# ETSI TS 132 254 V17.0.0 (2022-05)


**LTE;**
**5G;**
**Telecommunication management;**
**Charging management;**
**Exposure function Northbound**
**Application Program Interfaces (APIs) charging**
**(3GPP TS 32.254 version 17.0.0 Release 17)**

Reference
RTS/TSGS-0532254vh00

Keywords
5G,LTE

***ETSI***

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - APE 7112B
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# Contents

# Foreword

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

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# 1 Scope

The present document is part of a series of documents that specify charging functionality and charging management in 3GPP networks. The 3GPP core network charging architecture and principles are specified in TS 32.240 [1], which provides an umbrella for other charging management TSs that specify:

- the content of the CDRs per domain / subsystem / service (offline charging);
- the content of real-time charging messages per domain / subsystem / service (online charging);
- the functionality of online and offline charging for those domains / subsystems / services;
- the interfaces that are used in the charging framework to transfer the charging information (i.e. CDRs or charging events).

The complete document structure for these TSs is defined in TS 32.240 [1].

The present document specifies the offline, online and converged charging description for Northbound Application Program Interfaces (API), based on the functional stage 2 description in TS 23.682 [243] for transaction over T8 reference point between SCEF and SCS/AS and in TS 23.501 [200] for Network Exposure Function (NEF). This charging description includes the offline, online and converged charging architecture and scenarios specific to Northbound Application Program Interfaces (API), as well as the mapping of the common 3GPP charging architecture specified in TS 32.240 [1] onto the Northbound Application Program Interfaces (API). It further specifies the structure and content of the CDRs for offline charging. The present document is related to other 3GPP charging TSs as follows:

- The common 3GPP charging architecture is specified in TS 32.240 [1].
- The parameters, abstract syntax and encoding rules for the CDRs are specified in TS 32.298 [51].
- A transaction based mechanism for the transfer of CDRs within the network is specified in TS 32.295 [54].
- The file based mechanism used to transfer the CDRs from the network to the operator's billing domain (e.g. the billing system or a mediation device) is specified in TS 32.297 [52].
- The 3GPP Diameter application that is used for Northbound Application Program Interfaces (API) offline and online charging is specified in TS 32.299 [50].
- The services, operations and procedures of charging, using Service Based Interface are specified in TS 32.290 [57].
- The charging service of 5G system is specified in TS 32.291 [58].

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

[2] – [49] Void.

[50] 3GPP TS 32.299: "Telecommunication management; Charging management; Diameter charging application".

[51] 3GPP TS 32.298: "Telecommunication management; Charging management; Charging Data Record (CDR) parameter description".

[52] 3GPP TS 32.297: "Telecommunication management; Charging management; Charging Data Record (CDR) file format and transfer".

[53] 3GPP TS 32.296: "Telecommunication management; Charging management; Online Charging System (OCS): Applications and interfaces".

[54] 3GPP TS 32.295: "Telecommunication management; Charging management; Charging Data Record (CDR) transfer".

[55] – [56] Void.

[57] 3GPP TS 32.290: "Telecommunication management; Charging management; 5G system; Services, operations and procedures of charging using Service Based Interface (SBI)".

[58] 3GPP TS 32.291: "Telecommunication management; Charging management; 5G system; Charging service, stage 3".

[59] – [99] Void.

[100] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[101] – [199] Void

[200] 3GPP TS 23.501:"System Architecture for the 5G System".

[201] 3GPP TS 23.502:"Procedures for the 5G System".

[202] – [229] Void

[230] 3GPP TS 29.122: "T8 reference point for northbound Application Programming Interfaces (APIs)".

[231] – [242] Void

[243] 3GPP TS 23.682: "Architecture enhancements to facilitate communications with packet data networks and applications".

[244] – [299] Void

[300] – [399] Void.

# 3 Definitions, symbols and abbreviations

## 3.1 Definitions

For the purposes of the present document, the terms and definitions given in 3GPP TR 21.905 [100], TS 32.240 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in either 3GPP TR 21.905 [100] or TS 32.240 [1].

## 3.2 Symbols

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

Bea Reference point for the CDR file transfer from the Exposure function API CGF to the BD.
Ga Reference point for CDR transfer between a CDF and the CGF.
Nchf Service based interface exhibited by CHF.
N44 Reference point between the NEF and the CHF
Rf Offline charging reference point between a SCEF and the CDF.
Ro Online charging reference point between a SCEF and the CDF.

T8 Reference point between the SCEF and SCS/AS.

## 3.3 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TR 21.905 [100] 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 [100].

| | |
|---|---|
| AS | Application Server |
| BD | Billing Domain |
| CDF | Charging Data Function |
| CGF | Charging Gateway Function |
| CTF | Charging Trigger Function |
| ECUR | Event Charging with Unit Reservation |
| IE | Information Element |
| IEC | Immediate Event Charging |
| NEF | Network Exposure Function |
| PEC | Post Event Charging |
| SCEF | Service Capability Exposure Function |
| SCS | Services Capability Server |
| SGSN | Serving GPRS Support Node |
| RCAF | RAN Congestion Awareness Function |

# 4 Architecture considerations

## 4.1 High-level Service Exposure Function architecture

The overall architecture and detailed description for Service Capability Exposure which enables the 3GPP network to securely expose its services and capabilities provided by 3GPP network interfaces to external 3rd party service provider applications are defined in 3GPP TS 23.682 [243], and figure 4.1.1 is highlighting T8 involved for interworking between SCEF and SCS/AS.

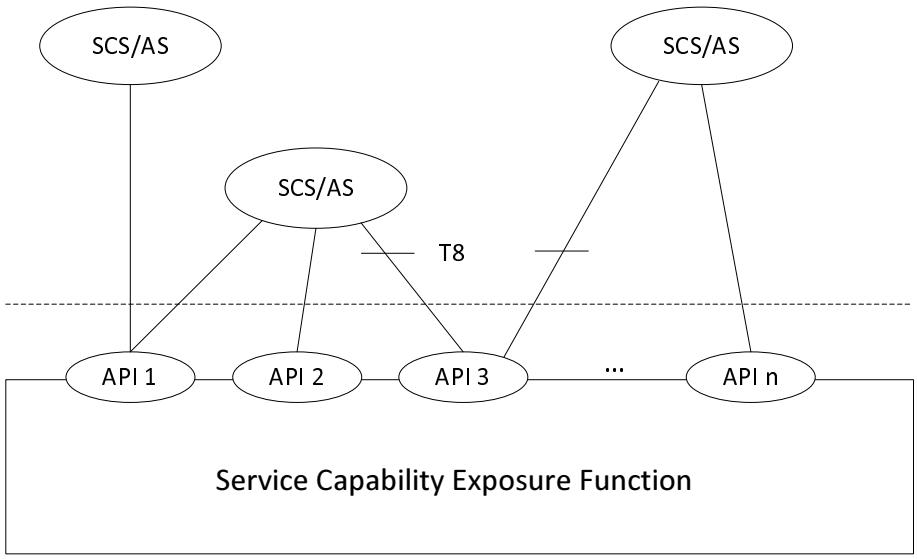


**Figure 4.1.1: Northbound API of 3GPP Architecture Service Capability Exposure**

## 4.2 Northbound API offline charging architecture

As described in TS 32.240 [1], the CTF (an integrated component in each charging relevant NE) generates charging events and forwards them to the CDF. The CDF, in turn, generates CDRs which are then transferred to the CGF. Finally, the CGF creates CDR files and forwards them to the BD.

For offline charging, SCEF functioning as the CTF, may generate accounting metrics sets for Northbound Application Program Interfaces (APIs) CDRs:

- the SCEF, to record Application Program Interfaces transaction.

If the SCEF generating the charging information has an integrated CDF, then the SCEF can produce CDRs. The CGF may also be integrated in the SCEF, or it may exist as a physically separate entity.
If the CGF is external to the SCEF /CDF, then the SCEF/CDF forwards the CDRs to the CGF across the Ga interface. If the CDF is external to the SCEF, the charging events are transferred from the SCEF to the CDF via the Rf interface specified in TS 32.299 [50].

When an external CGF is used, this CGF may also be used by other. It should be noted that the CGF may also be an integrated component of the BD – in this case, the Bea interface does not exist and is replaced by a proprietary solution internal to the BD.

Figure 4.2.1 depicts the architectural options described above.

