Source: **SA5 (Telecom Management)**

Title: **CR 32215-251 PS domain charging**

Document for: **Approval**

Agenda Item: **7.5.3**

Doc-1st-Level	Spec	CR	R	Phase	Subject	Ca	VerCr	Doc-2nd-Level	Workitem
SP-050027	32.215	037	--	Rel-5	Conditional criteria for the presence of the External Charging ID in the G-CDR – Align with SA2's TS 23.228	F	5.7.0	S5-054178	OAM-CH
SP-050027	32.251	003	--	Rel-6	Conditional criteria for the presence of the External Charging ID in the G-CDR – Align with SA2's TS 23.228	A	6.1.0	S5-054179	OAM-CH
SP-050027	32.251	004	--	Rel-6	Correction of online charging terminology	F	6.1.0	S5-054173	CH
SP-050027	32.251	005	--	Rel-6	Correct support of Termination action	F	6.1.0	S5-054181	CH
SP-050027	32.251	006	--	Rel-6	Addition of online charging CCR triggers – Align with TS 23.125 (Overall high level functionality and architecture impacts of flow based charging; Stage 2)	F	6.1.0	S5-054175	CH
SP-050027	32.251	007	--	Rel-6	Correct FBC Service Data Flow (SDF) determination with charging rules to align with SA2's TS 23.125 and CN3's TS 29.210	F	6.1.0	S5-054176	CH
SP-050027	32.251	008	--	Rel-6	Correction of Service Data Flow (SDF) specific usage duration in flow based charging	F	6.1.0	S5-054177	CH
SP-050027	32.251	009	--	Rel-6	Correction of the description of Charging Key – Align with SA2's 23.125 (Overall high level functionality and architecture impacts of flow based charging; Stage 2)	F	6.1.0	S5-054180	CH

CR-Form-v7

CHANGE REQUEST

⌘	**32.251** CR **004**	⌘**rev**	**-**	⌘	Current version:	**6.1.0**	⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☐ Core Network **X**

Title:	⌘	Correction of online charging terminology

Source:	⌘	SA5 (Benni.Alexander@Nokia.com)

Work item code: ⌘	CH		**Date:** ⌘	28/01/2005

Category:	⌘	**F**		**Release:** ⌘	Rel-6

Use <u>one</u> of the following categories:
F (correction)
A (corresponds to a correction in an earlier release)
B (addition of feature),
C (functional modification of feature)
D (editorial modification)
Detailed explanations of the above categories can
be found in 3GPP TR 21.900.

Use <u>one</u> of the following releases:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
Rel-4 (Release 4)
Rel-5 (Release 5)
Rel-6 (Release 6)

Reason for change:	⌘	Terminology used in online charging is misleading.

Summary of change: ⌘	Terminology of online charging is changed.

Consequences if not approved:	⌘	Missleading terminology might lead to interoperability problems.

Clauses affected:	⌘	5.3.1, 5.3.1.1, 5.3.1.2, 5.3.2, 5.3.2.1, 5.3.2.2

		Y	**N**		
Other specs affected:	⌘		X	Other core specifications	⌘
			X	Test specifications	
			X	O&M Specifications	

Other comments:	⌘	

5.3.1 Basic principles

PS domain online charging may be performed in the SGSN using CAMEL techniques. This functionality is specified in TS 23.078 [206] and TS 29.078 [202] and is outside the scope of the present document.

PS domain online charging may be performed in the GGSN using the common Ro based credit control application specified in TS 32.299 [50]. In order to provide the data required for the management activities outlined in TS 32.240 [1] (credit control, accounting, statistics etc.), the GGSN shall be able to perform online charging for each of the following:

- Charging Data related to PDP contexts;

- Charging Data related to service data flows.

The above items both pertain to sessions (PDP contexts), hence only session based online charging (SCUR) is required in the GGSN. The Credit Control Requests (CCR) and Credit Control Answers (CCA) specified for SCUR in TS 32.299 [50] (start / stop / interimintial/update/termination) are issued towards the OCS / received from the OCS when certain conditions (chargeable events) are met. The PS domain specific contents and purpose of each of these messages, as well as the chargeable events that trigger them, are described in the following subclauses. A detailed formal description of the online charging parameters defined in the present document is to be found in 3GPP TS 32.299 [50]. Further information on the general principles of the common 3GPP online charging application can also be found in TS 32.299 [50] and TS 32.240 [1].

5.3.1.1 PDP context charging

The GGSN collects charging information per user per PDP context. PDP context charging allows the GGSN to collect charging information related to data volumes sent to and received by the UE/MS, categorised by the QoS applied to the PDP context. The user can be identified by MSISDN and/or IMSI, while the PDP context can be determined by a unique identifier generated by the GGSN when creating a PDP context.

The main collected information items are duration of the PDP context and data volume transferred during the lifetime of the PDP context. The following chargeable events are defined for PDP context charging:

- Start of PDP context. Upon encountering this event, a CCR startinitial, indicating the start of the PDP context, is sent towards the OCS, and the data volume and elapsed time is captured for the PDP context.

- End of PDP context. Upon encountering this event, a CCR stoptermination, indicating the end of the PDP context, is sent towards the OCS together with the final volume count and elapsed time for the PDP context.

- Expiry of an operator configured time limit per PDP context. This event triggers the emission of an interim CCR update, indicating the elapsed time and the accrued data volume since the last report.

- Expiry of an operator configured data volume limit given by the OCS per for the PDP context. This event triggers the emission of an interim CCR update, indicating the elapsed time and the accrued data volume since the last report.

- Change of charging condition: QoS change, tariff time change. When this event is encountered, the current volume count and elapsed time are is captured and indicated in an interim CCR update is sent towards the OCS, indicating together with the new QoS charging condition.and the final volume count for the old QoS.

Management intervention may also force trigger a chargeable event.

When FBC is available in the GGSN, PDP context online charging may be achieved by FBC online charging using only the wildcard service data flow, see clause 5.3.1.2 below.

End of Change in Clause 5.3.1.1

Change in Clause 5.3.1.2

5.3.1.2 Flow Based Bearer Charging

PDP context charging allows the GGSN to collect charging information related to data volumes sent to and received by the UE/MS, categorised by the QoS applied to the PDP context. FBC may be supported by the GGSN by the integration of a TPF. When the TPF is present, the normal PDP context charging is enhanced by the capability to categorise the PDP context data volume by specific service data flows Service data flows are defined by means of charging rules which are characterised by e.g. protocol characteristics such as IP address, TCP port, etc. I.e., while there is only one uplink an one downlink data volume count per PDP context in PDP context charging, FBC provides multiple service data flow counts, one each per defined service data flow. The default service data flow is the wildcard, i.e. all traffic for all IP addresses, all TCP ports, etc.; when no other, specific service data flows are configured, the behaviour of FBC is identical to the normal PDP context charging on the GGSN. This implies that, when FBC is available in the GGSN, PDP context online charging may be achieved by FBC online charging using only the wildcard service data flow. When further service data flows are specified, traffic is categorised, and counted, according to the service data flow specification, and the wildcard service data flow applies to all traffic that does not match any of the specific service data flows. Details of this functionality are specified in TS 23.125 [70] and TS 32.240 [1].

