MUST be sent from SRC to SRS with no Send element for that stream.
- o recv: This attribute indicates whether a participant is receiving a media stream or not. This attribute has a value which points to a stream represented by its Unique_id. The presence of this attribute indicates that a participant is receiving a stream represented by the Unique_id. If due to changes in CS (like hold) the participants stops receiving a stream, a snapshot MUST be sent from SRC to SRS with no Recv element for that stream.

- o `participant_id` - This attribute points to the participant to which this streams are associated with.

This XML element is used to represent a snapshot of a participant association with a stream. The `send` and `recv` XML elements MUST be used to indicate whether a participant is contributing to a stream or receiving a stream. There MAY be multiple instances of the `send` and `recv` XML elements inside a `participantstreamassoc` element. If a metadata snapshot is sent with a `participantstreamassoc` that does not have any `send` and `recv` elements, it means that participant is neither contributing to any streams nor receiving any streams.

6.8.2. Linkages

The `participantStream` association class is linked to `participant` and `Stream` classes.

6.9. associate-time/disassociate-time

The XML `<associate-time>` and `<disassociate-time>` elements contain strings indicating the date and time of the status change of this tuple. The value of these elements MUST follow the IMPP datetime format [[RFC3339](#)]. Timestamps that contain 'T' or 'Z' MUST use the capitalized forms. At a time, any of the time tuple `associate-time` or `disassociate-time` MAY exist in the element namely `group`, `session`, `participant` and not both timestamp at the same time.

As a security measure, the timestamp element SHOULD be included in all tuples unless the exact time of the status change cannot be determined.

6.10. Unique ID format

A Unique id is generated in two steps:

- o the UUID is created using [[RFC4122](#)]
- o the UUID is encoded using base64 as defined in [[RFC4648](#)]

The above mentioned unique-id mechanism SHOULD be used for each metadata element. Multiple SRCs can refer to the same element/UUID (how each SRC learns the UUID here is out of scope of SIPREC)

6.11. Metadata version Indicator

This section defines a version indicator for metadata XML.

This version value allows the SRS to know the exact metadata XML schema used by the SRC. This document describes version 1. Implementations may not interoperate if the version implemented by the sender is not known by the receiver. No negotiation of versions is provided. There is no significance to the version number although documents which update or obsolete this document (possibly including drafts of such documents) should include a higher version number if the metadata XML schema changes.

7. Recording metadata snapshot Request format

This section gives an details of metadata snapshot request format. When SRS wishes to request metadata snapshot from SRC it MUST follow the syntax described in this section. The SRS requests metadata snapshot in a request message and SHOULD insert a XML document having the namespace urn:ietf:params:xml:ns:recording:1. The Request can have the following elements.

A <requestsnapshot> XML element MUST be present as the top level element in the XML document. A <requestreason> XML element that indicates the reason for requesting snapshot as a string MAY be present as a child XML element of <requestsnapshot>.

