**3GPP TSG-SA5 Meeting #133e *S5-205088r1***

**e-meeting 12th Oct-21st Oct 2020**

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| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
|  |
|  | **32.290** | **CR** | **0133** | **rev** | **1** | **Current version:** | **16.5.0** |  |
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| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
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| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network |  | Core Network | **x** |

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| ***Title:***  | Add the charging control for non-blocking charging |
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| ***Source to WG:*** | Huawei |
| ***Source to TSG:*** | S5 |
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| ***Work item code:*** | TEI16,5GS\_Ph1-SBI\_CH |  | ***Date:*** | 2020-10-14 |
|  |  |  |  |  |
| ***Category:*** | **F** |  | ***Release:*** | R16 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)Rel-12 (Release 12)**Rel-13 (Release 13)Rel-14 (Release 14)Rel-15 (Release 15)Rel-16 (Release 16)* |
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| ***Reason for change:*** | The CHF should be aware of the blocking mode and non-blocking mode and enable/disable the non-blocking mode from credit control aspect. |
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| ***Summary of change:*** |  Add the non-blocking mode indicator Add the non-blocking mode enable/disable control. |
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| ***Consequences if not approved:*** | The existing non-blocking mode may cause the credit control problem. |
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| ***Clauses affected:*** | 5.3.2.3,7 |
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|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** |  | **X** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

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| **First change** |

#### 5.3.2.3 Session based charging

For Converged Session based Charging, the following cases are supported:

- SCUR

- ECUR

Figure 5.3.2.3.1 shows a blocking mode scenario for Session based charging (SCUR) with: Unit Reservation, Decentralized and Centralized Unit Determination, Centralized Rating configuration, user’s account deduction, where the NF (CTF) invokes a converged charging service towards the CHF.



Figure 5.3.2.3.1: SCUR - Session based charging with Decentralized and Centralized Unit Determination, Centralized Rating

**1) Request for service delivery:** A request for session establishment is received in the NF (CTF). The service is configured to be authorized by the CHF to start.

**2) Units Determination:** the NF (CTF) determines the number of units depending on the service requested by the UE in "Decentralized Units determination" scenario.

**3) Charging Data Request [Initial, Quota Requested]:** The NF (CTF) sends the request to the CHF for the service to be granted authorization to start, and to reserve the number of units if determined in item 2.

**4) Account, Rating, Reservation Control:** the CHF rates the requests either based on the number of units requested or on internal unit determination, checks if corresponding funds can be reserved on the user's account balance. If the account has sufficient funds, the CHF performs the corresponding reservations.

**5) Open CDR:** based on policies, the CHF opens a CDR related to the service.

**6) Charging Data Response [Initial, Quota Granted]:** The CHF grants authorization to NF (CTF) for the service to start, with the reserved number of units.

**7) Granted Units Supervision:** the NF (CTF) monitors the consumption of the granted units.

**8) Start of service delivery:** the NF (CTF) starts to deliver the content/service based on the reserved number of units.

**9) Usage Reporting Trigger:** the NF (CTF) generates charging data related to the service delivered that is not under quota management, based on a trigger for usage reporting is met.

**10) Charging Data Request [Update, Unit Used]:** the NF (CTF) sends the request for reporting the related charging data, including the used units, to the CHF.

**11) Account, Rating Control:** The CHF performs the reported usage process involving rating entity and user's account balance.

**12) Update CDR:** based on policies, the CHF updates the CDR with charging data related to the service.

**13) Charging Data Response [Update]:** The CHF informs the NF (CTF) on the result of the request.

**14) Quota management Trigger:** A Trigger associated to Quota management is met. Units determination is performed when applicable.

**15) Charging Data Request [Update, Unit Used, Quota Requested]:** the NF (CTF) sends the request to the CHF, for more units to be granted for the service to continue, and reporting the used units.

**16) Account, Rating, Reservation Control:** The CHF performs the process related to the reported usage and the requested reservation, involving rating entity and user's account balance.