The following chargeable events are defined for FBC:

- Start of PDP context. Upon encountering this event, a CCR ~~start~~initial, indicating the start of the PDP context, is sent towards the OCS, and the data volume is captured per service data flow for the PDP context.

- Start of service data flow. A~~n interim~~ CCR update is generated for the PDP context, indicating the start of a new service data flow, and a new volume count for this service data flow is started.

- Termination of service data flow. The service data flow volume counter is closed, and a~~n interim~~ CCR update is generated towards the OCS, indicating the end of the service data flow and the final volume count for this service data flow. For information on how the termination of service data flows is detected, refer to TS 23.125 [70].

- End of PDP context. Upon encountering this event, a CCR ~~stop~~termination, indicating the end of the PDP context, is sent towards the OCS together with the final volume counts for the PDP context and all service data flows.

- Expiry of an operator configured time limit per PDP context. This event triggers the emission of a~~n interim~~ CCR update, indicating the elapsed time and the accrued data volume for the PDP context since the last report.

- Expiry of an operator configured time limit per service data flow. The service data flow volume counter is closed and a~~n interim~~ CCR update is sent to the OCS, indicating the elapsed time and the accrued data volume since the last report for that service data flow. A new service data flow container is opened if the service data flow is still active.

- Expiry of an operator configured data volume limit per PDP context. This event triggers the emission of a~~n interim~~ CCR update, indicating the elapsed time and the accrued data volume for the PDP context since the last report.

- Expiry of an operator configured data volume limit per service data flow. The service data flow volume counter is closed and a~~n interim~~ CCR update is sent to the OCS, indicating the elapsed time and the accrued data volume since the last report for that service data flow. A new service data flow container is opened if the service data flow is still active.

- Change of charging condition: QoS change, tariff time change. When this event is encountered, all current volume counts are captured and sent towards the OCS with a~~n interim~~ CCR update. New volume counts for all active service data flows are started.

Management intervention may also force trigger a chargeable event.

End of Change in Clause 5.3.1.2

Change in Clause 5.3.2

5.3.2 Ro message flows

CCR ~~start, stop and interim~~initial, update and termination, as defined in TS 32.299 [50], are used by the GGSN to transfer the collected charging information towards the OCS. CCA is used by the OCS to assign quotas for the PDP context and/or service data flows, and to instruct the GGSN whether to continue or terminate a service data flow or PDP context.

The support of other termination actions is ffs.

The GGSN shall use the Charging Characteristics to determine whether to activate or deactivate online charging. Further details of this functionality, including the mechanism of conveying the charging characteristics data item (HLR -> SGSN -> GGSN), are specified in annex A.

The following subclauses describe the trigger conditions for the chargeable events described in clause 5.3.1.1 and 5.3.1.2. In GPRS online charging, these chargeable events correspond to the triggers for collection of charging information and CCR emission towards the OCS. The responses from the OCS and the detailed behaviour of the GGSN upon receiving those responses are also specified in the subclauses below.

End of Change in Clause 5.3.2

Change in Clause 5.3.2.1

5.3.2.1 Triggers for PDP context Online Charging

CCR ~~start / stop / interim~~ initial / update / termination are used to convey charging information related to the PDP context data information collected for a UE/MS in the GGSN. CCA is used by the OCS to return quotas for the PDP context or to instruct the GGSN on the further handling of the PDP context (terminate, continue, reroute, etc.)

Further details on the support of termination actions are ffs.

If, according to the Charging Characteristics, online charging is activated, a CCR ~~start~~initial is sent to the OCS and the OCS supplies a PDP context authorisation together with a time and / or volume quota for the PDP context, based on the information provided by the GGSN, e.g. QoS, APN. The GGSN monitors the quota with respect to the actual volume or time used on the PDP context. The quota supervision mechanism is further described in TS 32.240 [1].

When a change of charging condition occurs, the volume count is reported to the OCS with a~~n interim~~ CCR update, and when a new quota for the changed charging condition is authorised, a new volume count is started. If no new quota is authorised by the OCS (e.g. when the subscriber's account on the OCS expires), the PDP context is closed. The OCS may also restrict the continuation of the session, such as to allow only charge free traffic, or to reroute the user to an account recharge site. See TS 32.240 [1] and TS 32.299 [50] for further information.

The CCR includes details such as CCR Type, Served IMSI, Sequence Number etc. The CCA includes details such as credit control quotas and session management instructions (continue, terminate, interim interval, etc). Not all of the charging information to be collected is static, and other charging information is directly dependent on dynamic Packet-Switched service usage.

The subsequent subclauses identify in detail the conditions for reporting online charging information, management of user and credit control sessions and PS domain quota supervision.

End of Change in Clause 5.3.2.1

Change in Clause 5.3.2.2

5.3.2.2   Triggers for FBC Online Charging

CCR ~~start / stop / interim~~ initial / update / termination is used to convey charging information related to the PDP context and service data flow data information collected for a UE/MS in the GGSN. CCA is used by the OCS to return quotas for the PDP context and / or service data flows or to instruct the GGSN on the further handling of the PDP context (terminate, continue, reroute, etc.)

Further details on the support of termination actions are ffs.

FBC online charging is employed instead of PDP context online charging if FBC is active in the GGSN. In contrast to the PDP context online charging, where only one volume container (uplink/downlink) can be active per PDP context, many service data flow volume containers per PDP context can be active simultaneously when FBC is enabled. A service data flow volume container is activated when traffic for a defined service data flow (including the wildcard for "all (other) traffic") is detected; a service data flow volume count is closed when the termination of the service data flow is detected by the GGSN. Details on FBC can be found in TS 23.125 [70] and TS 32.240 [1].

If, according to the Charging Characteristics, online charging is activated, a CCR ~~start~~ initial is sent to the OCS and the OCS supplies a PDP context authorisation together with time and / or volume quotas for the PDP context and the service data flows, based on the information provided by the GGSN, e.g. QoS, APN. The GGSN monitors the quotas with respect to the actual volume or time used on the PDP context and / or the service data flows. The quota supervision mechanism is further described in TS 32.240 [1].

When a change of charging condition occurs, all volume counters are reported to the OCS with a~~n interim~~ CCR update, and when new quotas for the changed charging condition is authorised, new volume counts are started for the PDP context and / or service data flows. If only partial quotas are authorised by the OCS (e.g. due to insufficient credit), the service data flows for which no quota was authorised are closed. If no new quota at all is authorised by the OCS (e.g. when the subscriber's account on the OCS expires), the PDP context is closed. The OCS may also restrict the continuation of the session, such as to allow only charge free traffic, or to reroute the user to an account recharge site. See TS 32.240 [1] and TS 32.299 [50] for further information.