8. SIP Recording Metadata Example

8.1. Complete SIP Recording Metadata Example

The following example provides all the tuples involved in Recording Metadata XML body.

```
<?xml version="1.0" encoding="UTF-8"?>
<recording xmlns='urn:ietf:params:xml:ns:recording:1'>
  <datamode>complete</datamode>
    <group group_id="7+0TCyoxTmqmqyA/1weDAg==">
      <associate-time>2010-12-16T23:41:07Z</associate-time>
      <!-- Standardized extension -->
      <call-center xmlns='urn:ietf:params:xml:ns:callcenter'>
        <supervisor>sip:alice@atlanta.com</supervisor>
      </call-center>
      <mydata xmlns='http://example.com/my'>
        <structure>F00!</structure>
        <whatever>bar</whatever>
      </mydata>
    </group>
    <session session_id="hVpd7YQgRW2nD22h7q60JQ==">
      <sipSessionID>ab30317f1a784dc48ff824d0d3715d86;
        remote=47755a9de7794ba387653f2099600ef2</sipSessionID>
```



```
<group-ref>7+0TCyoxTmqmqyA/1weDAg==
</group-ref>
<!-- Standardized extension -->
<mydata xmlns='http://example.com/my'>
  <structure>F00!</structure>
  <whatever>bar</whatever>
</mydata>
</session>
<participant
  participant_id="srfBEImCRp2QB23b7Mpk0w=="
  <nameID aor="sip:bob@biloxi.com">
    <name xml:lang="it">Bob B</name>
  </nameID>
  <!-- Standardized extension -->
  <mydata xmlns='http://example.com/my'>
    <structure>F00!</structure>
    <whatever>bar</whatever>
  </mydata>
</participant>
<participant
  participant_id="zSfPoSvdSDCmU3A3TRDxAw=="
  <nameID aor="sip:Paul@biloxi.com">
    <name xml:lang="it">Paul</name>
  </nameID>
  <!-- Standardized extension -->
  <mydata xmlns='http://example.com/my'>
    <structure>F00!</structure>
    <whatever>bar</whatever>
  </mydata>
</participant>
<stream stream_id="UAAMm5GRQKSCMVvLyl4rFw=="
  session_id="hVpd7YQgRW2nD22h7q60JQ=="
  <label>96</label>
</stream>
<stream stream_id="i1Pz3to5hGk8fuXl+PbwCw=="
  session_id="hVpd7YQgRW2nD22h7q60JQ=="
  <label>97</label>
</stream>
<stream stream_id="8zc6e0lYTlWIINA6GR+3ag=="
  session_id="hVpd7YQgRW2nD22h7q60JQ=="
  <label>98</label>
</stream>
<stream stream_id="EiXGlc+4TruqqoDaNE76ag=="
  session_id="hVpd7YQgRW2nD22h7q60JQ=="
  <label>99</label>
</stream>
<sessionrecordingassoc session_id="hVpd7YQgRW2nD22h7q60JQ=="
  <associate-time>2010-12-16T23:41:07Z</associate-time>
```



```

</sessionrecordingassoc>
<participantsessionassoc
  participant_id="srfBEImCRp2QB23b7Mpk0w=="
  session_id="hVpd7YQgRW2nD22h7q60JQ==">
  <associate-time>2010-12-16T23:41:07Z</associate-time>
</participantsessionassoc>
<participantsessionassoc
  participant_id="zSfPoSvdSDCmU3A3TRDxAw=="
  session_id="hVpd7YQgRW2nD22h7q60JQ==">
  <associate-time>2010-12-16T23:41:07Z</associate-time>
</participantsessionassoc>
<participantstreamassoc
  participant_id="srfBEImCRp2QB23b7Mpk0w==">
  <send>i1Pz3to5hGk8fuXl+PbwCw==</send>
  <send>UAAMm5GRQKSCMVvLy14rFw==</send>
  <recv>8zc6e0lYtlWIINA6GR+3ag==</recv>
  <recv>EiXGlc+4TruqqoDaNE76ag==</recv>
</participantstreamassoc>
<participantstreamassoc
  participant_id="zSfPoSvdSDCmU3A3TRDxAw==">
  <send>8zc6e0lYtlWIINA6GR+3ag==</send>
  <send>EiXGlc+4TruqqoDaNE76ag==</send>
  <recv>UAAMm5GRQKSCMVvLy14rFw==</recv>
  <recv>i1Pz3to5hGk8fuXl+PbwCw==</recv>
</participantstreamassoc>
</recording>

```

SIP Recording Metadata Example XML body

8.2. Partial Update of Recording metadata XML body

The following example provides partial update in Recording metadata XML body for the above example. The example has a snapshot that carries the disassociate-time for a participant from a session.


```

<?xml version="1.0" encoding="UTF-8"?>
  <recording xmlns='urn:ietf:params:xml:ns:recording:1'>
    <dataMode>partial</dataMode>
    <participant
      participant_id="srfBEImCRp2QB23b7Mpk0w=="
      <name ID="sip:bob@biloxi.com">
        <name xml:lang="it">Bob R</name>
      </nameID>
      <structure>F00!</structure>
      <whatever>bar</whatever>
    </participant>
    <participantsessionassoc
      participant_id="srfBEImCRp2QB23b7Mpk0w=="
      session_id="hVpd7YQgRW2nD22h7q60JQ=="
      <disassociate-time>2010-12-16T23:41:07Z</disassociate-time>
    </participantsessionassoc>
  </recording>

```

Partial update of SIP Recording Example XML body

9. XML Schema definition for Recording metadata

This section defines XML schema for Recording metadata document

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema targetNamespace="urn:ietf:params:xml:ns:recording:1"
  xmlns:xs="http://www.w3.org/2001/XMLSchema"
  xmlns:tns="urn:ietf:params:xml:ns:recording:1"
  elementFormDefault="qualified"
  attributeFormDefault="unqualified">
  <!-- This import brings in the XML language attribute xml:lang-->
  <xs:import namespace="http://www.w3.org/XML/1998/namespace"/>
  <xs:element name="recording" type="tns:recording"/>
  <xs:complexType name="recording">
    <xs:sequence>
      <xs:element name="datamode" type="tns:dataMode"
        minOccurs="0"/>
      <xs:element name="group" type="tns:group"
        minOccurs="0" maxOccurs="unbounded"/>
      <xs:element name="session" type="tns:session"
        minOccurs="0" maxOccurs="unbounded"/>
      <xs:element name="participant" type="tns:participant"
        minOccurs="0" maxOccurs="unbounded"/>
      <xs:element name="stream" type="tns:stream"
        minOccurs="0" maxOccurs="unbounded"/>
      <xs:element name="sessionrecordingassoc"

```



