TSG-RAN Meeting #11
Palm Springs, CA, USA, 13 - 16 March 2001

RP-010039

Title: **Agreed CRs (Release 4) for WI "Radio access bearer support enhancement"**

Source: **TSG-RAN WG2**

Agenda item: **6.6.2**

Doc-1st-	Status-	Spec	CR	Rev	Phase	Subject	Cat	Version	Versio	Workitem
R2-010762	agreed	25.306	011	1	Rel-4	Addition of ROHC	B	3.0.0	4.0.0	RANimp-RABSE
R2-010763	agreed	25.323	017	2	Rel-4	Robust Header Compression	B	3.3.0	4.0.0	RANimp-RABSE
R2-010764	agreed	25.331	726	1	Rel-4	ROHC updates to RRC	B	3.5.0	4.0.0	RANimp-RABSE

CR-Form-v3

CHANGE REQUEST

⌘ **25.306** CR **011** ⌘ rev **r1** ⌘ Current version: **3.0.0** ⌘

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Proposed change affects: ⌘ (U)SIM ☐ ME/UE **X** Radio Access Network **X** Core Network ☐

Title: ⌘	Addition of ROHC capabilities	
Source: ⌘	TSG-RAN WG2	
Work item code: ⌘	RANimp-RABSE	***Date:*** ⌘ 2001-03-07
Category: ⌘ **B**		***Release:*** ⌘ REL-4

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

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

Reason for change: ⌘	Support of ROHC in REL-4. This is part of the work item, "Radio Access Bearer Support Enhancements".
Summary of change: ⌘	Added capabilities "Support of ROHC" and "Maximum number of context sessions" (needed for ROHC).
Consequences if not approved: ⌘	There is no way for UTRAN to know whether the UE supports ROHC or not.

Clauses affected: ⌘	4.1, 5.1, 5.2.1

Other specs affected: ⌘	☐ Other core specifications ⌘	
	☐ Test specifications	
	☐ O&M Specifications	

Other comments: ⌘	

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3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

4.1 PDCP parameters

Header compression algorithm supported

Defines whether header compression algorithms will be supported by the UE. If it will be supported it will be the RFC 2507 as specified in 3GPP TS 25.323.

Support for ~~RFC ROHC~~RFC 3095

This parameter defines whether the UE supports header compression according to ~~RFC ROHC~~RFC 3095 as defined in [1] or not.

> NOTE: ~~When the ROHC protocol has been approved to be on the IETF Standards Track it will receive a RFC number (xxxx) and the UE radio access capabilities specification will replace the text "RFC ROHC" with "RFC xxxx~~

*** Next modified section ***

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5 Possible UE radio access capability parameter settings

5.1 Value ranges

Table 5.1: UE radio access capability parameter value ranges

		UE radio access capability parameter	Value range
PDCP parameters		Header compression algorithm supported	Yes/No
		Support for ~~RFC ROHC~~RFC 3095	Yes/No
RLC parameters		Total RLC AM buffer size	2,10,50,100,150,500,1000 kBytes
		Maximum number of AM entities	3,4,5,6,8,16,32
PHY parameters	Transport channel parameters in downlink	Maximum sum of number of bits of all transport blocks being received at an arbitrary time instant	640, 1280, 2560, 3840, 5120, 6400, 7680, 8960, 10240, 20480, 40960, 81920, 163840
		Maximum sum of number of bits of all convolutionally coded transport blocks being received at an arbitrary time instant	640, 1280, 2560, 3840, 5120, 6400, 7680, 8960, 10240, 20480, 40960, 81920, 163840
		Maximum sum of number of bits of all turbo coded transport blocks being received at an arbitrary time instant	640, 1280, 2560, 3840, 5120, 6400, 7680, 8960, 10240, 20480, 40960, 81920, 163840
		Maximum number of simultaneous transport channels	4, 8, 16, 32
		Maximum number of simultaneous CCTrCH	1, 2, 3, 4, 5, 6, 7, 8
		Maximum total number of transport blocks received within TTIs that end within the same 10 ms interval	4, 8, 16, 32, 48, 64, 96, 128, 256, 512
		Maximum number of TFC in the TFCS	16, 32, 48, 64, 96, 128, 256, 512, 1024
		Maximum number of TF	32, 64, 128, 256, 512, 1024
		Support for turbo decoding	Yes/No
	Transport channel parameters in uplink	Maximum sum of number of bits of all transport blocks being transmitted at an arbitrary time instant	640, 1280, 2560, 3840, 5120, 6400, 7680, 8960, 10240, 20480, 40960, 81920, 163840
		Maximum sum of number of bits of all convolutionally coded transport blocks being transmitted at an arbitrary time instant	640, 1280, 2560, 3840, 5120, 6400, 7680, 8960, 10240, 20480, 40960, 81920, 163840
		Maximum sum of number of bits of all turbo coded transport blocks being transmitted at an arbitrary time instant	640, 1280, 2560, 3840, 5120, 6400, 7680, 8960, 10240, 20480, 40960, 81920, 163840
		Maximum number of simultaneous transport channels	2, 4, 8, 16, 32
		Maximum number of simultaneous CCTrCH of DCH type (TDD only)	1, 2, 3, 4, 5, 6, 7, 8
		Maximum total number of transport blocks transmitted within TTIs that start at the same time	2, 4, 8, 16, 32, 48, 64, 96, 128, 256, 512
		Maximum number of TFC in the TFCS	4, 8, 16, 32, 48, 64, 96, 128, 256, 512, 1024
		Maximum number of TF	32, 64, 128, 256, 512, 1024
		Support for turbo encoding	Yes/No
	FDD Physical channel parameters in downlink	Maximum number of DPCH/PDSCH codes to be simultaneously received	1, 2, 3, 4, 5, 6, 7, 8
		Maximum number of physical channel bits received in any 10 ms interval (DPCH, PDSCH, S-CCPCH)	600, 1200, 2400, 3600, 4800, 7200, 9600, 14400, 19200, 28800, 38400, 48000, 57600, 67200, 76800
		Support for SF 512	Yes/No
		Support of PDSCH	Yes/No

		UE radio access capability parameter	Value range
		Simultaneous reception of SCCPCH and DPCH	Yes/No
		Simultaneous reception of SCCPCH, DPCH and PDSCH	Yes/No
		Maximum number of simultaneous S-CCPCH radio links	1 NOTE: Only the value 1 is part of R99
	FDD Physical channel parameters in uplink	Maximum number of DPDCH bits transmitted per 10 ms	600, 1200, 2400, 4800, 960, 19200, 28800, 38400, 48000, 57600
		Support of PCPCH	Yes/No
	TDD physical channel parameters in downlink	Maximum number of timeslots per frame	1..14
		Maximum number of physical channels per frame	1,2,3..,224
		Minimum SF	16, 1
		Support of PDSCH	Yes/No
		Maximum number of physical channels per timeslot	1..16
	TDD physical channel parameters in uplink	Maximum Number of timeslots per frame	1..14
		Maximum number of physical channels per timeslot	1, 2
		Minimum SF	16,8,4,2,1
		Support of PUSCH	Yes/No
RF parameters	FDD RF parameters	UE power class (25.101 subclause 6.2.1)	3, 4 NOTE: Only power classes 3 and 4 are part of R99
		Tx/Rx frequency separation (25.101 subclause 5.3) . NOTE: Not applicable if UE is not operating in frequency band a	190 MHz 174.8-205.2 MHz 134.8-245.2 MHz
RF parameters	TDD RF parameters	UE power class (25.102)	2,3 NOTE: Only power classes 2 and 3 are part of R99
		Radio frequency bands (25.102)	a), b), c), a+b), a+c), a+b+c)
		Chip rate capability (25.102)	3.84,1.28
Multi-mode related parameters		Support of UTRA FDD/TDD	FDD, TDD, FDD+TDD
Multi-RAT related parameters		Support of GSM	Yes/No (per GSM frequency band)
		Support of multi-carrier	Yes/No
LCS related parameters		Standalone location method(s) supported	Yes/No
		Network assisted GPS support	Network based / UE based / Both/ None
		GPS reference time capable	Yes/No
		Support for IPDL	Yes/No
		Support for OTDOA UE based method	Yes/No
Measurement related capabilities		Need for downlink compressed mode	Yes/No (per frequency band, UTRA mode and RAT)
		Need for uplink compressed mode	Yes/No (per frequency band, UTRA mode and RAT)

*** Next modified section ***

5.2.1 Combinations of common UE Radio Access Parameters for UL and DL

NOTE: It is FFS whether measurement-related capabilities need to be included in the combinations. These capabilities are independent from the supported RABs.

Table 5.2.1.1: UE radio access capability parameter combinations, parameters common for UL and DL

Reference combination of UE Radio Access capability parameters common for UL and DL	32kbps class	64kbps class	128kbps class	384kbps class	768kbps class	2048kbps class
PDCP parameters						
Header compression algorithm supported	No	No/Yes NOTE 1	No/Yes NOTE 1	No/Yes NOTE 1	No/Yes NOTE 1	No/Yes NOTE 1
Support for ~~RFC ROHC~~RFC 3095	No/Yes NOTE 1	No/Yes NOTE 1	No/Yes NOTE 1	No/Yes NOTE 1	No/Yes NOTE 1	No/Yes NOTE 1
RLC parameters						
Total RLC AM buffer size (kbytes)	10	10	50	50	100	500
Maximum number of AM entities	4	4	5	6	8	8
Multi-mode related parameters						
Support of UTRA FDD/TDD	FDD / FDD+TDD / TDD NOTE 1					
Multi-RAT related parameters						
Support of GSM	Yes/No NOTE 1					
Support of multi-carrier	Yes/No NOTE 1					
LCS related parameters						
Standalone location method(s) supported	Yes/No NOTE 1					
Network assisted GPS support	Network based / UE based / Both/ None NOTE 1					
GPS reference time capable	Yes/No NOTE 1					
Support for IPDL	Yes/No NOTE 1					
Support for OTDOA UE based method	Yes/No NOTE 1					
RF parameters for FDD						
UE power class	3 / 4 NOTE 1					
Tx/Rx frequency separation	190 MHz					
RF parameters for TDD						
Radio frequency bands	A / b / c / a+b / a+c / b+c / a+b+c NOTE 1					
Chip rate capability	1.28 / 3.84 Mchip/sec NOTE 1					
UE power class	2 / 3 NOTE 1					

NOTE 1: Options represent different combinations that should be supported with Conformance Tests.

