

3GPP TSG CN Plenary Meeting #24
2nd – 4th June 2004 Seoul, KOREA.

NP-040230

Source: TSG CN WG4
Title: Corrections on Charging
Agenda item: 9.22
Document for: APPROVAL

Spec	CR	Rev	Doc-2nd-Level N4-040	Phase	Subject	Cat	Ver_C
29.060	478	4	754	Rel-6	Provision of S-CDR information to the GGSN	C	6.4.0

CHANGE REQUEST

⌘ **29.060 CR 478** ⌘ rev **4** ⌘ Current version: **6.4.0** ⌘

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

Proposed change affects: UICC apps ME Radio Access Network Core Network

Title:	⌘ Provision of S-CDR information to the GGSN		
Source:	⌘ CN4		
Work item code:	⌘ CH	Date:	⌘ 14/05/04
Category:	⌘ C	Release:	⌘ Rel-6
	Use <u>one</u> of the following categories:		Use <u>one</u> of the following releases:
	F (correction)		2 (GSM Phase 2)
	A (corresponds to a correction in an earlier release)		R96 (Release 1996)
	B (addition of feature),		R97 (Release 1997)
	C (functional modification of feature)		R98 (Release 1998)
	D (editorial modification)		R99 (Release 1999)
	Detailed explanations of the above categories can be found in 3GPP TR 21.900 .		Rel-4 (Release 4)
			Rel-5 (Release 5)
			Rel-6 (Release 6)

Reason for change:	⌘ One of the underlying drivers for the IP Flow charging work is to permit greater flexibility in PS domain charging, and, to control this flexibility in the HPLMN. This is a fairly fundamental change from the concepts that lead to development of the CAMEL 3 standards (which provide the capability for pre-pay charging on the SGSN) and some aspects of the IMS architecture (eg P-CSCF and I-CSCF). This movement towards charging in the “GGSN arena” rather than “charging at the SGSN” leads to a need to ensure that all the relevant information that the SGSN places on the S-CDR is available at the GGSN. Annex A to TR 23.825 contains an analysis of which information needs to be moved from SGSN to the GGSN (and from the GGSN to RADIUS Server).
Summary of change:	⌘ This CR provides the necessary GTP modifications needed to support the stage 2 requirements as defined in 3GPP TS 23.060 v.6.4.0 (S2-040900 – CR 23.060-481r4, source Vodafone & Siemens), and also S2-041594 – CR 23.125-006 (approved at SA2 #39, source Nokia) which adds the Time Zone of where the user currently resides to also be conveyed to the GGSN. In this CR, five new IEs are introduced: <ul style="list-style-type: none"> • RAT Type – indicates what Radio Access Technology the subscriber is using. A bit field is used for the encoding. • User Location Information – indicates either the CGI or SAI of where the user currently resides. The encoding for MCC, MNC, LAC and CI are taken from 3GPP TS 24.008. The encoding for SAC is taken from 3GPP TS 25.413. • MS Time Zone – indicates the Time Zone (including any daylight saving time that is currently being used) of where the user currently resides.

The encoding is taken from TS 24.008.

- **IMEI(SV)** – indicates the IMEI(SV) of the UE that the MS is currently using. Encoding is taken from TS 24.008.
- **CAMEL Charging Information Container** – transparently send the CAMEL S-CDR information to the GGSN. Its contents are defined in 3GPP TS 32.215.

All five of the above are added to the Create PDP Context Request message but only RAT Type, User Location Information and MS Time Zone are added to the Update PDP Context Request message.

Also, some re-ordering of IEs to order them by Type Value has been done to the IE lists in 7.3.1 and 7.3.3.

Consequences if not approved:

⌘ N/A

Clauses affected:

⌘ 7.3.1, 7.3.3, 7.7; 4 new sub-clauses added after 7.7.49

Other specs affected:

Y	N
X	
	X
	X

Other core specifications
 Test specifications
 O&M Specifications

⌘ CR 23.125-006, CR 29.061-109

Other comments:

⌘ In the previous version of this CR a new, compound IE called "HGGSN Charging Info" was defined, however, it was found that very few bytes were actually saved by using this compound IE so in revision 1 separate IEs are introduced to avoid complexity.

Changes in Rev 3 include:

- Daylight saving time is now included in the MS Time Zone IE. Encoding taken from TS 24.008
- Reference to SMS stage 2 and NITZ stage 1 now removed and replaced with a reference to TS 24.008 in the explanation of MS Time Zone.
- New paragraph in sections 7.3.1 and 7.3.3 now re-worded to clarify that if any data required for populating IEs is not available, then the SGSN simply does not include them. Also corrected spelling of "geographic"!
- MS Time Zone IE is now included in the list of IEs in the table for SGSN-Initiated Update PDP Context Request.

Changes in Rev 4 include:

- The word "IE" added after "MS Time Zone" in sections 7.3.1 and 7.3.3.

