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| Technical Specification | |
| 3rd Generation Partnership Project;  Technical Specification Group Services and System Aspects;  Charging management;  Network Slice Admission Control charging in the 5G System (5GS); Stage 2  (Release 18) | |
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# Foreword

This Technical Specification| 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:

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

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 specifies the Converged Charging description for Network Slice Admission Control charging in the 5G System (5GS), based on Network Slice Admission Control Function (NSACF) of 5GS architecture and procedures specified in 3GPP TS 23.501 [3] and 3GPP TS 23.502 [4].

The charging aspect of Network Slice Admission Control charging is based on charging principles specified in 3GPP TS 32.240 [2].

The following functionalities of Network Slice Admission Control are within the scope:

- number of registered UEs per network slice;

- number of PDU Sessions per network slice.

# 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 32.240: "Telecommunication management; Charging management; Charging architecture and principles".

[3] 3GPP TS 23.501: "System Architecture for the 5G System (5GS)".

[4] 3GPP TS 23.502: "Procedures for the 5G System".

[5] 3GPP TS 32.290: "Telecommunication management; Charging management; 5G system; Services, operations and procedures of charging using Service Based Interface (SBI)".

[6] 3GPP TS 32.291: "Telecommunication management; Charging management; 5G system; Charging service, stage 3".

[7] 3GPP TS 32.298: "Telecommunication management; Charging management; Charging Data Record (CDR) parameter description".

[8] 3GPP TS 32.295: "Telecommunication management; Charging management; Charging Data Record (CDR) transfer".

[9] 3GPP TS 32.297: "Telecommunication management; Charging management; Charging Data Record (CDR) file format and transfer".

# 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].

**5G System:** 3GPP system consisting of 5G Access Network (AN), 5G Core Network and UE

**Network Slice:** A logical network that provides specific network capabilities and network characteristics

**PDU Session:** Association between the UE and a Data Network that provides a PDU connectivity service

## 3.2 Symbols

For the purposes of the present document, the following symbols apply:

Bnsac Reference point for the CDR file transfer from the NSACF CGF to the BD.

Ga Reference point for CDR transfer between a CDF and the CGF.

Nchf Service based interface exhibited by CHF.

N102 Reference point between NSACF and the CHF.

## 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].

3GPP 3rd Generation Partnership Project

5GS 5G System

CCS Converged Charging System

CDR Charging Data Record

CGF Charging Gateway Function

CHF CHarging Function

IEC Immediate Event Charging

NSAC Network Slice Admission Control

NSACF Network Slice Admission Control Function

PDU Protocol Data Unit

PEC Post Event Charging

PNI-NPN Public Network Integrated NPN

SNPN Stand-alone Non-Public Network

S-NSSAI Single Network Slice Selection Assistance Information

SBI Service Based Interface

SCUR Session Charging with Unit Reservation

UE User Equipment

# 4 Architecture considerations

## 4.1 High-level 5G System architecture

### 4.1.1 Non-roaming reference architecture

Figure 4.1.1-1 shows the Non-roaming 5G System high level architecture in the service-based representation, as defined in 3GPP TS 23.501 [3], with Network Slice Admission Control Function (NSACF):



Figure 4.1.1-1: Non-Roaming 5G System architecture

## 4.2 Network Slice Admission Control converged charging architecture

### 4.2.1 Non-roaming

Architectural options for Network Slice Admission Control converged charging in service-based representation are depicted in figure 4.2.1-1.

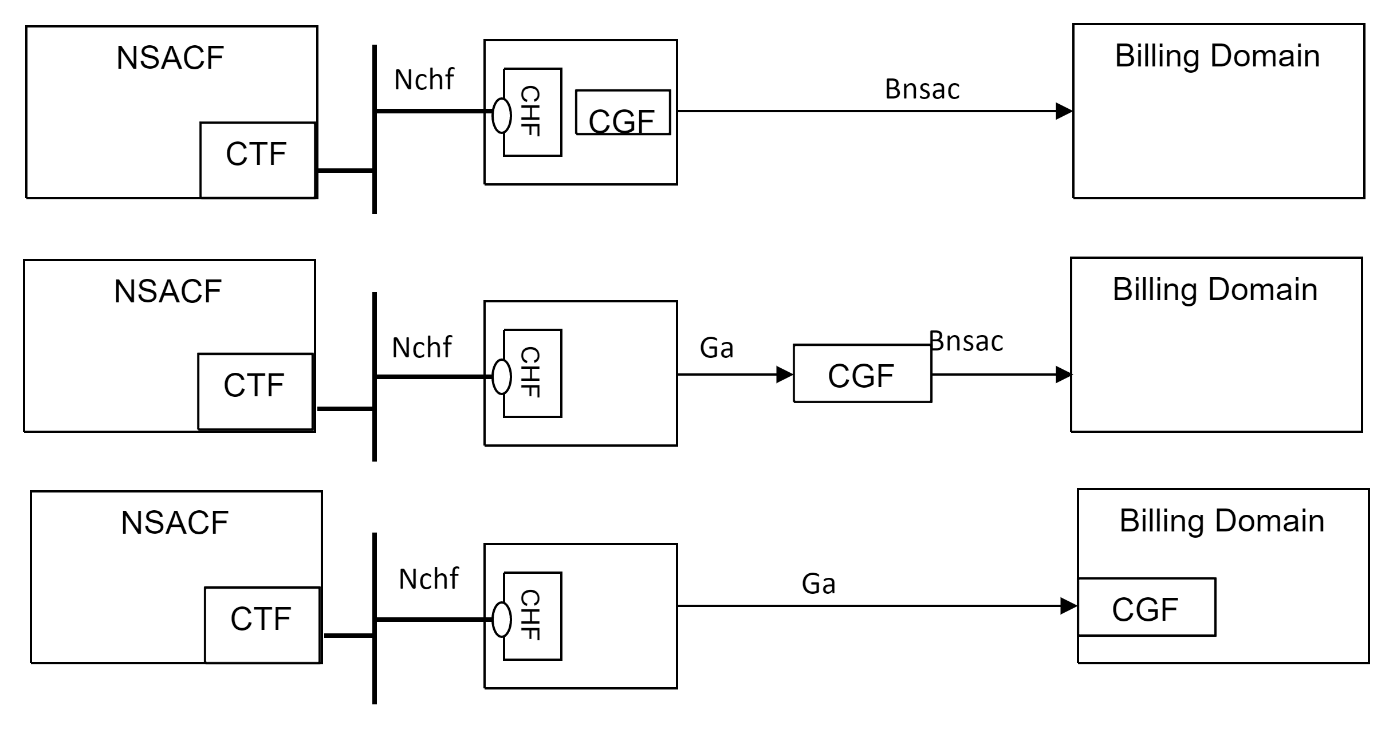


Figure 4.2.1-1: Non-Roaming Network Slice Admission Control converged charging architecture

Architectural options of figure 4.2.1-1 apply to any Network Slice Admission Control converged charging architecture of this clause.

