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

iTeh STANDARD
PREVIEW
(standards.iteh.ai)

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

ETSI TS 132 254 V17.0.0 (2022-05)
https://standards.iteh.ai/catalog/standards/sist/f56d-4d40-ada1-f078344bf8db/etsi-ts-132-254-v17-0-0-2022-05

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
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° w061004871

Important notice

The present document can be downloaded from:
http://www.etsi.org/standards-search

The present document may be made available in electronic versions and/or in print. The content of any electronic and/or print versions of the present document shall not be modified without the prior written authorization of ETSI. In case of any existing or perceived difference in contents between such versions and/or in print, the prevailing version of an ETSI deliverable is the one made publicly available in PDF format at www.etsi.org/deliver.

Users of the present document should be aware that the document may be subject to revision or change of status.
Information on the current status of this and other ETSI documents is available at
https://portal.etsi.org/TB/ETSIDeliverableStatus.aspx

If you find errors in the present document, please send your comment to one of the following services:
https://portal.etsi.org/People/CommiteeSupportStaff.aspx

If you find a security vulnerability in the present document, please report it through our
Coordinated Vulnerability Disclosure Program:
https://www.etsi.org/standards/coordinated-vulnerability-disclosure

Notice of disclaimer & limitation of liability

The information provided in the present deliverable is directed solely to professionals who have the appropriate degree of experience to understand and interpret its content in accordance with generally accepted engineering or other professional standard and applicable regulations.
No recommendation as to products and services or vendors is made or should be implied.
No representation or warranty is made that this deliverable is technically accurate or sufficient or conforms to any law and/or governmental rule and/or regulation and further, no representation or warranty is made of merchantability or fitness for any particular purpose or against infringement of intellectual property rights.
In no event shall ETSI be held liable for loss of profits or any other incidental or consequential damages.

Any software contained in this deliverable is provided "AS IS" with no warranties, express or implied, including but not limited to, the warranties of merchantability, fitness for a particular purpose and non-infringement of intellectual property rights and ETSI shall not be held liable in any event for any damages whatsoever (including, without limitation, damages for loss of profits, business interruption, loss of information, or any other pecuniary loss) arising out of or related to the use of or inability to use the software.

Copyright Notification

No part may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm except as authorized by written permission of ETSI.
The content of the PDF version shall not be modified without the written authorization of ETSI.
The copyright and the foregoing restriction extend to reproduction in all media.

© ETSI 2022.
All rights reserved.

iTeh STANDARD PREVIEW
(standards.iteh.ai)
ETSI TS 132 254 V17.0.0 (2022-05)
https://standards.iteh.ai/catalog/standards/sist/dd509c91-f56d-4d40-adad-f02834b84b/etsi-ts-132-254-v17-0-0-2022-05

Intellectual Property Rights

Essential patents

IPRs essential or potentially essential to normative deliverables may have been declared to ETSI. The declarations pertaining to these essential IPRs, if any, are publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: *"Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards"*, which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (https://ipr.etsi.org/).

Pursuant to the ETSI Directives including the ETSI IPR Policy, no investigation regarding the essentiality of IPRs, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

Trademarks

The present document may include trademarks and/or tradenames which are asserted and/or registered by their owners. ETSI claims no ownership of these except for any which are indicated as being the property of ETSI, and conveys no right to use or reproduce any trademark and/or tradename. Mention of those trademarks in the present document does not constitute an endorsement by ETSI of products, services or organizations associated with those trademarks.

DECT™, **PLUGTESTS™**, **UMTS™** and the ETSI logo are trademarks of ETSI registered for the benefit of its Members. **3GPP™** and **LTE™** are trademarks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners. **oneM2M™** logo is a trademark of ETSI registered for the benefit of its Members and of the oneM2M Partners. **GSM**® and the GSM logo are trademarks registered and owned by the GSM Association.

iTeh STANDARD
PREVIEW
(standards.iteh.ai)

Legal Notice

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

ETSI TS 132 254 V17.0.0 (2022-05)
https://standards.iteh.ai/catalog/standards/sist/ad30b0a1-156d-4d40-adad-107854461b8db/etsi-ts-132-254-v17-0-0-2022-05

The present document may refer to technical specifications or reports using their 3GPP identities. These shall be interpreted as being references to the corresponding ETSI deliverables.