**17) Update CDR:** based on policies, the CHF updates the CDR with charging data related to the service.

**18) Charging Data Response [Update, Quota Granted]:** The CHF grants quota to NF (CTF) for the service to continue, with the reserved number of units.

**19) Content/Service Delivery:** the NF (CTF) delivers the content/service based on the granted quota.

**20) Session released:** the session is released.

**21) Charging Data Request [Termination,** **Unit Used]:** the NF (CTF) sends the request to the CHF, for charging data related to the service termination with the final consumed units.

**22) Account, Rating Control:** The CHF performs the service termination process involving rating entity and user's account balance.

**23) Close CDR:** based on policies, the CHF closes the CDR with charging data related to the service termination and the last reported units.

**24) Charging Data Response [Termination]:** The CHF informs the NF (CTF) on the result of the request.

Figure 5.3.2.3.2 shows a Non-blocking mode scenario for Session based charging (SCUR) with: Unit Reservation, Decentralized and Centralized Unit Determination, Centralized Rating configuration , user’s account deduction , where the NF (CTF) invokes a converged charging service towards the CHF.



Figure 5.3.2.3.2: SCUR - Session based charging with Decentralized and Centralized Unit Determination, Centralized Rating, immediate start of service delivery (Non-blocking mode)

**1) Request for service delivery and start of service delivery:** A request for session establishment is received in the NF (CTF). The NF (CTF) is configured to allow the service to be delivered.

**2) Units Determination:** the NF (CTF) determines the number of units depending on the service requested, in "Decentralized Units determination" scenario.

**3) Charging Data Request [Initial, Unit Used, Quota Requested]:** the NF (CTF) sends the request to the CHF to reserve the number of units if determined in step 2, it carries non-blocking mode indicator and may also report the used units.

**4) Account, Rating, Reservation Control:** the CHF rates the requests either based on the number of units requested or on internal unit determination, checks if corresponding funds can be reserved on the user's account balance. If the account has sufficient funds, the CHF performs the corresponding reservation. The CHF may determine whether the non-blocking mode for the service need to be disabled.

**5) Open CDR:** based on policies, the CHF opens a CDR related to the service.

**6) Charging Data Response [Initial, Quota Granted]:** the CHF grants the reserved number of units to NF (CTF). If the CHF decides to disable the non-blocking mode for the service, the response carries the non-blocking disable information of the service. The non-blocking for the service will keep disable until non-blocking mode is enabled by CHF again.

**7) Granted Units Supervision:** The NF (CTF) monitors the consumption of the granted units.

**8) Service delivery ongoing:** the NF (CTF) continues to deliver the service.

**9) Usage reporting trigger:** the NF (CTF) generates charging data related to a service delivered that is not under quota management, based on that a trigger for service usage reporting is met.

**10) Charging Data Request [Update, Unit Used]:** the NF (CTF) reports the charging data related to service delivered, including the used units, to the CHF.

NOTE1: If the initial quota request using the non-blocking mode or the update quota request be configured with non-blocking mode in NF (CTF), the charging data request carries non-blocking mode indicator.

**11) Account, Rating Control:** the CHF uses the reported charging data to rate the usage and deduct the funds corresponding to the usage on the account balance.

**12) Update CDR:** based on policies, the CHF updates the CDR with charging data related to the service.

**13) Charging Data Response [Update]:** The CHF informs the NF (CTF) on the result of the request.

**14) Quota management Trigger:** A Trigger associated to Quota management is met. Units determination is performed when applicable.

**15) Charging Data Request [Update, Unit Used, Quota Requested]:** the NF (CTF) sends the request to the CHF, for more units to be granted for the service to continue, and reporting the used units.

**16) Account, Rating, Reservation Control:** same as step 4, with the option to also deduct the funds corresponding to the usage on the account balance.