***** First Modified Section *****

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

- [1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".
- [2] 3GPP TS 23.003: "Numbering, addressing and identification".
- [3] 3GPP TS 23.007: "Restoration procedures".
- [4] 3GPP TS 23.060: "General Packet Radio Service (GPRS); Service description; Stage 2".
- [5] 3GPP TS 24.008: "Mobile radio interface Layer 3 specification; Core network protocols; Stage 3".
- [6] 3GPP TS 29.002: "Mobile Application Part (MAP) specification".
- [7] 3GPP TS 25.413: "UTRAN Iu interface RANAP signalling".
- [8] 3GPP TS 33.102: "3G security; Security architecture".
- [9] 3GPP TS 43.020: " Security related network functions".
- [10] 3GPP TS 43.064: "Overall description of the GPRS radio interface; Stage 2".
- [11] 3GPP TS 44.064: "Mobile Station - Serving GPRS Support Node (MS-SGSN) Logical Link Control (LLC) layer specification".
- [12] IETF RFC 791 (STD 0005): "Internet Protocol", J. Postel.
- [13] IETF RFC 768 (STD 0006): "User Datagram Protocol", J. Postel.
- [14] IETF RFC 1700: "Assigned numbers", J. Reynolds and J. Postel.
- [15] IETF RFC 2181: "Clarifications to the DNS specification", R. Elz and R. Bush.
- [16] Void.
- [17] 3GPP TS 23.121: "Architectural requirements for Release 1999".
- [18] 3GPP TS 32.215: "Telecommunication management; Charging management; Charging data description for the Packet Switched (PS) domain".
- [19] 3GPP TS 23.236: "Intra domain connection of Radio Access Network (RAN) nodes to multiple Core Network (CN) nodes".
- [20] 3GPP TS 48.018: "General Packet Radio Service (GPRS); Base Station System (BSS) - Serving GPRS Support Node (SGSN); BSS GPRS protocol".
- [21] 3GPP TR 44.901 (Release 5): "External Network Assisted Cell Change (NACC)".
- [22] 3GPP TS 33.210: "3G security; Network Domain Security (NDS); IP network layer security".

- [23] 3GPP TS 25.414: "UTRAN Iu interface data transport and transport signalling".
- [24] 3GPP TS 23.271: " Technical Specification Group Services and System Aspects; Functional stage 2 description of LCS".
- [25] 3GPP TS 23.195: "Provision of User Equipment Specific Behaviour Information (UESBI) to network entities".
- [26] 3GPP TS_23.246: "Multimedia Broadcast/Multicast Service (MBMS) Architecture and Functional Description"
- [27] 3GPP TS_29.061: ["Interworking between the Public Land Mobile Network \(PLMN\) supporting Packet Based Services and Packet Data Networks \(PDN\)"](#)
- [\[YY\] 3GPP TS 23.040: "Technical realization of the Short Message Service \(SMS\)"](#)

***** Next Modified Section *****

7 GTP Messages and Message Formats

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7.3 Tunnel Management Messages

7.3.1 Create PDP Context Request

A Create PDP Context Request shall be sent from a SGSN node to a GGSN node as a part of the GPRS PDP Context Activation procedure. After sending the Create PDP Context Request message, the SGSN marks the PDP context as 'waiting for response'. In this state the SGSN shall accept G-PDUs from the GGSN but shall not send these G-PDUs to the MS. A valid request initiates the creation of a tunnel between a PDP Context in a SGSN and a PDP Context in a GGSN. If the procedure is not successfully completed, the SGSN repeats the Create PDP Context Request message to the next GGSN address in the list of IP addresses, if there is one. If the list is exhausted the activation procedure fails.

The Tunnel Endpoint Identifier Data I field specifies a downlink Tunnel Endpoint Identifier for G-PDUs which is chosen by the SGSN. The GGSN shall include this Tunnel Endpoint Identifier in the GTP header of all subsequent downlink G-PDUs which are related to the requested PDP context.

The Tunnel Endpoint Identifier Control Plane field specifies a downlink Tunnel Endpoint Identifier for control plane messages which is chosen by the SGSN. The GGSN shall include this Tunnel Endpoint Identifier in the GTP header of all subsequent downlink control plane messages which are related to the requested PDP context. If the SGSN has already confirmed successful assignment of its Tunnel Endpoint Identifier Control Plane to the peer GGSN, this field shall not be present. The SGSN confirms successful assignment of its Tunnel Endpoint Identifier Control Plane the GGSN when it receives any message with its assigned Tunnel Endpoint Identifier Control Plane in the GTP header from the GGSN.

The MSISDN of the MS is passed to the GGSN inside the Create PDP Context Request; This additional information can be used when a secure access to a remote application residing on a server is needed. The GGSN would be in fact able to provide the user identity (i.e. the MSISDN) to the remote application server, providing it with the level of trust granted to users through successfully performing the GPRS authentication procedures, without having to re-authenticate the user at the application level.

If the MS requests a dynamic PDP address and a dynamic PDP address is allowed, then the PDP Address field in the End User Address information element shall be empty. If the MS requests a static PDP Address then the PDP Address field in the End User Address information element shall contain the static PDP Address. In case the PDP addresses carried in the End User Address and optionally in the Protocol Configuration Option information element contain contradicting information, the PDP address carried in the End User Address information element takes the higher precedence. The Quality of Service Profile information element shall be the QoS values to be negotiated between the MS and the SGSN at PDP Context activation.

The SGSN shall include an SGSN Address for control plane and an SGSN address for user traffic, which may differ from that provided by the underlying network service (e.g. IP). The GGSN shall store these SGSN Addresses and use them when sending control plane on this GTP tunnel or G-PDUs to the SGSN for the MS.

