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Use Cases and Requirements for SIP-based Media Recording (SIPREC) draft-ietf-siprec-req-12

Abstract

Session recording is a critical requirement in many business communications environments such as call centers and financial trading floors. In some of these environments, all calls must be recorded for regulatory and compliance reasons. In others, calls may be recorded for quality control or business analytics.

Recording is typically performed by sending a copy of the session media to the recording devices. This document specifies requirements for extensions to SIP that will manage delivery of RTP media to a recording device. This is being referred to as SIP-based Media Recording.

Status of this Memo

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1. Introduction

Session recording is a critical operational requirement in many businesses, especially where voice is used as a medium for commerce and customer support. A prime example where voice is used for trade is the financial industry. The call recording requirements in this industry are quite stringent. The recorded calls are used for dispute resolution and compliance. Other businesses such as customer support call centers typically employ call recording for quality control or business analytics, with different requirements.

Depending on the country and its regulatory requirements, financial trading floors typically must record all calls. In contrast, call centers typically only record a subset of the calls, and calls must not fail regardless of the availability of the recording device.

Respecting the privacy rights and wishes of users engaged in a call is of paramount importance. In many jurisdictions participants have a right to know that the session is being recorded or might be recorded, and have a right to opt out, either by terminating the call or by demanding that the call not be recorded. Therefore this document contains requirements for being able to notify users that a call is being recorded and for users to be able to request that a call not be recorded. Use cases where users participating in a call are not informed that the call is or might be recorded are outside the scope of this document. In particular, lawful intercept is outside the scope of this document.

Furthermore, one-size-fits-all model will not fit all markets where the scale and cost burdens vary widely having different needs for solution capabilities such as media injection, transcoding, and security. If a standardized solution supports all of the requirements from every recording market, but doing so would be expensive for markets with lesser needs, then proprietary solutions for those markets will continue to propagate. Care must be taken, therefore, to make a standards-based solution support optionality and flexibility.

This document specifies requirements for using SIP [RFC3261] between a Session Recording Client and a Session Recording Server to control the recording of media that has been transmitted in the context of a Communication Session. A Communication Session is the "call" between participants. The Session Recording Client is the source of the recorded media. The Session Recording Server is the sink of recorded media. It should be noted that the requirements for the protocol between a Session Recording Server and Session Recording Client have very similar requirements (such as codec and transport negotiation, encryption key interchange, firewall traversal) as compared to

regular SIP media sessions. The choice of SIP for session recording provides reuse of an existing protocol.

The recorded sessions can be any RTP media sessions including voice, DTMF (as defined by [RFC4733]), video, and text (as defined by [RFC4103]).

An archived session recording is typically comprised of the Communication Session media content and the Communication Session Metadata. The Communication Session Metadata allows recording archives to be searched and filtered at a later time and allows a session to be played back in a meaningful way, e.g., with correct synchronization between the media. The Communication Session Metadata needs to be conveyed from the Session Recording Client to the Session Recording Server.

This document only considers active recording, where the Session Recording Client purposefully streams media to a Session Recording Server. Passive recording, where a recording device detects media directly from the network, is outside the scope of this document.

2. Requirements notation

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] and indicate requirement levels for compliant mechanisms.

3. Definitions

Session Recording Server (SRS): A Session Recording Server (SRS) is a SIP User Agent (UA) that is a specialized media server or collector that acts as the sink of the recorded media. An SRS is typically implemented as a multi-port device that is capable of receiving media from multiple sources simultaneously. An SRS is the sink of the recorded session metadata.

Session Recording Client (SRC): A Session Recording Client (SRC) is a SIP User Agent (UA) that acts as the source of the recorded media, sending it to the SRS. An SRC is a logical function. Its capabilities may be implemented across one or more physical devices. In practice, an SRC could be a personal device (such as a SIP phone), a SIP Media Gateway (MG), a Session Border Controller (SBC) or a SIP Media Server (MS) integrated with an Application Server (AS). This specification defines the term SRC such that all such SIP entities can be generically addressed under one definition. The SRC provides

metadata to the SRS.

Communication Session (CS): A session created between two or more SIP User Agents (UAs) that is the subject of recording.

Recording Session (RS): The SIP session created between an SRC and SRS for the purpose of recording a Communication Session.

Figure 1 pictorially represents the relationship between a Recording Session and Communication Session.

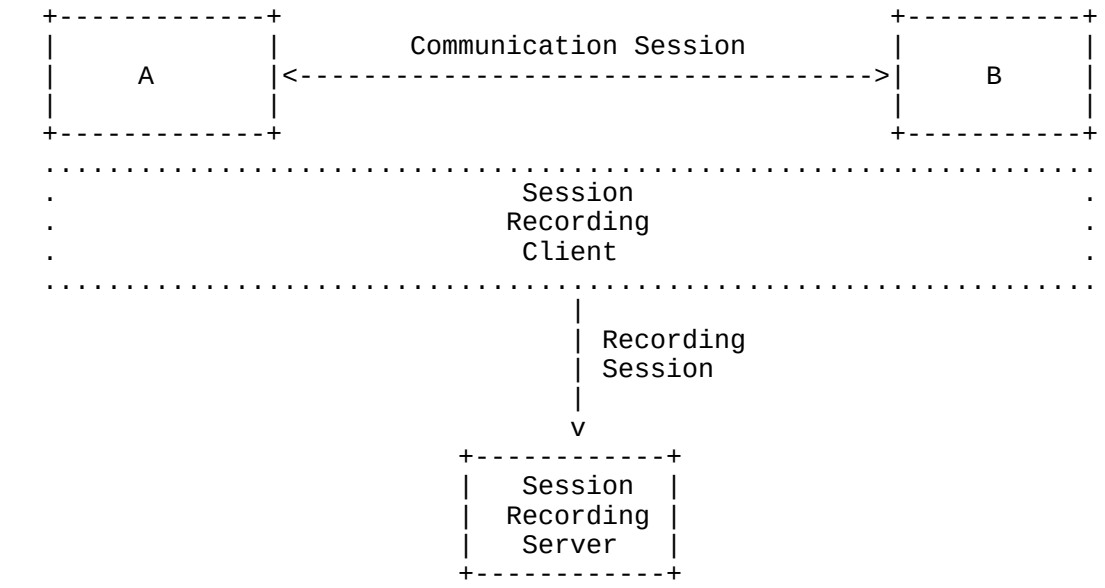


Figure 1

Metadata: Information that describes recorded media and the CS to which they relate.

Pause and Resume during a Communication Session: Pause: The action of temporarily discontinuing the transmission and collection of RS media Resume: The action of recommencing the transmission and collection of RS media

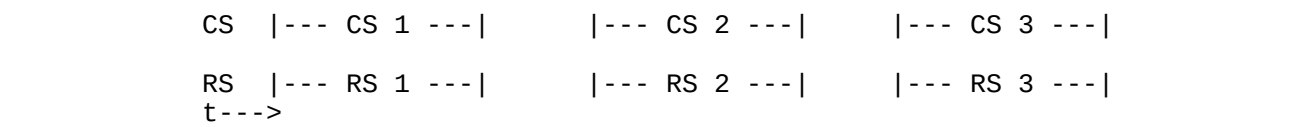
Most security-related terms in this document are to be understood in the sense defined in [RFC4949]; such terms include, but are not limited to, "authentication", "confidentiality", "encryption",

"identity", and "integrity".

4. Use Cases

Use Case 1: Full-time Recording: One Recording Session for each Communication Session.

For example, the diagram below shows the lifecycle of Communication Sessions (CS) and the relationship to the Recording Sessions (RS)



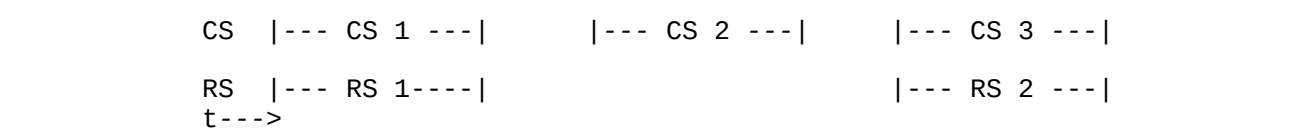
Record every CS for specific extension/person.

The need to record all calls is typically due to business process purposes (such as transaction confirmation or dispute resolution) or to ensure compliance with governmental regulations. Applications include enterprise, contact center, and financial trading floors.

Also commonly known as Total Recording.

Use Case 2: Selective Recording: Start a Recording Session when a Communication Session to be recorded is established.

In this example, Communication Sessions 1 and 3 are recorded but CS 2 is not.



Use Case 3: Start/Stop a Recording Session during a Communication Session.

The Recording Session starts during a Communication Session, either manually via a user-controlled mechanism (e.g. button on user's phone) or automatically via an application (e.g. a Contact Center customer service application) or business event. A Recording Session either ends during the Communication Session, or when the

Communication Session ends. One or more Recording Sessions may record each Communication Session.