**17) Update CDR:** based on policies, the CHF updates the CDR with charging data related to the service.

**18) Charging Data Response [Update, Quota Granted]:** The CHF grants quota to NF (CTF) for the service, with the reserved number of units.

**19) Service delivery ongoing:** the NF (CTF) continues to deliver the service.

**20) Service release:** the NF (CTF) is requested to end the service delivery and does this.

**21) Charging Data Request [Termination, Unit Used]:** the NF (CTF) sends the request to the CHF, for charging data related to the service termination with the final consumed units.

**22) Account, Rating Control:** the CHF performs the service termination process which involve using the reported charging data to rate the usage and deduct the funds corresponding to the usage on the account balance.

**23) Close CDR:** based on policies, the CHF closes the CDR with charging data related to the service termination and the last reported units.

**24) Charging Data Response [Termination]:** The CHF informs the NF (CTF)on the result of the request.

Figure 5.3.2.3.3 shows a scenario for Session based charging (ECUR) in Decentralized and Centralized Unit Determination, Centralized Rating configuration, where the NF (CTF) invokes a converged charging service towards the CHF, prior to service delivery if needed.



Figure 5.3.2.3.3: ECUR - Session based charging with - Decentralized and Centralized Unit Determination, Centralized Rating.

**1) Request for resource usage:** A request for session establishment is received in the NF (CTF). The service is configured to be authorized by the CHF to start.

**2) Units Determination:** the NF (CTF) determines the number of units depending on the service requested by the UE in "Decentralized Units determination" scenario.

**3) Charging Data Request [Initial, Quota Requested]:** The NF (CTF) sends the request to the CHF for the service to be granted authorization to start, and to reserve the number of units if determined in item 2.

**4) Account, Rating, Reservation Control:** the CHF rates the requests either based on the number of units requested or on internal unit determination, checks if corresponding funds can be reserved on the user's account balance. If the account has sufficient funds, the CHF performs the corresponding reservation.

**5) Open CDR:** based on policies, the CHF opens a CDR related to the service.

**6) Charging Data Response [Initial, Quota Granted]:** The CHF grants authorization to NF (CTF) for the service to start, with the reserved number of units.

**7) Granted Units Supervision:** The service starts and the NF (CTF) monitors the consumption of the granted units.

**8) Content/Service Delivery:** the NF (CTF) delivers the content/service based on the reserved number of units.

**9) Charging Data Request [Termination, Unit Used]:** the NF (CTF) sends the request to the CHF, for charging data related to the delivered service with the consumed units.

**10) Account, Rating Control:** The CHF performs the process for the delivered service involving rating entity and user's account balance.

**11) Close CDR:** based on policies, the CHF closes the CDR with charging data related to the delivered service.

**12) Charging Data Response [Termination]:** The CHF informs the NF (CTF) on the result of the request.

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| **Next change** |

# 7 Message contents

Converged charging or offline only charging is performed by NF (CTF) consuming service operations exposed by CHF, achieved using Charging Data Request and Charging Data Response.

The information structure used for these services operations is composed of two parts:

- Common structures specified in the present document.

- NF (CTF) consumer specific structures specified in the middle tier TSs.

Table 7.1 describes the data structure which is common to operations in request semantics.