The SGSN shall include a Recovery information element into the Create PDP Context Request if the SGSN is in contact with the GGSN for the very first time or if the SGSN has restarted recently and the new Restart Counter value has not yet been indicated to the GGSN or if the SGSN has noticed that the path between itself and the GGSN has failed at some point and has deleted all the active PDP contexts associated with the GGSN as a result and the new Restart Counter value has not yet been indicated to the GGSN. The GGSN that receives a Recovery information element in the Create PDP Context Request message element shall handle it in the same way as when receiving an Echo Response message. The Create PDP Context Request message shall be considered as a valid activation request for the PDP context included in the message.

The SGSN shall include either the MS provided APN, a subscribed APN or an SGSN selected APN in the message; the Access Point Name may be used by the GGSN to differentiate accesses to different external networks.

The Selection Mode information element shall indicate the origin of the APN in the message.

For contexts created by the Secondary PDP Context Activation Procedure the SGSN shall include the linked NSAPI. Linked NSAPI indicates the NSAPI assigned to any one of the already activated PDP contexts for this PDP address and APN.

The Secondary PDP Context Activation Procedure may be executed without providing a Traffic Flow Template (TFT) to the newly activated PDP context if all other active PDP contexts for this PDP address and APN already have an associated TFT, otherwise a TFT shall be provided. TFT is used for packet filtering in the GGSN.

When using the Secondary PDP Context Activation Procedure, the Selection mode, IMSI, MSISDN, End User Address, Access Point Name and APN Restriction information elements shall not be included in the message.

The Protocol Configuration Options (PCO) information element may be included in the request when the MS provides the GGSN with application specific parameters. The SGSN includes this IE in the Create PDP Context Request if the associated Activate PDP Context Request or Activate Secondary PDP Context Request from the MS includes protocol configuration options. The SGSN shall copy the content of this IE transparently from the content of the PCO IE in the Activate PDP Context Request message or Activate Secondary PDP Context Request.

The SGSN shall select one GGSN based on the user provided or SGSN selected APN. The GGSN may have a logical name that is converted to an address. The conversion may be performed with any name-to-address function. The converted address shall be stored in the "GGSN Address in Use" field in the PDP context and be used during the entire lifetime of the PDP context.

NOTE: A DNS query may be used as the name-to-IP address mapping of the GGSN. The IP address returned in the DNS response is then stored in the "GGSN Address in Use" field in the PDP context.

The IMSI information element together with the NSAPI information element uniquely identifies the PDP context to be created.

The SGSN shall not send a Create PDP Context Request for an already active context.

If a new Create PDP Context Request is incoming on TEID 0 for an already active PDP context, this Create PDP Context Request must be considered related to a new session. The existing PDP context shall be torn down locally, and the associated PDP contexts deleted locally, before the new session is created. If a new Create PDP Context Request is incoming on a TEID which is different from 0 and this TEID is already allocated to one or more activated PDP contexts, and the NSAPI IE value in this message matches the NSAPI value of an active PDP context, the GGSN shall send back a Create PDP Context Response with a rejection cause code. It is implementation dependent deciding whether to teardown or keep the existing PDP context.

If the GGSN uses the MNRG flag and the flag is set, the GGSN should treat the Create PDP Context Request as a Note MS Present Request and clear the MNRG flag.

The SGSN shall determine Charging Characteristics from the Subscribed Charging Characteristics and/or PDP Context Charging Characteristics depending on the presence of the information in the Packet Domain Subscription Data as defined in 3GPP TS 23.060 [4]. The requirements for the presence of the Charging Characteristics IE are defined in 3GPP TS 23.060 [4]. The contents of the Charging Characteristics IE are defined in 3GPP TS 32.215 [18].

The SGSN shall include Trace Reference, Trace Type, Trigger Id, and OMC Identity in the message if GGSN trace is activated. The SGSN shall copy Trace Reference, Trace Type, and OMC Identity from the trace request received from the HLR or OMC.

The SGSN may include the Routeing Area Identity (RAI) of the SGSN where the MS is registered. The MCC and MNC components shall be populated with the MCC and MNC, respectively, of the SGSN where the MS is registered. The LAC and RAC components shall be populated by the SGSN with the value of 'FFFE' and 'FF', respectively.

The APN Restriction is an optional information element. In this instance it is used by the SGSN to convey to the GGSN the highest restriction type out of all the currently active PDP Contexts for a particular subscriber.

If charging is to be performed in the GGSN, the SGSN shall include the User Location Information IE, MS Time Zone IE, RAT Type IE, IMEI(SV) IE and the CAMEL Charging Information Container IE if they are available (see sub-clause 15.1.1a of 3GPP TS 23.060 [4] for more information). The SGSN shall include the CGI or SAI in the 'Geographic Location' field depending on whether the MS is in a cell or a service area respectively.

The optional Private Extension contains vendor or operator specific information.

Table 5: Information Elements in a Create PDP Context Request

Information element	Presence requirement	Reference
IMSI	Conditional	7.7.2
Routeing Area Identity (RAI)	Optional	7.7.3
Recovery	Optional	7.7.11
Selection mode	Conditional	7.7.12
Tunnel Endpoint Identifier Data I	Mandatory	7.7.13
Tunnel Endpoint Identifier Control Plane	Conditional	7.7.14
NSAPI	Mandatory	7.7.17
Linked NSAPI	Conditional	7.7.17
Charging Characteristics	Conditional	7.7.23
Trace Reference	Optional	7.7.24
Trace Type	Optional	7.7.25
End User Address	Conditional	7.7.27
Access Point Name	Conditional	7.7.30
Protocol Configuration Options	Optional	7.7.31
SGSN Address for signalling	Mandatory	GSN Address 7.7.32
SGSN Address for user traffic	Mandatory	GSN Address 7.7.32
MSISDN	Conditional	7.7.33
Quality of Service Profile	Mandatory	7.7.34
TFT	Conditional	7.7.36
Trigger Id	Optional	7.7.41
OMC Identity	Optional	7.7.42
Private Extension	Optional	7.7.46
APN Restriction	Optional	7.7.49
RAT Type	Optional	7.7.A
User Location Information	Optional	7.7.B
MS Time Zone	Optional	7.7.C
IMEI(SV)	Optional	7.7.D
CAMEL Charging Information Container	Optional	7.7.E
Private Extension	Optional	7.7.46

