**3GPP TSG-SA5 Meeting #140-e *S5-216140rev1***

**e-meeting, 15 - 24 November 2021**

**Source: Huawei**

**Title: pCR 28.816**

**Document for: Approval**

**Agenda Item: 7.5.2**

# 1 Decision/action requested

***Proposed to approve this pCR***

# 2 References

 [1] 3GPP TR 28.816

# 3 Rationale

This contribution is to do cleanup for TR 28.816-110.

# 4 Detailed proposal

***Beginning of the modification***

# 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 32.251: "Telecommunication management; Charging management; Packet Switched (PS) domain charging".

[3] 3GPP TS 23.501: "System Architecture for the 5G System; Stage 2".

[4] 3GPP TS 23.502: "Procedures for the 5G System; Stage 2".

[5] 3GPP TS 23.503: "Policy and charging control framework for the 5G System (5GS); Stage 2".

[6] 3GPP TS 32.255: "Telecommunication management; Charging management; 5G data connectivity domain charging; Stage 2".

[7] 3GPP TS 32.253: "Telecommunication management; Charging management; Control Plane (CP) data transfer domain charging".

[8] 3GPP TS 32.278: "Telecommunication management; Charging management; Monitoring event charging".

[9] 3GPP TS 32.240: "Telecommunication management; Charging management; Charging architecture and principles".

[10] 3GPP TS 32.254: "Telecommunication management; Charging management; Exposure function northbound Application Program Interfaces (APIs) charging".

[11] 3GPP TS 36.331: "Evolved Universal Terrestrial Radio Access (E-UTRA); Radio Resource Control (RRC); Protocol specification".

[12] 3GPP TS 22.261: "Service requirements for the 5G system".

***Next modification***

## 4.1 General

The Packet Switched (PS) domain charging supports charging of CIoT functionalities (e.g., the usage of the radio interface for CIoT, CP CIoT Optimisation and Serving PLMN Rate Control) as described in TS 32.251 [2].

CIoT functionality is provided by the visited and home networks when the networks are configured to support CIoT. It applies to both the non-roaming case and the roaming case and some functionality may be dependent upon the existence of appropriate roaming agreements between the operators.

In 5GS CIoT has been evolved and refers to 5GS optimisations and functionality for support of Cellular Internet-of-Things (Cellular IoT, or CIoT) described in TS 23.501 [3] according to service requirements described in TS 22.261 [12]. The specific functionality is described in the affected procedures and features of 5G service aspect, in TS 23.501 [3], TS 23.502 [4] and TS 23.503 [5].

***Next modification***

### 5.1.1 Use case #1: Control plane optimization in 5G data connectivity domain charging

The Control Plane CIoT 5GS Optimisation is used to exchange user data between the UE and the SMF as payload of a NAS message in both uplink and downlink directions, avoiding the establishment of a user plane connection for the PDU Session as described in TS 23.501 [3].

When the Control Plane CIoT 5GS Optimisation feature is used and the PDU session type is unstructured, the SMF selects either NEF or UPF based on information in the UE's subscription as described in TS 23.501 [3]. The control plane is used with Control Plane CIoT 5GS Optimization instead of establishment data plane connection, the SRB1bis is established for NB-IoT rather using dedicated bearer. The cost of data plane connection and dedicated radio bearer are reduced by this optimization for 5GS CIoT.

During the PDU Session Establishment procedure the AMF indicates to the SMF that Control Plane CIoT 5GS Optimisation is available for data transmission. If a PDU session only uses Control Plane CIoT 5GS Optimisation, the AMF provides a Control Plane Only Indicator to the SMF during the PDU session establishment. A UE and SMF receiving the Control Plane Only Indicator for a PDU session always uses the Control Plane CIoT 5GS Optimisation for this PDU session.

***Next modification***

## 5.3 Mapping of use cases

In agreed use cases in this document, the mapping from use cases to particular charging aspects of SA5 charging are shown as following in table 5.3.1.