Details on the interfaces and functions can be found in 3GPP TS 32.240 [2] for the general architecture components, Ga is described in clause 5.2.4 and Bnsac in clause 5.2.5 of the present document, and Nchf is described in 3GPP TS 32.290 [5].

Figure 4.2.1-2 shows the Network Slice Admission Control converged charging architecture in reference point representation for non-roaming:



Figure 4.2.1-2: Non-Roaming Network Slice Admission Control converged charging architecture - reference point representation

# 5 Network Slice Admission Control charging principles and scenarios

## 5.1 Network Slice Admission Control charging principles

### 5.1.1 General

The charging functions specified for Network Slice Admission Control charging, are based on following functionalities supported by NSACF specified in 3GPP TS 23.501 [3]:

- monitoring and controlling the number of registered UEs per network slice;

- monitoring and controlling the number of established PDU Sessions per network slice.

In the present document, "Number of registered UEs per network slice" or "Number of UEs per network slice " refer to simultaneous number of UEs registered per network slice, and "Number of established PDU Sessions" or "Number of PDU Sessions" refer to simultaneous number of PDU Sessions established per network slice.

The identification of the subscription to the network slice is the S-NSSAI.

### 5.1.2 Requirements

The following are high-level charging requirements specific to Network Slice Admission Control charging:

- The NSACF shall support converged charging using service based interface.

- The NSACF shall support converged charging for number of UEs per S-NSSAI.

- The NSACF shall support converged charging for number of PDU Sessions per S-NSSAI.

### 5.1.3 Charging information

The charging information for Network Slice Admission Control charging are:

- S-NSSAI;

- number of UEs;

- number of PDU Sessions.

### 5.1.4 CHF selection

The CHF selection by the NSACF is based on the following options and with this priority order (highest to lowest):

- NRF based discovery;

- pre-configured CHF address(s).

## 5.2 Network Slice Admission Control charging converged charging scenarios

### 5.2.1 Basic principles

#### 5.2.1.1 General

Network Slice Admission Control converged charging, may be performed by the NSACF interacting with the Charging Function (CHF) using Nchf specified in 3GPP TS 32.290 [5] and 3GPP TS 32.291 [6].

The S-NSSAI may be used to identify the tenant e.g. Stand-alone Non-Public Network (SNPN) or Public Network Integrated NPN (PNI-NPN). To provide the data required for the management activities outlined in GPP TS 32.240 [2], the NSACF shall be able to perform converged charging for each of the following:

- Charging information related to number of UEs per S-NSSAI.

- Charging information related to number of PDU Sessions per S-NSSAI.

The NSACF shall be able to perform converged charging by interacting with the CHF, for charging data related to number of UEs and number of PDU Sessions. The Charging Data Request and Charging Data Response are exchanged between the NSACF and the CHF, based on IEC, PEC, ECUR or SCUR scenarios as specified in 3GPP TS 32.290 [5]. The Charging Data Request is issued by the NSACF towards the CHF when certain conditions (chargeable events) are met.

Whether network slice admission control converged charging per S-NSSAI is active or inactive, which charging scenarios (IEC, PEC, ECUR or SCUR) is applied, and the threshold of NSAC Unit per S-NSSAI for initial, upward/downward crossed, and termination are based on configuration.

Converged charging uses centralized or decentralized unit determination and centralized rating scenarios for session based convergent charging specified in 3GPP TS 32.290 [5].

A detailed formal description of the converged charging parameters defined in the present document is to be found in 3GPP TS 32.291 [6].

A detailed formal description of the CDR parameters defined in the present document is to be found in 3GPP TS 32.298 [7].

#### 5.2.1.2 Applicable triggers in the NSACF

##### 5.2.1.2.1 General

When a charging event is issued towards the CHF, it includes details of charging information such as S-NSSAI.

Each trigger condition (i.e. chargeable event) defined for the Network Slice Admission Control converged charging functionality with the associated behaviour when they are met, is specified the present document, and the basic trigger mechanism is specified in the 3GPP TS 32.290 [5].

For session based charging the following applies:

- A Charging Data Request [Initial] is invoked by the NSACF towards the CHF when a trigger for "initial" is met for an S-NSSAI, and no charging session exists for this S-NSSAI.

- A Charging Data Request [Termination] is invoked by the NSACF towards the CHF when a trigger for "termination" is met for an S-NSSAI.

- A Charging Data Request [Update] is invoked by the NSACF towards the CHF, when any trigger which is not a trigger for "initial" nor a trigger for "termination" is met, and the charging session exists for an S-NSSAI.

For event based charging, when a trigger for threshold reached is met for an S-NSSAI, and the converged charging is activated, the following applies:

- In IEC mode, the Charging Data Request [Event] is sent towards the CHF.

- In ECUR mode, the NSACF invokes a Charging Data Request [Initial] towards the CHF to get authorization to allow the new allocated units for the updated threshold request, and sends Charging Data Request [Termination] towards the CHF to inform that the new allocated units is accepted by NSACF.

- In PEC mode, the Charging Data Request [Event] is sent towards the CHF when the event completed, e.g. used threshold.

Table 5.2.1.2.1-1 summarizes the set of default trigger conditions which shall be supported by the NSACF when charging is active for the corresponding NSACF functionality, with the associated Charging Data Request message sent from NSACF towards the CHF.

"NSAC units" refers to "Number of UEs" or "Number of PDU sessions".