****** Next Modified Section ******

7.3.3 Update PDP Context Request

An Update PDP Context Request message shall be sent from a SGSN to a GGSN as part of the GPRS Inter SGSN Routeing Update procedure or the PDP Context Modification procedure or to redistribute contexts due to load sharing. It shall be used to change the QoS and the path. In addition it shall be used if it is necessary to change the GTP version of a tunnel to a GGSN from GTP v0 to GTP v1. The message shall be sent by the new SGSN at the Inter SGSN Routeing Update procedure.

The NSAPI information element together with the Tunnel Endpoint Identifier in the GTP header unambiguously identifies a PDP Context in the GGSN.

The IMSI shall be included if the message is sent during an Inter SGSN change when changing the GTP version from GTP v0 to GTP v1; this is required, as the TEID in the header of the message is set to all zeros in this case.

The Tunnel Endpoint Identifier Data field specifies a downlink Tunnel Endpoint Identifier for G-PDUs which is chosen by the SGSN. The GGSN shall include this Tunnel Endpoint Identifier in the GTP header of all subsequent downlink G-PDUs that are related to the requested PDP context.

The Tunnel Endpoint Identifier Control Plane field specifies a downlink Tunnel Endpoint Identifier Control Plane messages which is chosen by the SGSN. The GGSN shall include this Tunnel Endpoint Identifier in the GTP header of all subsequent downlink control plane messages that are related to the requested PDP context. If the SGSN has already confirmed successful assignment of its Tunnel Endpoint Identifier Control Plane to the peer GGSN, this field shall not be present. The SGSN confirms successful assignment of its Tunnel Endpoint Identifier Control Plane to the GGSN when it receives any message with its assigned Tunnel Endpoint Identifier Control Plane in the GTP header from the GGSN.

The Quality of Service Profile information element shall include the QoS negotiated between the MS and SGSN at PDP Context activation or the new QoS negotiated in the PDP Context Modification procedure.

The SGSN shall include an SGSN Address for control plane and an SGSN address for user traffic, which may differ from that provided by the underlying network service (e.g. IP).

If an IPv4/IPv6 capable SGSN received IPv4 GGSN addresses from the old SGSN, it shall include IPv4 addresses in the fields SGSN Address for Control Plane and SGSN Address for User Traffic and IPv6 addresses in the fields Alternative SGSN Address for Control Plane and Alternative SGSN Address for User Traffic. Otherwise, an IPv4/IPv6 capable SGSN shall use only SGSN IPv6 addresses if it has GGSN IPv6 addresses available. If the GGSN supports IPv6 below GTP, it shall store and use the IPv6 SGSN addresses for communication with the SGSN and ignore the IPv4 SGSN addresses. If the GGSN supports only IPv4 below GTP, it shall store and use the IPv4 SGSN addresses for communication with the SGSN and ignore the IPv6 SGSN addresses. When active contexts are being redistributed due to load sharing, G-PDUs that are in transit across the Gn-interface are in an undetermined state and may be lost.

The SGSN shall include a Recovery information element into the Update PDP Context Request if the SGSN is in contact with the GGSN for the very first time or if the SGSN has restarted recently and the new Restart Counter value has not yet been indicated to the GGSN or if the SGSN has noticed that the path between itself and the GGSN has failed at some point and has deleted all the active PDP contexts associated with the GGSN as a result and the new Restart Counter value has not yet been indicated to the GGSN. The GGSN that receives a Recovery information element in the Update PDP Context Request message element shall handle it in the same way as when receiving an Echo Response message. The Update PDP Context Request message shall be considered as a valid update request for the PDP context indicated in the message.

The Traffic Flow Template (TFT) is used to distinguish between different user traffic flows.

The SGSN shall include Trace Reference, Trace Type, Trigger Id, and OMC Identity in the message if GGSN trace is activated while the PDP context is active. The SGSN shall copy Trace Reference, Trace Type, and OMC Identity from the trace request received from the HLR or OMC.

The SGSN may include the Routing Area Identity (RAI) of the SGSN where the MS is registered. The MCC and MNC components shall be populated with the MCC and MNC, respectively, of the SGSN where the MS is registered. The LAC and RAC components shall be populated by the SGSN with the value of 'FFFE' and 'FF', respectively.

The optional Private Extension contains vendor or operator specific information.

The MS includes the Protocol Configuration Options (PCO) information element in the request if the MS wishes to provide the GGSN with application specific parameters. The SGSN includes this IE in the Update PDP Context Request if the associated Modify PDP Context Request from the MS includes protocol configuration options. The SGSN shall copy the content of this IE transparently from the content of the PCO IE in the Modify PDP Context Request message.

