**3GPP TSG-SA5 Meeting #143e *S5-223457***

**09 - 17 May 2022, E-meeting**

**Source: Intel**

**Title: pCR 32.257 Add charging information definition for EES exposed 5GC NF services**

**Document for: Approval**

**Agenda Item: 7.4.1**

# 1 Decision/action requested

***The group is asked to discuss and agree on the proposal.***

# 2 References

[1] 3GPP TS 32.257-110 “Edge Computing domain charging; stage 2”

# 3 Rationale

This pCR is to add charging information definition for EES exposed 5GC NF services to TS 32.257 [1].

# 4 Detailed proposal

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| **Start of modification** |

# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non‑specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 32.240: "Telecommunication management; Charging management; Charging architecture and principles".

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

[4] 3GPP TS 32.297: "Telecommunication management; Charging management; Charging Data Record (CDR) file format and transfer".

[5] 3GPP TS 32.295: "Telecommunication management; Charging management; Charging Data Record (CDR) transfer".

[6] 3GPP TS 32.290: "Telecommunication management; Charging management; 5G system; Services, operations and procedures of charging using Service Based Interface (SBI)".

[7] 3GPP TS 32.291: "Telecommunication management; Charging management; 5G system; Charging service, stage 3".

[8] 3GPP TS 23.501: "System architecture for the 5G System (5GS); Stage 2".

[9] 3GPP TS 23.558: "Architecture for enabling Edge Applications".

[10] 3GPP TS 23.548 "5G System Enhancements for Edge Computing; Stage 2".

[11] 3GPP TS 32.255: "Telecommunication management; Charging management; 5G Data connectivity domain charging; stage 2".

[12] 3GPP TS [28.538](https://www.3gpp.org/DynaReport/28538.htm): "Management and orchestration; Edge Computing Management".

[13] 3GPP TS 28.552: "Management and orchestration; 5G performance measurements".

[14] 3GPP TS [28.5](https://www.3gpp.org/DynaReport/28538.htm)50: "Management and orchestration; Performance assurance".

[15] 3GPP TS [28.5](https://www.3gpp.org/DynaReport/28538.htm)32: "Management and orchestration; Generic management services".

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

[y] 3GPP TS 29.558: “Enabling Edge Applications; Application Programming Interface (API) specification; Stage 3”

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| **Next modification** |

#### 5.1.5.1 General

In the present specification, the charging is specified for edge enabling services provided by an ECSP to an ASP.

The charging for edge enabling services, is based on the edge application enabling functionalities specified in TS 23.558 [9], including the services directly provided by ECSP to ASP, and the 3GPP 5GC NF services exposed by ECSP to ASP:

- Edge enabling services directly provided by ECSP to ASP:

- EAS registration;

- EAS discovery;

- Support to Service Continuity;

- Application Client information subscription/notification;

- 5GC NF services exposed by ECSP to ASP:

- Obtaining UE location;

- ACR management events subscription;

- Session with QoS.

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| **Next modification** |

##### 5.2.4.1.1 General

Converged charging for edge enabling services, when activated may be performed by the EES interacting with CHF using Nchf specified in TS 32.290 [6] and TS 32.291 [7]. In order to provide the data required for the management activities outlined in TS 32.240 [1] (Credit-Control, accounting, billing, statistics etc.), the EES shall be able to perform converged charging for each of the following:

- Edge enabling services directly provided by ECSP to ASP (see TS 23.558 [9]):

- EAS registration;

- EAS discovery;

- Support to Service Continuity;

- Application Client information exposure;

- 5GC NF services exposed by ECSP to ASP (see TS 23.558 [9]):

- Obtaining UE location;

- ACR management events subscription;

- Session with QoS.

The EES shall be able to perform converged charging by interacting with CHF, for charging data related to the evens mentioned above. The Charging Data Request and Charging Data Response are exchanged between the EES and the CHF, based on either IEC or PEC scenarios as specified in TS 32.290 [6].

