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*Technical Report*

**3rd Generation Partnership Project;  
Technical Specification Group Services and System Aspects;  
IP Multimedia Subsystem (IMS) service continuity  
enhancements; Service, policy and interaction;  
Stage 2  
(Release 9)**



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Keywords

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# Foreword

This Technical Report has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

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# 1 Scope

This technical report intends to develop enhancements for Rel-8 IMS Service Continuity and solutions for mobility of media flows and control of a session between different devices under the same subscription (i.e. Inter-UE Transfer) to a state where they can be transferred to normative specifications, focusing on the following aspects:

For Inter-UE transfer:

- Inter-UE Transfer scenarios for transferring/retrieval/addition/deletion of media flows in a Collaborative Session;
- Inter-UE Transfer scenarios for establishment or continuation of a Collaborative Session while transferring control;
- Transferring media flows to the target UE whilst keeping the Collaborative Session control in the source UE.

For IMS Service Continuity Enhancement:

- Management of operator policy and user preferences;
- Interaction and coexistence with underlying mobility mechanisms and corresponding policies;
- Further capabilities for the support of mid-call services during session transfer, in addition to those defined in TS 23.292 [6], TS 23.237 [5] and TS 23.216 [6];
- Session Continuity for speech and video over CS.

IMS Service Continuity will be restricted to service continuity using IMS procedures, i.e. mobility mechanisms on the IP-CAN level are not within the scope of this document. This document does not overlap with the underlying EPC and SRVCC features, even though there could be cross-references between the corresponding Technical Specifications.

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# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

- [1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".
- [2] 3GPP TS 22.101: "Service aspects; Service principles".
- [3] 3GPP TS 23.216: "Single Radio Voice Call Continuity (SRVCC); Stage 2".
- [4] 3GPP TS 23.228: "IP Multimedia Subsystem (IMS); Stage 2".
- [5] 3GPP TS 23.237: "IP Multimedia Subsystem (IMS) Service Continuity; Stage 2".
- [6] 3GPP TS 23.292: "IP Multimedia Subsystem (IMS) centralized services; Stage 2".
- [7] 3GPP TS 23.401: "GPRS enhancements for E-UTRAN access".
- [8] 3GPP TS 23.402: "Architecture enhancements for non-3GPP accesses".
- [9] 3GPP TS 24.173: "IMS Multimedia telephony service and supplementary services".

- [10] 3GPP TS 23.892: "IP Multimedia Subsystem (IMS) centralized services".
- [11] 3GPP TS 24.008: "Mobile radio interface Layer 3 specification; Core network protocols; Stage 3".
- [12] 3GPP TS 23.002: "Network architecture".
- [13] IETF RFC 3261: "SIP: Session Initiation Protocol".
- [14] IETF RFC 3680: "A Session Initiation Protocol (SIP) Event Package for Registrations".
- [15] IETF RFC 3840: "Indicating User Agent Capabilities in the Session Initiation Protocol (SIP)".
- [16] IETF RFC 3841: "Caller Preferences for the Session Initiation Protocol (SIP)".
- [17] IETF RFC 3856: "A Presence Event Package for the Session Initiation Protocol (SIP)".
- [18] IETF draft, draft-ietf-sipping-gruu-reg-event-09: "Registration Event Package Extension for Session Initiation Protocol (SIP) Globally Routable User Agent URIs (GRUU)", July 2007.

**Editor's Note:** The above document cannot be formally referenced until it is published as an RFC.

- [19] 3GPP TR 23.883: "Study on Enhancements to ICS".
- [20] 3GPP TS 22.228: "Service requirements for the Internet Protocol (IP) multimedia core network subsystem; Stage 1".
- [21] IETF RFC 5196: "Session Initiation Protocol (SIP) User Agent Capability Extension to Presence Information Data Format (PIDF)"
- [22] 3GPP TS 24.141: "Presence service using the IP Multimedia (IM) Core Network (CN) subsystem; Stage 3".
- [23] 3GPP TS 22.173: "IP Multimedia Core Network Subsystem (IMS) Multimedia Telephony Service and supplementary services; Stage 1".
- [24] 3GPP TS 24.610: "Communication HOLD (HOLD) using IP Multimedia (IM) Core Network (CN) subsystem; Protocol specification".
- [25] 3GPP TS 24.605: "Conference (CONF) using IP Multimedia (IM) Core Network (CN) subsystem; Protocol specification".
- [26] 3GPP TS 24.629: "Explicit Communication Transfer (ECT) using IP Multimedia (IM) Core Network (CN) subsystem; Protocol specification".
- [27] 3GPP TS 24.647: "Advice Of Charge (AOC) using IP Multimedia (IM)Core Network (CN) subsystem; Protocol Specification".

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## 3 Definitions and abbreviations

### 3.1 Definitions

For the purposes of the present document, the terms and definitions in TR 21.905 [1] and the following apply.

**Inter UE Transfer:** A mechanism to support the capability to transfer some or all of the media flows and/or service control across a set of UEs.

**Collaborative Session:** A logical set of one or more IMS sessions (on two or more UEs sharing the same IMS subscription) anchored in the SCC AS that are presented on the Remote Leg as a single IMS session.

NOTE: Procedures for a Collaborative Session with more than one Controller UE are not specified in this release.

**Collaborative Session Control Signalling Path:** A signalling path used to perform control of a Collaborative Session.

**Controller UE:** The UE that controls a Collaborative Session, and may also provide media flows for a Collaborative Session.

**Controllee UE:** A UE that provides media flows for a Collaborative Session, and is subordinate to the Controller UE for session control.

**Media Control Signalling Path:** A signalling path used by the Controllee UE to manage its IMS session established to provide media flow(s) for a Collaborative Session.

**STIset:** A set of STIs that uniquely identify a Collaborative Session.

## 3.2 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [1] and the following abbreviations apply:

IUT	Inter UE Transfer
TI	Transaction Identifier, as defined in TS 24.008 [11]

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# 4 Inter-UE Transfer

## 4.1 Architectural Requirements and Assumptions

### 4.1.1 Architectural requirements

The solution shall fulfil the following architectural requirements:

- IUT shall apply only for sessions that are already established.
- It shall be possible for the UE to apply Inter UE Transfer when a remote end adds media to an existing session.
- IUT shall be able to coexist with access transfer as specified in TS 23.237 [5] and TS 23.292[6].
- Access transfers of multimedia sessions as specified in TS 23.237 [5] can operate independent of IUT.
- If the Collaborative Session control or the Controller UE is lost for an active Collaborative Session, the SCC AS releases all the multimedia sessions participating in that Collaborative Session.
- It shall be possible to support all the IUT service requirements as specified in TS 22.228 [20].
- It shall be possible for the UE to determine all other UEs under the same subscription that are currently available for IUT procedures.
- For IUT, it shall be possible for the UE to determine the media and service capabilities of each available UE.
- The Controllee UE procedures shall not have any impacts to the UE. Therefore any IMS UE shall be able to act a Controllee UE within a Collaborative Session.
- The SCC AS shall prevent the Controllee UE to perform actions that are not allowed for its role (e.g. to add media to an existing session).
- UEs using CS access connected to the IMS via CS/IMS inter-working nodes shall be served with limited Controllee UE functionality based on the constraints of the CS/IMS inter-working nodes.
- The network shall be able to reject IUT between UEs that are not under same subscription.
- The SCC AS shall maintain the end-to-end session service state of a UE engaged in IUT.
- The IUT may be executed in any order, and any number of times, for a given session.



- The Controller UE shall maintain the Collaborative Session control for the session until the session is released or until the Collaborative Session control is transferred to another UE.
- The media flow(s) on the transferred target UE shall be established using IMS session setup procedures as specified in TS 23.228 [4].
- The Controller UE may transfer one or more media flow(s) to one or more target UEs (including itself).
- It shall be possible for the Controller UE to initiate an IUT procedure based on IUT policies provided by the network.
- It shall be possible for the SCC AS to update the IUT policies in the Controller UE to trigger the initiation of an IMS session transfer procedure.
- The selection of the media components, to be transferred, may be based on:
  - Target UE(s) capabilities.
  - User preferences and/or operator policies.
- The remote end of a session shall be made aware when the local end changes due to an IUT procedure without establishing a Collaborative Session. Otherwise the remote end shall not be aware of local IUT procedures.
- The Controller UE shall have up-to-date information about a Collaborative Session, which describes all media components currently existing in this session and the UEs associated with these media components.

## 4.1.2 Level of Inter-UE Transfer Support

### 4.1.2.1 UE Supporting Inter-UE Transfer

An UE supporting Inter-UE Transfer procedures described in this TR can initiate Inter-UE Transfer procedures and be the target for them. One or more of the following functionalities shall be supported by the UE:

- Discover the Inter-UE Transfer target as described in clause 4.6;
- Initiate media transfer of ongoing media or media modifications;
- Participate in the establishment of a Collaborative Session as a Controller or Controllee UE;
- Initiate Collaborative Session control transfer;
- Control the media in Controllee UE;
- Act as target in media transfer;
- Act as target in Collaborative Session control transfer;
- Act as Controllee UE for Controller UE;
- Add/remove media to/from target device;
- Act as a target for media adding/removing.

### 4.1.2.2 UE not supporting Inter-UE Transfer

#### 4.1.2.2.1 General

The supported features are limited to those that only require standard IMS functionality from the UE or from the interworking node acting as a SIP UA on behalf of the UE. No changes are required from the UE or from the interworking node. The UEs belonging to this category cannot act as a Controller UE with all the capabilities described in clause 4.3.

#### 4.1.2.2.2 IMS UE

An IMS UE that is not enhanced to support Inter-UE Transfer procedures, belongs to this category (e.g. Rel-8 SC UE). The following functionalities can be supported with the limitations described below:

- Act as a Controllee UE within a Collaborative Session, but the functionality is limited by the constraints of the UE (e.g. if a procedure requires an optional IMS feature by the UE, which the UE doesn't support, the procedure isn't supported). If the media is not related to an existing session of the UE, the UE handles the transfer request as a new incoming session. If the media is related to an existing session, the UE handles the request as the remote end adds the media.

For the above functionalities, it is required that the UE is IMS registered.

#### 4.1.2.2.3 CS UE connected to IMS via MSC Server enhanced for ICS

It is assumed that an IMS UE is CS attached and IMS registered via MSC Server enhanced for ICS (e.g. Rel-8 MSC Server enhanced for ICS). The following functionalities can be supported with the limitations described below:

- Act as a Controllee UE within a Collaborative Session with limited functionality according the constraints of the UE and the MSC Server (e.g. if video is not supported in the CS domain, the transfer of video media is not supported). If media is not related to an existing session of the UE, the UE handles the transfer request as a new incoming session. If media is related to an existing session, the UE handles the request as the remote end adds media.

The UE is assumed to be IMS registered via I2 interface.

#### 4.1.2.2.4 CS UE connected to IMS via MSC Server not enhanced for ICS

An UE using CS access and connected to IMS via MSC Server not enhanced for ICS (e.g. Rel-7 VCC UE connected to IMS via MGCF). The following functionalities can be supported with the limitations described below:

- Act as a Controllee UE within a Collaborative Session, but the functionality is limited by the constraints of the UE and the MGCF (e.g. if video is not supported in the CS domain. The transfer of video media is not supported). If media is not related to an existing session of the UE, the UE handles the transfer request as a new incoming session. If media is related to an existing session, the UE handles the request as the remote end adds the media.

As the UE is not IMS registered, it cannot be discovered using the dynamic target discovery procedures described in clause 4.6.3. An UE initiating Inter-UE Transfer procedures towards this category of UE needs to have the E.164 number of the device in order to address the transfer request.

## 4.2 Scenarios

The following scenarios describe the different IUT capabilities:

1. IUT Collaborative Session establishment with keep control.
2. IUT Collaborative Session establishment with transfer control.
3. IUT transfer Collaborative Session control.
4. Add new media flows in an ongoing multimedia session of different UEs.
5. Remove media flows bound to different UEs of an ongoing Collaborative Session.

NOTE 1: The UEs referred to above are under the control of the same subscription.

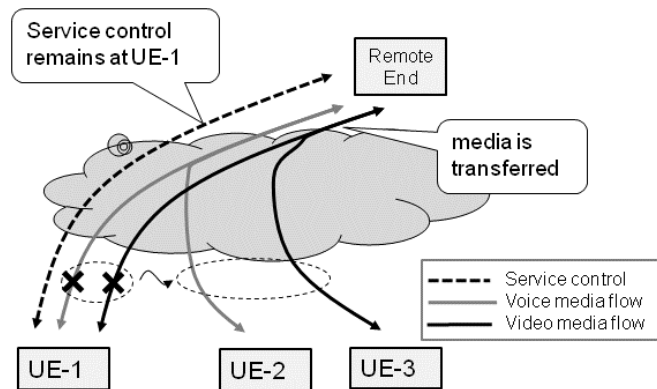
By means of the above capabilities the user is provided with IUT services. The details of the above scenarios of IUT capabilities are described in the following sub-clauses.

NOTE 2: Scenarios where session needs to be transferred between UEs with different subscriptions are outside the scope of this release.

## 4.2.1 IUT Keep Collaborative Session control

This scenario enables the IMS IUT user to establish a Collaborative Session and to transfer one or more media flows of an ongoing multimedia session between different UEs that he owns whilst keeping Collaborative Session control.

In the example shown in Figure 4.2.1-1, a user has a multimedia session on his device UE-1 with voice and video media flows. Subsequently, the user transfers the voice media flow from device UE-1 to device UE-2 and the video media flow from device UE-1 to device UE-3. After the transfer is completed, the Collaborative Session control remains with the device UE-1 and no media remains on the device UE-1. UE-1, UE-2 and UE-3 are then involved in a Collaborative Session, for which UE-1 is the Controller UE whereas UE-2 and UE-3 are Controllee UEs.

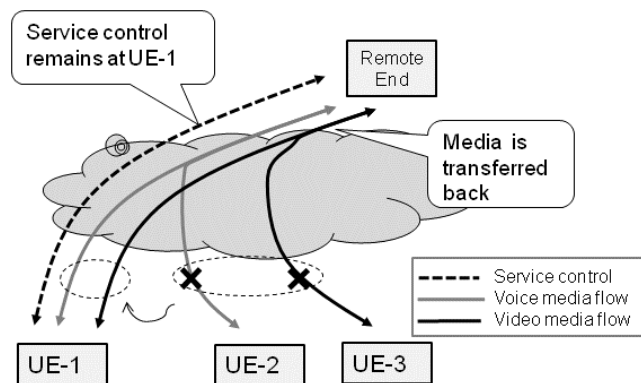


**Figure 4.2.1-1: An example of media flow transfer whilst keeping Collaborative Session control: The voice media flow is transferred to UE-2 and the video media flow is transferred to UE-3. The Collaborative Session control remains with UE-1**

**NOTE:** The Inter UE Transfer should also consider that different access networks can have different access capabilities, e.g., data rates, and different UEs can have different capabilities, e.g. display resolutions, Codecs, video encoding and decoding capabilities. In this scenario as part of the session continuity procedure, the UE may need to re-negotiate the different capabilities, in addition to changing the terminal and access network.

Within a Collaborative Session, the Controller UE can initiate inter-UE transfer of media flows bound to the Controllee UEs.

Continuing on the previous example, the user from his device UE-1 transfers the voice and video media flows of the Collaborative Session back to UE-1. This is shown in Figure 4.2.1-2.

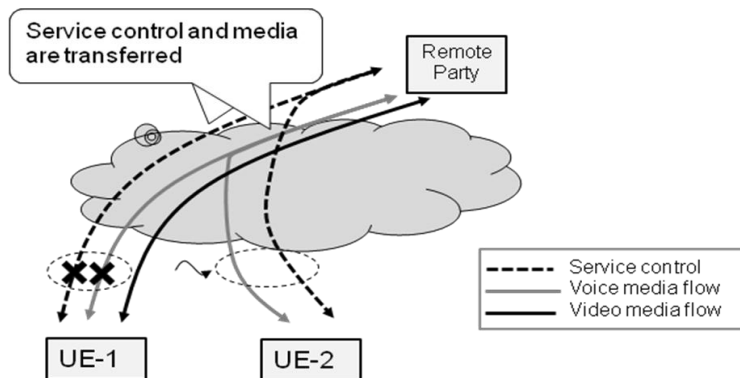


**Figure 4.2.1-2: An example of media flow transfer whilst keeping Collaborative Session control: The voice media flow on UE-2 and the video media flow on UE-3 are transferred back by Controller UE, UE-1**

## 4.2.2 IUT Transfer Collaborative Session control

This scenario enables the IMS IUT user to establish a Collaborative Session and to transfer Collaborative Session control and zero or more media flows of an ongoing multimedia session between different UEs that he owns.

In the example shown in Figure 4.2.2-1, a user has a multimedia session on her device UE-1 with voice and video media flows. Subsequently, the user selects to transfer the voice media flow and the Collaborative Session control from device UE-1 to device UE-2. After the completion of this transfer, UE-1 and UE-2 are involved in a Collaborative Session, for which UE-2 is made the Controller UE and UE-1 becomes a Controllee UE.



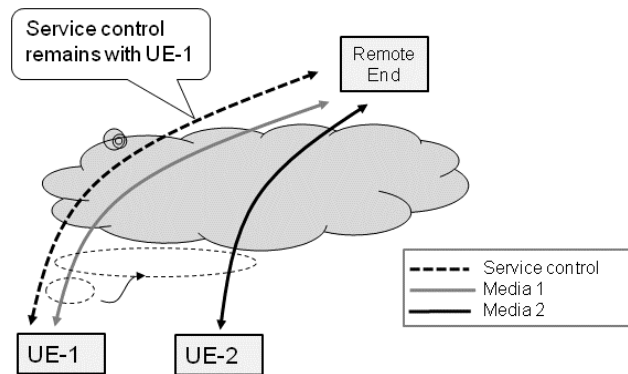
**Figure 4.2.2-1: An example of media flow and Collaborative Session control transfer: The voice media flow as well as the Collaborative Session control are transferred to UE-2**

### 4.2.3 Add new media flows in an ongoing multimedia session of different UEs

In this scenario the IUT user adds new media flows to an ongoing multimedia session targeted to additional UEs.