If charging is to be performed in the GGSN, the SGSN shall include the User Location Information IE, RAT Type IE and MS Time Zone IE if they are available. However, the RAT Type IE shall not be included for the MS-initiated PDP Context Modification procedure (see sub-clause 15.1.1a of 3GPP TS 23.060 [4] for more information). The SGSN shall include the CGI or SAI in the 'Geographic Location' field depending on whether the MS is in a cell or a service area respectively.

Table 7: Information Elements in an SGSN-Initiated Update PDP Context Request

Information element	Presence requirement	Reference
IMSI	Conditional	7.7.2
Routing Area Identity (RAI)	Optional	7.7.3
Recovery	Optional	7.7.11
Tunnel Endpoint Identifier Data I	Mandatory	7.7.13
Tunnel Endpoint Identifier Control Plane	Conditional	7.7.14
NSAPI	Mandatory	7.7.17
Trace Reference	Optional	7.7.24
Trace Type	Optional	7.7.25
Protocol Configuration Options	Optional	7.7.31
SGSN Address for Control Plane	Mandatory	GSN Address 7.7.32
SGSN Address for User Traffic	Mandatory	GSN Address 7.7.32
Alternative SGSN Address for Control Plane	Conditional	GSN Address 7.7.32
Alternative SGSN Address for User Traffic	Conditional	GSN Address 7.7.32
Quality of Service Profile	Mandatory	7.7.34
TFT	Optional	7.7.36
Trigger Id	Optional	7.7.41
OMC Identity	Optional	7.7.42
RAT Type	Optional	7.7.A
User Location Information	Optional	7.7.B
MS Time Zone	Optional	7.7.C
Private Extension	Optional	7.7.46

An Update PDP Context Request may also be sent from a GGSN to a SGSN to re-negotiate the QoS of a PDP context. The GGSN-initiated Update PDP Context Request can also be used to provide a PDP address to the SGSN (and MS). The latter shall be used by GGSN when it acts as a DHCP Relay Agent or Mobil IP Foreign Agent. A GGSN may send an update PDP context to a SGSN to check that the PDP context is still active at the SGSN. In such a case, the GGSN shall include the optional IMSI IE, to add robustness against the case the SGSN has re-assigned the TEID to another PDP context (this may happen when the PDP context is dangling at the GGSN). Also, the "Quality of service profile" IE and the "End user Address" IE shall not be included in this case.

The Quality of Service Profile information element shall include the GGSN requested QoS.

The End User Address information element shall contain a valid IPv4 or IPv6 address.

The GGSN shall include a Recovery information element into the Update PDP Context Request if the GGSN has restarted recently and the new Restart Counter value has not yet been indicated to the SGSN or if the GGSN has noticed that the path between itself and the SGSN has failed at some point and has deleted all the active PDP contexts associated with the SGSN as a result and the new Restart Counter value has not yet been indicated to the SGSN. The SGSN that receives a Recovery information element in the Update PDP Context Request message element shall handle it in the same way as when receiving an Echo Response message. The Update PDP Context Request message shall be considered as a valid update request for the PDP context indicated in the message.

The NSAPI information element together with the Tunnel Endpoint Identifier in the GTP header unambiguously identifies a PDP Context in the SGSN.

The GGSN includes the Protocol Configuration Options (PCO) information element in the request if the GGSN wishes to provide the MS with application specific parameters. The SGSN includes this IE in the Modify PDP Context Request message if the associated Update PDP Context Request message from the GGSN includes protocol configuration options. The SGSN shall copy the content of this IE transparently from the content of the PCO IE in the Update PDP Context Request message.

The optional Private Extension contains vendor or operator specific information.

The APN Restriction is an optional information element. In this instance it is used by the GGSN to convey to the SGSN the restriction type of the associated PDP Context being updated.

Table 8: Information Elements in a GGSN-Initiated Update PDP Context Request

Information element	Presence requirement	Reference
IMSI	optional	7.7.2
Recovery	Optional	7.7.11
NSAPI	Mandatory	7.7.17
End User Address	Optional	7.7.27
Protocol Configuration Options	Optional	7.7.31
Quality of Service Profile	Optional	7.7.34
Private Extension	Optional	7.7.46
APN Restriction	Optional	7.7.49
Private Extension	Optional	7.7.46

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7.7 Information Elements

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

For all the length fields, bit 8 of the lowest numbered octet is the most significant bit and bit 1 of the highest numbered octet is the least significant bit.

Within information elements, certain fields may be described as spare. These bits shall be transmitted with the value defined for them. To allow for future features, the receiver shall not evaluate these bits.

The most significant bit in the Type field is set to 0 when the TV format is used and set to 1 for the TLV format.