CR-Form-v3

CHANGE REQUEST

| ⌘ | **25.323** CR **017** | ⌘ | rev | **r2** | ⌘ | Current version: | **3.3.0** | ⌘ |

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Proposed change affects: ⌘   (U)SIM ☐   ME/UE **X**   Radio Access Network **X**   Core Network ☐

Title:	⌘	Robust Header Compression
Source:	⌘	TSG-RAN WG2
Work item code: ⌘	RANimp-RABSE	**Date:** ⌘ 2001-03-07
Category:	⌘ **B**	**Release:** ⌘ REL-4

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

Reason for change:	⌘	This is the corresponding CR to include the Robust Header Compression component of the work item, "Radio Access Bearer Support Enhancements", TR 25.844 in REL-4
Summary of change:	⌘	A new section (5.1.3) has been introduced to specify the inclusion of the IETF ~~RFC ROHC~~RFC 3095, or more commonly referred to as ROHC, protocol. Also, minor editorial changes have been made. For example, removal of text referring to features to be included in Release 2000 (REL-4).
Consequences if not approved:	⌘	

Clauses affected:	⌘	1, 2, 3, 4.1, 4.2, 5, 5.1, 5.1.1, 5.1.2, 5.1.2.1, 5.1.3 (new), , 5.2, 5.3, 5.3.1, 5.3.2, 5.3, 5.3.1, 7.1, 8.2, 8.3.2, 8.3.3

Other specs affected:	⌘	☐ Other core specifications ⌘	
		☐ Test specifications	
		☐ O&M Specifications	
Other comments:	⌘		

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1 Scope

The present document provides the description of the Packet Data Convergence Protocol (PDCP).

PDCP provides its services to the NAS at the UE or the relay at the Radio Network Controller (RNC).

PDCP uses the services provided by the Radio Link Control (RLC) sublayer.

The main functions of PDCP are:

- compression of redundant Network PDU control information (header compression);

- transfer of packet data protocol user data using services provided by RLC protocol.

The following functions are not part of release 1999 but will be included in Release 2000:

- multiplexing of different RBs onto the same RLC-entity;

- transfer of states and header compression context information to target SRNC during SRNS relocation.

Editor's Note: This current version of the PDCP specification was written at the time that the ROHC protocol, as standardised in the IETF Robust Header Compression Working Group, is currently an IETF draft. When the ROHC protocol has been approved to be on the IETF Standards Track it will receive a RFC number (xxxx) and the PDCP specification will replace the text "RFC ROHCRFC 3095" with "RFC xxxx".

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.

[1] 3GPP TS 25.401: "UTRAN Overall Description".

[2] 3GPP TR 25.990: "Vocabulary for the UTRAN".

[3] 3GPP TS 25.301: "Radio Interface Protocol Architecture".

[4] 3GPP TS 25.303: "Interlayer Procedures in Connected Mode".

[5] 3GPP TS 25.322: "RLC Protocol Specification".

[6] 3GPP TS 25.331: "RRC Protocol Specification".

[7] 3GPP TS 23.121: "Architectural Requirements for Release 1999".

[8] IETF RFC 2507: "IP Header Compression".

[9] 3GPP TS 23.060: "General Packet Radio Service (GPRS); Service description; Stage 2".

[10] IETF RFC ROHCRFC 3095: "RObust Header Compression (ROHC): Framework and four profiles: RTP, UDP, ESP, and uncompressedRobust Header Compression".

[11] IETF RFC 3096: "Requirements for robust IP/UDP/RTP header compression".

3   Abbreviations

For the purposes of the present document, the following abbreviations apply:

AS	Access Stratum
CID	Context Identifier
C-SAP	Control Service Access Point
IETF	Internet Engineering Task Force
IP	Internet Protocol
L2	Layer 2 (data link layer)
L3	Layer 3 (network layer)
NAS	Non Access Stratum
PDCP	Packet Data Convergence Protocol
PDU	Protocol Data Unit
PID	Packet Identifier
RB	Radio Bearer
RFC	Request For Comments
RLC	Radio Link Control
ROHC	RoObust Header Compression
RRC	Radio Resource Control
RTP	Real Time Protocol
SDU	Service Data Unit
TCP	Transmission Control Protocol
UDP	User Datagram Protocol
UE	User Equipment
UMTS	Universal Mobile Telecommunications System
UTRA	UMTS Terrestrial Radio Access
UTRAN	UMTS Terrestrial Radio Access Network

4   General

4.1   Objective

The present document describes the functionality of the UTRAN PDCP. The overall UTRAN logical architecture is defined in 3GPP TS 25.301 [3].

Network layer protocols are intended to be capable of operating over services derived from a wide variety of subnetworks and data links. UMTS supports several network layer protocols providing protocol transparency for the users of the service. At that point of view supported protocols are IPv4 and IPv6. Introduction of new network layer protocols to be transferred over UTRAN shall be possible without any changes to UTRAN protocols. Therefore, all functions related to transfer of packets from higher layers (PDCP SDUs) shall be carried out in a transparent way by the UTRAN network entities. This is one of the requirements for UTRAN PDCP.

Another requirement for the PDCP is to provide functions that help to improve channel efficiency. This requirement is fulfilled by the possibility to implement different kinds of optimization methods. The currently known methods are standardised IETF header compression algorithmprotocols.

Multiplexing of RBs onto the same RLC entity will be included in Release 2000 but is not available in Release 1999. Therefore, in Release 1999 eEvery RB, is connected to one PDCP entity and one PDCP entity is connected to one RLC entity. The PDCP entities are located in the PDCP sublayer.

Every PDCP entity uses zero, one or several header compression algorithmprotocol types with certain parameters. Several PDCP entities may use the same algorithmprotocol type. The algorithmprotocol types and their parameters are negotiated by RRC configured by upper layers and indicated to PDCP through the PDCP Control Service Access Point (PDCP-C-SAP).

Since the adaptation of different network layer protocols to PDCP is implementation dependent, it is not defined in the present document.

4.2 Overview on sublayer architecture

Figure 1 shows the model of the PDCP within the UTRAN protocol architecture. Every PDCP-SAP uses exactly one PDCP entity. Each PDCP entity uses none, one or several header compression ~~algorithm~~protocol types.
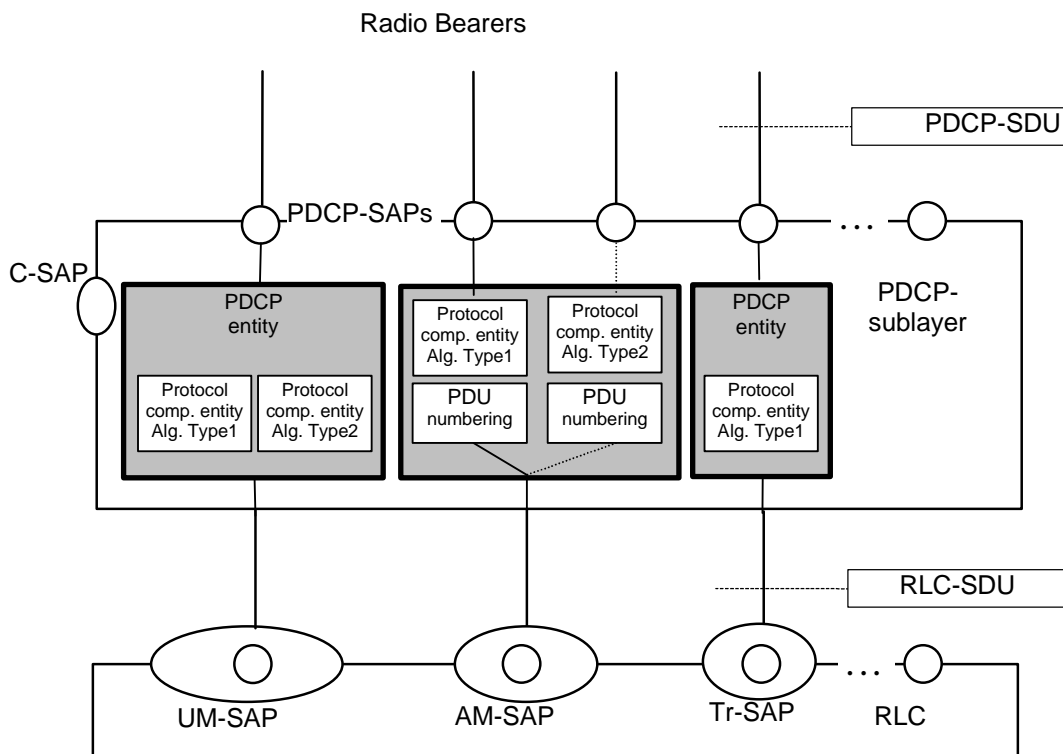
Figure 1: PDCP structure

Figure 1 represents only one possible structure for PDCP and this should not restrict implementation. However, subclause 5.1 shall be adhered to.