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 [7].

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

Editor’s note: how to avoid double triggering or support correlation of events in the case of triggers from both NEF and EAS is done is FFS.

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| **Next modification** |

##### 5.2.4.1.2 Applicable triggers in the EES

When a charging event is issued towards the CHF by the EES, it includes details of charging information, such as EAS identifier (e.g., EAS ID, see TS 23.558 [9]).

Each trigger condition (i.e., chargeable event) defined for edge enabling services charging, is specified with the associated behaviour when they are met.

The immediate report is applied to the chargeable events for edge enabling services charging, i.e., the chargeable events for which, when occurring, the current counts are closed and sent together with the charging data generated by the EES towards the CHF in a Charging Data Request. New counts are started by the EES.

Table 5.2.4.1.2-1 summarizes the set of default trigger conditions and their category which shall be supported by the EES when charging is active for the edge enabling services charging.

Table 5.2.4.1.2-1: Default Trigger conditions in EES

| Trigger Conditions | Trigger level | Default category | CHF allowed to change category | CHF allowed to enable and disable | Message when "immediate reporting" category |
| --- | --- | --- | --- | --- | --- |
| **Charging for edge enabling services directly provided by EES** | | | | | |
| EAS registration request | - | Immediate | Not Applicable | Yes | IEC: Charging Data Request [Event] |
| EAS registration response | - | Immediate | Not Applicable | Yes | PEC: Charging Data Request [Event] |
| EAS discovery request |  | Immediate | Not Applicable | Yes | IEC: Charging Data Request [Event] |
| EAS discovery response |  | Immediate | Not Applicable | Yes | PEC: Charging Data Request [Event] |
| ACR request | - | Immediate | Not Applicable | Yes | IEC: Charging Data Request [Event] |
| ACR response | - | Immediate | Not Applicable | Yes | PEC: Charging Data Request [Event] |
| ACR status update request | - | Immediate | Not Applicable | Yes | IEC: Charging Data Request [Event] |
| ACR status update response | - | Immediate | Not Applicable | Yes | PEC: Charging Data Request [Event] |
| AC information subscribe request |  | Immediate | Not Applicable | Yes | IEC: Charging Data Request [Event] |
| AC information subscribe response |  | Immediate | Not Applicable | Yes | PEC: Charging Data Request [Event] |
| AC information subscription update request |  | Immediate | Not Applicable | Yes | IEC: Charging Data Request [Event] |
| AC information subscription update response |  | Immediate | Not Applicable | Yes | PEC: Charging Data Request [Event] |
| AC information notification |  | Immediate | Not Applicable | Yes | PEC: Charging Data Request [Event] |
| **Charging for edge enabling services exposed by EES** | | | | | |
| UE location request | - | Immediate | Not Applicable | Yes | IEC: Charging Data Request [Event] |
| UE location response | - | Immediate | Not Applicable | Yes | PEC: Charging Data Request [Event] |
| UE location subscribe request |  | Immediate | Not Applicable | Yes | IEC: Charging Data Request [Event] |
| UE location subscribe response |  | Immediate | Not Applicable | Yes | PEC: Charging Data Request [Event] |
| UE location subscription update request |  | Immediate | Not Applicable | Yes | IEC: Charging Data Request [Event] |
| UE location subscription update response |  | Immediate | Not Applicable | Yes | PEC: Charging Data Request [Event] |
| UE location notification | - | Immediate | Not Applicable | Yes | PEC: Charging Data Request [Event] |
| ACR management event subscribe request |  | Immediate | Not Applicable | Yes | IEC: Charging Data Request [Event] |
| ACR management event subscribe response |  | Immediate | Not Applicable | Yes | PEC: Charging Data Request [Event] |
| ACR management event subscription update request |  | Immediate | Not Applicable | Yes | IEC: Charging Data Request [Event] |
| ACR management event subscription update response |  | Immediate | Not Applicable | Yes | PEC: Charging Data Request [Event] |
| Session with QoS create request |  | Immediate | Not Applicable | Yes | IEC: Charging Data Request [Event] |
| Session with QoS create response |  | Immediate | Not Applicable | Yes | PEC: Charging Data Request [Event] |
| Session with QoS update request |  | Immediate | Not Applicable | Yes | IEC: Charging Data Request [Event] |
| Session with QoS update response |  | Immediate | Not Applicable | Yes | PEC: Charging Data Request [Event] |
| Session with QoS event notification |  | Immediate | Not Applicable | Yes | PEC: Charging Data Request [Event] |