The CCR includes details such as CCR Type, Served IMSI, Sequence Number etc. The CCA includes details such as credit control quotas and session management instructions (continue, terminate, interim interval, etc). Not all of the charging information to be collected is static, and other charging information is directly dependent on dynamic Packet-Switched service usage.

The subsequent subclauses identify in detail the conditions for reporting online charging information, management of user and credit control sessions and PS domain quota supervision.

**End of Change in Clause 5.3.2.2
End of Document**

Annex B (informative):
Change history

<table>
<tr><th colspan="8">Change history</th></tr>
<tr><th>Date</th><th>TSG #</th><th>TSG Doc.</th><th>CR</th><th>Rev</th><th>Subject/Comment</th><th>Old</th><th>New</th></tr>
<tr><td>Sep 2003</td><td>S_21</td><td>SP-030410</td><td>--</td><td>--</td><td>Submitted to TSG SA#21 for Information</td><td>1.0.0</td><td></td></tr>
<tr><td>Sep 2004</td><td>S_25</td><td>SP-040552</td><td>--</td><td>--</td><td>Submitted to TSG SA#25 for Approval</td><td>2.0.0</td><td>6.0.0</td></tr>
<tr><td>Dec 2004</td><td>SA_26</td><td>SP-040775</td><td>001</td><td>--</td><td>Add "Furnish Charging Information" procedure for GPRS</td><td>6.0.0</td><td>6.1.0</td></tr>
<tr><td>Dec 2004</td><td>SA_26</td><td>SP-040775</td><td>002</td><td>--</td><td>Add data description for PS online charging</td><td>6.0.0</td><td>6.1.0</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table>

CR-Form-v7

CHANGE REQUEST

| ⌘ | **32.251** CR **006** | ⌘**rev** | **-** | ⌘ | Current version: | **6.1.0** | ⌘ |

For **HELP** *on using this form, see bottom of this page or look at the pop-up text over the* ⌘ *symbols.*

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☐ Core Network **X**

Title:	⌘	Addition of online charging CCR triggers – Align with TS 23.125 (Overall high level functionality and architecture impacts of flow based charging; Stage 2)

Source:	⌘	SA5 (benni.alexander@nokia.com)			
Work item code:	⌘	CH	**Date:** ⌘	28/01/05	

Category:	⌘ **F**	**Release:** ⌘ Rel-6

Use one of the following categories:
F (correction)
A (corresponds to a correction in an earlier release)
B (addition of feature),
C (functional modification of feature)
D (editorial modification)
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
Rel-4 (Release 4)
Rel-5 (Release 5)
Rel-6 (Release 6)

Reason for change:	⌘	Online charging CCR triggers are incomplete.
Summary of change:	⌘	CCR triggers for online charging are added.
Consequences if not approved:	⌘	Online charging standardisation is incomplete and might cause interoperability problems.

Clauses affected:	⌘	5.3.2.1.1, 5.3.2.1.2, 5.3.2.2.1, 5.3.2.2.2

				Y	N			
Other specs affected:	⌘				X	Other core specifications	⌘	
					X	Test specifications		
					X	O&M Specifications		

Other comments:	⌘	

Change in Clause 5.3.2.1

5.3.2.1.1 Triggers for starting and stopping a PDP context Credit Control session

To be completed. Below is a reminder of what needs to be considered.

Start and end of a credit control session coincide with the start and end of a PDP context; even when a PDP context is made free of charge the credit control session continues, i.e the authorisation by the OCS is granted and credit control does not fail.

CCR initial is sent to OCS when PDP context is activated

CCR terminate is sent to OCS when:

- PDP context is deactivated

- Session termination is indicated by the OCS (e.g. Credit Limit Reached)

5.3.2.1.2 Triggers for providing interim information for a PDP context Credit Control session

To be completed. Below is a reminder of what needs to be considered.

- time & volume limit per PDP context;

- change of charging condition (QoS, tariff time), as listed in 5.3.1.1.

CCR update is sent to OCS when:

- Granted quota runs out

- Validity time for granted quota expires

- Update is requested by the OCS

- Change of charging conditions occur and according re-authorisation trigger re-authorisation is needed.

- Management intervention

End of Change in Clause 5.3.2.1

Change in Clause 5.3.2.2

5.2.33.2.2.1 Triggers for starting and stopping an FBC Credit Control session

To be completed. Below is a reminder of what needs to be considered.

Start and end of a credit control session coincide with the start and end of a PDP context; even when a PDP context is made free of charge the credit control session continues, i.e the authorisation by the OCS is granted and credit control does not fail.

CCR init is sent to OCS when PDP context is activated

CCR terminate is sent to OCS when:

- PDP context is deactivated

- Session termination is indicated by the OCS (e.g. Credit Limit Reached)

5.2.33.2.2.2 Triggers for providing interim information for an FBC Credit Control session

To be completed. Below is a reminder of what needs to be considered.

~~start and stop of service data flow,~~

~~time & volume limit per PDP context,~~

~~time & volume limit per service data flow,~~

~~change of charging condition (QoS, tariff time), as listed in 5.3.1.2.~~

CCR update is sent to OCS when:

- User starts to use certain service

- Active service is removed from the allowed services (e.g. charging rule is removed)

- Granted quota runs out

- Validity time for granted quota expires

- Update is requested by the OCS

- Change of charging conditions occur and according re-authorisation trigger re-authorisation is needed.

- Management intervention

- Provision of a charging rule.

End of Change in Clause 5.3.2.2
End of Document

Annex B (informative): Change history

<table>
<tr><td colspan="8" align="center">Change history</td></tr>
<tr><th>Date</th><th>TSG #</th><th>TSG Doc.</th><th>CR</th><th>Rev</th><th>Subject/Comment</th><th>Old</th><th>New</th></tr>
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</table>

CR-Form-v7

CHANGE REQUEST

| ⌘ | **32.251** CR **007** | ⌘**rev** | **-** | ⌘ | Current version: | **6.1.0** | ⌘ |

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Proposed change affects: UICC apps⌘ ☐   ME ☐   Radio Access Network ☐   Core Network **X**

Title: ⌘	Correct FBC Service Data Flow (SDF) determination with charging rules to align with SA2's TS 23.125 and CN3's TS 29.210	
Source: ⌘	SA5 (Benni.Alexander@Nokia.com)	
Work item code: ⌘	CH	**Date:** ⌘ 28/01/05
Category: ⌘ **F**	Use <u>one</u> of the following categories: **F** *(correction)* **A** *(corresponds to a correction in an earlier release)* **B** *(addition of feature),* **C** *(functional modification of feature)* **D** *(editorial modification)* Detailed explanations of the above categories can be found in 3GPP TR 21.900.	**Release:** ⌘ Rel-6 Use <u>one</u> of the following releases: 2 *(GSM Phase 2)* R96 *(Release 1996)* R97 *(Release 1997)* R98 *(Release 1998)* R99 *(Release 1999)* Rel-4 *(Release 4)* Rel-5 *(Release 5)* Rel-6 *(Release 6)*

Reason for change: ⌘	Determination of the Service Data Flow (SDF) and its relationship to charging rule is not very clear in present TS 32.251. Even though charging rules are defined in TS 23.125 and TS 29.210, it is proposed to have a brief description in this TS.
Summary of change: ⌘	SDF determination and its relationship to charging rules is clarified.
Consequences if not approved: ⌘	TS 32.251 is not in line with TS 23.125. And SDF relationship to Gx interface (TS 29.210) is missing.