In the example shown in Figure 4.2.3-1, a user has initially an ongoing multimedia session on his UE-1 with only a voice component (Media 1). Subsequently, the user establishes a Collaborative Session and adds a video component (Media 2) to the session which is targeted to his device UE-2, while keeping the audio media and Collaborative Session control on his UE-1.

**NOTE:** This case refers specifically to the scenario where the user adds new media flow(s) to a different device, e.g. from device UE-1 he adds a media flow to device UE-2, as shown in figure 4.2.3-1. Addition of media flow(s) to the same device is considered a trivial case, readily supported by session re-negotiation between two peers.



**Figure 4.2.3-1: An example of media flow addition: UE-1 adds a video media flow to UE-2**

There is another scenario for adding new media flows to different UEs, which is when a new added media flow(s) request is coming to UE-1, the UE-1 transfers the added media flow(s) to UE-2.

### 4.2.4 Remove media flows bound to different UEs of an ongoing Collaborative Session

In this scenario the user removes existing media flows from an ongoing Collaborative Session on different UEs.

In the example shown in Figure 4.2.4-1, a user has initially an ongoing Collaborative Session with a voice media flow on her UE-1 and a video media flow on her UE-2. UE-1 is the Controller UE. Subsequently, the user from device UE-1 removes the video media flow that is active on device UE-2.

NOTE: Removal of media flow(s) on the same UE is considered a trivial scenario, readily supported by session re-negotiation between two peers.

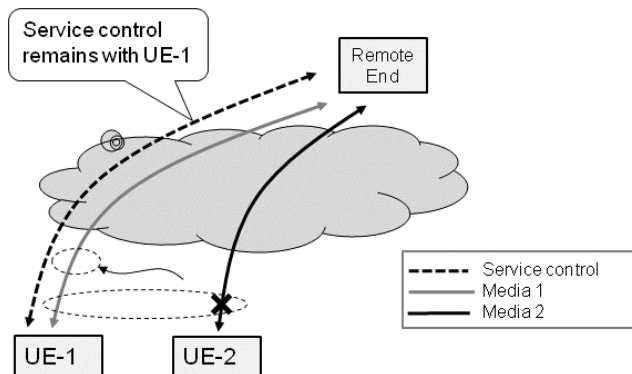


Figure 4.2.4-1: An example of media flow removal - UE-1 removes the video media flow active on UE-2

## 4.3 Controller UE and Controllee UE operations for an existing Collaborative Session

### 4.3.1 Overview

Table 4.3.1-1 provides an overview of Controller UE and Controllee UE operations.

Table 4.3.1-1 Controller UE and Controllee UE operations

	Operations	Controller UE	Controller UE Comment	Controllee UE	Controllee UE Comment
Add Media flow (local end initiating case)	Add media flow by creating a new Access Leg on the same UE	Yes	Standard SC procedures.	No	
	Add media flow by creating a new Access Leg on a different UE	Yes	New capability of Inter UE.	No	The Controllee UE can accept/reject media flow addition using Standard IMS procedures.
	Add media flow to an existing Access Leg on the same UE	Yes	Standard IMS procedures.	No	
	Add media flow to an existing Access Leg on a different UE	Yes	New capability of Inter UE.	No	The Controllee UE can accept/reject media flow addition using Standard IMS procedures.
Remove Media flow (local end initiating case)	Remove media flow from an Access Leg on the same UE.	Yes	Standard IMS procedures.	Yes	If all the media flows are removed from the Access Leg, the Access Leg is released. The Controller UE will be informed of this drop.
	Remove media flow from an Access Leg on a different UE	Yes	New capability of Inter UE.	No	
Invoke Supp Services	MMTEL Collaborative Session control with media on same UE (TS 22.173)	Yes	Standard IMS procedures.	No	
	MMTEL Service Control with media on different UE (TS 22.173)	Yes	New capability of Inter UE.	No	Editors' note: It is FFS whether MMTel service control can be applied with media on different UE.
Renegotiate Media characteristics (local end initiating side)	Collaborative Session Release	Yes	New capability of Inter UE.	No	
	Update of media characteristics on the same UE	Yes	Standard IMS procedures.	Yes	The Controller UE will be informed with the new media characteristics renegotiated by the Controllee UE. Editor's Note: Does the Controller UE need to know the new media characteristics is FFS.
	Update of media characteristics on a different UE.	Yes	New capability of Inter UE.	No	The Controllee UE can accept/reject media flow renegotiation.
Transfer Media flow/Collaborative Session Control	Transfer (in/out) of the media flow	Yes		No	Only Controller UE can initiate the transfer.
	Transfer (in/out) of Collaborative Session control	Yes		No	Only Controller UE can initiate the transfer.

### 4.3.2 Controller UE Operations (Collaborative Session control)

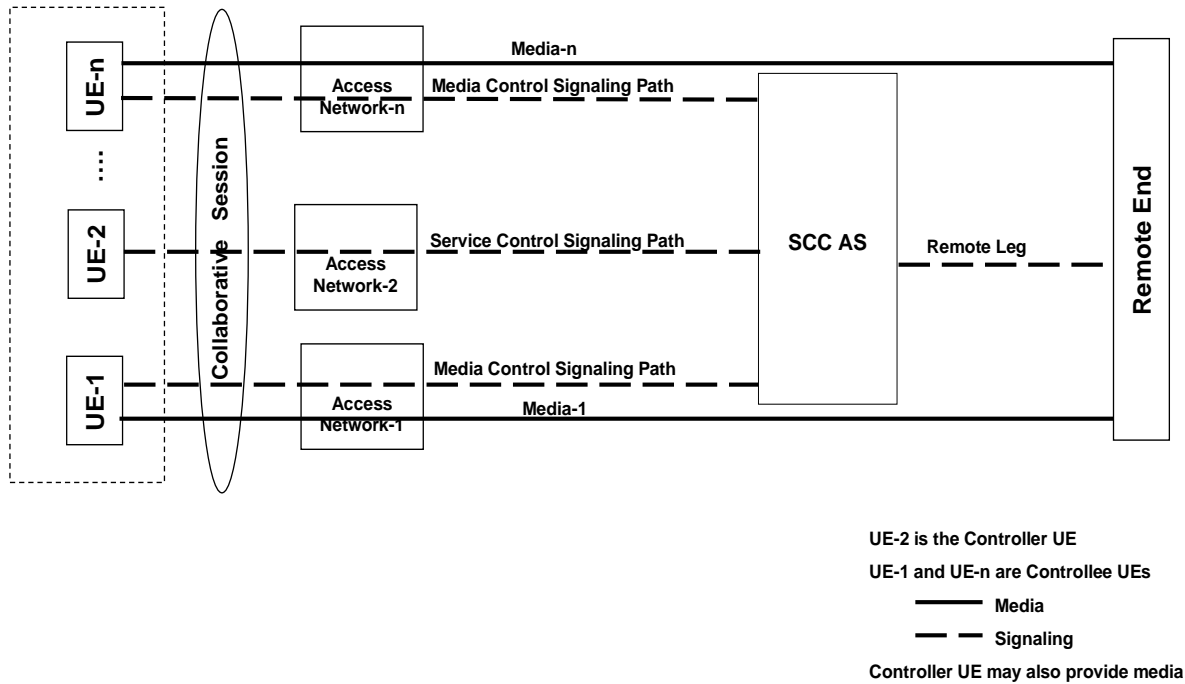
- The Controller UE can initiate the addition of a media flow to a Collaborative Session, on any of the Controllee UEs already involved in the collaborative session.
- The Controller UE can initiate the modification of a media flow that is part of a Collaborative Session it controls.
- The Controller UE can initiate the release of a media flow that is part of a Collaborative Session it controls.
- The Controller UE shall keep track about the state of the media flows which are part of a Collaborative Session it controls. That means it shall remain aware about the media flows that are established, as well as about the media used for those.
- The Controller UE is the one to accept or refuse requests for media additions initiated by the remote party for a Collaborative Session it controls. In case it accepts a remote party initiated media addition, the controller decides on which terminal the media shall be added.
- The Controller UE for a Collaborative Session can initiate Inter-UE transfer of one or more of the media flows of the Collaborative Session.
- The Controller UE can initiate the release of a Collaborative Session.
- The Controller UE can add into a Collaborative Session it controls a UE not yet involved in this Collaborative Session.

### 4.3.3 Controllee UE Operations (media control)

- The Controllee UE can initiate the modification of a media flow which terminates on it.
- The Controllee UE can initiate the release of a media flow which terminates on it.
- The Controllee UE is the one to accept or refuse media modifications initiated by the remote party for a media flow it terminates.
- The Controllee UE is able to accept or refuse:
  - media modifications initiated by the remote party or by the Controller UE, for media flow(s) it terminates;
  - media additions initiated by the Controller UE or by a remote party (in the latter case, this assumes that the Controller UE has accepted the addition and selected the Controllee UE);
  - media transfers initiated by the Controller UE, for which the Controllee UE is the target.

## 4.4 General Principles and Description

IUT for service continuity allows a multi media session to be split on the local end across two or more UEs that are part of a Collaborative Session. The UEs are under the control of the same IMS subscription and may be connected to IMS CN from a diverse set of access networks. Figure 4.4-1 provides an example illustration of these principles.



**Figure 4.4-1: Inter UE transfer and Collaborative Session control**

The Controller UE provides the Collaborative Session control for a Collaborative Session using IMS signalling on the Collaborative Session control Signalling Path. Collaborative Session control entails the Controller UE operations described in section 4.3.2.:

**Editor's Note:** The possibility for the Controller UE to initiate mid-call services for any media flows involved in the Collaborative Session is FFS.

**NOTE:** If the Controller UE terminates media flow(s), besides Collaborative Session control, it also provides media control for the media flow(s) that it terminates.

The Controllee UE controls the media flow(s) that it terminates using IMS signalling on the Media Control Signalling Path via the media control signalling path. Media control entails Controllee UE operations described in section 4.3.3.:

## 4.5 Architecture Reference Model

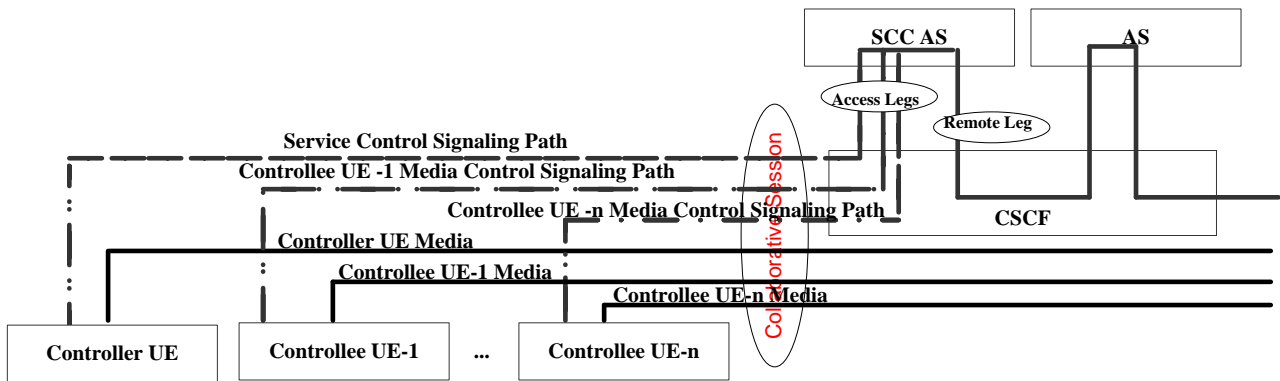
### 4.5.1 Architecture Alternative 1

#### 4.5.1.1 Overview

This architecture alternative builds on the Service Consistency and Service Continuity functions of SCC AS specified in 3GPP Rel-08 to enable set up and session transfers of multi-media sessions across multiple UEs such that the Collaborative Session control is provided by one UE and the media is established using the UE providing the Collaborative Session control and/or other UEs.



### 4.5.1.2 Signalling and Bearer Architecture



**Figure 4.5.1.2-1: Signalling and Bearer architecture**

NOTE: The media in Controller UE is optional.

A Media Control Signaling Path is established on a Controllee UE, and a media flow is transferred from Controller UE to Controllee UE, by using Collaborative Session control of the Controller UE (e.g. in the SDP).

The SCC AS combines the Collaborative Session control signalling with the media description communicated over the Media Control Signaling Path. The SCC AS also employs 3pcc for enabling Inter UE Transfers and maintains end-to-end session service state across Inter UE transfers forming a B2BUA:

- Access Leg: The Access Leg is either Collaborative Session control or Media Control Signaling Path of Collaborative Session.
- Remote Leg: The Remote Leg is presented by the SCC AS to the CSCF as a standard IMS session.

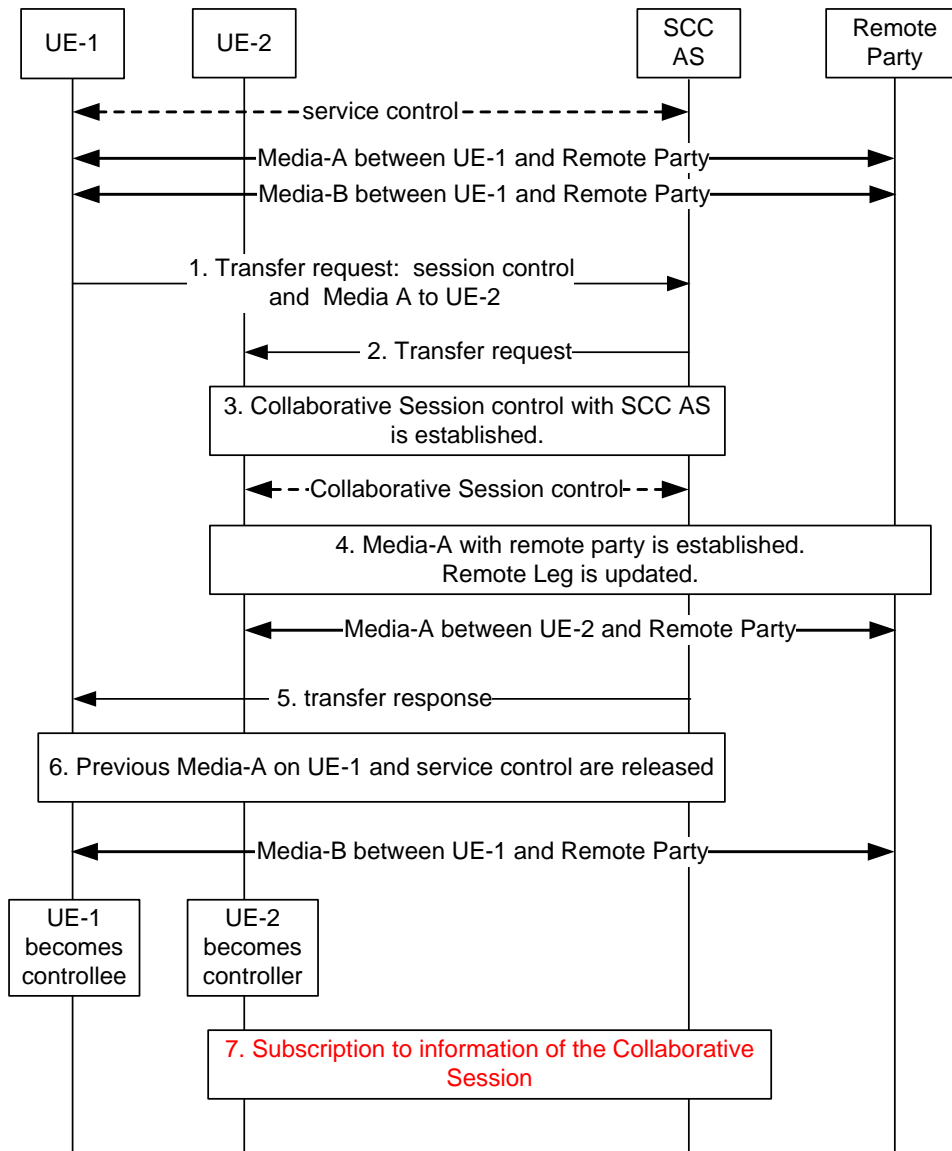
The TAS and other Application Servers are executed on the Remote Leg as part of standard service execution logic at the CSCF.

### 4.5.1.5 Information flows

#### 4.5.1.5.1 Collaborative Session establishment

##### 4.5.1.5.1.1 Establish Collaborative Session and transfer Collaborative Session control

In this example, UE-1 has a multimedia session with a Remote UE, which is anchored at the SCC AS. The multimedia session contains two media components and UE-1 wants to transfer the service control and one of the media to another UE-2. It is assumed that UE-1 and UE-2 belong to the same subscriber (i.e. they share the same subscription).



**Figure 4.5.1.5.1.1-1: Establish Collaborative Session and transfer Collaborative Session control**

1. UE-1 decides to transfer the service control and media-A to UE-2. It sends a request to the SCC AS, indicating that the current service control and Media-A will be transferred to UE-2.

NOTE: Authorization in this step by the SCC AS should be required in order to make sure e.g. that both UEs share the same subscription.