Table 5.2.1.2.1-1: Default trigger conditions in NSACF

| Trigger Conditions | Trigger level | Default category | CHF allowed to change category | CHF allowed to enable and disable | Message when "immediate reporting" category |
| --- | --- | --- | --- | --- | --- |
| **Initial** | | | | | |
| NSAC units threshold reached for initial | - | Immediate | Not Applicable | Not Applicable | SCUR: Charging Data Request [Initial] |
| **Change of charging conditions** | | | | | |
| NSAC units threshold upwards reached | - | Immediate | Yes | Yes | IEC: Charging Data Request [Event]  ECUR: Charging Data Request [Initial] |
| NSAC units threshold crossed upwards | - | Immediate | Yes | Yes | PEC: Charging Data Request [Event]  SCUR: Charging Data Request [Update] |
| NSAC units threshold crossed downwards | - | Immediate | Yes | Yes | PEC: Charging Data Request [Event]  SCUR: Charging Data Request [Update] |
| **Quota management** | | | | | |
| NSAC units quota threshold reached | - | Immediate | Not Applicable | Yes | SCUR: Charging Data Request [Update] |
| NSAC units quota exhausted | - | Immediate | Not Applicable | Yes |
| Expiry of NSAC units quota validity time | - | Immediate | Not Applicable | Yes |
| Expiry of NSAC units quota holding time | - | Immediate | Not Applicable | Yes |
| Re-authorization request by CHF | - | Immediate | Not Applicable | Not Applicable |
| **Termination** | | | | | |
| NSAC units threshold reached for termination | - | Immediate | Not Applicable | Not Applicable | SCUR: Charging Data Request [Termination] |
| NSAC check and update completed | - | Immediate | Not Applicable | Not Applicable | ECUR: Charging Data Request [Termination] |
| Abort charging request from the CHF | - | Immediate | Not Applicable | Not Applicable | SCUR: Charging Data Request [Termination] |
| Network slice termination | - | Immediate | Not Applicable | Not Applicable | PEC: Charging Data Request [Event]  SCUR: Charging Data Request [Termination] |

Table 5.2.1.2.1-2 details the set of trigger conditions and NSACF behaviour for SCUR.

Table 5.2.1.2.1-2: Chargeable events and their related actions in NSACF for SCUR

| Chargeable event | Conditions | NSACF action |
| --- | --- | --- |
| Initial | | |
| NSAC units threshold reached for initial | If no charging session exist for the S-NSSAI | Charging Data Request [Initial] with a possible request to allocate NSAC units quota for later use. |
| If the charging session exists for the S-NSSAI | The trigger will be ignored |
| Change of charging conditions | | |
| NSAC units threshold crossed upwards | If the category is set to "immediate reporting" | Charging Data Request [Update] with a possible request to allocate NSAC units quota.  Close the counts and start new counts with time stamps |
| If the category is set to "deferred reporting" | Close the counts and start new counts with time stamps |
| NSAC units threshold crossed downwards | If the category is set to "immediate reporting" | Charging Data Request [Update]  Close the counts and start new counts with time stamps |
| If the category is set to "deferred reporting" | Close the counts and start new counts with time stamps |
| Quota management | | |
| NSAC units quota threshold reached | If the corresponding trigger is enabled | Charging Data Request [Update] with a possible request to allocate NSAC units quota  Close the counts and start new counts with time stamps |
| NSAC units Quota exhausted | If the corresponding trigger is enabled | Charging Data Request [Update] with a possible request NSAC units quota.  Close the counts and start new counts with time stamps |
| Expiry of NSAC units quota validity time | If the corresponding trigger is enabled | Charging Data Request [Update] with a possible request NSAC units quota.  Close the counts and start new counts with time stamps |
| Expiry of NSAC units quota holding time | If the corresponding trigger is enabled | Charging Data Request [Update] with a possible request NSAC units quota.  Close the counts and start new counts with time stamps |
| Re-authorization request by CHF | If the corresponding trigger is enabled | Charging Data Request [Update] with a possible request NSAC units quota.  Close the counts and start new counts with time stamps |
| Termination | | |
| NSAC units threshold reached for termination | If the charging session exists for the S-NSSAI, and when NSAC units="Number of UEs", the Number of PDU sessions threshold for termination is active and not reached. | The trigger will be ignored |
| If the charging session exists for the S-NSSAI, and when NSAC units="Number of PDU sessions", the Number of UEs threshold for termination is active and not reached. | The trigger will be ignored |
| If the charging session exists for the S-NSSAI, and when NSAC units="Number of UEs", the Number of PDU sessions threshold for termination is active and reached. | Charging Data Request [Termination]  Close the counts with time stamps |
| If the charging session exists for the S-NSSAI, and when NSAC units="Number of PDU sessions", the Number of UEs threshold for termination is active and reached. | Charging Data Request [Termination]  Close the counts with time stamps |
| Abort charging request from the CHF |  | Charging Data Request [Termination]  Close the counts with time stamps |
| Network slice termination |  | Charging Data Request [Termination]  Close the counts with time stamps |

#### 5.2.1.3 Quota management

The quota management functionality is supported in Network Slice Admission Control converged charging, to allow controlling fluctuating number of simultaneous UEs and/or PDU sessions per S-NSSAI does not exceed CCS allocated numbers. There is a difference between quota that can be consumed in a cumulative manner e.g., seconds, bytes, and quota that can be used temporarily like allocated simultaneous UEs and PDU sessions per S-NSSAI for NSACF charging. The quota that can be consumed in a cumulative manner is requested as requested unit, reported as used unit and granted as granted unit. The quota that can be used in a temporary manner is requested as allocate Unit, reported as allocated unit, and granted as allocated unit in NSACF charging. The new allocated unit override previous allowed unit in the NSACF.

The NSACF is configured with maximum numbers for simultaneous UEs and PDU sessions per S-NSSAI. The CCS can, based on internal criteria, allocate quota of number of UEs and PDU sessions based on its own maximum numbers.

### 5.2.2 Message flows

#### 5.2.2.1 General

The flows in the present document specify the interaction between the NSACF and the CHF for as Network Slice Admission Control converged charging functionality, in different scenarios, based on 3GPP TS 23.501 [3] and 3GPP TS 23.502 [4] procedures and flows.

This interaction is based on Charging Data Request /Response specified in 3GPP TS 32.290 [5], exchanged between the NSACF embedding the CTF and the CHF. The following scenarios are supported:

- PEC;

- IEC;

- ECUR;

- SCUR.

As a general principle, the steps in the figures for the message flows below correspond to the steps of figures in 3GPP TS 23.502 [4], which is the reference. The present document specifies the charging specific extension part.

#### 5.2.2.2 Number of UEs per network slice charging from NSACF

##### 5.2.2.2.1 General

The subclause below describes the Network Slice for Admission Control charging for Number of UEs per network slice.