```
        type="tns:sessionrecordingassoc"
        minOccurs="0" maxOccurs="unbounded"/>
<xs:element name="participantsessionassoc"
  type="tns:participantsessionassoc"
  minOccurs="0" maxOccurs="unbounded"/>
<xs:element name="participantstreamassoc"
  type="tns:participantstreamassoc"
  minOccurs="0" maxOccurs="unbounded"/>
<xs:any namespace='##other'
  minOccurs='0'
  maxOccurs='unbounded'
  processContents='lax' />
</xs:sequence>
</xs:complexType>
<xs:complexType name="group">
  <xs:sequence>
    <xs:element name="associate-time" type="xs:dateTime"
      minOccurs="0"/>
    <xs:element name="disassociate-time" type="xs:dateTime"
      minOccurs="0"/>
    <xs:any namespace='##other'
      minOccurs='0'
      maxOccurs='unbounded'
      processContents='lax' />
  </xs:sequence>
  <xs:attribute name="group_id" type="xs:base64Binary"
    use="required"/>
</xs:complexType>
<xs:complexType name="session">
  <xs:sequence>
    <xs:element name="sipSessionID" type="xs:string" minOccurs="0"
      maxOccurs="unbounded"/>
    <xs:element name="reason" type="tns:reason" minOccurs="0"
      maxOccurs="unbounded"/>
    <xs:element name="group-ref" type="xs:base64Binary"
      minOccurs="0" maxOccurs="1"/>
    <xs:element name="start-time" type="xs:dateTime"
      minOccurs="0" maxOccurs="1"/>
    <xs:element name="stop-time" type="xs:dateTime"
      minOccurs="0" maxOccurs="1"/>
    <xs:any namespace='##other'
      minOccurs='0'
      maxOccurs='unbounded'
      processContents='lax' />
  </xs:sequence>
  <xs:attribute name="session_id" type="xs:base64Binary"
    use="required"/>
</xs:complexType>
```



```
<xs:complexType name="sessionrecordingassoc">
  <xs:sequence>
    <xs:element name="associate-time" type="xs:dateTime"
      minOccurs="0"/>
    <xs:element name="disassociate-time" type="xs:dateTime"
      minOccurs="0"/>
    <xs:any namespace='##other'
      minOccurs='0'
      maxOccurs='unbounded'
      processContents='lax'/>
  </xs:sequence>
  <xs:attribute name="session_id" type="xs:base64Binary"
    use="required"/>
</xs:complexType>
<xs:complexType name="participant">
  <xs:sequence>
    <xs:element name="nameID" type="tns:nameID"
      maxOccurs='unbounded'/>
    <xs:any namespace='##other'
      minOccurs='0'
      maxOccurs='unbounded'
      processContents='lax'/>
  </xs:sequence>
  <xs:attribute name="participant_id" type="xs:base64Binary"
    use="required"/>
</xs:complexType>
<xs:complexType name="participantsessionassoc">
  <xs:sequence>
    <xs:element name="associate-time" type="xs:dateTime"
      minOccurs="0"/>
    <xs:element name="disassociate-time" type="xs:dateTime"
      minOccurs="0"/>
    <xs:element name="param" minOccurs="0" maxOccurs="unbounded">
      <xs:complexType>
        <xs:attribute name="pname" type="xs:string" use="required"/>
        <xs:attribute name="pval" type="xs:string" use="required"/>
      </xs:complexType>
    </xs:element>
    <xs:any namespace='##other'
      minOccurs='0'
      maxOccurs='unbounded'
      processContents='lax'/>
  </xs:sequence>
  <xs:attribute name="participant_id" type="xs:base64Binary"
    use="required"/>
  <xs:attribute name="session_id" type="xs:base64Binary"
    use="required"/>
</xs:complexType>
```