The cross reference between 3GPP and ETSI identities can be found under http://webapp.etsi.org/key/queryform.asp.

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the ETSI Drafting Rules (Verbal forms for the expression of provisions).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

Contents

Intellectual Property Rights 2
Legal Notice 2
Modal verbs terminology 2
Foreword 5
1 Scope 6
2 References 6
3 Definitions, symbols and abbreviations 7
3.1 Definitions 7
3.2 Symbols 7
3.3 Abbreviations 8
4 Architecture considerations 8
4.1 High-level Service Exposure Function architecture 8
4.2 Northbound API offline charging architecture 9
4.3 Northbound API online charging architecture 10
4.4 Northbound API converged charging architecture 10
5 Northbound API charging principles and scenarios 11
5.1 Northbound API charging principles 11
5.1.0 General 11
5.1.1 Northbound API procedures 11
5.2 Northbound API offline charging scenarios 12
5.2.1 Basic principles 12
5.2.2 Rf message flows 12
5.2.2.1 Triggers for charging events from SCEF 12
5.2.3 CDR generation 13
5.2.3.1 Introduction 13
5.2.3.2 Triggers for EA-SCE-CDR creation and closure 13
5.2.3.2.1 Triggers for EA-SCE-CDR generation 13
5.2.4 Ga record transfer flows 13
5.2.5 Bea CDR file transfer 13
5.3 Northbound API online charging scenarios 13
5.3.1 Basic principles 13
5.3.1.1 General 13
5.3.2 Ro message flows 13
5.3.2.1 Event Based Charging 13
5.4 Northbound API converged online and offline charging scenarios 16
5.4.1 Basic principles 16
5.4.1.1 General 16
5.4.2 Message flows 17
5.4.2.1 Introduction 17
5.4.2.2 API Invocation - IEC 17
5.4.2.3 API Invocation - ECUR 18
5.4.2.4 API Notification - IEC 19
5.4.2.5 API event Notification - ECUR 19
5.4.2.6 API Invocation - PEC 20
5.4.2.7 API Notification - PEC 21
5.4.3 CDR generation 22
5.4.3.1 Introduction 22
5.4.3.2 Triggers for CHF CDR 22
5.4.3.2.1 General 22
5.4.3.2.2 Triggers for CHF CDR generation 22
5.4.3.2.3 Triggers for CHF CDR opening 23
5.4.3.2.4 Triggers for CHF CDR closure 23
5.4.4 Ga record transfer flows 23

iTeh STANDARD PREVIEW
(standards.iteh.ai)
ETSI TS 132 254 V17.0.0 (2022-05)
https://standards.iteh.ai/catalog/standards/sist/dd509c91-f56d-4d40-adad-f078544bf8db/etsi-ts-132-254-v17-0-0-2022-05

5.4.5 Bea CDR file transfer 23
6. Definition of charging information 23
6.1 Data description for Northbound API offline charging 23
6.1.1 Rf message contents 23
6.1.1.1 General 23
6.1.1.2 Charging data request message 24
6.1.1.3 Charging data response message 24
6.1.2 Ga message contents 24
6.1.3 CDR description on the Bea interface 25
6.1.3.1 General 25
6.1.3.2 Exposure Function API charging data (EA-SCE-CDR) 25
6.2 Data description for Northbound API online charging 25
6.2.1 Ro message contents 25
6.2.1.0 Introduction 25
6.2.1.1 Summary of message formats 26
6.2.1.2 Structure for the Credit-Control message formats 26
6.2.1.2.1 Debit/Reserve Units Request message 26
6.2.1.2.2 Debit / Reserve Units Response message 27
6.2a Data description for NEF converged charging 27
6.2a.1 Message contents 27
6.2a.1.1 General 27
6.2a.1.2 Structure for the converged charging message formats 28
6.2a.1.2.1 Charging Data Request message 28
6.2a.1.2.2 Charging Data Response message 28
6.2a.2 G_a message contents 28
6.2a.3 CDR description on the B_{ea} interface 29
6.2a.3.1 General 29
6.2a.3.2 NEF charging CHF CDR data 29
6.3 Northbound API charging specific parameters 30
6.3.1 Definition of Northbound API charging information 30
6.3.1.1 Exposure Function API charging information assignment for Service Information 30
6.3.1.2 Definition of the Exposure Function API Information 30
6.3.1.3 Supported features 31
6.3.1.4 Definition of the NEF API Information 31
6.3.1.4.1 Definition of the NEF API Charging Information 31
6.3.2 Detailed message format for offline charging 31
6.3.3 Detailed message format for online charging 33
6.3.4 Detailed message format for converged charging 35
6.4 Bindings for Northbound API offline charging 36
6.5 Bindings for NEF Northbound API converged charging 37