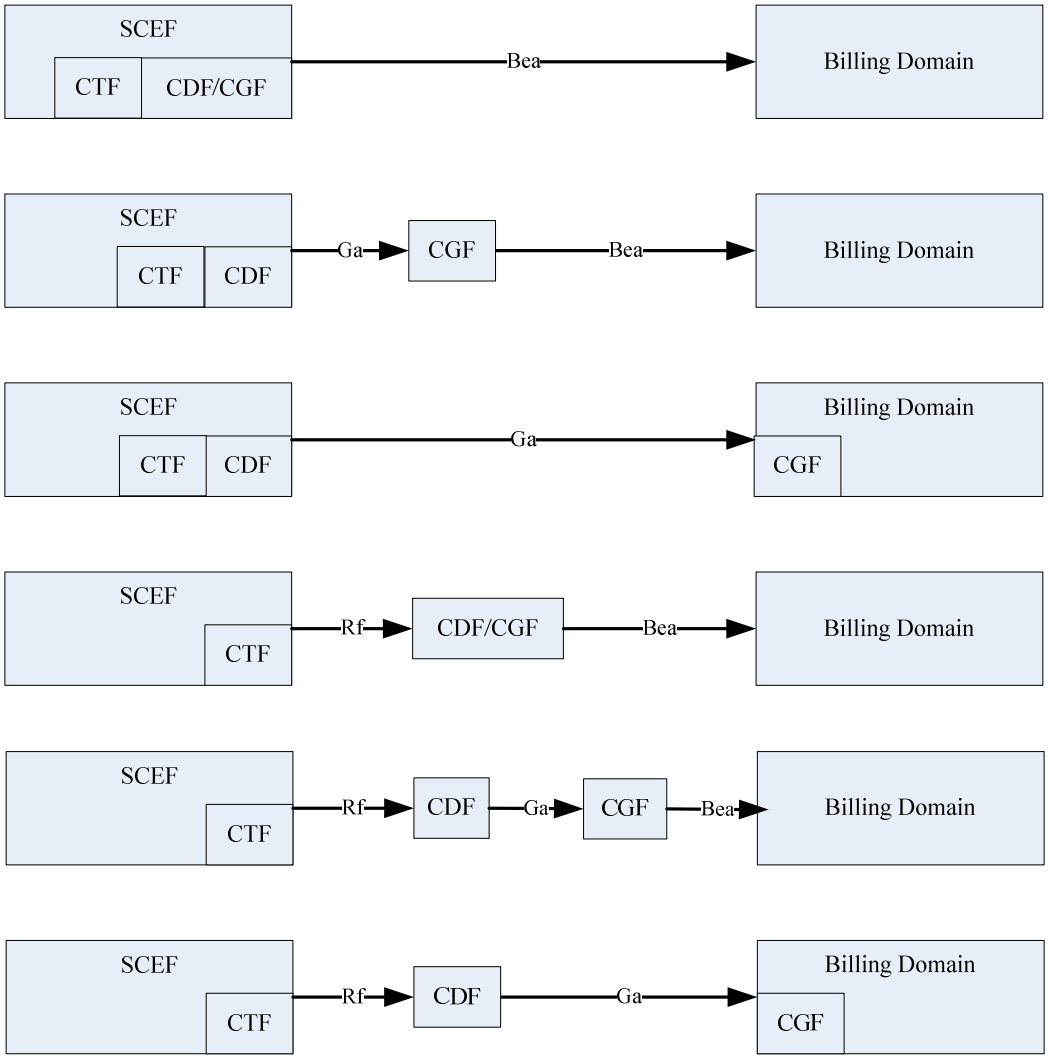


**Figure 4.2.1: Northbound API offline charging architecture**

It is mandatory to support at least one of the Rf, Ga or Bea interfaces from the SCEF as described in the present document.

## 4.3 Northbound API online charging architecture

Northbound API online charging is based on SCEF utilizing Ro interface and application towards the OCS as specified in TS 32.299 [50]. The Ro reference point covers all online charging functionality required for SCEF.


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**Figure 4.3.1: Northbound API online charging architecture**

Details on the interfaces and functions can be found in TS 32.240 [1] for the general architecture components, TS 32.296 [53] for the OCS, and TS 32.299 [50] for the Ro application.

## 4.4 Northbound API converged charging architecture

The architectural options for Northbound API converged charging are depicted in figure 4.4.1 in service-based representation:

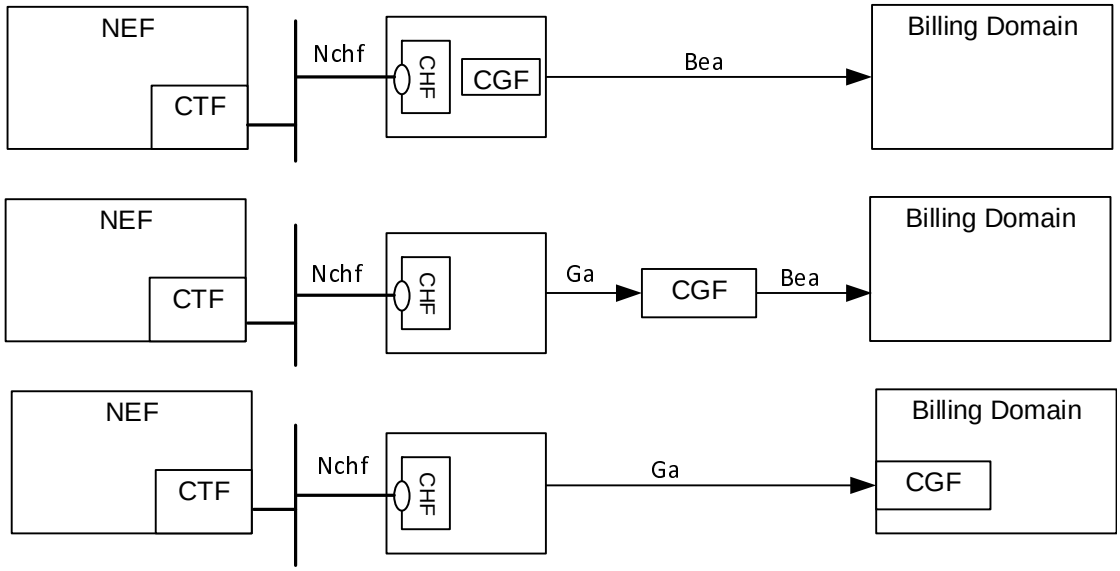


**Figure 4.4.1: Northbound API converged charging architecture**

Architectural options of figure 4.4.1 apply to any Northbound API converged charging architecture of this clause.

Details on the interfaces and functions can be found in TS 32.240 [1] for the general architecture components, Ga is described in clause 5.2.4 and Bea in clause 5.2.5 of this document, and Nchf is described in TS 32.290 [57].

Figure 4.4.2 depicts the Northbound API converged charging architecture for non-roaming in reference point representation:

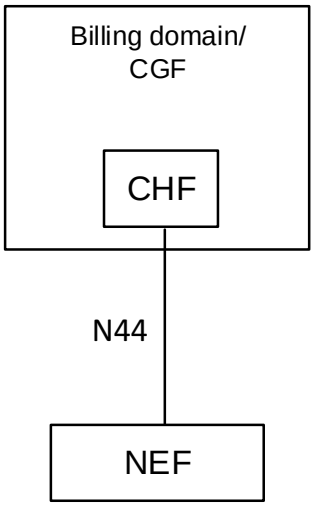


**Figure 4.4.2: Northbound API converged charging architecture non-roaming reference point representation**

# 5 Northbound API charging principles and scenarios

## 5.1 Northbound API charging principles

### 5.1.0 General

The following are high level charging requirements for northbound API for Exposure Function which are specified in TS 23.682 [243] and TS 23.501 [200]:

For northbound API invocation/notification, the SCEF or NEF shall collect the following charging information:

- invocations/notifications count of the northbound APIs.
- identification of the SCS/AS or AF and the associated northbound API invocation/notification.
- timestamp of the northbound API invocation/notification.
- northbound API related information, e.g. location.

### 5.1.1 Northbound API procedures

All procedures that operate across the T8 reference point, as specified in 3GPP TS 23.682 [243] and TS 29.122 [230], are covered, which are the following:

- Monitoring
- Resource management of Background Data Transfer
- Changing the chargeable party at session set up or during the session
- Non-IP Data Delivery
- Device Triggering
- Group Message Delivery

- Reporting of Network Status
- Communication Pattern Parameters Provisioning
- PFD Management
- Enhanced Coverage Restriction Control
- Network Parameter Configuration
- Setting up an AS session with required QoS
- MSISDN-less Mobile Originated SMS

The following clauses 5.2 and 5.3 describe the trigger conditions and simplified message flows for Event Based Charging(IEC/ECUR), with interfaces specified in 3GPP TS 32.299 [50].

The Northbound APIs supported by the NEF via the set of exposed services defined in 3GPP TS 23.502 [201] are covered for converged charging, with the trigger conditions and message flows defined in clause 5.4.

# 5.2 Northbound API offline charging scenarios

## 5.2.1 Basic principles

If charging is supported by an SCEF, it shall be able to collect charging information per T8 transaction.

The SCS/AS is identified by the SCS Identifier, which T8 transaction between SCEF and SCS/AS can be determined by a T8 Long Term Transaction Reference ID (TLTRI). The Identifiers are stored on both the SCEF and the SCS/AS for the duration of the transaction.

The following chargeable events are defined for SCEF charging for all Northbound APIs:

- Northbound API invocation/ notification per T8 transaction.
- Expiry of an operator configured time limit per T8 transaction.
- Expiry of an operator configured Northbound API invocation limit per T8 transaction.

Management intervention may also force trigger a chargeable event.

The subscriber is the API invoker (e.g. SCS, AS) of the Northbound APIs.

## 5.2.2 Rf message flows

### 5.2.2.1 Triggers for charging events from SCEF

When a charging event is reported to the CDF, it includes the details such as SCEF address, charging information with corresponding charging events to the CDF.

The trigger conditions specified in Table 5.2.2.1.1 are applicable for charging information collection.

**Table 5.2.2.1.1: Triggers for Charging Data Request from SCEF**

| Message | Triggering conditions |
|---|---|
| Charging Data Request[Event] | T8 transaction creation via HTTP POST |
| | T8 transaction update via HTTP PATCH message, HTTP PUT message received by SCEF |
| | T8 transaction termination via HTPP DELETE |

### 5.2.3 CDR generation

#### 5.2.3.1 Introduction

For the exposure functions SCEF, an exposure function API CDR is generated for subsequent transfer to the Charging Gateway Function (CGF).

The following clauses describe the trigger conditions for these exposure function API CDRs creation, update and closure.

#### 5.2.3.2 Triggers for EA-SCE-CDR creation and closure

##### 5.2.3.2.1 Triggers for EA-SCE-CDR generation

A EA-SCE-CDR is used to collect charging information related to API invocation/notification offline charging from the SCEF.

A single EA-SCE-CDR shall be generated for each event when the API invocation or notification is encountered.

### 5.2.4 Ga record transfer flows

Details of the Ga protocol application are specified in TS 32.295 [54].

### 5.2.5 Bea CDR file transfer

Details of the Bea protocol application are specified in TS 32.297 [52].

## 5.3 Northbound API online charging scenarios

### 5.3.1 Basic principles

#### 5.3.1.1 General

Northbound API online charging is performed by the SCEF using the common Ro based Credit-Control application specified in TS 32.299 [50]. In order to provide the data required for the management activities outlined in TS 32.240 [1], the SCEF shall be able to perform online charging for the following:

- Charging data related to northbound API invocation;
- Charging data related to northbound API notification.

Event based online charging IEC and ECUR are applicable scenarios for the SCEF.

### 5.3.2 Ro message flows

#### 5.3.2.1 Event Based Charging

This clause contains message flows for the different operation models IEC and ECUR, when the one-time API invocation is per T8 interaction is activated. e.g. Enhanced Coverage Restriction Control API, MSISDN-less Mobile Originated SMS API.