Clauses affected: ⌘	2, 5.1.2, 5.2.1.3, 5.3.1.2

	Y	N		
Other specs affected: ⌘		X	Other core specifications	⌘
		X	Test specifications	
		X	O&M Specifications	

Other comments: ⌘	

2 References

...

.

[70]   3GPP TS 23.125: "Overall High Level Functionality and Architecture Impacts of Flow Based Charging; Stage 2"

[71]   3GPP TS 29.210: "Charging rule provisioning over Gx interface"

[72~~1~~]-[99]   Void.

b)   Common 3GPP specifications

[100]   3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[101]   3GPP TS 22.101: "Service aspects; Service principles".

...

End of Change in Clause 2

Change in Clause 5.2.1.3

5.2.1.3   Flow based bearer charging

PDP context charging allows the GGSN to collect charging information related to data volumes sent to and received by the UE/MS, categorised by the QoS applied to the PDP context. FBC may be supported by the GGSN by the integration of a TPF. When the TPF is present, the normal PDP context charging is enhanced by the capability to categorise the PDP context data volume by specific service data flows. ~~Service data flows are defined by means of charging rules which are characterised by e.g. protocol characteristics such as IP address, TCP port, etc.~~ I.e., while there is only one uplink an one downlink data volume count per PDP context in PDP context charging, FBC provides multiple service data flow counts, one each per defined service data flow. The default service data flow is the wildcard, i.e. all traffic for all IP addresses, all TCP ports, etc.; when no other, specific service data flows are configured, the behaviour of FBC is identical to the normal PDP context charging on the GGSN. When further service data flows are specified, traffic is categorised, and counted, according to the service data flow specification ~~(i.e. the charging rule)~~, and the wildcard service data flow applies to all traffic that does not match any of the specific service data flows. Details of this functionality are specified in TS 23.125 [70] and TS 32.240 [1].

~~Note: alignment of the above terminology with TS 23.125 in terms of service data flows vs. charging rules is still pending~~

The following chargeable events are defined for FBC:

- Start of PDP context. Upon encountering this event, a new eG-CDR for this context is created and the data volume is captured per service data flow for the PDP context.

- Start of service data flow. A new volume count for this service data flow is started.

- Termination of service data flow. The service data flow volume counter is closed and added to the eG-CDR. For information on how the termination of service data flows is detected, refer to TS 23.125 [70].

- End of PDP context in the GGSN. The eG-CDR is closed upon encountering this trigger.

- Expiry of an operator configured time limit per PDP context. This event closes the eG-CDR, and a new one is opened if the PDP context is still active.

- Expiry of an operator configured time limit per service data flow. The service data flow volume counter is closed and added to the eG-CDR. A new service data flow container is opened if the service data flow is still active.

- Expiry of an operator configured data volume limit per PDP context. This event closes the eG-CDR, and a new one is opened if the PDP context is still active.

- Expiry of an operator configured data volume limit per service data flow. The service data flow volume counter is closed and added to the eG-CDR. A new service data flow container is opened if the service data flow is still active.

- Change of charging condition: QoS change, tariff time change. When this event is encountered, all current volume counts are captured and new volume counts for all active service data flows are started.

- Expiry of an operator configured change of charging condition limit per PDP context. This event closes the eG-CDR, and a new one is opened if the PDP context is still active.

Management intervention may also force trigger a chargeable event.

Relevant service data flows for a certain PDP context are determined when FBC is applied. Charging rules are used for this determination. One charging rule identifies service data flow to be measured but it can also include certain characteristics related to that service data flow.

Charging rule can contain e.g.:

- service data flow filters to identify packets belonging to certain service data flow,

- whether online/offline charging interface is used,

- rating group for that service data flow and/or

- precedence to the situations where two or more service data flows are overlapping.

And charging rules can be:

- pre-defined in GGSN,

- dynamically provisioned by the Charging Rules Function over Gx interface or

- mixture of those two.

This is specified in TS 23.125 [70] and TS 29.210 [71]

End of Change in Clause 5.2.1.3

Change in Clause 5.3.1.2

5.3.1.2   Flow Based Bearer Charging

PDP context charging allows the GGSN to collect charging information related to data volumes sent to and received by the UE/MS, categorised by the QoS applied to the PDP context. FBC may be supported by the GGSN by the integration of a TPF. When the TPF is present, the normal PDP context charging is enhanced by the capability to categorise the PDP context data volume by specific service data flows Service data flows are defined by means of charging rules which are characterised by e.g. protocol characteristics such as IP address, TCP port, etc. I.e., while there is only one uplink an one downlink data volume count per PDP context in PDP context charging, FBC provides multiple service data flow counts, one each per defined service data flow. The default service data flow is the wildcard, i.e. all traffic for all IP addresses, all TCP ports, etc.; when no other, specific service data flows are configured, the behaviour of FBC is identical to the normal PDP context charging on the GGSN. This implies that, when FBC is available in the GGSN, PDP context online charging may be achieved by FBC online charging using only the wildcard service data flow. When further service data flows are specified, traffic is categorised, and counted, according to the service data flow

specification, and the wildcard service data flow applies to all traffic that does not match any of the specific service data flows. Details of this functionality are specified in TS 23.125 [70] and TS 32.240 [1].

The following chargeable events are defined for FBC:

- Start of PDP context. Upon encountering this event, a CCR start, indicating the start of the PDP context, is sent towards the OCS, and the data volume is captured per service data flow for the PDP context.

- Start of service data flow. An interim CCR is generated for the PDP context, indicating the start of a new service data flow, and a new volume count for this service data flow is started.

- Termination of service data flow. The service data flow volume counter is closed, and an interim CCR is generated towards the OCS, indicating the end of the service data flow and the final volume count for this service data flow. For information on how the termination of service data flows is detected, refer to TS 23.125 [70].

- End of PDP context. Upon encountering this event, a CCR stop, indicating the end of the PDP context, is sent towards the OCS together with the final volume counts for the PDP context and all service data flows.

- Expiry of an operator configured time limit per PDP context. This event triggers the emission of an interim CCR, indicating the elapsed time and the accrued data volume for the PDP context since the last report.

- Expiry of an operator configured time limit per service data flow. The service data flow volume counter is closed and an interim CCR is sent to the OCS, indicating the elapsed time and the accrued data volume since the last report for that service data flow. A new service data flow container is opened if the service data flow is still active.