Table 5.3.1: The mapping of use cases of 5GS CIoT to charging aspects

|  |  |  |  |
| --- | --- | --- | --- |
| Charging domain | 5G data connectivity domain charging | CP data transfer domain charging | Monitoring event domain charging |
| Use case of 5GS CIoT charging | Control plane optimizationRate control of user dataException reportHandover 5GS CIoT charging in EPS interworking Charging support in home-routed roaming scenariosAccess service of 5GS CIoT | Charging support of NIDD with NEFRate control of user dataHandover 5GS CIoT charging in EPS interworkingCharging support in home-routed roaming scenariosAccess service of 5GS CIoT | Monitoring event charging with NEF |

***Next modification***

#### 5.4.1.2 Potential solutions

##### 5.4.1.2.0 General

The clause describes the charging solution of **key issue 1a, 1b, 1c and 1d** to identify the charging enhancement to 5G data connectivity domain charging.

The charging enhancement in 5G data connectivity domain are based on the charging aspect specified in TS 32.255 [6]. The description of 5G data connectivity domain charging architecture can be seen in clause 4.2 of this document.

The potential solutions that enhance the charging aspect in this clause may support the charging of following 5GS CIoT optimizations:

* Control Plane 5GS CIoT optimization
* Rate control of user data
* The access service of 5GS CIoT devices
* 5GS CIoT optimization information transfer during EPS interworking

- The handover of 5GS CIoT devices in home-routed roaming scenario.

##### 5.4.1.2.1 Charging enhancements of PDU session charging

The clause below describes the solution of PDU session charging of **key issue 1a** for 5GS CIoT optimization in non-roaming scenarios. This is an enhancement to PDU session charging in 5G data connectivity domain charging as described in TS 32.255 [6].

In this solution, the PDU session establishment charging is updated based on the message flow described in clause 5.2.2.2.2-1 of TS 32.255 [6] as following.

Step 1-7. The PDU session establishment as described. Some 5GS CIoT optimization information are included during PDU session establishment. The AMF sends Control Plane CIoT 5GS Optimisation to the SMF if determines. The AMF sends small data rate control to the SMF if it has stored in the AMF for the PDU session. The RAT type (NB-IoT or LTE-M) can be included in service request during PDU session establishment.

Step 8-9. The steps are described in clause 5.2.2.2.2 of TS 32.255 [6].

Step 9ch-a. The step is described is in clause 5.2.2.2.2 of TS 32.255 [6]. The possible charging information related to 5GS CIoT optimizations when supports are as following:

- the indication of Control Plane CIoT 5GS Optimisation,

- small data rate control indication,

- control plane only,

- RAT type (NB-IoT or LTE-M).

9ch-b. The CHF opens CDR for this PDU session.

9ch-c. The CHF acknowledges by sending Charging Data Response [Initial] to the SMF.

Step 10-16. The PDU session establishment or modification as described in clause 5.2.2.2.2 of TS 32.255 [6].

16ch-a. The step is described is in clause 5.2.2.2.2 of TS 32.255 [6]. The possible charging information related to 5GS CIoT optimizations when supports are as following:

- the indication of Control Plane CIoT 5GS Optimisation;

- small data rate control indication;

- control plane only;

- RAT type (NB-IoT or LTE-M).

16ch-b. The CHF updates CDR for this PDU session.

16ch-c. The CHF acknowledges by sending Charging Data Response [Update] to the SMF.

Step 17-19. The steps of PDU session modification are described in clause 5.2.2.2.2 of TS 32.255 [6].

##### 5.4.1.2.2 Solution of charging enhancement for 5GS CIoT access service

##### 5.4.1.2.2.1 Solution for SMF to interact with CHF for 5GS CIoT access service

The clause describes the charging solution of **key issue 1d** to reuse the PDU session charging in 5G data connectivity domain charging to enable the charging of access service of 5GS CIoT devices. This is an enhancement to PDU session charging in 5G data connectivity domain charging as described in TS 32.255 [6].

Based on the charging enhancements described in clause 5.4.1.2.1, 5.4.1.2.3 and 5.4.1.2.4 in 5G data connectivity domain charging.

The potential solution of charging of access service for 5GS CIoT devises can use the charging enhancement as described to collect charging information like subscriber ID, RAT type, PDU session information and charging information related to 5GS CIoT optimizations in 5G data connectivity domain charging.

For example, the charging system is capable to account the access service for a NB-IoT devices to use small data rate control, unstruectured PDU sessions.