Annex A (normative): Charging characteristics 38

A.1 General 38

Annex B (informative): Change history 39

History 40

iTeh STANDARD PREVIEW
(standards.iteh.ai)
ETSI TS 132 254 V17.0.0 (2022-05)
https://standards.iteh.ai/catalog/standards/sist/dd509c91-150d-4d40-adad-107858411bdb/etsi-ts-132-254-v17.0.0-2022-05

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.

iTeh STANDARD
PREVIEW
(standards.iteh.ai)

ETSI TS 132 254 V17.0.0 (2022-05)
https://standards.iteh.ai/catalog/standards/sist/dd509c91-f56d-4d40-adad-f078344bf8db/etsi-ts-132-254-v17-0-0-2022-05

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].

iTeh STANDARD PREVIEW (standards.iteh.ai) ETSI TS 132 254 V17.0.0 (2022-05) https://standards.iteh.ai/catalog/standards/sist/dd509c91-f56d-4d40-adad-f078344bf8db/etsi-ts-132-254-v17-0-0-2022-05

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.

iTeh STANDARD PREVIEW
(standards.iteh.ai)
ETSI TS 132 254 V17.0.0 (2022-05)
https://standards.iteh.ai/catalog/standard/sist/d1509c91-078344bf8db/etsi-ts-132-254-v17-0-0-2022-05

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

iTeh STANDARD PREVIEW

4.1 High-level Service Exposure Function architecture

(standards.iteh.ai)

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.

ETSI TS 132 254 V17.0.0 (2022-05)
https://standards.iteh.ai/catalog/standards/sist/dd509c91-f56d-4d40-adad-f078344bf8db/etsi-ts-132-254-v17-0-0-2022-05

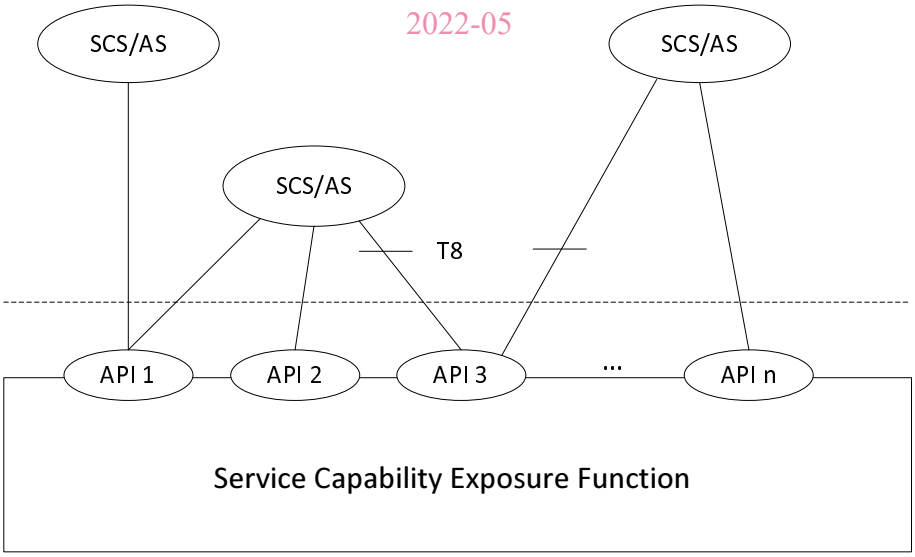


Figure 4.1.1: Northbound API of 3GPP Architecture Service Capability Exposure

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.