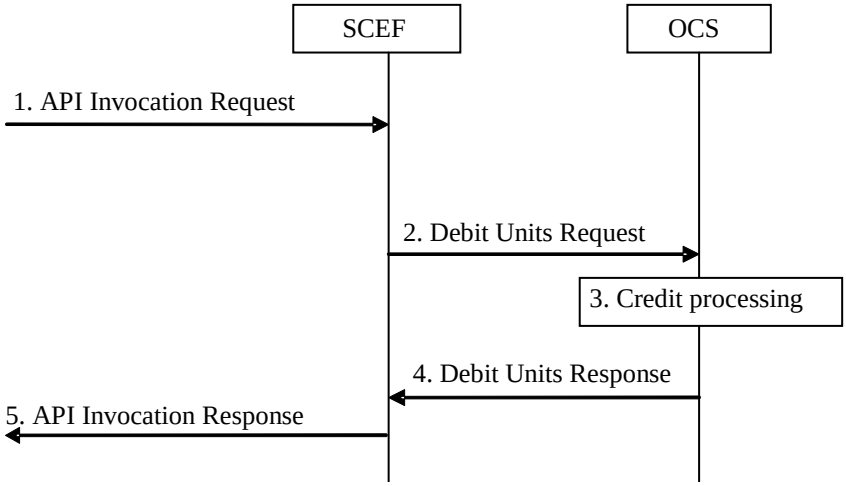


**Figure 5.3.2.1.1: Online charging in API Invocation for IEC**

1) SCEF receives an API invocation Request.
2) The SCEF triggers a Debit Units Request message to the OCS.
3) The OCS performs the appropriate credit processing based on the received request.
4) The OCS responds with a Debit Units Response message to the SCEF.
5) If authorized, the SCEF continues the API invocation processing and send out the API Invocation Response.

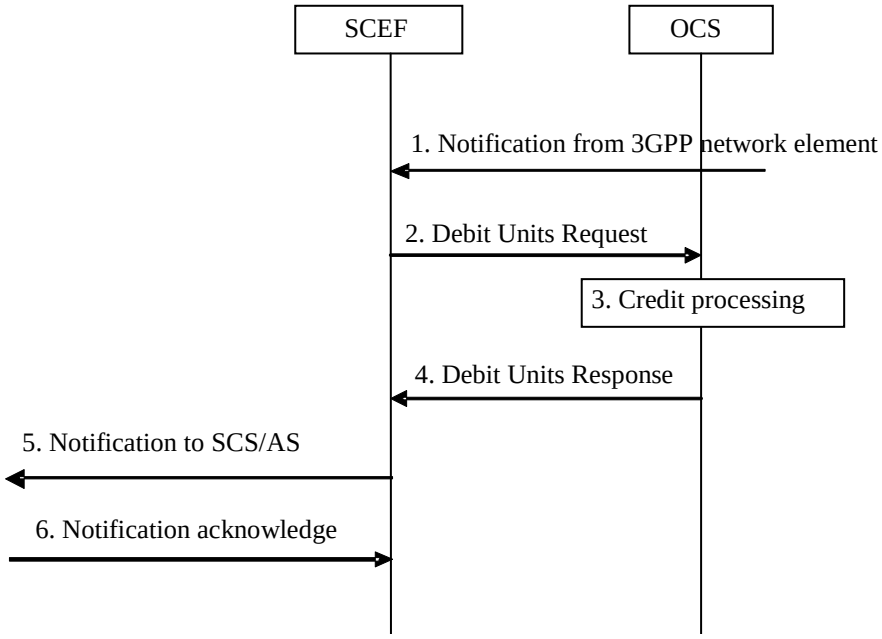


**Figure 5.3.2.1.2: Online charging in API Notification for IEC**

1) SCEF receives a notification from 3GPP network element.
2) The SCEF triggers a Debit Units Request message to the OCS.
3) The OCS performs the appropriate credit processing based on the received request.
4) The OCS responds with a Debit Units Response message to the SCEF.
5) SCEF sends the notification to SCS/AS.
6) SCEF receives acknowledgement for the notification.

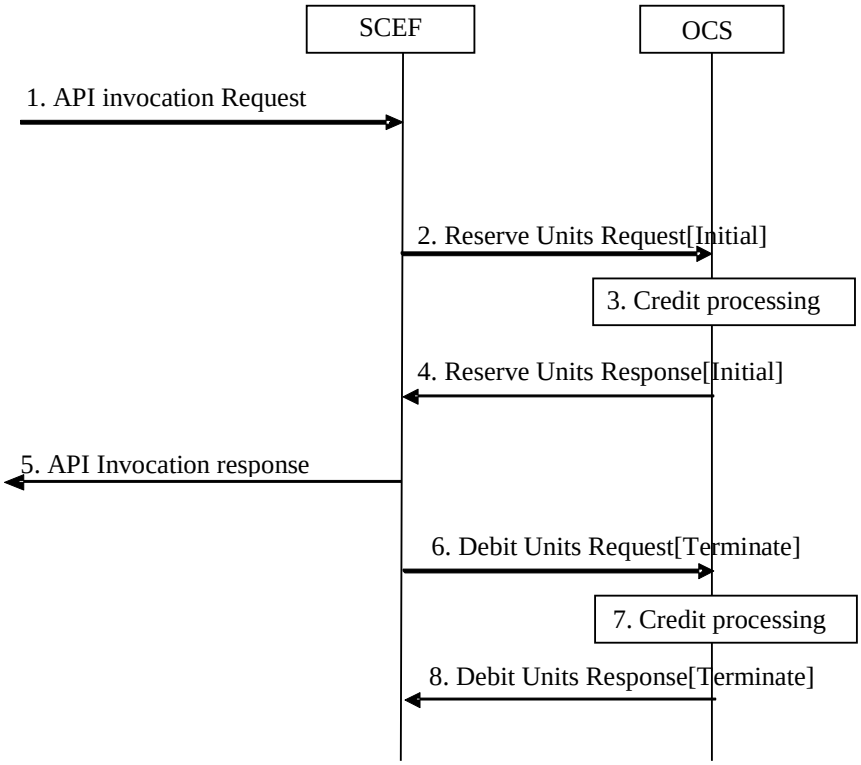


**Figure 5.3.2.1.3: Online charging in API Invocation for ECUR**

1) SCEF receives an API invocation Request.2) The SCEF triggers a Reserve Units Request [Initial] message to the OCS.
3) The OCS performs the appropriate credit processing based on the received request.
4) The OCS responds with a Reserve Units Response message to the SCEF.
5) If authorized, the SCEF continues the API invocation processing and send out the API Invocation Response.
6) The SCEF triggers a Debit Units Request [Terminate] message to the OCS reporting the successful event transaction.
7) The OCS performs the appropriate credit processing based on the received request.
8) The OCS responds with a Debit Units Response message to the SCEF.

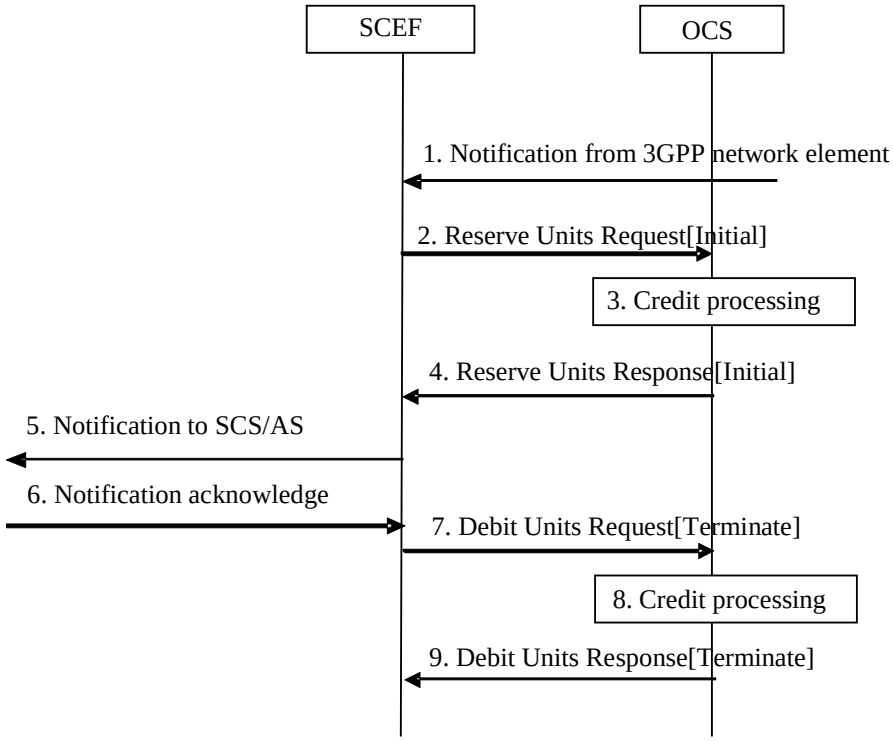


**Figure 5.3.2.1.4: Online charging in API Notification for ECUR**

1) SCEF receives a notification from 3GPP network entities.
2) The SCEF triggers a Reserve Units Request [Initial] message to the OCS.
3) The OCS performs the appropriate credit processing based on the received request.
4) The OCS responds with a Reserve Units Response message to the SCEF.
5) SCEF sends the notification to SCS/AS.
6) SCEF receives acknowledgement for the notification.
7) The SCEF triggers a Debit Units Request [Terminate] message to the OCS reporting the successful event transaction.
8) The OCS performs the appropriate credit processing based on the received request.
9) The OCS responds with a Debit Units Response message to the SCEF.

# 5.4 Northbound API converged online and offline charging scenarios

## 5.4.1 Basic principles

### 5.4.1.1 General

Converged charging may be performed by the NEF interacting with CHF using Nchf specified in TS 32.290 [57] and TS 32.291 [58]. In order to provide the data required for the management activities outlined in TS 32.240 [1] (Credit-Control, accounting, billing, statistics etc.), the NEF shall be able to perform converged charging for the northbound API access.

The NEF shall be able to perform convergent charging by interacting with CHF, for charging data related to Northbound API access. The Charging Data Request and Charging Data Response are exchanged between the NEF and the CHF, based on PEC, either IEC or ECUR scenarios specified in TS 32.290 [57]. The Charging Data Request is issued by the NEF towards the CHF when certain conditions (chargeable events) are met.

Converged charging uses centralized or decentralized unit determination and centralized rating scenarios for event based convergent charging specified in TS 32.290 [57].

The contents and purpose of each charging event that triggers interaction with CHF, as well as the chargeable events that trigger them, are described in the following clauses.