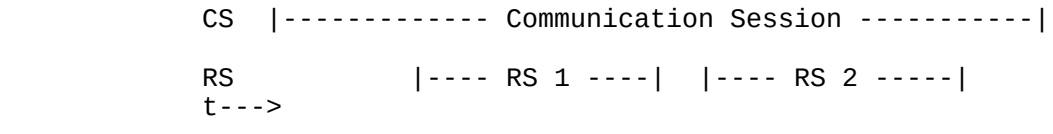


Figure 4

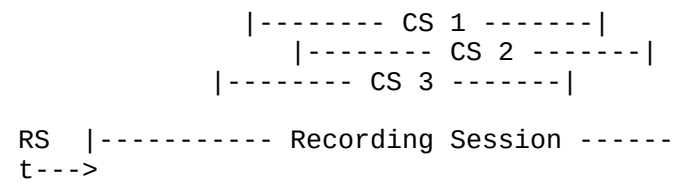
Use Case 4: Persistent Recording: A single Recording Session captures one or more Communication Sessions.

Figure 5

A Recording Session records continuously without interruption. Periods when there is no CS in progress must be reproduced upon playback (e.g. by recording silence during such periods or by not recording such periods but marking them by means of metadata for utilization on playback, etc.). Applications include financial trading desks and emergency (first-responder) service bureaus. The length of a Persistent Recording Session is independent from the length of the actual Communication Sessions. Persistent Recording Sessions avoid issues such as media clipping that can occur due to delays in Recording Session establishment.

The connection and attributes of media in the Recording Session are not dynamically signaled for each Communication Session before it can be recorded; however, codec re-negotiation is possible.

In some cases, more than one concurrent Communication Session (on a single end-user apparatus, e.g. trading floor turret) is mixed into one Recording Session:



Use Case 5: Real-time Recording Controls.

For an active Recording Session, privacy or security reasons may demand not capturing a specific portion of a conversation. An example is for PCI (payment card industry) compliance where credit card info must be protected. One solution is to not record a caller speaking their credit card information.

An example of a real-time controls is Pause/Resume.

Use Case 6: IVR / Voice Portal Recording.

Self-service Interactive Voice Response applications may need to be recorded for application performance tuning or to meet compliance requirements.

Metadata about an IVR session recording must include session information and may include application context information (e.g. VoiceXML session variables, dialog names, etc.)

Use Case 7: Enterprise Mobility Recording.

Many agents and enterprise workers whose calls are to be recorded are not located on company premises.

Examples:

o Home-based agents or enterprise workers.

o Mobile phones of knowledge workers when they conduct work related (and legally required recording) calls. e.g. insurance agents, brokers, physicians.

Use Case 8: Geographically distributed or centralized recording.

Enterprises such as banks, insurance agencies, and retail stores may have many locations, possibly up to thousands of small sites. Frequently only phones and network infrastructure are installed in branches, without local recording services. In cases where calls inside or between branches must be recorded, a centralized recording system in data centers together with telephony infrastructure (e.g. PBX) may be deployed.

Use Case 9: Record complex call scenarios.

The following is an example of a scenario where one call that is recorded must be associated with a related call that also must be recorded.

o A Customer is in a conversation with a Customer Service Agent.

o Agent puts Customer on hold in order to consult with a Supervisor.

o Agent enters into a conversation with Supervisor.

o Agent disconnects from Supervisor, then reconnects with Customer.

o The Supervisor call must be associated with the original customer call.

Use case 10: High availability and continuous recording.

Specific deployment scenarios present different requirements for system availability, error handling, etc. including:

o An SRS must always be available at call setup time.

o No loss of media recording, including during failure of an SRS.

o The Communication Session must be terminated (or suitable notification given to parties) in the event of a recording failure.

Use Case 11: Record multi-channel, multi-media session.

Some applications require the recording of more than one media stream, possibly of different types. Media are synchronized, either at storage or at playback.

Speech analytics technologies (e.g. word spotting, emotion detection, speaker identification) may require speaker-separated recordings for optimum performance.

Multi-modal Contact Centers may include audio, video, IM or other

interaction modalities.

In trading floors environments, in order to minimize storage and recording system resources, it may be preferable to mix multiple concurrent calls (Communication Sessions) on different handsets/ speakers on the same turret into single recording session.

Use Case 12: Real-time media processing.

It must be possible for an SRS to support real-time media processing, such as speech analytics of trading floor interactions. Real-time analytics may be employed for automatic intervention (stopping interaction or alerting) if for example, a trader is not following regulations.

Speaker separation is required in order to reliably detect who is saying specific phrases.

5. Requirements

The following are requirements for SIP-based Media Recording:

o REQ-001 The mechanism MUST provide a means for using the SIP protocol for establishing, maintaining and terminating Recording Sessions between a Session Recording Client and a Session Recording Server.

o REQ-002 The mechanism MUST support the ability to record all CSs in their entirety.

o REQ-003 The mechanism MUST support the ability to record selected CSs in their entirety, according to policy.

o REQ-004 The mechanism MUST support the ability to record selected parts of selected CSs.

o REQ-005 The mechanism MUST support the ability to record a CS without loss of media of RS (for example, clipping media at the beginning of the CS) due to RS recording preparation and also, without impacting the quality or timing of the CS (for example, delaying the start of the CS while preparation for recording session). See Use Case 4 in Section 4 for more details.

o REQ-006 The mechanism MUST support the recording of IVR sessions.

o REQ-007 The mechanism MUST support the recording of RTP media types voice, DTMF (as defined by [RFC4733]), video, and text (as defined by

[RFC4103]).

o REQ-008 The mechanism MUST support the ability for an SRC to deliver mixed audio streams from multiple Communication Sessions to an SRS.

Note: A mixed audio stream is where several related Communication Sessions are carried in a single Recording Session. A mixed media stream is typically produced by a mixer function. The RS MAY be informed about the composition of the mixed streams through session metadata.

o REQ-009: The mechanism MUST support the ability for an SRC to deliver mixed audio streams from different parties of a given Communication Session to an SRS.

o REQ-010 The mechanism MUST support the ability to deliver to the SRS multiple media streams for a given CS.

o REQ-011 The mechanism MUST support the ability to pause and resume the transmission and collection of RS media.

o REQ-012 The mechanism MUST include a means for providing the SRS with metadata describing CSs that are being recorded, including the media being used and the identifiers of parties involved.

o REQ-013 The mechanism MUST include a means for the SRS to be able to correlate RS media with CS participant media.

o REQ-014 Metadata format must be agnostic of the transport protocol.

o REQ-015: The mechanism MUST support a means to stop the recording.

o REQ-016: The mechanism MUST support a means for a recording-aware UA involved in a CS to request at session establishment time that the CS should be recorded or should not be recorded, the honoring of such a request being dependent on policy.

o REQ-017: The mechanism MUST support a means for a recording-aware UA involved in a CS to request during a session that the recording of the CS should be started, paused, resumed or stopped, the honoring of such a request being dependent on policy. Such recording-aware UA MUST be notified about outcome of such requests.

o REQ-018 The mechanism MUST NOT prevent the application of tones or announcements during recording or at the start of a CS to support notification to participants that the call is being recorded or may be recorded.

o REQ-019 The mechanism MUST provide a means of indicating to recording-aware UAs whether recording is taking place, for appropriate rendering at the user interface.

o REQ-020 The mechanism MUST provide a way for metadata to be conveyed to the SRS incrementally during the CS.

o REQ-021 The mechanism MUST NOT prevent high availability deployments.

o REQ-022 The mechanism MUST provide means for facilitating synchronization of the recorded media streams and metadata.

o REQ-023 The mechanism MUST provide means for facilitating synchronization among the recorded media streams.

o REQ-024 The mechanism MUST provide means to relate recording and recording controls such as start/stop/pause/resume to the wall clock time.

o REQ-025 The mechanism MUST provide means for an SRS to authenticate the SRC on RS initiation.

o REQ-026 The mechanism MUST provide means for an SRC to authenticate the SRS on RS initiation.

o REQ-027 The mechanism MUST include a means for ensuring that the integrity of the metadata sent from SRC to SRS is an accurate representation of the original CS metadata.

o REQ-028 The mechanism MUST include a means for ensuring that the integrity of the media sent from SRC to SRS is an accurate representation of the original CS media.

o REQ-029 The mechanism MUST include a means for ensuring the confidentiality of the Metadata sent from SRC to SRS.

o REQ-030 The mechanism MUST provide a means to support RS confidentiality.

o REQ-031 The mechanism MUST support the ability to deliver to the SRS multiple media streams of the same media type (e.g. audio, video). For example in the case of delivering unmixed audio for each participant in the CS.

6. Privacy Considerations

Respecting the privacy rights and wishes of users engaged in a call is of paramount importance. In many jurisdictions participants have a right to know that the session is being recorded or might be recorded, and have a right to opt out, either by terminating the call or by demanding that the call not be recorded. Therefore this document contains requirements for being able to notify users that a call is being recorded and for users to be able to request that a call not be recorded. Use cases where users participating in a call are not informed that the call is or might be recorded are outside the scope of this document. In particular, lawful intercept is outside the scope of this document.

Requirements for participant notification of recording vary widely by jurisdiction. In a given deployment, not all users will be authorized to stop the recording of a CS (although any user can terminate its participation in a CS). Typically users within the domain that is carrying out the recording will be subject to policies of that domain concerning whether CSs are recorded. For example, in a call centre, agents will be subject to policies of the call centre and may or may not have the right to prevent the recording of a CS or part of a CS. Users calling into the call centre, on the other hand, will typically have to ask the agent not to record the CS. If the agent is unable to prevent recording, or if the caller does not trust the agent, the only option generally is to terminate the CS.

