Technical Specification Group Services and System Aspects
Meeting #8, Düsseldorf, Germany, 26-28 June 2000

TSGS#8(00)0246

Source: **SA5 (Telecom Management)**

Title: **32.015 CR, "GPRS charging enhancement, Addition of charging characteristics per PDP context" (S5-000237)**

Document for: **Approval**

Agenda Item: **6.5.3**

Spec	CR	Phas	Subject	Ca	Versi	Versi	Doc-2nd-
32.015	009	R99	GPRS charging enhancement, Addition of charging characteristics per PDP context	B	3.1.1	3.2.0	S5-000237

3GPP TSG SA WG5 Meeting #11
Paris, France, 10 – 14 April, 2000

Tdoc S5-000237

CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

32.015 **CR** **009** Current Version: 3.1.1

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

For submission to: SA#8 *list expected approval meeting # here ↑*

for approval [X] for information [ ]

strategic [ ] non-strategic [ ] *(for SMG use only)*

Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

Proposed change affects: *(at least one should be marked with an X)* (U)SIM [ ] ME [ ] UTRAN / Radio [ ] Core Network [X]

Source: SA5#11 **Date:** 14 April 2000

Subject: GPRS charging enhancement, Addition of charging characteristics per PDP context

Work item:

Category: *(only one category shall be marked with an X)*

F	Correction	[ ]
A	Corresponds to a correction in an earlier release	[ ]
B	Addition of feature	[X]
C	Functional modification of feature	[ ]
D	Editorial modification	[ ]

Release:

Phase 2	[ ]
Release 96	[ ]
Release 97	[ ]
Release 98	[ ]
Release 99	[X]
Release 00	[ ]

Reason for change:

Currently it is possible to define for the GPRS subscribers a charging characteristics reflecting the method used to charge, e. g. normal subscription, prepaid, flat rate and/or hot billing. However, one subscriber my have different services based on different charging methods, and one service may be charged differently for different subscribers (e. g. normal and prepaid).

Therefore in order to offer more flexibility it is proposed to add charging characteristics also on PDP context basis. If both subscriber and PDP context charging characteristics are defined in subscriber's data, the PDP context will have the priority.

To each Charging Characteristics value is associated a set of parameters indicating the partial CDR generation triggering thresholds.

Clauses affected: 5.7, 5.7.1.2, 5.7.3, 6.1.1, 6.1.2, 6.1.6.33

Other specs affected:

Other 3G core specifications	[ ]	→ List of CRs: 23.060, 29.060, 23.008, 29.002
Other GSM core specifications	[ ]	→ List of CRs:
MS test specifications	[ ]	→ List of CRs:
BSS test specifications	[ ]	→ List of CRs:
O&M specifications	[ ]	→ List of CRs:

Other comments:

5.7 Charging Triggers – CDR Generation

The S-CDR, M-CDR G-CDR, S-SMO-CDR, and S-SMT-CDR are generated by the SGSN and GGSN to collect charging information such that they may be subsequently transferred to the Charging Gateway Function.

A Charging Characteristics may be specified for a PDP context. It is determined as described in subclause 5.7.1.2 and 5.7.3. If set it will determine the S-CDRs and G-CDRs generation and trigger values. If no Charging Characteristics is set for a PDP context, a default set of trigger values shall be applied.

In the GSNs it shall be possible to activate and deactivate CDR generation for each Charging Characteristics. If CDR generation is activated, it shall be possible to define separate trigger conditions values per Charging Characteristics for the following triggers:

- data volume limit
- time (duration limit)
- maximum number of charging conditions changes (QoS change, Tariff Time change)

5.7.1 Triggers for S-CDR Charging Information Collection

An S-CDR is used to collect charging information related to the packet data information for a GPRS mobile in the SGSN.

If, according to the Charging Characteristics of a PDP context, CDR generation is activated ~~A~~an S-CDR shall be opened ~~for each activated~~at PDP context activation, and record includes details such as Record Type, Served IMSI, Sequence Number etc. Not all of the charging information to be collected is static, and other charging information is directly dependent on dynamic GPRS usage.

The subsequent sections identify the conditions for adding information to, and closing, the CDR.

5.7.1.1 Triggers for S-CDR Charging Information Addition

The "List of Traffic Volumes" attribute of the S-CDR consists of a set of containers which are added when specific trigger conditions are met, and identify the volume count separated for uplink and downlink traffic on encountering that trigger condition.

Table 1: Triggers for S-CDR charging information addition

Trigger Conditions	Description/Behaviour
QoS Change	A change in the QoS shallresult in a "List of Traffic Data Volumes" container being added to the CDR.
Tariff Time Change	On reaching the Tariff Time Change a "List of Traffic Data Volumes " container shall be added to the CDR.
CDR Closure	A list of "List of Traffic Data Volumes" container shall be added to the S-CDR.

5.7.1.2 Triggers for S-CDR Closure

The S-CDR shall be closed on encountering some trigger conditions. The following table identifies which conditions are supported to permit closures of the S-CDR.