A detailed formal description of the converged charging parameters defined in the present document is to be found in TS 32.291 [58].

A detailed formal description of the CDR parameters defined in the present document is to be found in TS 32.298 [51].

The selection of the CHF can be configured in the NEF but may also rely on NRF.

## 5.4.2 Message flows

### 5.4.2.1 Introduction

The different scenarios below focus on the different messages from/to the NEF and corresponding interaction with the CHF, based on scenarios specified in TS 23.222 [202].

### 5.4.2.2 API Invocation - IEC

Figure 5.4.2.2.1 describes the scenario where there is an API invocation request at the NEF for IEC mode

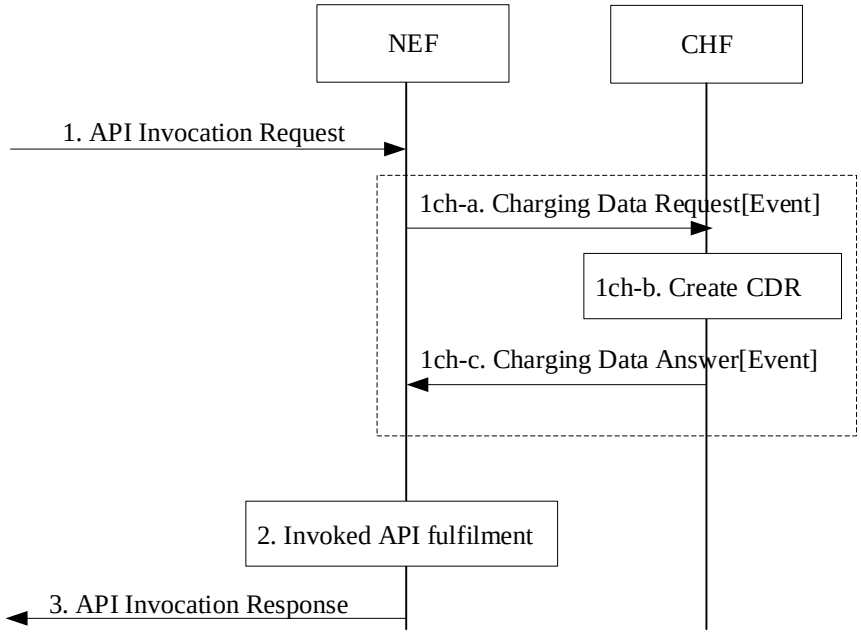


**Figure 5.4.2.2.1: API Invocation Request to NEF using IEC**

1. NEF receives an API invocation Request from an AF.

1ch-a. The NEF sends Charging Data Request [Event] to CHF for the received API Invocation.

1ch-b. The CHF creates a CDR for this API Invocation.

1ch-c. The CHF acknowledges and grants authorization by sending Charging Data Response [Event] to the NEF.

2. NEF performs the actions needed to fulfil the API invoked.

3. If authorized, the NEF continues the API invocation processing and sends the API Invocation Response.

### 5.4.2.3 API Invocation - ECUR

Figure 5.4.2.3.1 describes the scenario where there is an API invocation request at the NEF for ECUR mode.

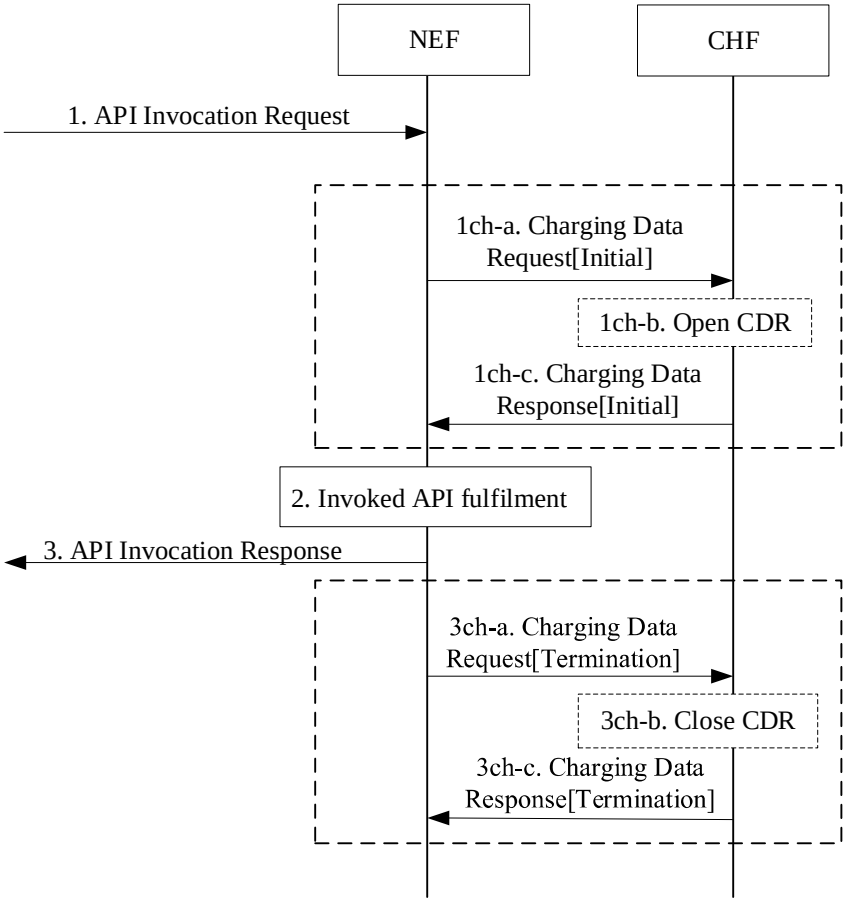


**Figure 5.4.2.3.1: API Invocation Request to NEF using ECUR**

1. NEF receives an API invocation Request from an AF.

1ch-a. The NEF sends Charging Data Request [Initial] to CHF for the received API Invocation.

1ch-b. The CHF opens CDR for this API Invocation.

1ch-c. The CHF acknowledges by sending Charging Data Response [Initial] to the NEF.

2. NEF performs the actions needed to fulfil the API invoked.

3. If authorized, the NEF continues the API invocation processing and sends the API Invocation Response.

3ch-a. The NEF sends Charging Data Request [Termination] to the CHF for terminating the charging associated with the API Invocation.

3ch-b. The CHF closes the CDR for this API Invocation.

3ch-c. The CHF acknowledges by sending Charging Data Response [Termination] to the NEF.

### 5.4.2.4 API Notification - IEC

Figure 5.4.2.4.1 describes the scenario where an API Notification is delivered from the NEF for IEC mode

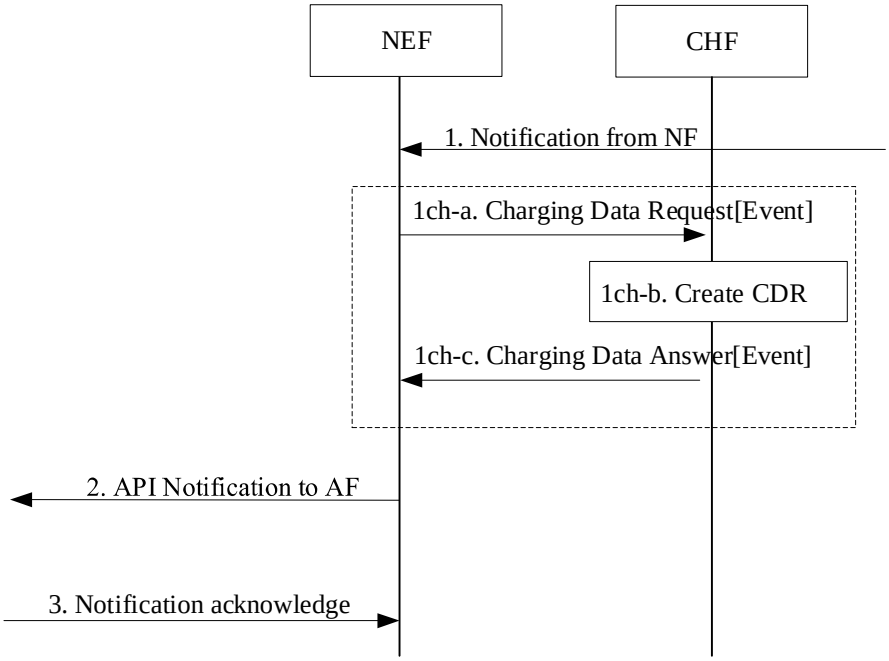


**Figure 5.4.2.4.1 API Notification from NEF using IEC**

1. The NEF receives a notification from an NF.

1ch-a. The NEF sends Charging Data Request [Event] to CHF for the Notification.

1ch-b. The CHF creates a CDR for this Notification.

1ch-c. The CHF acknowledges and grant authorization by sending Charging Data Response [Event] to the NEF.

2. The NEF sends the notification to AF.

3. The NEF receives acknowledgement for the notification.

### 5.4.2.5 API event Notification - ECUR

Figure 5.4.2.5.1 describes the scenario where an API event Notification is delivered from the NEF for ECUR mode.