Privacy considerations also extend to what happens to a recording once it has been created. Typical issues are who can access the recording (e.g., receive a copy of the recording, view the metadata, play back the media, etc.), for what purpose the recording can be used (e.g., for training purposes, for quality control purposes, etc.) and for how long the recording is to be retained before deletion. These are typically policies of the domain that makes the recording, rather than policies of individual users involved in a recorded CS, whether those users be in the same domain or in a different domain. Taking the call centre example again, agents might be made aware of call centre policy regarding retention and use of recordings as part of their employment contract, and callers from outside the call centre might be given some information about policy when notified that a CS will be recorded (e.g., through an announcement that says that calls may be recorded for quality purposes).

This document does not specify any requirements for a user engaged in a CS to be able to dictate policy for what happens to a recording, or for such information to be conveyed from an SRC to an SRS. It is assumed that the SRS has access to policy applicable to its

environment and can ensure that recordings are stored and used in accordance with that policy.

7. Security Considerations

Session recording has substantial security implications, for the SIP UA's being recorded, the SRC, and the SRS.

For the SIP UA's involved in the Communication Session, the requirements in this draft enable the UA to identify that a Communication Session is being recorded and for the UA to request that a given Communication Session is not subject to recording.

Since humans don't typically look at or know about protocol signaling such as SIP, and indeed the SIP session might have originated through a PSTN Gateway without any ability to pass on in-signaling indications of recording, users can be notified of recording in the media itself through voice announcements, a visual indicator on the endpoint, or other means.

With regards to security implications of the protocol(s), clearly there is a need for authentication, authorization and eavesdropping protection for the solution. The SRC needs to know the SRS it is communicating with is legitimate, and vice-versa, even if they are in different domains. Both the signaling and media for the Recording Session need the ability to be authenticated and protected from eavesdropping. Requirements are detailed in the requirements section.

Communication Sessions and Recording Sessions can require different security levels both for signaling and media, depending on deployment configurations. For some environments, for example, SRS and SRC will be collocated in a secure network region and therefore the RS will not require the same protection level as a CS that extends over a public network, for example. For other environments, the SRS can be located in a public cloud, for example, and the RS will require a higher protection level than the CS. For these reasons, there is not a direct relationship between the security level of Communication Sessions and the security level of Recording Sessions.

A malicious or corrupt SRC can tamper with media and metadata relating to a CS before sending to an SRS. Also CS media and signaling can be tampered with in the network prior to reaching an SRC, unless proper means are provided to ensure integrity protection during transmission on the CS. Means for ensuring the correctness of media and metadata emitted by an SRC are outside the scope of this work. Other organizational and technical controls will need to be

used to prevent tampering.

8. IANA Considerations

This document has no IANA actions.

9. Acknowledgements

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Session Initiation Protocol (SIP) Recording Metadata
draft-ram-siprec-metadata-04

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).

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1. Introduction

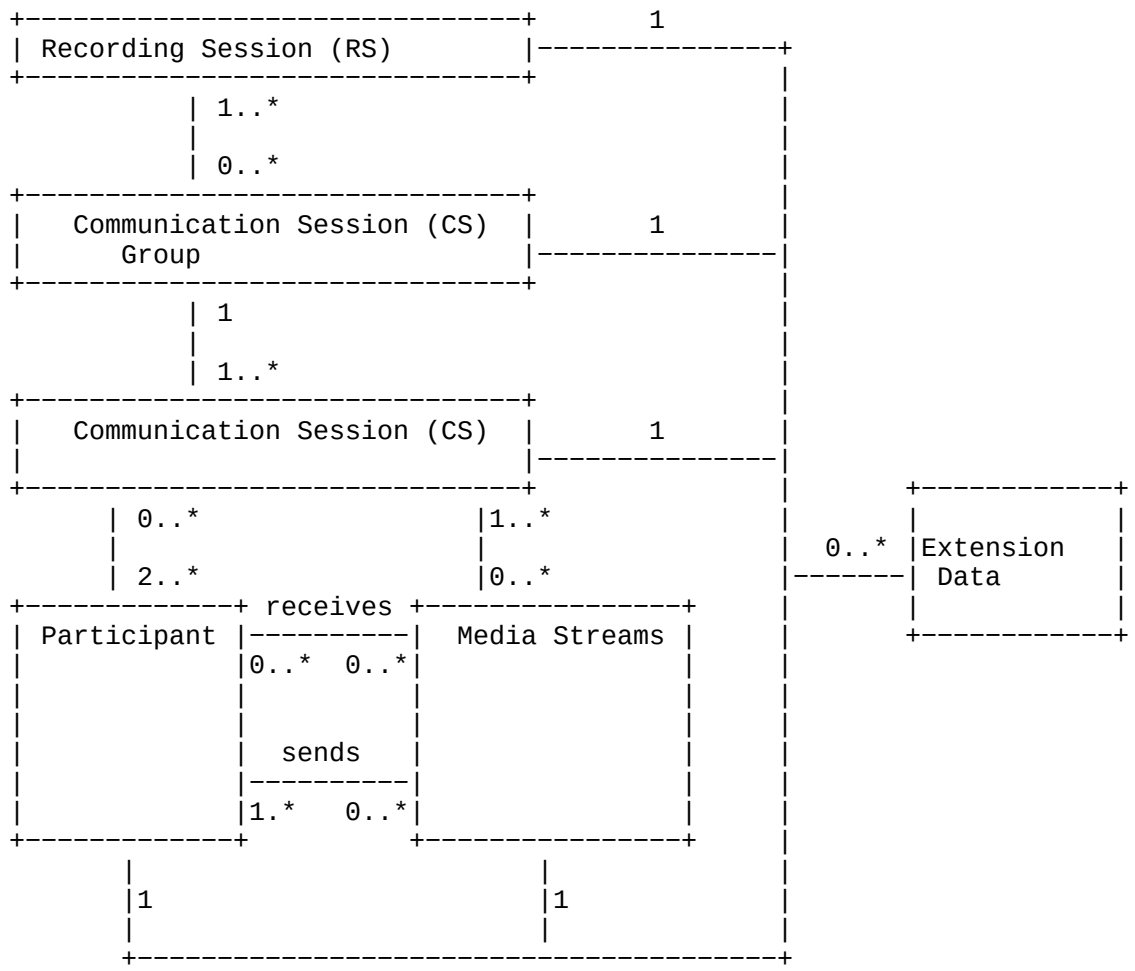
Session recording is a critical requirement in many communications environments such as call centers and financial trading. In some of these environments, all calls must be recorded for regulatory, compliance, and consumer protection reasons. Recording of a session is typically performed by sending a 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, the requirements for which are described in [I-D.ietf-siprec-req] and the architecture for which is described in [I-D.ietf-siprec-architecture].

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. Metadata Model

Metadata is the data that describes the communication session. Below diagram shows a model for Metadata as viewed by Session Recording Server (SRS).



The mechanism MUST provide a means to convey every attribute mentioned in the metamodel. Session Recording Client (SRC) MAY initiate the Recording Session. It should be noted that the Recording Session is a completely independent from the Communication Session that is being recorded at both the SIP dialog level and at the session level. The metadata MUST be conveyed from SRC to SRS. The metadata MAY be conveyed in Recording Session Dialog.

Note that the metadata model captures changes that occur over the duration of the recording session. For example, if the call is transferred from one participant to another, then the SRC SHALL

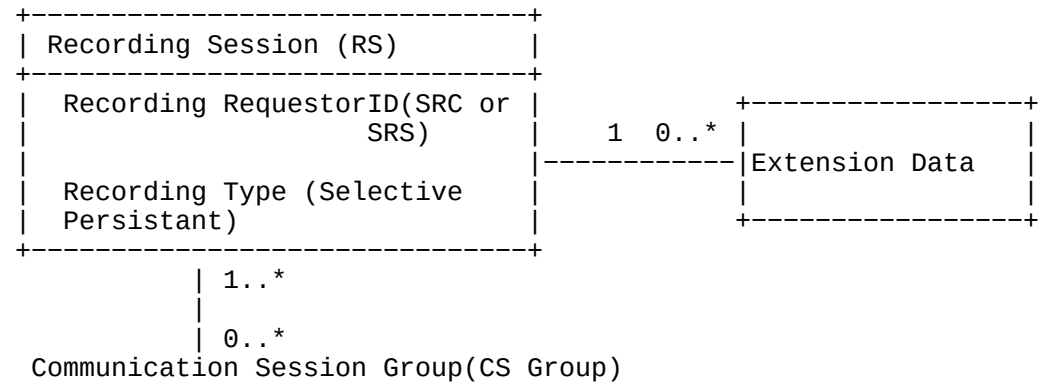
convey a change of participant and the properties of the new media stream to the SRS.

Some of the data in the model may not be conveyed explicitly from the SRC to the SRS, if it can be obtained contextually by the SRS. For instance, the timing of changes may not explicitly conveyed from the SRC to the SRC, because the mechanism (yet to be defined) which conveys the metadata may implicitly provide the timing. (E.g. the time a change occurred by be assumed to be the same as the time when notification of the change is received by the SRS.)