##### 5.4.1.2.3 PDU session charging for Home-routed roaming scenario

The clause below describes charging enhancement of key issue 1c of PDU session charging for 5GS CIoT optimization in Home-routed roaming scenario. The UE requested PDU session establishment work flows in Home-routed roaming scenario is described in clause of 4.2.2.2.2 of TS 23.502 [4]. The charging aspect and charging work flow is described in clause 5.2.2.12.2 in TS 32.255 [6].

The charging enhancement for 5GS CIoT optimization during PDU session establishment in Home-routed roaming scenario is based on the message flow described in figure 4.3.2.2.2-1 of TS 23.502 [4] and figure 5.2.2.12.2.1 of TS 32.255 [6] description.

Charging enhancements of PDU session establishment in Home-routed roaming scenario for 5GS CIoT is updated based on the message flow in figure 5.2.2.12.2.1 of TS 32.255 [6] as following.

1-3a. UE initiates a new PDU session. V-SMF and H-SMF selection by the AMF as described in clause 5.2.2.11.7 of TS 32.255 [6]. If Control Plane CIoT 5GS Optimisation is enabled for the PDU Session, the AMF selects V-SMF and H-SMF that supports the Control Plane CIoT 5GS Optimisation as described the step 2 in clause 4.3.2.2.2 of TS 23.502 [4]. Assuming that AMF sends Small Data Rate Control to V-SMF during PDU session establishment process.

3ch-a. The UE is identified as a roamer, the CHF is selected accordingly.

3ch-b. A Charging Data Request [Initial] is sent to CHF, with charging information as following:

- RAT Type,

- Small Data Rate Control Status,

- Control Plane CIoT 5GS Optimisation.

3ch-c. The CHF opens a CDR

3ch-d. The CHF acknowledges by sending Charging Data Response [Initial].

3b-11. The steps are described in clause 5.2.2.12.3 of TS 32.255 [6]. The V-SMF sends Small Data Rate Control indication Status and Control Plane CIoT 5GS Optimisation Indication to H-SMF in step 6 as described in clause 4.3.2.2.2 of TS 23.502 [4].

11ch-a. Based on UE is identified as roaming in a different PLMN, the CHF is selected accordingly.

11ch-b. A Charging Data Request [Initial] is sent to CHF, may include charging information as following:

- RAT Type,

- Small Data Rate Control Status,

- Control Plane CIoT 5GS Optimisation.

11ch-c. The CHF opens a CDR (indicating "out-bound roamer").

11ch-d. The CHF acknowledges by sending Charging Data Response [Initial] as described in clause 5.2.2.12.3 of TS 32.255 [6].

The steps from 12a-b to 19a-b.The steps are described in clause 5.2.2.12.3 of TS 32.255 [6].

The steps from 19ch-a to 19ch-c. The steps are described in clause 5.2.2.12.3 of TS 32.255 [6].

20-23. The steps are described in clause 5.2.2.12.3 of TS 32.255 [6].

23ch-a. Counts per rejected QFI (s) are closed. A Charging Data Request [Update] is sent to CHF to report if needed.

23ch-b. The CHF updates the CDR.

23ch-c. The CHF acknowledges by sending Charging Data Response [Update] to the H-SMF.

##### 5.4.1.2.4 PDU session charging in case of EPS interworking

The clause below describes charging enhancement of key issues 1b of PDU session charging for 5GS CIoT optimization in EPS interworking scenarios. The non-roaming architecture for interworking between 5GS and EPC/E-UTRAN is described in figure 4.1.3.1 of TS 23.501 [3]. The message flows of PDU session charging for interworking with EPC are described in TS 32.255 [6].

The charging enhancement for EPS to 5GS handover using N26 interface is based on the message flow described in clause 4.11.1.2.2 of TS 23.502 [4] and clause 5.2.2.11.3 of TS 32.255 [6] description.

The charging enhancements of PDU session handover ofEPS to 5GS handover using N26 interface is updated based on the message flow in figure 5.2.2.11.3.1 of TS 32.255 [6] as following:

0ch. A charging session between the PGW-C+SMF and CHF exists for this PDU session with multiple QoS Flows associated to the default bearer and dedicated bearers.

1-3. The AMF determines that a PDU Session supports EPS interworking with N26.