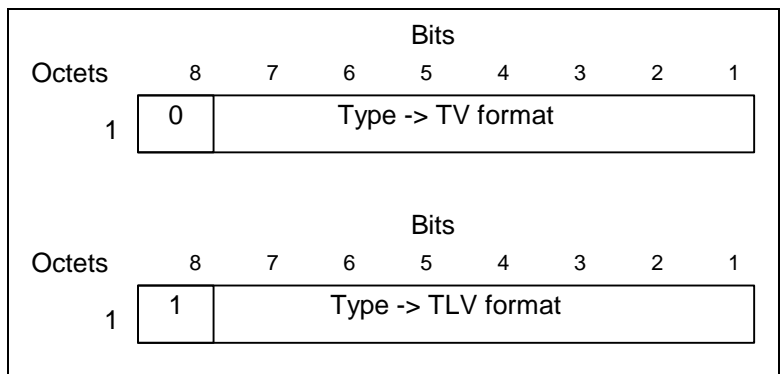


Figure 8: Type field for TV and TLV format

Table 37: Information Elements

IE Type Value	Format	Information Element	Reference
1	TV	Cause	7.7.1
2	TV	International Mobile Subscriber Identity (IMSI)	7.7.2
3	TV	Routeing Area Identity (RAI)	7.7.3
4	TV	Temporary Logical Link Identity (TLLI)	7.7.4
5	TV	Packet TMSI (P-TMSI)	7.7.5
6-7	Spare		
8	TV	Reordering Required	7.7.6
9	TV	Authentication Triplet	7.7.7
10	Spare		
11	TV	MAP Cause	7.7.8
12	TV	P-TMSI Signature	7.7.9
13	TV	MS Validated	7.7.10

IE Type Value	Format	Information Element	Reference
14	TV	Recovery	7.7.11
15	TV	Selection Mode	7.7.12
16	TV	Tunnel Endpoint Identifier Data I	7.7.13
17	TV	Tunnel Endpoint Identifier Control Plane	7.7.14
18	TV	Tunnel Endpoint Identifier Data II	7.7.15
19	TV	Teardown Ind	7.7.16
20	TV	NSAPI	7.7.17
21	TV	RANAP Cause	7.7.18
22	TV	RAB Context	7.7.19
23	TV	Radio Priority SMS	7.7.20
24	TV	Radio Priority	7.7.21
25	TV	Packet Flow Id	7.7.22
26	TV	Charging Characteristics	7.7.23
27	TV	Trace Reference	7.7.24
28	TV	Trace Type	7.7.25
29	TV	MS Not Reachable Reason	7.7.25A
30	TV	Radio Priority LCS	7.7.25B
117-126	Reserved for the GPRS charging protocol (see GTP' in 3GPP TS 32.215 [18])		
127	TV	Charging ID	7.7.26
128	TLV	End User Address	7.7.27
129	TLV	MM Context	7.7.28
130	TLV	PDP Context	7.7.29
131	TLV	Access Point Name	7.7.30
132	TLV	Protocol Configuration Options	7.7.31
133	TLV	GSN Address	7.7.32
134	TLV	MS International PSTN/ISDN Number (MSISDN)	7.7.33
135	TLV	Quality of Service Profile	7.7.34
136	TLV	Authentication Quintuplet	7.7.35
137	TLV	Traffic Flow Template	7.7.36
138	TLV	Target Identification	7.7.37
139	TLV	UTRAN Transparent Container	7.7.38
140	TLV	RAB Setup Information	7.7.39
141	TLV	Extension Header Type List	7.7.40
142	TLV	Trigger Id	7.7.41
143	TLV	OMC Identity	7.7.42
144	TLV	RAN Transparent Container	7.7.43
145	TLV	PDP Context Prioritization	7.7.45
146	TLV	Additional RAB Setup Information	7.7.45A
147	TLV	SGSN Number	7.7.47
148	TLV	Common Flags	7.7.48
149	TLV	APN Restriction	7.7.49
AAA	TLV	RAT Type	7.7.A
BBB	TLV	User Location Information	7.7.B
CCC	TLV	MS Time Zone	7.7.C
DDD	TLV	IMEI(SV)	7.7.D
EEE	TLV	CAMEL Charging Information Container	7.7.E
239-250	Reserved for the GPRS charging protocol (see GTP' in 3GPP TS 32.215 [18])		
251	TLV	Charging Gateway Address	7.7.44
252-254	Reserved for the GPRS charging protocol (see GTP' in 3GPP TS 32.215 [18])		
255	TLV	Private Extension	7.7.46

***** Next Modified Section (editorial) *****

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7.7.25A MS Not Reachable Reason

The MS Not Reachable Reason indicates the reason for the setting of the MNRG flag.

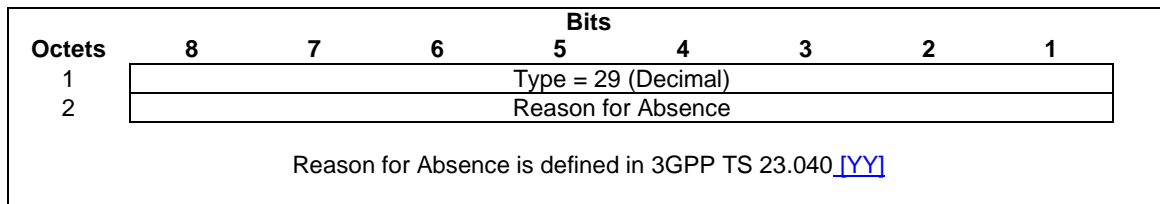


Figure 33a: MS Not Reachable Reason Information Element

****** Last Modified Section ******

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7.7.48 Common Flags

The Common Flags optional information element is used to hold values for multiple bit flags.

The Prohibit Payload Compression bit field is relevant only for A/Gb mode access and is used to determine whether or not an SGSN should attempt to compress the payload of user data when the users asks for it to be compressed.

Bits marked as Spare shall be assigned the value 0 by the sending node and shall not be evaluated by the receiving node.