5 Functions

Packet Data Convergence Protocol shall perform the following functions:

- header compression and decompression of IP data streams (e.g., TCP/IP and RTP/UDP/IP headers) at the transmitting and receiving entity, respectively. The header compression method is specific to the particular network layer, transport layer or upper layer protocol combinations e.g. TCP/IP and RTP/UDP/IP

- transfer of user data. Transmission of user data means that PDCP receives PDCP SDU from the NAS and forwards it to the RLC layer and vice versa

- maintenance of PDCP sequence numbers for radio bearers that are configured to support lossless SRNS relocation

- ~~multiplexing of different RBs onto the same RLC entity. Multiplexing is not part of Release 1999 but will be included in Release 2000~~

5.1 Header Compression

The header compression method is specific for each network layer protocol type. The network layer protocol type is indicated during PDP context activation as defined in 23.060 [9]. The header compression ~~algorithm~~protocols and their parameters are ~~negotiated by RRC~~ configured by upper layers for each PDCP entity and indicated to PDCP through the

PDCP-C-SAP. Compressor and decompressor initiated signalling between peer PDCP entities, during operation, is carried out in the user plane.

The PDCP layer shall be able to support several header compression ~~algorithm~~protocols and it shall always be possible to extend the list of supported ~~algorithm~~protocols in the future.

The PDCP layer can have one or several PDCP entities. Each PDCP entity may use zero, one, or several header compression ~~algorithm~~protocols. It shall be possible to establish several header compression ~~algorithm~~protocols of different types related to one PDCP entity. Different PDCP entities may include header compression ~~algorithm~~protocols of the same type.

Figure 1 shows an example how PDCP may be configured.

5.1.1   Assignment of PID values

PDCP shall be able to distinguish different types of header compression packets to handle them with a correct header compression ~~algorithm~~protocol and furthermore to indicate the type of the packet within a certain ~~algorithm~~protocol. This is realised by utilising the PID field in the PDU structure. ~~The table is reconfigured every time the PDCP entity is reconfigured.~~

PDCP shall be able to:

-    identify different types of header compression protocols

-    identify different header compression protocol packet types and

-    identifiy different contexts for a header compression protocol

The requirements above are realised by utilising the PID field in the PDCP PDU format.

The following table illustrates an example of the PID value allocation table when ~~three~~ five arbitrary header compression methods (RFC 2507 [8], Methods A and B, Method C and ~~RFC ROHC~~RFC 3095 [10]) are configured for one PDCP entity. The table is reconfigured every time the PDCP entity is reconfigured with a change in the supported header compression protocols.

Table 1: Example of the PID value allocation table

PID Value	Optimization method	Packet type
0	No header compression	-
1	RFC 2507	Full header
2	RFC 2507	Compressed TCP
3	RFC 2507	Compressed TCP nondelta
4	RFC 2507	Compressed non TCP
5	RFC 2507	Context state
6	Method A	Uncompressed TCP/IP
7	Method A	Compressed TCP/IP
8	Method B	Uncompressed IP/UDP/RTP
9	Method B	Compressed IP/UDP/RTP
10	~~RFC ROHC~~RFC 3095	CID 0
11	RFC 3095~~ROHC~~	CID 1
12	RFC 3095~~ROHC~~	CID 2
13	Method C	Full header
14	Method C	Compressed header
~~...~~15…31	Unassigned value	-

The assignment of the PID values follow the general rules listed below:

-    PID value 0 is reserved permanently for no compression;

-    PID values are assigned in ascending order, starting from 1;

-    PID values are assigned independently to each PDCP entity;

- PID values are reassigned for the PDCP entity after renegotiation of the header compression ~~algorithm~~protocols;

- the list of negotiated (or re-negotiated) header compression entities shall be examined, starting from the first one in the list. The number of PID values to be assigned is specified in the subclause for this ~~algorithm~~protocol;

- if there are not enough unused PID values to be assigned to a header compression ~~algorithm~~protocol, the negotiated header compression entities using this ~~algorithm~~protocol shall be ignored without error notification;

- PID values that are used and are not defined invalidate the PDCP PDU;

- for a certain ~~algorithm~~protocol in a PDCP entity the assignment of PID values starts from (n+1) where n is the number of PID values already assigned to other ~~algorithm~~protocols. The assignment is done in the order the ~~algorithm~~protocols are ~~negotiated by RRC~~configured by upper layers. In the example given in table 1, RFC 2507 was the first, Method A ~~was~~ the second ~~and~~, Method B ~~was~~ the third, ~~RFC ROHC~~RFC 3095 the fourth and Method C the fifth ~~algorithm~~ protocol configured ~~in the PDCP Info information element exchanged between peer RRC entities~~by upper layers. The PID assigment shall follows this order.

The used header compression ~~algorithm~~protocol ~~and the~~, header compression packet type and header compression protocol contexts are unambiguously known by the basis of the PID value and shall apply to peer PDCP entities. While transferring data, the PID values are conveyed in the field of the PDCP header belonging to the PDCP PDU. Any successfully ~~negotiated~~ configured ~~algorithm~~header compression protocol may be used for header compression of a PDCP SDU.

5.1.2 ~~TCP/IP and UDP/IP header compression~~IP Header Compression (RFC 2507)

The ~~d~~Detailed operation of the ~~RFC 2507, "IP~~ ~~header~~ Header ~~compression~~ Compression", protocol is described in clause 3 of the IETF specification RFC 2507 [8]. Furthermore the mechanisms related to error recovery and packet reordering are described in clauses 10 and 11 of the RFC 2507. These mechanisms shall be included in the functionality of the header compression supported by PDCP.

5.1.2.1 Context identifiers

Context identifiers for RFC 2507 shall only be included in the RFC 2507 packet types, as defined in [8].

5.1.2.~~1~~2 Assignment of PID values for RFC 2507

The following PID values shall be assigned to the RFC 2507 header compression in the order presented in the table where n is the number of PID values already assigned to other ~~algorithm~~protocols.

Table 2: PID values assigned to RFC 2507 header compression ~~algorithm~~protocol

PID value	Optimization method	Packet type
n+1	RFC 2507	Full header
n+2	RFC 2507	Compressed TCP
n+3	RFC 2507	Compressed TCP non-delta
n+4	RFC 2507	Compressed non-TCP
n+5	RFC 2507	Context state

5.1.3 Robust Header Compression (~~RFC ROHC~~RFC 3095)

The detailed operation of the, "RObust Header Compression (ROHC): Framework and four profiles: RTP, UDP, ESP, and uncompressed~~Robust Header Compression~~", protocol is described in the IETF specification ~~RFC ROHC~~RFC 3095 [10].

~~Editor's Note: This current version of the PDCP specification was written at the time that the ROHC protocol, as standardised in the IETF Robust Header Compression Working Group, is currently an IETF draft. When the ROHC protocol has been approved to be on the IETF Standards Track it will receive a RFC number (xxxx) and the PDCP specification will replace the text "RFC ROHCRFC 3095" with "RFC xxxx".~~

5.1.3.1 Context indentifiers

The context of the ~~ROHC~~RFC 3095 protocol is defined in [10]. ~~The ROHC protocol~~ RFC 3095 can only be configured to support one or several contexts. Each context is indentified by a value known as the context identifier (CID). If CIDs are to be used, then the CID shall be:

- included in the PDCP header or,

- included in the ~~ROHC~~RFC 3095 packet format [10].

The choice of which of the above two methods to use is configured by upper layers. The assignment of the PID values is specified in subclauses 5.1.3.2 and 5.1.3.3, respectively.

5.1.3.2 Assignment of PID values for ~~RFC ROHC~~RFC 3095 with CIDs in PDCP PDU Header

The following PID values shall be assigned to the ~~RFC ROHC~~RFC 3095 protocol in the order presented in the table where n is the number of PID values already assigned to other protocols. As shown in the Table Z below, the allocation of PID values for the ~~ROHC protocol~~RFC 3095 map to the CID values used by ~~ROHC~~RFC 3095. The maximum CID value (CID_X) is configured by upper layers. The ~~ROHC~~RFC 3095 protocol shall not introduce CIDs in the ROHC packet format.

Table z: PID values assigned to ~~ROHC~~RFC 3095 header compression protocol

PID value	Optimisation method	Packet type
n+1	~~RFC ROHC~~RFC 3095	CID1
n+2	RFC 3095~~ROHC~~	CID2
…	RFC 3095~~ROHC~~	…
…	RFC 3095~~ROHC~~	…
n+x	RFC 3095~~ROHC~~	CID_X

5.1.3.3 Assignment of PID values for ~~RFC ROHC~~RFC 3095 packet format

The following PID value shall be assigned to the ROHC header compression as presented in the table where n is the number of PID values already assigned to other protocols.

Table 2: PID values assigned to RFC 2507 header compression protocol

PID value	Optimisation method	Packet type
n+1	~~RFC ROHC~~RFC 3095	~~RFC ROHC~~RFC 3095 packet format

The ~~RFC ROHC~~RFC 3095 protocol can be configured to handle CIDs within the ROHC packet format. In such a case, PDCP shall not be configured to accommodate ROHC CIDs in the PDCP PID, as described in subclause 5.1.3.1.

5.1.3.4 ~~ROHC~~RFC 3095 Segmentation

The ~~ROHC~~RFC 3095 protocol supports segmentation. The segmentation can vary packet by packet and it does not cause any overhead to packets that are not segmented. The segmentation in ~~ROHC~~RFC 3095 shall not be used when ~~ROHC~~RFC 3095 uses the non-transparent mode of RLC [5], in which case the MRRU (maximum reconstructed reception unit) shall be equal to 0. ~~ROHC~~RFC 3095 segmentation shall only be used when ~~ROHC~~RFC 3095 uses the transparent mode of RLC and the PACKET_SIZES_ALLOWED is used to configure ROHC packet sizes. Furthermore, segmentation shall be applied if the produced packet does not fit to the largest packet as indicated by PACKET_SIZES_ALLOWED.

5.1.3.5 Protocol Parameters~~The RFC ROHC~~RFC 3095 ~~protocol is configured by upper layers with the following parameters:~~

~~a) MAX_CID~~

~~This is the highest CID value that can be used. One CID value shall always be reserved for uncompressed flows.~~

Editor's Note: It is FFS as to whether to configure a MAX_CID for each ROHC mode or to provide only one MAX_CID, covering all ROHC modes.

b) PACKET_SIZES_ALLOWED

This parameter, if set, governs which packet sizes in bytes may be used by the ROHC implementation. Thus, packet sizes not in the set of values for this parameter shall not be used. This parameter is used to stipulate which packet sizes a ROHC implementation can use; the rules shall apply as indicated in [10].