4. The AMF includes in the Nsmf\_PDUSession\_CreateSMContext an indication whether the PDU Session supports EPS Interworking with N26. If the AMF stores APN Rate Control Status, the same as the APN in stored APN Rate Control Status and interworking with EPC is enabled for this PDU Session, the AMF sends the APN Rate Control Status to the PWG-C+SMF, as described in 4.11.5.3 of TS 23.502 [4].

12. If APN Rate Control Status is received from the AMF then the SMF provides the APN Rate Control Status to the PGW-U+UPF.

13ch-a. All counts are closed and a Charging Data Request [Update] is sent to CHF, if required by "RAT type change" trigger. The APN Rate Control Status as part of charging information, may be included in charging information.

13ch-b. The CHF updates CDR for this PDU session.

13ch-c. The CHF acknowledges by sending Charging Data Response [Update] to the PGW-C+SMF.

#### 5.4.1.3 Evaluation

The potential solutions of charging enhancement to 5G data connectivity domain charging are described in clause 5.4.1.2.1, 5.4.1.2.2.1, 5.4.1.2.3 and 5.4.1.2.4.

The following enhancements based on the charging aspect of 5G data connectivity domain charging can be considered to support charging enhancements for 5GS CIoT:

- The support of SMF to charging information collection and report of 5GS CIoT.

- The support of SMF to charging information collection and report of access service of 5GS CIoT devices.

### 5.4.2 Control Plane data transfer domain charging

#### 5.4.2.1 Key issues of 5GS CIoT charging in control plane data transfer domain charging

The purpose of this clause is to describe the key issues of charging enhancement for 5GS CIoT features regarding control plane data transfer domain charging.

Considering the use cases described in clause 5.1 and potential requirement (**REQ-3GPPCH-5GSCIoT-02, REQ-3GPPCH-5GSCIoT-03, REQ-3GPPCH-5GSCIoT-04, REQ-3GPPCH-5GSCIoT-05, REQ-3GPPCH-5GSCIoT-07, REQ-3GPPCH-5GSCIoT-12**) as described in clause 5.2, the key issues in solution for control plane data transfer domain charging for investigation can include:

* Key issue 2a: Identify which network functions in 5G system potentially provides charging information.

- Key issue 2b: Identify the interaction(s) with network function(s) and potential charging information in control plane data transfer domain charging.

#### 5.4.2.2 Potential solutions

##### 5.4.2.2.0 General

The clause describes the charging solution of **key issue 2a and 1b** to identify the charging enhancement to ontrol plane data transfer domain charging.

The enhancement on charging aspect of control plane data transfer domain charging are based on the charging aspect specified in TS 32.254 [10] and TS 32.253 [7]. The background of control plane data transfer domain charging are described in 4.3 in this document.

The potential solutions of charging aspect in this clause can support the charging enhancement of following 5GS CIoT optimizations:

* NIDD.
* Rate control of user data.
* 5GS CIoT optimization information transfer during EPS interworking.
* The handover of 5GS CIoT devices in home-routed roaming scenario.

It is assumed that the particular 5GC NFs are considered as a control plane data transfer charging node (CPCN) based on service based architecture as specified in TS 32.501 [3]. The possible 5GC NFs as CPCN can be as following: AMF, SMF and NEF.

##### 5.4.2.2.1 Charging enhancement for NEF based NIDD

##### 5.4.2.2.1.1 Charging architecture in control plane data transfer domain charging for 5GS CIoT

The SMF embedding the CTF or the NEF embedding the CTF, generate charging events to the CHF for the control plane data transfer domain charging. Figure 5.4.2.2.1.1.1 shows the architectural options for the converged charging.



Figure 5.4.2.2.1.1.1: The converged charging architecture for control plane data transfer domain charging

##### 5.4.2.2.1.2 Message flow for SMF to interact with CHF in case of NEF based NIDD

Non-IP Data Delivery (NIDD) it is a means for delivering data via a PDU Sessions of type "Unstructured". Converged charging and session based charging are used in this solution.

The Figure 5.4.2.2.1.2.1 shows the charging enhancements of SMF and CHF and procedure when UE performs the PDU Session establishment with PDU Sessions of type "Unstructured" toward NEF.



Figure 5.4.2.2.1.2.1: Charging enhancements of SMF and CHF for NIDD

Step 1. The step 1 is described in clause 4.25.2 of TS 23.502 [4].

