

Source: SA WG5 (Telecom Management)
Title: CRs to Telecommunications Management; Charging and billing;
GSM call and event data for the Packet Switched (PS) domain
(32.015)
Document for: Approval
Agenda Item: 7.5.3

Doc-1st-Level	Doc-2nd-Level	Spec	CR	Rev	Phase	Cat	Subject	Versi on-Curre nt	Versi on-New
SP-000433	S5-000354	32.015	010		R99	F	Clarifications to chapter 7	3.2.0	3.3.0
SP-000433	S5-000355	32.015	011		R99	F	Clarifications and corrections	3.2.0	3.3.0
SP-000433	S5-000356	32.015	012		R99	F	Clarification for QoS parameter	3.2.0	3.3.0

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 010		Current Version: V3.2.0	
GSM (AA.BB) or 3G (AA.BBB) specification number ↑		↑ CR number as allocated by MCC support team	
For submission to: SA#9 <small>list expected approval meeting # here ↑</small>	for approval <input checked="" type="checkbox"/>	strategic <input type="checkbox"/>	(for SMG use only)
	for information <input type="checkbox"/>	non-strategic <input type="checkbox"/>	

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: (U)SIM ME UTRAN / Radio Core Network
(at least one should be marked with an X)

Source: **SA5#13** (Charging Rapporteur Group) **Date:** 2000-07-25

Subject: Miscellaneous detail clarifications to chapter 7

Work item: Charging

Category: <small>(only one category shall be marked with an X)</small>	F Correction	<input checked="" type="checkbox"/>	Release: Phase 2 <input type="checkbox"/> Release 96 <input type="checkbox"/> Release 97 <input type="checkbox"/> Release 98 <input type="checkbox"/> Release 99 <input checked="" type="checkbox"/> Release 00 <input type="checkbox"/>
	A Corresponds to a correction in an earlier release	<input type="checkbox"/>	
	B Addition of feature	<input type="checkbox"/>	
	C Functional modification of feature	<input type="checkbox"/>	
	D Editorial modification	<input type="checkbox"/>	

Reason for change: To add an earlier SA5 approved sentence to 7.3.2 (IPv6 support to the version history of GTP'), since the related CR S5-00141 (and its 12.15 mirror CR S5-00140) became approved in the SA5 meeting #10 in Luleå.

GTP-only messages are removed from the GTP' message table.

Also, some typos are corrected and some descriptions clarified, to avoid ambiguous text points.

Clauses affected: 7.2, 7.3.1, 7.3.2

Other specs affected:	Other 3G core specifications	<input type="checkbox"/>	→ List of CRs:	
	Other GSM core specifications	<input type="checkbox"/>	→ List of CRs:	
	MS test specifications	<input type="checkbox"/>	→ List of CRs:	
	BSS test specifications	<input type="checkbox"/>	→ List of CRs:	
	O&M specifications	<input type="checkbox"/>	→ List of CRs:	

Other comments:

7.2 The GTP' charging protocol

This subclause describes the necessary enhancements and additional features of the GTP' protocol message types to the basic For the message types mentioned in the chapter "Reused GTP Message Types" GTP protocol, described in see also the related subchapters in TS 29.060, GTP' is used for GPRS and 3G charging data collection.

7.2.1 Usage of GTP Header in charging

The start of the GTP header defined in TS 29.060 is reused. In GPRS charging GTP' messaging, 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'.

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.

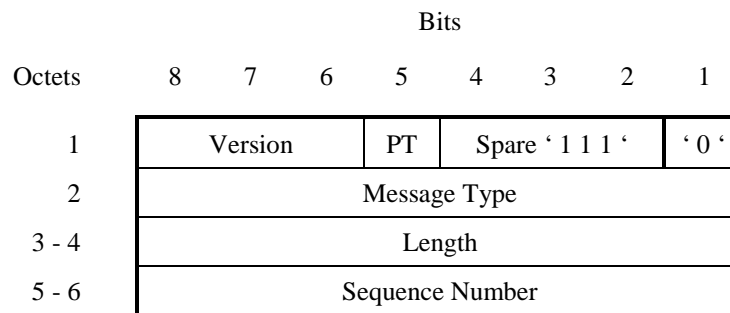


Figure 12: GTP' header

7.2.2 Information elements

Signalling-The messages may contain several information elements. The TLV (Type, Length, Value) or TV (Type, Value) encoding formats shall be used for the GTP' information elements. The signalling messages for GTP' messages shall have the information elements sorted with the Type fields in ascending order. The Length field shall contain the information element length excluding the Type and Length fields.