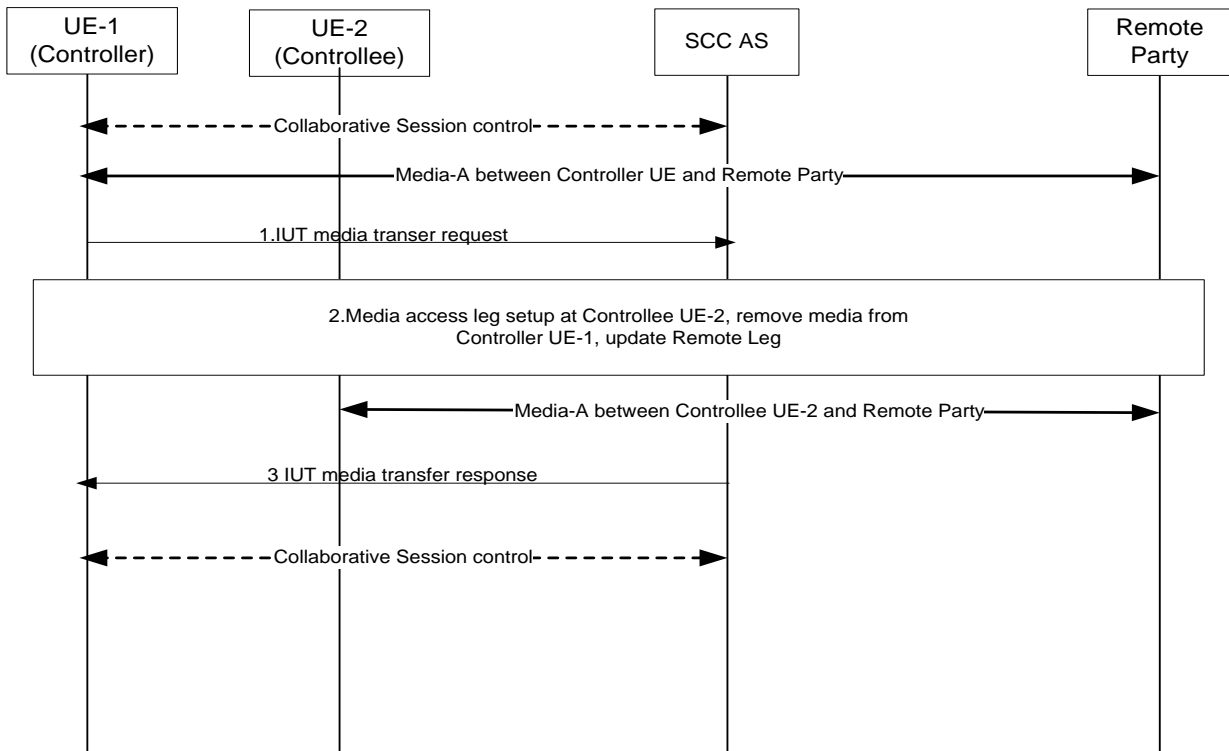
2. The SCC AS identifies the request, and sends a transfer request to UE-2, indicating that the session control and Media-A will be transferred to UE-2.
3. The Collaborative Session control between UE-2 and the SCC AS is established. UE-2 becomes the controller UE for the established Collaborative Session.
4. Media-A between UE-2 and remote party is established. The remote leg is updated accordingly.
5. After the successful establishment of the Collaborative Session control and Media-A on UE-2, the SCC AS sends a transfer response back to UE-1.
6. The Previous Media-A on UE-1 and the Collaborative Session control is released. UE-1 becomes a controllee UE.
7. Controller UE subscribes to the SCC AS for changes of media flows that are part of the Collaborative Session.

## 4.5.1.5.2 during established Collaborative Session

## 4.5.1.5.2.1 Controller Initiated Procedures

## 4.5.1.5.2.1.1 Controller Initiated Transfer Media: Controller to Controllee

UE-1 and UE-2 are under the same user subscription. Following is an example information flow for UE-1 performing media transfer to UE-2; after the transfer, the UE-1 maintains the role of the Controller UE, and UE-2 maintains the role of the Controllee UE.



**Figure 4.5.1.5.2.1.1-1: Controller Initiated Transfer Media - Controller to Controllee**

1. UE-1 sends IUT media transfer request to the S-CSCF to transfer the Media-A from UE-1 to UE-2. The IUT media transfer request shall include the enough information for the network to:
  - identify the transferred media flow is Media-A;
  - identify the source of the transferred media flow is UE-1;
  - identify the target of the transferred media flow is UE-2;
  - keep the service control of the transferred media flow in the Controller UE.
2. The SCC AS initiates the media session setup procedure with UE-2 for the Media-A, executes the remove Media-A procedure from UE-1, and updates Remote Leg with Remote Party.

*Editor's Note: Whether details for this step are required is FFS.*

*Editor's Note: In case the Controllee UE-2 was involved prior to the media transfer, and therefore there exists an access leg between the SCC AS and Controllee UE-2, it is FFS how the SCC AS decides if a new access leg needs to be established or if an existing one can be reused.*

3. The SCC AS sends media transfer response to UE-1.

When the above transfer is completed the SCC AS retains the service state (e.g. media flows status) of UE-1 and UE-2, and the UE-1 retains the control of the Collaborative Session.

NOTE 1: UE-1 can transfer other media flows from UE-1 by repeating the above step 1-3.

NOTE 2: If, besides the Media-A, there are other media flows in the session between UE-1 and Remote Party, the other media flows shall not be impacted by the above session transfer operation.

4.5.1.5.2.1.2 Controller Initiated Transfer Media: Controllee to Controllee

UE-1, UE-2 and UE 3 are under the same user subscription. There is a session with Media-A between UE-2 and Remote Party. The following figure presents an example information flow of UE-1 performing IUT media transfer from UE-2 to UE 3.

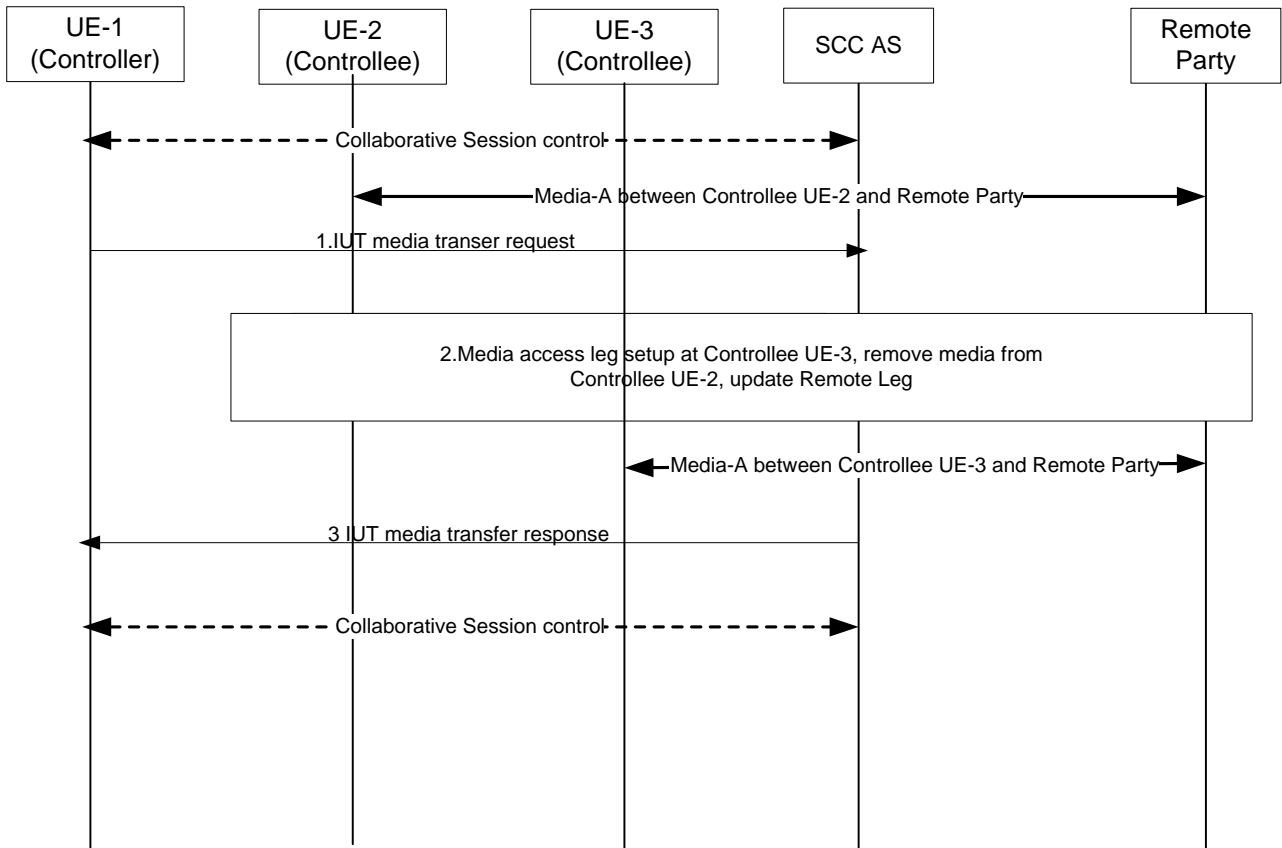


Figure 4.5.1.5.2.1.2-1: Controller Initiated Transfer Media - Controllee to Controllee

1. UE-1 sends IUT media transfer request to the SCC AS to transfer the Media-A from UE-2 to UE 3. The IUT media transfer request shall include the enough information for the network to:
  - identify the transferred media flow is Media-A;
  - identify the source of the transferred media flow is UE-2;
  - identify the target of the transferred media flow is UE 3;
  - keep the service control of the transferred media flow in the UE-1.
2. The SCC AS initiates the media session setup procedure with UE 3 for the Media-A, executes the remove Media-A procedure from UE-2, and updates Remote Leg with Remote Party.
3. The SCC AS sends media transfer response to UE-1.

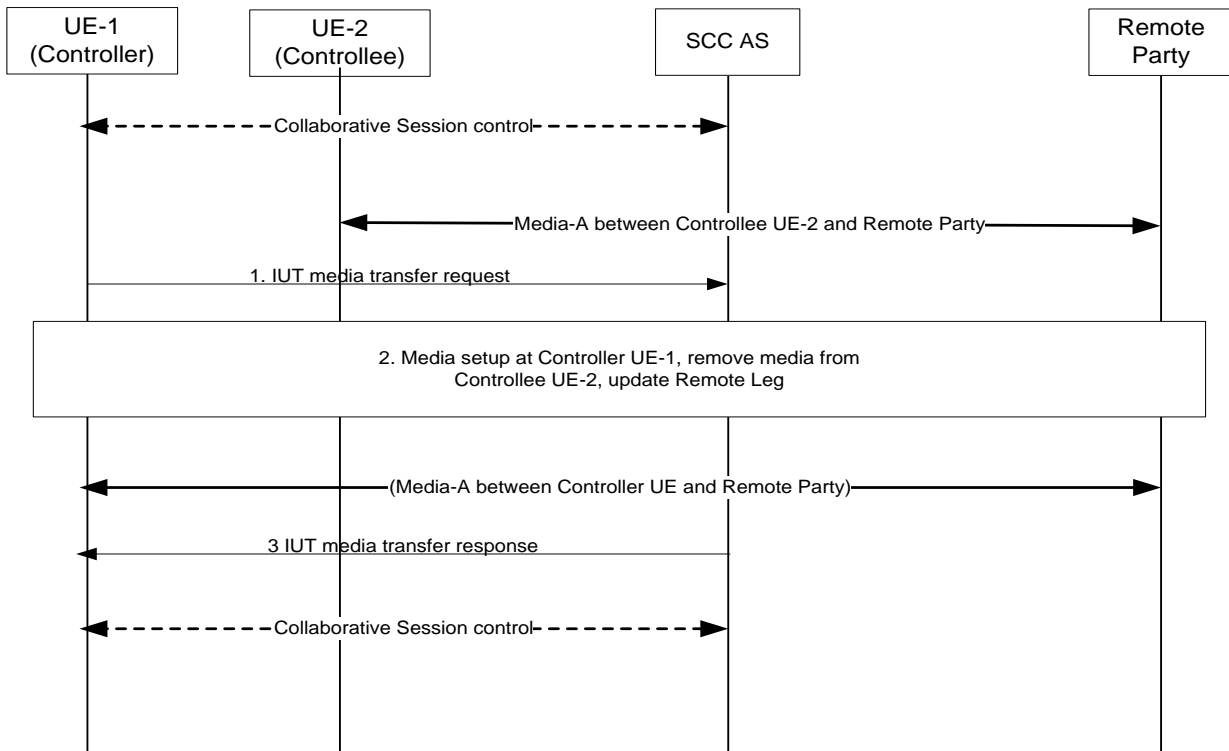
When the session transfer is completed UE-1 keeps the Collaborative Session control.

NOTE 1: UE-1 can transfer other media flows from UE-2 by repeating the above step 1-3.

NOTE 2: If, besides the Media-A, there are other media flows in the session between UE-2 and Remote Party, the other media flows shall not be impacted by the above session transfer operation

## 4.5.1.5.2.1.3 Controller Initiated Transfer Media: Controllee to Controller

Figure 4.5.1.5.2.1.3-1 depicts an example call flow for the case when a Controller UE transfers a media flow from a Controllee UE to itself.



**Figure 4.5.1.5.2.1.3 -1: Controller Initiated Transfer Media - Controllee to Controller**

A collaborative session exists, involving Controller UE-1 and Controllee UE-2. Controllee UE-2 has an established media flow with remote party. To transfer media from Controllee UE-2 to Controller UE-1 the following procedures are applied:

1. Controller UE-1 initiates a media transfer request, indicating the media flow to be transferred from Controllee UE-2 to Controller UE-1. The IUT media transfer request shall include the enough information for the network to:
  - identify the transferred media flow is Media-A;
  - identify the source of the transferred media flow is Controllee UE-2;
  - identify the target of the transferred media flow is Controller UE-1.

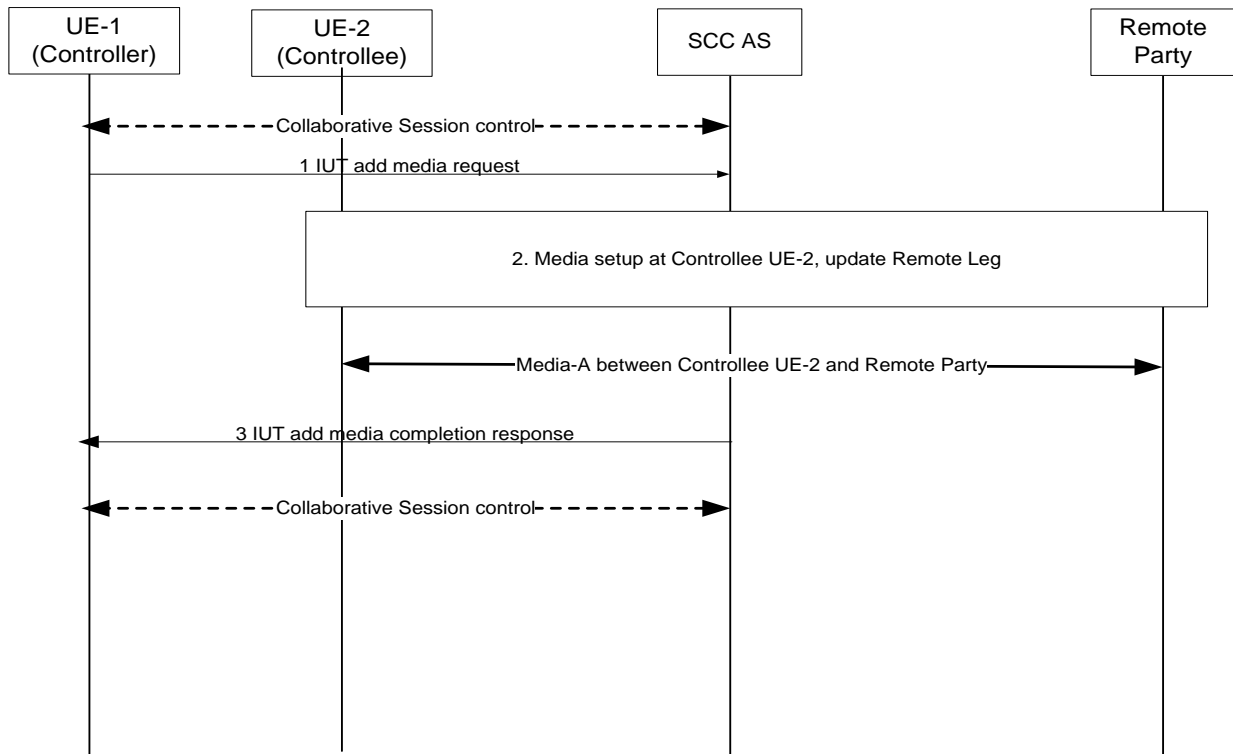
2. SCC AS initiates the transfer by setting up the requested media flow towards Controller UE-1, removing the media flow from Controllee UE-1, and updating the remote leg. The media flow will after this be established between Controller UE-1 and remote party.

NOTE 1: If no more media remains on the access leg between SCC AS and Controllee UE-2, this access leg is released and Controllee UE-2 will no longer be part of the Collaborative Session.

3. The IUT media transfer is completed.

## 4.5.1.5.2.1.4 Controller Initiated Add New Media: On Controllee

Figure 4.5.1.5.2.1.4 depicts an example call flow for the case when the Controller UE adds a media flow to the Controllee UE. Such add media procedure could result in a new access leg for the Controllee UE, or it could be an additional media flow for an already existing session for the Controllee UE. In addition, the media could be a replicate of the media session the controlling UE is currently involved in or it could be a new media for both Controllee UE and Controller UE.