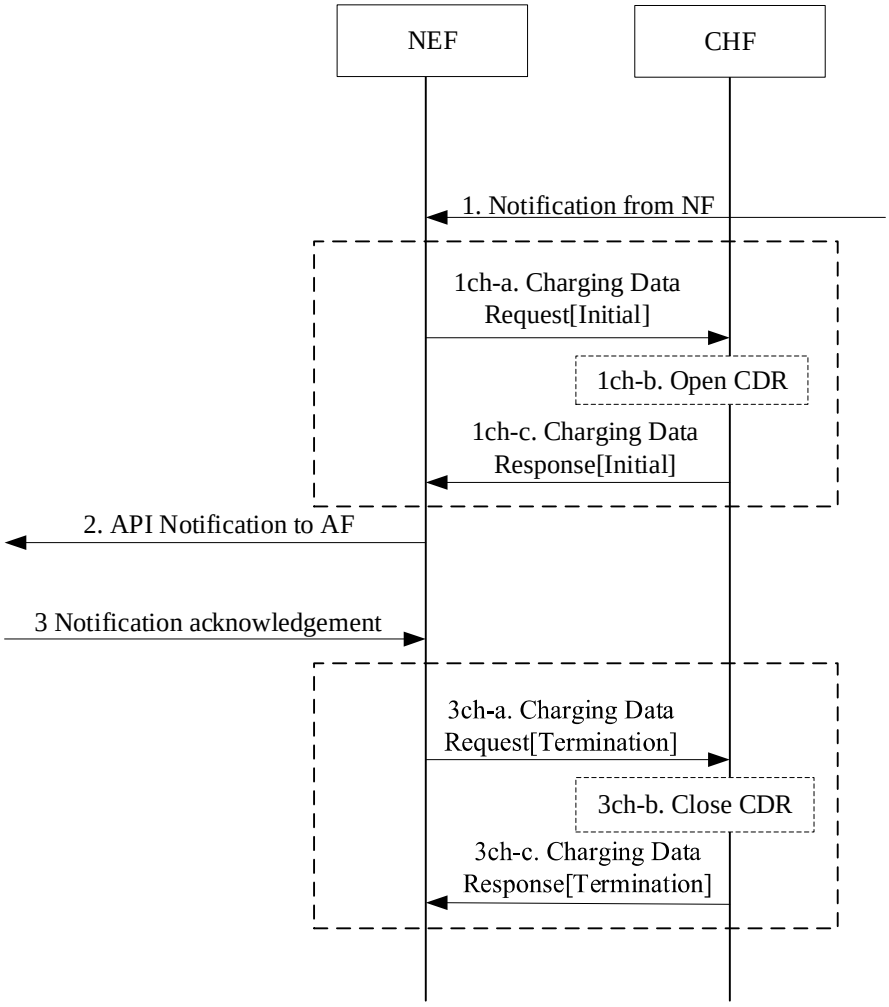


**Figure 5.4.2.4.1: API Notification from NEF using ECUR**

1. The NEF receives a notification from an NF.

1ch-a. The NEF sends Charging Data Request [Initial] to CHF for the Notification.

1ch-b. The CHF opens CDR for this API Notification.

1ch-c. The CHF acknowledges by sending Charging Data Response [Initial] to the NEF.

2. The NEF sends the notification to AF.

3. The NEF receives acknowledgement for the notification.

3ch-a. The NEF sends Charging Data Request [Termination] to the CHF for terminating the charging associated with the API event Notification.

3ch-b. The CHF closes the CDR for this API Notification.

3ch-c. The CHF acknowledges by sending Charging Data Response [Termination] to the NEF.

### 5.4.2.6 API Invocation - PEC

Figure 5.4.2.6.1 describes the scenario where there is an API invocation request at the NEF for PEC mode

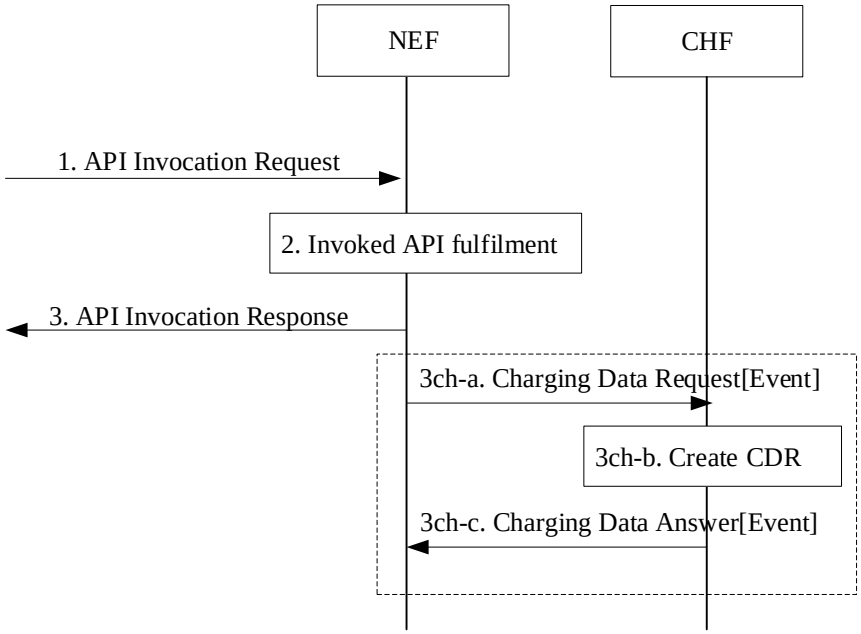


**Figure 5.4.2.6.1: API Invocation Request to NEF using PEC**

1. NEF receives an API invocation Request from an AF.
2. NEF performs the actions needed to fulfil the API invoked.
3. If authorized, the NEF continues the API invocation processing and sends the API Invocation Response.

3ch-a. The NEF sends Charging Data Request [Event] to CHF for the received API Invocation.

3ch-b. The CHF creates a CDR for this API Invocation.

3ch-c. The CHF acknowledges by sending Charging Data Response [Event] to the NEF.

### 5.4.2.7 API Notification - PEC

Figure 5.4.2.7.1 describes the scenario where an API Notification is delivered from the NEF for PEC mode

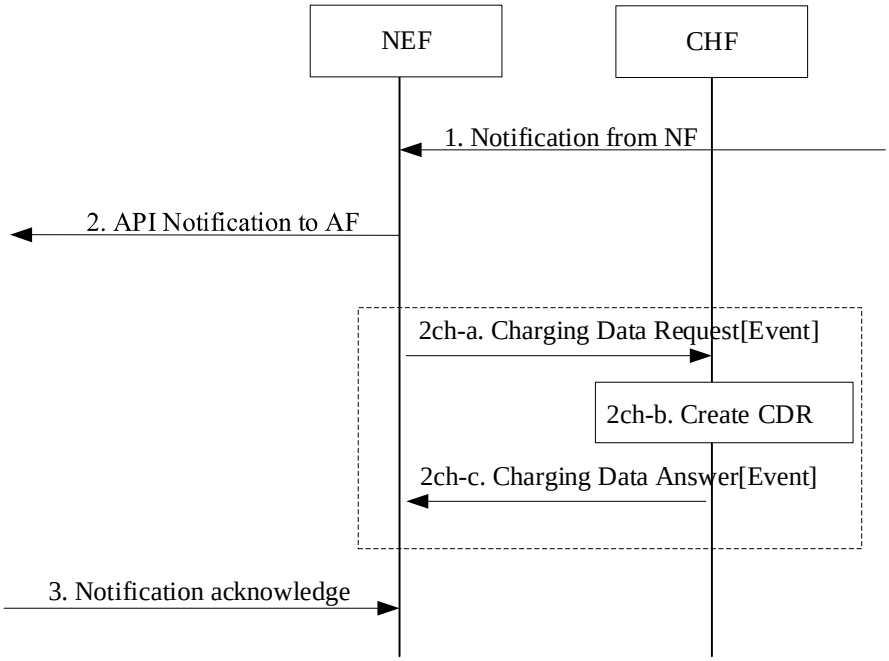


**Figure 5.4.2.7.1 API Notification from NEF using PEC**

1. The NEF receives a notification from an NF.
2. The NEF sends the notification to AF.

2ch-a. The NEF sends Charging Data Request [Event] to CHF for the Notification.

2ch-b. The CHF creates a CDR for this Notification.

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

3. The NEF receives acknowledgement for the notification.

## 5.4.3 CDR generation

### 5.4.3.1 Introduction

The CHF CDRs for NEF 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 details the conditions for generating, opening and closing the CHF CDR, which shall be supported by the CHF.

### 5.4.3.2 Triggers for CHF CDR

#### 5.4.3.2.1 General

A Northbound API charging CHF CDR is used to collect charging information related to northbound API invocation and notifications chargeable events for PEC, IEC and ECUR.

#### 5.4.3.2.2 Triggers for CHF CDR generation

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

#### 5.4.3.2.3 Triggers for CHF CDR opening

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

#### 5.4.3.2.4 Triggers for CHF CDR closure

The CHF CDR shall be closed when the CHF receives Charging Data Request[Termination].

### 5.4.4 Ga record transfer flows

Details of the Ga protocol application are specified in TS 32.295 [6].

### 5.4.5 Bea CDR file transfer

Details of the Bea protocol application are specified in TS 32.297 [5].

# 6. Definition of charging information

## 6.1 Data description for Northbound API offline charging

### 6.1.1 Rf message contents

#### 6.1.1.1 General

The Exposure Function API offline charging uses the Charging Data Transfer messages Charging Data Request and Charging Data Response defined in TS 32.299 [50].

The Charging Data Request can be of type event and includes all charging information. The Charging Data Response is an acknowledgement of the Charging Data Request.

Table 6.1.1.1.1 describes the use of these messages for offline charging.

**Table 6.1.1.1.1: Offline charging messages reference table**

| Message | Source | Destination |
|---|---|---|
| Charging Data Request | SCEF | CDF |
| Charging Data Response | CDF | SCEF |

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 TS 32.240 [1].

### 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 SCEF as used for Exposure Function API offline charging.

**Table 6.1.1.2.1: Charging Data Request message contents**

| Information Element | Category | Description |
|---|---|---|
| Session Identifier | M | Described in TS 32.299 [50] |
| Originator Host | M | Described in TS 32.299 [50] |
| Originator Domain | M | Described in TS 32.299 [50] |
| Destination Domain | M | Described in TS 32.299 [50] |
| Operation Type | M | Described in TS 32.299 [50] |
| Operation Number | M | Described in TS 32.299 [50] |
| Operation Identifier | $O_C$ | Described in TS 32.299 [50] |
| User Name | $O_C$ | Described in TS 32.299 [50] |
| Destination Host | $O_C$ | Described in TS 32.299 [50] |
| Operation Interval | $O_C$ | Described in TS 32.299 [50] |
| Origination State | $O_C$ | Described in TS 32.299 [50] |
| Origination Timestamp | $O_C$ | Described in TS 32.299 [50] |
| Proxy Information | $O_C$ | Described in TS 32.299 [50] |
| Route Information | $O_C$ | Described in TS 32.299 [50] |
| Operation Token | $O_M$ | This field identifies the Exposure Function API domain service. |
| Service Information | $O_M$ | This field holds the Exposure Function API specific information described in clause 6.3. |

NOTE: Detailed descriptions of the information elements are provided in TS 32.299 [50].

### 6.1.1.3 Charging data response message

Table 6.1.1.3.1 illustrates the basic structure of a Charging Data Response message as used for Exposure Function API offline charging.