##### 5.2.2.2.2 Number of UEs per network slice – IEC charging

The following figure 5.2.2.2.2-1 describes a Network Slice Admission Control charging for Number of UEs per network slice message flow in IEC charging, based on figure 4.2.11.2-1 of 3GPP TS 23.502 [4] description:



Figure 5.2.2.2.2-1: Number of UEs per S-NSSAI – IEC charging

Steps 1 to 2: per 3GPP TS 23.502 [4] Figure 4.2.11.2-1 Number of UEs per network slice availability check and update procedure.

2ch-a: For a particular S-NSSAI, e.g. the "Nb of UEs threshold upwards reached" trigger is met.

2ch-b: The NSACF sends Charging Data Request [Event] to CHF with "Number of UEs" in the Allocate Unit.

2ch-c: The CHF creates a CDR for this "Number of UEs" for the S-NSSAI.

2ch-d: CHF provides response to NSACF.

Steps 3 and 4: per 3GPP TS 23.502 [4] Figure 4.2.11.2-1 Number of UEs per network slice availability check and update procedure.

##### 5.2.2.2.3 Number of UEs per network slice – PEC

The following figure 5.2.2.2.3-1 describes a Number of UEs per network slice charging message flow in PEC, based on figure 4.2.11.2-1 of 3GPP TS 23.502 [4] description:



Figure 5.2.2.2.3-1: Number of UEs per S-NSSAI – PEC

Steps 1 to 4: per 3GPP TS 23.502 [4] Figure 4.2.11.2-1 Number of UEs per network slice availability check and update procedure.

4ch-a: For a particular S-NSSAI, e.g. the "Nb of UEs threshold crossed upwards/downwards" trigger is met.

4ch-b: The NSACF sends Charging Data Request [Event] to CHF with "Number of UEs".

4ch-c: The CHF creates a CDR for this "Number of UEs" for the S-NSSAI.

4ch-d: CHF provides response to NSACF.

##### 5.2.2.2.4 Number of UEs per network slice – ECUR

The following figure 5.2.2.2.4-1 describes a Number of UEs per network slice charging message flow in ECUR, based on figure 4.2.11.2-1 of 3GPP TS 23.502 [4] description:



Figure 5.2.2.2.4-1: Number of UEs per S-NSSAI – ECUR

Steps 1 to 2: per 3GPP TS 23.502 [4] Figure 4.2.11.2-1 Number of UEs per network slice availability check and update procedure.

2ch-a: For a particular S-NSSAI, e.g. the "Nb of UEs threshold upwards reached" trigger is met.

2ch-b: The NSACF sends Charging Data Request [Initial] to CHF with "Number of UEs", in the allocate unit, to be granted authorization.

2ch-c: Account, Rating, reservation control by the CHF. The CHF opens a CDR

2ch-d: CHF provides response to NSACF, which may provide the granted threshold in the allocated unit. The previous number of UEs threshold is overridden by the granted threshold.

3: NSACF check and update completed.

3ch-a: The NSACF sends Charging Data Request [Termination] to CHF with "Number of UEs" in the allocated unit, which is triggered by "NSAC units threshold upwards completed".

3ch-b: Account, Rating Control by the CHF. The CHF closes the CDR

3ch-c: CHF provides response to NSACF.

4: per 3GPP TS 23.502 [4] Figure 4.2.11.2-1.

#### 5.2.2.3 Number of PDU sessions per network slice charging from NSACF

##### 5.2.2.3.1 General

The subclause below describes the Network Slice Admission Control charging for Number of PDU sessions per network slice.

##### 5.2.2.3.2 Number of PDU sessions per network slice – PEC

The following figure 5.2.2.3.2-1 describes a Number of PDU sessions per network slice charging message flow in PEC, based on figure 4.2.11.4-1 of 3GPP TS 23.502 [4] description.



Figure 5.2.2.3.2-1: Number of PDU sessions per S-NSSAI – PEC

Steps 1 to 4: per 3GPP TS 23.502 [4] Figure 4.2.11.4-1 Number of PDU sessions per network slice availability check and update procedure.

4ch-a: For a particular S-NSSAI, e.g. the "Nb of PDU sessions threshold crossed upwards/ downwards" trigger is met.

4ch-b: The NSACF sends Charging Data Request [Event] to CHF with "Number of PDU sessions".

4ch-c: The CHF creates a CDR for this "Number of PDU sessions" for the S-NSSAI.

4ch-d: CHF provides response to NSACF.

##### 5.2.2.3.3 Number of PDU sessions per network slice – IEC

The following figure 5.2.2.3.3-1 describes a Number of PDU sessions per network slice charging message flow in IEC, based on figure 4.2.11.4-1 of 3GPP TS 23.502 [4] description:



Figure 5.2.2.3.3-1: Number of PDU sessions per S-NSSAI – IEC

Steps 1 to 2: per 3GPP TS 23.502 [4] Figure 4.2.11.4-1 Number of PDU sessions per network slice availability check and update procedure.

2ch-a: For a particular S-NSSAI, e.g. the "Nb of PDU sessions threshold upwards reached" trigger is met.

2ch-b: The NSACF sends Charging Data Request [Event] to CHF with "Number of PDU sessions " in the Allocate Unit.

2ch-c: The CHF creates a CDR for this " Number of PDU sessions" for the S-NSSAI.

2ch-d: CHF provides response to NSACF.

Steps 3 and 4: per 3GPP TS 23.502 [4] Figure 4.2.11.4-1 Number of PDU sessions per network slice availability check and update procedure.

##### 5.2.2.3.4 Number of PDU sessions per network slice – ECUR

The following figure 5.2.2.3.4-1 describes a Number of PDU sessions per network slice charging message flow in ECUR, based on figure 4.2.11.4-1 of 3GPP TS 23.502 [4] description.



Figure 5.2.2.3.4-1: Number of PDU sessions per S-NSSAI – ECUR

Steps 1 to 2: per 3GPP TS 23.502 [4] Figure 4.2.11.4-1 Number of PDU sessions per network slice availability check and update procedure.

2ch-a: For a particular S-NSSAI, e.g. the "Nb of PDUs threshold upwards reached" trigger is met.

2ch-b: The NSACF sends Charging Data Request [Initial] to CHF with "Number of PDU sessions" in the allocate unit to be granted authorization.