**Figure 4.5.1.5.2.1.4: Controller Initiated Add New Media - On Controllee**

Adding media to the Controllee from the controlling UE would follow the following steps:

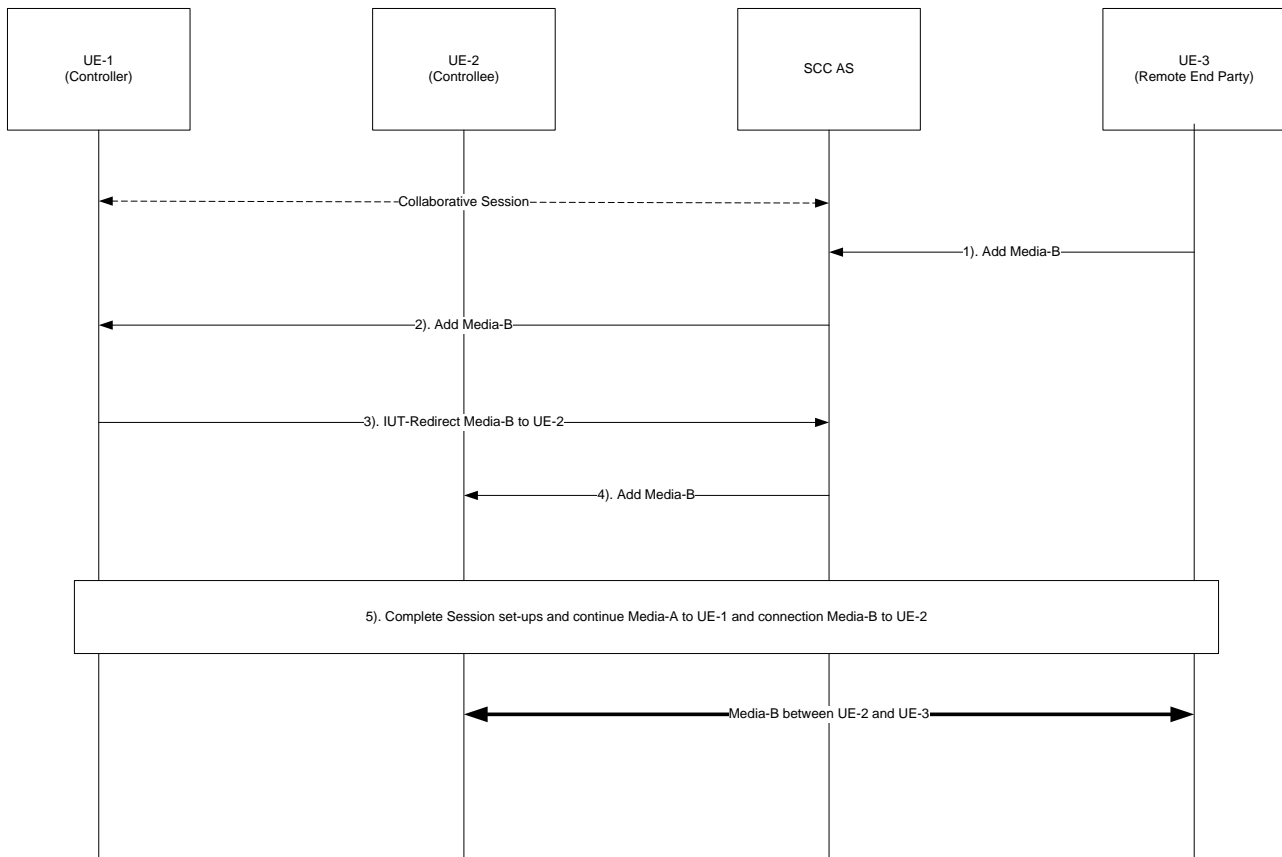
1. Controller UE-1 decides to add a new media flow to Controllee UE-2, and performs a IUT add media request for the particular media requested. The IUT media transfer request shall include the enough information for the network to:
  - identify the added media flow is Media-A;
  - identify the source of the added media flow is Controllee UE-2;
2. The new media flow is setup for Controllee UE-2, and the remote leg is updated as well with the newly added media flow. The new media flow will after this be established between Controllee UE-2 and remote party.
3. The IUT addition of media is completed.

4.5.1.5.2.2 Remote Party Initiated Procedures

4.5.1.5.2.2.1 Remote Party Initiated Add New Media: On Controllee

The following is an example of an information flow where UE 3 wants to modify an existing session with UE-1 to add Media-B. However, UE1 wants to redirect Media-B to UE-2 while retaining the Collaborative Service control of the Media-B in UE-1. The procedures are similar if UE 3 creates a new session towards UE-1 offering Media-B, instead of modifying an existing session.

NOTE 1: UE-1 and UE-2 belong in the same user subscription. UE-1 is the Controller UE and UE-2 is a Controllee UE.



**Figure 4.5.1.5.2.2.1-1: Remote Party Initiated Add New Media - On Controllee**

1. UE 3 sends an add media message to add Media- B to an existing session between UE-1 and UE 3 as per TS 23.228 [4].

NOTE 2: The media (Media B) can be also offered in a new session towards UE-1 as per TS 23.228 [4].

2. SCC AS forwards the add media message to UE-1 according to the procedures defined in TS 23.228 [4].
3. Controller UE-1 sends an IUT-Redirect-Media message to SCC AS. The IUT-Redirect-Media message needs to include at least the following information:
  - identify that Media-B needs to be redirected to UE-2;
  - identify that control for Media- B remains in Controller UE-1.
4. SCC AS sends an Add Media-B to UE-2;
5. The session setup is complete.

After the above add media operation, there is Media-B between UE 3 and UE-2. There is a Collaborative Session established between UE-1 and UE-2. The Media-B is controlled by UE-1.

## 4.6 UE Awareness

### 4.6.1 General

When initiating an Inter-UE transfer(s), an IMS UE may use the following information:

- other UEs belonging to the same subscription
- the availability (e.g., online, offline etc) of the UEs
- the capabilities (e.g., support of audio/video formats etc) of the UEs

## 4.6.2 Alternative 1 – Based on user configuration

The UE should maintain a list of authorized UEs, and their capabilities, that could be presented to the end-user. The list of UEs, eligible for Inter-UE Transfer, could either be provisioned statically or entered manually by the end-user.

NOTE: Such a provisional list of authorized UE's does not by itself determine whether or not the UE is currently available.

## 4.6.3 Alternative 2 – Based on dynamic discovery

### 4.6.3.1 Dynamic discovery based on IMS registration

The principle of this alternative is that the user and/or the UE is provided with the correct information in a dynamic manner about which devices under the same subscription are available and suitable for Inter-UE Transfer in that particular moment, and also what are the media capabilities of these devices.

The UE could obtain the contacts, GRUUs and human readable names of the currently registered devices under the same subscription using mechanisms such as RFC 3680 [14] and draft-ietf-sipping-gruu-reg-event [18]. In addition, the mechanism described in IETF RFC 3840 [15] allows advertising also the media capabilities of the said contacts.

When new UEs become available (e.g. a device is switched on or simply registers with IMS) or becomes unavailable (e.g. a device is switched off or deregisters with IMS), UEs under the same subscription, that have registered for this information, get notifications and can update the information provided to the user with regards to the other UEs that could potentially be used as targets for Inter-UE Transfer.

The following sections 4.6.3.2 and 4.6.3.3 describe additional mechanisms that can be utilized in implementation specific manner, if they are available. Section 4.6.3.4 presents an example information flow on dynamic discovery.

### 4.6.3.2 Capability query

An alternative to identify the capabilities of the UEs, once the GRUUs are known, is to perform SIP capability query towards the registered contacts (i.e. GRUUs) as described in RFC 3261 [13]. The media capabilities of the other devices can be provided as described in RFC 3840 [15] and RFC 3841 [16].

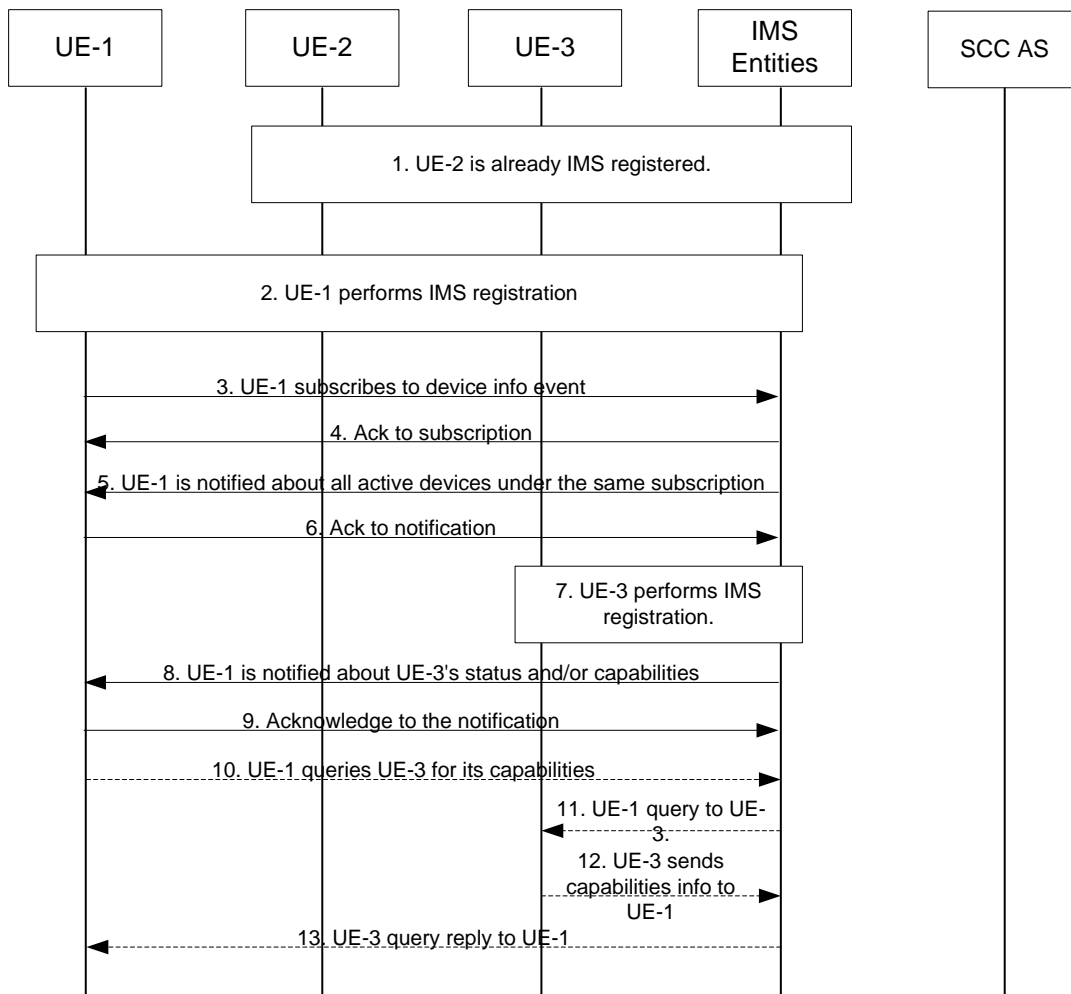
### 4.6.3.3 Dynamic discovery based on presence

Yet another mechanism for dynamic discovery and learning about the capability of other UEs is based on presence service described in TS 24.141 [22]. The UE may subscribe to the presence event package described in RFC 3856 [17] and get notified about the availability and media capabilities of the other contacts as specified in RFC 5196 [21]. For UE to utilize presence for IUT target discovery, it is required that the presence service is available to the UE.

### 4.6.3.4 Example information flow

An example of how the aforementioned mechanisms might be used is shown in Figure 4.6.3-1:





**Figure 4.6.3-1 Inter-UE Transfer target discovery based on dynamic mechanisms**

1. UE-2 is IMS registered following the procedures defined in TS 23.228 [4].
2. UE-1 performs IMS registration following the procedures defined in TS 23.228 [4].
- 3 ~ 4. UE-1 is interested to discover the status and capabilities of other devices under the same subscription. It subscribes to an event package for registration information and the capabilities information.
- 5 ~ 6. The IMS CN subsystem notifies UE-1 of other devices (e.g. UE-2) status and, if available, capabilities information.
7. UE 3 performs IMS registration.
- 8 ~ 9. The IMS CN subsystem notifies UE-1 of UE 3's availability and, if available, capabilities information.

Optionally, if no sufficient UE capabilities information is included in step 9, then the following steps can be performed:

- 10 ~ 13. Among all the available devices, UE-1 is interested in performing Inter-UE transfer to UE 3. UE-1 sends query to UE 3 to request device capability information as described in IETF RFC 3261.

#### 4.6.4 Evaluation of the alternatives

Alternative 1 described in clause 4.6.2 proposes that the target for Inter-UE Transfer is configured to the UE. The configuration mechanism is implementation specific need not require standardization work. In this alternative, it is not possible for the UE to know, which of the terminals are currently available, i.e. switched on and registered. Therefore the user may try to execute the Inter-UE Transfer procedure and get an error back, if the target is not available. These procedures do not require standardization work.

Alternative 2 described in clause 4.6.3 proposes that the target for Inter-UE Transfer is discovered dynamically based on IMS registration of the available devices. By nature, in this alternative the discovered devices are known to be available for Inter-UE Transfer. The procedures to dynamically discover the IUT target based on IMS registration described in section 4.6.3.1, need to be standardized, but it is based on existing mechanisms. However, the procedures to complete the discovery by performing a capability query as described in section 4.6.3.2 and the procedures to use presence to discover IUT target can be seen as implementation options that can be used if available, but they do not require standardization work as the mechanisms are already standardized.

It is possible to combine the two alternatives, such that the list of possible target UEs is configured in the UE, but the dynamic procedure is used to discover if the target UE is available or not. This combining is implementation specific and does not require standardization work.

## 4.7 Information of Collaborative Session

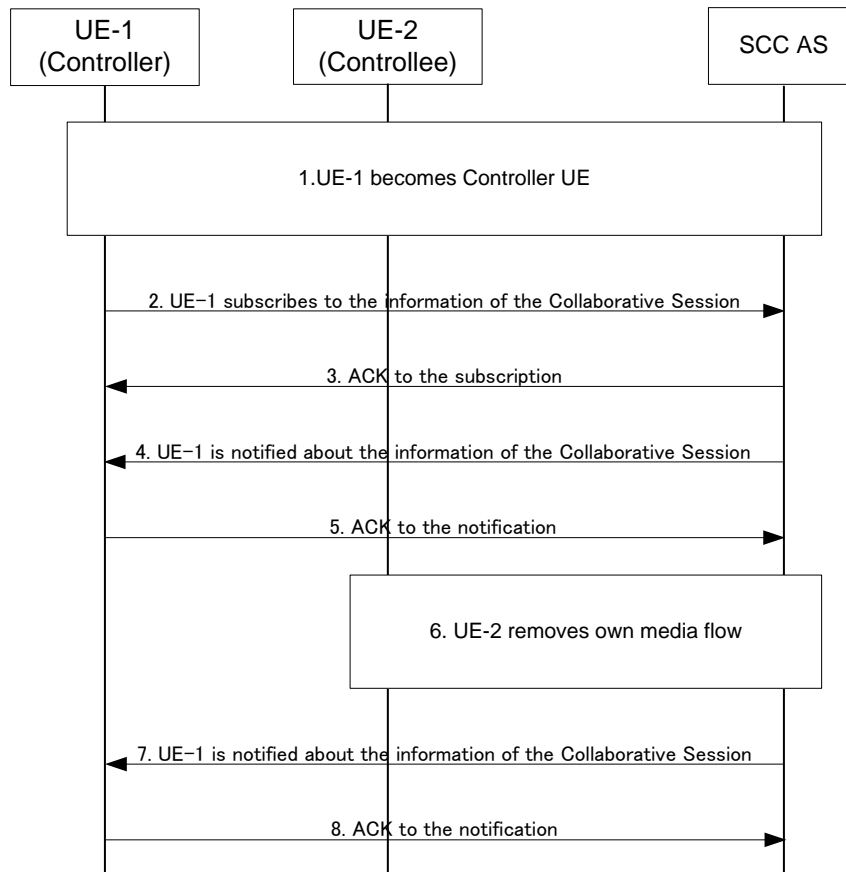
### 4.7.1 General

The Controller UE provides to the user up-to-date information about a Collaborative Session in order to enable the user perform appropriate IUT operations. For this purpose, the Controller UE maintains the following information about a Collaborative Session:

- All media flows currently existing in this Collaborative Session.
- UEs associated with the media flows.

### 4.7.2 Notification of the information of the Collaborative Session

The following is an example of an information flow where UE-1 (Controller UE) requests from the SCC AS to receive information about a Collaborative Session. When the information of the Collaborative Session is changed, e.g. when UE-2 (Controllee UE) removes its own media flow, then UE-1 is notified and receives updated information about the Collaborative Session from the SCC AS.



**Figure 4.7.2-1 Notification of the information of Collaborative Session**

1. UE-1 becomes a Controller UE in the Collaborative Session.
- 2 ~ 3. UE-1 subscribes to the SCC AS to be notified when the information of the Collaborative Session changes.
- 4 ~ 5. The SCC AS provides UE-1 with the current information of the Collaborative Session.
6. UE-2 performs a media removal for its own media in the Collaborative Session.
- 7 ~ 8. The SCC AS notifies UE-1 with the updated information of the Collaborative Session.

## 4.8 Execution of supplementary services

### 4.8.1 General

Even though the media components for the Collaborative Session are split onto multiple Access Legs of different UEs, the remote end is presented with one session including all the media components. This section describes the SCC AS and IUT UE procedures for handling supplementary services as described in TS 22.173 [23].

*Editor's Note: The interactions listed in this clause when a CS media is involved requires further study.*

### 4.8.2 Originating Identification Presentation (OIP)

The OIP service is not impacted by IUT.

### 4.8.3 Originating Identification Restriction (OIR)

The OIR service is not impacted by IUT.

#### 4.8.4 Terminating Identification Presentation (TIP)

The TIP service is not impacted by IUT.

#### 4.8.5 Terminating Identification Restriction (TIR)

The TIR service is not impacted by IUT.

#### 4.8.6 Communication Diversion (CDIV)

The CDIV service is not impacted by IUT.