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| **Next modification** |

##### 6.3.1.1.2 Charging data request message

Table 6.3.1.1.2-1 illustrates the basic structure of a Charging Data Request message from the EES as used for edge enabling services converged charging.

Table 6.3.1.1.2-1: Charging Data Request message contents

| **Information Element** | **Converged Charging**  **Category** | **Description** |
| --- | --- | --- |
| Session Identifier | - | This field is not applicable. |
| Subscriber Identifier | - | This field is not applicable. |
| NF Consumer Identification | M | Described in TS 32.290 [6]. |
| NF Functionality | M | Described in TS 32.290 [6]. |
| NF Name | OC | Described in TS 32.290 [6]. |
| NF Address | OC | Described in TS 32.290 [6]. |
| NF PLMN ID | OC | Described in TS 32.290 [6]. |
| Charging Identifier | OM | Described in TS 32.290 [6]. |
| Invocation Timestamp | M | Described in TS 32.290 [6]. |
| Invocation Sequence Number | - | This field is not applicable. |
| Retransmission Indicator | OC | Described in TS 32.290 [6]. |
| One-time Event | OC | Described in TS 32.290 [6]. |
| One-time Event Type | OC | Described in TS 32.290 [6]. |
| Notify URI | - | This field is not applicable. |
| Supported Features | OC | Described in TS 32.290 [6]. |
| Service Specification Information | OC | Described in TS 32.290 [6]. |
| Triggers | OC | Described in TS 32.290 [6]. |
| Multiple Unit Usage | OM | Described in TS 32.290 [6]. |
| Rating Group | OM | Described in TS 32.290 [6]. |
| Requested Unit | - | This field is not applicable. |
| Used Unit Container | - | This field is not applicable. |
| EAS ID | OM | This field holds the EAS ID, see TS 23.558 [9]. |
| EAS Provider Identifier | OM | The identifier of the ASP that provides the EAS, see TS 23.558 [9]. |
| Direct Edge Enabling Service Charging Information | OM | This field holds the charging information described in clause 6.3.2.1.2 specific for charging of the edge enabling services directly provided by EES, used if structured charging information is required. |
| Exposed Edge Enabling Service Charging Information | OM | This field is mapped to the NEF API Charging information defined in TS 32.254 [x] clause 6.3.1.4 and holds the charging information described in clause 6.3.2.1.3. It can hole both the charging information of the 5G NF services exposed by EES as well as the edge enabling services directly provided by the EES. |

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##### 6.3.1.1.3 Charging data response message

Table 6.3.1.1.3-1 illustrates the basic structure of a Charging Data Response message from the CHF as used for edge enabling services converged charging.