Within the Type field the most significant bit will be set to 0 when the TV format is used and set to 1 when the TLV format is used.

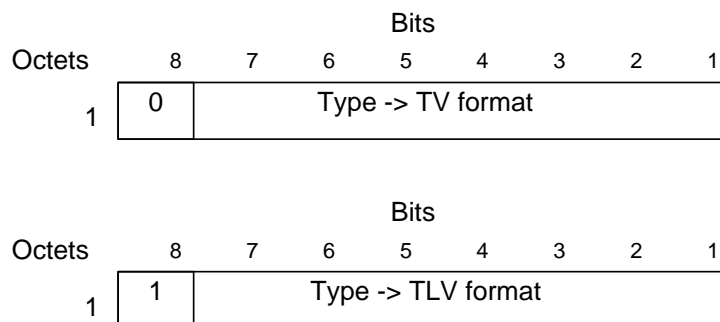


Figure 12a: Type field for TV and TLV format

7.3 GTP' Message Types

7.3.1 List of all GTP' message types

GTP' defines a set of signalling messages between two associated GSN-nodes. The signalling-GTP' messages defined are shown in table 11. The enhancements-messages introduced by GTP' are printed in this table in **boldface**. The messages modified due to the GPRS charging requirements are printed in *italics*. The other messages are inherited from the GTP protocol.

Of the GTP' introduced new signalling message types, Node Alive Request, Node Alive Response, Redirection Request and Redirection Response belong to the "Path Management messages". The Data Record Transfer Request and Data Record Transfer Response form a new GTP signalling the message type group: "Record Transmission messages".

The reserved fields in the signalling messages shall be filled with ones, and are intended for future use.

GTP' shall reuse the GTP Cause values. The GTP-message type numbers required for the newly introduced GTP' messages needed for charging have been derived from the unallocated message type number space specified in the GTP message table defined in TS 29.060.

The number ranges allocated for GTP' are as follows:

For Information Elements: 117-127 (TV type fields) and 239-254 (for TLV type fields).

TLV Information Element types introduced in this specification:

- 254 Address of Recommended Node
- 253 Requests Responded
- 252 Data Record Packet
- 251 Charging Gateway Address (this IE is also used in TS 29.060)
- 250 Sequence Numbers of Cancelled Packets
- 249 Sequence Numbers of Released Packets

TV Information Element types introduced in this specification:

- 127 Charging ID
- 126 Packet Transfer Command

For Cause Codes: Cause values used in requests: 49 to 63, Cause values used in responses indicating acceptance: 177 to 191, Cause values used in responses indicating rejection: 241 to 255.

Charging related Cause values introduced for this specification:

In requests:

- 63 This node is about to go down
- 62 Another node is about to go down
- 61 The receive buffers are becoming full
- 60 The transmit buffers are becoming full
- 59 System failure

In responses indicating acceptance:

-

In responses indicating rejection:

- 255 Request not fulfilled
- 254 Sequence numbers of released/cancelled packets IE incorrect
- 253 Request already fulfilled
- 252 Request related to possibly duplicated packets already fulfilled

The charging related message types are listed in the following signalling-message table. If the Signalling Messages table defined in TS 29.060 differs other than the boldfaced message types in table 11, then the defined signalling table in TS 29.060 shall be considered as the latest version of the two tables. Those GTP' messages that are listed in boldface in the table, are defined in this document, the other GTP' messages listed in the table are inherited from the GTP protocol.

For a description about the GTP messages reused in GTP', see the chapter "Reused GTP message types" of this document, and for further details about those messages, see the GTP documentation (in 3G TS 29.060).