#### 4.8.7 Communication Hold (HOLD)

If the Controller UE wants to invoke the HOLD service on one or more media component(s), the Controller UE shall invoke the HOLD procedures, as defined in TS 24.610 [24]. The SCC AS shall act on the HOLD requests by updating all the Controllee UEs whose media status are changed and shall update the remote Access Leg using the procedures defined in TS 24.610 [24].

#### 4.8.8 Communication Barring (CB)

The CB service is not impacted by IUT.

#### 4.8.9 Message Waiting Indication (MWI)

The MWI service is not impacted by IUT.

#### 4.8.10 Conference (CONF)

Only the Controller UE can invoke the CONF service for the Collaborative Session and it shall follow the procedures as defined in TS 24.605 [25] for any CONF service related operations.

When the remote end sends a request for the CONF service to replace an existing session, the SCC AS shall deliver the request for CONF service to the Controller UE, which then sets up new session and releases the existing session by following the normal Collaborative Session control procedures.

**Editor's Note: It is FFS whether or not the media control sessions on the Controllee UEs can be reused by the session established between the Controller UE and the conferencing AS.**

#### 4.8.11 Explicit Communication Transfer (ECT)

Only the Controller UE can invoke the ECT service on behalf of the Collaborative Session and it shall follow the procedures as specified in TS 24.629 [26]. Upon receiving notification that ECT has been performed successfully, the Controller UE shall terminate the previous active session with the transferee UE by terminating all related media control sessions on the Controllee UEs.

Upon receiving an ECT transfer request from the remote end to transfer the Collaborative Session, the SCC AS shall deliver the request to the Controller UE.

Upon receiving an ECT transfer request to transfer the Collaborative Session, the Controller UE shall establish a new session toward the transfer target and terminate the previous active session with the remote end by terminating all related media control sessions on the Controllee UEs.

**Editor's Note: It is FFS whether or not the media control sessions on the Controllee UEs can be reused by the session established between the Controller UE and the transfer target.**

#### 4.8.12 Advice of Charge (AOC)

When the AOC service specified in TS 24.647 [27] is active, the SCC AS shall deliver charging information during the communication to the Controller UE.

#### 4.8.13 Closed User Groups (CUG)

The CUG service is not impacted by IUT.

#### 4.8.14 Three-Party (3PTY)

The 3PTY service in TS 24.605 [25] is considered as a special case of CONF service and the interaction with IUT is the same as that specified in clause 4.8.10 for CONF service.

#### 4.8.15 Flexible Alerting (FA)

The FA service is not impacted by IUT.

#### 4.8.16 Communication Waiting (CW)

*Editor's Note: The interaction with this service is FFS.*

#### 4.8.17 Completion of Communications to Busy Subscriber (CCBS)/Completion of Communications by No Reply (CCNR)

*Editor's Note: The interaction with this service is FFS.*

#### 4.8.18 Customized Alerting Tones (CAT)

The CAT service is not impacted.

---

## 5 Other IMS Service Continuity enhancements

### 5.1 General

### 5.2 Operator policy and user preferences

The mechanisms to convey the user preferences are entailed in TR 23.883 [19].

### 5.3 Interaction and coexistence with underlying mobility mechanisms and corresponding policies

#### 5.3.1 Architectural requirements

The solution shall fulfil the following architectural requirements:

- It shall be possible to update the S-CSCF and SCC AS with the access network information when UE changes IP-CAN without changing contact address, e.g. using the mobility mechanism specified in TS 23.401 [7] and TS 23.402 [8]. This information is thus available for T-ADS.

- The T-ADS shall be robust to handle cases where the access network capability of the UE is not up-to-date.
- The solution shall work with ISR, when ISR is deployed and used.
- It is preferred that the solution shall be possible with and without PCC.
- It shall be possible to perform session transfer between two registered contacts regardless of whether they are registered via the same access network or via different access networks.

**Editor's Note:** How to trigger session transfer between contacts registered via the same access network is FFS.

**Editor's Note:** The interaction between IMS Service Continuity and ANDSF policies is FFS.

## 5.4 Support of mid-call services during session transfer

### 5.4.1 Architectural Requirements

- The solution shall provide PS-CS Access Transfer of multiple multi-media sessions for configurations in which ICS UE capabilities (i.e., Gm and I1) are not supported.
- The solution can coexist with ICS UE capabilities in configurations where both are supported by the UE and/or by the network.
- The solution shall be based on PS-CS Access Transfer procedures specified in TS 23.237 [5].

### 5.4.2 Alternative 1: MSC Server enhancement to support mid-call services during session transfer

#### 5.4.2.1 PS-CS Assumptions

The following assumptions apply for PS-CS service continuity in addition to those in TS 23.237 [5]:

- If the session transfer request is sent by or via the MSC Server and the MSC Server has indicated its capability in the registration or indicates its capability in the session transfer request sent to the SCC AS, the SCC AS provides session state information on active and inactive sessions with speech media on the transferring-in leg for enablement of PS-CS service continuity of IMS multimedia-sessions.
- If either the UE (during registration) or operator policy on the SCC AS indicate that network capabilities shall not be used to support mid-call services during session transfer, the SCC AS will not provide session state information on active and inactive sessions with speech media on the transferring-in leg. Operator policy on the UE shall include information on whether use of ICS capabilities is restricted for session transfer.

#### 5.4.2.2 Access Transfer (PS – CS) concepts

When using a UE that does not have, or that is unable to use, ICS capabilities as specified in TS 23.292 [6], Access Transfer of one active and zero or more inactive speech-only sessions shall be provided when transferring voice media bearer between CS and PS access.

SCC AS maintains for all active and held sessions a subscriber session state information containing A party, B party, and further session information (e.g. active, inactive, conference call initiator) as required.

The SCC AS provides session state information on one or two sessions with speech media to the MSC Server enhanced for ICS as specified in TS 23.292 [6] or the MSC Server enhanced for SRVCC as specified in TS 23.216 [3] on the transferring-in leg when transfer from PS to CS access happens if the session transfer request has been sent by or via an MSC Server and if the MSC server has indicated its capability. The SCC AS does not provide session state information if either the UE or operator policy on the SCC AS indicates that network capabilities shall not be used to support mid-call services during session transfer. When receiving information about an additional session, the MSC Server initiates session transfer towards SCC AS for the additional session. In case of PS to CS single-radio, both the UE and the MSC Server use the same (pre-defined) Transaction Identifier for the active and the inactive session, e.g. TI1 for the active session and TI2 for the inactive session. In case of PS to CS dual-radio, both the UE and the MSC Server use the same

(pre-defined) Transaction Identifier for the inactive session. In case the UE is using a conference service when camping on PS, the UE will allocate the TIs and send them to the SCC AS for all participants of the conference service.

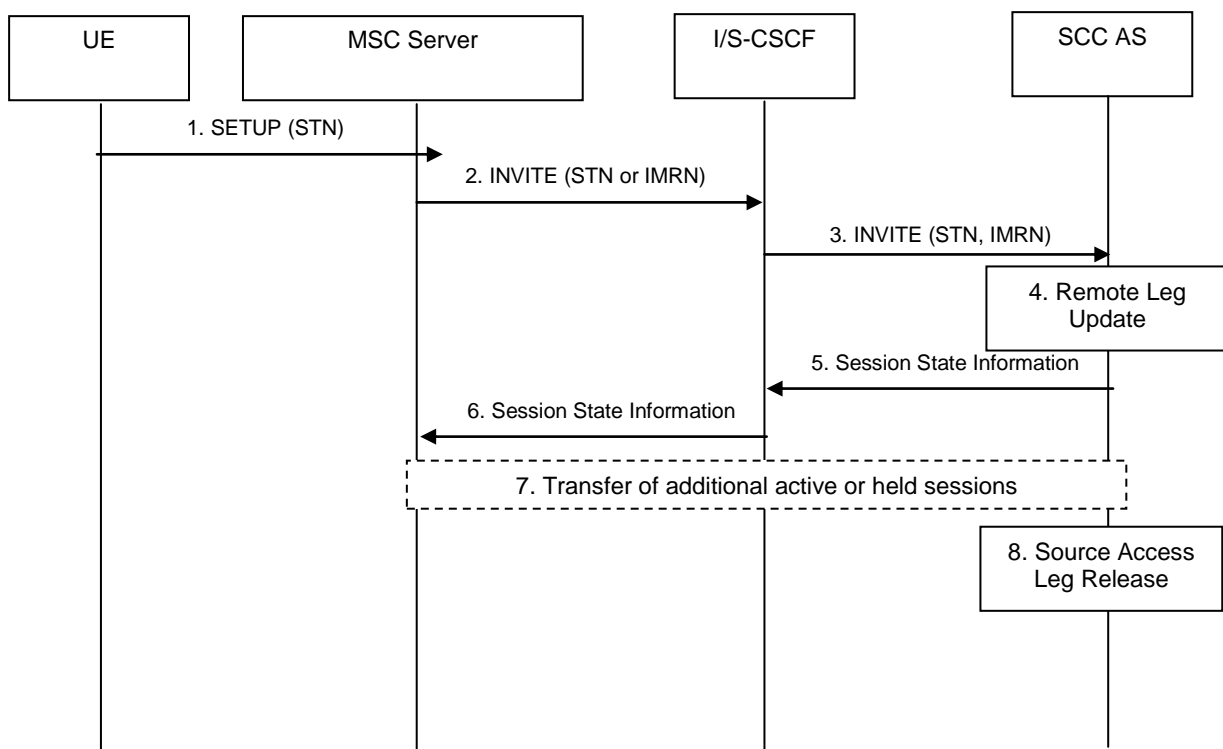
**Editor's Note: It is FFS how the UE and network indicate capabilities and policies.**

NOTE: The transferring-in leg is established either by the UE or by the MSC Server enhanced for SRVCC.

### 5.4.2.3 Procedures and Flows

#### 5.4.2.3.1 PS – CS Access Transfer: PS to CS – Dual Radio

Figure 5.4.2.3.1-1 PS - CS Access Transfer: PS to CS - Dual Radio, provides an information flow for Access Transfer of an IMS session in PS to CS direction. The flow requires that the user is active in an IMS originating or terminating session using PS media at the time of initiation of Access Transfer to CS and that the use of network capabilities to support mid-call services during session transfer is possible. It further requires that the MSC Server supports I2 reference point.



**Figure 5.4.2.3.1-1: PS – CS Access Transfer: PS to CS – Dual Radio**

1. If the user is not attached to the CS domain at the time when the UE determines a need for Access Transfer to CS, the UE performs a CS Attach as specified in TS 23.292 [6], clause 7.2.1. It subsequently originates a session that uses CS media using the STN to establish an Access Leg via the CS access and requests Access Transfer of the IMS session to CS access using the procedures described in TS 23.292 [6], clause 7.3.2 Originating Sessions that use CS media.
2. Standard procedures as specified in TS 23.292 [6], clause 7.3.2 Originating Sessions that use CS media are used by the MSC Server which results in routing of the INVITE with the STN to the I/S CSCF. The MSC Server includes the Instance ID into the session transfer request, which can be used for session (and terminal) correlation as specified in TS 23.237 [5].

NOTE 1: The MSC Server enhanced for ICS includes the Instance ID during registration; the Instance ID can be used for session (and terminal) correlation as specified in TS 23.237 [5].

NOTE 2: The MSC Server has indicated its capability to support mid-call services during session transfer in the registration.

3. Standard procedures are used at I/S-CSCF for routing of the INVITE to the SCC AS.

4. The SCC AS completes the establishment of the Access Leg via the CS access. The SCC AS is able to identify the correct anchored session using the Instance ID for session identification as specified in TS 23.237 [5]. The SCC AS performs the Access Transfer by updating the Remote Leg with the connection information of the newly established Access Leg using the Remote Leg Update procedure as specified in TS 23.237 [5], clause 6.3.1.5. The SCC AS completes the session setup towards UE according to procedures defined in TS 23.228 [4].
5. The SCC AS provides session state information on the inactive session with speech media including needed STI on the transferring-in leg. In case there are more than two sessions with speech media (active or hold), the SCC AS selects the second-most recently active session in case there were more than one active speech session, and puts it on hold, or otherwise selects the held session that has been most recently made inactive. All other sessions are released. The selected session is sent in session state information to the MSC Server.

NOTE 3: The session state information can be provided as part of the SCC AS response to the INVITE.

6. The S-CSCF forwards the session state information to the MSC Server.
7. In case the MSC Server enhanced for ICS receives the session state information on more than one active or inactive speech sessions, it initiates session transfer towards SCC AS for the additional session.
8. The Source Access Leg (which is the Access Leg previously established over PS access) is released as specified in TS 23.237 [5], clause 6.3.1.6.

NOTE 4: Steps 4 and 8 consist of a sequence of messages, some of which may occur in parallel.

#### 5.4.2.3.2 PS – CS Access Transfer: PS to CS – Single Radio

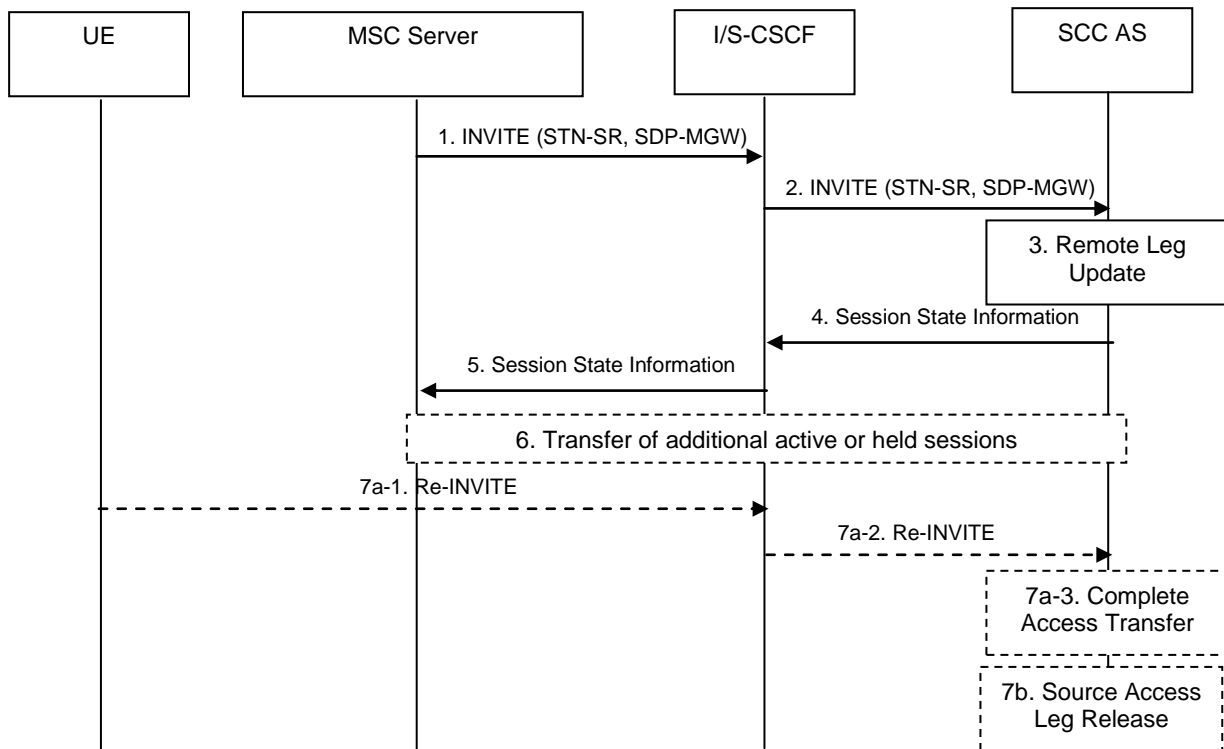
Figure 5.4.2.3.2-1 PS-CS: PS to CS – Single Radio, provides an information flow for Access Transfer of media of an IMS session in PS to CS direction for Access Transfers within 3GPP access networks as specified in TS 23.216 [3].

The flow requires that the user is active in an IMS originating or terminating session and that the use of network capabilities to support mid-call services during session transfer is possible; procedures and capabilities specified in TS 23.216 [3], clause 6.2.1 are used for the switching of access networks at the transport layer. It further requires that the MSC Server supports I2 reference point with needed enhancements.

NOTE 1: See TS 23.216 [3] for initiation of handover of only one voice PS bearer at EPC.

NOTE 2: The UE capable of procedures as specified in TS 23.216 [3] does not need to support session and access transfer procedures as specified in TS 23.237 [5], clauses 6.3.2.1.1 and 6.3.2.3 to support PS to CS Access Transfer.





**Figure 5.4.2.3.2-1: PS-CS: PS to CS – Single Radio**

The user may be registered in the IMS by the MSC Server in case both UE and network support CS Fallback.

1. Procedures specified in TS 23.216 [3], clause 6.2.2.1 result in an INVITE to be sent with an STN-SR indicating use of Single Radio VCC procedures for Access Transfer to CS access. If the user is not IMS registered by the MSC Server, the MSC Server enhanced for SRVCC includes the C-MSISDN as calling party number. If the user is registered in the IMS by the MSC Server, then the MSC Server includes the Instance ID into the session transfer request. The MSC Server indicates its capability to support mid-call services during session transfer.
2. Standard procedures are used at S-CSCF for routing of the INVITE to the SCC AS.
3. The SCC AS uses the STN-SR to determine that Access Transfer using Single Radio VCC is requested. The SCC AS may retrieve the C-MSISDN from the HSS. The SCC AS is able to identify the correct anchored session as specified in TS 23.237 [5]. The SCC AS proceeds with the Access Transfer of the recently added active session with bi-directional speech for the UE by updating the Remote Leg with the media description and other information using the Remote Leg Update procedure as specified in TS 23.237 [5], clause 6.3.1.5.
4. The SCC AS provides session state information on all active and inactive sessions with speech media including needed STIs on the transferring-in leg. In case there are more than two sessions with speech media (active or hold), the SCC AS selects the second-most recently active session in case there were more than one active speech session, and puts it on hold, or otherwise selects the held session that has been most recently made inactive. All other sessions are released. The selected session is sent in session state information to the MSC Server.

