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| Technical Report |
| 3rd Generation Partnership Project;Technical Specification Group Services and System Aspects;Study on charging aspects of next generation real time communication services phase 2(Release 19) |
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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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where:

x the first digit:

1 presented to TSG for information;

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y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the document.

In the present document, modal verbs have the following meanings:

**shall** indicates a mandatory requirement to do something

**shall not** indicates an interdiction (prohibition) to do something

The constructions "shall" and "shall not" are confined to the context of normative provisions, and do not appear in Technical Reports.

The constructions "must" and "must not" are not used as substitutes for "shall" and "shall not". Their use is avoided insofar as possible, and they are not used in a normative context except in a direct citation from an external, referenced, non-3GPP document, or so as to maintain continuity of style when extending or modifying the provisions of such a referenced document.

**should** indicates a recommendation to do something

**should not** indicates a recommendation not to do something

**may** indicates permission to do something

**need not** indicates permission not to do something

The construction "may not" is ambiguous and is not used in normative elements. The unambiguous constructions "might not" or "shall not" are used instead, depending upon the meaning intended.

**can** indicates that something is possible

**cannot** indicates that something is impossible

The constructions "can" and "cannot" are not substitutes for "may" and "need not".

**will** indicates that something is certain or expected to happen as a result of action taken by an agency the behaviour of which is outside the scope of the present document

**will not** indicates that something is certain or expected not to happen as a result of action taken by an agency the behaviour of which is outside the scope of the present document

**might** indicates a likelihood that something will happen as a result of action taken by some agency the behaviour of which is outside the scope of the present document

**might not** indicates a likelihood that something will not happen as a result of action taken by some agency the behaviour of which is outside the scope of the present document

In addition:

**is** (or any other verb in the indicative mood) indicates a statement of fact

**is not** (or any other negative verb in the indicative mood) indicates a statement of fact

The constructions "is" and "is not" do not indicate requirements.

# 1 Scope

The present document studies the charging aspects for enhanced support of next generation real time communication services phase 2 on the TS 23.501 [2], TS 23.502 [3], TS 23.503 [4], TS 23.228 [5], TS 22.011 [6], TS 22.156 [7] and TS 26.114 [8] incorporating conclusions from TR 23.700-77 [9].

The following is studied:

- Identify charging scenarios and potential charging requirements to support the following aspects of IMS network capabilities exposure, standalone IMS data channel, avatar communication, services over IMS data channel as a part of 3GPP PS Data Off Exempt Services, and IMS data channel applications download.

- Investigate the potential solutions to support the above charging scenarios and charging requirements.

# 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 23.501: "System Architecture for the 5G System (5GS); Stage 2".

[3] 3GPP TS 23.502: "Procedures for the 5G System; Stage 2".

[4] 3GPP TS 23.503: "Policy and charging control framework for the 5G System (5GS); Stage 2".

[5] 3GPP TS 23.228: "IP Multimedia Subsystem (IMS); Stage 2".

[6] 3GPP TS 22.011: "Service accessibility".

[7] 3GPP TS 22.156: "Mobile Metaverse Services".

[8] 3GPP TS 26.114: "IP Multimedia Subsystem (IMS); Multimedia Telephony; Media handling and interaction".

[9] 3GPP TR 23.700‑77: "Study on system architecture for next generation real time communication services Phase 2".

[10] 3GPP TS 32.255: "Telecommunication management; Charging management; 5G Data connectivity domain charging; stage 2".

[11] 3GPP TS 32.260: "Telecommunication management; Charging management; IP Multimedia Subsystem (IMS) charging".

[12] 3GPP TS 32.275: "Telecommunication management; Charging management; MultiMedia Telephony (MMTel) charging".

[13] 3GPP TS 32.254: "Telecommunication management; Charging management; Exposure function northbound Application Program Interfaces (APIs) charging".

[14] 3GPP TS 29.513: "Policy and Charging Control signalling flows and QoS parameter mapping".

# 3 Definitions of terms, symbols and abbreviations

## 3.1 Terms

For the purposes of the present document, the terms given in 3GPP TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in 3GPP TR 21.905 [1].

## 3.2 Symbols

Void.

## 3.3 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in 3GPP TR 21.905 [1].

API Application Programming Interface

AS Application Server

A2P Application to Person

DC Data Channel

DCSF Data Channel Signalling Function

NEF Network Exposure Function

P2A Person to Application

P2P Person to Person

# 4 Overview

## 4.1 General

The charging aspects for IMS has been specified in 3GPP TS 32.260 [11], TS 32.255 [10] and TS 32.275 [12].

3GPP SA4 introduced the data channel for IMS network in Rel-16 in TS 26.114 [8]. In Rel-18, SA2 specified the architecture, interfaces and procedures of IMS data channel and AR communication documented in TS 23.228 [5].