2ch-c: Account, Rating, reservation control by the CHF. The CHF opens a CDR.

2ch-d: CHF provides response to NSACF, which may provide the granted threshold in the allocated unit. The previous number of UEs threshold is overridden by the granted threshold.

3: NSACF check and update completed.

3ch-a: The NSACF sends Charging Data Request [Termination] to CHF with "Number of PDU sessions" in the allocated unit, which is triggered by "NSAC units threshold upwards completed".

3ch-b: Account, Rating Control by the CHF. The CHF closes the CDR.

3ch-c: CHF provides response to NSACF.

4: per 3GPP TS 23.502 [4] Figure 4.2.11.4-1.

#### 5.2.2.4 Number of UEs and Number of PDU sessions per network slice charging from NSACF – single charging session

##### 5.2.2.4.1 General

The subclause below describes the Network Slice Admission Control charging for Number of UEs and Number of PDU sessions per network slice in SCUR with a single charging session for the S-NSSAI, based on figure 4.2.11.2-1 and figure 4.2.11.4-1 of 3GPP TS 23.502 [4] description.

##### 5.2.2.4.2 Number of UEs and Number of PDU sessions per network slice charging – initial

The following figure 5.2.2.4.2-1 describes Network Slice Admission Control charging for Number of UEs and Number of PDU sessions per network slice charging session initiation message flows in SCUR:



Figure 5.2.2.4.2-1: Number of UEs and Number of PDU sessions per S-NSSAI – SCUR - initial

Och. No charging session exists for the S-NSSAI.

A.Steps 1 to 3: per 3GPP TS 23.502 [4] Figure 4.2.11.2-1 Number of UEs per network slice availability check and update procedure.

B.Steps 1 to 3: per 3GPP TS 23.502 [4] Figure 4.2.11.4-1 Number of PDU sessions per network slice availability check and update procedure.

A and B occurs in parallel and asynchronously from each other.

3ch-a: For a particular S-NSSAI, one of the Nb of UEs threshold or Nb of PDU sessions trigger reached for initial.

3ch-b: The NSACF sends Charging Data Request [Initial] to CHF and, depending on the trigger:

if "Nb of UEs threshold reached for initial", sends the "Number of UEs" and may request for a "Number of UEs Quota limit",

if "Nb of PDU sessions threshold reached for initial", sends the "Number of PDU sessions" and may request for a "Number of PDU sessions Quota limit".

3ch-c: Account, Rating Control by the CHF. The CHF opens a CDR.

3ch-d: CHF provides response to NSACF and may include quota granted and new triggers setting.

A.Step 4: per 3GPP TS 23.502 [4] Figure 4.2.11.2-1.

B.Step 4: per 3GPP TS 23.502 [4] Figure 4.2.11.4-1.

##### 5.2.2.4.3 Number of UEs and Number of PDU sessions per network slice charging – update

The following figure 5.2.2.4.3-1 describes Network Slice Admission Control charging for Number of UEs and Number of PDU sessions per network slice charging session update message flows in SCUR:



Figure 5.2.2.4.3-1: Number of UEs and Number of PDU sessions per S-NSSAI – SCUR - update

Och. A charging session is established for the S-NSSAI.

A.Steps 1 to 3: per 3GPP TS 23.502 [4] Figure 4.2.11.2-1 Number of UEs per network slice availability check and update procedure.

B.Steps 1 to 3: per 3GPP TS 23.502 [4] Figure 4.2.11.4-1 Number of PDU sessions per network slice availability check and update procedure.

A and B occurs in parallel and asynchronously from each other.

3ch-a: For a particular S-NSSAI, one of the trigger related to "Nb of UEs or Nb of PDU sessions threshold crossed upwards/downwards" or granted quota is met.

3ch-b: The NSACF sends Charging Data Request [update] to CHF and, depending on the trigger:

if "Nb of UEs" trigger, sends the "Number of UEs" and may request for a "Number of UEs Quota limit",

if "Nb of PDU sessions" trigger, sends the "Number of PDU sessions" and may request for a "Number of PDU sessions Quota limit".

3ch-c: Account, Rating Control by the CHF. The CHF updates the CDR.

3ch-d: CHF provides response to NSACF and may include quota granted and new triggers setting.

A.Step 4: per 3GPP TS 23.502 [4] Figure 4.2.11.2-1.

B.Step 4: per 3GPP TS 23.502 [4] Figure 4.2.11.4-1.

##### 5.2.2.4.4 Number of UEs and Number of PDU sessions per network slice charging – termination

The following figure 5.2.2.4.4-1 describes Network Slice Admission Control charging for Number of UEs and Number of PDU sessions per network slice charging session termination message flows in SCUR:



Figure 5.2.2.4.4-1: Number of UEs and Number of PDU sessions per S-NSSAI – SCUR - termination

Och. A charging session is established for the S-NSSAI.

A.Steps 1 to 3: per 3GPP TS 23.502 [4] Figure 4.2.11.2-1 Number of UEs per network slice availability check and update procedure.

B.Steps 1 to 3: per 3GPP TS 23.502 [4] Figure 4.2.11.4-1 Number of PDU sessions per network slice availability check and update procedure.

A and B occurs in parallel and asynchronously from each other.

3ch-a: For a particular S-NSSAI, the "Nb of UEs and Nb of PDU sessions threshold reached for termination.

3ch-b: The NSACF sends Charging Data Request [Termination] to CHF and, depending on the trigger:

if "Nb of UEs" trigger, sends the "Number of UEs".

if "Nb of PDU sessions" trigger, sends the "Number of PDU sessions".

3ch-c: Account, Rating Control by the CHF. The CHF closes the CDR.

3ch-d: CHF provides response to NSACF

A.Step 4: per 3GPP TS 23.502 [4] Figure 4.2.11.2-1.

B.Step 4: per 3GPP TS 23.502 [4] Figure 4.2.11.4-1.

### 5.2.3 CDR generation

#### 5.2.3.1 Introduction

The CHF CDRs for Network Slice Admission Control charging are generated by the CHF to collect charging information that they subsequently transfer to the Charging Gateway Function (CGF).

The following clauses describe in detail the conditions for generating the CHF CDR, which shall be supported by the CHF.

#### 5.2.3.2 Triggers for CHF CDR

##### 5.2.3.2.1 General

A Network Slice Admission Control charging CHF CDR is used to collect charging information related to Network Slice Admission Control chargeable events for PEC, IEC, ECUR and SCUR scenarios.