iTeh STANDARD PREVIEW
(standards.iteh.ai)
ETSI TS 132 254 V17.0.0 (2022-05)
https://standards.iteh.ai/catalog/standards/sist/dd509c91-f56d-4d40-adad-f078344bf8db/etsi-ts-132-254-v17.0.0-2022-05

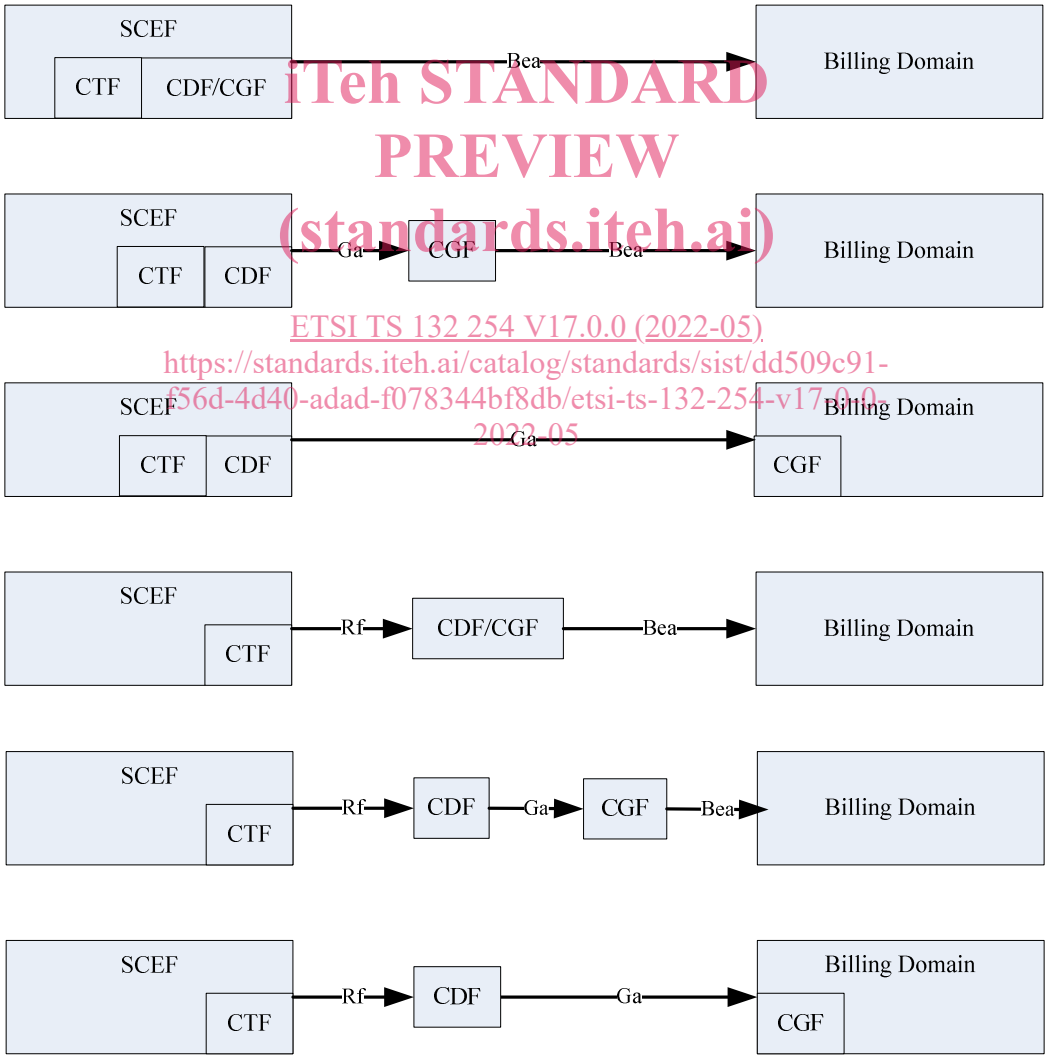


Figure 4.2.1: Northbound API offline charging architecture

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.