## 4.2 Networks functionality and architecture of IMS data channel

Figure 4.2-1 shows the architecture of IMS data channel depicted in clause AC.2 of 3GPP TS 23.228 [5].



Figure 4.2-1: Architecture option of IMS supporting DC usage with MF

Three new network functions are introduced for IMS data channel:

- Data Channel Application Repository (DCAR): It stores the verified data channel applications which are retrieved by the DCSF when required.

- Data Channel Signaling Function (DCSF): It is the signalling control function that provides data channel control logic.

- Media Function (MF): It provides the media resource management and forwarding of data channel media traffic.

## 4.3 Data channel application download

Figure 4.3-1 shows the data channel workflow depicted in clause 6.2.10.1 of 3GPP TS 26.114 [8]. The local UE A and the remote UE B can download the data channel application required download through the interaction with local DCSF over the bootstrap data channels.

Figure 4.3-1: Data Channel Workflow

The bootstrap data channel setup signalling procedure depicted in clause AC.7.1 of 3GPP TS 23.228 [5] also described how the data channel application is downloaded to the UEs in an IMS session.

## 4.4 Avatar communication

Figure 4.4-1 shows the architecture to support Avatar communication in clause AC.11 of 3GPP TS 23.228 [5].

Figure 4.4-1: Architecture to support Avatar communication

To support Avatar communication, the data channel architecture and functions described in clause 4.2 are enhanced as depicted in clause AC.11.2 of 3GPP TS 23.228 [5].

# 5 Charging scenarios and key issues

## 5.1 Topic 1: Support of standalone IMS Data Channel sessions

### 5.1.1 Use cases

#### 5.1.1.1 Use case #1a: Establishment and modification of standalone IMS Data Channel sessions

The standalone IMS data channel can be used for standalone applications that do not require a MMTel session or can be used without any voice or video communication between the connected parties.

TR 23.700-77 [9] concludes that the following scenarios for IMS session with standalone bootstrap DC, or a combination of standalone bootstrap DC and application DC should be supported.

a. An IMS session with only standalone bootstrap DC is used for downloading application list and applications from DCSF;

b. The UE initiate an IMS session to another UE with only standalone bootstrap DC and further updates the session with application DC;

c. An IMS session with a combination of standalone bootstrap DC and application DC is used to establish application DC for a downloaded application to the remote UE, which allows the remote UE to download the application if not yet downloaded after accepting the bootstrap DC, and update the session to use the application in the same session.

The SDP offer/answer procedure is used to change an IMS session with audio/video/DC media components to a standalone IMS DC session and adding audio/video media components to an established standalone IMS DC session.

The potential charging requirements for this UC are: REQ-NG\_RTC\_CH\_SIDCS-01, REQ-NG\_RTC\_CH\_SIDCS-02.

### 5.1.2 Potential charging requirements

**REQ-NG\_RTC\_CH\_SIDCS-01:** The IMS should support converged charging for establishment and modification of standalone IMS Data Channel sessions.

**REQ-NG\_RTC\_CH\_SIDCS-02:** The 5G system should support converged charging for establishment and modification of standalone IMS Data Channel sessions.

### 5.1.3 Key issues

The key issues are for investigating how to support converged charging for establishment and modification of standalone IMS Data Channel sessions considering REQ-NG\_RTC\_CH\_SIDCS-01 and REQ-NG\_RTC\_CH\_SIDCS-02. This investigation covers the following:

- **Key Issue #1a:** Identification of the charging information for converged charging for standalone IMS Data Channel sessions;

- **Key Issue #1b:** Identification of the main interactions with the NFs to obtain the charging information.

### 5.1.4 Possible solutions

#### 5.1.4.1 Solution #1.1: Duration-based charging for standalone IMS Data Channel

##### 5.1.4.1.1 General

Solution #1.1 addresses Key Issue #1a and #1b. It is based on charging support of duration-based charging for IMS data channel specified in 3GPP TS 32.260 [11].

##### 5.1.4.1.2 Description

When the UE initiates a IMS session with standalone bootstrap DC, the originating UE generally follows existing procedures to establish bootstrap DC as specified in TS 23.228 [5] for standalone DC session establishment. The three scenarios for IMS session with standalone Data Channel described in clause 5.1.1.1 with the following additions:

a. The UE may only include bootstrap DC media components when generating SDP offer in initial SIP INVITE request;

b. The UE may only include bootstrap DC media components when generating SDP offer in initial SIP INVITE request and further update the SDP with application DC;

c. The UE may include bootstrap DC and application DC media components when generating SDP offer in initial SIP INVITE request.