- Expiry of an operator configured data volume limit per PDP context. This event triggers the emission of an interim CCR, indicating the elapsed time and the accrued data volume for the PDP context since the last report.

- Expiry of an operator configured data volume limit per service data flow. The service data flow volume counter is closed and an interim CCR is sent to the OCS, indicating the elapsed time and the accrued data volume since the last report for that service data flow. A new service data flow container is opened if the service data flow is still active.

- Change of charging condition: QoS change, tariff time change. When this event is encountered, all current volume counts are captured and sent towards the OCS with an interim CCR. New volume counts for all active service data flows are started.

Management intervention may also force trigger a chargeable event.

**End of Change in Clause 5.3.1.2
End of Document**

Annex B (informative):
Change history

Change history							
Date	TSG #	TSG Doc.	CR	Rev	Subject/Comment	Old	New
Sep 2003	S_21	SP-030410	--	--	Submitted to TSG SA#21 for Information	1.0.0	
Sep 2004	S_25	SP-040552	--	--	Submitted to TSG SA#25 for Approval	2.0.0	6.0.0
Dec 2004	SA_26	SP-040775	001	--	Add "Furnish Charging Information" procedure for GPRS	6.0.0	6.1.0
Dec 2004	SA_26	SP-040775	002	--	Add data description for PS online charging	6.0.0	6.1.0

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CHANGE REQUEST

| ⌘ | **32.251** CR **008** | ⌘**rev** | **-** | ⌘ | Current version: | **6.1.0** | ⌘ |

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ ☐   ME ☐   Radio Access Network ☐   Core Network **X**

Title:	⌘	Correction of Service Data Flow (SDF) specific usage duration in flow based charging
Source:	⌘	SA5 (Benni.Alexander@Nokia.com)

Work item code:	⌘ CH			**Date:** ⌘	28/01/05

Category:	⌘	**F**	**Release:** ⌘	Rel-6

Use <u>one</u> of the following categories:	Use <u>one</u> of the following releases:
F (correction)	2 (GSM Phase 2)
A (corresponds to a correction in an earlier release)	R96 (Release 1996)
B (addition of feature),	R97 (Release 1997)
C (functional modification of feature)	R98 (Release 1998)
D (editorial modification)	R99 (Release 1999)
Detailed explanations of the above categories can	Rel-4 (Release 4)
be found in 3GPP TR 21.900.	Rel-5 (Release 5)
	Rel-6 (Release 6)

Reason for change:	⌘	Wrong definition of the usage duration in Service Data Flow (SDF).
Summary of change:	⌘	SDF specific usage duration is used.
Consequences if not approved:	⌘	Errors in GPRS Flow Based Charging.

Clauses affected:	⌘	5.1.2

	Y	N		
Other specs affected:	⌘		X	Other core specifications	⌘
		X	Test specifications	
		X	O&M Specifications	

Other comments:	⌘	

5.1.2   Charging information

Charging information in the PS domain network is collected for each MS/UE by the SGSNs and GGSNs, which are serving that MS/UE. The SGSN collects charging information for each MS/UE related with the radio network usage, while the GGSN collects charging information for each MS related with the external data network usage. Both GSNs also collect charging information on usage of the PS domain network resources. The following paragraphs list the charging information to be collected by the GSNs for both online and offline charging.

For PDP contexts, the GSNs shall collect the following charging information:

1. usage of the radio interface: the charging information shall describe the amount of data transmitted in MO and MT directions categorized with QoS and user protocols;

2. usage duration: duration of PDP context is counted as the time interval from PDP Context activation to PDP Context Deactivation;

3. usage of the general PS domain resources: the charging information shall describe the usage of other PS domain-related resources and the MSs PS domain network activity (e.g. mobility management);

4. destination and source: the charging information shall provide the actual source addresses used by the subscriber for the PDP context. The charging information shall describe the destination addresses with a level of accuracy as determined by the Access Point Name (APN);

5. usage of the external data networks: the charging information shall describe the amount of data sent and received to and from the external data network. External networks can be identified by the Access Point Name (APN).

6. location of MS/UE: HPLMN, VPLMN, plus optional higher-accuracy location information. The highest accuracy location information available in a GGSN is a SGSN address.

For service data flows defined for FBC, the GGSN shall collect the following charging information:

1. the information described above for PDP context charging;

2. the amount of data transmitted in MO and MT directions categorized by service data flow;

3. usage duration: duration of servive data flows is counted as the time interval from ~~PDP Context~~ service data flow activation to ~~PDP Context~~ service data flow ~~D~~deactivation.

For non-PDP context related activities, the SGSN shall collect the following charging information:

1. mobility management actions for GPRS atttached UEs/MSs;

2. short messages passing through the SGSN in MO and MT directions;

3.   location requests passing through the SGSN, triggered by the UE/MS, by an external source, or by the network.

Annex B (informative):
Change history

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
Dec 2004	SA_26	SP-040775	001	--	Add "Furnish Charging Information" procedure for GPRS	6.0.0	6.1.0
Dec 2004	SA_26	SP-040775	002	--	Add data description for PS online charging	6.0.0	6.1.0

CR-Form-v7.1

CHANGE REQUEST

| ⌘ | **32.215** CR **037** | ⌘**rev** | **-** | ⌘ | Current version: | **5.7.0** | ⌘ |

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☐ Core Network **X**

Title: ⌘	Conditional criteria for the presence of the External Charging ID in the G-CDR – Align with SA2's TS 23.228	
Source: ⌘	**SA5** (alain.bibas@francetelecom.com)	
Work item code:⌘	OAM-CH	**Date:** ⌘ 28/01/2005
Category: ⌘	**F**	**Release:** ⌘ Rel-5

Use *one* of the following categories:
F (correction)
A (corresponds to a correction in an earlier release)
B (addition of feature),
C (functional modification of feature)
D (editorial modification)
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use *one* of the following releases:
Ph2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
Rel-4 (Release 4)
Rel-5 (Release 5)
Rel-6 (Release 6)
Rel-7 (Release 7)

Reason for change: ⌘	The "External charging ID" (also called ICID for the IMS) parameter which allows charging correlation between the PS domain and the IMS Domain is categorized as "Oc" (Conditional Operator provisionnable) in the GGSN CDR. However, the Stage 2 IMS specification TS 23.228 indicates that the Go interface that conveys the ICID from the GGSN to the IMS Domain is optional. Therefore, the condition for the presence of this parameter should be specified
Summary of change:⌘	The condition for the presence of the parameter is specified in the G-CDR
Consequences if not approved: ⌘	Errors would occur in the implementation of the G-CDR

Clauses affected: ⌘	4.3

	Y	N		
Other specs ⌘		X	Other core specifications ⌘	
affected:		X	Test specifications	
		X	O&M Specifications	

Other comments: ⌘	

4.3 Charging data in GGSN (G-CDR)

If the collection of CDR data is enabled then the GGSN data specified in Table 2 shall be available for each PDP context. The table provides a brief description of each field. A more elaborate definition of the fields, sorted by the field name in alphabetical order, is provided in clause 5.