4. Recording Metadata elements

This section describes the different elements and its attributes of the metadata model shown above. This section also describes in brief on how the different elements of metadata are associated.

4.1. Recording Session



A Recording Session element represents one instance of a Recording Session.

4.1.1. Attributes

A Recording Session element MAY have attributes like:

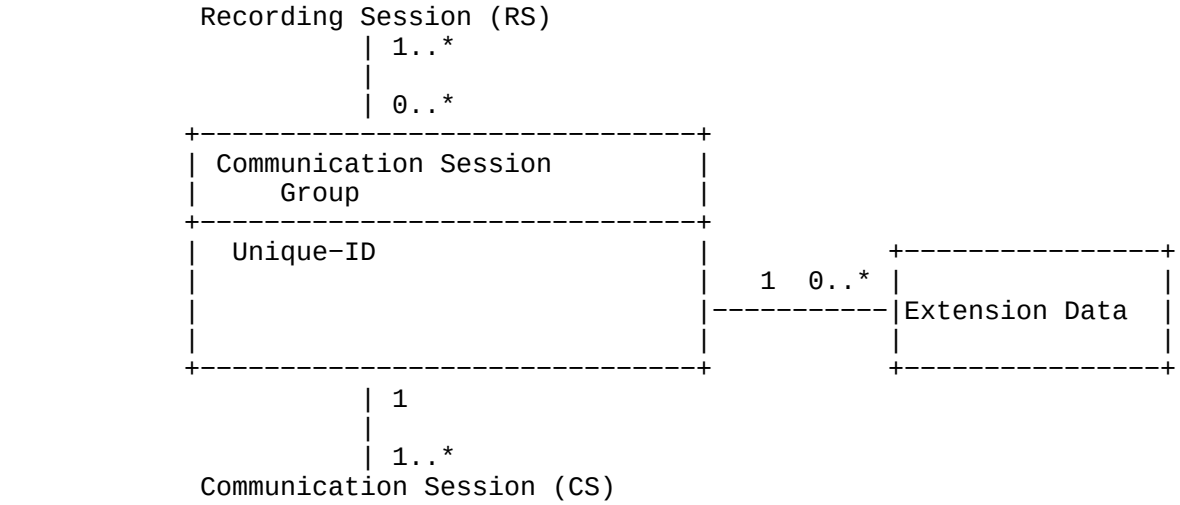
- Recording requestor ID(which could be SRS or SRC).
- Recording type − This attribute indicates whether the recording session is selective or persistent.

4.1.2. Associations

One instance of Recording Session SHALL have:

- o Zero or more instances of Communication Session Group.The allowance of zero instances is to accommodate persistent recording, where there may be none.
- o Each CS Group MUST be associated with one or more Recording Sessions [setup by the same SRC.]

4.2. Communication Session Group



A Communication Session Group provides association or linking of Communication Sessions.

4.2.1. Attributes

A CS Group MUST have a Unique-ID attribute. This Unique-ID is to group different CSs that are related. SRC (or MAY be SRS) MUST ensure the uniqueness of Unique-ID in case multiple SRC interacts with the same SRS. The mechanism by which SRC creates this unique-ID and ensures its uniqueness is outside the scope of SIPREC.

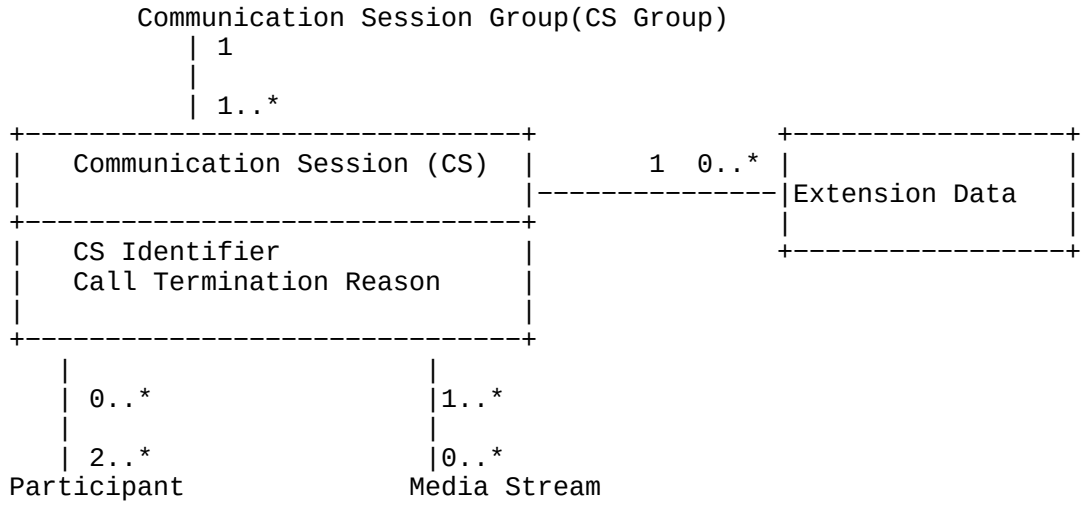
NOTE: Need more clarity/use cases on how the unique-ID SHALL be used

4.2.2. Associations

A communication Session Group SHALL be associated with RS and CS in the following manner:

- o There can be one or more Recording Session elements per Communication Session Group.
- o Each Communication Session Group MUST be associated with one or more RS [setup by the same SRC]
- o There MAY be one or more Communication Sessions per CS Group [e.g. Consult Transfer]
- o Each CS MUST be associated to one CS-Group

4.3. Communication Session



A Communication Session block/element in the metadata model represents Communication Session and its properties needed as seen by SRC.

4.3.1. Attributes

A communication Session block SHALL have the following attributes:

- o Call Termination Reason - This represents the reason why a CS was terminated. The communication session MAY contain a Call Termination Reason. This MAY be derived from SIP Reason header of

CS.

- o CS Identifier - This attribute is used to uniquely identify a CS.

NOTE: Attributes like Retention (represent the value/duration for which Media streams of the CS needs to be retained), Force Deletion, Access Information e.t.c that are primarily related to policy will not be passed in metadata from SRC to SRS. However if there are implementations where SRC has enough information, this could be sent as Extension Data attached to CS

4.3.2. Associations

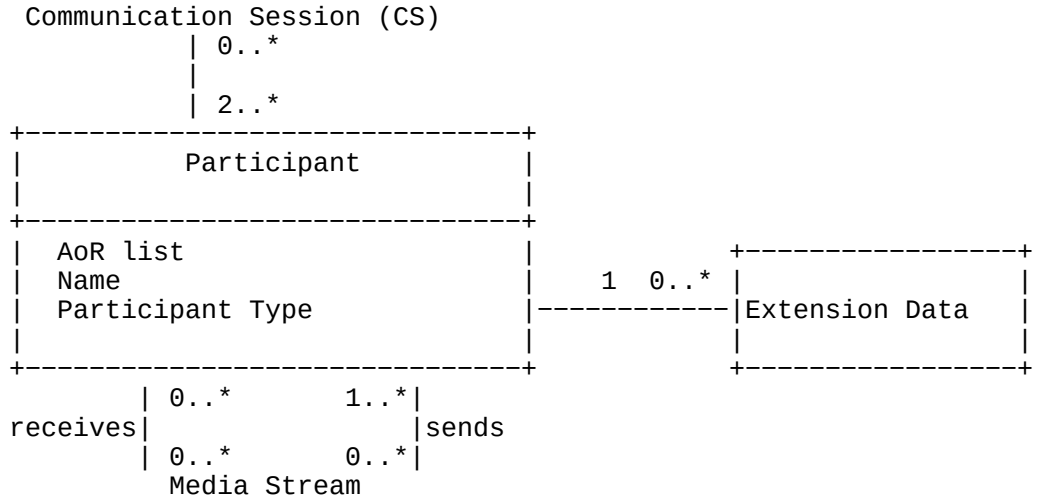
A Communication Session SHALL be associated to CS-Group,Participant and Media Stream. Cardinalities between CS and Participant allows:

- o CS to have atleast two or more participants
- o Participant may be associated with zero or more CS's (It is possible, though unlikely, that there are participants who are not 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 conf focus. Another use case is if one UA in CS works in 3pcc mode to acquire an MoH media stream, this might be reflected as unique source for media stream without having a reported signaling relationship to it.
- o The model also allows participants in CS that are not participants in the media. An example is the identity of a 3pcc controller 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.

Cardinalities between CS and Media Stream allows:

- o A CS to have zero or more Streams
- o A stream can be associated with 1 or more CS. An example is multicast MoH stream which might be associated with many CSs. Also if we were to consider a B2BUA to have a separate CS on each "side" then they might share a stream.(Though more likely this would be treated as a single CS.)

4.4. Participant



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

4.4.1. Attributes

Participant has attributes like:

- AoR list – Has list of AoRs. An AoR MAY be SIP/SIPS/TEL URI. There MAY be cases where a participant can have more than one AoR [e.g. P-Asserted-ID which can have both SIP and TEL URIs]
- Name – This attribute represents Participant name(SIP display name) or DN number (in case it is known)
- Participant Type – This attribute can have values as "internal" or "external" or "don't know" (in cases where it is not possible to determine).