Similar to regular IMS Data Channel, the SDP can contain different DC media components for standalone Data Channel in different scenarios. The charging information of each DC media components which specified in clause 5.1.15 of TS 32.260 [11] for IMS Data Channel can be reused for duration-based charging for standalone IMS Data Channel.

#### 5.1.4.2 Solution #1.2: Volume-based charging for standalone IMS Data Channel

##### 5.1.4.2.1 General

Solution #1.2 addresses Key Issue #1a and #1b. It is based on IMS data channel volume-based charging specified in 3GPP TS 32.255 [10].

##### 5.1.4.2.2 Description

If standalone data channel is used in a IMS session, one or more data channel SDP media descriptions may be included in the SDP when generating SDP offer in initial SIP INVITE request. When a session is initiated or modified the P-CSCF derives a Media-Component-Description AVP for Rx interface or a "MediaComponent" attribute for N5 interface from the SDP Parameters which specified in clause 7.2 of TS 29.513 [14]. These QoS related parameters, as well as the identifier of caller and callee, are supported by N7 interface. SMF can collect these charging information and report them to CHF, as described in clause 5.1.18 of TS 32.255 [10].

The IMS data channel volume-based charging specified in clause 5.1.18 of TS 32.255 [10] is applicable for volume-based charging for standalone IMS Data Channel.

### 5.1.5 Evaluation

Solution #1.1 proposed to charge standalone IMS Data Channel based on IMS DC usage duration. The principles of solution #1.1, are inline the charging support of duration-based charging for IMS data channel in TS 32.260 [11] clause 5.1.15.

Solution #1.2 proposed to charge standalone IMS Data Channel based on IMS DC data volume consumption. The principles of solution #1.2, are inline the IMS data channel volume-based charging in TS 32.255 [10] clause 5.1.18.

### 5.1.6 Conclusion

Based on the evaluation in clause 5.1.5, Solution #1.1 is the only solution for duration-based charging for the standalone IMS Data Channel. The Solution #1.1 is selected to the normative work. This solution does not introduce any new charging functions. It only requires adding a brief description of duration-based charging principle for the standalone IMS Data Channel session in TS 32.260 [11].

Based on the evaluation in clause 5.1.5, Solution #1.2 is the only solution for volume-based charging for the standalone IMS Data Channel. The Solution #1.2 is selected to the normative work. This solution does not introduce any new charging functions. It only requires adding a brief description of volume-based charging principle for the standalone IMS Data Channel session in TS 32.255 [10].

## 5.2 Topic 2: charging for DC application download and usage

### 5.2.1 Use cases

#### 5.2.1.1 Use case #2a: Download application via bootstrap data channel

According to TS 23.228 [5] Annex AC.4 and AC.7.5, when UE request to establish an IMS Data Channel, the DCSF provides a URL to the MF via the IMS AS during data channel media resource reservation for the bootstrap data channel that enables downloading a subscriber specific graphical user interface to the UE via the Bootstrap Data Channel. The subscriber specific graphical user interface provides a menu of applications (e.g. Real-time Screen Sharing application) for which the user has subscribed to and is authorized to use. The originating UE and/or terminating UE may request DCSF to download the selected data channel application for further interaction.

The business roles and relationships are shown in Figure 5.2.1.1-1.



Figure 5.2.1.1-1: Business roles and relationship in IMS Data Channel Application Download

The charging party is IMS DC operator.

The charged party is the originating UE and terminating UE.

The potential charging requirements for this UC is: REQ-NG\_RTC\_CH-DCAPP-01.

#### 5.2.1.2 Use case #2b: Using application via application data channel in P2A and P2A2P scenarios

According to TS 23.228 [5] Annex AC.7.2, the application data channel support multiple interaction scenarios, for example, Person-to-Application interaction (P2A), and Person-to-Application-to-Person interaction (P2A2P).

- In P2A scenario, the application data channel is established between the originating UE and DC AS or between the terminating UE and DC AS.

- In P2A2P scenario, the originating and terminating UE establish application data channels for the same application to communicate with the same DC AS.

The charging party is IMS DC operator.

The charged party is the originating UE and terminating UE.

The potential charging requirements for this UC is: REQ-NG\_RTC\_CH-DCAPP-02.

### 5.2.2 Potential charging requirements

**REQ\_NG\_RTC\_CH-DCAPP-01:** The 5G system should support converged charging for DC application download.

**REQ\_NG\_RTC\_CH-DCAPP-02:** The 5G system should support converged charging for DC application usage.

### 5.2.3 Key issues

The key issues are for investigating how to support converged charging for DC application download and usage considering REQ-NG\_RTC\_CH\_DCAPP-01 and REQ-NG\_RTC\_CH\_DCAPP-02. This investigation covers the following:

- **Key Issue #2a:** Identification of the charging information and the main interactions with the NFs for converged charging for DC application download;

- **Key Issue #2b:** Identification of the charging information and the main interactions with the NFs for converged charging for DC application usage.