**Table 6.1.1.3.1: Charging Data Response message contents**

| Information Element | Category | Description |
|---|---|---|
| Session Identifier | M | Described in TS 32.299 [50] |
| Operation Result | M | Described in TS 32.299 [50] |
| Originator Host | M | Described in TS 32.299 [50] |
| Originator Domain | M | Described in TS 32.299 [50] |
| Operation Type | M | Described in TS 32.299 [50] |
| Operation Number | $O_C$ | Described in TS 32.299 [50] |
| Operation Identifier | $O_C$ | Described in TS 32.299 [50] |
| Operation Interval | $O_C$ | Described in TS 32.299 [50] |
| Error Reporting Host | $O_C$ | Described in TS 32.299 [50] |
| Origination State | $O_C$ | Described in TS 32.299 [50] |
| Origination Timestamp | $O_C$ | Described in TS 32.299 [50] |
| Proxy Information | $O_C$ | Described in TS 32.299 [50] |

NOTE: Detailed descriptions of the information elements are provided in TS 32.299 [50].

## 6.1.2 Ga message contents

Refer to clause 5.2.4 for further information.

### 6.1.3 CDR description on the Bea interface

#### 6.1.3.1 General

The following standard CDRs content and format are considered:

- EA-SCE-CDR generated for exposure function API from the SCEF.

For each of the CDR types, a parameter table, which gives a short description of the parameters, is provided. The category in the tables is used according to the charging data configuration defined in clause 5.4 of TS 32.240 [1]. Full definitions of the CDR parameters, sorted by the name in alphabetical order, are provided in TS 32.298 [51].

#### 6.1.3.2 Exposure Function API charging data (EA-SCE-CDR)

Exposure function API record shall be produced for each API invocation to the SCEF. The fields in the record are specified in table 6.1.3.2.1.

**Table 6.1.3.2.1: Exposure function API from SCEF charging data (EA-SCE-CDR)**

| Field | Category | Description |
|---|---|---|
| Record Type | M | SCEF exposure function API record. |
| Retransmission | $O_C$ | This parameter, when present, indicates that information from retransmitted Accounting Requests has been used in this CDR. |
| Service Context Id | $O_M$ | This parameter indicates the CDR is applicable to exposure function API service. |
| Node Id | $O_{M_M}$ | Name of the recording entity. |
| SCEF ID | M | This parameter holds the identity of the SCEF used for this API invocation. |
| SCEF Address | $O_C$ | This parameter holds the IP address of SCEF. |
| API Identifier | M | This field holds the identity of API for each API invocation. |
| TLTRI | $O_C$ | This field holds the T8 Long Term Transaction Reference ID. |
| SCS/AS Address | M | This field holds the IP address of SCS/AS |
| Event Timestamp | M | This field holds the time stamp of the event reported. |
| API Invocation Timestamp | | This field holds the time stamp when the API invocation request is submitted to the SCEF from SCS/AS. |
| API Direction | $O_C$ | This field holds the direction to indicate the API invocation or API notification. |
| API Network Service Node | $O_C$ | This field holds the identifier of the network element (e.g. SGSN, RCAF)that triggers the API notification as defined in TS 23.682 [243]. |
| API Content | $O_C$ | This field holds the API content (e.g. location, Monitoring Type) used in the T8 transaction for the API invocation request, if available. |
| API Size | $O_C$ | This field holds the size of API payload. |
| API Result Code | $O_C$ | This field holds the result of API Invocation. |
| External Identifier | $O_C$ | This field holds the external Identifier identifying the served party associated to the IMSI or MSISDN or External Group ID, if available. |
| Local Record Sequence Number | $O_M$ | Consecutive record number created by this node. The number is allocated sequentially including all CDR types. |
| Record Extensions | $O_C$ | A set of network operator/manufacturer specific extensions to the record. Conditioned upon the existence of an extension. |

## 6.2 Data description for Northbound API online charging

### 6.2.1 Ro message contents

#### 6.2.1.0 Introduction

The SCEF generates Debit / Reserve Units information that can be transferred from the CTF to the OCF. For this purpose, SCEF online charging utilizes the *Debit Units and Reserve Units* procedure that is specified in the 3GPP Debit / Reserve Units operation in TS 32.299 [50].

### 6.2.1.1 Summary of message formats

Table 6.2.1.1.1 describes the use of these messages for SCEF online charging.

**Table 6.2.1.1.1: SCEF online charging messages contents**

| Command-Name | Source | Destination |
|---|---|---|
| Debit / Reserve Units Request | SCEF | OCF |
| Debit / Reserve Units Response | OCF | SCEF |

This clause describes the different fields used in the Debit / Reserve Units Request and Debit / Reserve Units Reponses messages and the category in the tables are used according to the charging data configuration defined in clause 5.4 of TS 32.240 [1].

Detailed descriptions of the fields are provided in TS 32.299 [50].

### 6.2.1.2 Structure for the Credit-Control message formats

#### 6.2.1.2.1 Debit/Reserve Units Request message

Table 6.2.1.2.1.1 illustrates the basic structure of a *Debit / Reserve Units Request* message from SCEF as used for exposure function API online charging.

**Table 6.2.1.2.1.1: Debit / Reserve Units Request message contents for exposure function API**

| Information Element | Category | Description |
|---|---|---|
| Session Identifier | M | Described in TS 32.299 [50] |
| Originator Host | M | Described in TS 32.299 [50] |
| Originator Domain | M | Described in TS 32.299 [50] |
| Destination Domain | M | Described in TS 32.299 [50] |
| Operation Identifier | M | Described in TS 32.299 [50] |
| Operation Token | M | Described in TS 32.299 [50] |
| Operation Type | M | Described in TS 32.299 [50] |
| Operation Number | M | Described in TS 32.299 [50] |
| Destination Host | $O_C$ | Described in TS 32.299 [50] |
| User Name | $O_C$ | Described in TS 32.299 [50] |
| Origination State | $O_C$ | Described in TS 32.299 [50] |
| Origination Timestamp | $O_C$ | Described in TS 32.299 [50] |
| Subscriber Identifier | $O_M$ | This field contains the identification of the subscriber (i.e. SCS/AS Identifier) that uses the requested service. |
| Termination Cause | $O_C$ | Described in TS 32.299 [50] |
| Requested-Action | $O_C$ | This field contains the requested action, used for IEC only. |
| Multiple Operation | $O_M$ | This field indicate the occurrence of multiple operations. |
| Multiple Unit Operation | $O_C$ | This field contains the parameter for the quota management. |
| Proxy Information | $O_C$ | This field contains the parameter of the proxy. |
| Route Information | $O_C$ | This field contains the parameter of the route. |
| Service Information | $O_M$ | This field holds the SCEF specific parameter and is described in clause 6.3. |

#### 6.2.1.2.2 Debit / Reserve Units Response message

Table 6.2.1.2.2.1 illustrates the basic structure of a Debit / Reserve Units Response message as used for SCEF charging.

This message is always used by the OCS as specified below, independent of the receiving SCEF and the operation type that is being replied to.

**Table 6.2.1.2.2.1: Debit / Reserve Units Response message contents for exposure function API**

| Information Element | Category | Description |
|---|---|---|
| Session Identifier | M | Described in TS 32.299 [50] |
| Operation Result | M | Described in TS 32.299 [50] |
| Originator Host | M | Described in TS 32.299 [50] |
| Originator Domain | M | Described in TS 32.299 [50] |
| Operation Identifier | M | Described in TS 32.299 [50] |
| Operation Type | M | Described in TS 32.299 [50] |
| Operation Number | M | Described in TS 32.299 [50] |
| Multiple Unit Operation | Oc | Described in TS 32.299 [50] |
| Operation Failure Action | Oc | Described in TS 32.299 [50] |
| Operation Event Failure Action | OC | Described in TS 32.299 [50] |
| Redirection Host | OC | Described in TS 32.299 [50] |
| Redirection Host Usage | OC | Described in TS 32.299 [50] |
| Route Information | OC | Described in TS 32.299 [50] |
| Failed parameter | OC | Described in TS 32.299 [50] |
| Service Information | OC | Described in TS 32.299 [50] |

# 6.2a Data description for NEF converged charging

## 6.2a.1 Message contents

### 6.2a.1.1 General

The Charging Data Request and Charging Data Response are specified in TS 32.290 [57] and include charging information. The Charging Data Request can be of type [Event, Initial, Termination].

Table 6.2a.1.1.1 describes the use of these messages for converged charging.

**Table 6.2a.1.1.1: Converged charging messages reference table**

| Message | Source | Destination |
|---|---|---|
| Charging Data Request | NEF | CHF |
| Charging Data Response | CHF | NEF |

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 TS 32.240 [2].

### 6.2a.1.2 Structure for the converged charging message formats

#### 6.2a.1.2.1 Charging Data Request message

Table 6.2a.1.2.1.1 illustrates the basic structure of a Charging Data Request message as used for NEF converged charging.

**Table 6.2a.1.2.1.1: Charging Data Request message contents**

| Information Element | Category | Description |
|---|---|---|
| Session Identifier | $O_C$ | Described in TS 32.290 [57] |
| Subscriber Identifier | $O_M$ | Described in TS 32.290 [57], and holds the identifier of the AF |
| NF Consumer Identification | M | Described in TS 32.290 [57] |
| Invocation Timestamp | M | Described in TS 32.290 [57] |
| Invocation Sequence Number | M | Described in TS 32.290 [57] |
| Retransmission Indicator | - | This field is not applicable. |
| One-time Event | $O_C$ | This field indicates, if included, that this is a one-time event and that there will be no update or termination. |
| One-time Event Type | $O_C$ | Described in TS 32.290 [57]. |
| Notify URI | $O_C$ | This field contains URI to which notifications are sent by the CHF. The latest received value shall always be used at notifications. |
| Triggers | $O_C$ | This field is described in TS 32.290 [57] and holds the NEF specific triggers described in clause 5.x |
| Multiple Unit Usage | $O_C$ | This field contains the parameters for the quota management request and/or usage reporting. |
| Rating Group | M | Described in TS 32.290 [57] |
| Requested Unit | $O_C$ | Described in TS 32.290 [57] |
| Used Unit Container | $O_C$ | Described in TS 32.290 [57] |
| NEF API Charging Information | $O_M$ | This field holds the NEF API specific information described in clause 6.3.1.4 |

#### 6.2a.1.2.2 Charging Data Response message

Table 6.2a.1.2.2.1 illustrates the basic structure of a Charging Data Response message as used for NEF converged charging.