```
<xs:complexType name="participantstreamassoc">
  <xs:sequence>
    <xs:element name="send" type="xs:base64Binary"
      minOccurs="0" maxOccurs="unbounded"/>
    <xs:element name="recv" type="xs:base64Binary"
      minOccurs="0" maxOccurs="unbounded"/>
    <xs:element name="associate-time" type="xs:dateTime"
      minOccurs="0"/>
    <xs:element name="disassociate-time" type="xs:dateTime"
      minOccurs="0"/>
    <xs:any namespace='##other'
      minOccurs='0'
      maxOccurs='unbounded'
      processContents='lax'/>
  </xs:sequence>
  <xs:attribute name="participant_id" type="xs:base64Binary"
    use="required"/>
</xs:complexType>
<xs:complexType name="stream">
  <xs:sequence>
    <xs:element name="label" type="xs:string"
      minOccurs="0" maxOccurs="1"/>
    <xs:any namespace='##other'
      minOccurs='0'
      maxOccurs='unbounded'
      processContents='lax'/>
  </xs:sequence>
  <xs:attribute name="stream_id" type="xs:base64Binary"
    use="required"/>
  <xs:attribute name="session_id" type="xs:base64Binary"/>
</xs:complexType>
<xs:simpleType name="dataMode">
  <xs:restriction base="xs:string">
    <xs:enumeration value="complete"/>
    <xs:enumeration value="partial"/>
  </xs:restriction>
</xs:simpleType>
<xs:complexType name="nameID">
  <xs:sequence>
    <xs:element name="name" type="tns:name" minOccurs="0"
      maxOccurs="1"/>
  </xs:sequence>
  <xs:attribute name="aor" type="xs:anyURI" use="required"/>
</xs:complexType>
<xs:complexType name="name">
  <xs:simpleContent>
    <xs:extension base="xs:string">
      <xs:attribute ref="xml:lang" use="optional"/>
    </xs:extension>
  </xs:simpleContent>
</xs:complexType>
```



```
        </xs:extension>
      </xs:simpleContent>
    </xs:complexType>
    <xs:complexType name="reason">
      <xs:simpleContent>
        <xs:extension base="xs:string">
          <xs:attribute type="xs:short" name="cause" use="required"/>
          <xs:attribute type="xs:string" name="protocol" default="SIP"/>
        </xs:extension>
      </xs:simpleContent>
    </xs:complexType>
    <xs:element name="requestsnapshot" type="tns:requestsnapshot"/>
    <xs:complexType name="requestsnapshot">
      <xs:sequence>
        <xs:element name="requestreason" type="tns:name" minOccurs="0"/>
        <xs:any namespace='##other'
          minOccurs='0'
          maxOccurs='unbounded'
          processContents='lax'/>
      </xs:sequence>
    </xs:complexType>
  </xs:schema>
```

10. Security Considerations

This document describes an extensive set of metadata that may be recorded by the SRS. Most of the metadata could be considered private data. For this reason, it is RECOMMENDED that a SRC use a strong means for authentication and metadata information protection and that it apply comprehensive authorization rules when using the metadata format defined in this document.

It is RECOMMENDED that a SRC authenticate the SRS using the normal SIP authentication mechanisms, such as Digest as defined in [Section 22 of \[RFC3261\]](#). The mechanism used for conveying the metadata information MUST ensure integrity and confidentiality of the information. In order to achieve these, an end-to-end SIP encryption mechanism, such as S/MIME described in [\[RFC3261\]](#), SHOULD be used.

If a strong end-to-end security means (such as above) is not available, it is RECOMMENDED that a SRC use mutual hop-by-hop Transport Layer Security (TLS) authentication and encryption mechanisms described in "SIPS URI Scheme" and "Interdomain Requests" of [\[RFC3261\]](#).

Some implementations may have the SRC choose parts of metadata that can be sent to the SRS. In other cases, SRCs may send metadata that

is not appropriate for the SRS to record. Which metadata is actually recorded by the SRS must be carefully considered to balance privacy concerns with usability. Implementations MUST control what metadata is recorded, and MUST NOT save metadata sent by the SRC that does not conform to the recording policy of the SRS. Metadata in storage needs to be provided with a level of security that is comparable to that of the recording session.

11. IANA Considerations

This specification registers a new XML namespace, and a new XML schema.

11.1. SIP recording metadata Schema Registration

URI: urn:ietf:params:xml:ns:recording:1

Registrant Contact: IETF SIPREC working group, Ram mohan
R(rmohanr@cisco.com)

XML: the XML schema to be registered is contained in [Section 8](#).

Its first line is `<?xml version="1.0" encoding="UTF-8"?>` and its last line is `</xs:schema>`

12. Acknowledgement

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