### 5.2.4 Possible solutions

#### 5.2.4.1 Solution #2.1: DC application download charging by event

##### 5.2.4.1.1 General

This solution #2.1 resolves the key issues #2a for REQ\_NG\_RTC\_CH-DCAPP-01. The solution is based on the data channel signalling control function (DCSF), as specified in TS 23.228 [5], to collect and report the charging information for DC application download event.

##### 5.2.4.1.2 Description

In an IMS DC session, the originating UE and terminating UE may request to download or update a dedicated DC application for following up interactions via a bootstrap DC. TS 23.228 [5] Figure AC.7.1-1 depicts the bootstrap DC setup signalling procedure, which includes four scenarios of DC application downloading:

- In step 21, the originating UE downloads DC application from the originating DCSF via the bootstrap DC with stream ID 0, 10. According to TS 26.114 [8] Table 6.2.10.1-2, the stream ID 0 and 10 refers to local network provider and local user.

- In step 22, the terminating UE downloads DC application from the originating DCSF via the bootstrap DC with stream ID 100, 110. According to TS 26.114 [8] Table 6.2.10.1-2, the stream ID 100 and 110 refers to remote network provider and remote user.

- In step 23, the originating UE downloads DC application from the terminating DCSF via the bootstrap DC with stream ID 100, 110 (i.e. remote network provider and remote user).

- In step 24, the terminating UE downloads DC application from the terminating DCSF via the bootstrap DC with stream ID 0, 10 (i.e. local network provider and local user).

Depends on the SDP offers and answers demonstrated in TS 26.114 [8] A.17, each UE decides the source for DC application download. Either one of the above scenarios may be a chargeable event, i.e. download DC application.

Since DC application is downloaded by DCSF for all scenarios, this NF can support the collection and reporting of relevant charging information. The charging information can be based on the information sent to DCSF from IMS AS in the Nimsas\_SessionEventControl\_Notify request, for instance,

- Session ID and Event ID;

- Calling ID and Called ID;

- DC Stream ID and DC application binding information, which are specified in TS 26.114 [8] clause 6.2.10.1 and A.17, e.g. a=dcmap:0 subprotocol="http".

Figure 5.2.4.1.2-1 depicts the charging procedure for DC application download based on DCSF.



Figure 5.2.4.1.2-1: Event Charging Procedure for DC application download (PEC as example)

1. Originating UE initiate the bootstrap DC set up procedure, as specified in step 1-20 of Figure AC.7.1-1 TS 23.228 [5].

2. Boostrap DC has been established between originating/terminating MF and originating/terminating UE, as specified in step 21-24 of Figure AC.7.1-1 TS 23.228 [5]. The UE send application request message to MF to request a data channel application(s) via the established bootstrap DC. The MF prepare the URL for DCSF to download the requested DC application(s) from DCAR. The DCSF provide the application list and proper data channel applications to UE#1 and UE#2 based on their data channel capabilities and their choices through MF, via either one of the following steps:

- when stream ID 0, 10 is negotiated for UE#1, step 21-3 is performed and triggered the step 2ch-a.

- When stream ID 100, 110 is negotiated for UE#2, step 22-3 is performed and triggered the step 2ch-a.

- When stream ID 100, 110 is negotiated for UE#1, step 23-3 is performed and triggered the step 2ch-a.

- when stream ID 0, 10 is negotiated for UE#2, step 24-3 is performed and triggered the step 2ch-a.

2ch-a. The DCSF sends Charging Data Request [Event] to CHF for the UE successful DC application download, triggered by completion of sending application to UE.

2ch-b. The CHF creates the CDR for this DC application download.

2ch-c. The CHF acknowledges by sending Charging Data Response [Event] to the DCSF.

#### 5.2.4.2 Solution #2.2: DC application usage charging by duration

##### 5.2.4.2.1 General

This solution #2.2 resolves the key issues #2b for REQ\_NG\_RTC\_CH-DCAPP-02. The IMS charging specified in TS 32.260 [11] can support the duration based charging for DC application usage.

##### 5.2.4.2.2 Description

The application DC may be established and terminated via SIP Re-INVITE message during an IMS DC session. In this case, the IMS charging can support the duration based charging for application DC, with the following details:

- Triggers: IMS trigger conditions in TS 32.260 [11] Table 5.4.3.1 may apply. For example, the application DC setup may be triggered by a SIP Re-INVITE message for adding application DC. The application DC release may be triggered by end of the call via SIP BYE message, or SDP negotiation via another SIP Re-INVITE message to release the application data channel.