Table 7.1: Common Data structure of Charging Data Request

| **Information Element** | **Converged Charging****Category** | **Offline Only Charging Category** | **Description** |
| --- | --- | --- | --- |
| Session Identifier | OC | OC | This field identifies the charging session. |
| Subscriber Identifier | OM | OM | This field contains the identification of the subscriber that uses the requested service. |
| NF Consumer Identification | M | M | This is a grouped field which contains a set of information identifying the NF consumer of the charging service. |
| NF Functionality | M | M | This field contains the function of the node.  |
| NF Name | OC | OC | This fields holds the name (i.e. UUID) of the NF consumer. At least one of the NF Address or NF Name shall be present.  |
| NF Address | OC | OC | This field holds the address (i.e. IP address and/or FQDN) of NF consumer. At least one of the NF Address or NF Name shall be present.  |
| NF PLMN ID | OC | OC | This field holds the PLMN ID of the network the NF consumer belongs to. |
| Invocation Timestamp | M | M | This field holds the timestamp of the charging service invocation by the NF consumer |
| Invocation Sequence Number | M | M | This field contains the sequence number of the charging service invocation by the NF consumer in a charging session. |
| Retransmission Indicator | OC | OC | This field indicates if included, this is a retransmitted request message. |
| One-time Event | OC | - | This field indicates, if included, that this is event based charging and whether this is a one-time event in that there will be no update or termination. |
| One-time Event Type | OC | - | This field indicated the type of the one time event, i.e. Immediate or Post event charging. |
| Notify URI | OC | - | This field contains URI to which notifications are sent by the CHF. The latest received value shall always be used at notifications. |
| Service Specification Information | OC | - | This field identifies the technical specification for the service (e.g. TS 32.255) and release version (e.g. Release 16) that applies to the request. It is for information. |
| Triggers | OC | OC | This field identifies the event(s) triggering the request and is common to all Multiple Unit Usage occurrences. |
| Multiple Unit Usage  | OC | OC | This field contains the parameters for the quota management request and/or usage reporting. It may have multiple occurrences. |
| Rating Group | M | M | This field holds the identifier of a rating group. |
| Requested Unit | OC | - | This field indicates, if included, that quota management is required. It may additionally contain the amount of requested service units for a particular category. |
| Time | OC | - | This field holds the amount of requested time. |
| Total Volume | OC | - | This field holds the amount of requested volume in both uplink and downlink directions. |
| Uplink Volume | OC | - | This field holds the amount of requested volume in uplink direction. |
| Downlink Volume | OC | - | This field holds the amount of requested volume in downlink direction. |
| Non-Blocking Indicator | OC | - | This field indicates whether the non-blocking mode is used or not. |
| Service Specific Units | OC | - | This field holds the amount of requested service specific units. |
| Used Unit Container | OC | OC | This field contains the amount of used non-monetary service units measured. up to the triggers and trigger timestamp. It may have multiple occurrences. |
| Service Identifier | OC | OC | This field holds the Service Identifier. |
| Quota management Indicator | OC | - | This field holds an indicator on whether the reported used units are with quota management control, without quota management control or with quota management control temporary suspended. If the field is not present, it indicates the used unit is without quota management applied.  |
| Triggers | OC | Oc | This field holds reason for charging information reporting or closing for the used unit container. |
| Trigger Timestamp | OC | OC | This field holds the timestamp of the trigger. |
| Time | OC | OC | This field holds the amount of used time. |
| Total Volume | OC | OC | This field holds the amount of used volume in both uplink and downlink directions. |
| Uplink Volume | OC | OC | This field holds the amount of used volume in uplink direction. |
| Downlink Volume | OC | OC | This field holds the amount of used volume in downlink direction. |
| Service Specific Unit | OC | OC | This field holds the amount of used service specific units. |
| Event Time Stamps | OC | OC | This field holds the timestamps of the event reported in the Service Specific Units, if the reported units are event based.  |
| Local Sequence Number  | OM | OM | This field holds the container sequence number. |

Table 7.2 describes the data structure which is common to operations in response semantics.