Step 2. As described in TS 23.502 [4], if the subscription information corresponding to DNN and S-NSSAI includes the "NEF Identity for NIDD" (NEF ID), the SMF creates a PDU Session towards the NEF. The SMF sends Nnef\_SMContext\_Create Request with 5GS CIoT optimization related indications (NIDD information, S-NSSAI, Small Data Rate Control Status) message towards the NEF.

Step 2ch-a. The SMF sends charging data request [initial] to CHF, with charging information related 5GS CIoT (Small Data Rate Control Status, Control plane only indicator and 5GS CIoT optimization related indications).

Step 2ch-b. CHF opens CHF CDR for the PDU Session of NIDD.

Step 2ch-c. CHF sends Charging data response to the SMF.

Step 3. The NEF creates an NEF PDU session Context and send invokes Nnef\_SMContext\_Create Response to the SMF

Step 4. The step 4 is to finish the PDU session establishment as described in clause 4.25.2 of TS 23.502 [4].

##### 5.4.2.2.2 Charging enhancement to north bound API charging for NEF based NIDD

5.4.2.2.2.1 Charging architecture in control plane data transfer domain charging for 5GS CIoT

The NEF embedding the CTF generates charging events to the CHF for the north bound API charging. Figure 5.4.2.2.2.1.1 shows the architectural options for the converged charging.



Figure 5.4.2.2.2.1: The converged charging architecture for control plane data transfer domain charging

5.4.2.2.2.2 Flow for north bound API charging in case of NIDD configuration

The NIDD configuration procedure is the configuration triggered by AF or NEF initiated. The NEF embedding CTF in north bound API charging may store and collect charging information of NIDD configuration.

The Figure 5.4.2.2.2.2.1 shows the message flow of charging enhancement in case of NIDD configuration.



Figure 5.4.2.2.2.2.1: The message flow of charging enhancement for NIDD configuration

Step 1-2, the NEF initiated or AF triggered NIDD configuration messages exchange as described in clause 4.25.3 TS 23.502 [4]. The AF ID, and NEF ID are included and sent to AF for asking the NEF configuration.

Step 2ch-a, NEF is triggered to send Charging data request [Event] to CHF. The NEF ID, AF ID, the MTC provider information can be included as part of charging information.

Step 2ch-b, CHF opens CHF CDR.

Step 2ch-c, CHF sends Charging data response to the NEF.

Step 3-7, the rest messages of NIDD configuration procedure as described in clause 4.25.3 TS 23.502 [4].

##### 5.4.2.2.2.3 Flow for north bound API charging in case of NEF based NIDD

Non-IP Data Delivery (NIDD) it is a means for delivering data via a PDU Sessions of type "Unstructured". Converged charging and PEC based charging are used in this solution.

The Figure 5.4.2.2.3.1 shows the charging enhancements of SMF and CHF and procedure when UE performs the PDU Session establishment with PDU Sessions of type "Unstructured" toward NEF.



Figure 5.4.2.2.3.1: Message flow of north bound API charging for NIDD

Step 1. The step 1 is described in clause 4.25.2 of TS 23.502 [4].

Step 2. As described in TS 23.502 [4], if the subscription information corresponding to DNN and S-NSSAI includes the "NEF Identity for NIDD" (NEF ID), the SMF should create a PDU Session towards the NEF. The SMF sends Nnef\_SMContext\_Create Request with 5GS CIoT optimization related indications (NIDD information, S-NSSAI, [Small Data Rate Control parameters], [Small Data Rate Control Status]) message towards the NEF.

Step 2ch-a. The NEF sends charging data request [Event] to CHF, with corresponding charging information.

Step 2ch-b. CHF opens CHF CDR for the PDU Session of NIDD.

Step 2ch-c. CHF sends Charging data response [Event] to the SMF.

Step 3. The NEF creates an NEF PDU session Context and send invokes Nnef\_SMContext\_Create Response to the SMF.

Step 4. The step 4 is to finish the PDU Session establishment as described in clause 4.25.2 of TS 23.502 [4].

#### 5.4.2.3 Evaluation

The potential solutions of charging enhancements to north bound API charging for NEF based NIDD are described in clauses 5.4.2.2.2.1, 5.4.2.2.2.2 and 5.4.2.2.2.3.