RFC ROHCRFC 3095 has two types of parameters [10]:

- configuration parameters: these are mandatory and must be configured between compressor and decompressor peers.

- implementation parameters: these are optional and, when used, stipulate how RFC ROHCRFC 3095 operates.

These parameters are categorized in four different groups, as defined below:

- M: Mandatory and configured by upper layers.

- MO: Parameters that must be supported and when used can only be configured or triggered by upper layers.

- O: Optional RFC ROHCRFC 3095 parameters that are not configured by upper layers. They may be used locally (ie UTRAN and/or in UE) for RFC ROHCRFC 3095.

- N/A: These are not used in RFC ROHCRFC 3095.

The usage and definition of the parameters shall be as specified below.

- MAX_CID (M): This is the maximum CID value that can be used. One CID value shall always be reserved for uncompressed flows.

- LARGE_CIDS: This is not configured by upper layers but inferred from the configured value of MAX_CID according to the following rule:

    If MAX_CID > 15 then LARGE_CIDS = TRUE else LARGE_CIDS = FALSE.

- PROFILES (M): Profiles are used to define which profiles are allowed to be used by the UE in uplink. All profiles defined in [10] shall be supported by the UE.

- FEEDBACK_FOR (N/A):

- MRRU (M): Segmentation is not used by default.

- NO_OF_PACKET_SIZES_ALLOWED (O)

- PACKET_SIZES_ALLOWED (MO): This parameter, if configured, governs which packet sizes in bytes may be used by RFC ROHCRFC 3095. Thus, packet sizes not in the set of values for this parameter shall not be used.

- PAYLOAD_SIZES (O)

- NO_OF_PACKET_SIZES_USED (O)

- PACKET_SIZES_USED (O)

- CONTEXT_REINITIALIZATION (MO)

- MODE (O)

- CLOCK_RESOLUTION (O)

- REVERSE_DECOMPRESSION_DEPTH (M): Default value is that reverse decompression is not used.

5.2 ~~Multiplexing~~VOID

~~Multiplexing of different RBs onto the same RLC entity is not part of Release 1999 but will be included in Release 2000.~~

5.3 ~~Data Transfer~~5.2 Data Transfer

5.~~3~~2.1 Data transfer over acknowledged mode RLC

If header compression is negotiated the PDCP entity shall perform header compression upon reception of a PDCP-DATA.Req. The PDCP-PDU is then delivered in RLC-AM-DATA.Req to RLC.

During operation, when the peer PDCP entity receives the PDCP-PDU in a RLC-AM-DATA.Ind primitive, the PDCP entity shall perform the header decompression (if negotiated) of PDCP-PDU to obtain the PDCP SDU and deliver the PDCP SDU to the PDCP user with the PDCP-DATA.Ind. The following figure illustrates data transfer over acknowledged mode RLC.
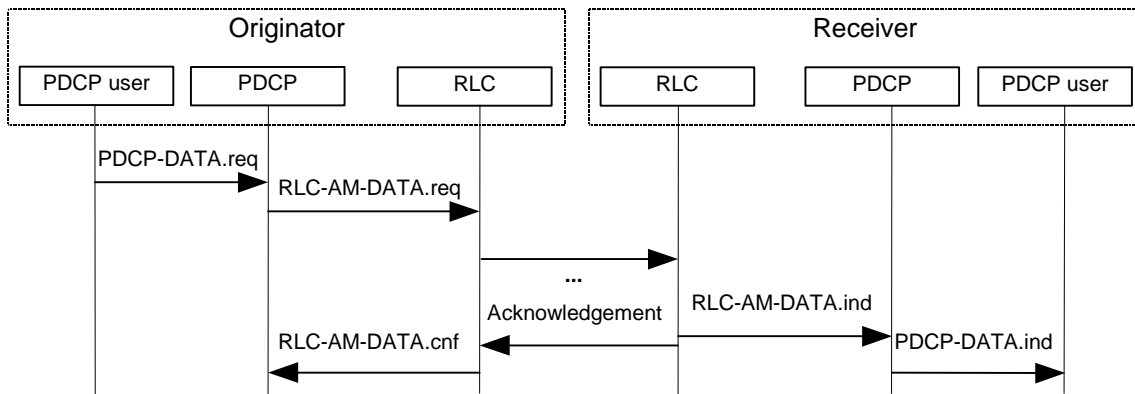
Figure 2: PDCP data transfer over acknowledged mode RLC

5.~~3~~2.2 Data transfer over unacknowledged and transparent mode RLC

If header compression is negotiated the PDCP entity shall perform header compression upon reception of a PDCP-DATA.Req. The PDCP-PDU is then delivered in RLC-UM-DATA.Req or RLC-Tr-DATA.Req to RLC.

When the peer PDCP entity receives the PDCP-PDU in the RLC-UM-DATA.Ind or RLC-Tr-DATA.Ind primitive, the PDCP entity shall perform the header decompression (if negotiated) of PDCP-PDU to obtain the PDCP SDU and deliver the PDCP SDU to the PDCP user with the PDCP-DATA.Ind. The following figure illustrates data transfer over unacknowledged and transparent mode RLC.
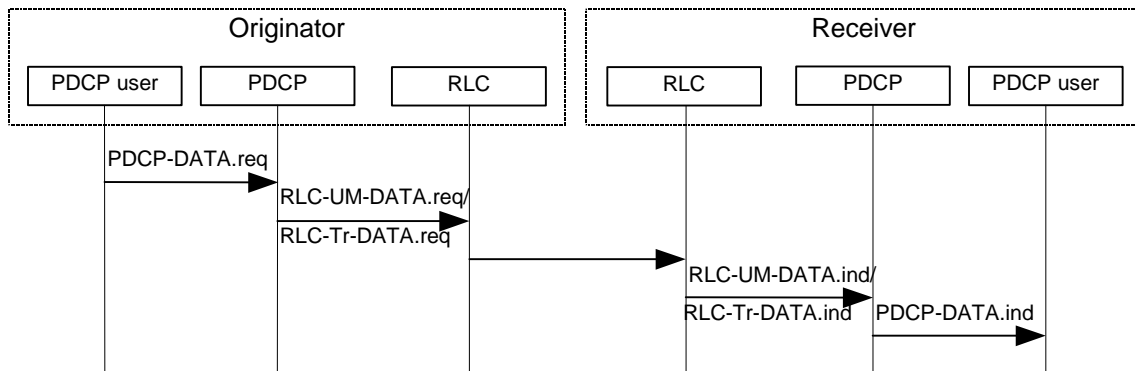
Figure 3: PDCP data transfer over unacknowledged or transparent mode RLC

5.43 SRNS Relocation

Lossless SRNS relocation is only applicable when RLC is in-sequence delivery and acknowledged mode PDCP will only support lossless SRNS relocation if it is 'capable' of doing so. This is indicated by RRC in the IE "Support for lossless SRNS relocation" in "PDCP Capability" and "PDCP info".

The PDCP layer shall, for those radio bearers that are configured to support lossless SRNS relocation:

- support PDCP sequence numbering as specified in subcaluse 5.4.1.

The PDCP layer shall carry out the following during lossless SRNS relocation:

- provide unconfirmed PDCP SDUs and sequence numbers for forwarding to the target RNC

For each radio bearer, the Receive PDCP Sequence Number of the next PDCP SDU expected to be received is transferred from the source to target SRNC. For each radio bearer the source SRNC forwards to the target SRNC the downlink PDCP-SDUs. Source SRNC provides the Send PDCP sequence number of the first PDCP SDU to be forwarded to the target SRNC.

The target SRNC shall send to the UE the next expected UL Receive PDCP Sequence Number. The UE shall send to the target SRNC the DL Receive PDCP Sequence Number of the next expected PDCP SDU. The successfully transmitted PDCP SDUs are thus confirmed. More detailed descriptions of this procedure can be found in [4] and [9].

The reset of all compression entities, for an RB, shall be made during SRNS relocation. Header compression is still possible during relocation Negotiated compression parameters remain valid during reset, but all state information is initialised, e.g. header compression contexts Therefore, in header compression case, the first 'compressed' packet is a full header. For Release 2000, it may be considered not to reset the PDCP entity, internal protocol information, i.e. states and header compression contexts, but to forward these from the source SRNC to target SRNC. Header compression for a PDCP entity can then continue from the state that it had directly before SRNS relocation.

5.43.1 PDCP Sequence Numbering

PDCP sequence numbering is only applicable when lossless SRNS relocation is to be supported. The value of the PDCP sequence number ranges from 0 to 65535. The PDCP SN window size indicates the maximum number of PDCP PDUs that can be numbered at any given time. The PDCP SN window size is negotiated by RRC. When the PDCP entity is setup for the first time for the PDCP user the PDCP sequence numbers are initialised to zero.

For each radio bearer:

- an UL_Send PDCP sequence number is associated with each sent PDCP-PDU in the UE and is incremented by one when a PDCP PDU is delivered to RLC;

- a DL_Send PDCP sequence number is associated with each sent PDCP-PDU in UTRAN and is incremented by one when a PDCP PDU is delivered to RLC;

- an UL_Receive PDCP sequence number is associated with each received PDCP-PDU in UTRAN and is incremented by one when a PDCP PDU is received from RLC or is incremented by one for each discarded RLC SDU, as indicated by the RLC SDU Discard function [5];

- a DL_Receive PDCP sequence number is associated with each received PDCP-PDU in the UE and is incremented by one when a PDCP PDU is received from RLC or is incremented by one for each discarded RLC SDU, as indicated by the RLC SDU Discard function [5].

PDCP sequence numbers are never decremented in the PDCP Tx.