- Charging Information: IMS charging information in TS 32.260 [11] Table 6.4.2.2.1 may apply. For example, the "SDP Media Component" may hold the application binding information via the "a=3gpp-req-app" attribute when media component is DC. The application binding information contains: the application identification via the "req-app-id" parameter, and the endpoints for the application DC via "app-dc-info" parameter, according to TS 26.114 [8] clause 6.2.13.

#### 5.2.4.3 Solution #2.3: DC application usage charging by data volume per IMS session

##### 5.2.4.3.1 General

This solution #2.3 resolves the key issues #2b for REQ\_NG\_RTC\_CH-DCAPP-02. The SMF charging specified in TS 32.255 [10] can support the volume based charging for IMS services, as specified in clause 5.1.18, on a per IMS DC session basis.

##### 5.2.4.3.2 Description

The caller and callee information are already supported in the PDU session charging information, which makes it possible to correlate the PDU session with IMS service. The volume is counted throughout the whole IMS DC session, which may include more than one application DC.

#### 5.2.4.4 Solution #2.4: DC application download charging by reporting volume per bootstrap DC

##### 5.2.4.4.1 General

This solution #2.4 resolves the key issues #2a for REQ\_NG\_RTC\_CH-DCAPP-01. The SMF charging specified in TS 32.255 [10] can support the volume based charging for IMS services, as specified in clause 5.1.18, which may be extended to support the reporting of volume for downloading DC application(s) during an IMS Bootstrap DC.

##### 5.2.4.4.2 Description

The IMS DC application(s) are downloaded during the bootstrap DC procedure, according to bootstrap DC setup signalling procedure in the TS 23.228 [5] Figure AC.7.1-1. In this case, the volume for downloading applications can be counted by the volume consumed per bootstrap DC.

According to TS 23.228 [5] clause 4.6.1, the P‑CSCF can derive the session information that is relevant for Policy and Charging Control from the SDP contained in the SIP signalling and forwards it to the PCF over Rx or N5 interface, which may identify the bootstrap DC information.

After receiving the IMS bootstrap DC setup session information from P-CSCF, the PCF may assign a service identifier for bootstrap DC. When SMF receives the PCC rule with service identifier for an IMS bootstrap DC, it can support the volume based charging for IMS DC application download according to the application based charging principle specified in TS 32.255 [10] clause 5.1.17.

#### 5.2.4.5 Solution #2.5: DC application usage charging by volume per application DC

##### 5.2.4.5.1 General

This solution #2.5 resolves the key issues #2b for REQ\_NG\_RTC\_CH-DCAPP-02. The SMF charging specified in TS 32.255 [10] can support the volume based charging for IMS services, as specified in clause 5.1.18, which may be extended to support the identification of volume for IMS DC application.

##### 5.2.4.5.2 Description

An IMS session may contain one or more IMS application DC(s), which can be identified by the application binding information in the SDP, e.g. "a=3gpp-req-app" attribute with "req-app-id" and "app-dc-info" parameter, as specified in TS 26.114 [8] clause 6.2.13. The DC application usage volume can be differentiated for an IMS application DC.

According to TS 23.228 [5] clause 4.6.1, the P‑CSCF can derive the session information that is relevant for Policy and Charging Control from the SDP contained in the SIP signalling and forwards it to the PCF over Rx or N5 interface, which may identify the IMS application DC information.

According to the application detection and control in PCC rule for PDU session management over N7 interface, the PCF may assign a service identifier for an application DC. When SMF receives the PCC rule with service identifier for an application DC, it can support the volume based charging for IMS application DC according to the application based charging principle specified in TS 32.255 [10] clause 5.1.17.

### 5.2.5 Evaluation

Solution #2.1 and solution #2.4 address key issue #2a for the DC application download charging.

- Solution #2.1 proposed to charge based on the DC application download event. This requires DCSF as a new CTF to collect and report DC application download information to CHF. TS 32.260 [11] can be extended to specify the charging requirement and principles for the new CTF, as well as the corresponding charging information.

- Solution #2.4 proposed to charge based on the DC application download volume per bootstrap DC. This solution requires a minimum extension to the IMS DC volume based charging principle, as specified in TS 32.255 [10], by describing the IMS bootstrap DC media information.

Solution #2.2, #2.3 and solution #2.5 address key issue #2b for the DC application usage charging.

- Solution #2.2 proposed to charge based on the DC application usage duration. The charging information can reuse the existing IE in IMS charging. This solution requires a minimum extension to the IMS DC duration based charging principle, as specified in TS 32.260 [11], by describing the IMS application DC media information.

- Solution #2.3 proposed to charge based on the data volume consumed during DC application usage on per IMS DC session basis. The SMF charging can already support this solution according to the IMS DC volume based charging specified in TS 32.255 [10]. However, this solution does not distinguish the volume consumed for each application, when the IMS DC session involved more than one application DC.