Table 6.3.1.1.3-1: Charging Data Response message contents

| **Information Element** | **Converged Charging**  **Category** | **Description** |
| --- | --- | --- |
| Session Identifier | M | Described in TS 32.290 [6]. |
| Invocation Timestamp | M | Described in TS 32.290 [6]. |
| Invocation Result | OC | Described in TS 32.290 [6]. |
| Invocation Result Code | OC | Described in TS 32.290 [6]. |
| Failed parameter | OC | Described in TS 32.290 [6]. |
| Failure Handling | OC | Described in TS 32.290 [6]. |
| Invocation Sequence Number | - | This field is not applicable. |
| Session Failover | - | This field is not applicable. |
| Supported Features | OC | Described in TS 32.290 [6]. |
| Triggers | - | Described in TS 32.290 [6]. |
| Multiple Unit Information | OC | Described in TS 32.290 [6]. |
| Result Code | OC | Described in TS 32.290 [6]. |
| Rating Group | - | This field is not applicable. |
| Granted Unit | - | This field is not applicable. |
| Validity Time | - | This field is not applicable. |
| Final Unit Indication | - | This field is not applicable. |
| Time Quota Threshold | - | This field is not applicable. |
| Volume Quota Threshold | - | This field is not applicable. |
| Unit Quota Threshold | - | This field is not applicable. |
| Quota Holding Time | - | This field is not applicable. |
| Triggers | - | This field is not applicable. |

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| **Next modification** |

##### 6.3.1.3.2 Edge enabling services charging CHF CDR data

If enabled, CHF CDRs for edge enabling services charging shall be produced for each triggering event.

The fields of edge enabling services charging CHF CDR are specified in table 6.3.1.3.2-1.

Table 6.3.1.3.2-1: Edge enabling services charging CHF record data

|  |  |  |
| --- | --- | --- |
| Field | Category | Description |
| Record Type | M | Described in TS 32.298 [3] |
| Recording Network Function ID | OM | Described in TS 32.298 [3] |
| Tenant Identifier | OM | Described in TS 32.298 [3] |
| MnS Consumer Identifier | OC | Described in TS 32.298 [3] |
| NF Consumer Information | M | This field holds the information of the EES that used the charging service. |
| NF Functionality | M | This field contains the function of the node (i.e. EES) |
| NF Name | OC | This field holds the name of the EES used. |
| NF Address | OC | This fields holds the IP Address of the EES used. |
| NF PLMN ID | OC | This field holds the PLMN identifier (MCC MNC) of the EES. |
| Charging Identifier | OM | Described in TS 32.298 [3] |
| Triggers | OM | Described in TS 32.298 [3] |
| List of Multiple Unit Usage | OM | Described in TS 32.298 [3] |
| Rating Group | OM | 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 | OM | Described in TS 32.298 [3] |
| Record Extensions | OC | Described in TS 32.298 [3] |
| Service Specification Information | OC | Described in TS 32.298 [3] |
| EAS ID | OM | This field holds the EAS ID, see TS 23.558 [9]. |
| EAS Provider Identifier | OM | The identifier of the ASP that provides the EAS, see TS 23.558 [9]. |
| Direct Edge Enabling Service Charging Information | OC | This field holds the charging information described in clause 6.3.2.1.2 specific for charging of the edge enabling services directly provided by EES, may be used if structured charging information is required. |
| Exposed Edge Enabling Service Charging Information | OM | This field is mapped to the NEF API Charging information defined in TS 32.254 [x] clause 6.3.1.4 and holds the charging information described in clause 6.3.2.1.3. It can hold both the charging information of the 5G NF services exposed by EES as well as the edge enabling services directly provided by the EES. |

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##### 6.3.2.1.2 Definition of direct edge enabling services charging specific charging information

Specific charging information used for edge enabling services charging of EAS registration, EAS discovery, ACR, ACR status, AC information, is provided within the Edge Enabling Service Charging Information, specied in TS 23.558 [9] clause 8. May be used detailed information is required, otherwise Edge Enabling Service specific charging information clause 6.3.1.2.1.3 shall be used.

The detailed structure of the Edge Enabling Service Charging Information can be found in table 6.3.2.1.2-1.