NOTE 3: The session state information can be provided as part of the SCC AS response to the INVITE.

5. The S-CSCF forwards the session state information to the MSC Server.

6. In case the MSC Server enhanced for SRVCC receives the session state information on more than one active or inactive speech sessions, it initiates session transfer towards SCC AS for the additional session.

NOTE 4: The SCC AS is using the C-MSISDN or Instance ID to correlate the session transfer request, and additionally the received session state information to select the correct session.

7a. If the Gm reference point is retained upon PS handover procedure then:

- 7a-1. The UE sends a Re-INVITE via the PS access to update the remaining non-voice media associated with the recently added active session.

7a-2. Standard procedures are used at S-CSCF for routing of the INVITE to the SCC AS.

7a-3. The SCC AS processes the Re-INVITE and updates the Remote Leg if needed.

7b. If the Gm reference point is not retained upon PS handover procedure, or if there was no other non-voice media in the IMS session than the voice which was transferred to the target access, then the Source Access Leg is released as specified in TS 23.237 [5], clause 6.3.1.6.

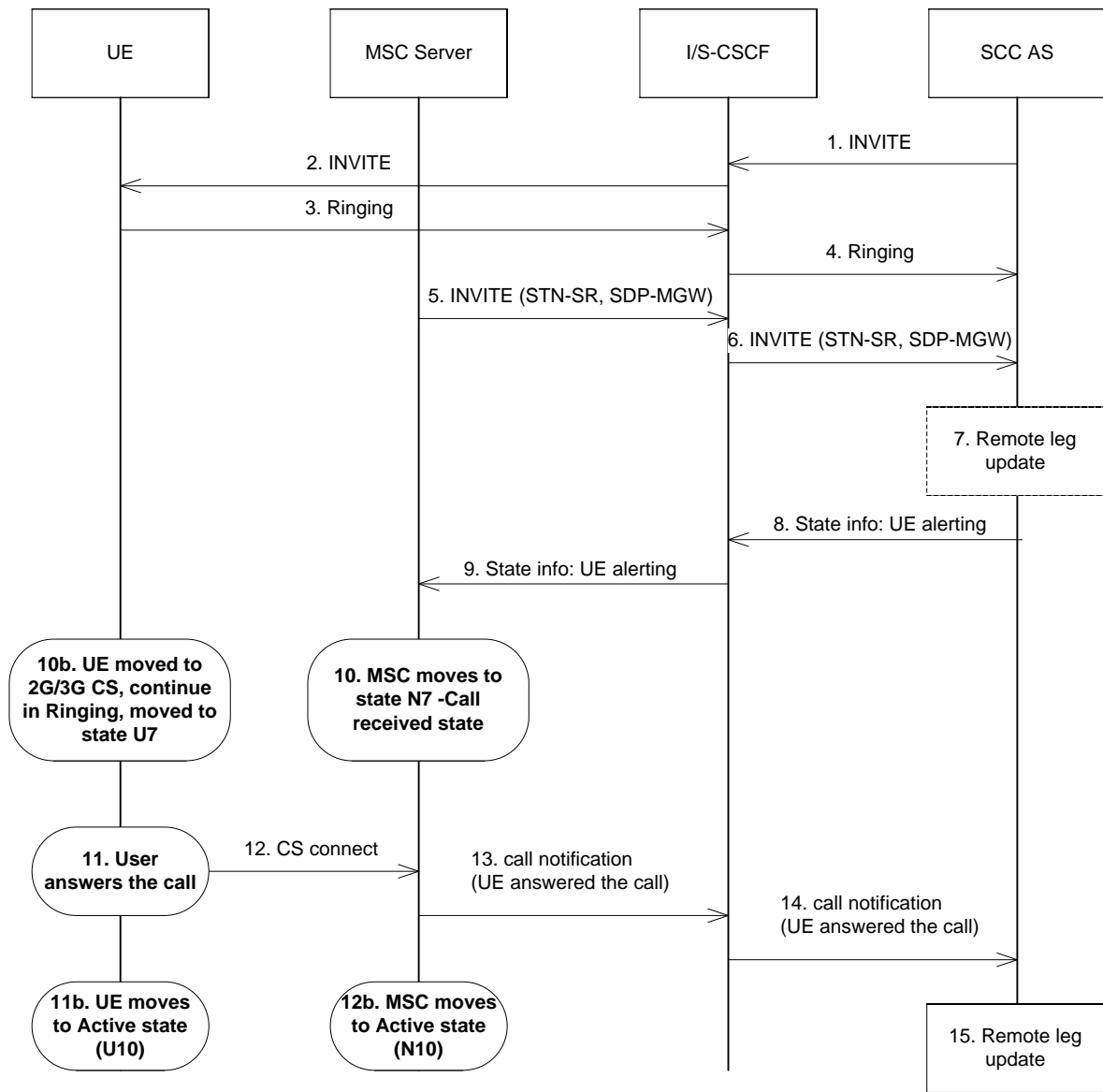
NOTE 5: Some or all of the steps between steps 3 and 4b may consist of a sequence of messages, some of which may occur in parallel.

NOTE 6: The MSC Server enhanced for SRVCC can have also capabilities as specified in TS 23.292 [6]. In this case and if not having performed IMS registration before step 1, it shall not perform IMS registration until all IMS sessions via CS access that are anchored in the SCC AS have been terminated.

#### 5.4.2.3.3 PS – CS Access Transfer: PS to CS – Single Radio, incoming call in alerting phase

Figure 5.4.2.3.3-1 PS-CS: PS to CS – Single Radio, incoming call in alerting phase, provides an information flow for Access Transfer of media of an IMS session in PS to CS direction for Access Transfers within 3GPP access networks as specified in TS 23.216 [3].

The flow requires that the user is active in an terminating IMS session and that the SIP session is in alerting state; procedures and capabilities specified in TS 23.216 [3], clause 6.2.1 are used for the switching of access networks at the transport layer. It further requires that the MSC Server supports I2 reference point.



**Figure 5.4.2.3.3-1: PS-CS: PS to CS – Single Radio, incoming call in alerting phase**

- 1-4. Standard procedures are used to initiate a SIP session towards the UE. The UE is alerting the user for the incoming voice session.
- 5. Procedures specified in TS 23.216 [3], clause 6.2.2.1 result in an INVITE to be sent with an STN-SR indicating use of Single Radio VCC procedures for Access Transfer to CS access. If the user is not IMS registered by the MSC Server, the MSC Server enhanced for SRVCC includes the C-MSISDN as calling party number. If the user is registered in the IMS by the MSC Server, then the MSC Server includes the Instance ID into the session transfer request. The MSC Server indicates its capability to support mid-call services during session transfer.
- 6. Standard procedures are used at S-CSCF for routing of the INVITE to the SCC AS.
- 7. The SCC AS uses the STN-SR to determine that Access Transfer using Single Radio VCC is requested. The SCC AS may retrieve the C-MSISDN from the HSS. The SCC AS is able to identify the correct anchored session as specified in TS 23.237 [5]. The SCC AS proceeds with the Access Transfer of the recently added active session with bi-directional speech for the UE by updating the Remote Leg with the media description and other information using the Remote Leg Update procedure as specified in TS 23.237 [5], clause 6.3.1.5.

NOTE 1: The SCC AS may not be able to update the remote leg at this point depending on the state of SDP negotiation

NOTE 2: It is assumed the initial SDP negotiation has been completed prior to triggering the SRVCC, thus the SCC AS can update the remote leg.

8. The SCC AS provides session state information on the incoming speech call in alerting state.

NOTE 3: The session state information can be provided as part of the SCC AS response to the INVITE.

9. The S-CSCF forwards the session state information to the MSC Server.

10. The MSC moves to the corresponding CS call state, N7 - Call Received in TS 24.008 [11].

10b. In parallel to step 10, the UE has received the HO command as described in TS 23.216 [3]. The UE determines the local call state in the SIP session, and creates the corresponding CS call state, U7 – Call Received in TS 24.008 [11]. The UE continues to alert the user for incoming call.

11. The user answers to the call.

11a. UE moves to U10 – Active state.

12. The UE uses the standard procedure to send the CS connect message to MSC as described in TS 24.008 [11].

NOTE 4: Solution for possible race conditions (e.g. MSC server receives the CS connect before the SCC AS responds) will be defined in Stage 3.

12b. The MSC moves to the N10 – Active state.

13. The MSC notifies the SCC AS the user has answered the call.

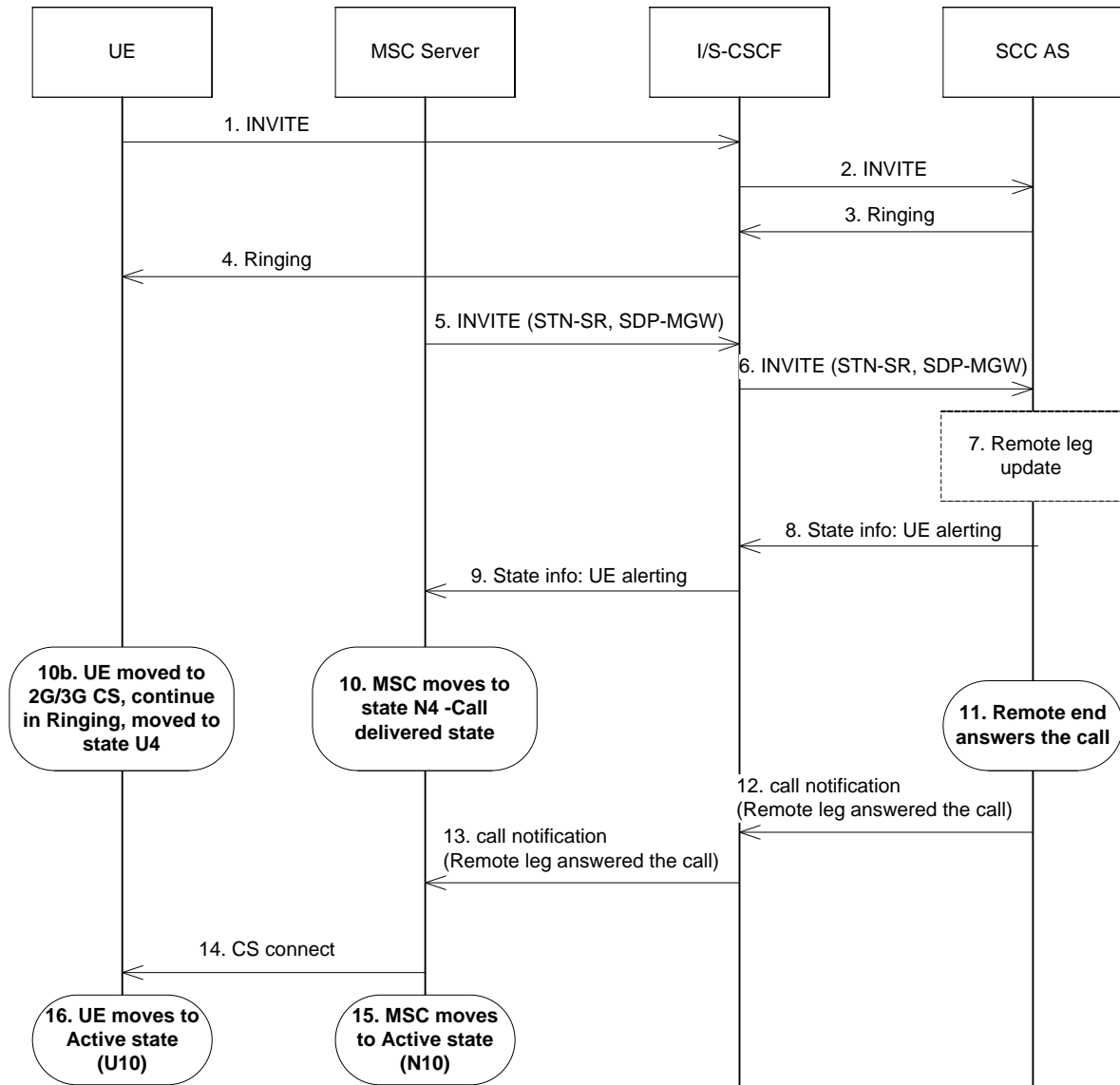
14. Standard procedures are used at S-CSCF for routing of the notification to the SCC AS.

15. The SCC AS creates the corresponding SIP request to the remote end, updates the remote leg.

#### 5.4.2.3.4 PS – CS Access Transfer: PS to CS – Single Radio, outgoing call in alerting phase

Figure 5.4.2.3.4-1 PS-CS: PS to CS – Single Radio, outgoing call in alerting phase, provides an information flow for Access Transfer of media of an IMS session in PS to CS direction for Access Transfers within 3GPP access networks as specified in TS 23.216 [3].

The flow requires that the user is active in an outgoing IMS session and that the SIP session is in alerting state; procedures and capabilities specified in TS 23.216 [3], clause 6.2.1 are used for the switching of access networks at the transport layer. It further requires that the MSC Server supports I2 reference point.



**Figure 5.4.2.3.4-1: PS-CS: PS to CS – Single Radio, outgoing call in alerting phase**

- 1-4. Standard procedures are used to initiate a SIP session from the UE towards the remote end. The remote end is alerting the user for the incoming voice session.
- 5. Procedures specified in TS 23.216 [3], clause 6.2.2.1 result in an INVITE to be sent with an STN-SR indicating use of Single Radio VCC procedures for Access Transfer to CS access. If the user is not IMS registered by the MSC Server, the MSC Server enhanced for SRVCC includes the C-MSISDN as calling party number. If the user is registered in the IMS by the MSC Server, then the MSC Server includes the Instance ID into the session transfer request. The MSC Server indicates its capability to support mid-call services during session transfer.
- 6. Standard procedures are used at S-CSCF for routing of the INVITE to the SCC AS.
- 7. The SCC AS uses the STN-SR to determine that Access Transfer using Single Radio VCC is requested. The SCC AS may retrieve the C-MSISDN from the HSS. The SCC AS is able to identify the correct anchored session as specified in TS 23.237 [5]. The SCC AS proceeds with the Access Transfer of the recently added active session with bi-directional speech for the UE by updating the Remote Leg with the media description and other information using the Remote Leg Update procedure as specified in TS 23.237 [5], clause 6.3.1.5.

NOTE 1: The SCC AS may not be able to update the remote leg at this point depending on the state of SDP negotiation.

- 8. The SCC AS provides session state information on the outgoing speech call in alerting state.

NOTE 2: The session state information can be provided as part of the SCC AS response to the INVITE.

9. The S-CSCF forwards the session state information to the MSC Server.

10. The MSC moves to the corresponding CS call state, N4 - Call Delivered in TS 24.008 [11].

10b. In parallel to step 10, the UE has received the HO command as described in TS 23.216 [3]. The UE determines the local call state in the SIP session, and creates the corresponding CS call state, U4 – Call Delivered in TS 24.008 [11]. The UE continues play ring back tone to the end user.

11. The remote end answers to the call.

12. The SCC AS notifies the MSC the remote end has answered the call.

13. Standard procedures are used at S-CSCF for routing of the notification to the MSC.

**Editor's note: The possible race condition of steps 5 and 13 is FFS. Remote end might answer the call before the handover is completed.**

14. The MSC uses the standard procedure to send the CS connect message to UE as described in TS 24.008 [11].

15. The MSC moves to the N10 – Active state.

16. The UE moves to the U10 – Active state.

#### 5.4.2.3.5 Information Flow for Dual Radio CS to PS transfer

Procedures specified in clause 5.4.3.2 apply.

#### 5.4.2.4 Co-existence of ICS UE and MSC Server assisted mid-call support

The mid-call support is only triggered if UE, MSC server, and SCC AS all have indicated support of the mid-call feature. A Rel-9 UE may implement both ICS UE capability and the MSC Server assisted mid-call support for situations when the ICS UE capabilities cannot be used or be maintained after the transfer. For such scenario, the SCC AS must be able to determine, when the ICS UE capabilities are used and when not.

ICS UE with MSC Server assisted mid-call support may indicate support for both capabilities and follows the UE procedures defined for both capabilities. In such a case, the SCC AS will know that the UE is both ICS capable and supports MSC Server assisted mid-call capability.

When a session transfer occurs, the SCC AS needs to determine which capabilities are used to transfer the additional active or inactive sessions. Following logic is applied:

- If the session transfer request is made using Gm or I1 procedures, the SCC AS detects that ICS UE capabilities are used and executes the transfer according to current procedures defined in TS 23.237 [5] and TS 23.292 [6].
- If the session transfer request is made via MSC Server, and support for both ICS UE and MSC Server assisted mid-call capability is indicated, the SCCAS needs to wait whether the UE uses the ICS UE capabilities to transfer the additional active or inactive sessions and fall back to MSC server assisted mid-call if it does not.

NOTE 1: The transfer procedure of held session will be delayed due to the need to wait to detect the need for fall back to MSC server assisted mid-call capability in case ICS UE capability is not used.

NOTE 2: This means that MSC Server assisted mid-call will not be used for scenarios such as PS - PS in conjunction with PS - CS Access Transfer with ICS UE capabilities.

### 5.4.3 Alternative 2: Use of 24.008 CC TI to support mid-call services during session transfer

#### 5.4.3.1 Overview

For networks not supporting the Gm or the I1 reference points of ICS, Service Continuity for multi-session scenarios is provided with a coordinated use of 24.008 CC TI between the SCC AS, the MSC Server and the UE.

An STI is allocated and communicated between the UE and the SCC AS at IMS session setup; additionally, a TS 24.008 [11] CC TI is allocated and communicated between the UE and the SCC AS at IMS session; the UE uses the STI for PS-PS Session Transfer and TI for PS to CS Session Transfer. The STI is allocated as specified in TS 23.237 [5] and TS 24.008 [11] CC TI is allocated as specified in TS 24.008 [11].