- Solution #2.5 proposed to charge based on the data volume consumed during DC application usage per IMS application DC. This solution requires a minimum extension to the IMS DC volume based charging principle, as specified in TS 32.255 [10], by describing the IMS application DC media information.

### 5.2.6 Conclusion

For key issue #2a, solution #2.4 is recommended into the normative work, to support the volume based charging per IMS bootstrap DC for application downloading. No extension to the charging information is required. The charging principle can be specified in TS 32.255 [10]. The solution #2.1 for event based charging for application download requires to specify a new CTF, which can be specified in TS 32.260 [11].

For key issue #2b, solution #2.2 and solution #2.5 are recommended into the normative work, to support the duration and volume based charging per IMS application DC. No extension to the charging information is required. The charging principle can be specified in TS 32.255 [10] and TS 32.260 [11].

## 5.3 Topic 3: Support IMS network capabilities exposure

### 5.3.1 Use cases

#### 5.3.1.1 Use case #3a: IMS network capabilities exposure to an external NF/AF

IMS network exposes its capabilities to an external NF/AF through the NEF. It includes the following scenarios:

- IMS DC related and non-IMS DC related events can be subscribed/notified. These events can be subscriber specific or non-subscriber specific. A subscriber specific event is e.g. an event like "user A has registered to the network or has established a call", a non-subscriber event is e.g. an event like "a user has called number 800-123456" where 800-123456 is a service number.

- Network capabilities such as establishing, updating and terminating of bootstrap data channel and P2A/P2A2P/P2P application data channel can be invoked.

Charged Party: An external NF/AF which invokes the Northbound APIs of IMS network exposed through the NEF.

Charging Party: IMS operator who charge the external NF/AF for invoking the Northbound APIs of IMS network exposed through the NEF.

The potential charging requirements for this UC are: REQ-NG\_RTC\_CH\_EXP-01.

### 5.3.2 Potential charging requirements

**REQ-NG\_RTC\_CH\_EXP-01:** The IMS network should support converged charging for invoking the Northbound APIs of IMS network through the NEF.

### 5.3.3 Key issues

The following key issues are identified considering REQ-NG\_RTC\_CH\_EXP-01:

- **Key Issue #3a**: Identification of the charging information to support converged charging for invoking the Northbound APIs of IMS network through the NEF.

- **Key Issue #3b**: Identification of the main interactions with the NFs to obtain the charging information.

### 5.3.4 Possible solutions

#### 5.3.4.1 Solution #3.1: Reuse of Northbound API converged charging

##### 5.3.4.1.1 General

Solution #3.1 addresses Key Issue #3a and #3b. It is based on the Northbound API converged charging specified in 3GPP TS 32.254 [13].

##### 5.3.4.1.2 Description

The Northbound API converged charging architecture specified in clause 4.4 of 3GPP TS 32.254 [13] is applicable for IMS network exposure.

The Northbound API charging principles specified in clause 5.1 of 3GPP TS 32.254 [13] is applicable for IMS network exposure.

The Northbound API converged charging scenarios specified in clause 5.4 of 3GPP TS 32.254 [13] are applicable for IMS network exposure. For flows see TS 32.254 [13] clause 5.4.2 where the external NF/AF are invoking the NEF, and the NEF uses IMS for the API fulfilment.

The definition of charging information for the Northbound API converged charging specified in clause 6 of 3GPP TS 32.254 [13] is applicable for IMS network exposure. The specific charging information of IMS network exposure, e.g. the calling number and the called number, are contained in "API Content" IE specified in Table 6.3.1.4.1 of 3GPP TS 32.254 [13]. The API Target Network Function would be IMS Node. The external NF/AF would be considered the tenant, i.e. the API Provider Id would be stored in the Tenant Identifier.

### 5.3.5 Evaluation

Solution #3.1 addresses both Key Issue #3a and #3b with reusing of Northbound API converged charging architecture, charging principles, charging scenarios and the definition of charging information.

### 5.3.6 Conclusion

Solution #3.1 is the only solution and therefore selected to the normative work.

## 5.4 Topic 4: Support IMS Data Channel as a PS Data Off Exempt Service

### 5.4.1 Use cases

#### 5.4.1.1 Use case #4a: Services over IMS Data Channel is configured as a PS Data Off Exempted Service

IMS data channel deployment is based on the IMS architecture depicted in Annex AC of TS 23.228 [5].

Charged Party: A serving End User (UE) who used IMS data channel application.

Charging Party: IMS Data channel operator who charge the serving End User for IMS data channel application usage.

The potential charging requirements for this UC are: REQ-NG\_RTC\_CH-PS-01.