PDCP SeqNum PDUs shall be sent by the peer PDCP entities when synchronization of the PDCP SN is required. It shall only be used for radio bearers that support or are configured / reconfigured to support lossless SRNS relocation. Synchronization of PDCP SN is required after RLC reset, RB reconfiguration or reception of invalid next expected UL/DL Receive PDCP Sequence Number after relocation.

.When a PDCP entity receives a PDCP SeqNum PDU, the receive PDCP sequence number shall be set to the value indicated in the PDCP SeqNum PDU.

PDCP SeqNum PDUs shall not be delivered to RLC after RLC has confirmed the successful transmission of a RLC SDU which contained a numbered PDCP PDU.

6   Services

6.1   Services provided to upper layers

The following services are provided by PDCP to upper layers:

- PDCP SDU delivery.

6.2   Services expected from RLC layer

For a detailed description of the following functions see [5].

- Data transfer in acknowledged mode.

- Data transfer in unacknowledged mode.

- Data transfer in transparent mode.

- Segmentation and reassembly.

- In-Sequence delivery.

7   Elements for layer-to-layer communication

The interaction between the PDCP layer and other layers are described in terms of primitives where the primitives represent the logical exchange of information and control between the PDCP layer and other layers. The primitives shall not specify or constrain implementations.

7.1   Primitives between PDCP and upper layers

The primitives between PDCP and upper layers are shown in table 3.

Table 3: Primitives between PDCP and upper layers

Generic Name	Parameter			
	Req.	Ind.	Resp.	Conf.
PDCP-DATA	Data	Data	Not Defined	Not Defined
CPDCP-CONFIG	PDCP-Info, RLC-SAP SN_Sync	Not Defined	Not Defined	Not Defined
CPDCP-RELEASE	RLC-SAP	Not Defined	Not Defined	Not Defined
CPDCP-SN	PDCP SN	Not Defined	Not Defined	Not Defined
CPDCP-RELOC	Receive_SN	Not Defined	Not Defined	Receive_SN, Send_SN

Each Primitive is defined as follows:

a) PDCP-DATA-Req./Ind.

- PDCP-DATA-Req is used by higher user-plane protocol layers to request a transmission of higher layer PDU. PDCP-DATA-Ind is used to deliver PDCP SDU that has been received to upper user plane protocol layers.

b) CPDCP-CONFIG-Req.

- CPDCP-CONFIG Req is used to configure and – in case of already existing PDCP entity – to reconfigure a PDCP entity and to assign it to the radio bearer associated with that entity.

c) PDCP-RELEASE-Req.

- CPDCP-RELEASE-Req is used by RRC to release a PDCP entity.

d) PDCP-SN-Req.

- CPDCP-SN-Req is used to transfer the PDCP SN to PDCP.

e) CPDCP- RELOC-Req.

- CPDCP-RELOC-Req initiates the SRNS relocation procedure in PDCP for those radio bearers that are configured to support lossless SRNS relocation. The Receive_SN is only included when the UE receives a new U-RNTI.

The following parameters are used in the primitives:

1) PDCP info:

- contains the parameters for each of the header compression algorithmprotocols configured to be used by one PDCP entity.

2) RLC-SAP:

- the RLC-SAP (Tr/UM/AM) used by PDCP entity when communicating with RLC sublayer.

3) SN_Sync:

- Indicates that PDCP should start PDCP sequence number synchronization

4) Send_SN:

- The send PDCP sequence number. There is one in the uplink and one in the downlink. Refer to subclause 5.4.1.

5) Receive_SN:

- The receive PDCP sequence number. There is one in the uplink and one in the downlink. Refer to subclause 5.4.1.

6) PDCP SN:

- This includes a PDCP sequence number.

8 Elements for peer-to-peer communication

8.1 Protocol data units

Two different protocol data unit formats are defined in PDCP for Release 1999. This is configured for the PDCP entity by RRC with the information element, "PDCP PDU header" in *PDCP info*.

8.2 Formats

A PDCP PDU is byte-aligned, if the RLC is run on unacknowledged or acknowledged mode. Otherwise, in transparent mode, it is bit-aligned. In the drawings in subclause 8.2, bit strings are represented by tables in which the first bit is the leftmost one on the first line of the table, the last bit is the rightmost on the last line of the table, and more generally the bit string is to be read from left to right and then in the reading order of the lines.

SDUs are bit strings, with any non-null length. If not compressed within PDCP an SDU is included from first bit onward.

8.2.1 PDCP-No-Header PDU

The PDCP-No-Header PDU does not introduce any overhead to the PDCP SDU.

The format of the PDCP-No-Header-PDU is shown in table 4.

Table 4: PDCP-No-Header PDU

Data

8.2.2 PDCP Data PDU

The data PDU is used to convey a payload unit containing a PDCP SDU, header compression related control signalling or data that has been obtained from PDCP SDU after header compression.

The format of the PDCP-Data-PDU is shown in table 5.

Table 5: PDCP-Data-PDU format

PDU type	PID
Data	

8.2.3 PDCP SeqNum PDU

The sequence number PDU is used to convey a payload unit containing a PDCP PDU sequence number and PDCP SDU, header compression related control signalling or data that has been obtained from PDCP SDU after header compression.

The format of the PDCP-SeqNum-PDU is shown in table 6.

Table 6: PDCP-SeqNum-PDU format

PDU type	PID
Sequence number	
Data	

8.3 Parameters

If not otherwise mentioned in the definition of each field then the bits in the parameters shall be interpreted as follows: the left most bit string is the first and most significant and the right most bit is the last and least significant bit.

Unless otherwise mentioned, integers are encoded in standard binary encoding for unsigned integers. In all cases the bits appear ordered from MSB to LSB when read in the PDU.

8.3.1 PDU Type

Length: 3 bits.

The PDU type field indicates the PDCP-data-PDU type.

Bit	PDU Type
000	PID field used for header compression information (PDCP-PDU format described in table 5)
001	PID field used for header compression information and the PDCP PDU sequence number included (PDCP-PDU format described in table 6)
010-111	Reserved (PDUs with this encoding are invalid for this version of the protocol)

8.3.2 PID

Length: 5 bits.

The PID ~~type~~ field indicates the used header compression ~~and~~ packet type or a context identifier.

Bit	Description
00000	No header compression
00001-11111	Dynamically negotiated header compression identifier, as described in subclause 5.1.1

The PID field value defines the used header compression type and packet type. One compression ~~algorithm~~protocol may reserve a certain amount of values from the PID field value space for different packet types. ~~Receiving~~ The receiving PDCP entity makes the reverse operation (~~e.g.~~i.e. header decompression) according to the PID field value. There is no~~t~~ fixed relation~~ship~~ between the PID field value and the used optimization / packet type, but PID field values are defined dynamically at the PDCP parameter negotiation.

The PID field can also be used to represent context identifier values, as illustrated in subclause 5.1.1.

8.3.3 Data

PDCP SDUs that have been header compressed~~, as described in RFC 2507 for 1999,~~ are mapped to this field if header compression is negotiated. Otherwise, PDCP SDUs are mapped to this field.

8.3.4 Sequence number

Length: 16 bits

PDCP PDU sequence number.

9 Handling of unknown, unforeseen and erroneous protocol data

In case of error situations the following action is foreseen:

1) PDCP entity should discard invalid PDU.

Annex A (informative): Change history

Change history					
TSG-RAN#	**Version**	**CR**	**Tdoc RAN**	**New Version**	**Subject/Comment**
RAN_06	-	-	RP-99645	3.0.0	(12/99) Approved at TSG-RAN #6 and placed under Change Control
RAN_07	3.0.0	004	RP-000041	3.1.0	(03/00) Bit order of PDCP PDUs
RAN_07	3.0.0	005	RP-000041	3.1.0	Changes to PDCP
RAN_08	3.1.0	006	RP-000221	3.2.0	(06/00) Changes in PDCP PDU format due to PDCP sequence numbering
RAN_09	3.2.0	009	RP-000359	3.3.0	(09/00) Clarification of PDCP Sequence Numbering
RAN_09	3.2.0	011	RP-000359	3.3.0	Clarification on how to handle invalid PDUs
RAN_09	3.2.0	012	RP-000359	3.3.0	Primitives required for SRNS relocation
RAN_09	3.2.0	015	RP-000359	3.3.0	Handling of invalid PDCP PDU sequence number

CR-Form-v3

CHANGE REQUEST

| ⌘ | **25.331** CR **726** | ⌘ rev **r1** | ⌘ | Current version: | **3.5.0** | ⌘ |

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

Proposed change affects: ⌘   (U)SIM ☐   ME/UE **X**   Radio Access Network **X**   Core Network ☐

Title:	⌘	ROHC updates to RRC

Source:	⌘	TSG-RAN WG2

Work item code: ⌘	RANimp-RABSE		*Date:* ⌘	07.03.2001

Category:	⌘	**B**			*Release:* ⌘	REL-4

	Use one of the following categories:	*Use one of the following releases:*
	F *(essential correction)*	*2 (GSM Phase 2)*
	A *(corresponds to a correction in an earlier release)*	*R96 (Release 1996)*
	B *(Addition of feature),*	*R97 (Release 1997)*
	C *(Functional modification of feature)*	*R98 (Release 1998)*
	D *(Editorial modification)*	*R99 (Release 1999)*
	Detailed explanations of the above categories can	*REL-4 (Release 4)*
	be found in 3GPP TR 21.900.	*REL-5 (Release 5)*

Reason for change:	⌘	ROHC signalling has been added to support ROHC header compression protocol in PDCP. This CR is the outcome of the work item, "Radio Access Bearer Support Enhancements", for which the technical report is TR 25.844.

Summary of change: ⌘	ROHC configuration parameters have been added to the PDCP info IE.

Consequences if not approved:	⌘	ROHC can not be supported on PDCP.