When the session set up in the PS access, the UE or the SCC AS allocate a TI and communicate to each other.

- For an originated call, the TI is allocated by the UE and is communicated to SCC AS.
- For a terminated call the TI is allocated by the SCC AS just like MSC behaviour as specified in TS 24.008 [11] and is communicate to UE.

One TI is allocated for each session and shared between with UE and SCC AS. The UE and SCC AS use the TI to identify the session to be transferred.

This alternative is limited in that only one active and one held session can be transferred to CS access due to limitations of TS 24.008 [11] CC. If two or more sessions are present when PS to CS Session Transfer is initiated, the recently added active session is transferred first, followed by the transfer of the held session.

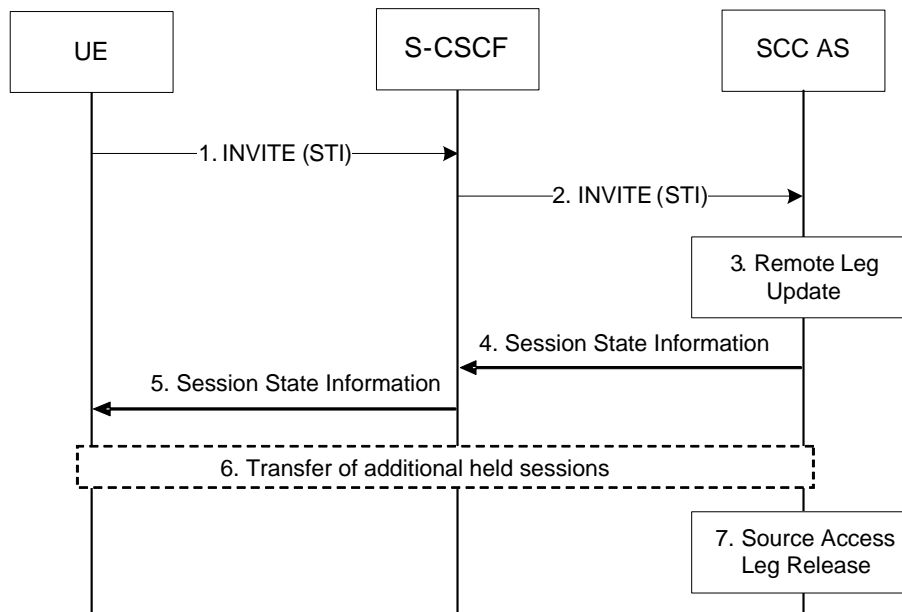
**Editor's Note: When there are more than one held sessions in PS, which held session to transfer is FFS.**

The SCC AS may provide session state information on active and inactive sessions with speech media on the transferring-in leg for enablement of PS-CS service continuity of IMS multimedia-sessions if necessary.

**Editor's Note: Details of IMS Registration by the MSC Server for SR-VCC procedure are FFS.**

#### 5.4.3.2 Information Flow for Dual Radio CS to PS transfer

The following figure provides an example flow for dual radio CS to PS Session Transfer with Held and Active sessions.



**Figure 5.4.3.2-1: CS to PS Access Transfer (dual radio)**

1. When the UE determines a need for Access Transfer, the UE initiates registration with IMS (if not already registered in IMS) as specified in TS 23.228 [4]. It subsequently initiates an IMS originated session toward the SCC AS using a static STI to establish an Access Leg via PS access and requests Access Transfer of the active session to PS access.

2. Standard procedures are used at S-CSCF for routing of the INVITE to the SCC AS.

NOTE 1: The UE has indicated its capability to support mid-call services during session transfer in the registration.

3. The SCC AS performs the Access Transfer by updating the Remote Leg with connection information of the newly established Access Leg (see the Remote Leg Update procedure, described in TS 23.237 [5])

clause 6.3.1.5). The SCC AS completes the establishment of the Access Leg according to procedures defined in TS 23.228 [4].

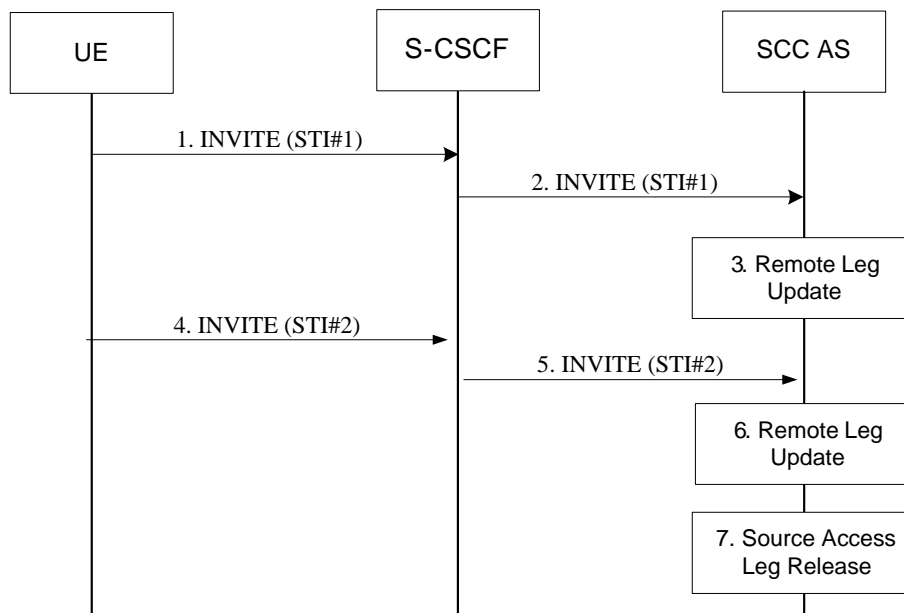
- The SCC AS provides session state information on the additional held session with speech media including dynamic STI needed for the held session on the transferring-in leg when it determines that there is a held session with speech media in the CS access network.

NOTE 2: The session state information can be provided as part of the SCC AS response to the INVITE.

- The S-CSCF forwards the session state information to the UE.
- If the UE receives the session state information of the held session, it initiates session transfer request towards SCC AS using the dynamic STI for the held session.
- The Source Access Leg, which is the Access Leg previously established over CS access, is released as specified in TS 23.237 [5], clause 6.3.1.6.

NOTE 3: Steps 3 and 7 consist of a sequence of messages, some of which may occur in parallel.

The following figure provides an alternative example flow for dual radio CS to PS Session Transfer with Held and Active sessions. This flow applies to the scenario where the UE is not using ICS capabilities.



**Figure 5.4.3.2-2: CS to PS Access Transfer (dual radio)**

- When the UE determines a need for Access Transfer, the UE initiates registration with IMS (if not already registered in IMS) as specified in TS 23.228 [4]. It subsequently initiates an IMS originated session toward the SCC AS using a static STI #1 to establish an Access Leg via PS access and requests Access Transfer of the active session to PS access. The static STI #1 is used to indicate that the transfer is for the active session and it can be formed by combining a static STI and the predefined TI for the active session.

- Standard procedures are used at S-CSCF for routing of the INVITE to the SCC AS.

NOTE 1: The UE has indicated its capability to support mid-call services during session transfer in the registration.

- The SCC AS performs the Access Transfer by updating the Remote Leg with connection information of the newly established Access Leg (see the Remote Leg Update procedure, described in TS 23.237 [5] clause 6.3.1.5). The SCC AS completes the establishment of the Access Leg according to procedures defined in TS 23.228 [4].
- The UE initiates an IMS originated session toward the SCC AS using a static STI #2 to establish an Access Leg via PS access and requests Access Transfer of the held session to PS access. The static STI #2 is used to indicate



that the transfer is for the held session and it can be formed by combining a static STI and the predefined TI for the held session.

- Standard procedures are used at S-CSCF for routing of the INVITE to the SCC AS.

NOTE 2: The UE has indicated its capability to support mid-call services during session transfer in the registration.

- The SCC AS performs the Access Transfer by updating the Remote Leg with connection information of the newly established Access Leg (see the Remote Leg Update procedure, described in TS 23.237 [5] clause 6.3.1.5). The SCC AS completes the establishment of the Access Leg according to procedures defined in TS 23.228 [4]. When performing the Access Transfer for the held session, in case there are more than two sessions with speech media (active or hold), the SCC AS selects the second-most recently active session in case there were more than one active speech session, and puts it on hold, or otherwise selects the held session that has been most recently made inactive.

- The Source Access Leg, which is the Access Leg previously established over CS access, is released as specified in TS 23.237 [5], clause 6.3.1.6.

NOTE 3: Steps 3, 6 and 7 consist of a sequence of messages, some of which may occur in parallel.

### 5.4.3.3 Information Flow for Dual Radio PS to CS transfer

The following figure provides an example flow for dual radio PS to CS Session Transfer with Held and Active sessions.

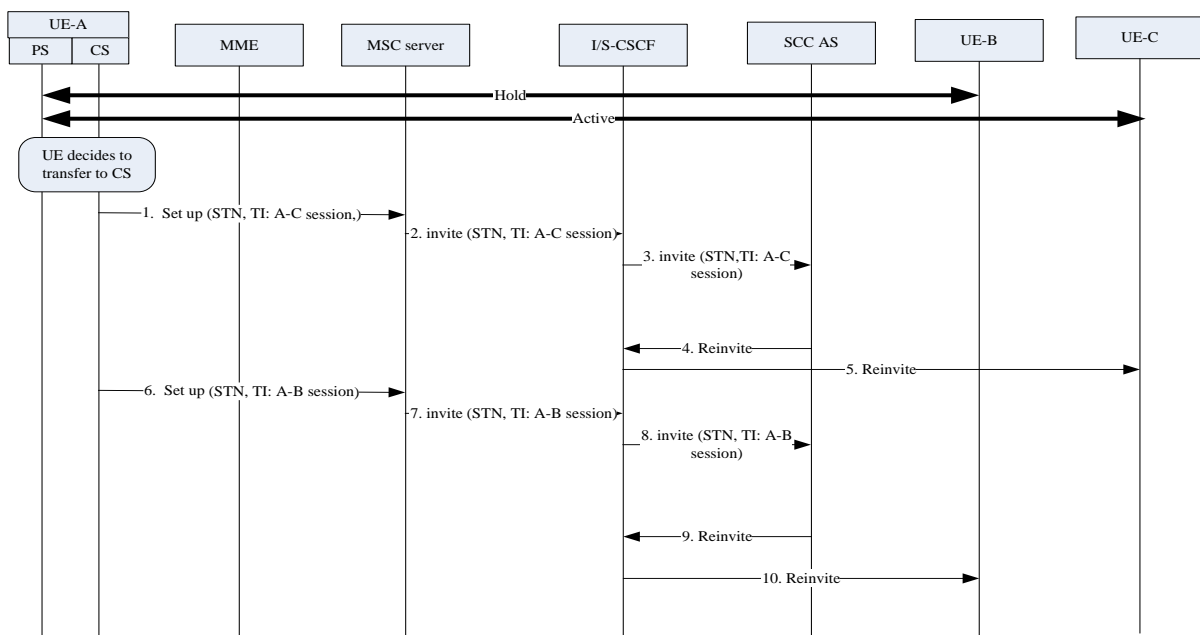


Figure 5.4.3.3: 24.008 CC TI alternative - PS to CS Access Transfer (dual radio)

- UE A has two sessions, one is active, one is on hold when attached to PS access. UE decides to transfer to CS; it sends transfer request to MSC server including a STN to request a Session Transfer, and the TS 24.008 [11] CC TI of the A-C session to be used for identification of A-C session for subsequent service control.
- MSC Server sends transfer request to SCC AS including STN and TS 24.008 [11] CC T1.
- SCC AS receives the transfer request and proceeds with execution of the session identified by the TS 24.008 [11] CC TI.
5. SCC AS transfers the session to CS.
- UE A sends transfer request to MSC server including STN to request a Session Transfer and the TS 24.008 [11] CC TI of the A-B session to be used for identification of A-B session for subsequent service control.

NOTE 1: The MSC Server identifies this as a Session Transfer for non ICS UE and applies non ICS UE specific behaviour, e.g. to suppress requirements to Hold the first session before setting up a subsequent session; and to setup only recently added session in active state and all other sessions in Held state.

NOTE 2: Sending this setup without putting the A-C session into hold requires change to the UE stack.

7. MSC Server sends transfer request to SCC AS including STN and TS 24.008 [11] CC TI.
8. SCC AS receives the transfer request and proceeds with execution of the session identified by the TS 24.008 [11] CCTI.
- 9-10. SCC completes the PS-CS Session Transfer procedure.

### 5.4.3.4 Information Flow for Single Radio PS to CS transfer

The following figure provides an example flow for Single Radio PS to CS Session Transfer with Held and Active sessions.

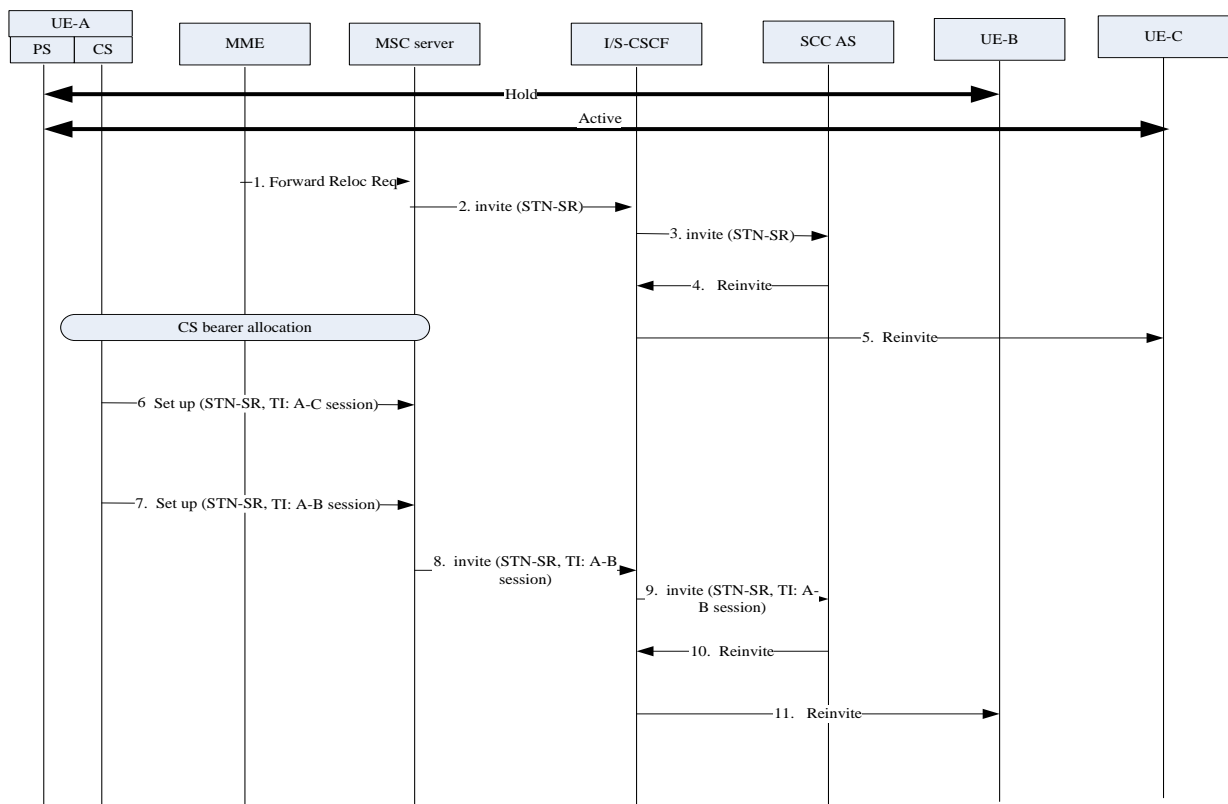


Figure 5.4.3.4: 24.008 CC TI alternative - PS to CS Access Transfer (single radio)

1. UE A has two sessions, one is active, one is on hold when attached to PS access. Upon initiation of SR-VCC procedure, MME sends the transfer request to MSC Server.
- 2-3. MSC server sends transfer request to SCC AS including STN-SR to request a SR-VCC Session Transfer.
- 4-5. SCC AS proceeds with execution of the recently added active session.
6. Upon completion of CS radio bearer allocation using TS 23.216 [6] procedures, UE tunes to CS and sends a Setup message to MSC server to establish the context for TS 24.008 [11] service control including the STN-SR and the TS 24.008 [11] CC TI of the A-C session to be used for identification of A-C session for subsequent service control.

Editor's Note: Whether this step is required is FFS.

NOTE 1: A STN-SR is used to indicate use of SR-VCC procedures, e.g. CS bearer does not need to be established upon receipt of Setup message.

7. UE A sends transfer request to MSC server including STN-SR to request a SR-VCC Session Transfer and the TS 24.008 [11] CC TI of the A-B session to be used for identification of A-B session for subsequent service control.

NOTE 2: The MSC Server identifies this as a Session Transfer for non ICS UE and applies non ICS UE specific behaviour, e.g. to suppress requirements to Hold the first session before setting up a subsequent session.

8. MSC Server sends transfer request to SCC AS including STN-SR and the TS 24.008 [11] CC TI.
9. SCC AS receives the transfer request and proceeds with execution of the session identified by the TS 24.008 [11] CCTI.
- 10-11. SCC completes the PS-CS Session Transfer procedure.

## 5.4.4 Alternative 3: Use of STI to support mid-call services during session transfer

### 5.4.4.1 Overview

For networks not supporting the Gm or the I1 reference points of ICS, Service Continuity for multi-session scenarios is provided with a coordinated use of STI between the SCC AS, the MSC Server and the UE.

An STI is allocated and communicated between the UE and the SCC AS at IMS session setup; the UE uses the STI for PS-PS Session Transfer and PS to CS Session Transfer. The STI is allocated as specified in TS 23.237 [6].