The following enhancements based on the charging aspect of north bound API charging for NEF can be considered to support charging enhancements for PDU session of NIDD:

- The support of NEF to charging information collection and report of NIDD configuration.

- The support of NEF to charging information collection and report of deliver data in an "Unstructured" PDU session of NIDD.

The potential solutions of charging enhancements to SMF for NIDD are described in clauses 5.4.2.2.1.1.

* The support of SMF to charging information collection and report of dilever data in an "Unstructured" PDU session of NIDD.

### 5.4.3 Monitoring event domain charging

#### 5.4.3.0 General

The purpose of this clause is to describe the key issues of charging enhancement for 5GS CIoT features regarding monitoring event domain charging.

Considering the use cases described in clause 5.1 and potential requirement (**REQ-3GPPCH-5GSCIoT-08**) as described in clause 5.2, the key issues in solution for control plane data transfer domain charging for investigation can include:

- Key issue 3a: Identify which network functions in 5G system potentially provides charging information;

- Key issue 3b: Identify the interaction(s) with network function(s) and potential charging information in monitoring event domain charging.

#### 5.4.3.1 Potential solutions

##### 5.4.3.1.1 Charging architecture in Monitoring event domain charging for 5GS CIoT

The NEF embedding the CTF generates charging events to the CHF for monitoring event domain charging. Figure 5.4.1.2.1.1 shows the architectural options for the converged charging.



Figure 5.4.3.1.1.1: The converged charging architecture for monitoring event domain charging

In this architecture, the converged charging has capability to support monitoring event domain charging via Nchf interface.

##### 5.4.3.1.2 Message flow for monitoring event charging for NEF

The Network Exposure Function (NEF) supports external exposure of capabilities of network functions. Monitoring capability is comprised of means that allow the identification of the 5G network function suitable for configuring the specific monitoring events, detect the monitoring event, and report the monitoring event to the authorised external party.

The support of 5G CIoT the list of supported monitoring events is specified in Table 4.15.3.1-1 of TS 23.502 [4].

The NEF embedded CTF in monitoring event charging domain can store and collect charging information related to monitoring event for 5GS CIoT.

The Figure 5.4.1.2.2.1 shows the message flow that NEF embedded CTF collects charging information and generate charging message to CHF, in case of AF configuration monitoring events for network exposure.



Figure 5.4.3.1.2.1: Charging enhancement for 5GS CIoT in monitoring event charging domain for event monitoring configuration

Step 1, The AF configures a monitoring event via the NEF.

Step 2-3. NEF configures the monitoring event in 5GC NFs (UDM), and UDM configures the monitoring events.

Step3ch-a, NEF is triggered to send Charging data request [Event] to CHF. The NEF ID, AF ID, and the indication of monitoring event configuration.

Step 2ch-b, CHF opens CHF CDR.

Step 2ch-c, CHF sends Charging data response to the NEF.

Step 4-5, the rest messages are the event exposure subscribe response toward to AF via NEF.

The figure 5.4.3.2.2.2 shows the message flow that NEF embedded CTF collects charging information and generate charging message to CHF, in case of receiving monitoring event notifications.



Figure 5.4.3.1.2.2: Charging enhancement for 5GS CIoT in monitoring event charging domain for event monitoring notification

Step 1, The AF subscribes to one or several Event(s) (identified by Event ID) and provides the associated notification endpoint of the AF.

Step 2-3. The NEF subscribes to received Event(s) (identified by Event ID) and provides the associated notification endpoint of the NEF. The 5GC NFs (e.g., UDM, AMF, SMF, NSACF) start monitor event subscribed.

Step3ch-a, NEF is triggered to send Charging data request [Event] to CHF. The NEF ID, Event ID, and the indication of monitoring event.

Step 2ch-b, CHF opens CHF CDR.

Step 2ch-c, CHF sends Charging data response to the NEF.

Step 4-5, the rest messages are the event exposure subscribe response toward to AF via NEF.

#### 5.4.3.2 Evaluation

The potential solutions of charging enhancement to monitoring event domain charging are described in clause 5.4.3.1.2.

The north bound API charging via NEF can be used to support charging enhancements for monitoring event domain charging for 5GS CIoT:

- The support of NEF to charging information collection and report of event monitoring configuration.

- The support of NEF to charging information collection and report of event monitoring notification.

***End of the modification***