Table 2: GGSN PDP context data (G-CDR)

Field	Category	Description
Record Type	M	GGSN PDP context record.
Network initiated PDP context	O$_C$	A flag that is present if this is a network initiated PDP context.
Served IMSI	M	IMSI of the served party
GGSN Address used	M	The control plane IP address of the GGSN used.
Charging ID	M	PDP context identifier used to identify this PDP context in different records created by GSNs
SGSN Address	M	List of SGSN addresses used during this record.
Access Point Name Network Identifier	O$_M$	The logical name of the connected access point to the external packet data network (network identifier part of APN).
PDP Type	O$_M$	PDP type, i.e. IP, PPP, or IHOSS:OSP
Served PDP Address	O$_C$	PDP address, i.e. IPv4 or IPv6. This parameter shall be present except when both the PDP type is PPP and dynamic PDP address assignment is used.
Dynamic Address Flag	O$_C$	Indicates whether served PDP address is dynamic, which is allocated during PDP context activation. This field is missing if address is static.
List of Traffic Data Volumes	O$_M$	A list of changes in charging conditions for this PDP context, each change is time stamped. Charging conditions are used to categorise traffic volumes, such as per tariff period. Initial and subsequently changed QoS and corresponding data values are listed.
Record Opening Time	M	Time stamp when PDP context is activated in this GGSN or record opening time on subsequent partial records.
Duration	M	Duration of this record in the GGSN.
Cause for Record Closing	M	The reason for the release of record from this GGSN.
Diagnostics	O$_M$	A more detailed reason for the release of the connection.
Record Sequence Number	C	Partial record sequence number, only present in case of partial records.
Node ID	O$_M$	Name of the recording entity.
Record Extensions	O$_C$	A set of network operator/manufacturer specific extensions to the record. Conditioned upon the existence of an extension.
Local Record Sequence Number	O$_M$	Consecutive record number created by this node. The number is allocated sequentially including all CDR types.
APN Selection Mode	O$_M$	An index indicating how the APN was selected.
Served MSISDN	O$_M$	The primary MSISDN of the subscriber.
Charging Characteristics	M	The Charging Characteristics applied to the PDP context.
Charging Characteristics Selection Mode	O$_M$	Holds information about how Charging Characteristics were selected.
IMS Signalling Context	O$_C$	Included if the PDP context is used for IMS signalling
External Charging Identifier	O$_C$	Holds Aa Charging Identifier and is present only if it is received from a none-GPRS, external network entity
SGSN PLMN Identifier	O$_M$	SGSN PLMN Identifier (MCC and MNC) used during this record.

End of Change in Clause 4.3
End of document

Annex B (informative):
Change history

Date	TSG #	TSG Doc.	CR	Rev	Subject/Comment	Old	New
May 2001	--	--	--	--	Transferred from 3GPP 32.015 v3.5.0.	--	1.0.0
Jun 2001	S_12	SP-010236	--	--	Submitted to TSG SA #12 for Information	1.0.0	1.0.1
Sep 2001	S_13	SP-010464	--	--	Submitted to TSG SA #13 for Approval	2.0.0	4.0.0
Dec 2001	S_14	SP-010633	001	--	Specification of the "Data Record Format" and "Data Record Format Version"	4.0.0	4.1.0
Dec 2001	S_14	SP-010633	002	--	Correction of ASN.1 data item QosInformation	4.0.0	4.1.0
Dec 2001	S_14	SP-010634	003	--	Correction of ASN.1 statements for backwards compatibility reason	4.0.0	4.1.0
Mar 2002	S_15	SP-020022	004	--	Addition of CAMEL phase 3 extensions in SMS-MO CDR	4.1.0	4.2.0
Mar 2002	S_15	SP-020024	005	--	Addition of "QoSRequested" parameter into "traffic volume containers"	4.1.0	4.2.0
Mar 2002	S_15	SP-020025	006	--	Addition of CAMEL phase 4 extensions in SMS-MT CDRs	4.2.0	5.0.0
Jun 2002	S_16	SP-020289	007	--	Addition of real-time delivery of Charging Data Records (CDRs) to the Billing System	5.0.0	5.1.0
Jun 2002	S_16	SP-020289	008	--	Alignment of CDRs' IPv4 versus IPv6 address usage with architectural principles	5.0.0	5.1.0
Jun 2002	S_16	SP-020286	010	--	Correction of S-CDR triggers	5.0.0	5.1.0
Jun 2002	S_16	SP-020289	011	--	Addition of external charging identifier into G-CDR	5.0.0	5.1.0
Jun 2002	S_16	SP-020289	012	--	Addition of an "IMS signalling PDP context" flag into G-CDR	5.0.0	5.1.0
Jun 2002	S_16	SP-020288	014	--	Correcting definition of traffic data volume CDR field & Specify usage of the LRSN to avoid loss of billing data	5.0.0	5.1.0
Jun 2002	S_16	SP-020285	016	--	Alignment with 23.271 (LCS stage 2) of CDR definition for LCS in PS domain	5.0.0	5.1.0
Dec 2002	S_18	SP-020734	018	--	Corrections on parameter Destination Number	5.1.0	5.2.0
Dec 2002	S_18	SP-020736	021	--	Corrections on LCS error cause definitions	5.1.0	5.2.0
Dec 2002	S_18	SP-020738	022	--	IPv4-IPv6 co-existence in PS charging	5.1.0	5.2.0
Dec 2002	S_18	SP-020738	023	--	Correction of the list of parameters of the QoS profile (requested and negotiated)	5.1.0	5.2.0
Dec 2002	S_18	SP-020738	024	--	Extension of CDR encoding	5.1.0	5.2.0
Mar 2003	S_19	SP-030055	025	--	Addition of SGSN's Mobile Country Code (MCC) and Mobile Network Code (MNC) on G-CDR - alignment with CN4's 29.060	5.2.0	5.3.0
Jun 2003	S_20	SP-030270	026	--	Correction of "Cause Code"	5.3.0	5.4.0
Dec 2003	S_22	SP-030618	029	--	Correction of "Data Record Format Version"	5.4.0	5.5.0
Dec 2003	S_22	SP-030620	030	--	Correction to Level of CAMEL Service	5.4.0	5.5.0
Dec 2003	S_22	SP-030621	031	--	Correction on QoS Information (only if CN#22 approved CN4 CR 24.060)	5.4.0	5.5.0
Jun 2004	S_24	SP-040277	035	--	Correction to the selection and use of charging characteristics and profiles	5.5.0	5.6.0
Sep 2004	S_25	SP-040548	036	--	Inclusion of UTRAN positioning data parameter – Align with 29.002 CR 710	5.6.0	5.7.0

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CHANGE REQUEST

| ⌘ | **32.251** CR **003** | ⌘**rev** | **-** | ⌘ | Current version: | **6.1.0** | ⌘ |

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ ☐   ME ☐   Radio Access Network ☐   Core Network **X**

Title:	⌘	Conditional criteria for the presence of the External Charging ID in the G-CDR – Align with SA2's TS 23.228

Source:	⌘	**SA5** (alain.bibas@francetelecom.com)

Work item code:	⌘	OAM-CH		**Date:**	⌘	28/01/2005

Category:	⌘	**A**		**Release:**	⌘	Rel-6

Use one of the following categories:
F (correction)
A (corresponds to a correction in an earlier release)
B (addition of feature),
C (functional modification of feature)
D (editorial modification)
Detailed explanations of the above categories can
be found in 3GPP TR 21.900.

Use one of the following releases:
Ph2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
Rel-4 (Release 4)
Rel-5 (Release 5)
Rel-6 (Release 6)
Rel-7 (Release 7)

Reason for change:	⌘	The "External charging ID" (also called ICID for the IMS) parameter which allows charging correlation between the PS domain and the IMS Domain is categorized as "Oc" (Conditional Operator provisionnable) in the GGSN CDR. However, the Stage 2 IMS specification TS 23.228 indicates that the Go interface that conveys the ICID from the GGSN to the IMS Domain is optional. Therefore, the condition for the presence of this parameter should be specified

Summary of change:	⌘	The condition for the presence of the parameter is specified in the G-CDR

Consequences if not approved:	⌘	Errors would occur in the implementation of the G-CDR

Clauses affected:	⌘	6.1.2

		Y	**N**		
Other specs affected:	⌘		**X**	Other core specifications	⌘
			X	Test specifications	
			X	O&M Specifications	

Other comments:	⌘	

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Change in Clause 6.1.2

</div>

6.1.2 PDP context charging data in GGSN (G-CDR)

If FBC is disabled and the collection of CDR data is enabled then the GGSN data specified in the following table shall be available for each PDP context.

Table 6.1.2: GGSN PDP context data (G-CDR)

Field	Category	Description
Record Type	M	GGSN PDP context record.
Network initiated PDP context	O_C	A flag that is present if this is a network initiated PDP context.
Served IMSI	M	IMSI of the served party.
GGSN Address used	M	The control plane IP address of the GGSN used.
Charging ID	M	PDP context identifier used to identify this PDP context in different records created by GSNs
SGSN Address	M	List of SGSN addresses used during this record.
Access Point Name Network Identifier	O_M	The logical name of the connected access point to the external packet data network (network identifier part of APN).
PDP Type	O_M	PDP type, i.e. IP, PPP, or IHOSS:OSP.
Served PDP Address	O_C	PDP address, i.e. IPv4 or IPv6. This parameter shall be present except when both the PDP type is PPP and dynamic PDP address assignment is used.
Dynamic Address Flag	O_C	Indicates whether served PDP address is dynamic, which is allocated during PDP context activation. This field is missing if address is static.
List of Traffic Data Volumes	O_M	A list of changes in charging conditions for this PDP context, each change is time stamped. Charging conditions are used to categorize traffic volumes, such as per tariff period. Initial and subsequently changed QoS and corresponding data values are also listed.
Record Opening Time	M	Time stamp when PDP context is activated in this GGSN or record opening time on subsequent partial records.
Duration	M	Duration of this record in the GGSN.
Cause for Record Closing	M	The reason for the release of record from this GGSN.
Diagnostics	O_M	A more detailed reason for the release of the connection.
Record Sequence Number	C	Partial record sequence number, only present in case of partial records.
Node ID	O_M	Name of the recording entity.
Record Extensions	O_C	A set of network operator/manufacturer specific extensions to the record. Conditioned upon the existence of an extension.
Local Record Sequence Number	O_M	Consecutive record number created by this node. The number is allocated sequentially including all CDR types.
APN Selection Mode	O_M	An index indicating how the APN was selected.
Served MSISDN	O_M	The primary MSISDN of the subscriber.
Charging Characteristics	M	The Charging Characteristics applied to the PDP context.
Charging Characteristics Selection Mode	O_M	Holds information about how Charging Characteristics were selected.
IMS Signalling Context	O_C	Included if the PDP context is used for IMS signalling
External Charging Identifier	O_C	Holds ~~A~~a Charging Identifier and is present only if it is received from a non-GPRS, external network entity
SGSN PLMN Identifier	O_M	SGSN PLMN Identifier (MCC and MNC) used during this record.
PS Furnish Charging Information	OC	Online charging session specific information

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End of Change in Clause 6.1.2
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Annex B (informative):
Change history

<table>
<tr><td colspan="9" align="center">Change history</td></tr>
<tr><th>Date</th><th>TSG #</th><th>TSG Doc.</th><th>CR</th><th>Rev</th><th>Subject/Comment</th><th>Old</th><th>New</th></tr>
<tr><td>Sep 2003</td><td>S_21</td><td>SP-030410</td><td>--</td><td>--</td><td>Submitted to TSG SA#21 for Information</td><td>1.0.0</td><td></td></tr>
<tr><td>Sep 2004</td><td>S_25</td><td>SP-040552</td><td>--</td><td>--</td><td>Submitted to TSG SA#25 for Approval</td><td>2.0.0</td><td>6.0.0</td></tr>
<tr><td>Dec 2004</td><td>SA_26</td><td>SP-040775</td><td>001</td><td>--</td><td>Add "Furnish Charging Information" procedure for GPRS</td><td>6.0.0</td><td>6.1.0</td></tr>
<tr><td>Dec 2004</td><td>SA_26</td><td>SP-040775</td><td>002</td><td>--</td><td>Add data description for PS online charging</td><td>6.0.0</td><td>6.1.0</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
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CR-Form-v7

CHANGE REQUEST

| ⌘ | **32.251** CR **009** | ⌘**rev** | **-** | ⌘ | Current version: | **6.1.0** | ⌘ |

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☐ Core Network **X**

Title:	⌘	Correction of the description of Charging Key – Align with SA2's 23.125 (Overall high level functionality and architecture impacts of flow based charging; Stage 2)
Source:	⌘	SA5 (ggfj@nortelnetworks.com)
Work item code: ⌘	CH	***Date:*** ⌘ 28/01/2005

Category:	⌘	**F**	***Release:*** ⌘ Rel-6

Use <u>one</u> of the following categories:
    F *(correction)*
    A *(corresponds to a correction in an earlier release)*
    B *(addition of feature),*
    C *(functional modification of feature)*
    D *(editorial modification)*
Detailed explanations of the above categories can
be found in 3GPP TR 21.900.

Use <u>one</u> of the following releases:
    2   (GSM Phase 2)
    R96   (Release 1996)
    R97   (Release 1997)
    R98   (Release 1998)
    R99   (Release 1999)
    Rel-4 (Release 4)
    Rel-5 (Release 5)
    Rel-6 (Release 6)

Reason for change:	⌘	To complete the description of the Rating-Group AVP (already included in 32.299), introducing the procedural text that maps the charging key directly to the DCC Rating-Group. SA2 introduced some text in 23.125 clarifying this use of the charging key (S2-043377) in this same direction.
Summary of change: ⌘		Introduce the procedural text that maps the charging key to the DCC Rating-Group AVP
Consequences if not approved:	⌘	Inconsistency between TS 32.251 and TS 32.299. Stage 2 requirements will not be fulfilled in TS 32.251.

Clauses affected:	⌘	5.3.2.2

Other specs affected:	⌘	Y	N		⌘	
			X	Other core specifications	⌘	
			X	Test specifications		
			X	O&M Specifications		

Other comments:	⌘	

<div style="border:1px solid black; text-align:center; font-weight:bold; padding:4px;">Change in Clause 5.3.2.2</div>

5.3.2.2 Triggers for FBC online charging

CCR start / stop / interim is used to convey charging information related to the PDP context and service data flow data information collected for a UE/MS in the GGSN. CCA is used by the OCS to return quotas for the PDP context and / or service data flows or to instruct the GGSN on the further handling of the PDP context (terminate, continue, reroute, etc.)

Further details on the support of termination actions are ffs.

FBC online charging is employed instead of PDP context online charging if FBC is active in the GGSN. In contrast to the PDP context online charging, where only one volume container (uplink/downlink) can be active per PDP context, many service data flow volume containers per PDP context can be active simultaneously when FBC is enabled. A service data flow volume container is activated when traffic for a defined service data flow (including the wildcard for "all (other) traffic") is detected; a service data flow volume count is closed when the termination of the service data flow is detected by the GGSN. Details on FBC can be found in TS 23.125 [70] and TS 32.240 [1].

If, according to the Charging Characteristics, online charging is activated, a CCR start is sent to the OCS and the OCS supplies a PDP context authorisation together with time and / or volume quotas for the PDP context and the service data flows, based on the information provided by the GGSN, e.g. QoS, APN. The GGSN monitors the quotas with respect to the actual volume or time used on the PDP context and / or the service data flows. The quota supervision mechanism is further described in TS 32.240 [1].

When a change of charging condition occurs, all volume counters are reported to the OCS with an interim CCR, and when new quotas for the changed charging condition is authorised, new volume counts are started for the PDP context and / or service data flows. If only partial quotas are authorised by the OCS (e.g. due to insufficient credit), the service data flows for which no quota was authorised are closed. If no new quota at all is authorised by the OCS (e.g. when the subscriber's account on the OCS expires), the PDP context is closed. The OCS may also restrict the continuation of the session, such as to allow only charge free traffic, or to reroute the user to an account recharge site. See TS 32.240 [1] and TS 32.299 [50] for further information.

The CCR includes details such as CCR Type, Served IMSI, Sequence Number etc. The CCA includes details such as credit control quotas and session management instructions (continue, terminate, interim interval, etc). Not all of the charging information to be collected is static, and other charging information is directly dependent on dynamic Packet-Switched service usage.

TS 23.125 [70] specifies that it shall be possible to request online charging quotas for each charging key. The charging key is a piece of information used for rating purposes as defined in TS 23.125 [70]. The charging key is mapped into the Rating-Group AVP as defined in DCC [402]. Each quota allocated to a Diameter CC session has a unique Rating-Group value.

The subsequent subclauses identify in detail the conditions for reporting online charging information, management of user and credit control sessions and PS domain quota supervision.

<div style="border:1px solid black; text-align:center; font-weight:bold; padding:4px;">End of Change in Clause 5.3.2.2</div>

Annex B (informative): Change history

Change history							
Date	TSG #	TSG Doc.	CR	Rev	Subject/Comment	Old	New
Sep 2003	S_21	SP-030410	--	--	Submitted to TSG SA#21 for Information	1.0.0	
Sep 2004	S_25	SP-040552	--	--	Submitted to TSG SA#25 for Approval	2.0.0	6.0.0
Dec 2004	SA_26	SP-040775	001	--	Add "Furnish Charging Information" procedure for GPRS	6.0.0	6.1.0
Dec 2004	SA_26	SP-040775	002	--	Add data description for PS online charging	6.0.0	6.1.0

CR-Form-v7

CHANGE REQUEST

⌘ **32.251** CR **005** ⌘**rev** **-** ⌘ Current version: **6.1.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☐ Core Network **X**

Title: ⌘	Correct support of Termination action
Source: ⌘	SA5 (ggfj@nortelnetworks.com)
Work item code:⌘	CH ***Date:*** ⌘ 28/01/2005

Category: ⌘ **F**   ***Release:*** ⌘ Rel-6

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can
be found in 3GPP TR 21.900.

Use one of the following releases:
2 *(GSM Phase 2)*
R96 *(Release 1996)*
R97 *(Release 1997)*
R98 *(Release 1998)*
R99 *(Release 1999)*
Rel-4 *(Release 4)*
Rel-5 *(Release 5)*
Rel-6 *(Release 6)*

Reason for change: ⌘	The Termination Action is not correct described for the PS domain.
Summary of change:⌘	The termination action is part of the PS charging, and it works as specified in 32.299. Some text clarifying it is added avoiding the duplication of text.
Consequences if not approved: ⌘	The termination action is undefined in PS domain.

Clauses affected: ⌘	5.3.2

	Y	N		
Other specs affected: ⌘		X	Other core specifications	⌘
		X	Test specifications	
		X	O&M Specifications	

Other comments: ⌘	

5.3.2 Ro message flows

CCR start, stop and interim, as defined in TS 32.299 [50], are used by the GGSN to transfer the collected charging information towards the OCS. CCA is used by the OCS to assign quotas for the PDP context and/or service data flows, and to instruct the GGSN whether to continue or terminate a service data flow or PDP context.

CCA is also used to communicate to the TPF~~The support of other~~ the tTermination aAction, i.e. the GGSN behaviour when the user has consumed the final granted units. The Termination Action is specified in TS 32.299 [50].~~s is ffs.~~

The GGSN shall use the Charging Characteristics to determine whether to activate or deactivate online charging. Further details of this functionality, including the mechanism of conveying the charging characteristics data item (HLR -> SGSN -> GGSN), are specified in annex A.

The following subclauses describe the trigger conditions for the chargeable events described in clause 5.3.1.1 and 5.3.1.2. In GPRS online charging, these chargeable events correspond to the triggers for collection of charging information and CCR emission towards the OCS. The responses from the OCS and the detailed behaviour of the GGSN upon receiving those responses are also specified in the subclauses below.

End of Change in Clause 5.3.2
End of Document

Annex B (informative): Change history

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
Sep 2003	S_21	SP-030410	--	--	Submitted to TSG SA#21 for Information	1.0.0	
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Dec 2004	SA_26	SP-040775	002	--	Add data description for PS online charging	6.0.0	6.1.0