A partial records mechanism applies in the CHF for SCUR scenarios.

##### 5.2.3.2.2 Triggers for CHF CDR generation

A CHF CDR shall be generated by the CHF for each received Charging Data Request [Event].

5.2.3.2.3 Triggers for CHF CDR opening

A CHF CDR shall be opened when the CHF receives Charging Data Request [Initial] with charging information added.

##### 5.2.3.2.4 Triggers for CHF CDR charging information addition

When the CHF receives Charging Data Request[Update], with the trigger conditions different from those of Table 5.2.3.2.5-1, the received charging information shall be added to the CHF CDR, and the CDR shall remain open.

##### 5.2.3.2.5 Triggers for CHF CDR partial record closure

When the CHF receives Charging Data Request [Update], with the trigger conditions of Table 5.2.3.2.5-1, the charging information shall be added in the CHF CDR, before the CDR is closed and a subsequent CHF CDR shall be opened with an incremented Sequence Number.

Table 5.2.3.2.5-1: Triggers for CHF CDR partial record closure

|  |
| --- |
| Trigger Conditions |
| Quota management |
| Number of UEs quota exhausted |
| Number of PDU sessions quota exhausted |

##### 5.2.3.2.6 Triggers for CHF CDR closure

When the CHF receives Charging Data Request [Termination], the charging information shall be added in the CHF CDR and the CDR shall be closed.

### 5.2.4 Ga record transfer flows

Details of the Ga protocol application are specified in 3GPP TS 32.295 [8].

### 5.2.5 Bnsac CDR file transfer

Details of the Bnsac protocol application are specified in 3GPP TS 32.297 [9].

# 6 Definition of charging information

## 6.1 Data description for network slice admission control charging

### 6.1.1 Message contents

#### 6.1.1.1 General

The Charging Data Request and Charging Data Response are specified in subclause 5.1.2.2.1 of 3GPP TS 32.290 [5].

Table 6.1.1.1-1 describes the use of these messages for network slice admission control charging.

Table 6.1.1.1-1: Network slice admission control charging messages reference table

|  |  |  |
| --- | --- | --- |
| **Message** | **Source** | **Destination** |
| Charging Data Request | NSACF | CHF |
| Charging Data Response | CHF | NSACF |

The following clauses describe the different fields used in the Charging Data messages and the category in the tables is used according to the charging data configuration defined in clause 5.4 of 3GPP TS 32.240 [2].

#### 6.1.1.2 Charging Data Request message

Table 6.1.1.2-1 illustrates the basic structure of a Charging Data Request message from the NSACF as used for network slice admission control.

Table 6.1.1.2-1: Charging Data Request message contents

| Information Element | Converged Charging  Category | | Description | |
| --- | --- | --- | --- | --- |
| Session Identifier | OC | | Described in 3GPP TS 32.290 [5] | |
| NF Consumer Identification | M | | Described in 3GPP TS 32.290 [5] and holds the identifier of the NSACF | |
| NF Functionality | M | | Described in 3GPP TS 32.290 [5]. | |
| NF Name | OC | | Described in 3GPP TS 32.290 [5]. | |
| NF Address | OC | | Described in 3GPP TS 32.290 [5]. | |
| NF PLMN ID | OC | | Described in 3GPP TS 32.290 [5]. | |
| Charging Identifier | OM | | Described in 3GPP TS 32.290 [5]. | |
| Invocation Timestamp | M | | Described in 3GPP TS 32.290 [5]. | |
| Invocation Sequence Number | M | | Described in 3GPP TS 32.290 [5]. | |
| Retransmission Indicator | OC | | Described in 3GPP TS 32.290 [5]. | |
| One-time Event | OC | | Described in 3GPP TS 32.290 [5]. | |
| One-time Event Type | OC | | Described in 3GPP TS 32.290 [5]. | |
| Notify URI | OC | | Described in 3GPP TS 32.290 [5]. | |
| Supported Features | OC | | Described in 3GPP TS 32.290 [5]. | |
| Service Specification Information | OC | | Described in 3GPP TS 32.290 [5]. | |
| Multiple Unit Usage | OM | | Described in 3GPP TS 32.290 [5]. | |
| Rating Group | OM | | Described in 3GPP TS 32.290 [5]. | |
| Allocate Unit | OC | This field holds the new allowed units to be allocated, overriding previous allowed units. | |
| Allocate Unit Indicator | OM | This field indicates on whether the allowed units to be allocated are determined by CHF or supplied by the NSACF. | |
| NSAC Container Information | OC | | This field holds the network slice admission control specific Allocate Unit described in clause 6. 2.1.3. | |
| Allocated Unit | OC | This field holds the Allocated Unit. | | |
| Quota management Indicator | OC | Described in 3GPP TS 32.290 [5]. | |
| Triggers | OC | Described in 3GPP TS 32.290 [5]. | |
| Trigger Timestamp | OC | Described in 3GPP TS 32.290 [5]. | |
| Local Sequence Number | OM | | Described in 3GPP TS 32.290 [5]. | |
| NSAC Container Information | OC | This field holds the network slice admission control specific units in use described in clause 6.2.1.3. | |
| S NSSAI | M | | This field holds the Single Network Slice Selection Assistance Information identifying the network slice. | |
| NSAC Charging Information | OM | | This field holds NSAC specific information described in clause 6.2.1.2 | |

#### 6.1.1.3 Charging data response message

Table 6.1.1.3-1 illustrates the basic structure of a Charging Data Response message from the CHF to the NSACF as used for network slice admission control.

Table 6.1.1.3-1: Charging Data Response message contents

| Information Element | Converged Charging  Category | Description |
| --- | --- | --- |
| Session Identifier | OC | Described in 3GPP TS 32.290 [5]. |
| Invocation Timestamp | M | Described in 3GPP TS 32.290 [5]. |
| Invocation Result | OC | Described in 3GPP TS 32.290 [5]. |
| Invocation Sequence Number | OM | Described in 3GPP TS 32.290 [5]. |
| Session Failover | OC | Described in 3GPP TS 32.290 [5]. |
| Supported Features | OC | Described in 3GPP TS 32.290 [5]. |
| Multiple Unit Information | OC | Described in 3GPP TS 32.290 [5]. |
| Result Code | OC | Described in 3GPP TS 32.290 [5]. |
| Rating Group | OM | Described in 3GPP TS 32.290 [5]. |
| Allocated Unit | OC | This field holds the Allocated Unit. |
| NSAC Container Information | OC | This field holds the network slice admission control specific Allocated Unit described in clause 6.2.1.3. |
| Validity Time | OC | Described in 3GPP TS 32.290 [5]. |
| Triggers | OC | Described in 3GPP TS 32.290 [5] and holds the network slice admission control specific triggers described in clause 5.2.1. |

### 6.1.2 Ga message contents

See clause 5.2.4.