Clauses affected:	⌘	8.6.4.10, 10.3.3.24, 10.3.4.2, 10.3.10, 11

Other specs affected:	⌘	☐ Other core specifications	⌘	
		☐ Test specifications		
		☐ O&M Specifications		

Other comments:	⌘	

How to create CRs using this form:

Comprehensive information and tips about how to create CRs can be found at:
http://www.3gpp.org/3G_Specs/CRs.htm. Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://www.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2000-09 contains the specifications resulting from the September 2000 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

8.6.4.10 PDCP Info

For RFC 3095~~ROHC~~:

- the chosen MAX_CID shall not be greater than the value "Maximum number of ROHC context sessions" as indicated in the IE "PDCP Capability".

- the configuration for the PACKET_SIZES_ALLOWED is FFS.

If IE "PDCP info" is included, the UE shall:

- Configure the PDCP entity for that radio bearer accordingly.

~~Editor's Note: This current version of the RRC specification was written at the time that the ROHC protocol, as standardised in the IETF Robust Header Compression Working Group, is currently an IETF draft. When the ROHC protocol has been approved to be on the IETF Standards Track it will receive a RFC number (xxxx) and the RRC specification will replace the text "RFC ROHC" with "RFC xxxx".~~

10.3.4.2   PDCP info

The purpose of the PDCP info IE is to indicate which algorithms shall be established and to configure the parameters of each of the algorithms.

Information Element/Group name	Need	Multi	Type and reference	Semantics description	Version
Support for lossless SRNS relocation	CV-*LosslessCriteria*		Boolean	TRUE means support	
Max PDCP SN window size	CV *Lossless*		Integer (255, 65535)	Maximum PDCP sequence number window size. The handling of sequence number when the Max PDCP SN window size is 255 is specified in [23]. Default value is 65535.	
PDCP PDU header	MD		Enumerated (present, absent)	Whether a PDCP PDU header is existent or not. Default value is "present"	
Header compression information	OP	1 to <maxPDCPAlgoType>			
>CHOICE *algorithm type*	MP				
>>RFC 2507				Header compression according to IETF standard RFC 2507	
>>>F_MAX_PERIOD	MD		Integer (1..65535)	Largest number of compressed non-TCP headers that may be sent without sending a full header. Default value is 256.	
>>>F_MAX_TIME	MD		Integer (1..255)	Compressed headers may not be sent more than F_MAX_TIME seconds after sending last full header. Default value is 5.	
>>>MAX_HEADER	MD		Integer (60..65535)	The largest header size in octets that may be compressed. Default value is 168.	
>>>TCP_SPACE	MD		Integer (3..255)	Maximum CID value for TCP connections. Default value is 15.	
>>>NON_TCP_SPACE	MD		Integer (3..65535)	Maximum CID value for non-TCP connections. Default value is 15.	
>>>EXPECT_REORDERING	MD		Enumerated (reordering not expected, reordering expected)	Whether the algorithm shall reorder PDCP SDUs or not. Default value is "reordering not expected".	
>>RFC 3095ROHC				Header compression according to IETF standard RFC 3095ROHC	Rel-4
>>>Max_CID	MD		Integer (1.. 16383)	Highest context ID number to be used by the compressor. Default value is 15.	Rel-4
>>>Profiles	MP	1 to <maxROHC-Profiles>		Profiles supported by the decompressor.	Rel-4
>>>>Profile instance	MP		Integer(1 .. 3)	Supported profile types. At least four spare values.	Rel-4

>>>MRRU	MD		Integer (0 .. 65535)	Maximum reconstructed reception unit. Default value is 0 (no segmentation).	Rel-4
>>> Packet _ Sizes _ Allowed	OP	1 to <maxRO HC-PacketSi zes>		List of packet sizes that are allowed to be produced by RFC 3095ROHC.	Rel-4
>>>>Packet size	MP		Integer (2 .. 1500)	Packet size as defined in RFC 3095ROHC.	Rel-4
>>> Reverse_Decompression_Dep th	MD		Integer (0..65535)	Determines whether reverse decompression should be used or not and the maximum number of packets that can be reverse decompressed by the decompressor. Default value is 0 (reverse decompression shall not be used).	Rel-4

Condition	Explanation
LosslessCriteria	This IE is present only if the IE "RLC mode" is "Acknowledged" and the IE "In-sequence delivery " is "True".
Lossless	This IE shall be present if the IE "Support for lossless SRNS relocation" Is TRUE, otherwise it shall be absent.

Editor's Note: This current version of the RRC specification was written at the time that the ROHC protocol, as standardised in the IETF Robust Header Compression Working Group, is currently an IETF draft. When the ROHC protocol has been approved to be on the IETF Standards Track it will receive a RFC number (xxxx) and the RRC specification will replace the text "RFC ROHC" with "RFC xxxx".

10.3.3.24   PDCP capability

Indicates which algorithms and which value range of their parameters are supported by the UE.

Information Element/Group name	Need	Multi	Type and reference	Semantics description	Version
Support for lossless SRNS relocation	MP		Boolean	TRUE means supported	
Support for RFC 2507	MP		Boolean	TRUE means supported	
>Max HC context space	CV-hc_supMP		Integer(512, 1024, 2048, 4096, 8192)		
Support for RFC 3095ROHC	MP		Boolean	TRUE means supported	Rel-4
>Maximum number of ROHC context sessions	MD		Integer(2, 4, 8, 12, 16, 24, 32, 48, 64, 128, 256, 512, 1024, 16384)	Default value is 16.	Rel-4
> Reverse decompression depth	MD		Integer (0..65535)	Default value is 0 (reverse decompression shall not be used).	Rel-4

Condition	Explanation
hc_sup	Presence is mandatory if IE Support for RFC 2507 = TRUE. Otherwise this field is not needed in the message.

Editor's Note: This current version of the RRC specification was written at the time that the ROHC protocol, as standardised in the IETF Robust Header Compression Working Group, is currently an IETF draft. When the ROHC

~~protocol has been approved to be on the IETF Standards Track it will receive a RFC number (xxxx) and the RRC specification will replace the text "RFC ROHC" with "RFC xxxx".~~

10.3.10 Multiplicity values and type constraint values

The following table includes constants that are either used as multi bounds (name starting with "max") or as high or low value in a type specification (name starting with "lo" or "hi"). Constants are specified only for values appearing more than once in the RRC specification. In case a constant is related to one or more other constants, an expression is included in the "value" column instead of the actual value.

Constant	Explanation	Value
CN information		
maxCNdomains	Maximum number of CN domains	4
UTRAN mobility information		
maxRAT	Maximum number or Radio Access Technologies	maxOtherRAT + 1
maxOtherRAT	Maximum number or other Radio Access Technologies	15
maxURA	Maximum number of URAs in a cell	8
maxInterSysMessages	Maximum number of Inter System Messages	4
maxRABsetup	Maximum number of RABs to be established	16
UE information		
maxtransactions	Maximum number of parallel RRC transactions in downlink	25
maxPDCPalgoType	Maximum number of PDCP algorithm types	8
maxDRACclasses	Maximum number of UE classes which would require different DRAC parameters	8
maxFrequencybands	Maximum number of frequency bands supported by the UE as defined in 25.102	4
maxPage1	Number of UEs paged in the Paging Type 1 message	8
maxSystemCapability	Maximum number of system specific capabilities that can be requested in one message.	16
RB information		
maxPredefConfig	Maximum number of predefined configurations	16
maxRB	Maximum number of RBs	32
maxSRBsetup	Maximum number of signalling RBs to be established	8
maxRBperRAB	Maximum number of RBs per RAB	8
maxRBallRABs	Maximum number of non signalling RBs	27
maxRBMuxOptions	Maximum number of RB multiplexing options	8
maxLoCHperRLC	Maximum number of logical channels per RLC entity	2
MaxROHC-PacketSizes	Maximum number of packet sizes that are allowed to be produced by ROHC.	16
MaxROHC-Profiles	Maximum number of profiles supported by ROHC on a given RB.	8
TrCH information		
maxTrCH	Maximum number of transport channels used in one direction (UL or DL)	32
maxTrCHpreconf	Maximum number of preconfigured Transport channels, per direction	16
maxCCTrCH	Maximum number of CCTrCHs	8
maxTF	Maximum number of different transport formats that can be included in the Transport format set for one transport channel	32
maxTF-CPCH	Maximum number of TFs in a CPCH set	16
maxTFC	Maximum number of Transport Format Combinations	1024
maxTFCI-1-Combs	Maximum number of TFCI (field 1) combinations	512
maxTFCI-2-Combs	Maximum number of TFCI (field 2) combinations	512
maxCPCHsets	Maximum number of CPCH sets per cell	16
maxSIBperMsg	Maximum number of complete system information blocks per SYSTEM INFORMATION message	16
maxSIB	Maximum number of references to other system information blocks.	32
maxSIB-FACH	Maximum number of references to system information blocks on the FACH	8
PhyCH information		
maxSubCh	Maximum number of sub-channels on PRACH	12
maxPCPCH-APsubCH	Maximum number of available sub-channels for AP signature on PCPCH	12
maxPCPCH-CDsubCH	Maximum number of available sub-channels for CD signature on PCPCH	12
maxSig	Maximum number of signatures on PRACH	16
maxPCPCH-APsig	Maximum number of available signatures for AP on PCPCH	16
maxPCPCH-CDsig	Maximum number of available signatures for CD on PCPCH	16
maxAC	Maximum number of access classes	16
maxASC	Maximum number of access service classes	8
maxASCmap	Maximum number of access class to access service classes mappings	7

