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Application Program Interfaces (APIs) charging
(3GPP TS 32.254 version 18.4.0 Release 18)**



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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] – [2235] Void
- [236] 3GPP TS 29.503: "5G System; Unified Data Management Services; Stage 3".
- [237] – [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].

AI/ML	Artificial Intelligence/Machine Learning
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.

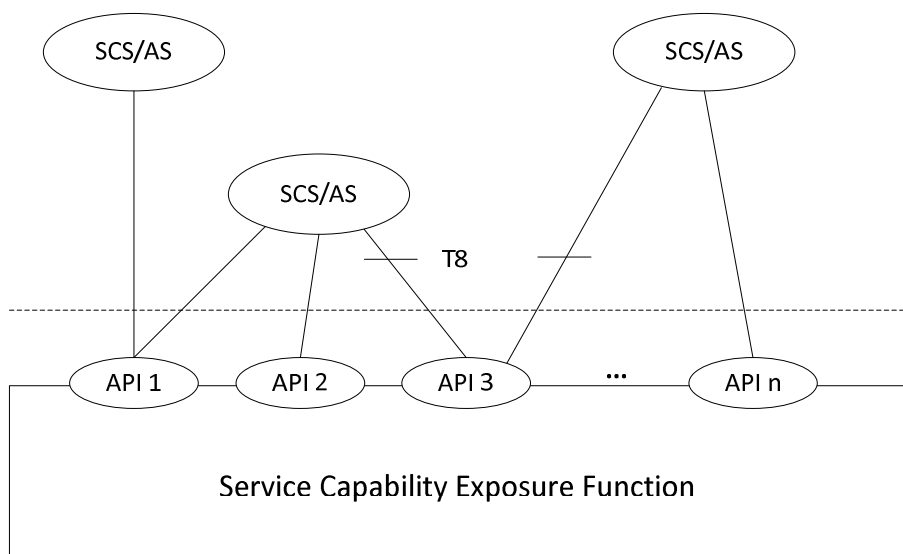


Figure 4.1.1: Northbound API of 3GPP Architecture Service Capability Exposure

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.