.

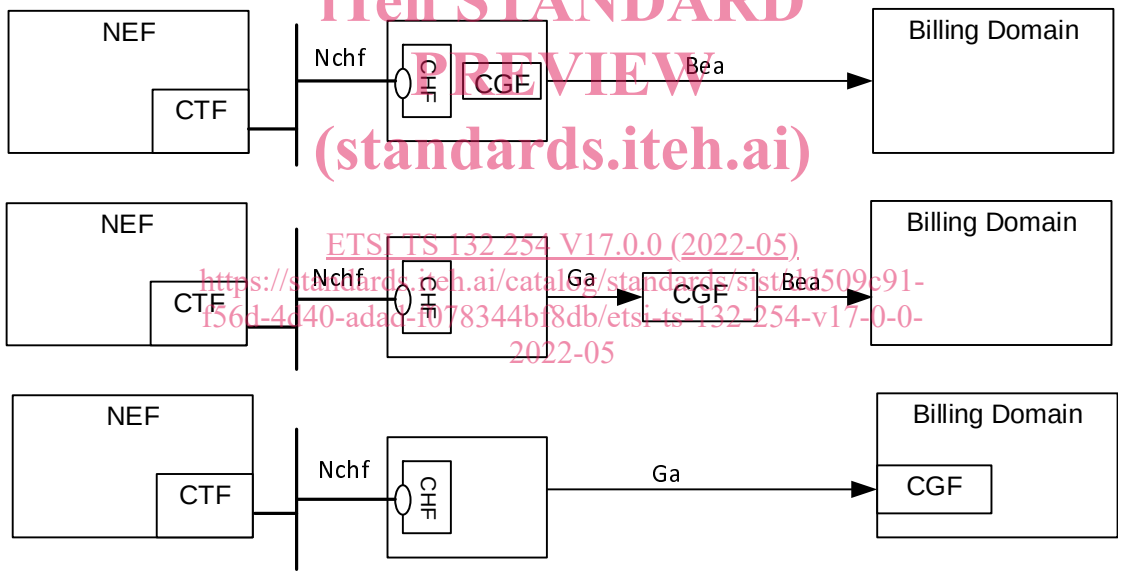
Figure 4.3.1: Northbound API online charging architecture

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:

iTeh STANDARD PREVIEW (standards.iteh.ai)



ETSI TS 132 254 V17.0.0 (2022-05)
https://standards.iteh.ai/catalog/standards/sist/d1509c91-156d-4d40-adad-f078344bf8db/etsi-ts-132-254-v17-0-0-2022-05

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:

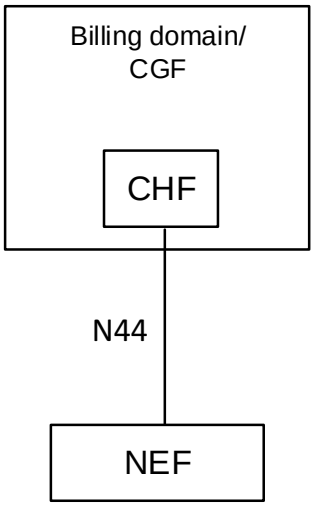


Figure 4.4.2: Northbound API converged charging architecture non-roaming reference point representation

iTeh STANDARD
PREVIEW
(standards.iteh.ai)

5 Northbound API charging principles and scenarios

5.1 Northbound API charging principles

5.1.0 General

ETSI TS 132 254 V17.0.0 (2022-05)
https://standards.iteh.ai/catalog/standards/sist/dd509c91-f56d-4d80-adad-f078344bf8db/etsi-ts-132-254-v17-0-0-2022-05

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

iTeh STANDARD
PREVIEW
(standards.iteh.ai)

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.

ETSI TS 132 254 V17.0.0 (2022-05)
https://standards.iteh.ai/catalog/standards/sist/dd509c91-f56d-4d40-abcb-8f7834f8f8db/etsi-ts-132-254-v17-0-0-2022-05

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