**Table 6.2a.1.2.2.1: Charging Data Response message content**

| Information Element | Category | Description |
|---|---|---|
| Session Identifier | $O_C$ | Described in TS 32.290 [57] |
| Invocation Timestamp | M | Described in TS 32.290 [57] |
| Invocation Result | $O_C$ | Described in TS 32.290 [57] |
| Invocation Sequence Number | M | Described in TS 32.290 [57] |
| Session Failover | $O_C$ | Described in TS 32.290 [57] |
| Triggers | - | Not applicable |
| Multiple Unit Information | $O_C$ | This field holds the parameters for the quota management information. |
| Result Code | $O_C$ | Described in TS 32.290 [57] |
| Rating Group | $O_M$ | Described in TS 32.290 [57] |
| Granted Unit | $O_C$ | Described in TS 32.290 [57] |
| Validity Time | $O_C$ | Described in TS 32.290 [57] |

## 6.2a.2 $G_a$ message contents

Refer to clause 5.4.4.

## 6.2a.3 CDR description on the $B_{ea}$ interface

### 6.2a.3.1 General

This clause describes the CDR content and format generated for NEF converged 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 TS 32.240 [2]. Full definitions of the CDR parameters, sorted by the name in alphabetical order, are provided in TS 32.298 [3].

### 6.2a.3.2 NEF charging CHF CDR data

If enabled, CHF CDRs for NEF charging shall be produced for NEF chargeable events.

The fields of NEF charging CHF CDR are specified in table 6.2a.3.2.1.

**Table 6.2a.3.2.1: NEF charging CHF record data**

| Field | Category | Description |
|---|---|---|
| Record Type | M | Described in TS 32.298 [3] |
| Recording Network Function ID | $O_M$ | Described in TS 32.298 [3] |
| Subscriber Identifier | M | This field contains the identification of the API user (e.g. SCS Identifier) |
| NF Consumer Information | $O_C$ | This field holds the information of the NEF that used the charging service |
| Triggers | $O_C$ | This field is described in TS 32.298 [3] and holds the NEF specific triggers described in clause 5.x |
| List of Multiple Unit Usage | $O_M$ | Described in TS 32.298 [3] |
| Record Opening Time | $O_C$ | Described in TS 32.298 [3] |
| Duration | M | Described in TS 32.298 [3] |
| Record Sequence Number | C | Described in TS 32.298 [3] |
| Cause for Record Closing | M | Described in TS 32.298 [3] |
| Local Record Sequence Number | $O_M$ | Described in TS 32.298 [3] |
| Record Extensions | $O_C$ | Described in TS 32.298 [3] |
| NEF API Charging Information | $O_M$ | This field holds the NEF specific information defined in clause 6.3.1.4 |

# 6.3 Northbound API charging specific parameters

## 6.3.1 Definition of Northbound API charging information

### 6.3.1.1 Exposure Function API charging information assignment for Service Information

The components in the Service Information that are used for Exposure Function API charging can be found in table 6.3.1.1.1.

**Table 6.3.1.1.1: Service Information used for Exposure Function API charging**

| Information Element | Category | Description |
|---|---|---|
| Service Information | $O_M$ | This is a structured field and holds the 3GPP specific parameter as defined in TS 32.299 [50]. |
| Subscriber Identifier | $O_M$ | This field contains the identification of the user (i.e. SCS Identifier). |
| IMS Information | $O_M$ | This is a structured field and holds IMS specific parameters. The complete structure is defined in TS 32.260 [20]. |
| Node Functionality | $O_c$ | This IE Identifies the type of record. |
| Exposure Function API Information | $O_M$ | This is a structured field and holds the Exposure Function API specific parameters. The details are defined in clause 6.3.1.2. |

### 6.3.1.2 Definition of the Exposure Function API Information

Exposure Function API specific charging information is provided within the Exposure Function API Information. The fields of the Exposure Function API Information are indicated with the SCEF from which the information is sent.

The detailed structure of the Exposure Function API Information can be found in table 6.3.1.2.1.

**Table 6.3.1.2.1: Structure of the Exposure Function API Information**

| Information Element | Category | Description |
|---|---|---|
| Supported Features | $O_c$ | This field holds the list of features supported by the SCEF, CDF or OCF as defined in clause 6.3.1.3. |
| External Identifier | $O_c$ | This parameter holds the external Identifier identifying the served party associated to the IMSI or MSISDN or External Group ID, if available |
| SCEF ID | $O_c$ | This parameter holds the Diameter identity of the SCEF used for API invocation. |
| SCEF Address | $O_c$ | This parameter holds the IP address of SCEF. |
| API Identifier | $O_M$ | This parameter holds the identity of API |
| SCS/AS Address | $O_M$ | This parameter holds the IP address of SCS/AS which invoke the API via T8 interface |
| TLTRI | $O_c$ | This parameter holds T8 Long Term Transaction Reference ID is which refers to long term transaction (e.g. NIDD Configuration, Group Message Request, Monitoring Event configuration) between the SCEF and the SCS/AS when using T8 interface. |
| Event Timestamp | M | This field holds the time stamp of the event reported. |
| API Invocation Timestamp | $O_c$ | This parameter holds the time stamp when API Invocation request was submitted to the SCEF from SCS/AS. |
| API Direction | $O_c$ | This field holds the direction to indicate the API invocation or API notification. |
| API Network Service Node | $O_c$ | This field holds the identifier the network element (e.g. SGSN, RCAF) that triggers the API notification, as defined in 23.682 [243]. |
| API Content | $O_c$ | This parameter holds the API content (e.g. Location, Monitoring Type) used in the T8 transaction for the API invocation request, if available. |
| API Size | $O_c$ | This parameter holds size of API payload. |
| API Result Code | $O_c$ | This parameter holds the result of API Invocation. |

### 6.3.1.3 Supported features

The Supported features information that is used for Exposure Function API charging is based on the information defined for the supported features mechanism specified in clause 6.5.x of TS 32.299 [50].

The following table defines the features applicable for the feature lists with a Feature-List-ID of 1.

**Table 6.3.1.3.1: Features of Feature-List-ID 1 used in Exposure Function API charging**

| Feature bit | Feature | Description | Online/ Offline |
|---|---|---|---|
| 0 | NAPS-CH | This feature indicates the support Exposure Function API charging. | Both |
| Feature bit: The order number of the bit within the Feature-List AVP where the least significant bit is assigned number "0".<br>Feature: A short name that can be used to refer to the bit and to the feature, e.g. "EPS".<br>Feature in this table is always mandatory since it relates to the charging functionality of a network feature.<br>Description: A clear textual description of the feature. | | | |

### 6.3.1.4 Definition of the NEF API Information

#### 6.3.1.4.1 Definition of the NEF API Charging Information

Network Exposure Function API specific charging information is provided within the NEF API Charging Information. The detailed structure of the NEF API Charging Information can be found in table 6.3.1.4.1.

**Table 6.3.1.4.1: Structure of the NEF API Charging Information**

| Information Element | Category | Description |
|---|---|---|
| External Individual Identifier | $O_C$ | This parameter holds the external Identifier or the MSISDN associated to the GPSI of the individual UE, if available. |
| External Group Identifier | $O_C$ | This parameter holds the external identifier for a group of individual UE(s), if available. |
| API Direction | M | This field holds the direction to indicate if it is an API invocation from an AF or notification to an AF. |
| API Target Network Function | $O_C$ | This field holds the identifier of the network function that either is the destination of the API invocation or triggers the notification. |
| API Result Code | $O_C$ | This parameter holds the result of API Invocation. |
| API Name | M | This field holds the name of the API invoked. |
| API Reference | $O_C$ | This field holds the reference to the definition of the format of the API invocation, this can be a URI or refence to the standard where it's specified |
| API Content | $O_C$ | This field holds the actual content of the API invocation, in the format described by the API Reference |

Editor's note: The full list of information elements is FFS.

## 6.3.2 Detailed message format for offline charging

The following clause specifies per Operation Type the charging data that are sent by SCEF for Exposure Function API offline charging.

The Operation Types are listed in the following order: S (Start)/I (Interim)/S (Stop)/E (Event). Therefore, when all Operation Types are possible it is marked as SISE. If only some Operation Types are allowed for a node, only the appropriate letters are used (i.e. SIS or E) as indicated in the table heading. The omission of an Operation Type for a particular field is marked with "-" (i.e. SI-E). Also, when an entire field is not allowed in a node the entire cell is marked as "-".

Table 6.3.2.1 illustrates the basic structure of the supported fields in the *Charging Data* Request message for Exposure Function API offline charging.

**Table 6.3.2.1: Supported fields in *Charging Data Request* message**

| Information Element | Node Type<br>Supported Operation Types | SCEF<br>S/I/S/E |
|---|---|---|
| Session Identifier | | ---E |
| Originator Host | | ---E |
| Originator Domain | | ---E |
| Destination Domain | | ---E |
| Operation Type | | ---E |
| Operation Number | | ---E |
| Operation Identifier | | ---E |
| User Name | | ---E |
| Destination Host | | ---E |
| Operation Interval | | ---E |
| Origination State | | ---E |
| Origination Timestamp | | ---E |
| Proxy Information | | ---E |
| Route Information | | ---E |
| Operation Token | | ---E |
| Subscriber Identifier | | ---E |
| **Service Information with IMS Information and Exposure Function API Information** | | |
| Supported Features | | ---E |
| Node Functionality | | ---E |
| External Identifier | | ---E |
| SCEF ID | | ---E |
| SCEF Address | | ---E |
| TLTRI | | ---E |
| API Identifier | | ---E |
| SCS/AS Address | | ---E |
| Event Timestamp | | ---E |
| API Invocation Timestamp | | ---E |
| API Direction | | ---E |
| API Network Service Node | | ---E |
| API Content | | ---E |
| API Size | | ---E |
| API Result Code | | ---E |

Table 6.3.2.2 illustrates the basic structure of the supported fields in the *Charging Data* Response message for Exposure function API offline charging.