### 5.4.2 Potential charging requirements

**REQ\_NG\_RTC\_CH-PS-01:** The 5G system should support converged charging when Services over IMS Data Channel as a part of PS Data Off Exempt Services.

### 5.4.3 Key issues

The following key issues are identified considering REQ-NG\_RTC\_CH-PS-01:

- **Key Issue #4a**: Identification of the charging information to support converged charging for services over IMS Data Channel when UE turn on the PS Data Off.

- **Key Issue #4b**: Identification of the main interactions with the NFs to obtain the charging information.

### 5.4.4 Possible solutions

#### 5.4.4.1 Solution #4.1: Reuse of 3GPP PS Data Off Status

##### 5.4.4.1.1 General

This solution #4.1 resolves the key issues **#**4a and **#**4b. The solution is based on the current 3GPP PS Data Off Status information element define in TS 32.255 [10], received from the SMF the PS Data Off status can be determined, together with the Change of 3GPP PS Data off Status trigger defined in TS 32.255 [10].

##### 5.4.4.1.2 Description

If any charging information is received in the CHF with the 3GPP PS Data Off Status set to Activated, all data usage reported should be rated this information considered.

### 5.4.5 Evaluation

Solution #4.1 proposed to reuse the information element and the PS Data Off status trigger defined in TS 32.255 [10] when Services over IMS Data Channel as a part of PS Data Off Exempt Services.

### 5.4.6 Conclusion

Solution #4.1 is the only solution and therefore selected to the normative work.

## 5.5 Topic 5: Support of Avatar communication

### 5.5.1 Use cases

#### 5.5.1.1 Use case #5a: Network centric IMS Avatar communication

According to TS 23.228 [5] Annex AC.11, for Avatar communication over the IMS data channel, the UE downloads a list of Avatar ID(s), which identify Avatar Representations and/or associated information, such as user selection preferences for avatar calls. Once the user selects an Avatar ID for an avatar call, the corresponding Avatar Representation may be provided from the BAR to the MF. It can then be transferred to the local UE (if not locally available) and/or to the remote UE via the application data channel, depending on the rendering mode. The avatar media rendering process supports a network rendering mode, in which the network processes the Avatar Representation along with the animation data.

Avatar communication is based on the IMS data channel, and specific charging information to Avatar communication can be used for charging purposes.

- Avatar Media Type：Avatar communication can be charged based on the duration of Avatar communication service usage. With the distinction of Avatar media types, operators can set different charging rates for DC and Avatar communication.

- Avatar ID: Different prices can be applied for charging based on the specific Avatar ID associated with different Avatar Representation.

The charging party: IMS operator who charge the serving End User for Avatar communication service usage because it provides Avatar communication service and performs avatar animation.

The charged party: A serving End User who used Avatar communication service.

The potential charging requirement for this use case is: REQ-NG\_RTC\_CH\_NCIAC-01.

### 5.5.2 Potential charging requirements

**REQ-NG\_RTC\_CH\_NCIAC-01:** The IMS should support converged charging for network centric IMS Avatar communication.

### 5.5.3 Key issues

The key issues are for investigating how to support converged charging for network centric IMS Avatar communication considering REQ-NG\_RTC\_CH\_NCIAC-01. This investigation covers the following:

- **Key Issue #5a:** Identification of the charging information for converged charging for network centric IMS Avatar communication;

- **Key Issue #5b:** Identification of the main interactions with the NFs to obtain the charging information.

### 5.5.4 Possible solutions

#### 5.5.4.1 Solution #5.1: IMS AS based charging solution for Avatar communication

##### 5.5.4.1.1 General

Solution #5.1 addresses Key Issue #5a and #5b for REQ-NG\_RTC\_CH\_NCIAC-01. The solution is based on the IMS AS, which collects and reports specific charging information for Avatar communication.

##### 5.5.4.1.2 Description

In TS 23.228 [5] Figure AC.11.3.3-1, UE1 requests the network to perform avatar animation. If the avatar animation negotiation between the DC AS and UE1 is successful, UE1 initiates new application data channels for avatar data transmission in Step 5. The IMS AS sends Charging Data Request[Start] to CHF for application data channel of Avatar communication service established successful, triggered after Step 5. The Avatar communication service release may be triggered by end of the Avatar communication service via SIP BYE message, or SDP negotiation via another SIP Re-INVITE message to release the application data channel. It will trigger IMS AS to send Charging Data Request[Stop] to CHF.