NOTE: Other attributes [like Participant Role] MAY be carried as part of extension data to Participant from SRC to SRS.

4.4.2. Associations

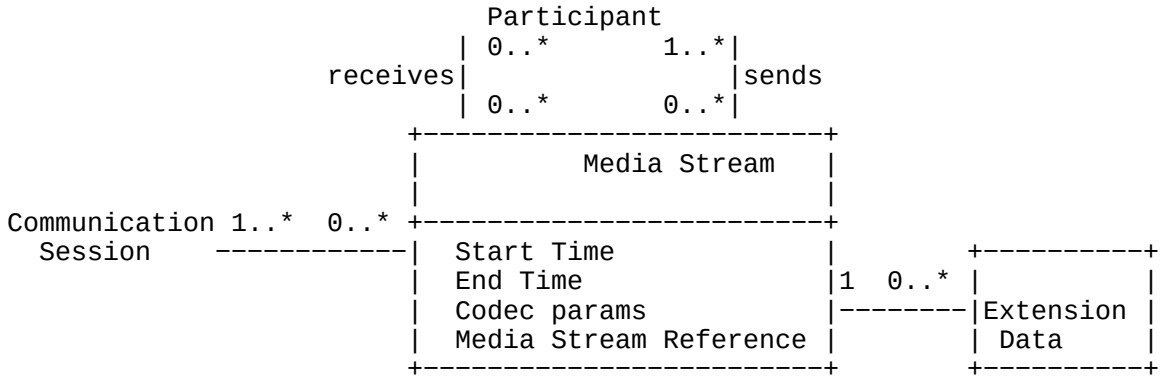
Cardinalities between participant and Media Stream allows:

- Participant to receives zero or more media streams
- 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).

NOTE: Example of a case where a participant may receive Zero or more streams - a Supervisor may have side conversation with Agent, while Agent converses with customer.

4.5. Media Stream



A Media Stream block shall have properties of media as seen by SRC and sent to SRS. Different instances of Media Stream block would be created whenever there is a change in media (e.g. dir change like pause/resume and/or codec change and/or participant change.).

4.5.1. Attributes

A Media Stream block SHALL have the following attributes:

- o Start Time - Represents Media Start time at SRC.
- o End Time - Represents Media End time at SRC. This is an optional attribute and MAY be included after a stream ends
- o Codec params - represents codec parameters of the CS media
- o Media Stream Reference - In implementations this can reference to m-line

There may 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. In such cases SRC MAY continue to send information about media streams that are not recorded to SRS in the metadata.

4.5.2. Associations

A Media Stream SHALL be associated with Participant and CS. The details of association with the Participant are described in the Participant block section. The details of association with CS is mentioned in the CS section.

4.6. Extension Data

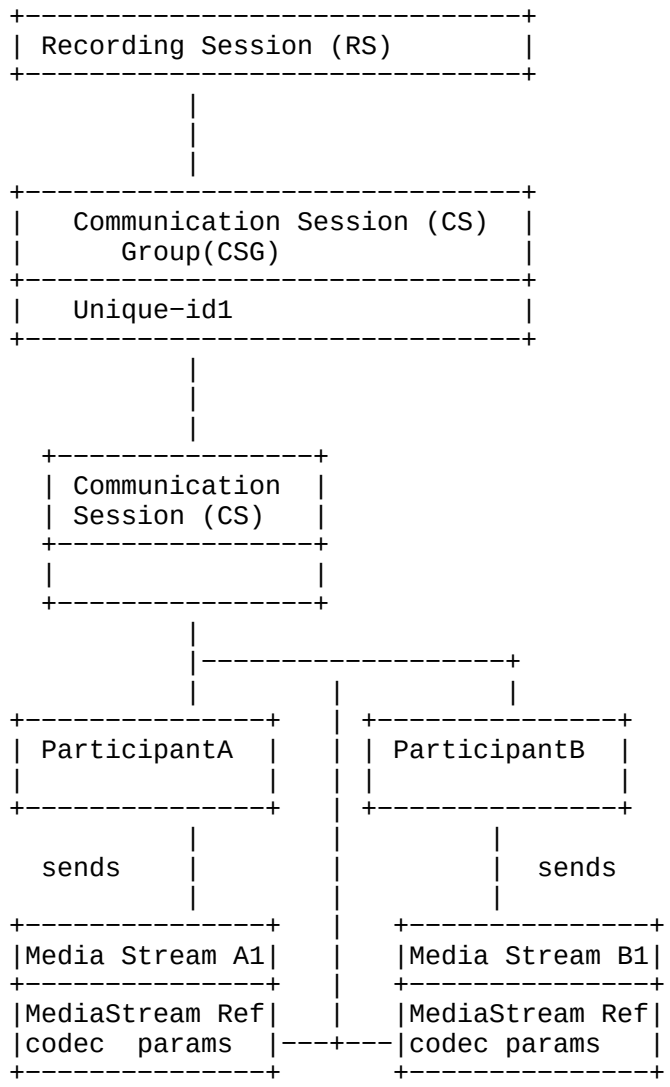
A recording metadata object contains additional data not specified as part of siprec. This is intended to accommodate future standards track extensions, as well as vendor and user specific extensions. The mechanism MUST provide a means of unambiguously distinguishing such extension data.

5. Metadata Model Object Instances

This section describes the metadata model object instances for different use cases of SIPREC. For the sake of simplicity as the media streams sent by each of the participants is received by every other participant in these use cases, it is NOT shown in the object instance diagrams below.

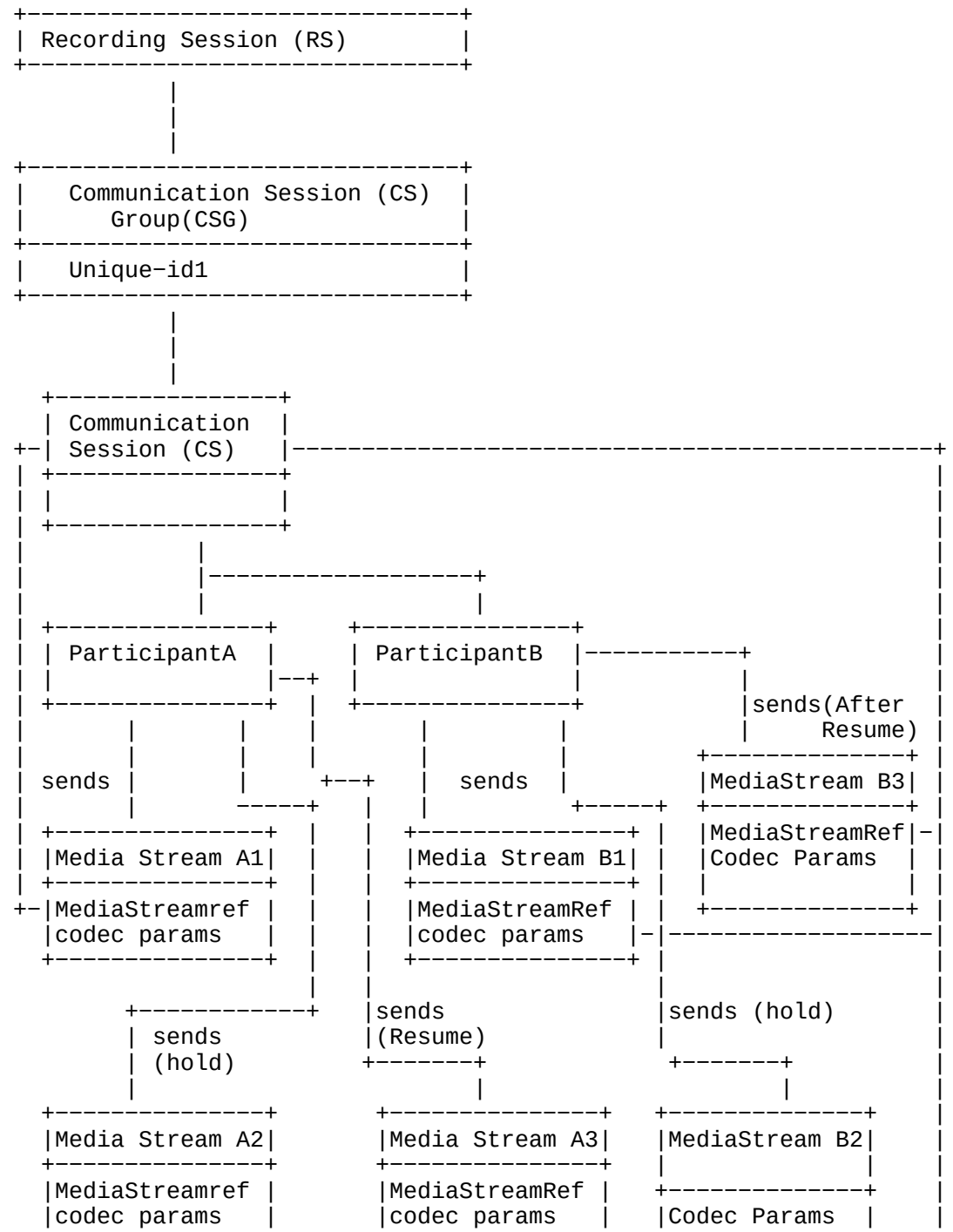
5.1. Use case 1: Basic Call

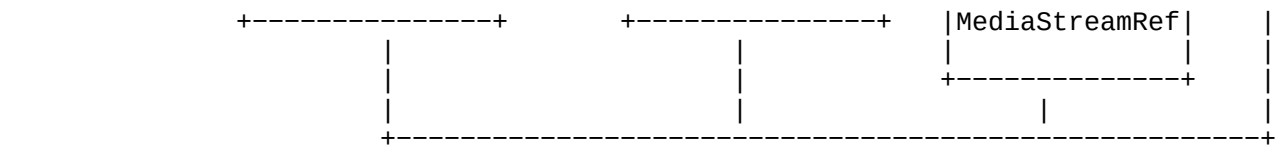
Basic call between two Participants A and B. In this use case each participant sends one Media Stream. For the sake of simplicity "receives" lines are not shown in this instance diagram. Media Streams sent by each participant is received all other participants of that CS.