maxASCpersist	Maximum number of access service classes for which persistence scaling factors are specified	6
maxPRACH	Maximum number of PRACHs in a cell	16
maxFACHPCH	Maximum number of FACHs and PCHs mapped onto one secondary CCPCHs	8
maxRL	Maximum number of radio links	8
maxSCCPCH	Maximum number of secondary CCPCHs per cell	16
maxDPDCH-UL	Maximum number of DPDCHs per cell	6
maxDPCH-DLchan	Maximum number of channelisation codes used for DL DPCH	8
maxDPCHcodesPerTS	Maximum number of codes for one timeslots (TDD)	16
maxPUSCH	Maximum number of PUSCHs	(8)
maxPDSCH	Maximum number of PDSCHs	8
maxPDSCHcodes	Maximum number of codes for PDSCH	16
maxPDSCH-TFCIgroups	Maximum number of TFCI groups for PDSCH	256
maxPDSCHcodeGroups	Maximum number of code groups for PDSCH	256
maxPCPCHs	Maximum number of PCPCH channels in a CPCH Set	64
maxPCPCH-SF	Maximum number of available SFs on PCPCH	7
maxTS	Maximum number of timeslots used in one direction (UL or DL)	14
HiPUSCHIdentities	Maximum number of PDSCH Identities	64
HiPDSCHIdentities	Maximum number of PDSCH Identities	64
Measurement information		
maxTGPS	Maximum number of transmission gap pattern sequences	6
maxAdditionalMeas	Maximum number of additional measurements for a given measurement identity	4
maxMeasEvent	Maximum number of events that can be listed in measurement reporting criteria	8
maxMeasParEvent	Maximum number of measurement parameters (e.g. thresholds) per event	2
maxMeasIntervals	Maximum number of intervals that define the mapping function between the measurements for the cell quality Q of a cell and the representing quality value	1
maxCellMeas	Maximum number of cells to measure	32
maxReportedGSMCells	Maximum number of GSM cells to be reported	6
maxFreq	Maximum number of frequencies to measure	8
maxSat	Maximum number of satellites to measure	16
HiRM	Maximum number that could be set as rate matching attribute for a transport channel	256
Frequency information		
maxFDDFreqList	Maximum number of FDD carrier frequencies to be stored in USIM	4
maxTDDFreqList	Maximum number of TDD carrier frequencies to be stored in USIM	4
maxFDDFreqCellList	Maximum number of neighbouring FDD cells to be stored in USIM	32
maxTDDFreqCellList	Maximum number of neighbouring TDD cells to be stored in USIM	32
maxGSMCellList	Maximum number of GSM cells to be stored in USIM	32
Other information		
maxNumGSMFreqRanges	Maximum number of GSM Frequency Ranges to store	32
maxNumFDDFreqs	Maximum number of FDD centre frequencies to store	8
MaxNumTDDFreqs	Maximum number of TDD centre frequencies to store	8
maxNumCDMA200Freqs	Maximum number of CDMA2000 centre frequencies to store	8