Table 6.3.2.1.2-1: Structure of Direct Edge Enabling Service Charging Information

|  |  |  |
| --- | --- | --- |
| Information Element | Category | Description |
| EAS Profile | OC | EAS Profile, see TS 23.558 [9] Table 8.2.4-1 |
| UE Identifier | OC | The identifier of the UE (i.e. GPSI or identity token) |
| UE location | OC | The location information of the UE, see TS 23.558 [9] clause 7.3.2. |
| Target DNAI | OC | Target DNAI information which can be associated with potential T-EAS(s). |
| EEC Service Continuity Support | OC | Indicates if the EEC supports service continuity or not. The IE also indicates which ACR scenarios are supported by the EEC or, if this message is sent by the EEC to discover a T‑EAS, which ACR scenario(s) are intended to be used for the ACR. |
| EES Service Continuity Support | OC | Indicates if the S-EES supports service continuity or not. The IE also indicates which ACR scenarios are supported by the S-EES or, if the EAS discovery is used for an S‑EES executed ACR according to clause 8.8.2.5, which ACR scenario is to be used for the ACR. |
| EAS Service Continuity Support | OC | Indicates if the S-EAS supports service continuity or not. The IE also indicates which ACR scenarios are supported by the S-EAS or, if the EAS discovery is used for an S‑EAS decided ACR according to clause 8.8.2.4, which ACR scenario is to be used for the ACR. |
| Discovered EAS list | OC | List of discovered EAS(s). Each element includes the information described below. |
| List of clients | OC | List of clients matched based on the given filtering criteria: AC Profile(s), UE ID(s) and UE location(s) |
| ACID | OC | The identifier of the AC. |
| ACR action | OC | Indicates the ACR action (ACR initiation or ACR determination) |
| ACR initiation data | OC | ACR initiation related information, see TS 23.558 [9] Table 8.8.4.4-1. |
| ACR determination data | OC | ACR determination related information, see TS 23.558 [9] Table 8.8.4.4-1. |
| ACT result | OC | Indicates whether the ACT was successful or failed. |
| EECID | OC | Unique identifier of the EEC. |
| EASID(s) | OC | The identifier of the EAS(s) |
| ACID(s) | OC | The identifier of the AC(s) |
| Target information | OC | Details of the selected T-EAS and the T-EES. |
| ACR complete event information | OC | Details of a completed ACR and its result. |
| Result of ACR | OC | Indicates whether the ACR is successful or failure |
| EEC Context Relocation status | OC | Indicates whether the EEC context relocation was successful or not. |



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| **Next modification** |

##### 6.3.2.1.3 Definition of exposed Edge Enabling Service specific charging information

Specific charging information used for exposed Edge Enabling service charging is provided within the Exposed Edge Enabling Service Charging Information.

The Exposed Edge Enabling Service Charging Information is mapped to the "NEF API Charging Information" defined in TS 32.254 [x] table 6.3.1.4.1, the mapping is described in table 6.3.2.1.3-1.

Table 6.3.2.1.3-1: Structure of NEF API Charging Information for Exposed Edge Enabling Service Charging Information

| Exposed Edge Enabling Service Charging Information  (Mapped to NEF API Charging Information) | Category | Description |
| --- | --- | --- |
| External Individual Identifier | OC | The identifier of the UE (i.e,. GPSI or identity token), see TS 23.558 [9]. |
| External Group Identifier | - | This field is not applicable. |
| Internal Group Identifier | - | This field is not applicable. |
| API Direction | M | Described in TS 32.254 [x] table 6.3.1.4.1. |
| API Target Network Function | OC | This field holds the identifier of the network function or type of server that either is the destination of the API invocation or triggers the notification, see TS 32.254 [x] table 6.3.1.4.1. |
| API Result Code | OC | Described in TS 32.254 [x] table 6.3.1.4.1. |
| API Name | M | This field holds the name of the API invoked, see TS 23.558 [9] table 6.7.2-2. |
| API Reference | OC | This field holds the reference to TS  29.558 [y], either as the TS number and release (e.g., “TS 29.558 Rel-17”) or the URI to the specification. |
| API Content | OC | Described in TS 29.558 [y], see also TS 32.254 [x] table 6.3.1.4.1. |
| API Direction | M | Described in TS 32.254 [x] table 6.3.1.4.1. |



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| **Next modification** |

##### 6.3.2.2.1 Edge enabling services CHF CDR parameters

Editor’s note: The detailed definitions, abstract syntax and encoding of edge enabling services CHF CDRs parameters are to be specified in TS 32.298 [3].