Table 2: Triggers for S-CDR closure

Closure Conditions	Description/Behaviour
End of PDP Context within	Deactivation of the PDP context in the SGSN shall result in the CDR

the SGSN	being closed. The trigger condition covers:- - termination of PDP context, - SGSN change (inter-SGSN routing area update), - any abnormal release.
Partial Record Reason	O&M reasons permit the closure of the CDR for internal reasons. The trigger condition covers:- - data volume limit, - time (duration) limit, - maximum number of charging condition changes, - management intervention.

The Partial Record generation trigger thresholds are those associated to the Charging Characteristics of the related PDP context. The Charging Characteristics of the PDP context are determined as follows:

- If a "PDP context Charging Characteristics" is present in the subscriber's data for this PDP context, than it shall be used,

- If there is no "PDP context Charging Characteristics" but a "Subscribed Charging Characteristics" is present in the subscriber's data, the "Subscribed Charging Characteristics" shall be used,

- If neither a "PDP context Charging Characteristics" nor a "Subscribed Charging Characteristics" is present, a default charging profile shall be applied.

The Partial Record generation trigger thresholds are GSN configuration parameters defined by the operator through O&M means.

In the event that the S-CDR is closed and the PDP context remains active, a further S-CDR shall be opened with an incremented Sequence Number.

5.7.2 Triggers for M-CDR Charging Information Collection

An M-CDR is used to collect charging information related to the mobility management of a GPRS mobile in the SGSN.

An M-CDR shall be opened for each GPRS mobile upon GPRS Attach, and record details such as Record Type, Served IMSI, Sequence Number etc. Not all of the charging information to be collected is static, and other charging information is directly dependent on GPRS mobility.

The subsequent sections identify the conditions for adding information to, and closing, the CDR.

5.7.2.1 Triggers for M-CDR Charging Information Addition

The "Change of Location" attribute of the M-CDR consists of a set of containers which are added when specific trigger conditions are met, and identify the timestamped routing area on encountering that trigger condition.

Table 3: Triggers for M-CDR Charging Information Addition

Trigger Conditions	Description/Behaviour
Mobility Change	A change in the Routing Area shall result in a "Change of Location" container being added to the M-CDR.

5.7.2.2 Triggers for M-CDR Closure

The M-CDR shall be closed on encountering some trigger conditions. The following table identifies which conditions are supported to permit closures of the M-CDR.

Table 4: Triggers for M-CDR closure

Closure Conditions	Description/Behaviour

End of MM Context within SGSN	Deactivation of the MM context in the SGSN shall result in the CDR being closed. The trigger condition covers:- - SGSN change (inter-SGSN routing area update), - GPRS detach, - any abnormal release.
Partial Record Reason	O&M reasons permit the closure of the CDR for internal reasons. The trigger condition covers:- - time (duration) limit, - maximum number of mobility changes, and - Management intervention.

In the event that the M-CDR is closed and the GPRS mobile is still known to the SGSN, a further M-CDR shall be opened with an incremented Sequence Number.

5.7.3 Triggers for G-CDR Charging Information Collection

A G-CDR is used to collect charging information related to the packet data information for a GPRS mobile in the GGSN.

If, according to the Charging Characteristics of a PDP context, CDR generation is activated ~~A~~a G-CDR shall be opened ~~for each activated~~at PDP context activation, and record includes details such as Record Type, Served IMSI, Sequence Number etc. Not all of the charging information to be collected is static, and other charging information is directly dependent on dynamic GPRS usage.

The "List of Traffic Data Volumes" attribute of the G-CDR consists of a set of containers which are added following specific trigger conditions, and identify the volume count on encountering that trigger condition. The trigger conditions are as for the S-CDR (see previous section on "Triggers for S-CDR Charging Information Collection") with exception that the SGSN change does not need to close the CDR.

The Partial Record generation trigger thresholds are those associated to the Charging Characteristics of the related PDP context determined as follows:

- If a "PDP context Charging Characteristics" is present in the PDP context data, it shall be used
- Otherwise a default charging profile shall be applied.

The Partial Record generation trigger thresholds are GSN configuration parameters defined by the operator through O&M means.~~,~~

In the event that the G-CDR is closed and the PDP context remains active, a further G-CDR is opened with an incremented Sequence Number.

----------NEXT MODIFIED SECTION----------

6.1.1 GPRS charging data in SGSN (S-CDR)

If the collection of SGSN data is enabled then the following GPRS SGSN data shall be available for each PDP context.