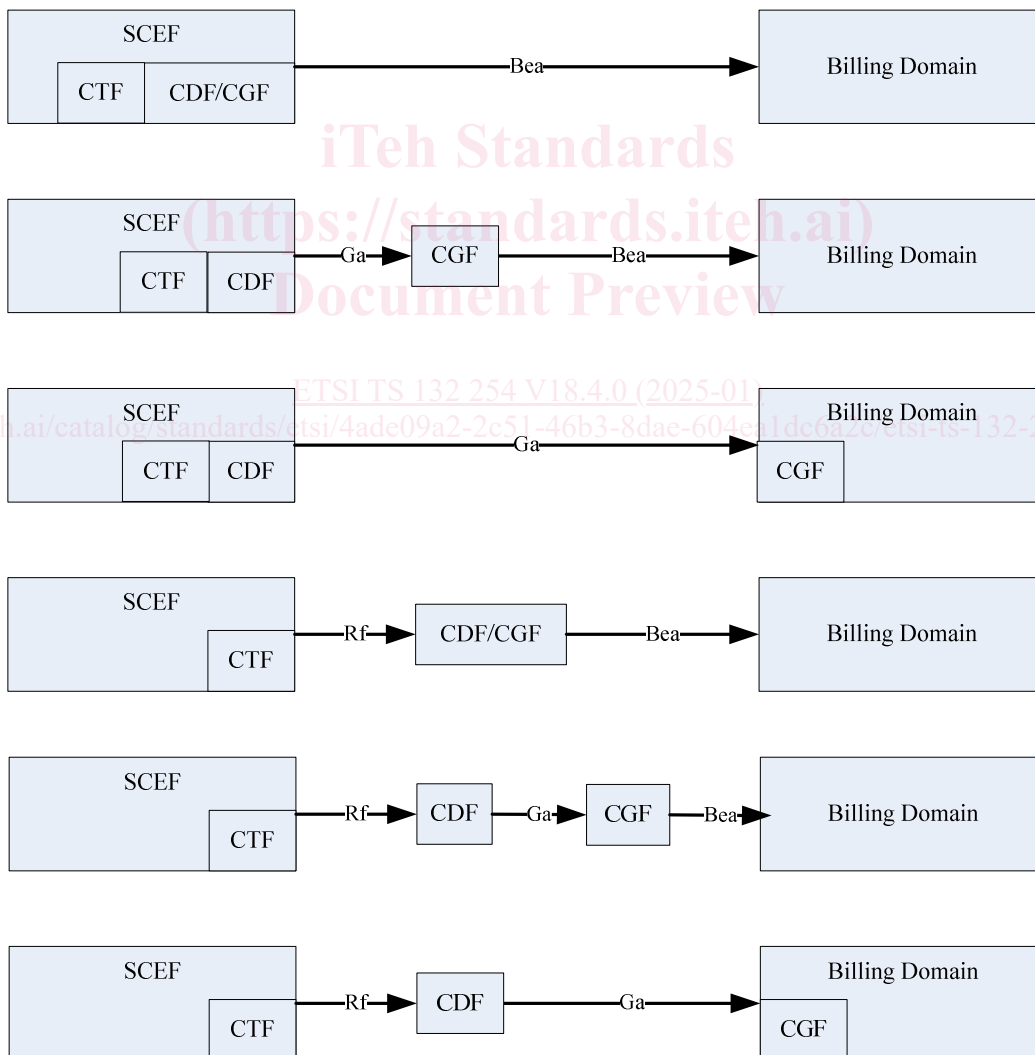


Figure 4.2.1: Northbound API offline charging architecture

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.

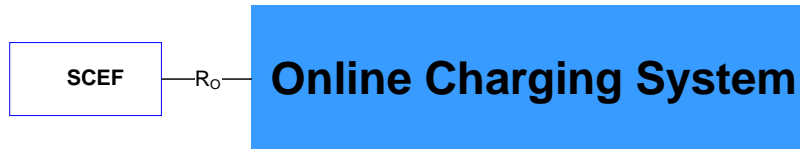


Figure 4.3.1: Northbound API online charging architecture

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:

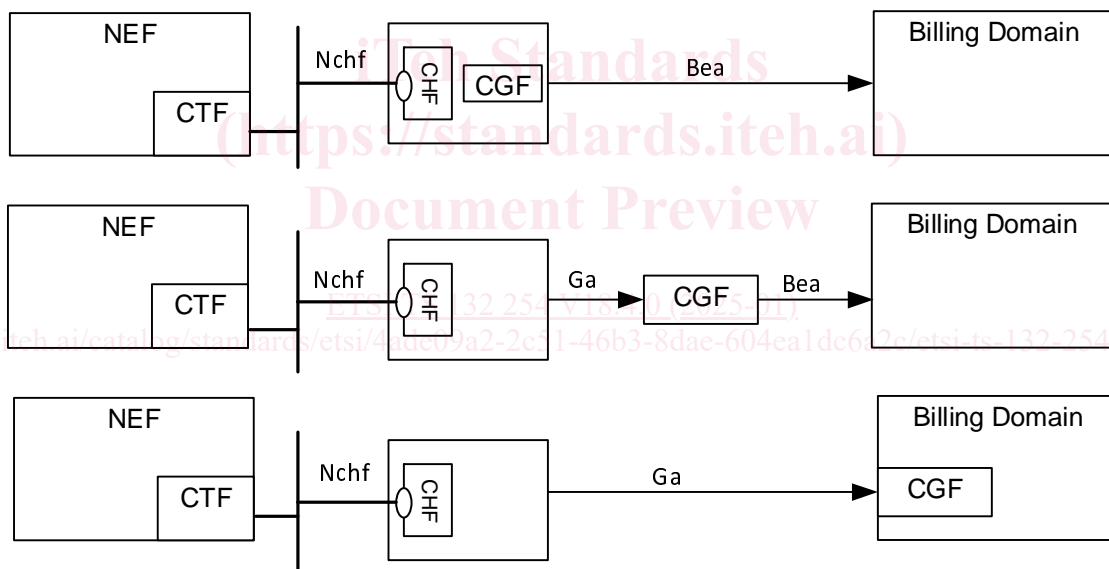


Figure 4.4.1: Northbound API converged charging architecture

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: