Technical Specification Group Services and System Aspects
Meeting #7, Madrid, Spain, 15-17 March 2000

TSGS#7(00)0017

Source: **WG SA5 (Telecom Management)**

Title: **4 CRs to 32.015 v.3.0.0 (GSM charging PS domain) &**
2 CRs to 12.15 v.7.4.0 (GPRS Charging)

Document for: **Approval**

Agenda Item: **5.5.3**

Ty	Number	Title	WG	editor	version
	12.15	GPRS Charging	SMG06	G. Heaton	7.4.0

Ty	Number	Title	WG	editor	version
TS	32.015	GSM charging PS domain	S5	Ian Deakin	3.0.0

TSG Meet-ing	TSG WG doc number	Spec	CR	Rv	Ph	Vers Old	Vers New	Subject	TSG WG meeting	WG status	Work item
SP-07	S5-000141	32.015	001		R99	3.0.0	3.1.0	IP v6 support GTP'	S5-10	Agreed	CH
SP-07	S5-000140	12.15	A018		R98	7.4.0	7.5.0	IP v6 support GTP'	S5-10	Agreed	CH
SP-07	S5-000158	12.15	A019	1	R98	7.4.0	7.5.0	GTP' header length fix	S5-10	Agreed	CH
SP-07	S5-000159	32.015	002	1	R99	3.0.0	3.1.0	GTP' header length fix	S5-10	Agreed	CH
SP-07	S5-000160	32.015	003		R99	3.0.0	3.1.0	Charging Characteristics to CDRs	S5-10	Agreed	CH
SP-07	S5-000166	32.015	004		R99	3.0.0	3.1.0	include MSISDN in S,G,M-CDR	S5-10	Agreed	CH

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Luleå, Sweden, 28 Feb - 03 Mar 2000

***Document* S5-000141**
e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

CHANGE REQUEST

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32.015	CR	xxx	Current Version:	3.0.0

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

For submission to:	SA#7	for approval	X	strategic		(for SMG use only)
list approval meeting # here ↑		for information		non-strategic		

Form: CR cover sheet, version 1.1 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CRF-11.rtf*

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

Source: SA5 **Date:** 29-02-2000

Subject: IPv6 support to GTP'

Work item: Charging. (SA5 CH sessions from 2000-03-01 evening to end of 2000-03-02.)

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

F	Correction	X	**Release:**	Phase 2	
A	Corresponds to a correction in an earlier release			Release 96	
B	Addition of feature			Release 97	
C	Functional modification of feature			Release 98	X
D	Editorial modification			Release 99	

(releases phase2, 96, 97 and 98 apply only to GSM specifications)

Reason for change:

The GPRS base documents (like GSM 03.60 and 3G TS 23.060 and 3G TS 29.060) contain already the possibility of having IPv6 addresses in the backbone, so it is now high time to have the IPv6 addresses supported in GTP' too.

This way future problems with IPv6 type addresses are avoided. The effect of the addition to this specification is very small, affecting just the Address of Recommended Node information element of the Redirection Request in GTP'.

Advantage: Also IPv6 compatibility provided, avoiding any problems when IPv6 address support is required.

Clauses affected: 3.2, 7.3.2, 7.3.4.3

Other specs affected:

Other 3G core specifications		→ List of CRs:
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:


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3.2 Abbreviations

For the purposes of the present document the following abbreviations apply. Additional applicable abbreviations can be found in TS 21.905 [1].

APN	Access Point Name
BG	Border Gateway
BS	Billing System
BSS	Base Station Subsystem
CDR	Call Detail Record
C-ID	Charging ID
CG	Charging Gateway
CGF	Charging Gateway Functionality
GTP	GPRS Tunnel Protocol
CMIP	Common Management Information Protocol
F/W	Firewall
GGSN	Gateway GPRS Support Node
GPRS	General Packet Radio Service
G-CDR	Gateway GPRS Support Node – Call Detail Record
IHOSS:OSP	Internet Hosted Octet Stream Service:Octect Stream Protocol
IP	Internet Protocol
IPv4	Internet Protocol version 4
IPv6	Internet Protocol version 6
MS	Mobile Station
M-CDR	Mobility Management - Call Detail Record
NE	Network Element
NSS	Network and Switching Subsystem
NMG	Network Management Gateway
NMN	Network Management Node
OMC	Operations and Maintenance Centre
OSF	Operations System Function
OSP	Octet Stream Protocol
PDN	Packet Data Network
PDP	Packet Data Protocol, e.g., IP or X.25
PLMN	Public Land Mobile Network
PPP	Point to Point Protocol
PSPDN	Packet Switched Public Data Network
PTM-M	Point to Multipoint - Multicast
PTM-G	Point to Multipoint - Group Call
PTM SC	Point to Multipoint Service Centre
RAC	Routing Area Code
SGSN	Serving GPRS Support Node
SNDCP	Sub-Network Dependent Convergence Protocol
SNMP	Simple Network Management Protocol
SS7	Signalling System No. 7
S-CDR	Serving GPRS Support Node – Call Detail Record
S-SMO-CDR	SGSN delivered Short message Mobile Originated – Call Detail Record
S-SMT-CDR	SGSN delivered Short message Mobile Terminated – Call Detail Record
TID	Tunnel Identifier

7.3.2 Reused GTP message types

The existing **Echo Request** and **Echo Response** messages defined in GSM 09.60 are also used in GPRS charging. They may be used by the CDR generating nodes SGSN or GGSN, or by the CGF for checking if another GSN or CGF is alive. If this specification and GSM 09.60 differ in their description then the GSM 09.60 is to be taken as the latest specification status of the related Information elements. If the path protocol is TCP, Echo Request and Echo Response messages are not required.

The **Version Not Supported** message in the GTP' resembles much the corresponding GTP message. It indicates the latest GTP' version that the GTP' entity can support. If a receiving node receives a GTP' signalling mesage of an unsupported version, that node shall return a GTP' Version Not Supported message indicating in the Version field of the GTP' header the latest GTP' version that that node supports. The received payload data of the GTP' packet shall then be discarded.

The Version bits in the GTP' header have currently the following possible values:

GTP' version 0 (binary '000') is the GSM 12.15 v7.0.0 (October 1998) level, with the following Message Type values: 3 = Version Not Supported , 4 = Node Alive Request, 5 = Node Alive Response, 6 = Redirection Request, 7 = Redirection Response. In Chapter 7.3.4.6 the Requests Responded information element has Length field in place of the Number of Requests Responded field, to make that TLV IE to be handled like normal TLV IEs.

GTP' version 1 (binary '001') is the same as version 0, but with the duplicate CDR prevention mechanism, introduced in this specification version.

GTP' version 2 (binary '010'): as version 1, but IPv6 address type also supported (for Address of Recommended Node information element of the Redirection Request).

7.3.4.3 Redirection Request

There are two kinds of usage for the Redirection Request message. One is to advise that received CDR traffic is to be redirected to another CGF due to that CGF node is about to stop service (due to an outage for maintenance or an error condition). The second purpose is to inform a CDR generating node (e.g. SGSN) that is currently sending data to this node (e.g. CGF), that the next node in the chain (e.g. a mediator device or Billing Computer) has lost connection to this node (e.g. CGF).

An Address of Recommended Node may be given if for example a CGF maintenance outage is handled by first introducing another CGF ready to take incoming CDRs. In this way the network performance can be maintained. The Address of Recommended Node shall only describe an intra-PLMN node containing a CGF, and not to a node in any other PLMN.

Table 14: Information elements in a Redirection Request

Information element	Presence requirement
Cause	Mandatory
Address of Recommended Node	Optional
Private Extension	Optional

Possible Cause values are:

- "This node is about to go down"
- "Another node is about to go down"
- "System failure"
- "Receive buffers becoming full"
- "Send buffers becoming full"

The Address of Recommended Node information element defines the IPv4 or IPv6 format address that the node is identified by in the GPRS network.

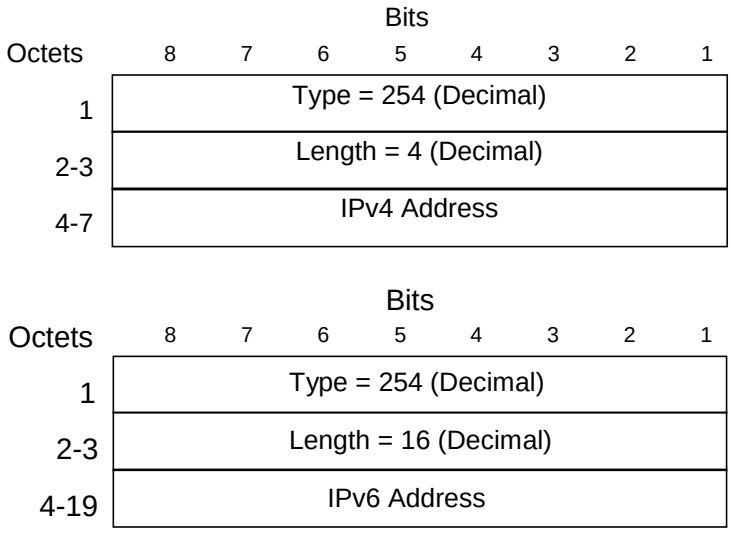

Figure 13: Address of Recommended Node information element

The optional Private Extension contains vendor or operator specific information.

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Luleå, Sweden, 28 Feb - 03 Mar 2000

***Document* S5-000140**
e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

CHANGE REQUEST

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12.15	CR	xxx	Current Version:	7.4.0

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

For submission to:	SA#7	for approval	X	strategic		(for SMG use only)
list approval meeting # here ↑		for information		non-strategic		

Form: CR cover sheet, version 1.1 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CRF-11.rtf*

Proposed change affects: (U)SIM ☐ ME ☐ UTRAN ☐ Core Network X
(at least one should be marked with an X)

Source: SA5 **Date:** 29-02-2000

Subject: IPv6 support to GTP'

Work item: Charging. (SA5 CH sessions from 2000-03-01 evening to end of 2000-03-02.)

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

F	Correction	X	**Release:**	Phase 2	
A	Corresponds to a correction in an earlier release			Release 96	
B	Addition of feature			Release 97	
C	Functional modification of feature			Release 98	X
D	Editorial modification			Release 99	

(releases phase2, 96, 97 and 98 apply only to GSM specifications)

Reason for change:

The GPRS base documents (like GSM 03.60 and 3G TS 23.060 and 3G TS 29.060) contain already the possibility of having IPv6 addresses in the backbone, so it is now high time to have the IPv6 addresses supported in GTP' too.

This way future problems with IPv6 type addresses are avoided. The effect of the addition to this specification is very small, affecting just the Address of Recommended Node information element of the Redirection Request in GTP'.

Advantage: Also IPv6 compatibility provided, avoiding any problems when IPv6 address support is required.

Clauses affected: 3.2, 7.3.2, 7.3.4.3

Other specs affected:

Other 3G core specifications	☐	→ List of CRs:
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:

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3.2 Abbreviations

For the purposes of the present document the following abbreviations apply. Additional applicable abbreviations can be found in GSM 01.04 [1].

APN	Access Point Name
BG	Border Gateway
BS	Billing System
BSS	Base Station Subsystem
CDR	Call Detail Record
C-ID	Charging ID
CG	Charging Gateway
CGF	Charging Gateway Functionality
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CMIP	Common Management Information Protocol
F/W	Firewall
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GPRS	General Packet Radio Service
G-CDR	Gateway GPRS Support Node – Call Detail Record
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IP	Internet Protocol
IPv4	Internet Protocol version 4
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MS	Mobile Station
M-CDR	Mobility Management - Call Detail Record
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NSS	Network and Switching Subsystem
NMG	Network Management Gateway
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OMC	Operations and Maintenance Centre
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OSP	Octet Stream Protocol
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TID	Tunnel Identifier

7.3.2 Reused GTP message types

The existing **Echo Request** and **Echo Response** messages defined in GSM 09.60 are also used in GPRS charging. They may be used by the CDR generating nodes SGSN or GGSN, or by the CGF for checking if another GSN or CGF is alive. If this specification and GSM 09.60 differ in their description then the GSM 09.60 is to be taken as the latest specification status of the related Information elements. If the path protocol is TCP, Echo Request and Echo Response messages are not required.

The **Version Not Supported** message in the GTP' resembles much the corresponding GTP message. It indicates the latest GTP' version that the GTP' entity can support. If a receiving node receives a GTP' signalling mesage of an unsupported version, that node shall return a GTP' Version Not Supported message indicating in the Version field of the GTP' header the latest GTP' version that that node supports. The received payload data of the GTP' packet shall then be discarded.

The Version bits in the GTP' header have currently the following possible values:

GTP' version 0 (binary '000') is the GSM 12.15 v7.0.0 (October 1998) level, with the following Message Type values: 3 = Version Not Supported , 4 = Node Alive Request, 5 = Node Alive Response, 6 = Redirection Request, 7 = Redirection Response. In Chapter 7.3.4.6 the Requests Responded information element has Length field in place of the Number of Requests Responded field, to make that TLV IE to be handled like normal TLV IEs.

GTP' version 1 (binary '001') is the same as version 0, but with the duplicate CDR prevention mechanism, introduced in this specification version.

GTP' version 2 (binary '010'): as version 1, but IPv6 address type also supported (for Address of Recommended Node information element of the Redirection Request).

7.3.4.3 Redirection Request

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An Address of Recommended Node may be given if for example a CGF maintenance outage is handled by first introducing another CGF ready to take incoming CDRs. In this way the network performance can be maintained. The Address of Recommended Node shall only describe an intra-PLMN node containing a CGF, and not to a node in any other PLMN.

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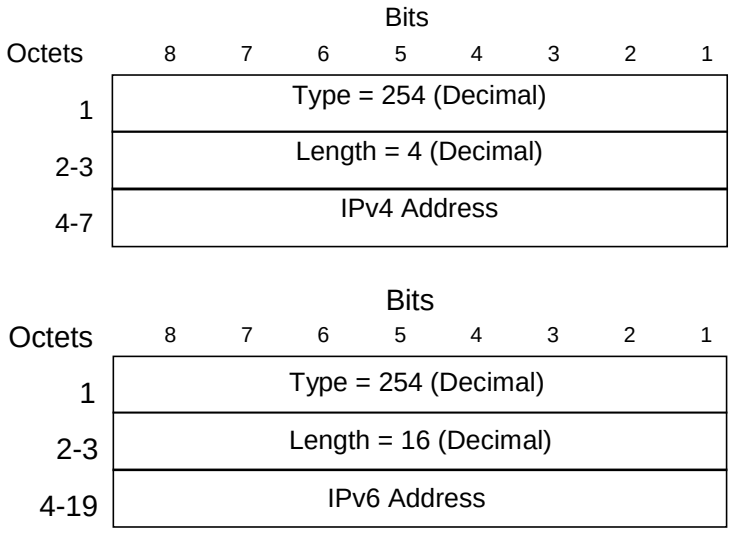

Figure 13: Address of Recommended Node information element

The optional Private Extension contains vendor or operator specific information.

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Luleå, Sweden, 28 Feb - 03 Mar 2000

***Document* S5-000158**
e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

CHANGE REQUEST

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

12.15	CR	xxx	Current Version:	7.4.0

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

For submission to:	SA#7	for approval	X	strategic		(for SMG use only)
list approval meeting # here ↑		for information		non-strategic		

Form: CR cover sheet, version 1.1 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CRF-11.rtf*

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

Source: SA5 **Date:** 02-03-2000

Subject: GTP' header length fixing, r1

Work item: Charging

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

F	Correction	X	**Release:**	Phase 2	
A	Corresponds to a correction in an earlier release			Release 96	
B	Addition of feature			Release 97	
C	Functional modification of feature			Release 98	X
D	Editorial modification			Release 99	

(releases phase2, 96, 97 and 98 apply only to GSM specifications)

Reason for change: The GTP header length which previously had always fixed length, has been changed after the GSM 09.60 specification stabilisation to have in e.g. 3G TS 29.060 3.3.0 a variable length. Now it is not possible for CGF (which does not even use GTP) to know how long the GTP' header should be, if the GTP' header would still be stated in GSM 12.15 / 3G TS 32.015 specifications to be "the same as in GTP". Therefore the GTP' header length should be defined to be just what it really is: 6 octets long. (By so far the GTP' header has been defined to have so many dummy octets after the 6 needed octets, that the total header length would be the same as in GTP. Anyhow, such assumption does not any more work, since the GTP header length is not any more always 20 octets.) The GTP' version becomes thus v2 and the GTP' Version bits are correspondingly set binary '010' in the header. Advantages: Compatibility and interoperability problems avoided. Better bandwidth usage as the previously carried dummy octets 7-20 are avoided. The CGFs can be independent of the generation (GPRS/3G/XX) and GTP subversions. Operators can get CGF service and redundancy with a lower price, as the CGFs can simultaneously serve different generation GSNs.

Clauses affected: 7.2.1, 7.3.2

Other specs affected:

Other 3G core specifications	[ ]	→ List of CRs:
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: This CR revision is an update of S5-000027.

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7.2.1 Usage of GTP Header in charging

The start of the GTP header defined in GSM 09.60 is reused. In GPRS charging, only the signalling plane of GTP is partly reused.

Bit 5 of octet 1 of the GTP header is the Protocol Type flag and is '0' if the message is GTP'.

The Version bits indicate the GTP' protocol version when the Protocol Type flag is '0'.

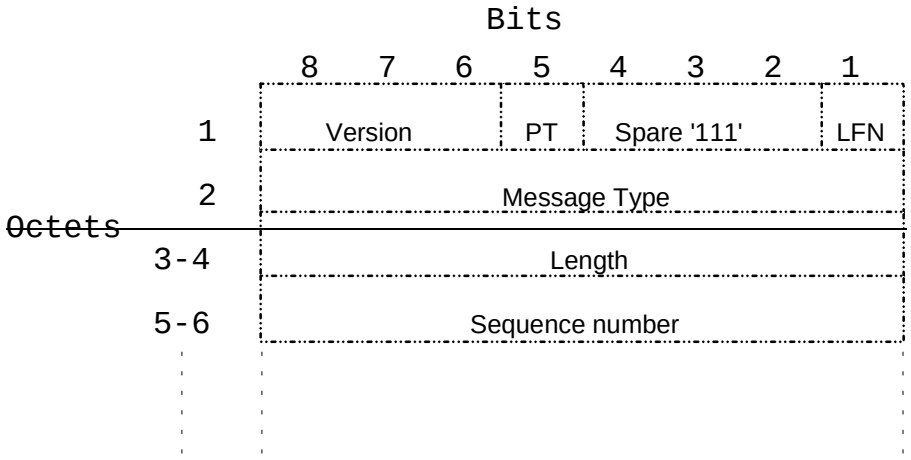
~~LFN flag (LLC Frame Number flag)~~ Bit 1 of octet 1 is not used in GTP' (except in v0), and it is '0' in the GTP' header.

The Length indicates the length of payload (number of octets after the GTP' header).

The Sequence Number of the packet is part of the GTP' header.

~~LLC Frame Number in GTP' header is always set to 255 by the sender and shall be ignored by the receiver.~~

~~TID is the tunnel identifier that points out MM and PDP contexts. In GPRS charging, it is not used, and it is always 0.~~



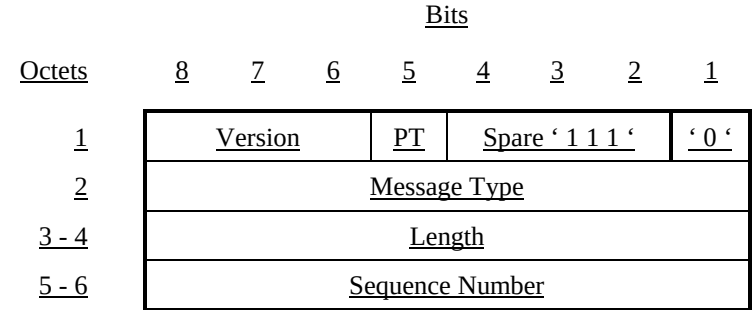


Figure 12: ~~Start of the GTP/~~GTP' header

7.3.2 Reused GTP message types

The existing **Echo Request** and **Echo Response** messages defined in GSM 09.60 are also used in GPRS charging. They may be used by the CDR generating nodes SGSN or GGSN, or by the CGF for checking if another GSN or CGF is alive. If this specification and GSM 09.60 differ in their description then the GSM 09.60 is to be taken as the latest specification status of the related Information elements. If the path protocol is TCP, Echo Request and Echo Response messages are not required.

The **Version Not Supported** message in the GTP' resembles much the corresponding GTP message. It indicates the latest GTP' version that the GTP' entity can support. If a receiving node receives a GTP' signalling mesage of an unsupported version, that node shall return a GTP' Version Not Supported message indicating in the Version field of the GTP' header the latest GTP' version that that node supports. The received payload data of the GTP' packet shall then be discarded.

The Version bits in the GTP' header have currently the following possible values:

GTP' version 0 (binary '000') is the GSM 12.15 v7.0.0 (October 1998) level, with the following Message Type values: 3 = Version Not Supported , 4 = Node Alive Request, 5 = Node Alive Response, 6 = Redirection Request, 7 = Redirection Response. In Chapter 7.3.4.6 the Requests Responded information element has Length field in place of the Number of Requests Responded field, to make that TLV IE to be handled like normal TLV IEs. If the GTP' v0 is used in parallel to GTP' v2 or a newer version, then a 6 octet header length (with no trailing dummy octets) is used also with v0 (like in GTP' v2). The mark of the usage of GTP' v0 with 6 octet header (instead of the original 20 octet long header) is then the version bits being 0 and the bit 1 of octet 1being '1' (instead of '0').

GTP' version 1 (binary '001') is the same as version 0, but with the duplicate CDR prevention mechanism, introduced in this specification version.

GTP' version 2 (binary '010') is the same as version 1, but the header is just 6 octets long. No unused trailing octets.

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***Document* S5-000159**
e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

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	xxx	Current Version:	3.0.0

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

For submission to:	SA#7	for approval	X	strategic		*(for SMG use only)*
list approval meeting # here ↑		for information		non-strategic		

Form: CR cover sheet, version 1.1 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CRF-11.rtf*

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

Source: SA5 **Date:** 02-03-2000

Subject: GTP' header length fixing, r1

Work item: Charging

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

F	Correction	X	**Release:**	Phase 2	
A	Corresponds to a correction in an earlier release			Release 96	
B	Addition of feature			Release 97	
C	Functional modification of feature			Release 98	
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(releases phase2, 96, 97 and 98 apply only to GSM specifications)

Reason for change: The GTP header length which previously had always fixed length, has been changed after the GSM 09.60 specification stabilisation to have in e.g. 3G TS 29.060 3.3.0 a variable length. Now it is not possible for CGF (which does not even use GTP) to know how long the GTP' header should be, if the GTP' header would still be stated in GSM 12.15 / 3G TS 32.015 specifications to be "the same as in GTP". Therefore the GTP' header length should be defined to be just what it really is: 6 octets long. (By so far the GTP' header has been defined to have so many dummy octets after the 6 needed octets, that the total header length would be the same as in GTP. Anyhow, such assumption does not any more work, since the GTP header length is not any more always 20 octets.) The GTP' version becomes thus v2 and the GTP' Version bits are correspondingly set binary '010' in the header. Advantages: Compatibility and interoperability problems avoided. Better bandwidth usage as the previously carried dummy octets 7-20 are avoided. The CGFs can be independent of the generation (GPRS/3G/XX) and GTP subversions. Operators can get CGF service and redundancy with a lower price, as the CGFs can simultaneously serve different generation GSNs.

Clauses affected: 7.2.1, 7.3.2

Other specs affected:

Other 3G core specifications	[ ]	→ List of CRs:
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: This CR revision is an update of S5-000028.

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7.2.1 Usage of GTP Header in charging

The start of the GTP header defined in GSM 09.60 is reused. In GPRS charging, only the signalling plane of GTP is partly reused.

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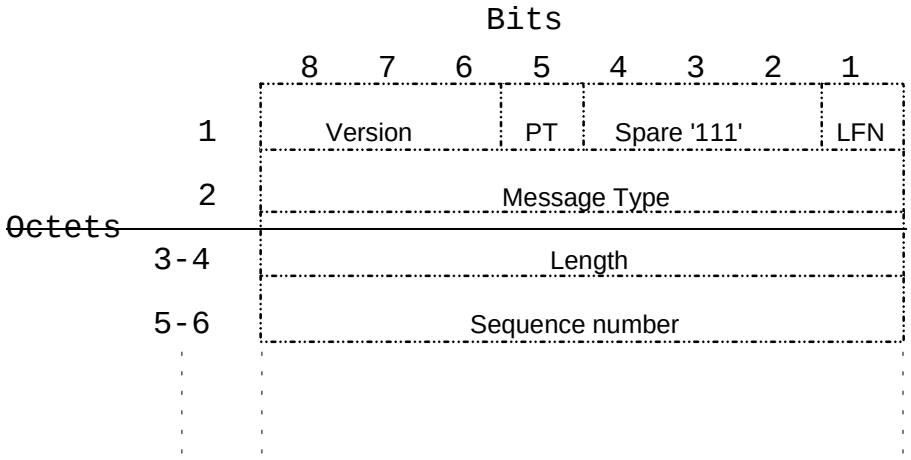
~~TID is the tunnel identifier that points out MM and PDP contexts. In GPRS charging, it is not used, and it is always 0.~~



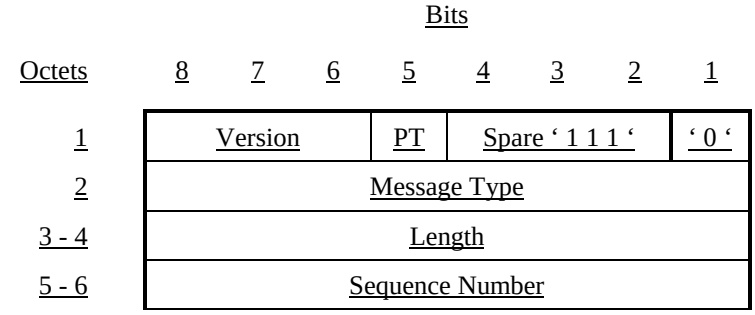


Figure 12: ~~Start of the GTP/~~GTP' header

7.3.2 Reused GTP message types

The existing **Echo Request** and **Echo Response** messages defined in GSM 09.60 are also used in GPRS charging. They may be used by the CDR generating nodes SGSN or GGSN, or by the CGF for checking if another GSN or CGF is alive. If this specification and GSM 09.60 differ in their description then the GSM 09.60 is to be taken as the latest specification status of the related Information elements. If the path protocol is TCP, Echo Request and Echo Response messages are not required.

The **Version Not Supported** message in the GTP' resembles much the corresponding GTP message. It indicates the latest GTP' version that the GTP' entity can support. If a receiving node receives a GTP' signalling mesage of an unsupported version, that node shall return a GTP' Version Not Supported message indicating in the Version field of the GTP' header the latest GTP' version that that node supports. The received payload data of the GTP' packet shall then be discarded.

The Version bits in the GTP' header have currently the following possible values:

GTP' version 0 (binary '000') is the GSM 12.15 v7.0.0 (October 1998) level, with the following Message Type values: 3 = Version Not Supported , 4 = Node Alive Request, 5 = Node Alive Response, 6 = Redirection Request, 7 = Redirection Response. In Chapter 7.3.4.6 the Requests Responded information element has Length field in place of the Number of Requests Responded field, to make that TLV IE to be handled like normal TLV IEs. If the GTP' v0 is used in parallel to GTP' v2 or a newer version, then a 6 octet header length (with no trailing dummy octets) is used also with v0 (like in GTP' v2). The mark of the usage of GTP' v0 with 6 octet header (instead of the original 20 octet long header) is then the version bits being 0 and the bit 1 of octet 1being '1' (instead of '0').

GTP' version 1 (binary '001') is the same as version 0, but with the duplicate CDR prevention mechanism, introduced in this specification version.

GTP' version 2 (binary '010') is the same as version 1, but the header is just 6 octets long. No unused trailing octets.

3GPP TSG SA WG5 Meeting #10
Luleå, Sweden, 28 Feb - 03 Mar 2000

***Document* S5-000160**
e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

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	xxx	Current Version:	3.0.0

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

For submission to:	SA#7	for approval	X	strategic		(for SMG use only)
list approval meeting # here ↑		for information		non-strategic		

Form: CR cover sheet, version 1.1 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CRF-11.rtf*

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

Source: SA5 **Date:** 02-03-2000

Subject: Charging Characteristics to CDRs

Work item: Charging

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

F	Correction		**Release:**	Phase 2	
A	Corresponds to a correction in an earlier release			Release 96	
B	Addition of feature	X		Release 97	
C	Functional modification of feature			Release 98	
D	Editorial modification			Release 99	X

(releases phase2, 96, 97 and 98 apply only to GSM specifications)

Reason for change: The Charging Characteristics

Clauses affected: 6.1.1, 6.1.2, 6.1.3, 6.1.4, 6.1.5, 6.1.6.33 (New), 8.1

Other specs affected:

Other 3G core specifications	[ ]	→ List of CRs:
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:


help.doc

<--------- double-click here for help and instructions on how to create a CR

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.
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.

6.1.2 ~~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).
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 HLR.

6.1.3 ~~6.1.3~~ GPRS mobile station mobility management data in SGSN (M-CDR)

If the collection of MS mobility management data is enabled then GPRS SGSN shall start collecting information each time the mobile is attached to the SGSN.

Table 7: GPRS SGSN mobile station mobility management data

Field		Description
Record Type	M	GPRS SGSN mobility management record.
Served IMSI	M	IMSI of the MS.
Served IMEI	C	The IMEI of the ME, if available.
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 record creation.
Cell Identity	O	Cell id at the time of the record creation.
Change of Location	O	A list of changes in Routing Area Identity, each time stamped.
Record Opening Time	M	Timestamp when this record was opened.
Duration	O	Duration of this record.
SGSN Change	C	Present if this is first record after SGSN change.
Cause for Record Closing	M	The reason for the release of the record in 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.
Charging Characteristics	C	The Charging Characteristics flag set retrieved from the HLR.

6.1.4 ~~6.1.4~~ GPRS MO SMS data in SGSN (S-SMO-CDR)

If enabled, an S-SMO-CDR SGSN Mobile originated SMS record shall be produced for each short message sent by a mobile subscriber via SGSN.

Table 8: SGSN Mobile originated SMS record

Field		Description
Record Type	M	SGSN Mobile Originated SMS.
Served IMSI	M	The IMSI of the subscriber.
Served IMEI	O	The IMEI of the ME, if available.
Served MSISDN	O	The primary MSISDN of the subscriber.
MS Network Capability	M	The mobile station network capability.
Service Centre	M	The address (E.164) of the SMS-service centre.
Recording Entity	M	The E.164 number of the SGSN.
Location Area Code	O	The Location Area Code from which the message originated.
Routing Area Code	O	The Routing Area Code from which the message originated.
Cell Identity	O	The Cell Identity from which the message originated.
Event Time Stamp	M	The time at which the message was received by the SGSN from the subscriber.
Message Reference	M	A reference, provided by the MS uniquely identifying this message.
SMS Result	C	The result of the attempted delivery if unsuccessful.
Record Extensions	O	A set of network/ manufacturer specific extensions to the record.
Node ID	O	Name of the recording entity.

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 HLR.

6.1.5 GPRS MT SMS data in SGSN (S-SMT-CDR)

If enabled, an SGSN Mobile terminated SMS record shall be produced for each short message received by a mobile subscriber via SGSN.

Table 9: SGSN Mobile terminated SMS record

Field		Description
Record Type	M	SGSN Mobile terminated SMS.
Served IMSI	M	The IMSI of the subscriber.
Served IMEI	O	The IMEI of the ME, if available.
Served MSISDN	O	The primary MSISDN of the subscriber.
MS Network Capability	M	The mobile station network capability
Service Centre	M	The address (E.164) of the SMS-service centre.
Recording Entity	M	The E.164 number of the SGSN.
Location Area Code	O	The Location Area Code to which the message was delivered.
Routing Area Code	O	The Routing Area Code to which the message was delivered.
Cell Identity	O	The Cell Identity to which the message was delivered.
Event Time Stamp	M	Delivery time stamp, time at which message was sent to the MS by the SGSN.
SMS Result	C	The result of the attempted delivery if unsuccessful.
Record Extensions	O	A set of network/ manufacturer specific extensions to the record.
Node ID	O	Name of the recording entity.
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 HLR.

6.1.6 Description of Record Fields

6.1.6.32 APN Selection Mode

This field indicates how the SGSN selected the APN to be used. The values and their meaning are as specified in GSM 09.60 [22] clause 7.9 'Information elements'.

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.

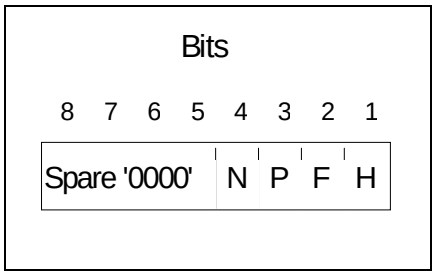


Figure XX: Charging Characteristics flags

8.1 ASN.1 definitions for CDR information

Within the current GSM 12-series of specifications the ASN.1 definitions are based on X.208 [40] which has been superseded by X.680. This newer version not only includes new features but also removes some that were present in X.208. It was agreed that where possible, the GPRS work would be based on those ASN.1 features that were common to both. However, where necessary, the new features in X.680 [41] be used in some places. X.208 feature that are no longer in X.680 will not be used.

```
Changes (enhancements) in GSM1205-DataTypes:

CallEventRecordType     ::= INTEGER
{
    moCallRecord            (0),
    mtCallRecord            (1),
    roamingRecord           (2),
    incGatewayRecord        (3),
    outGatewayRecord        (4),
    transitCallRecord       (5),
    moSMSRecord             (6),
    mtSMSRecord             (7),
    moSMSIWRecord           (8),
    mtSMSGWRecord           (9),
    ssActionRecord          (10),
    hlrIntRecord            (11),
    locUpdateHLRRecord      (12),
    locUpdateVLRRecord      (13),
    commonEquipRecord       (14),
    moTraceRecord           (15),
    mtTraceRecord           (16),
    termCAMELIntRecord      (17),
    sgsnPDPRecord           (18),
    ggsnPDPRecord           (19),
    sgsnMMRecord            (20),
    sgsnSMORecord           (21),
    sgsnSMTRecord           (22)

}
GPRS_Charging-DataTypes { ... }

DEFINITIONS IMPLICIT TAGS   ::=

BEGIN

-- EXPORTS everything

IMPORTS

CellId, Diagnostics, CallDuration, ManagementExtensions, TimeStamp, MSISDN, LocationAreaCode,
MessageReference, RecordingEntity, SMSResult
FROM GSM1205-DataTypes{ ccitt (0) identified-organization (4) etsi(0) mobileDomain (0) gsmOperation-
Maintenance (3) moduleId (3) gsm-12-05 (5) InformationModel (0) asn1Module (2) 1 }


AddressString, ISDN-AddressString, IMSI, IMEI
FROM MAP-CommonDataTypes { ccitt identified-organization (4) etsi(0) mobileDomain (0) gsmNetworkId
(1) moduleId (3) map-CommonDataTypes (18) version2 (2) }


ObjectInstance
FROM CMIP-1 {joint-iso-ccitt ms(9) cmip(1) version1 (1) protocol (3)}

ManagementExtension
FROM Attribute-ASN1Module {joint-iso-ccitt ms(9) smi(3) part2 (2) asn1Module(2) 1}

AE-title
FROM ACSE-1 {joint-iso-ccitt association-control(2) abstract-syntax(1) apdus(0) version(1) };
--
-- Note that the syntax of AE-title to be used is from
-- CCITT Rec. X.227 / ISO 8650 corrigendum and not "ANY"
--
-------------------------------------------------------------------------------
--
--  CALL AND EVENT RECORDS
--
-------------------------------------------------------------------------------

CallEventRecord ::= CHOICE
{
    sgsnPDPRecord           [0] SGSNPDPRecord,
```

```
    ggsnPDPRecord           [1] GGSNPDPRecord,
    sgsnMMRecord            [2] SGSNMMRecord,
    sgsnSMORecord           [3] SGSNSMORecord,
    sgsnSMTRecord           [4] SGSNSMTRecord
}

GGSNPDPRecord   ::= SET
{
    recordType              [0] CallEventRecordType,
    networkInitiation       [1] NetworkInitiatedPDPContext OPTIONAL,
    anonymousAccessIndicator    [2] BOOLEAN OPTIONAL,
    servedIMSI              [3] IMSI,
    ggsnAddress             [4] GSNAddress,
    chargingID              [5] ChargingID,
    sgsnAddress             [6] SEQUENCE OF GSNAddress,
    accessPointNameNI       [7] AccessPointNameNI,
    pdpType                 [8] PDPType,
    servedPDPAddress        [9] PDPAddress,
    remotePDPAddress        [10] SEQUENCE OF PDPAddress OPTIONAL,
    dynamicAddressFlag      [11] DynamicAddressFlag OPTIONAL,
    listOfTrafficVolumes    [12] SEQUENCE OF ChangeOfCharCondition,
    recordOpeningTime       [13] TimeStamp,
    duration                [14] CallDuration,
    causeForRecClosing      [15] CauseForRecClosing,
    diagnostics             [16] Diagnostics OPTIONAL,
    recordSequenceNumber    [17] INTEGER OPTIONAL,
    nodeID                  [18] NodeID OPTIONAL,
    recordExtensions        [19] ManagementExtensions OPTIONAL,
    localSequenceNumber     [20] LocalSequenceNumber OPTIONAL,
    apnSelectionMode        [21] APNSelectionMode,
    chargingCharacteristics [22] ChargingCharacteristics CONDITIONAL
}


SGSNMMRecord    ::= SET
{
    recordType              [0] CallEventRecordType,
    servedIMSI              [1] IMSI ,
    servedIMEI              [2] IMEI OPTIONAL,
    sgsnAddress             [3] GSNAddress,
    msNetworkCapability     [4] MSNetworkCapability OPTIONAL,
    routingArea             [5] RoutingAreaCode OPTIONAL,
    locationAreaCode        [6] LocationAreaCode OPTIONAL,
    cellIdentity            [7] CellId OPTIONAL,
    changeLocation          [8] SEQUENCE OF ChangeLocation OPTIONAL,
    recordOpeningTime       [9] TimeStamp,
    duration                [10] CallDuration OPTIONAL,
    sgsnChange              [11] SGSNChange OPTIONAL,
    causeForRecClosing      [12] CauseForRecClosing,
    diagnostics             [13] Diagnostics OPTIONAL,
    recordSequenceNumber    [14] INTEGER OPTIONAL,
    nodeID                  [15] NodeID OPTIONAL,
    recordExtensions        [16] ManagementExtensions OPTIONAL,
    localSequenceNumber     [17] LocalSequenceNumber OPTIONAL,
    chargingCharacteristics [22] ChargingCharacteristics CONDITIONAL
}

SGSNPDPRecord   ::= SET
{
    recordType              [0] CallEventRecordType,
    networkInitiation       [1] NetworkInitiatedPDPContext OPTIONAL,
    anonymousAccessIndicator    [2] BOOLEAN OPTIONAL,
    servedIMSI              [3] IMSI ,
    servedIMEI              [4] IMEI OPTIONAL,
    sgsnAddress             [5] GSNAddress,
    msNetworkCapability     [6] MSNetworkCapability OPTIONAL,
    routingArea             [7] RoutingAreaCode OPTIONAL,
    locationAreaCode        [8] LocationAreaCode OPTIONAL,
    cellIdentity            [9] CellId OPTIONAL,
    chargingID              [10] ChargingID,
    ggsnAddressUsed         [11] GSNAddress,
    accessPointNameNI       [12] AccessPointNameNI,
    pdpType                 [13] PDPType,
    servedPDPAddress        [14] PDPAddress,
    listOfTrafficVolumes    [15] SEQUENCE OF ChangeOfCharCondition,
    recordOpeningTime       [16] TimeStamp,
    duration                [17] CallDuration,
    sgsnChange              [18] SGSNChange OPTIONAL,
    causeForRecClosing      [19] CauseForRecClosing,
    diagnostics             [20] Diagnostics OPTIONAL,
    recordSequenceNumber    [21] INTEGER OPTIONAL,
    nodeID                  [22] NodeID OPTIONAL,
    recordExtensions        [23] ManagementExtensions OPTIONAL,
```

```
    localSequenceNumber     [24] LocalSequenceNumber OPTIONAL,
    apnSelectionMode        [25] APNSelectionMode,
    accessPointNameOI       [26] AccessPointNameOI,
    chargingCharacteristics [22] ChargingCharacteristics CONDITIONAL
}

SGSNSMORecord   ::= SET
{
    recordType              [0] CallEventRecordType,
    servedIMSI              [1] IMSI,
    servedIMEI              [2] IMEI OPTIONAL,
    servedMSISDN            [3] MSISDN OPTIONAL,
    msNetworkCapability     [4] MSNetworkCapability,
    serviceCentre           [5] AddressString,
    recordingEntity         [6] RecordingEntity,
    locationArea            [7] LocationAreaCode OPTIONAL,
    routingArea             [8] RoutingAreaCode OPTIONAL,
    cellIdentity            [9] CellId OPTIONAL,
    messageReference        [10] MessageReference,
    originationTime         [11] TimeStamp,
    smsResult               [12] SMSResult OPTIONAL,
    recordExtensions        [13] ManagementExtensions OPTIONAL,
    nodeID                  [14] NodeID OPTIONAL,
    localSequenceNumber     [15] LocalSequenceNumber OPTIONAL,
    chargingCharacteristics [22] ChargingCharacteristics CONDITIONAL
}

SGSNSMTRecord   ::= SET
{
    recordType              [0] CallEventRecordType,
    servedIMSI              [1] IMSI,
    servedIMEI              [2] IMEI OPTIONAL,
    servedMSISDN            [3] MSISDN OPTIONAL,
    msNetworkCapability     [4] MSNetworkCapability,
    serviceCentre           [5] AddressString,
    recordingEntity         [6] RecordingEntity,
    locationArea            [7] LocationAreaCode OPTIONAL,
    routingArea             [8] RoutingAreaCode OPTIONAL,
    cellIdentity            [9] CellId OPTIONAL,
    originationTime         [10] TimeStamp,
    smsResult               [11] SMSResult OPTIONAL,
    recordExtensions        [12] ManagementExtensions OPTIONAL,
    nodeID                  [13] NodeID OPTIONAL,
    localSequenceNumber     [14] LocalSequenceNumber OPTIONAL,
    chargingCharacteristics [22] ChargingCharacteristics CONDITIONAL
}

-------------------------------------------------------------------------------
--
--  OBJECT IDENTIFIERS
--
-------------------------------------------------------------------------------

gsm1205InformationModel  OBJECT IDENTIFIER  ::=
    { ccitt (0) identified-organization (4) etsi (0) mobileDomain (0)
    gsm-Operation-Maintenance (3) gsm-12-05 (5) informationModel (0) }

gsm1205ASN1Module   OBJECT IDENTIFIER   ::=
    { gsm1205InformationModel asn1Module(2) }

gsm1205ManagedObjectClass OBJECT IDENTIFIER ::=
    { gsm1205InformationModel managedObjectClass(3) }

gsm1205Package OBJECT IDENTIFIER ::=
    { gsm1205InformationModel package(4) }

gsm1205NameBinding OBJECT IDENTIFIER ::=
    { gsm1205InformationModel nameBinding(6) }

gsm1205Attribute OBJECT IDENTIFIER ::=
    { gsm1205InformationModel attribute(7) }

gsm1205Action OBJECT IDENTIFIER ::=
    { gsm1205InformationModel action(9) }

gsm1205Notification OBJECT IDENTIFIER   ::=
    { gsm1205InformationModel notification(10) }

-------------------------------------------------------------------------------
--
--  COMMON DATA TYPES
--
-------------------------------------------------------------------------------
```

```
AccessPointNameNI   ::= IA5String (SIZE(1..63))
    --
    -- Network Identifier part of APN in "dot" representation
    -- see GSM 03.03
    --

AccessPointNameOI   ::= IA5String (SIZE(1..37))
    --
    -- Operator Identifier part of APN in dot representation
    -- see GSM 03.03
    --

APNSelectionMode ::= ENUMERATED
{
    --
    -- See Information Elements TS GSM 09.60
    --
    MSorNetworkProvidedSubscriptionVerified            (0),
    MSProvidedSubscriptionNotVerified                  (1),
    NetworkProvidedSubscriptionNotVerified             (2)
}

CauseForRecClosing  ::= INTEGER
{
    --
    -- in GGSN the value sGSNChange should be used for partial record
    -- generation due to SGSN Address List Overflow
    --
    -- cause codes 0 to 15 are defined in GSM12.05 as 'CauseForTerm' (cause for termination)
    --
    normalRelease           (0),
    abnormalRelease         (4),
    volumeLimit             (16),
    timeLimit               (17),
    sGSNChange              (18),
    maxChangeCond           (19),
    managementIntervention  (20)
}

ChangeCondition ::= ENUMERATED
{
    qoSChange               (0),
    tariffTime              (1),
    recordClosure           (2)
}

ChangeOfCharCondition   ::= SEQUENCE
    --
    -- used in PDP context record only
    --
{
    qosRequested            [1] QoSInformation OPTIONAL,
    qosNegotiated           [2] QoSInformation OPTIONAL,
    dataVolumeGPRSUplink    [3] DataVolumeGPRS,
    dataVolumeGPRSDownlink  [4] DataVolumeGPRS,
    changeCondition         [5] ChangeCondition,
    changeTime              [6] TimeStamp
}

ChangeLocation  ::= SEQUENCE
    --
    -- used in SGSNMMRecord only
    --
{
    locationAreaCode        [0] LocationAreaCode,
    routingAreaCode         [1] RoutingAreaCode,
    cellId                  [2] CellID OPTIONAL,
    changeTime              [3] TimeStamp
}

ChargingID  ::= INTEGER (0..4294967295)
    --
    -- generated in GGSN, part of PDP context, see TS GSM 03.60
    -- 0..4294967295 is equivalent to 0..2**32-1

DataVolumeGPRS  ::= INTEGER
    --
    -- The volume of uncompressed data transferred in octets.
    --

DynamicAddressFlag  ::= BOOLEAN
```

```
ETSIAddress ::= AddressString
    --
    --first octet for nature of address, and numbering plan indicator (3 for X.121)
    --other octets TBCD
    -- See TS GSM 09.02
    --

GSNAddress  ::= IPAddress

IPAddress   ::= CHOICE
{
    iPBinaryAddress  IPBinaryAddress,
    iPTextRepresentedAddress     IPTextRepresentedAddress
}
IPBinaryAddress ::= CHOICE
{
    iPBinV4Address          [0] OCTET STRING (SIZE(4)),
    iPBinV6Address          [1] OCTET STRING (SIZE(16))
}
IPTextRepresentedAddress    ::= CHOICE
{   --
    -- IP address in the familiar "dot" notation
    --
    iPTextV4Address         [2] IA5String (SIZE(7..15)),
    iPTextV6Address         [3] IA5String (SIZE(15..45))
}

LocalSequenceNumber  ::= INTEGER (0..4294967295)
    --
    -- Sequence number of the record in this node
    -- 0.. 4294967295 is equivalent to 0..2**32-1, unsigned integer in four octets

MSNetworkCapability ::= OCTET STRING (SIZE(1))

NetworkInitiatedPDPContext  ::= BOOLEAN
    --
    -- Set to true if PDP context was initiated from network side
    --

NodeID  ::= IA5 string (SIZE(1..20))

PDPAddress  ::= CHOICE
{
    iPAddress               [0] IPAddress,
    eTSIAddress             [1] ETSIAddress
}

PDPType     ::= OCTET STRING (SIZE(2))
    --
    --OCTET 1: PDP Type Organization
    --OCTET 2: PDP Type Number
    -- See TS GSM 09.60
    --

QoSDelay        ::= ENUMERATED
{
    --
    -- See Quality of service TS GSM 04.08
    --
    delayClass1             (0),
    delayClass2             (1),
    delayClass3             (2),
    delayClass4             (3)
}

QoSInformation  ::=SEQUENCE
{
    reliability             [0] QoSReliability,
    delay                   [1] QoSDelay,
    precedence              [2] QoSPrecedence,
    peakThroughput          [3] QoSPeakThroughput,
    meanThroughput          [4] QoSMeanThroughput
}

QoSMeanThroughput   ::= ENUMERATED
{
    --
    -- See Quality of service TS GSM 04.08
    --
    bestEffort              (0),
    mean100octetPh          (1),
    mean200octetPh          (2),
    mean500octetPh          (3),
```

```
    mean1000octetPh         (4),
    mean2000octetPh         (5),
    mean5000octetPh         (6),
    mean10000octetPh        (7),
    mean20000octetPh        (8),
    mean50000octetPh        (9),
    mean100000octetPh       (10),
    mean200000octetPh       (11),
    mean500000octetPh       (12),
    mean1000000octetPh      (13),
    mean2000000octetPh      (14),
    mean5000000octetPh      (15),
    mean10000000octetPh     (16),
    mean20000000octetPh     (17),
    mean50000000octetPh     (18)
}

QoSPeakThroughput   ::= ENUMERATED
{
    --
    -- See Quality of service TS GSM 04.08
    --
    unspecified             (0),
    upTo100OctetPs          (1),
    upTo200OctetPs          (2),
    upTo400OctetPs          (3),
    upTo800OctetPs          (4),
    upTo1600OctetPs         (5),
    upTo3200OctetPs         (6),
    upTo6400OctetPs         (7),
    upTo12800OctetPs        (8),
    upTo25600OctetPs        (9)
}

QoSPrecedence   ::= ENUMERATED
{
    --
    -- See Quality of service TS GSM 04.08
    --
    unspecified             (0),
    highPriority            (1),
    normalPriority          (2),
    lowPriority             (3)
}

QoSReliability  ::= ENUMERATED
{
```

```
    --
    -- See Quality of service TS GSM 04.08
    --
    unspecifiedReliability  (0),
    acknowledgedGTP         (1),
    unackGTPAcknowLLC       (2),
    unackGTPLLCAcknowRLC    (3),
    unackGTPLLCRLC          (4),
    unacknowUnprotectedData (5)
}

RoutingAreaCode ::= OCTET STRING (SIZE(1))
    --
    -- See TS GSM 04.08 --
    --

SGSNChange  ::= BOOLEAN
    --
    -- present if first record after inter SGSN routing area update
    -- in new SGSN
    --

ChargingCharacteristics ::= OCTET STRING (SIZE(1))
    --
    --  Descriptions for the bits of the flag set:
    --
    --  Bit 1: H (Hot billing)          := '00000001'B
    --  Bit 2: F (Flat rate)            := '00000010'B
    --  Bit 3: P (Prepaid service)      := '00000100'B
    --  Bit 4: N (Normal billing)       := '00001000'B
    --  Bit 5: - (Reserved, set to 0)   := '00010000'B
    --  Bit 6: - (Reserved, set to 0)   := '00100000'B
    --  Bit 7: - (Reserved, set to 0)   := '01000000'B
    --  Bit 8: - (Reserved, set to 0)   := '10000000'B
    --
```

3GPP TSG SA WG5 (Network Management) Meeting #10
Lulea, Sweden, 29th Feb – 3rd Mar, 2000

S5-000166

Document

e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

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**		Current Version:	3.0.0

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

For submission to:	SA#7	for approval	X	strategic		(for SMG use only)
list expected approval meeting # here ↑		for information		non-strategic		

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 **Date:** 02.03.2000

Subject: Addition of MSISDN in GPRS CDRs

Work item:

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

F	Correction		**Release:**	Phase 2	
A	Corresponds to a correction in an earlier release			Release 96	
B	Addition of feature	X		Release 97	
C	Functional modification of feature			Release 98	
D	Editorial modification			Release 99	X
				Release 00	

Reason for change:

1) According to § 5.4 the couple (GGSN address, Charging ID) identifies all the CDRs related to a given PDP context. Therefore the GGSN address shall be included in all S-CDRs and G-CDRs.

2) Currently PDP context related GSN generated CDRs do not include subscriber's MSISDN. This is considered as and important information, therefore it is proposed to add it as an optional data in S-CDRs, G-CDRs and M-CDRs.

Clauses affected: 6.1, 6.1.1, 6.1.2, 6.1.3, 8.1

Other specs affected:

Other 3G core specifications		→ List of CRs:
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:

6 Charging Data Collection

6.1 Record contents

The following tables describe the contents of each of the call and event records generated by the GSNs. Each table contains the name of the field, a key indicating whether or not the field is mandatory, and a description of the contents.

The key field has the following meaning:

M This field is mandatory and always present. Any exceptions to this rule are explicitly described.

C This field is only available under certain conditions. If available the field is present.

The conditions under which the field is available are individually described.

O This field is optional and configurable either via additional TMN management functions or manufacturer specific means. For the avoidance of doubt, optional does not mean that the parameter is not supported by the network element. Equipment manufacturers shall be capable of providing all of these fields in order to claim conformance with this document.

The mandatory, conditional, and optional designations are described at the GSN / CGF interface (see exceptions below) and may be available at the CGF / BS interface to meet the Billing System requirement.

All the mandatory or conditional fields are not required in all CDRs at the GSN / CGF interface in the following cases:

- Each information element is included at least in one record. This applies for situations where partial records are produced between the GSN and CGF, and the information has not changed, e.g. "~~GGSN Address Used~~Network Initiated PDP Context". The following primary identifier fields are however needed in all records: Record Type, Served IMSI, and if the CDR is related to a PDP context (G-CDR and S-CDR), GGSN Address, then also the Charging ID.

- GSNs are configured to produce only part of the described information. This applies for situations where record types are not produced or some functional component is excluded from the records such as whole M-CDR or time based charging in G-CDR.

In the case of a distributed CGF the following charging data records are not applicable at the GSN / CGF interface and proprietary solutions or variations to this standard are allowed. However, the described information content needs to be supported to be able to conform to the requirements towards the BS.

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.

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.

6.1.3 GPRS mobile station mobility management data in SGSN (M-CDR)

If the collection of MS mobility management data is enabled then GPRS SGSN shall start collecting information each time the mobile is attached to the SGSN.

Table 7: GPRS SGSN mobile station mobility management data

Field		Description
Record Type	M	GPRS SGSN mobility management record.
Served IMSI	M	IMSI of the MS.
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 record creation.
Cell Identity	O	Cell id at the time of the record creation.
Change of Location	O	A list of changes in Routing Area Identity, each time stamped.
Record Opening Time	M	Timestamp when this record was opened.
Duration	O	Duration of this record.
SGSN Change	C	Present if this is first record after SGSN change.
Cause for Record Closing	M	The reason for the release of the record in 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.

8 Charging Data Record Structure

8.1 ASN.1 definitions for CDR information

```
-------------------------------------------------------------------------------
--
--  CALL AND EVENT RECORDS
--
-------------------------------------------------------------------------------

CallEventRecord ::= CHOICE
{
    sgsnPDPRecord           [0] SGSNPDPRecord,
    ggsnPDPRecord           [1] GGSNPDPRecord,
    sgsnMMRecord            [2] SGSNMMRecord,
    sgsnSMORecord           [3] SGSNSMORecord,
    sgsnSMTRecord           [4] SGSNSMTRecord
}

GGSNPDPRecord   ::= SET
{
    recordType              [0] CallEventRecordType,
    networkInitiation       [1] NetworkInitiatedPDPContext OPTIONAL,
    anonymousAccessIndicator    [2] BOOLEAN OPTIONAL,
    servedIMSI              [3] IMSI,
    ggsnAddress             [4] GSNAddress,
    chargingID              [5] ChargingID,
    sgsnAddress             [6] SEQUENCE OF GSNAddress,
    accessPointNameNI       [7] AccessPointNameNI,
    pdpType                 [8] PDPType,
    servedPDPAddress        [9] PDPAddress,
    remotePDPAddress        [10] SEQUENCE OF PDPAddress OPTIONAL,
    dynamicAddressFlag      [11] DynamicAddressFlag OPTIONAL,
    listOfTrafficVolumes    [12] SEQUENCE OF ChangeOfCharCondition,
    recordOpeningTime       [13] TimeStamp,
    duration                [14] CallDuration,
    causeForRecClosing      [15] CauseForRecClosing,
    diagnostics             [16] Diagnostics OPTIONAL,
    recordSequenceNumber    [17] INTEGER OPTIONAL,
    nodeID                  [18] NodeID OPTIONAL,
    recordExtensions        [19] ManagementExtensions OPTIONAL,
    localSequenceNumber     [20] LocalSequenceNumber OPTIONAL,
    apnSelectionMode        [21] APNSelectionMode,
    servedMSISDN            [22] MSISDN OPTIONAL
}


SGSNMMRecord    ::= SET
{
    recordType              [0] CallEventRecordType,
    servedIMSI              [1] IMSI ,
    servedIMEI              [2] IMEI OPTIONAL,
    sgsnAddress             [3] GSNAddress,
    msNetworkCapability     [4] MSNetworkCapability OPTIONAL,
    routingArea             [5] RoutingAreaCode OPTIONAL,
```

```
    locationAreaCode        [6] LocationAreaCode OPTIONAL,
    cellIdentity            [7] CellId OPTIONAL,
    changeLocation          [8] SEQUENCE OF ChangeLocation OPTIONAL,
    recordOpeningTime       [9] TimeStamp,
    duration                [10] CallDuration OPTIONAL,
    sgsnChange              [11] SGSNChange OPTIONAL,
    causeForRecClosing      [12] CauseForRecClosing,
    diagnostics             [13] Diagnostics OPTIONAL,
    recordSequenceNumber    [14] INTEGER OPTIONAL,
    nodeID                  [15] NodeID OPTIONAL,
    recordExtensions        [16] ManagementExtensions OPTIONAL,
    localSequenceNumber     [17] LocalSequenceNumber OPTIONAL,
    servedMSISDN            [18] MSISDN OPTIONAL
}

SGSNPDPRecord   ::= SET
{
    recordType              [0] CallEventRecordType,
    networkInitiation       [1] NetworkInitiatedPDPContext OPTIONAL,
    anonymousAccessIndicator    [2] BOOLEAN OPTIONAL,
    servedIMSI              [3] IMSI ,
    servedIMEI              [4] IMEI OPTIONAL,
    sgsnAddress             [5] GSNAddress,
    msNetworkCapability     [6] MSNetworkCapability OPTIONAL,
    routingArea             [7] RoutingAreaCode OPTIONAL,
    locationAreaCode        [8] LocationAreaCode OPTIONAL,
    cellIdentity            [9] CellId OPTIONAL,
    chargingID              [10] ChargingID,
    ggsnAddressUsed         [11] GSNAddress,
    accessPointNameNI       [12] AccessPointNameNI,
    pdpType                 [13] PDPType,
    servedPDPAddress        [14] PDPAddress,
    listOfTrafficVolumes    [15] SEQUENCE OF ChangeOfCharCondition,
    recordOpeningTime       [16] TimeStamp,
    duration                [17] CallDuration,
    sgsnChange              [18] SGSNChange OPTIONAL,
    causeForRecClosing      [19] CauseForRecClosing,
    diagnostics             [20] Diagnostics OPTIONAL,
    recordSequenceNumber    [21] INTEGER OPTIONAL,
    nodeID                  [22] NodeID OPTIONAL,
    recordExtensions        [23] ManagementExtensions OPTIONAL,
    localSequenceNumber     [24] LocalSequenceNumber OPTIONAL,
    apnSelectionMode        [25] APNSelectionMode
    accessPointNameOI       [26] AccessPointNameOI,
    servedMSISDN            [27] MSISDN OPTIONAL
}
```