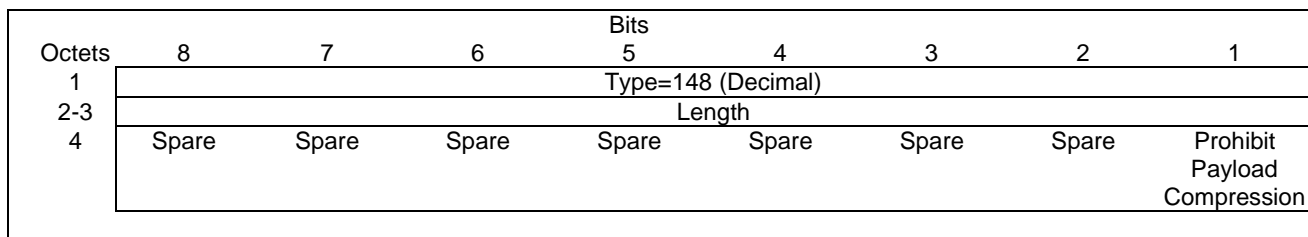


Figure 62a: Common Flags Information Element

7.7.49 APN Restriction

The APN Restriction information element, when used in messages from the GGSN to the SGSN, contains an unsigned integer value indicating the level of restriction imposed on primary PDP Contexts created to the associated APN. When used in messages from the SGSN to GGSN, it contains an unsigned integer value indicating the highest level of restriction type for all currently active PDP Contexts associated with the subscriber. In both cases, the meaning of the value contained within the IE is as defined in 3GPP TS 23.060 [4], sub-clause 15.4.

The structure of the APN Restriction IE is as follows:

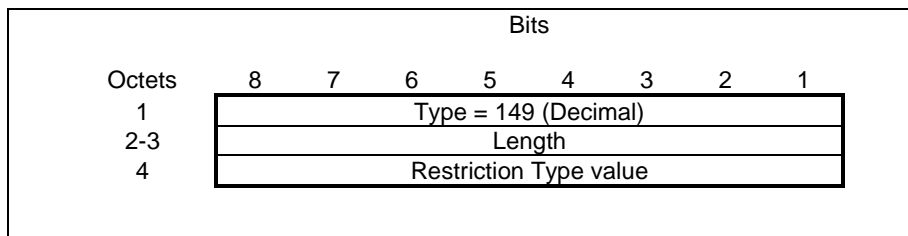


Figure 62b: Restriction Type Information Element

7.7.A RAT Type

The 'RAT Type' information element is used to indicate which Radio Access Technology is currently serving the UE. If the UE is currently being served by a GPRS/EDGE Radio Access Network (GERAN) then bit 1 of octet 4 shall be set to

1, otherwise it shall be set to 0. If the UE is currently being served by a UMTS Terrestrial Radio Access Network (UTRAN) then bit 2 of octet 4 shall be set to 1, otherwise it shall be set to 0.

Octets	8	7	6	Bits				
1	Type = AAA (Decimal)							
2-3	Length							
4	Spare	Spare	Spare	Spare	Spare	Spare	UTRAN	GERAN

Figure AAA: RAT Type Information Element

NOTE: Currently it is only possible to detect the difference between GERAN and UTRAN when GERAN Gb mode is used. If GERAN Iu mode is used, then an SGSN may not be able to detect the difference between GERAN and UTRAN.

7.7.B User Location Information

The 'User Location Information' IE is used to indicate CGI/SAI of where the MS is currently located.

The 'Geographic Location Type' field is used to convey whether or not location field is included, and if so, what type of location. The types of locations that can be conveyed are defined in table XXX..

The 'Geographic Location' field is used to convey the actual geographic information as indicated in the 'Geographic Location Type' field. This field shall not be present if the value of the 'Geographic Location Type' field is 0.

Octets	8	7	6	Bits			
1	Type = BBB (Decimal)						
2-3	Length						
4	Geographic Location Type						
5 - m	Geographic Location						

Figure BBB: User Location Information IE

Table XXX: Geographic Location Type values and their meanings

Value (Decimal)	Definition	Encoding Definition
0	Geographic Location field included and it holds the Cell Global Identification (CGI) of where the user currently is registered. CGI is defined in sub-clause 4.3.1 of 3GPP TS 23.003 [2].	Figure BB1.
1	Geographic Location field included and it holds the Service Area Identity (SAI) of where the user currently is registered. SAI is defined in sub-clause 9.2.3.9 of 3GPP TS 25.413 [7].	Figure BB2.

NOTE: The decimal values 3 to 255 are reserved for future use.

Octets	8	7	6	Bits			
5	MCC digit 2			MCC digit 1			
6	MNC digit 3			MCC digit 3			
7	MNC digit 2			MNC digit 1			
8-9	LAC						
10-11	CI						

Figure BBB1: Geographic Location field for CGI

If only two digits are included in the MNC, then bits 5 to 8 of octet 6 are coded as "1111".

The location area code consists of 2 octets and is found in octet 8 and octet 9. Bit 8 of octet 8 is the most significant bit and bit 1 of octet 9 the least significant bit. The coding of the location area code is the responsibility of each administration. Coding using full hexadecimal representation shall be used.

The cell identity consists of 2 octets and is found in octet 10 and octet 11. Bit 8 of octet 10 is the most significant bit and bit 1 of octet 11 the least significant bit. The coding of the cell identity is the responsibility of each administration. Coding using full hexadecimal representation shall be used.