##### 6.3.2.2.2 Edge enabling services resources attributes

Editor’s note: The detailed definitions of resources attributes used for edge enabling services charging are to be specified in TS 32.291 [7].

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| **Next modification** |

#### 6.3.2.3 Detailed message format for converged charging

The following clause specifies per Operation Type the charging data that are sent by EES for edge enabling services converged charging.

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

Table 6.3.2.3-1 defines the basic structure of the supported fields in the *Charging Data Request* message for edge enabling services converged charging.

Table 6.3.3.1: Supported fields in Charging Data Request message

| **Information Element** | **Functionality of EES** | **Edge enabling services charging** |
| --- | --- | --- |
| **Supported Operation Types** | **I/E** |
| Session Identifier | | - |
| Subscriber Identifier | | - |
| NF Consumer Identification | | I/E |
| NF Functionality | | I/E |
| NF Name | | I/E |
| NF Address | | I/E |
| NF PLMN ID | | I/E |
| Charging Identifier | | I/E |
| Invocation Timestamp | | I/E |
| Invocation Sequence Number | | - |
| Retransmission Indicator | | I/E |
| One-time Event | | I/E |
| One-time Event Type | | I/E |
| Notify URI | | - |
| Supported Features | | I/E |
| Service Specification Information | | I/E |
| Triggers | | I/E |
| Multiple Unit Usage | | - |
| Rating Group | | - |
| Requested Unit | | - |
| Time | | - |
| Total Volume | | - |
| Uplink Volume | | - |
| Downlink Volume | | - |
| Service Specific Units | | - |
| Used Unit Container | | - |
| Service Identifier | | - |
| Quota management Indicator | | - |
| Triggers | | - |
| Trigger Timestamp | | - |
| Time | | - |
| Total Volume | | - |
| Uplink Volume | | - |
| Downlink Volume | | - |
| Service Specific Unit | | - |
| Event Time Stamps | | - |
| Local Sequence Number | | - |
| EAS ID | | I/E |
| EAS Provider Identifier | | I/E |
| Direct Edge Enabling Service Charging Information | | I/E |
| Exposed Edge Enabling Service Charging Information | | I/E |

Table 6.3.2.3-2 defines the basic structure of the supported fields in the *Charging Data Response* message for edge enabling services converged charging.

Table 6.3.2.3-2: Supported fields in Charging Data Response message

| Information Element | Functionality of EES | Edge enabling services charging |
| --- | --- | --- |
| Supported Operation Types | I/E |
| Session Identifier | | I/E |
| Invocation Timestamp | | I/E |
| Invocation Result | | I/E |
| Invocation Result Code | | I/E |
| Failed parameter | | I/E |
| Failure Handling | | I/E |
| Invocation Sequence Number | | - |
| Session Failover | | - |
| Supported Features | | I/E |
| Triggers | | - |
| Multiple Unit Information | | - |
| Result Code | | - |
| Rating Group | | - |
| Granted Unit | | - |
| Tariff Time Change | | - |
| Time | | - |
| Total Volume | | - |
| Uplink Volume | | - |
| Downlink Volume | | - |
| Service Specific Units | | - |
| Validity Time | | - |
| Final Unit Indication | | - |
| Time Quota Threshold | | - |
| Volume Quota Threshold | | - |
| Unit Quota Threshold | | - |
| Quota Holding Time | | - |
| Triggers | | - |

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| **Next modification** |

### 6.3.3 Bindings for edge enabling services converged charging

Editor’s note: This mapping between the Information Elements, resource attributes and CHF CDR parameters for edge enabling services converged charging is to be described in TS 32.291 [7].

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| **End of modifications** |