**Table 6.3.2.2: Supported fields in *Charging Data* Response message**

| Information Element | Node Type | SCEF |
|---|---|---|
| | Supported Operation Types | S/I/S/E |
| Session Identifier | | ---E |
| Operation Result | | ---E |
| Originator Host | | ---E |
| Originator Domain | | ---E |
| Operation Type | | ---E |
| Operation Number | | ---E |
| Operation Identifier | | ---E |
| Operation Interval | | ---E |
| Error Reporting Host | | ---E |
| Origination State | | ---E |
| Origination Timestamp | | ---E |
| Proxy Information | | ---E |
| Session Identifier | | ---E |
| **Service Information with Exposure Function API Information** | | |
| Supported Features | | ---E |

## 6.3.3 Detailed message format for online charging

The Operation types are listed in the following order: I [initial] /U [update]/ T [terminate]/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. IT or E) as indicated in the table heading. The omission of an Operation type for a particular field is marked with "-" (i.e. I-E). Also, when an entire field is not allowed in a node the entire cell is marked as "-".

Table 6.3.3.1 illustrates the basic structure of the supported fields in the Debit / Reserve Units Request for exposure function API online charging.

**Table 6.3.3.1: Supported fields in Debit / Reserve Units Request message**

| Information Element | Service Type<br>Supported Operation Types | SCEF<br>I/U/T/E |
|---|---|---|
| Session Identifier | | ---E |
| Originator Host | | ---E |
| Originator Domain | | ---E |
| Destination Domain | | ---E |
| Operation Identifier | | ---E |
| Operation Token | | ---E |
| Operation Type | | ---E |
| Operation Number | | ---E |
| Destination Host | | ---E |
| User Name | | ---E |
| Origination State | | ---E |
| Origination Timestamp | | ---E |
| Subscriber Identifier | | ---E |
| Termination Cause | | ---E |
| Requested Action | | ---E |
| Multiple Operation | | ---E |
| Multiple Unit Operation | | ---E |
| Proxy Information | | ---E |
| Route Information | | ---E |
| Service Information | | ---E |
| **Service Information with IMS and Exposure Function API Information** | | |
| Supported Features | | ---E |
| Node Functionality | | ---E |
| SCEF Node | | ---E |
| SCEF Address | | ---E |
| SCS/AS Address | | ---E |
| API Identifier | | ---E |
| TLTRI | | ---E |
| Event Timestamp | | ---E |
| API Invocation Timestamp | | ---E |
| API Direction | | ---E |
| API Network Service Node | | ---E |
| API Content | | ---E |
| API Size | | ---E |
| API Result Code | | ---E |
| External Identifier | | ---E |

Table 6.3.3.2 illustrates the basic structure of the supported fields in the Debit / Reserve Units Response for exposure function API online charging.

**Table 6.3.3.2: Supported fields in *Debit / Reserve Units Response* Message**

| Information Element | Node Type | SCEF |
|---|---|---|
| | Supported Operation Types | I/U/T/E |
| Session Identifier | | ---E |
| Operation Result | | ---E |
| Originator Host | | ---E |
| Originator Domain | | ---E |
| Operation Identifier | | ---E |
| Operation Type | | ---E |
| Operation Number | | ---E |
| Operation Failover | | ---E |
| Multiple Unit Operation | | ---E |
| Operation Failure Action | | ---E |
| Redirection Host | | ---E |
| Redirection Host Usage | | ---E |
| Redirection Cache Time | | ---E |
| Route Information | | ---E |
| Failed parameter | | ---E |
| Service Information | | ---E |
| **Service Information with Exposure Function API Information** | | |
| Supported Features | | I--- |

## 6.3.4 Detailed message format for 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 (e.g. IUT or E) as indicated in the table heading. The omission of an Operation type for a particular field is marked with "-" (e.g. I-E). Also, when an entire field is not allowed in a node the entire cell is marked as "-".

Table 6.3.4.1 illustrates the basic structure of the supported fields in the Charging Data Request for exposure function API online charging.

**Table 6.3.4.1: Supported fields in Charging Data Request message**

| Information Element | Node Type | NEF |
|---|---|---|
| | Supported Operation Types | I/T/U/E |
| Session Identifier | | ITE |
| Subscriber Identifier | | ITE |
| NF Consumer Identification | | ITE |
| Invocation Timestamp | | ITE |
| Invocation Sequence Number | | ITE |
| Retransmission Indicator | | --- |
| One-time Event | | --E |
| One-time Event Type | | --E |
| Notify URI | | I-- |
| Triggers | | ITE |
| Multiple Unit Usage | | ITE |
| NEF API Charging Information | | |
| External Individual Identifier | | ITE |
| External Group Identifier | | ITE |
| API Direction | | ITE |
| API Target Network Function | | ITE |
| API Result Code | | ITE |
| API Name | | ITE |
| API Reference | | ITE |
| API Content | | ITE |

Table 6.3.4.2 illustrates the basic structure of the supported fields in the Charging Data Response for exposure function API converged charging.

**Table 6.3.4.2: Supported fields in *Charging Data Response* Message**

| Information Element | Node Type | NEF |
|---|---|---|
| | Supported Operation Types | I/U/T/E |
| Session Identifier | | ITE |
| Invocation Timestamp | | ITE |
| Invocation Result | | ITE |
| Invocation Sequence Number | | ITE |
| Session Failover | | ITE |
| Triggers | | ITE |
| Multiple Unit Information | | I-E |

# 6.4 Bindings for Northbound API offline charging

This clause aims to describe the mapping between the Service Information fields, AVPs, Ies and CDR parameters for exposure function API online and offline charging.

Table 6.4.1 describes the mapping of the Diameter Accounting AVP, Ies and CDR to the CDR parameters of EA-SCE-CDR.

**Table 6.4.1: Bindings of CDR Parameters, Information Elements and AVPs**

| CDR Parameter | Information Element | AVP |
|---|---|---|
| Service Context Id | Service Context Id | Service-Context-Id |
| | **Service Information** | **Service-Information** |
| | **IMS Information** | **IMS-Information** |
| Record Type | Node Functionality | Node-Functionality |
| | **API invocation Information** | **API-invocation-Information** |
| - | Supported Features | Supported-Features |
| External Identifier | External Identifier | External-Identifier |
| SCEF ID | SCEF ID | SCEF-ID |
| SCEF Address | SCEF Address | SCEF-Address |
| SCS/AS Address | SCS/AS Address | SCS/AS- Address |
| API Identifier | APIIdentifier | API-Identifier |
| TLTRI | TLTRI | TLTRI |
| Event Timestamp | Event Timestamp | Event-Timestamp |
| API Invocation Timestamp | API Invocation Timestamp | API-Invocation-Timestamp |
| API Direction | API Direction | API-Direction |
| API Network Service Node | API Network Service Node | API-Network-Service-Node |
| API Content | API Content | API -Content |
| API Size | API Size | API-Size |
| API Result Code | API Result Code | API-Result-Code |

## 6.5 Bindings for NEF Northbound API converged charging

This mapping between the Information Elements, resource attributes and CHF CDR parameters for NEF Northbound API converged charging is described in clause 7 of TS 32.291 [58].

# Annex A (normative): Charging characteristics

## A.1 General

A subscriber (The API Invoker) may have Charging Characteristics assigned to his subscription. Default charging characteristics may be pre-provisioned on the SCEF. The charging information content is configured for each API, including charging method (online and offline charging), Event based charging, whether report the message content or not.

The Charging Characteristics parameter format is specified TS 32.298 [51]. Each bit of the string of 16 bits corresponds to a specific charging behaviour which is defined on a per operator basis, configured within the SCEF and pointed when bit is set to "1" value.

One way to define a charging behaviour could be to associate it to a specific usage, which may consist of a set of trigger profiles associated to CDR types e.g.:

- **EA-SCE-CDR:** activate/deactivate CDRs, time limit, data volume limit, maximum number of API invocation.

In addition to these trigger sets, a CDF/CGF address may also be included.

# Annex B (informative): Change history

| Change history | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Date** | **Meeting** | **Tdoc** | **CR** | **Rev** | **Cat** | **Subject/Comment** | **New version** |
| 2018-06 | SA#80 | | | | | Upgrade to change control version | 15.0.0 |
| 2018-12 | SA#82 | SP-181041 | 0001 | 1 | F | Correction on the TTRL and TLTRL | 15.1.0 |
| 2019-03 | SA#83 | SP-190114 | 0002 | 1 | B | Add convergent charging architecture | 16.0.0 |
| 2019-03 | SA#83 | SP-190114 | 0003 | 1 | B | Add basic principles for convergent charging | 16.0.0 |
| 2019-03 | SA#83 | SP-190114 | 0004 | 1 | B | Add message flows for converged charging | 16.0.0 |
| 2019-03 | SA#83 | SP-190114 | 0005 | 1 | B | Adding CDR generation and handling for converged charging | 16.0.0 |
| 2019-06 | SA#84 | SP-190380 | 0006 | 1 | B | Addition of NEF charging data for Converged Charging | 16.1.0 |
| 2019-06 | SA#84 | SP-190380 | 0007 | 1 | B | Adding NEF API Information for charging | 16.1.0 |
| 2019-09 | SA#85 | SP-190756 | 0009 | 1 | B | Update of NEF API Charging Information | 16.2.0 |
| 2019-09 | SA#85 | SP-190756 | 0010 | 1 | B | Addition of detailed message format for converged charging | 16.2.0 |
| 2020-07 | SA#88-E | SP-200484 | 0011 | 1 | F | Add the Retransmission Indicator | 16.3.0 |
| 2020-07 | SA#88-E | SP-200484 | 0012 | 1 | F | Correct the message content for NEF charging | 16.3.0 |
| 2021-03 | SA#91e | SP-210159 | 0013 | - | F | Correction on applicable scenarios and flows | 16.4.0 |
| 2021-03 | SA#91e | SP-210159 | 0014 | 1 | F | Correction on different identities | 16.4.0 |
| 2021-03 | SA#91e | SP-210159 | 0015 | 1 | F | Correction on Multiple Unit Usage | 16.4.0 |
| 2021-03 | SA#91e | SP-210159 | 0016 | - | F | Correction on binding description | 16.4.0 |
| 2021-06 | SA#92e | SP-210407 | 0017 | 1 | C | Correction on Reference Points | 17.0.0 |

# History

| Document history | | |
|---|---|---|
| V17.0.0 | May 2022 | Publication |
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