5.2. Use case 2: Basic Call with hold/resume

Basic call between two Participants A and B and with Participant A or B doing a Hold/Resume. In this use case each participant sends one Media Stream. After Hold/Resume the properties of Media MAY change. For the sake of simplicity "receives" lines are not shown in this instance diagram. Media Streams sent by each participant is received all other participants of that CS.

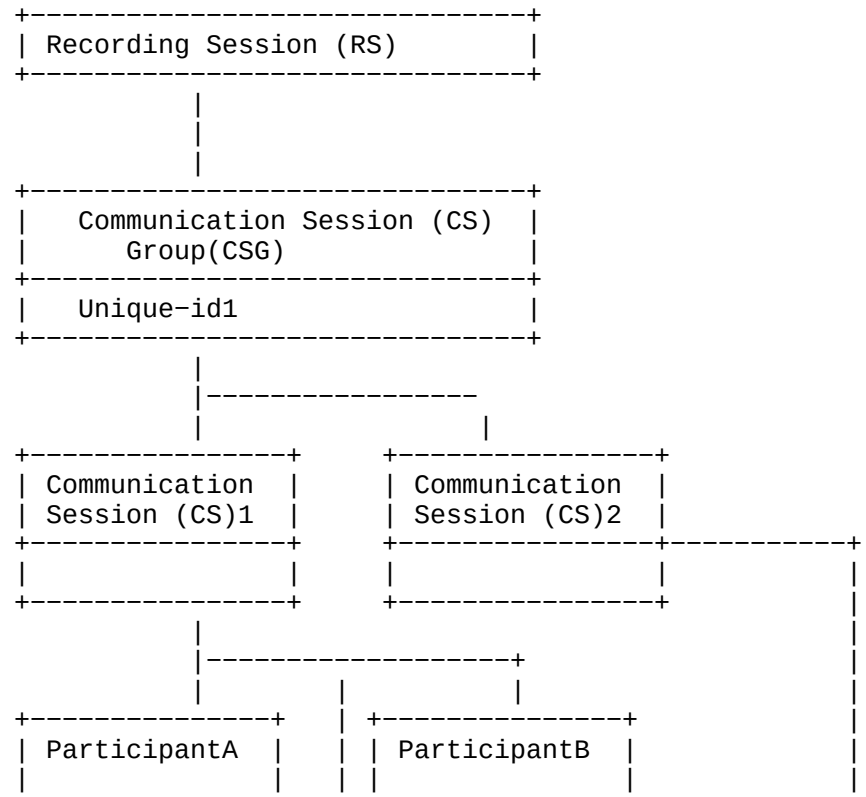

Recording Session (RS)
Communication Session (CS) Group(CSG)
Unique-id1
Communication Session (CS)
ParticipantA
ParticipantB
sends
sends
sends(After Resume)
Media Stream A1
MediaStreamref codec params
MediaStreamRef codec params
Media Stream B1
MediaStreamRef codec params
MediaStream B3
MediaStreamRef Codec Params
sends (hold)
sends (Resume)
sends (hold)
Media Stream A2
MediaStreamref codec params
Media Stream A3
MediaStreamRef codec params
MediaStream B2
Codec Params

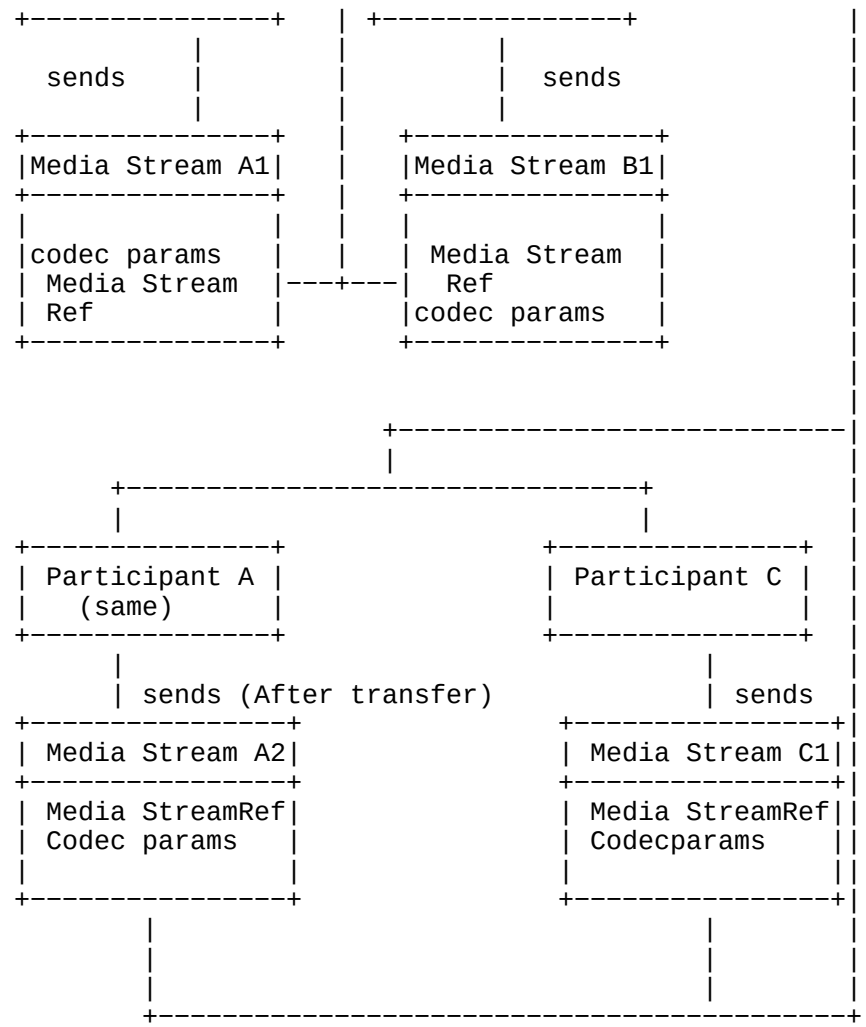


NOTE: Need discssions on how to represent Hold/Resume from SRC to SRS and Pause/Resume from SRS to SRC.

5.3. Use case 3: Basic call with Transfer

Basic call between two Participants A and B and with Participant A transfer(consult transfer) to Participant C. In this use case each participant sends one Media Stream. After transfer the properties of Participant A Media MAY change. For the sake of simplicity "receives" lines are not shown in this instance diagram. Media Streams sent by each participant is received all other participants of that CS.





5.4. Conference Use Cases

Depending on who act as SRC and the information that an SRC has there can be several ways to model conference use cases. This section has instance diagrams for the following cases:

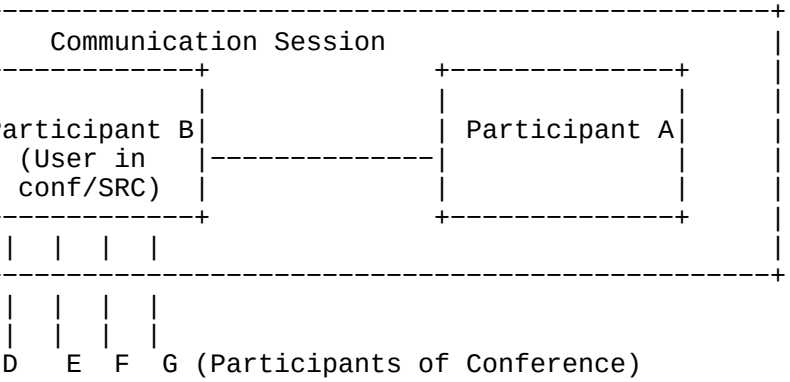
- o A CS where one of the participant (which is also SRC) is a user in a conference
- o A CS where one of the participant is focus (which is also SRC)

- o A CS where one of the participant is user and the SRC is a different entity like B2BUA
- o A CS where one of the participant is focus and the SRC is a different entity like B2BUA

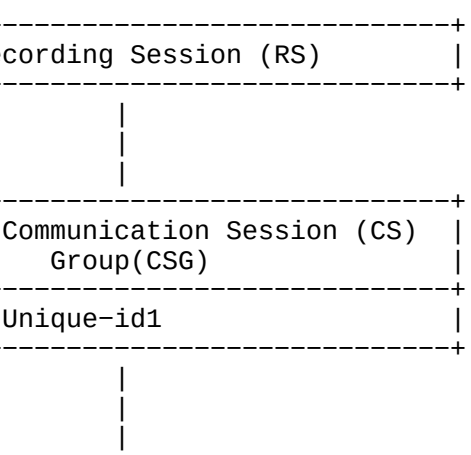
NOTE: There MAY be other ways to model the same use cases depending on what information the SRC has.