Table 11: Signalling GTP' messages

Message Type value (Decimal)	Signalling GTP' message
1	Echo Request
2	Echo Response
3	Version Not Supported
4	Node Alive Request
5	Node Alive Response
6	Redirection Request
7	Redirection Response
16	Create PDP Context Request
17	Create PDP Context Response
18	Update PDP Context Request
19	Update PDP Context Response
20	Delete PDP Context Request
21	Delete PDP Context Response
22	Create AA PDP Context Request
23	Create AA PDP Context Response
24	Delete AA PDP Context Request
25	Delete AA PDP Context Response
26	Error Indication
27	PDU Notification Request
28	PDU Notification Response
29	PDU Notification Reject Request
30	PDU Notification Reject Response
32	Send Routing Information for GPRS Request
33	Send Routing Information for GPRS Response
34	Failure Report Request
35	Failure Report Response
36	Note MS GPRS Present Request
37	Note MS GPRS Present Response
48	Identification Request
49	Identification Response
50	SGSN Context Request
51	SGSN Context Response
52	SGSN Context Acknowledge
240	Data Record Transfer Request
241	Data Record Transfer Response
255	T-PDU
others	reserved for future use

7.3.2 Reused GTP message types

The existing **Echo Request** and **Echo Response** messages defined in TS 29.060 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 TS 29.060 differ in their description then the TS 29.060 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 message 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 1 being '1' (instead of '0').

GTP' version 1 (binary '001') is the same as version 0, but with the duplicate CDR prevention mechanism, introduced in the v7.2.1 (1999-07) version of the GPRS charging document (GSM 12.15)~~this specification version.~~

GTP' version 2 (binary '010') is the same as version 1, but the header is just 6 octets long (~~no~~no unused trailing octets). IPv6 address type is also supported (for Address of Recommended Node information element of the Redirection Request).

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 011

Current Version: **V3.2.0**

GSM (AA.BB) or 3G (AA.BBB) specification number ↑

↑ CR number as allocated by MCC support team

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for approval
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strategic
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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: (U)SIM ME UTRAN / Radio Core Network
(at least one should be marked with an X)

Source: **SA5#13 (Charging Rapporteur Group)** **Date:** **2000-07-25**

Subject: **Miscellaneous detail clarifications and corrections to version 3.2.0.**

Work item: **Charging**

Category:	F Correction	<input checked="" type="checkbox"/>	Release:	Phase 2	<input type="checkbox"/>
(only one category shall be marked with an X)	A Corresponds to a correction in an earlier release	<input type="checkbox"/>		Release 96	<input type="checkbox"/>
	B Addition of feature	<input type="checkbox"/>		Release 97	<input type="checkbox"/>
	C Functional modification of feature	<input type="checkbox"/>		Release 98	<input type="checkbox"/>
	D Editorial modification	<input type="checkbox"/>		Release 99	<input checked="" type="checkbox"/>
				Release 00	<input type="checkbox"/>

Reason for change: Some corrections about the record closing reason during inter system change and in the record layout / ASN.1 definitions for:
 - System Type in G-CDR not possible
 - RNCUnsentDownlinkVolume defined in S-CDR, not M-CDR

Clauses affected: **5.6.1.2, 5.6.2.2, 6.1.2, 8.1**

Other specs affected:	Other 3G core specifications	<input type="checkbox"/>	→ List of CRs:	
	Other GSM core specifications	<input type="checkbox"/>	→ List of CRs:	
	MS test specifications	<input type="checkbox"/>	→ List of CRs:	
	BSS test specifications	<input type="checkbox"/>	→ List of CRs:	
	O&M specifications	<input type="checkbox"/>	→ List of CRs:	

Other comments:

5.6.1 Triggers for S-CDR Charging Information Collection

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

If according to the Charging Characteristics of a PDP context, CDR generation is activated an S-CDR shall be opened 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 subclauses identify the conditions for adding information to, and closing of the S-CDR for generation towards the CGF.

5.6.1.1 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 shall result 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.

5.6.1.2 Triggers for S-CDR Closure

The S-CDR shall be closed on encountering some trigger conditions. Table 2 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 the SGSN	Deactivation of the PDP context in the SGSN shall result in the CDR being closed. The trigger condition covers:- <ul style="list-style-type: none"> - termination of PDP context, - SGSN change (inter-SGSN routing area update <u>including system handover</u>), - any abnormal release.
Partial Record Reason	O&M reasons permit the closure of the CDR for internal reasons. The trigger condition covers:- <ul style="list-style-type: none"> - data volume limit, - time (duration) limit, - maximum number of charging condition changes, - management intervention, - Intra system handover (change of radio interface from GSM to 3G or visa versa).

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 in the SGSN.

5.6.2 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 the mobility of the MS as provided by the Radio Access Network (RAN). Subsequent partial records may be opened if the M-CDR is closed and the MS is still attached to the network.

The subsequent subclauses identify the conditions for adding information to, and closing of the M-CDR for generation towards the CGF.

5.6.2.1 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 time stamped 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.

5.6.2.2 Triggers for M-CDR Closure

The M-CDR shall be closed on encountering some trigger conditions. Table 4 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:- <ul style="list-style-type: none"> - SGSN change (inter-SGSN routing area update <u>including system handover</u>), - GPRS detach, - any abnormal release.
Partial Record Reason	O&M reasons permit the closure of the CDR for internal reasons. The trigger condition covers:- <ul style="list-style-type: none"> - time (duration) limit, - maximum number of mobility changes, and - Management intervention, - Intra system handover (change of radio interface from GSM to 3G or visa versa).

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

6.1.2 GPRS charging data in GGSN (G-CDR)

If the collection of CDR data is enabled then the following GSM or 3G 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.
System Type	C	Indicates 3G-UMTS System; Not present for GSM-GPRS.
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, i.e. IP, PPP, or IHOSS:OSP
Served PDP Address	M	PDP address, i.e. IPv4 or IPv6
Dynamic Address Flag	C	Indicates whether served PDP address is dynamic, which 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. In GSM, data volumes are in octets above the GTP layer and are separated for uplink and downlink traffic. In 3G, data volumes are in octets above the GTP-U 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 retrieved from subscriber's data as described in subclause 6.1.6.2a.

8 Charging Data Record Structure

8.1 ASN.1 definitions for CDR information

Within the current GSM 12-series of specifications the ASN.1 definitions are based on ISO8824 (90) / X.208 (88) [40], which has been superseded by ISO8824-1 (94) / X.680 (94). This newer version not only includes new features but also removes some that were present in ISO8824 (90) / X.208 (88) [40].

Where possible, the GPRS work would be based on those ASN.1 features to both. However, where necessary, the new

features in ISO8824-1 (94) / X.680 (94) [41] be used in some places.

ISO8824 (90) / X.208 (88) [40] features that are no longer in ISO8824-1 (94) / X.680 (94) [41] 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, LevelOfCAMELService, CalledNumber, CallingNumber
FROM GSM1205-DataTypes { ccitt (0) identified-organization (4) etsi(0) mobileDomain (0) gsmOperation-
Maintenance (3) moduleId (3) gsm-12-05 (5) InformationModel (0) asnlModule (2) 1 }

AddressString, ISDN-AddressString, IMSI, IMEI, DefaultGPRS-Handling, DefaultSMS-Handling
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) asnlModule(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,
servedIMSI             [3] IMSI,
ggsnAddress            [4] GSNAddress,
chargingID             [5] ChargingID,
sgsnAddress            [6] SEQUENCE OF GSNAddress,
accessPointNameNI     [7] AccessPointNameNI,
pdpType               [8] PDPTType,
servedPDPAddress       [9] PDPAddress,
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 OPTIONAL,
servedMSISDN          [22] MSISDN OPTIONAL,
chargingCharacteristics [23] ChargingCharacteristics OPTIONAL,
systemType            [24] SystemType OPTIONAL
}

```

```

SGSNMMRecord ::= SET
{
  recordType           [0] CallEventRecordType,
  servedIMSI           [1] IMSI,
  servedIMEI           [2] IMEI OPTIONAL,
  ggsnAddress          [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,
  chargingCharacteristics [19] ChargingCharacteristics OPTIONAL,
  cAMELInformationMM  [20] CAMELInformationMM OPTIONAL,
  ncUnsentDownlinkVolume [21] DataVolumeGPRS OPTIONAL
}

```

```

SGSNPDPRecord ::= SET
{
  recordType           [0] CallEventRecordType,
  networkInitiation   [1] NetworkInitiatedPDPContext OPTIONAL,
  servedIMSI           [3] IMSI,
  servedIMEI           [4] IMEI OPTIONAL,
  ggsnAddress          [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] PDPTType,
  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 OPTIONAL,
  accessPointNameOI   [26] AccessPointNameOI,
  servedMSISDN        [27] MSISDN OPTIONAL,
  chargingCharacteristics [28] ChargingCharacteristics OPTIONAL,
  systemType          [29] SystemType OPTIONAL,
  cAMELInformationPDP [30] CAMELInformationPDP OPTIONAL,
}

```

```
| _____ rNCUnsentDownlinkVolume [31] DataVolumeGPRS OPTIONAL, }  
| }  
  
SGSNSMORRecord ::= 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 [16] ChargingCharacteristics OPTIONAL,  
    systemType [17] SystemType OPTIONAL,  
    destinationNumber [18] CalledNumber OPTIONAL,  
    CAMELInformationSMS [19] CAMELInformationSMS OPTIONAL  
}  
  
SGSNSMTRRecord ::= 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 [15] ChargingCharacteristics OPTIONAL,  
    systemType [16] SystemType OPTIONAL  
}  
}
```

3GPP TSG-SA5 (Telecom Management)
Meeting #13 Alexandria, 24 – 28 Jul 2000

S5-000356
Tdoc S5B000032

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 012

Current Version: **V3.2.0**

GSM (AA.BB) or 3G (AA.BBB) specification number ↑

↑ CR number as allocated by MCC support team

For submission to: **SA#9**
list expected approval meeting # here ↑

for approval
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: <http://ftp.3gpp.org/Information/CR-Form-v2.doc>

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

Source: **SA5#13** (Charging Rapporteur Group) **Date:** 2000-07-26

Subject: Clarification for QoS parameter

Work item: Charging

Category: <small>(only one category shall be marked with an X)</small>	F Correction	<input checked="" type="checkbox"/>	Release:	Phase 2	<input type="checkbox"/>
	A Corresponds to a correction in an earlier release	<input type="checkbox"/>		Release 96	<input type="checkbox"/>
	B Addition of feature	<input type="checkbox"/>		Release 97	<input type="checkbox"/>
	C Functional modification of feature	<input type="checkbox"/>		Release 98	<input type="checkbox"/>
D Editorial modification	<input type="checkbox"/>	Release 99	<input checked="" type="checkbox"/>		
			Release 00	<input type="checkbox"/>	

Reason for change: Definition of the QoS parameter alignment as a field of QoS attributes defined in TS 24.008.

Clauses affected: 8.1.

Other specs affected:	Other 3G core specifications	<input type="checkbox"/>	→ List of CRs:	
	Other GSM core specifications	<input type="checkbox"/>	→ List of CRs:	
	MS test specifications	<input type="checkbox"/>	→ List of CRs:	
	BSS test specifications	<input type="checkbox"/>	→ List of CRs:	
	O&M specifications	<input type="checkbox"/>	→ List of CRs:	

Other comments:

8 Charging Data Record Structure

8.1 ASN.1 definitions for CDR information

Within the current GSM 12-series of specifications the ASN.1 definitions are based on ISO8824 (90) / X.208 (88) [40], which has been superseded by ISO8824-1 (94) / X.680 (94). This newer version not only includes new features but also removes some that were present in ISO8824 (90) / X.208 (88) [40].

Where possible, the GPRS work would be based on those ASN.1 features to both. However, where necessary, the new features in ISO8824-1 (94) / X.680 (94) [41] be used in some places.

ISO8824 (90) / X.208 (88) [40] features that are no longer in ISO8824-1 (94) / X.680 (94) [41] 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),
    sgsnSMORRecord        (21),
    sgsnSMTRRecord        (22)
}
GPRS_Charging-DataTypes {... }

DEFINITIONS IMPLICIT TAGS ::=

BEGIN

-- EXPORTS everything

IMPORTS

CellId, Diagnostics, CallDuration, ManagementExtensions, TimeStamp, MSISDN, LocationAreaCode,
MessageReference, RecordingEntity, SMSResult, LevelOfCAMELService, CalledNumber, CallingNumber
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, DefaultGPRS-Handling, DefaultSMS-Handling
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,
  sgsnSMORRecord     [3] SGSNSMORRecord,
  sgsnSMTRRecord     [4] SGSNSMTRRecord
}
```

```
GGSNPDPRecord ::= SET
```

```
{
  recordType          [0] CallEventRecordType,
  networkInitiation  [1] NetworkInitiatedPDPContext OPTIONAL,
  servedIMSI         [3] IMSI,
  ggsnAddress        [4] GSNAddress,
  chargingID         [5] ChargingID,
  sgsnAddress        [6] SEQUENCE OF GSNAddress,
  accessPointNameNI [7] AccessPointNameNI,
  pdpType            [8] PDPType,
  servedPDPAddress   [9] PDPAddress,
  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,
  chargingCharacteristics [23] ChargingCharacteristics OPTIONAL,
  systemType         [24] SystemType 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,
  chargingCharacteristics [19] ChargingCharacteristics OPTIONAL,
  cAMELInformationMM [20] CAMELInformationMM OPTIONAL,
  rNCUnsentDownlinkVolume [21] DataVolumeGPRS OPTIONAL
}
```

```
SGSNPDPRecord ::= SET
```

```
{
  recordType          [0] CallEventRecordType,
  networkInitiation  [1] NetworkInitiatedPDPContext 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,
chargingCharacteristics [28] ChargingCharacteristics OPTIONAL,
systemType            [29] SystemType OPTIONAL
cAMELInformationPDP   [30] CAMELInformationPDP OPTIONAL}
}

```

```
SGSNSMORRecord ::= 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 [16] ChargingCharacteristics OPTIONAL,
  systemType           [17] SystemType OPTIONAL
  destinationNumber    [18] CalledNumber OPTIONAL,
  cAMELInformationSMS  [19] CAMELInformationSMS OPTIONAL
}

```

```
SGSNSMTRRecord ::= 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 [15] ChargingCharacteristics OPTIONAL,
  systemType           [16] SystemType OPTIONAL
}

```

```

-----
--
-- 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) }

```

```

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

```

```

AccessPointNameNI ::= IA5String (SIZE(1..63))
--
-- Network Identifier part of APN in "dot" representation
-- see TS 23.003
--

AccessPointNameOI ::= IA5String (SIZE(1..37))
--
-- Operator Identifier part of APN in dot representation
-- see TS 23.003
--

APNSelectionMode ::= ENUMERATED
{
--
-- See Information Elements TS 29.060
--
MSorNetworkProvidedSubscriptionVerified (0),
MSProvidedSubscriptionNotVerified (1),
NetworkProvidedSubscriptionNotVerified (2)
}

CAMELAccessPointNameNI ::= AccessPointNameNI
CAMELAccessPointNameOI ::= AccessPointNameOI

CAMELInformationMM ::= SET
{
sCFAddress [1] SCFAddress OPTIONAL,
serviceKey [2] ServiceKey OPTIONAL,
defaultTransactionHandling [3] DefaultGPRSHandling OPTIONAL,
numberOfDPENcountered [4] NumberOfDPENcountered OPTIONAL,
levelOfCAMELService [5] LevelOfCAMELService OPTIONAL,
freeFormatData [6] FreeFormatData OPTIONAL,
fFDAppendIndicator [7] FreeFormatDataAppendIndicator OPTIONAL
}

CAMELInformationPDP ::= SET
{
sCFAddress [1] SCFAddress OPTIONAL,
serviceKey [2] ServiceKey OPTIONAL,
defaultTransactionHandling [3] DefaultGPRSHandling OPTIONAL,
cAMELAccessPointNameNI [4] CAMELAccessPointNameNI OPTIONAL,
cAMELAccessPointNameOI [5] CAMELAccessPointNameOI OPTIONAL,
numberOfDPENcountered [6] NumberOfDPENcountered OPTIONAL,
levelOfCAMELService [7] LevelOfCAMELService OPTIONAL,
freeFormatData [8] FreeFormatData OPTIONAL,
fFDAppendIndicator [9] FreeFormatDataAppendIndicator OPTIONAL
}

CAMELInformationSMS ::= SET
{
sCFAddress [1] SCFAddress OPTIONAL,
serviceKey [2] ServiceKey OPTIONAL,
defaultSMShandling [3] DefaultSMShandling OPTIONAL,
cAMELCallingPartyNumber [4] CallingNumber OPTIONAL,
cAMELDestinationSubscriberNumber [5] CalledNumber OPTIONAL,
cAMELSMSCAddress [6] AddressString OPTIONAL,
freeFormatData [7] FreeFormatData OPTIONAL
}

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),
cAMELInitCallRelease (5),
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
}

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
--

ChargingID ::= INTEGER (0..4294967295)
--
-- generated in GGSN, part of PDP context, see TS 23.060
-- 0..4294967295 is equivalent to 0..232-1

DataVolumeGPRS ::= INTEGER
--
-- The volume of 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 29.002
--

FFDAppendIndicator ::= BOOLEAN

FreeFormatData ::= OCTET STRING (SIZE(1..160))
--
-- Free formatted data as sent in the FurnishChargingInformationGPRS
-- see TS 29.002
--

GSNAddress ::= IPAddress

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

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
}

PDPTType ::= OCTET STRING (SIZE(2))
    --
    --OCTET 1: PDP Type Organization
    --OCTET 2: PDP Type Number
    -- See TS 29.060
    --

QoSAllocRetenPriority ::= ENUMERATED
{
_____
_____ See Quality of service TS 24.008
    --
    priorityLevel 1 (1),
    priorityLevel 2 (2),
    priorityLevel 3 (3)
}

QoSDelay ::= ENUMERATED
{
    --
    -- See Quality of service TS 24.008
    --
    delayClass1      (1),
    delayClass2      (2),
    delayClass3      (3),
    delayClass4      (4)
}

QoSDeliveryOrder ::= ENUMERATED
{
_____
_____ See Quality of service TS 24.008
    --
    withDeliveryOrder (1),
    withoutDeliveryOrder (2)
}

QoSErroneousSDUs ::= ENUMERATED
{
_____
_____ See Quality of service TS 24.008
    --
    noDetect (1),

```

```

    delivered (2),
    notDelivered (3)
}

QoSHandlingPriority ::= ENUMERATED
{
    -- See Quality of service TS 24.008

    priorityLevel 1 (1),
    priorityLevel 2 (2),
    priorityLevel 3 (3)
}

QoSInformation ::= CHOICE
{
    gsmQoSInformation [0] GSMQoSInformation,
    umtsQoSInformation [1] UMTSQoSInformationOCTET STRING (SIZE (11))
}
--
-- The umtsQoSInformation octet string is a 1:1 copy of the contents (i.e. starting with
-- octet 3) of the "Quality of service" information element specified in TS 24.008.
}

QoSMaxBitRate ::= OCTET STRING (SIZE(1))
--
-- See Quality of service TS 24.008
--
-- In MS to network direction:
-- 0 0 0 0 0 0 0 0 Subscribed maximum bit rate for uplink
-- In network to MS direction:
-- 0 0 0 0 0 0 0 0 Reserved
-- In MS to network direction and in network to MS direction:
-- 0 0 0 0 0 0 0 1 The max bit rate is binary coded in 8 bits, using a granularity of 1 kbps
-- 0 0 1 1 1 1 1 1 giving a range of values from 1 kbps to 63 kbps in 1 kbps increments.
-- 0 1 0 0 0 0 0 0 MBR is 64 kbps+((the binary coded value in 8 bits -01000000)*8 kbps)
-- 0 1 1 1 1 1 1 1 giving a range of values from 64 kbps to 564 kbps in 8 kbps increments.
-- 1 0 0 0 0 0 0 0 MBR is 576 kbps + ((the binary coded value in 8 bits -10000000) * 64 kbps)
-- 1 1 1 1 1 1 1 0 giving a range of values from 576 kbps to 8640 kbps in 64 kbps increments.
-- 1 1 1 1 1 1 1 1 Reserved

QoSMaxSDUsize ::= OCTET STRING (SIZE(1))
--
-- See Quality of service TS 24.008
--
-- The Maximum SDU size value is binary coded in 8 bits, using a granularity of 10 octets.
-- In MS to network direction:
-- 00000000 Subscribed maximum SDU size
-- 11111111 Reserved
-- In network to MS direction:
-- 00000000 Reserved
-- 11111111 Reserved
-- In MS to network direction and in network to MS direction:
-- For values in the range 00000001 to 10010110 the Maximum SDU size value is binary coded in 8
-- bits, using a granularity of 10 octets, giving a range of values from 10 octets to 1500 octets.
-- Values above 10010110 are as below:
-- 10010111 1502 octets
-- 10011000 1510 octets
-- 10011001 1520 octets

QoSMeanThroughput ::= ENUMERATED
{
    --
    -- See Quality of service TS 24.008
    --
    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 24.008
    --
    unspecified            (0),
    upTo1000octetPs       (1),
    upTo2000octetPs       (2),
    upTo4000octetPs       (3),
    upTo8000octetPs       (4),
    upTo16000octetPs      (5),
    upTo32000octetPs      (6),
    upTo64000octetPs      (7),
    upTo128000octetPs     (8),
    upTo256000octetPs     (9)
}
|
QoSPrecedence ::= ENUMERATED
{
    --
    -- See Quality of service TS 24.008
    --
    unspecified            (0),
    highPriority           (1),
    normalPriority         (2),
    lowPriority            (3)
}
|
QoSReliability ::= ENUMERATED
{
    --
    -- See Quality of service TS 24.008
    --
    unspecifiedReliability (0),
    acknowledgedGTP       (1),
    unackGTPAcknowLLC     (2),
    unackGTPLLCAcknowRLC (3),
    unackGTPLLCRLC       (4),
    unacknowUnprotectedData (5)
}
|
QoSResidualBER ::= ENUMERATED
{
    -----
    ----- See Quality of service TS 24.008
    -----
    ----- The Residual BER value consists of 4 bits. The ranges from  $5 \cdot 10^{-2}$  to  $6 \cdot 10^{-8}$ .
    5*10power2 (1),
    1*10power2 (2),
    5*10power3 (3),
    4*10power3 (4),
    1*10power3 (5),
    1*10power4 (6),
    1*10power5 (7),
    1*10power6 (8),
    6*10power8 (9)
}
|
QoSSDUErrrorRatio ::= ENUMERATED
{
    -----
    ----- See Quality of service TS 24.008
    -----
    1*10power2 (1),
    7*10power3 (2),
    1*10power3 (3),
    1*10power4 (4),
    1*10power5 (5),
    1*10power6 (6)
}
|
QoSTrafficClass ::= ENUMERATED
{
    -----
    ----- See Quality of service TS 24.008
    -----
    Subscribed (0),
    Conversational (1),
    Streaming (2),
}

```

```

    Interactive (3),
    Background (4)
}

QoSTransferDelay ::= OCTET STRING (SIZE(1))
{
    -- See Quality of service TS 24.008
    -- In MS to network direction:
    -- 0 0 0 0 0 0 Subscribed transfer delay
    -- sIn network to MS direction:
    -- 0 0 0 0 0 0 Reserved
    -- In MS to network direction and in network to MS direction:
    -- 0 0 0 0 0 1 The Transfer delay is binary coded in 6 bits, using a granularity of 10 ms
    -- 0 0 1 1 1 1 giving a range of values from 10 ms to 150 ms in 10 ms increments
    -- 0 1 0 0 0 0 transfer delay is 200 ms + ((the binary coded value in 6 bits - 010000)*50 ms)
    -- 0 1 1 1 1 1 giving a range of values from 200 ms to 950 ms in 50ms increments
    -- 1 0 0 0 0 0 transfer delay is 1000 ms + ((the binary coded value in 6 bits - 100000)*100 ms)
    -- 1 1 1 1 1 0 giving a range of values from 1000 ms to 4100 ms in 100ms increments
    -- 1 1 1 1 1 1 Reserved
}

RoutingAreaCode ::= OCTET STRING (SIZE(1))
--
-- See TS 24.008 --
--

SCFAddress ::= AddressString
--
-- See TS 29.002 ---
--

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

SystemType ::= ENUMERATED
{
    umtsRel99 (1)
}

UMTSQoSInformation ::= SEQUENCE
{
    trafficClass [0] QoSTrafficClass,
    maxBitRateUplink [1] QoSMaxBitRate,
    maxBitRateDownlink [2] QoSMaxBitRate,
    DeliveryOrder [3] QoSDeliveryOrder,
    maxSDUsize [4] QoSMaxSDUsize,
    sduErrorRatio [6] QoSSDUErrorRatio,
    residualBER [7] QoSResidualBER,
    erroneousSDUs [8] QoSErroneousSDUs,
    transferDelay [9] QoSTransferDelay,
    handlingPriority [10] QoSHandlingPriority,
    allocRetenPriority [11] QoSAllocRetenPriority
}

```