This alternative does not have the limitation of the TS 24.008 [11] CCTI alternative, in that more than one held sessions can be transferred to CS access.

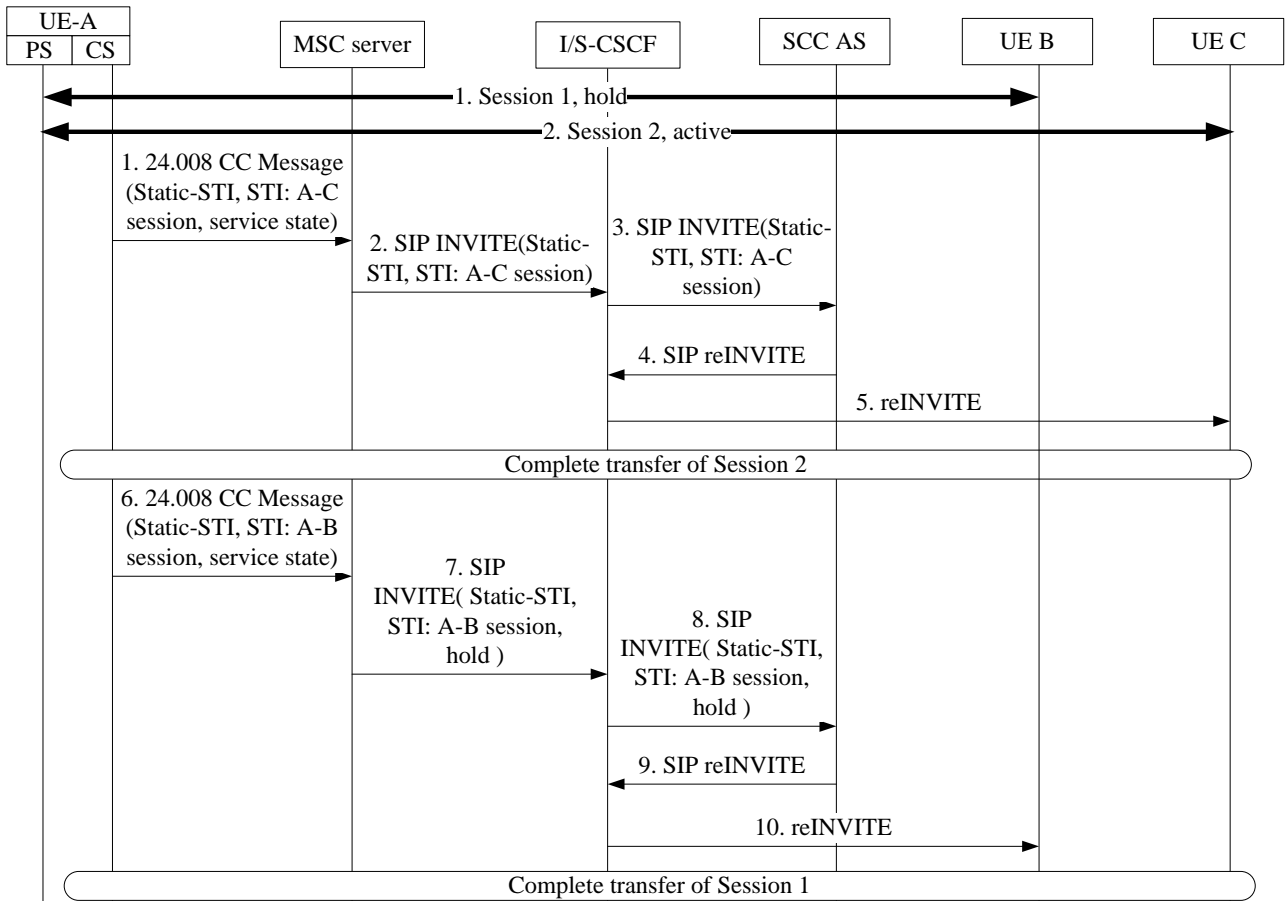
**Editor's Note: Capability exchange between UE and MSC Server is FFS.**

### 5.4.4.2 Information Flow for Dual Radio CS to PS transfer

The information flow for Access Transfer of an IMS session in CS to PS direction is the same as the information flow for PS-CS Access Transfer: CS to PS access, as specified in TS 23.237 [5] clause 6.3.2.1.2 with a precondition that the dynamic STI is communicated between MSC Server and UE in the 24.008 signalling used to establish the IMS session with CS media.

### 5.4.4.3 Information Flow for Dual Radio PS to CS transfer

Figure 5.4.4.3-1 provides an example flow for dual radio PS to CS Session Transfer with Held and Active sessions.



**Figure 5.4.4.3-1: STI alternative - PS to CS Access Transfer (dual radio)**

NOTE 1: Potential impact of the particular TS 24.008 [11] message(s) used on the CS state machine of UE and the one the network may require is for study at stage 3.

1. UE A has two sessions, one is active, one is on hold when attached to PS access. UE decides to transfer to CS; it sends transfer request to MSC server including an STI to request A-C Session Transfer, and the service state. UE-A also includes the Static-STI (as defined in 23.237[5]) in the request for the purposes of routing.

2. MSC Server sends transfer request to SCC AS targeting the Static-STI and includes the STI for the A-C session.

3. SCC AS receives the transfer request and proceeds with execution of session identified by the STI.

4-5. SCC AS transfers the session to CS.

6. UE A sends transfer request to MSC server including an STI to request A-B Session Transfer and the service state. UE-A also includes the Static-STI (as defined in 23.237[5]) in the request for the purposes of routing.

NOTE 2: The MSC Server identifies this as a Session Transfer for non ICS UE and applies non ICS UE specific behaviour, e.g. to suppress requirements to Hold the first session before setting up a subsequent session.

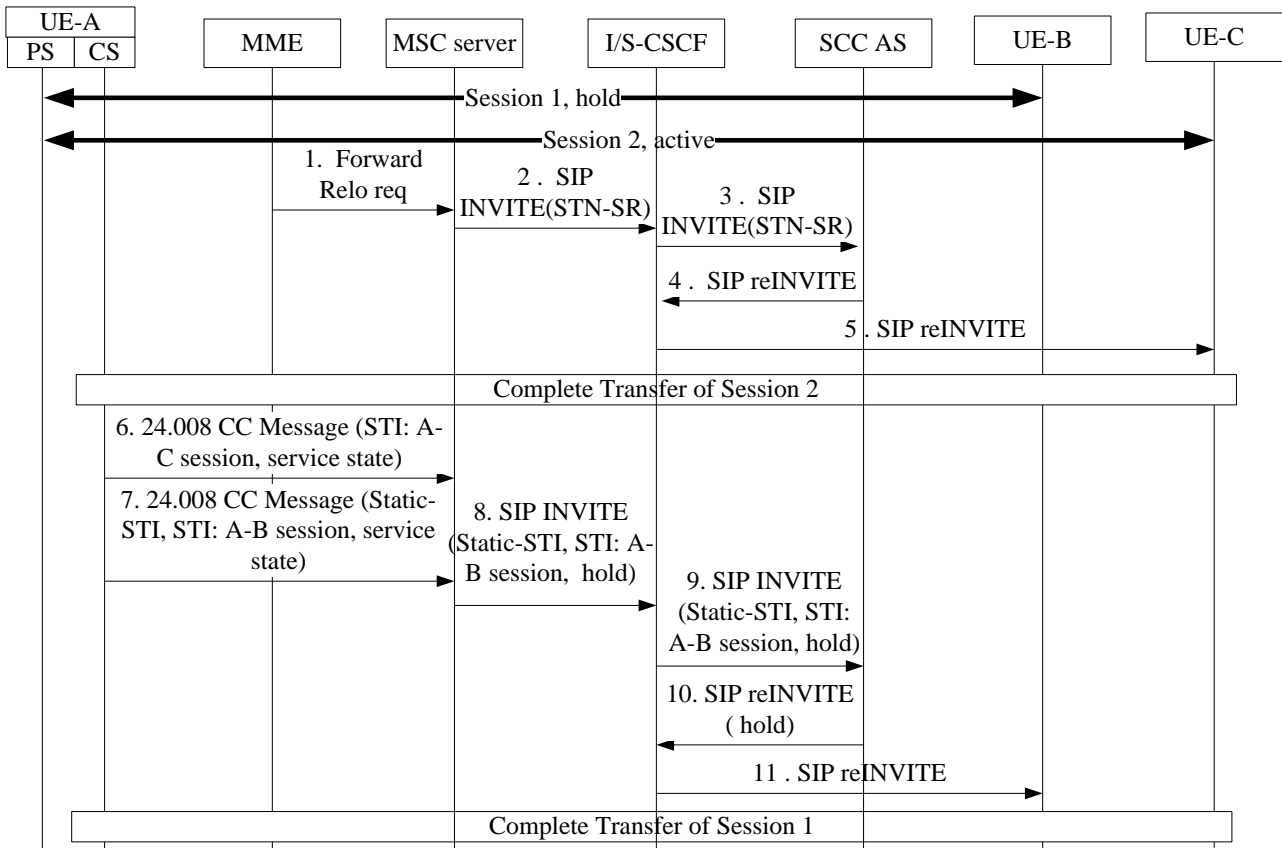
7. MSC Server sends transfer request to SCC AS targeting the Static-STI and includes the STI for the A-B session.

8. SCC AS receives the transfer request and proceeds with execution of the session identified by the STI.

9-10. SCC completes the PS-CS Session Transfer procedure.

#### 5.4.4.4 Information Flow for Single Radio PS to CS transfer

Figure 5.4.4.4-1 provides an example flow for Single Radio PS to CS Session Transfer with Held and Active sessions.



**Figure 5.4.4.4-1: STI alternative - PS to CS Access Transfer (single radio)**

1. UE A has two sessions, one is active, one is on hold when attached to PS access. Upon initiation of SR-VCC procedure, MME sends the transfer request to MSC Server.
- 2-3. MSC server sends transfer request to SCC AS including STN-SR to request a SR-VCC Session Transfer.
- 4-5. SCC AS proceeds with execution of the recently added active session.
6. Upon completion of CS radio bearer allocation using 23.216 procedures, UE tunes to CS and sends a 24.008 CC message to MSC server to establish the context for 24.008 service control including STI for A-C session and service state.
7. UE A sends transfer request to MSC server including STI for A-B session and service state. UE-A also includes the Static-STI (as defined in 23.237[5]) in the request for the purposes of routing.

NOTE 1: The MSC Server identifies this as a Session Transfer for non ICS UE and applies non ICS UE specific behaviour, e.g. to suppress requirements to Hold the first session before setting up a subsequent session.

NOTE 2: Steps 6 and 7 may be combined.

8. MSC Server sends transfer request to SCC AS targeting the Static-STI and includes the STI for the A-B session.
9. SCC AS receives the transfer request and proceeds with execution of the session identified by the STI.
- 10-11. SCC completes the PS-CS Session Transfer procedure.

## 5.4.5 Evaluation of the alternatives

### 5.4.5.1 UE capability

All the above presented alternatives for support for mid-call services during session transfer have impact to the UE. The actual impact depends on the alternative, but in general this means that in order to use this functionality, the UE needs to be upgraded with this new capability.

The additional functionality provided to the user compared to Rel-7 VCC, is the ability to perform domain transfer from PS access to CS access for one active and one or more inactive sessions. In Rel-8 this same functionality was achieved with ICS UE capability whenever the Gm is available. In Rel-9 the ICS UE capability includes the I1 interface, which means that this capability is always available for the UE, if supported by the UE and by the network. Therefore the UE capability to support mid-call services during session transfer can be seen as an alternative to ICS UE capability. It can also co-exist with the ICS UE capabilities.

## 5.5 Session Continuity for speech and video over CS

### 5.6 Architecture

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## 6 Conclusion

### 6.1 Conclusion on Inter-UE Transfer

#### 6.1.1 Conclusion on UE awareness

It is concluded that from the Alternative 2 described in clause 4.6.3, the dynamic discovery of an IUT target based on IMS registration described in clause 4.6.3.1 will be specified in normative specifications in Rel-9. Additionally, alternative 1 described in clause 4.6.2 can be supported for discovery of an IUT target as an implementation option without normative specifications but must be used with other capabilities to determine target current availability. The capability query described in clause 4.6.3.2 and dynamic discovery of IUT target based on presence described in clause 4.6.3.3 are existing mechanisms that can be used within an implementation option but do not require any standardization.

#### 6.1.2 Collaborative Session

The following conclusions on Collaborative Session shall apply for this release:

- The Collaborative Session control cannot be transferred between UEs.
- There is one Controller UE within a Collaborative Session.
- The Controllee UE is not aware of its role within the Collaborative session and is not aware of a Controller UE. In that respect any UE can undertake the role of Controllee UE.
- The Collaborative Session is transparent to the remote end, to which it appears that the session is with the Controller UE.

#### 6.1.3 UEs not supporting IUT

UEs not supporting IUT can act as Controllee UEs within a Collaborative Session. Those UEs are provided with limited IUT functionality based on the constraints of the UE and the network (e.g. MSC Server or MGCF) as described in clause 4.1.2.2.

## 6.2 Conclusion on support of mid-call services during session transfer

Different solutions for support of mid-call services during session transfer have been studied in clause 5.4. It is concluded to progress with Alternative 1 "MSC Server enhancement to support mid-call services during session transfer" is the preferred of the three alternatives.

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## Annex A: List of IUT procedures

1. Procedures for Collaborative Session establishment:
  - 1.1 Establish Collaborative Session and keep Collaborative Session control
    - 1.1.1 Transfer media  
Comments: 1A
    - 1.1.2 Establish with new media  
Comments: 3A
  - 1.2 Establish Collaborative Session and transfer Collaborative Session control
    - 1.2.1 Transfer media  
Comments: 2B
    - 1.2.2 Establish with new media  
Comments: ??
    - 1.2.3 Transfer Collaborative Session control only (no media on new Controller)  
Comments: 2A
2. Procedures during established Collaborative Session
  - 2.1 Controller Initiated Procedures
    - 2.1.1 Controller Initiated Transfer Media
      - 2.1.1.1 Controller to Controllee  
Comments: 1B
      - 2.1.1.2 Controllee to Controller  
Comments: 1B
      - 2.1.1.3 Controllee to Controllee  
Comments: ??
    - 2.1.2 Controller Initiated Add New Media
      - 2.1.2.1 On Controller  
Comments: 5A
      - 2.1.2.2 On Controllee  
Comments: 5A
    - 2.1.3 Controller Initiated Release Media
      - 2.1.3.1 On Controller  
Comments: 4A – Last media may end session
      - 2.1.3.2 On Controllee  
Comments: 4A – Last media may end session
    - 2.1.4 Controller Initiated Modify Media
      - 2.1.4.1 On Controller  
Comments: 5A
      - 2.1.4.2 On Controllee  
Comments: 5A



- 2.1.5 Controller Initiated Transfer Collaborative Session control  
Comments: 2A – May result in end of session at source
- 2.1.6 Controller Initiated MM-Tel Services
  - 2.1.6.1 On Controller  
Comments: ??
  - 2.1.6.2 On Controllee  
Comments: ??
- 2.1.7 Controller Initiated End Collaborative Session  
Comments: 6A
- 2.2 Remote Party Initiated Procedures
  - 2.2.1 Remote Party Initiated Add New Media
    - 2.2.1.1 Media On Controller  
Comments: ??
    - 2.2.1.2 Media On Controllee  
Comments: 3B
  - 2.2.2 Remote Party Initiated Release Media
    - 2.2.2.1 Media On Controller  
Comments: 4B
    - 2.2.2.2 Media On Controllee  
Comments: 4B
  - 2.2.3 Remote Party Initiated Modify Media
    - 2.2.3.1 Media On Controller  
Comments: 5C
    - 2.2.3.2 Media On Controllee  
Comments: 5C
  - 2.2.4 Remote Party Initiated MM-Tel Services
    - 2.2.4.1 On Controller  
Comments: ??
    - 2.2.4.2 On Controllee  
Comments: ??
  - 2.2.5 Remote Party Initiated End Collaborative Session  
Comments: 6C
- 2.3 SCC-AS Initiated Procedures
  - 2.3.1 SCC-AS Initiated Release Media
    - 2.3.1.1 On Controller  
Comments: 4D
    - 2.3.1.2 On Controllee  
Comments: 4D
  - 2.3.2 SCC-AS Initiated End Collaborative Session  
Comments: 6B
- 2.4 Controllee Initiated Procedures
  - 2.4.1 Controllee Initiated Transfer Media

- 2.4.1.1 Controller to Controllee  
Comments: ??
- 2.4.1.2 Controllee to Controller  
Comments: ??
- 2.4.2 Controllee Initiated Add New Media
  - 2.4.2.1 On Controller  
Comments: ??
  - 2.4.2.2 On Controllee  
Comments: ??
- 2.4.3 Controllee Initiated Release Media (on Controllee only)  
Comments: 4C - Last media may end session
- 2.4.4 Controllee Initiated Modify Media (on Controllee only)  
Comments: 5B
- 2.4.5 Controllee Initiated Transfer Collaborative Session control  
Comments: ?? – May result in end of session at source
- 2.4.6 Controllee Initiated MM-Tel Services (on Controllee only)  
Comments: ??
- 2.4.7 Controllee Initiated End Collaborative Session (on Controllee only)  
Comments: ??

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## Annex B: Change history

Change history							
Date	TSG #	TSG Doc.	CR	Rev	Subject/Comment	Old	New
2009-03	SP-43	SP-090091	-	-	MCC Editorial update for presentation to TSG SA for information	0.4.0	1.0.1
2009-05	SP-44	SP-090364	-	-	<a href="#">MCC Update for presentation to TSG SA for approval</a>	1.2.0	2.0.0
2009-06	SP-44	-	-	-	MCC Update to version 9.0.0 after TSG SA Approval	2.0.0	9.0.0