### 6.1.3 CDR description on the Bnsac interface

#### 6.1.3.1 General

This clause describes the CDR content and format generated for Network Slice Admission Control charging.

The following tables provide a brief description of each CDR parameter. The category in the tables is used according to the charging data configuration defined in clause 5.4 of 3GPP TS 32.240 [2]. Full definitions of the CDR parameters, sorted by the name in alphabetical order, are provided in 3GPP TS 32.298 [7].

#### 6.1.3.2 Network Slice Admission Control charging CHF CDR data

If enabled, CHF CDRs for Network Slice Admission Control charging shall be produced for each Network Slice Admission Control on simultaneous number of UEs and simultaneous number of PDU Sessions under quota management, and reporting defined triggers.

The fields of Network Slice Admission Control charging CHF CDR are specified in table 6.1.3.2-1.

Table 6.1.3.2-1: Network Slice Admission Control charging CHF record data

| Field | Category | | Description |
| --- | --- | --- | --- |
| Record Type | M | | Described in 3GPP TS 32.298 [7] |
| Recording Network Function ID | OM | | Described in 3GPP TS 32.298 [7] |
| Charging Session Identifier | OC | | Described in 3GPP TS 32.298 [7] |
| NF Consumer Information | M | | This field holds the information of the entity that used the charging service (i.e. NSACF). |
| NF Functionality | M | | This field holds the type of functionality the NF provides: i.e. NSACF |
| NF Name | OC | | This field holds the name of the NSACF. |
| NF Address | OC | | This field holds the IP Address of the used NSACF. |
| NF PLMN ID | Oc | | This field holds the PLMN identifier (MCC MNC) of the NSACF. |
| Charging Identifier | OM | | Charging identifier for correlation between different records. |
| Triggers | OC | | This field holds the triggers that are common to all Multiple Unit Usage. Can be the same as in Used Unit Container. |
| List of Multiple Unit Usage | OC | | Described in 3GPP TS 32.298 [7] |
| Rating Group | M | | Described in 3GPP TS 32.298 [7] |
| Allocated Unit | | OC | This field holds the Allocated Unit. |
| Quota management Indicator | OC | | Described in 3GPP TS 32.298 [7] |
| Triggers | OC | | This field holds the triggers that caused the Used Unit Container to be reported and holds the Network Slice Admission Control specific triggers described in clause 5.2.1. |
| Trigger Timestamp | OC | | Described in 3GPP TS 32.298 [7] |
| NSAC Container Information | OC | | This field holds the Network Slice Admission Control specific units in use described in clause 6.2.1.3. |
| Local Sequence Number | OM | | Described in 3GPP TS 32.298 [7] |
| Record Opening Time | M | | Described in 3GPP TS 32.298 [7] |
| Duration | M | | Described in 3GPP TS 32.298 [7] |
| Record Sequence Number | C | | Described in 3GPP TS 32.298 [7] |
| Cause for Record Closing | M | | Described in 3GPP TS 32.298 [7] |
| Diagnostics | OM | | Described in 3GPP TS 32.298 [7] |
| Local Record Sequence Number | OM | | Described in 3GPP TS 32.298 [7] |
| Record Extensions | OC | | Described in 3GPP TS 32.298 [7] |
| S NSSAI | M | | This field holds the Single Network Slice Selection Assistance Information identifying the network slice. |
| NSAC Charging Information | OM | | This field holds NSAC specific information described in clause 6.2.1.2 |

## 6.2 Network slice admission control charging specific parameters

### 6.2.1 Definition of network slice admission control charging information

#### 6.2.1.1 General

The Charging Information parameter used for Network slice admission control charging is provided in the following clauses.

#### 6.2.1.2 Definition of network slice admission control charging information

Specific charging information used for Network slice admission control charging is provided within the NSAC Charging Information.

The detailed structure of the NSAC Charging Information can be found in table 6.2.1.2-1.

Table 6.2.1.2-1: Structure of NSAC Charging Information

| Information Element | Category | Description |
| --- | --- | --- |
| NSAC charging indicator | OM | This field holds an indicator on whether the request is related to NSAC Charging. |

#### 6.2.1.3 Definition of NSAC Container Information

Specific charging information used for Network slice admission control charging is provided within the NSAC Container Information.

The detailed structure of the NSAC Container Information can be found in table 6.2.1.3-1.

Table 6.2.1.3-1: Structure of NSAC Container Information

|  |  |  |
| --- | --- | --- |
| Information Element | Category | Description |
| Nb of UEs | OC | This field holds the simultaneous number of registered UEs in the S-NSSAI | |
| Nb of PDUs | OC | This field holds the simultaneous number of established PDU sessions in the S-NSSAI | |

### 6.2.2 Detailed message format for converged charging

The following clause specifies per Operation Type the charging data that are sent by NSACF for Network Slice Admission Control converged charging.

The Operation Types are listed in the following order: I (Initial)/U (Update)/T (Termination)/E (Event). Therefore, when all Operation Types are possible it is marked as IUTE. If only some Operation Types are allowed for a node, only the appropriate letters are used (i.e. IUT or E) as indicated in the table heading. The omission of an Operation Type for a particular field is marked with "-" (i.e. IU-E). Also, when an entire field is not allowed in a node the entire cell is marked as "-".

Table 6.2.2-1 defines the basic structure of the supported fields in the *Charging Data Request* message for Network Slice Admission Control converged charging.