The "Avatar Media Specification" attribute for Nimsas\_MediaControl\_MediaInstruction service operation which is invoked by the DCSF to the IMS AS specified in clause AA.2.4.3.2 of TS 23.228 [5] can support IMS AS based charging solution for Avatar communication. If there is a "Avatar Media Specification" attribute in Nimsas\_MediaControl\_MediaInstruction service operation, it indicates IMS AS that this is an Avatar communication media. The "Resource URL" attribute in "Avatar Media Specification" can be used to retrieve the avatar representation, and IMS AS can use it to identify Avatar Representation for charging purpose. In this case, the support of the IMS AS for the collection and reporting of charging information related to the Avatar communication media and Avatar Representation Identifier in TS 32.260 [11] can be extended.

### 5.5.5 Evaluation

Solution #5.1 addresses Key Issue #5a and #5b proposing a converged charging method for network centric IMS Avatar communication. This requires IMS AS to collect and report specific charging information for Avatar communication to CHF.

### 5.5.6 Conclusion

Based on the evaluation in clause 5.5.5, Solution #5.1 is the only solution for network centric IMS Avatar communication. The Solution #5.1 is selected to the normative work.

# 6 Conclusions and recommendations

The present document describes the architecture, use cases, and potential charging requirements for next generation real time communication services, defines key issues, develops possible solutions, and evaluates these solutions. The present document made conclusions on the following aspects:

- Charging support of standalone IMS Data Channel sessions, in clause 5.1.6;

- Charging support of DC application download and usage, in clause 5.2.6;

- Charging support of IMS network capabilities exposure, in clause 5.3.6;

- Charging support of IMS Data Channel as a PS Data Off Exempt Service, in clause 5.4.6;

- Charging support of avatar communication, in clause 5.5.6.

To support next generation real time communication services charging phase 2 in normative work, it is recommended to specify the requirements, architectures and solutions for the aspects mentioned above based on the conclusions of the corresponding solutions documented in clauses 5.1.6, 5.2.6, 5.3.6, 5.4.6 and 5.5.6 of the present document.

Annex A:
Change history

|  |
| --- |
| **Change history** |
| **Date** | **Meeting** | **TDoc** | **CR** | **Rev** | **Cat** | **Subject/Comment** | **New version** |
| 2024-08 | SA5#156 | S5-243526 |  |  |  | Initial skeleton | 0.0.0 |
| 2024-08 | SA5#156 | S5-243822S5-243823S5-243824S5-244519S5-243825S5-244520S5-244064S5-244065S5-244521 |  |  |  | Skeleton updateAdd scopeAdd referenceIntroduce the backgroundSupport of standalone IMS Data Channel sessionsIntroduce the use case of charging for DC application download and usageNew KI on Support IMS network capabilities exposureNew KI on Support IMS Data Channel PS Data OffSolution for PS Data Off | 0.1.0 |
| 2024-10 | SA5#157 | S5-245900S5-245901S5-245902S5-245922 |  |  |  | Adding solution on IMS converged charging for standalone IMS Data ChannelNew charging solution for IMS network capabilities exposureUpdate charging scenario for DC application usageNew charging solution for DC application download | 0.2.0 |
| 2024-11 | SA5#158 | S5-246991S5-246992S5-246576S5-246993S5-246578S5-246994S5-246995S5-246581S5-246582 |  |  |  | Adding solution on volume-based charging for standalone IMS Data ChannelAdding evaluation for topic 1Update the architecture reference for IMS DCResolve EN in charging solution for DC application downloadNew charging solution for DC application usage by durationNew charging solution for DC application usage by volumeEvaluation for IMS DC charging topic 2Evaluation for IMS DC charging topic 3Evaluation for IMS DC charging topic 4 | 0.3.0 |
| 2024-12 |  |  |  |  |  | EditHelp's cleanup | 0.3.1 |
| 2024-12 | SA#106 | SP-241602 |  |  |  | Presentation to SA for Information | 1.0.0 |
| 2025-02 | SA5#158 | S5-250499S5-250398S5-250716S5-250717S5-250718S5-250745S5-250746S5-250747S5-250748S5-250749 |  |  |  | Adding conclusion for topic 1New charging solution for DC application usage by volumeNew charging solution for DC application download by volumeUpdate evaluation for Topic 2Add conclusion for Topic 2Add conclusion for Topic 3Add conclusion for Topic 4New KI on Support of Avatar communicationAdding solution on Support of Avatar communicationConclusions and recommendations | 1.1.0 |
| 2025-02 | SA5#159 |  |  |  |  | EditHelp cleanup | 1.1.1 |
| 2025-03 | SA#107 | SP-250146 |  |  |  | Presentation to SA for approval | 2.0.0 |
| 2025-03 | SA#107 |  |  |  |  | Upgrade to change control version | 19.0.0 |
| 2025-06 | SA#108 | SP-250533 | 0002 | 1 | D | Rel-19 CR 28.851 Addressing editHelp comments | 19.1.0 |