Table 7.2: Common Data structure of Charging Data Response

| **Information Element** | **Converged Charging****Category** | **Offline Only Charging Category** | **Description** |
| --- | --- | --- | --- |
| Session Identifier | OC | OC | This field identifies the charging session. |
| Invocation Timestamp | M | M | This field holds the timestamp of the charging service response from the CHF. |
| Invocation Result | OC | OC | This field holds the failure handling and in case of unsuccessful result of the charging service invocation by the NF consumer the result code. |
| Invocation Result Code | OC | OC | This field contains the result code in case of failure. |
| Failed parameter | OC | OC | This field holds missing and/or unsupported parameter that caused the failure. |
| Failure Handling | OC | OC | This field holds the failure handling to be performed by the NF consumer when failure. |
| Invocation Sequence Number | M | M | This field holds the sequence number of the charging service invocation by the NF consumer. |
| Session Failover | OC | OC | This field indicates whether alternative CHF is supported for ongoing charging service failover handling by NF consumer.  |
| Triggers  | OC | OC | This field holds the triggers supplied from the CHF for the charging session that are independent of rating group for quota management and without quota management. |
| Multiple Unit Information | OC | - | This field holds the parameters for the quota management and/or usage reporting information. It may have multiple occurrences. |
| Result Code | OC | - | This field contains the result of the Rating Group quota allocation. |
| Rating Group | OM | - | The identifier of a rating group. |
| Non-blocking Manamgement | OC | - | This field indicates whether the non-blocking is disable or enable from CHF. |
| Granted Unit | OC | - | This field holds the granted quota. |
| Tariff Time Change | OC | - | This field contains the switch time when the tariff will be changed. |
| Time | OC | - | This field holds the amount of granted time. |
| Total Volume | OC | - | This field holds the amount of granted volume in both uplink and downlink directions. |
| Uplink Volume | OC | - | This field holds the amount of granted volume in uplink direction. |
| Downlink Volume | OC | - | This field holds the amount of granted volume in downlink direction.  |
| Service Specific Units | OC | - | This field holds the amount of granted requested service specific units. |
| Validity Time | OC | - | This field defines the time in order to limit the validity of the granted quota for a given category instance. |
| Final Unit Indication | OC | - | This field indicates the granted final units for the service. |
| Time Quota Threshold  | OC | - | This field indicates the threshold in seconds when the granted quota is time |
| Volume Quota Threshold  | OC | - | This field indicates the threshold in octets when the granted quota is volume |
| Unit Quota Threshold  | OC | - | This field indicates the threshold in service specific units, that are defined in the service specific documents, when the granted quota is service specific |
| Quota Holding Time | OC | - | This field holds the quota holding time in seconds. |
| Triggers | OC | OC | This field holds triggers for usage reporting associated to the rating group, which is supplied from the CHF. |

The CTF NF consumer specific structures which are specified in the middle tier TSs, are defined as extensions of:

- common part structure of Charging Data Request and Charging Data Response.

- structure of Multiple Unit Usage.

- structure of Multiple Unit Information.

Table 7.3 describes the data structure which is common to Charging Notify Request.

Table 7.3: Common Data structure of Charging Notify Request

| Information Element | Converged ChargingCategory | Description |
| --- | --- | --- |
| Notify URI | M | This field holds the URI previously supplied by the CHF for notifications associated to the charging session.  |
| Notification type | M | This field holds the type of notification indicating re-authorization or termination. |
| Reauthorization Details | OC | This field holds the details of re-authorization.It’s only present when type of notification is re-authorization.If not present and type of notification is re-authorization, the re-authorization notification applies to all units. |
| Service Identifier | OC | This field holds the Service Identifier to which re-authorization notification applies. If present, the rating group shall also be present. If not present the re-authorization notification applies to all service identifiers.  |
| Rating Group | OC | This field holds the rating group to which re-authorization notification applies. If not present the re-authorization notification applies to all rating groups.  |
| Quota management Indicator | OC | This field holds an indicator on whether the re-authorization notification is for quota management control or not. If not present the re-authorization notification applies to both units with and without quota management.  |

Table 7.4 describes the data structure which is common to Charging Notify Response.

Table 7.4: Common Data structure of Charging Notify Response

| Information Element | Category | Description |
| --- | --- | --- |
| Invocation Result | OC | This field holds the result code in case of unsuccessful result of the charging notify request. |
| Invocation Result Code | OC | This field contains the result code in case of failure. |
| Failed parameter | OC | This field holds missing and/or unsupported parameter that caused the failure. |

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| **End of change** |