Table 5: GPRS SGSN PDP context data

Field		Description
Record Type	M	GPRS SGSN PDP context record.
Network Initiated PDP Context	C	Present if this is a network initiated PDP context.
Anonymous Access Indicator	C	Set to true to indicate anonymous access (and that the Served IMSI is not supplied)
Served IMSI	M	IMSI of the served party (if Anonymous Access Indicator is FALSE or not supplied).
Served IMEI	C	The IMEI of the ME, if available.
Served MSISDN	O	The primary MSISDN of the subscriber.
SGSN Address	M	The IP address of the current SGSN.
MS Network Capability	O	The mobile station Network Capability.
Routing Area	O	Routing Area at the time of the record creation.
Local Area Code	O	Location area code at the time of the record creation.
Cell Identity	O	Cell id at the time of the record creation.
Charging ID	M	PDP context identifier used to identify this PDP context in different records created by GSNs
GGSN Address Used	M	The IP address of the GGSN currently used. The GGSN address is always the same for an activated PDP.
Access Point Name Network Identifier	M	The logical name of the connected access point to the external packet data network (network identifier part of APN).
APN Selection Mode	O	An index indicating how the APN was selected.
PDP Type	M	PDP type, e.g. X.25, IP, PPP, IHOSS:OSP
Served PDP Address	M	PDP address of the served IMSI, e.g. an IPv4, IPv6 or X.121.
List of Traffic Data Volumes	M	A list of changes in charging conditions for this PDP context, each time stamped. Charging conditions are used to categorise traffic volumes, such as per QoS/tariff period. Initial and subsequently changed QoS and corresponding data values are listed. Data volumes are in Octets above the SNDCP layer and are separated for uplink and downlink traffic.
Record Opening Time	M	Time stamp when PDP context activation is created in this SGSN or record opening time on following partial records
Duration	M	Duration of this record in the SGSN.
SGSN Change	C	Present if this is first record after SGSN change.
Cause for Record Closing	M	The reason for the release of record from this SGSN.
Diagnostics	O	A more detailed reason for the release of the connection.
Record Sequence Number	C	Partial record sequence number in this SGSN. Only present in case of partial records.
Node ID	O	Name of the recording entity
Record Extensions	O	A set of network/ manufacturer specific extensions to the record.
Local Record Sequence Number	O	Consecutive record number created by this node. The number is allocated sequentially including all CDR types.
Access Point Name Operator Identifier	M	The Operator Identifier part of the APN.
Charging Characteristics	C	The Charging Characteristics flag ~~set~~ retrieved from ~~the HLR~~subscriber's data as described in section 6.1.6.33.

6.1.2 GPRS charging data in GGSN (G-CDR)

If the collection of GGSN data is enabled then the following GPRS GGSN data shall be available for each PDP context.

Table 6: GPRS GGSN PDP context data

Field		Description
Record Type	M	GPRS GGSN PDP context record.
Network initiated PDP context	C	Present if this is a network initiated PDP context.
Anonymous Access Indicator	C	Set to true to indicate anonymous access (and that the Served IMSI is not supplied).
Served IMSI	M	IMSI of the served party (if Anonymous Access Indicator is FALSE or not supplied).
Served MSISDN	O	The primary MSISDN of the subscriber.
GGSN Address	M	The 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	M	The logical name of the connected access point to the external packet data network (network identifier part of APN).
APN Selection Mode	O	An index indicating how the APN was selected.
PDP Type	M	PDP type, e.g. X.25, IP, PPP, or IHOSS:OSP
Served PDP Address	M	PDP address, e.g. an IPv4, IPv6 or X.121.
Remote PDP Address	O	List of PDP addresses of the remote host or DTE e.g. an IPv4, IPv6, or X.121 (Included if the PDP type is X.25)
Dynamic Address Flag	C	Indicates whether served PDP address is dynamic, that is allocated during PDP context activation.
List of Traffic Data Volumes	M	A list of changes in charging conditions for this PDP context, each 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. Data volumes are in octets above the GTP layer and are separated for uplink and downlink traffic.
Record Opening Time	M	Time stamp when this record was opened.
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	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	Name of the recording entity.
Record Extensions	O	A set of network/ manufacturer specific extensions to the record.
Local Record Sequence Number	O	Consecutive record number created by this node. The number is allocated sequentially including all CDR types.
Charging Characteristics	C	The Charging Characteristics flag ~~set~~ retrieved from ~~the~~ subscriber's data as described in section 6.1.6.33.~~HLR~~.

----------NEXT MODIFIED SECTION----------

6.1.6.33 Charging Characteristics

The Charging Characteristics field allows the operator to apply different kind of charging methods for the CDRs. The N flag in the Charging Characteristics indicates normal charging, the P flag indicates prepaid charging, the F flag indicates flat rate charging and the H flag indicates charging by hot billing. One or more of the flags shall be set according to the charging characteristics received from the HLR and transmitted by the CDR generating node over the Ga interface.

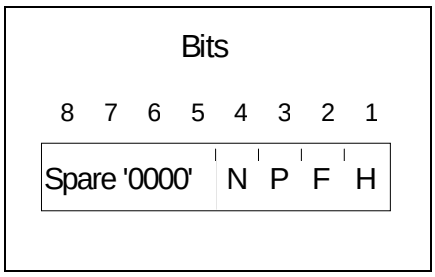

Figure 9a: Charging Characteristics flags

Charging Characteristics in S-CDR is determined by the SGSN as follows:

- If a "PDP context Charging Characteristics" is present in the subscriber's data for this PDP context, than it shall be used,
- If there is no "PDP context Charging Characteristics" but a "Subscribed Charging Characteristics" is present in the subscriber's data, the "Subscribed Charging Characteristics" shall be used.

Charging Characteristics in G-CDR corresponds to the "Charging characteristics" information of the PDP context data in the GGSN.