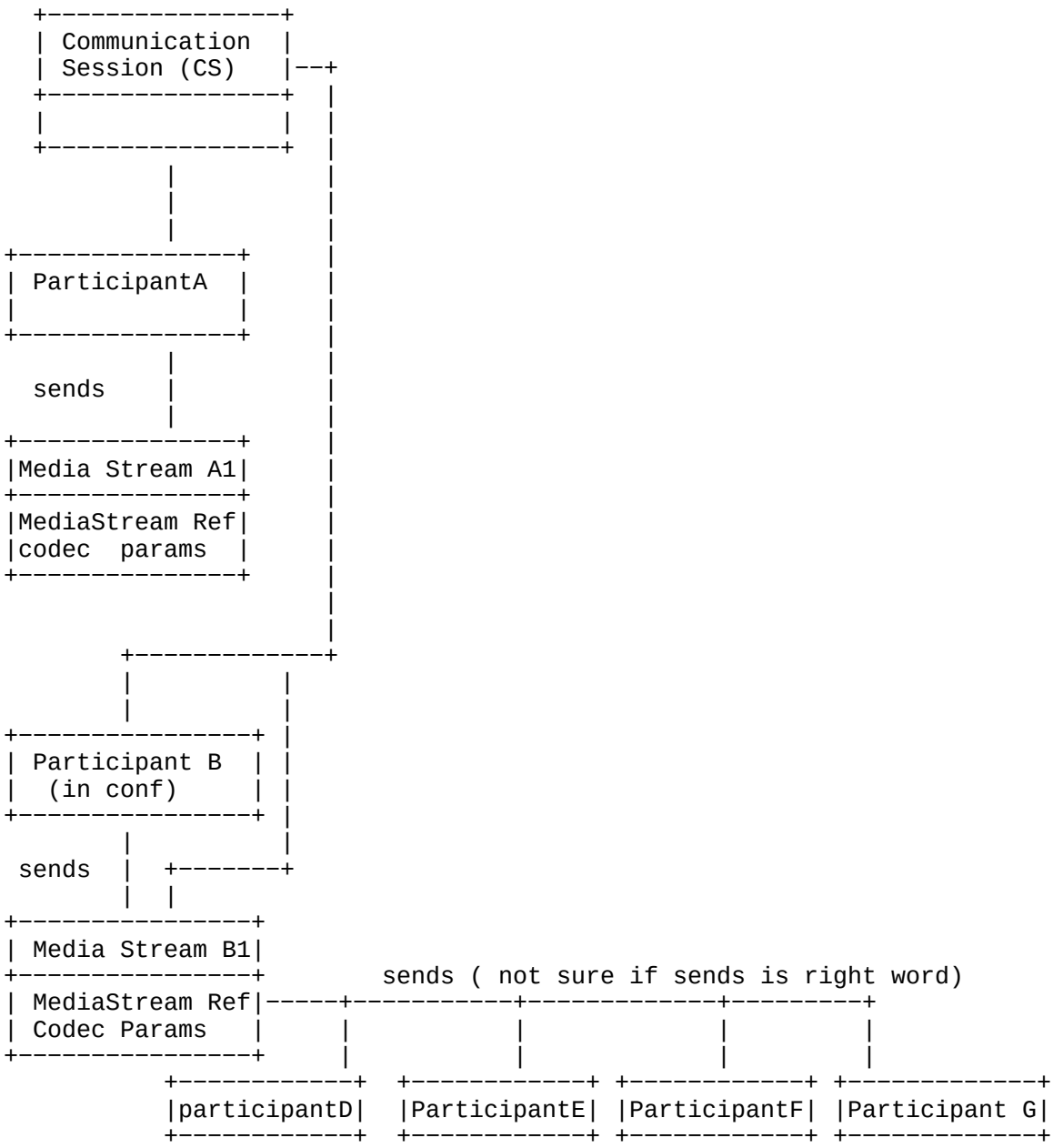
5.4.1. Case 1:

This is the usecase where there is a CS with one of the participant (who is also SRC) as a user in a conference. For the sake of simplicity the receive lines for each of the participant is not shown.



Instance Diagram:



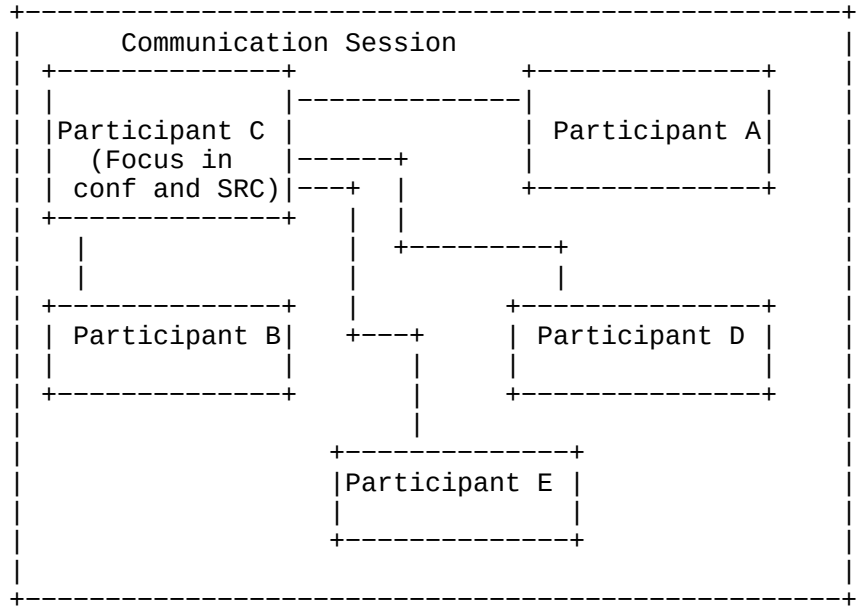


In this example we have two participants A and B who are part of a Communication Session(CS). One of the participants B is part of a

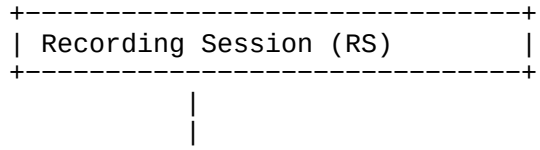
conference and also acts as SRC.There can be two cases here. B can be a participant of the conference or B can be a focus. In this instance diagram Participant B is a user in a conference. The SRC (Participant B) SHALL subscribe to conference event package to get the details of other particiants. Participant B(SRC) SHALL send the same through the metadata to SRS. In this instance diagram the Media Stream(mixed stream) sent from Participant B SHALL have media streams contributed by conference participants (D,E,F and G). For the sake of simplicity the "receives" line is not shown here. In this example the media stream sent by each participant(A or B) of CS is received by all other participant(A or B).

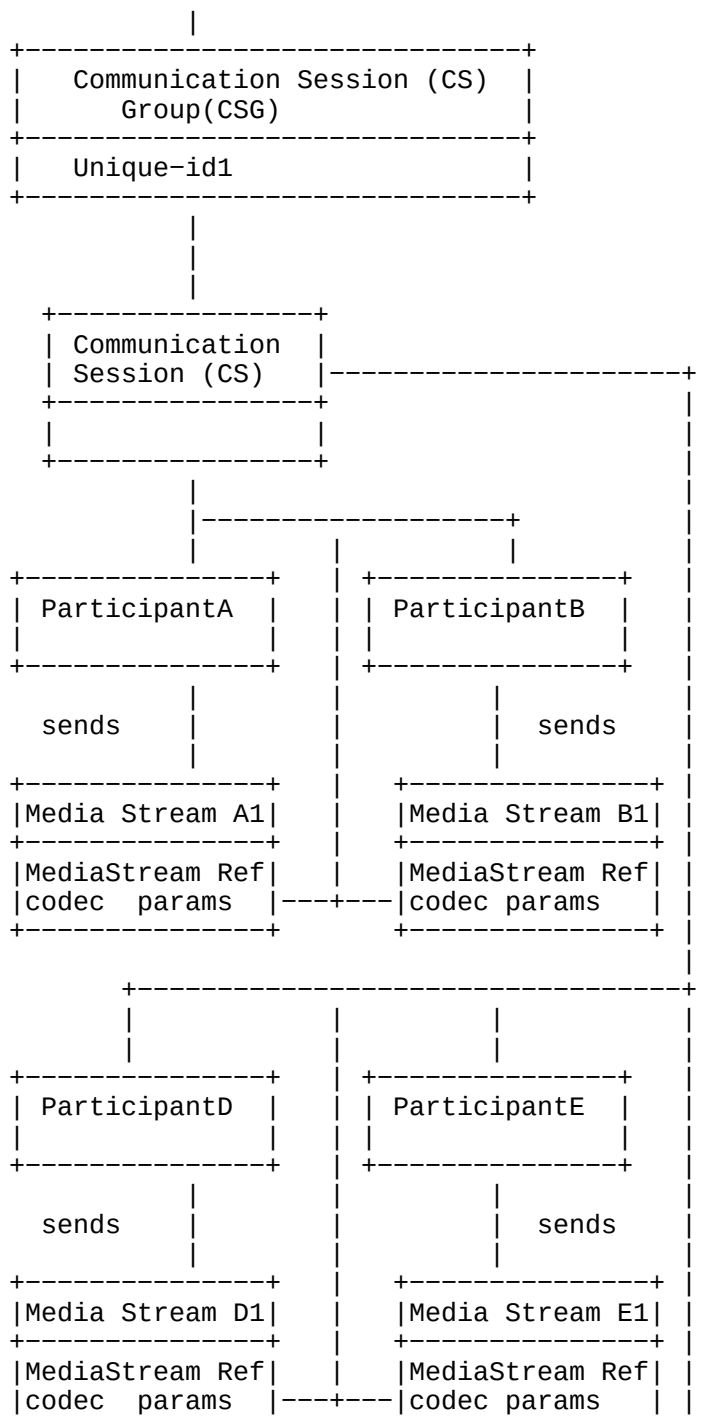
5.4.2. Case 2:

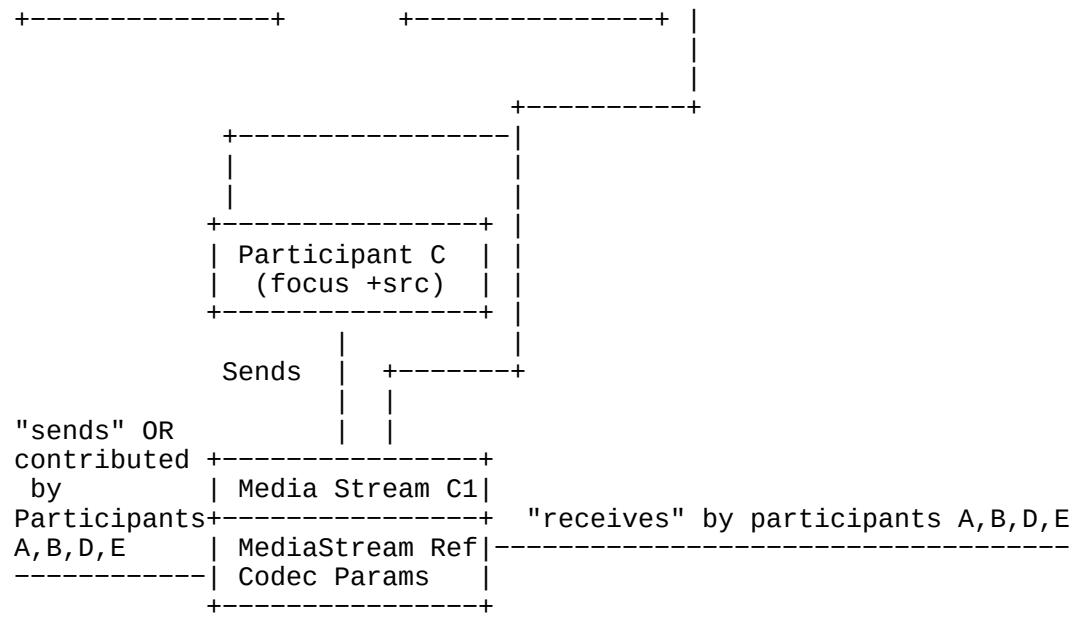
This is the usecase where there is a CS where one of the participant is focus (which is also SRC).



Instance Diagram:




Communication Session (CS)
Group(CSG)
Unique-id1
Communication
Session (CS)
ParticipantA
ParticipantB
sends
sends
Media Stream A1
MediaStream Ref
codec params
Media Stream B1
MediaStream Ref
codec params
ParticipantD
ParticipantE
sends
sends
Media Stream D1
MediaStream Ref
codec params
Media Stream E1
MediaStream Ref
codec params

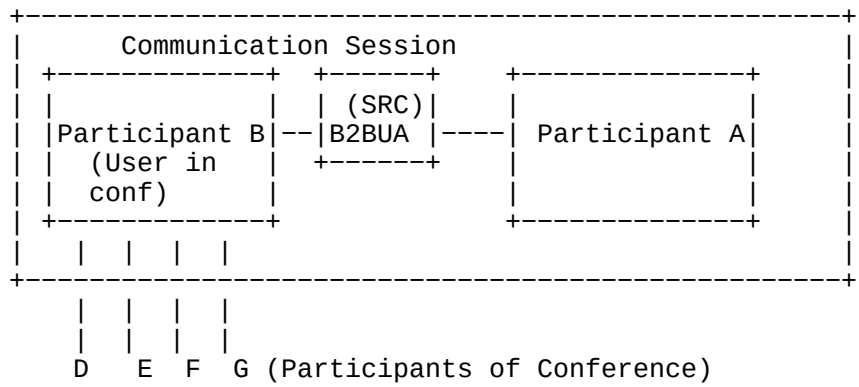


In this example we have two participants A and B who are part of a Communication Session(CS). One of the participants (C) is focus of a conference and also acts as SRC. The SRC (Participant C) being the Focus of the conference SHALL have access to the details of other particiants. SRC (Participant C) SHALL send the same through the metadata to SRS. In this instance diagram the Media Stream(mixed stream) sent by C SHALL have media streams contributed by conference participants (A, B, D and E). Participants A, B,D and E SHALL send Media Streams A1, B1, D1 and E1 respectively. The media stream sent by Participant C(Focus) shall be received by all other participants of CS. For the sake of simplicity the "receives" line is not shown linked to all other participants.

NOTE: SRC (Participant C) MAY send mixed stream or seperate streams to SRS

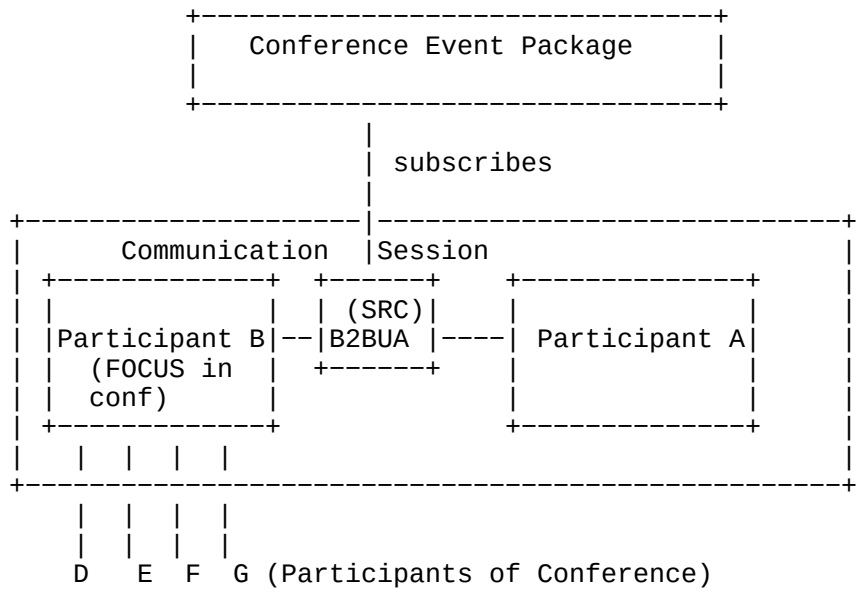
5.4.3. Case 3:

A CS where one of the participant is user and the SRC is a different entity like B2BUA. In this case the SRC MAY not know that one of the user is part of conference. Hence the instance diagram will not have information about the conference participants.



5.4.4. Case 4:

A CS where one of the participant is focus and the SRC is a different entity like B2BUA. In this case the participant which is focus MAY send "isfocus" in SIP message to SRC. The SRC MAY subscribe to conference event package on seeing this "isfocus". SRC SHALL learn the details of other participants of conference from the conference package and send the same in metadata to SRS. The instance diagram for this use case SHALL be same as Case 1.



6. Security Considerations

The metadata information sent from SRC to SRS MAY reveal sensitive Information about different participants of CS. 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 model defined in this document. The security considerations for this SHALL be defined in the solution document.

7. IANA Considerations

Not Applicable

8. Acknowledgement

We wish to thank John Elwell, Henry Lum, Leon Portman, De Villers, Andrew Hutton, Deepanshu Gautam, Charles Eckel for their valuable comments.

9. References

9.1. Normative References

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997.

9.2. Informative References

[I-D.ietf-siprec-req]
Rehor, K., Portman, L., Hutton, A., and R. Jain, "Requirements for SIP-based Media Recording (SIPREC)", draft-ietf-siprec-req-06 (work in progress), December 2010.

[I-D.ietf-siprec-architecture]
Hutton, A., Portman, L., Jain, R., and K. Rehor, "An Architecture for Media Recording using the Session Initiation Protocol", draft-ietf-siprec-architecture-01 (work in progress), October 2010.

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