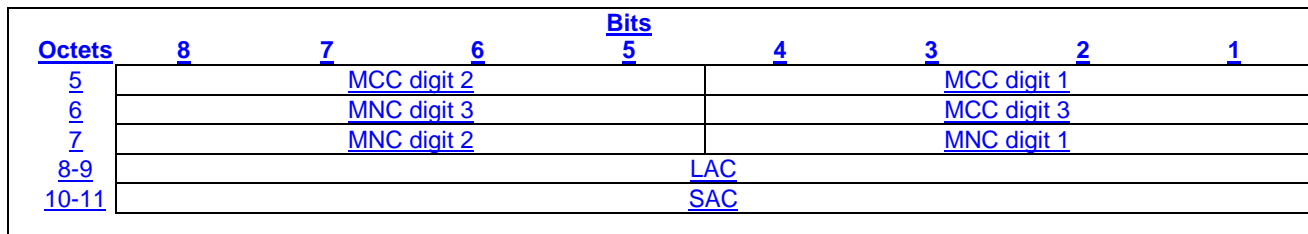


Figure BBB2: Geographic Location field for SAI

If only two digits are included in the MNC, then bits 5 to 8 of octet 6 are coded as "1111".

The location area code consists of 2 octets and is found in octet 8 and octet 9. Bit 8 of octet 8 is the most significant bit and bit 1 of octet 9 the least significant bit. The coding of the location area code is the responsibility of each administration. Coding using full hexadecimal representation shall be used. See 3GPP TS 24.008 [5] for more information.

The service area code consists of 2 octets and is found in octet 10 and octet 11. Bit 8 of octet 10 is the most significant bit and bit 1 of octet 11 the least significant bit. The SAC is defined by the operator. See 3GPP TS 23.003 [2] section 12.5 for more information.

7.7.C MS Time Zone

The 'MS Time Zone' IE is used to indicate the offset between universal time and local time in steps of 15 minutes of where the MS currently resides. The 'Time Zone' field uses the same format as the 'Time Zone' IE in 3GPP TS 24.008 [5].

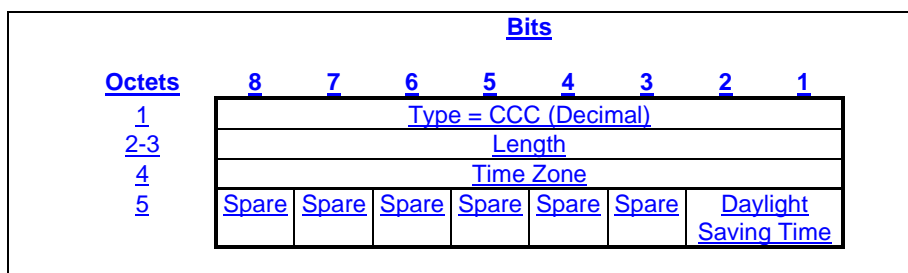


Figure CCC: User Location Information IE

Table YYY Possible values for the Daylight Saving Time field and their meanings.

Daylight Saving Time	Value (binary)	
	Bit 2	Bit 1
No adjustment for Daylight Saving Time	0	0
+1 hour adjustment for Daylight Saving Time	0	1
+2 hours adjustment for Daylight Saving Time	1	0
Reserved	1	1

7.7.D International Mobile Equipment Identity (and Software Version) (IMEI(SV))

The structure of the IMEI and IMEISV are defined in sub-clause 6.2 of 3GPP TS 23.003 [2]. The 'IMEI(SV)' field shall contain the IMEISV if it is available. If only the IMEI is available, then the IMEI shall be placed in the IMEI(SV) field and the last semi-octet of octet 11 shall be set to '1111'. Both IMEI and IMEISV are BCD encoded.

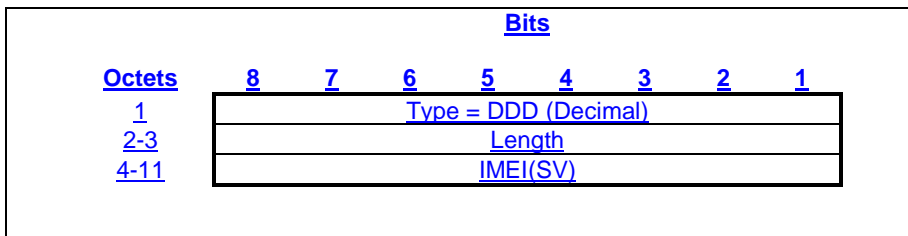


Figure DDD: IMEI(SV) Information Element

7.7.E CAMEL Charging Information Container

The 'CAMEL Charging Information Container' IE is used to copy the CAMELInformationPDP IE including Tag and Length from the SGSN's CDR (S-CDR). The CAMELInformationPDP IE within an S-CDR is defined in 3GPP TS 32.215 [18].

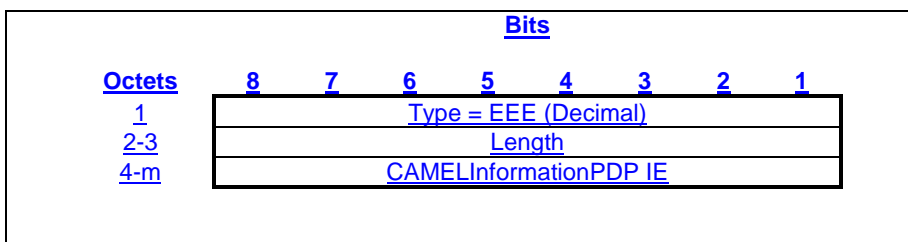


Figure EEE: CAMEL Charging Information Container Information Element