Table 6.2.2-1: Supported fields in Charging Data Request message

| Information Element | Functionality of NSACF | Network Slice Admission Control |
| --- | --- | --- |
| Supported Operation Types | I/U/T/E |
| Session Identifier | | IUT- |
| NF Consumer Identification | | IUTE |
| NF Functionality | | IUTE |
| NF Name | | IUTE |
| NF Address | | IUTE |
| NF PLMN ID | | IUTE |
| Charging Identifier | | IUT- |
| Invocation Timestamp | | IUTE |
| Invocation Sequence Number | | IUTE |
| Retransmission Indicator | | IUT- |
| One-time Event | | E |
| One-time Event Type | | E |
| Notify URI | | IU-- |
| Supported Features | | IUTE |
| Service Specification Information | | IUTE |
| Multiple Unit Usage | | IUTE |
| Rating Group | | IUTE |
| Allocate Units | | IU-- |
| NSAC Container Information | | IU-- |
| Allocated Unit | | IUTE |
| Quota management Indicator | | -UT- |
| Triggers | | IUTE |
| Trigger Timestamp | | IUTE |
| NSAC Container Information | | IUTE |
| Local Sequence Number | | IUTE |
| S NSSAI | | IUTE |
| NSAC Charging Information | | IUTE |

Table 6.2.2-2 defines the basic structure of the supported fields in the *Charging Data Response* message for Network Slice Admission Control converged charging.

Table 6.2.2-2: Supported fields in Charging Data Response message

| Information Element | Functionality of NSACF | Network Slice Admission Control |
| --- | --- | --- |
| Supported Operation Types | I/U/T/E |
| Session Identifier | | IUT- |
| Invocation Timestamp | | IUTE |
| Invocation Result | | IUTE |
| Invocation Sequence Number | | IUTE |
| Session Failover | | IUTE |
| Supported Features | | IUTE |
| Multiple Unit Information | | IU-- |
| Result Code | | IU-- |
| Rating Group | | IU-- |
| Allocated Units | | IU-- |
| NSAC Container Information | | IU-- |
| Validity Time | | IU-- |
| Triggers | | IU-- |
| NSAC Container Information | | IU-- |

### 6.2.3 Formal Network Slice Admission Control charging parameter description

#### 6.2.3.1 Network Slice Admission Control CHF CDR parameters

The detailed definitions, abstract syntax and encoding of the Network Slice Admission Control charging CHF CDR parameters are specified in 3GPP TS 32.298 [7].

#### 6.2.3.2 Network Slice Admission Control resources attributes

The detailed definitions of resources attributes used for Network Slice Admission Control charging are specified in 3GPP TS 32.291 [6].

## 6.3 Bindings for Network Slice Admission Control converged charging

This mapping between the Information Elements, resource attributes and CHF CDR parameters for Network Slice Admission Control converged charging is described in clause 7 of 3GPP TS 32.291 [6].

Annex A (informative):  
Change history

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Change history** | | | | | | | | | | | | |
| **Date** | **Meeting** | | **TDoc** | | **CR** | | **Rev** | **Cat** | **Subject/Comment** | **New version** | | |
| 2023-03 | SA5#147 | |  | |  | |  |  | Initial skeleton | 0.0.0 | | |
| 2023-03 | SA5#147 | | S5-232093  S5-232215  S5-232740  S5-232741 | |  | |  |  | Introduction of the References  Introduction of the Terms  Introduction of the Scope  Introduction of the Abbreviations | 0.1.0 | | |
| 2023-04 | SA5#148e | | S5-233376  S5-233657  S5-233658  S5-233659  S5-233660 | |  | |  |  | Introduce Architecture  Introduce message flows  Introduce charging principles  Introduce charging scenarios principles  Introduce triggers | 0.2.0 | | |
| 2023-05 | SA5#149 | | S5-234407  S5-234461  S5-234468  S5-234469  S5-234470  S5-234471  S5-234472 | |  | |  |  | Introduce Nb of PDUs IEC message flow  Solve Editor's Note on charged party  Introduce Nb of UEs PEC message flow  Introduce Nb of UEs ECUR message flow  Introduce Nb of PDUs PEC message flow  Introduce Nb of PDUs ECUR message flow  Introduce message flows SCUR | 0.3.0 | | |
| 2023-06 | SA5#150 | | S5-235764  S5-235758  S5-235125  S5-235759  S5-235760  S5-235761  S5-235763  S5-235765 | |  | |  |  | Clarify triggers and solve Editor's Note  Introduce CDR generation  Introduce Ga record and CDR file transfer  Correction on Number of UEs per network slice flow description  Introduce definition of charging information  Introduce NSACF specific charging information  Update of quota management for NSACF  Update of basic principles for NSACF | 0.4.0 | |
| 2023-09 | SA#101 | | SP-230931 | |  | |  |  | Presented for information | 1.0.0 | |
| 2023-10 | | SA5#151 | | S5-236282  S5-236284  S5-236897  S5-236898  S5-236899  S5-236900  S5-236902  S5-236288  S5-236298  S5-236903  S5-236300 | |  |  |  | Introduce Reference Point for NSACF  Solve Editor's Note - partial CDRs  Solve Editor's Note - trigger description table  Solve Editor's Note on Abort  Clarification on the quota management  Solve Editor's Note - charging information  Introduction of Detailed message format for converged charging  Introduction of Bindings for NS admission control converg. charging  Introduction of CHF selection  Introduction of CDR description  Introduction of Formal network slice admission control charging parameter description  Incorporate comments from Edithelp | | 1.1.0 | |
| 2023-11 | | SA5#152 | | S5-237996  S5-237997  S5-237998  S5-237999  S5-238000  S5-238001 | |  |  |  | Clarify IEC and ECUR scenarios  Addition of ECUR in triggers table  Update for the event based charging  Update Charging principle for NSACF Charging  Clarify Quota management description  Clarification on the reporting in charging data message | | 1.2.0 | |
| 2024-02 | | SA5#153 | | S5-240696  S5-240698  S5-240699  S5-240706 | |  |  |  | Refinement on NSACF Charging information  Update triggers for ECUR  Clarification on charging scenarios for the NSACF charging  Clarify basic principles | | 1.3.0 | |
| 2024-03 | | SA#103 | | SP-240255 | |  |  |  | Presented for approval | | 2.0.0 | |
| 2024-03 | | SA#103 | |  | |  |  |  | Upgrade to change control version | | 18.0.0 | |
| 2024-06 | | SA#104 | | SP-240826 | | 0002 | 1 | F | Rel-18 CR 28.203 Clarification on the quota for the NSACF charging | | 18.1.0 | |
| 2024-06 | | SA#104 | | SP-240826 | | 0003 | 1 | F | Rel-18 CR 28.203 Clarification on triggers for NSACF | | 18.1.0 | |