11.2 PDU definitions

```
--***************************************************************
--
-- TABULAR: The message type and integrity check info are not
-- visible in this module as they are defined in the class module.
-- Also, all FDD/TDD specific choices have the FDD option first
-- and TDD second, just for consistency.
--
--***************************************************************

PDU-definitions DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

--***************************************************************
--
-- IE parameter types from other modules
--
--***************************************************************

IMPORTS

-- Core Network IEs :
    CN-DomainIdentity,
    CN-InformationInfo,
    NAS-Message,
    PagingRecordTypeID,
-- UTRAN Mobility IEs :
    URA-Identity,
-- User Equipment IEs :
    ActivationTime,
    C-RNTI,
    CapabilityUpdateRequirement,
    CellUpdateCause,
    CipheringAlgorithm,
    CipheringModeInfo,
    EstablishmentCause,
    FailureCauseWithProtErr,
    FailureCauseWithProtErrTrId,
    InitialUE-Identity,
    IntegrityProtActivationInfo,
    IntegrityProtectionModeInfo,
    N-308,
    PagingCause,
    PagingRecordList,
    ProtocolErrorIndicator,
    ProtocolErrorIndicatorWithMoreInfo,
    Rb-timer-indicator,
    Re-EstablishmentTimer,
    RedirectionInfo,
    RejectionCause,
    ReleaseCause,
    RRC-StateIndicator,
    RRC-TransactionIdentifier,
    SecurityCapability,
    START-Value,
    STARTList,
    U-RNTI,
    U-RNTI-Short,
    UE-RadioAccessCapability,
    UE-RadioAccessCapability-r4ext,
    UE-ConnTimersAndConstants,
    URA-UpdateCause,
    UTRAN-DRX-CycleLengthCoefficient,
    WaitTime,
-- Radio Bearer IEs :
    PredefinedConfigIdentity,
    RAB-Info,
    RAB-Info-Post,
    RAB-InformationList,
    RAB-InformationReconfigList,
    RAB-InformationSetupList,
    RAB-InformationSetupList-r4,
    RB-ActivationTimeInfo,
    RB-ActivationTimeInfoList,
    RB-COUNT-C-InformationList,
    RB-COUNT-C-MSB-InformationList,
    RB-IdentityList,
    RB-InformationAffectedList,
    RB-InformationReconfigList,
```

```
|     RB-InformationReconfigList-r4,
     RB-InformationReleaseList,
     RB-InformationSetupList,
|     RB-InformationSetupList-r4,
     RB-WithPDCP-InfoList,
     SRB-InformationSetupList,
     SRB-InformationSetupList2,
-- Transport Channel IEs:
     CPCH-SetID,
     DL-AddReconfTransChInfo2List,
     DL-AddReconfTransChInfoList,
     DL-CommonTransChInfo,
     DL-DeletedTransChInfoList,
     DRAC-StaticInformationList,
     TFC-Subset,
     TFCS-Identity,
     UL-AddReconfTransChInfoList,
     UL-CommonTransChInfo,
     UL-DeletedTransChInfoList,
-- Physical Channel IEs :
     AllocationPeriodInfo,
     Alpha,
     CCTrCH-PowerControlInfo,
     ConstantValue,
     CPCH-SetInfo,
     DL-CommonInformation,
     DL-CommonInformationPost,
     DL-InformationPerRL,
     DL-InformationPerRL-List,
     DL-InformationPerRL-ListPostFDD,
     DL-InformationPerRL-PostTDD,
     DL-DPCH-PowerControlInfo,
     DL-PDSCH-Information,
     DPCH-CompressedModeStatusInfo,
     FrequencyInfo,
     FrequencyInfoFDD,
     FrequencyInfoTDD,
     IndividualTS-InterferenceList,
     MaxAllowedUL-TX-Power,
     PDSCH-CapacityAllocationInfo,
     PDSCH-Identity,
     PDSCH-Info,
     PRACH-RACH-Info,
     PrimaryCCPCH-TX-Power,
     PUSCH-CapacityAllocationInfo,
     PUSCH-Identity,
     RL-AdditionInformationList,
     RL-RemovalInformationList,
     SSDT-Information,
     TFC-ControlDuration,
     TimeslotList,
     TX-DiversityMode,
     UL-ChannelRequirement,
     UL-ChannelRequirementWithCPCH-SetID,
     UL-DPCH-Info,
     UL-DPCH-InfoPostFDD,
     UL-DPCH-InfoPostTDD,
     UL-TimingAdvance,
     UL-TimingAdvanceControl,
-- Measurement IEs :
     AdditionalMeasurementID-List,
     EventResults,
     InterRAT-TargetCellDescription,
     MeasuredResults,
     MeasuredResultsList,
     MeasuredResultsOnRACH,
     MeasurementCommand,
     MeasurementIdentity,
     MeasurementReportingMode,
     PrimaryCCPCH-RSCP,
     TimeslotListWithISCP,
     TrafficVolumeMeasuredResultsList,
     UP-GPS-AssistanceData,
     UP-OTDOA-AssistanceData,
-- Other IEs :
     BCCH-ModificationInfo,
     CDMA2000-MessageList,
     GSM-MessageList,
     InterRAT-ChangeFailureCause,
     InterRAT-HO-Failure,
     InterRAT-UE-RadioAccessCapabilityList,
     InterRATMessage,
     IntraDomainNasNodeSelector,
     ProtocolErrorInformation,
```

```
    ProtocolErrorMoreInformation,
    Rplmn-Information,
    SegCount,
    SegmentIndex,
    SFN-Prime,
    SIB-Data-fixed,
    SIB-Data-variable,
    SIB-Type
FROM InformationElements

    maxSIBperMsg,
    maxSystemCapability
FROM Constant-definitions;

-- **************************************************
--
-- ACTIVE SET UPDATE (FDD only)
--
-- **************************************************

ActiveSetUpdate-r3 ::= CHOICE {
    r3                              SEQUENCE {
        activeSetUpdate-r3              ActiveSetUpdate-r3-IEs,
        nonCriticalExtensions          SEQUENCE {} OPTIONAL
    },
    criticalExtensions              SEQUENCE {}
}

ActiveSetUpdate-r3-IEs ::= SEQUENCE {
    -- User equipment IEs
        rrc-TransactionIdentifier       RRC-TransactionIdentifier,
        integrityProtectionModeInfo     IntegrityProtectionModeInfo         OPTIONAL,
        cipheringModeInfo               CipheringModeInfo                   OPTIONAL,
        activationTime                  ActivationTime                      OPTIONAL,
        newU-RNTI                       U-RNTI                              OPTIONAL,
    -- Core network IEs
        cn-InformationInfo              CN-InformationInfo                  OPTIONAL,
    -- Radio bearer IEs
        rb-WithPDCP-InfoList            RB-WithPDCP-InfoList                OPTIONAL,
    -- Physical channel IEs
        maxAllowedUL-TX-Power           MaxAllowedUL-TX-Power               OPTIONAL,
        rl-AdditionInformationList      RL-AdditionInformationList          OPTIONAL,
        rl-RemovalInformationList       RL-RemovalInformationList           OPTIONAL,
        tx-DiversityMode                TX-DiversityMode                    OPTIONAL,
        ssdt-Information                SSDT-Information                    OPTIONAL
}

-- **************************************************
--
-- ACTIVE SET UPDATE COMPLETE (FDD only)
--
-- **************************************************

ActiveSetUpdateComplete ::= SEQUENCE {
    -- User equipment IEs
        rrc-TransactionIdentifier       RRC-TransactionIdentifier,
        ul-IntegProtActivationInfo      IntegrityProtActivationInfo         OPTIONAL,
    -- Radio bearer IEs
        rb-UL-CiphActivationTimeInfo    RB-ActivationTimeInfoList           OPTIONAL,
        rb-WithPDCP-InfoList            RB-WithPDCP-InfoList                OPTIONAL,
    -- Extension mechanism for non- release99 information
        nonCriticalExtensions           SEQUENCE {} OPTIONAL
}

-- **************************************************
--
-- ACTIVE SET UPDATE FAILURE (FDD only)
--
-- **************************************************

ActiveSetUpdateFailure ::= SEQUENCE {
    -- User equipment IEs
        rrc-TransactionIdentifier       RRC-TransactionIdentifier,
        failureCause                    FailureCauseWithProtErr,
    -- Extension mechanism for non- release99 information
        nonCriticalExtensions           SEQUENCE {} OPTIONAL
}

-- **************************************************
--
-- Assistance Data Delivery
--
-- **************************************************
```

```
AssistanceDataDelivery-r3 ::= CHOICE {
    r3                                SEQUENCE {
        assistanceDataDelivery-r3       AssistanceDataDelivery-r3-IEs,
        nonCriticalExtensions           SEQUENCE {} OPTIONAL
    },
    criticalExtensions                SEQUENCE {}
}

AssistanceDataDelivery-r3-IEs ::= SEQUENCE {
    --Assistance Data Information Elements
    up-GPS-AssistanceData           UP-GPS-AssistanceData             OPTIONAL,
    up-OTDOA-AssistanceData     UP-OTDOA-AssistanceData       OPTIONAL
}

-- **************************************************
--
-- CELL CHANGE ORDER FROM UTRAN
--
-- **************************************************

CellChangeOrderFromUTRAN-r3 ::= CHOICE {
    r3                                SEQUENCE {
        cellChangeOrderFromUTRAN-IEs      CellChangeOrderFromUTRAN-r3-IEs,
        nonCriticalExtensions           SEQUENCE {} OPTIONAL
    },
    criticalExtensions                SEQUENCE {}
}

CellChangeOrderFromUTRAN-r3-IEs ::= SEQUENCE {
    -- User equipment IEs
        integrityProtectionModeInfo    IntegrityProtectionModeInfo       OPTIONAL,
        activationTime                 ActivationTime                    OPTIONAL,
        rab-InformationList            RAB-InformationList               OPTIONAL,
        interRAT-TargetCellDescription  InterRAT-TargetCellDescription
}

-- **************************************************
--
-- CELL CHANGE FAILURE FROM UTRAN
--
-- **************************************************

CellChangeFailureFromUTRAN ::= CHOICE {
    r3                                SEQUENCE {
        r3-IEs                          CellChangeFailureFromUTRAN-r3-IEs,
        nonCriticalExtensions           SEQUENCE {} OPTIONAL
    },
    criticalExtensions                SEQUENCE {}
}

CellChangeFailureFromUTRAN-r3-IEs ::= SEQUENCE {
    -- User equipment IEs
        integrityProtectionModeInfo    IntegrityProtectionModeInfo       OPTIONAL,
        interRAT-ChangeFailureCause    InterRAT-ChangeFailureCause
}

-- **************************************************
--
-- CELL UPDATE
--
-- **************************************************

CellUpdate ::= SEQUENCE {
    -- User equipment IEs
        u-RNTI                        U-RNTI,
        startList        STARTList,
        am-RLC-ErrorIndicationC-plane   BOOLEAN,
        am-RLC-ErrorIndicationU-plane   BOOLEAN,
        cellUpdateCause                 CellUpdateCause,
        failureCause                    FailureCauseWithProtErrTrId        OPTIONAL,
        -- TABULAR: RRC transaction identifier is nested in FailureCauseWithProtErrTrId
        rb-timer-indicator            Rb-timer-indicator,
    -- Measurement IEs
        measuredResultsOnRACH           MeasuredResultsOnRACH              OPTIONAL,
    -- Extension mechanism for non- release99 information
        nonCriticalExtensions           SEQUENCE {} OPTIONAL
}

-- **************************************************
--
-- CELL UPDATE CONFIRM
--
```

```
-- **************************************************

CellUpdateConfirm-r3 ::= CHOICE {
    r3                              SEQUENCE {
        cellUpdateConfirm-r3            CellUpdateConfirm-r3-IEs,
        nonCriticalExtensions           SEQUENCE {} OPTIONAL
    },
    criticalExtensions              SEQUENCE {}
}

CellUpdateConfirm-r3-IEs ::= SEQUENCE {
    -- User equipment IEs
        rrc-TransactionIdentifier       RRC-TransactionIdentifier,
        integrityProtectionModeInfo     IntegrityProtectionModeInfo             OPTIONAL,
        cipheringModeInfo               CipheringModeInfo                       OPTIONAL,
        activationTime                  ActivationTime                          OPTIONAL,
        new-U-RNTI                      U-RNTI                                  OPTIONAL,
        new-C-RNTI                      C-RNTI                                  OPTIONAL,
        rrc-StateIndicator              RRC-StateIndicator,
        utran-DRX-CycleLengthCoeff      UTRAN-DRX-CycleLengthCoefficient        OPTIONAL,
        rlc-ResetIndicatorC-Plane       BOOLEAN,
        rlc-ResetIndicatorU-Plane       BOOLEAN,
    -- CN information elements
        cn-InformationInfo              CN-InformationInfo                      OPTIONAL,
    -- UTRAN mobility IEs
        ura-Identity                    URA-Identity                            OPTIONAL,
    -- Radio bearer IEs
        rb-InformationReleaseList       RB-InformationReleaseList               OPTIONAL,
        rb-InformationReconfigList      RB-InformationReconfigList              OPTIONAL,
        rb-InformationAffectedList      RB-InformationAffectedList              OPTIONAL,
        rb-WithPDCP-InfoList            RB-WithPDCP-InfoList                    OPTIONAL,
    -- Transport channel IEs
        ul-CommonTransChInfo            UL-CommonTransChInfo                    OPTIONAL,
        ul-deletedTransChInfoList       UL-DeletedTransChInfoList               OPTIONAL,
        ul-AddReconfTransChInfoList     UL-AddReconfTransChInfoList             OPTIONAL,
        modeSpecificTransChInfo         CHOICE {
            fdd                             SEQUENCE {
                cpch-SetID                      CPCH-SetID                      OPTIONAL,
                addReconfTransChDRAC-Info       DRAC-StaticInformationList  OPTIONAL
            },
            tdd                             NULL
        },
        dl-CommonTransChInfo            DL-CommonTransChInfo                    OPTIONAL,
        dl-DeletedTransChInfoList       DL-DeletedTransChInfoList               OPTIONAL,
        dl-AddReconfTransChInfoList     DL-AddReconfTransChInfoList             OPTIONAL,
    -- Physical channel IEs
        frequencyInfo                   FrequencyInfo                           OPTIONAL,
        maxAllowedUL-TX-Power           MaxAllowedUL-TX-Power                   OPTIONAL,
        ul-ChannelRequirement           UL-ChannelRequirement                   OPTIONAL,
        modeSpecificPhysChInfo          CHOICE {
            fdd                             SEQUENCE {
                dl-PDSCH-Information             DL-PDSCH-Information             OPTIONAL
            },
            tdd                             NULL
        },
        dl-CommonInformation            DL-CommonInformation                    OPTIONAL,
        dl-InformationPerRL-List        DL-InformationPerRL-List                OPTIONAL
}

CellUpdateConfirm-r4-IEs ::= SEQUENCE {
    -- User equipment IEs
        rrc-TransactionIdentifier       RRC-TransactionIdentifier,
        integrityProtectionModeInfo     IntegrityProtectionModeInfo             OPTIONAL,
        cipheringModeInfo               CipheringModeInfo                       OPTIONAL,
        activationTime                  ActivationTime                          OPTIONAL,
        new-U-RNTI                      U-RNTI                                  OPTIONAL,
        new-C-RNTI                      C-RNTI                                  OPTIONAL,
        rrc-StateIndicator              RRC-StateIndicator,
        utran-DRX-CycleLengthCoeff      UTRAN-DRX-CycleLengthCoefficient        OPTIONAL,
        rlc-ResetIndicatorC-Plane       BOOLEAN,
        rlc-ResetIndicatorU-Plane       BOOLEAN,
    -- CN information elements
        cn-InformationInfo              CN-InformationInfo                      OPTIONAL,
    -- UTRAN mobility IEs
        ura-Identity                    URA-Identity                            OPTIONAL,
    -- Radio bearer IEs
        rb-InformationReleaseList       RB-InformationReleaseList               OPTIONAL,
        rb-InformationReconfigList      RB-InformationReconfigList-r4           OPTIONAL,
        rb-InformationAffectedList      RB-InformationAffectedList              OPTIONAL,
        rb-WithPDCP-InfoList            RB-WithPDCP-InfoList                    OPTIONAL,
    -- Transport channel IEs
        ul-CommonTransChInfo            UL-CommonTransChInfo                    OPTIONAL,
        ul-deletedTransChInfoList       UL-DeletedTransChInfoList               OPTIONAL,
```

```
            ul-AddReconfTransChInfoList        UL-AddReconfTransChInfoList          OPTIONAL,
        modeSpecificTransChInfo            CHOICE {
            fdd                                SEQUENCE {
                cpch-SetID                         CPCH-SetID                   OPTIONAL,
                addReconfTransChDRAC-Info          DRAC-StaticInformationList   OPTIONAL
            },
            tdd                                NULL
        },
        dl-CommonTransChInfo               DL-CommonTransChInfo                 OPTIONAL,
        dl-DeletedTransChInfoList          DL-DeletedTransChInfoList            OPTIONAL,
        dl-AddReconfTransChInfoList        DL-AddReconfTransChInfoList          OPTIONAL,
    -- Physical channel IEs
        frequencyInfo                      FrequencyInfo                        OPTIONAL,
        maxAllowedUL-TX-Power              MaxAllowedUL-TX-Power                OPTIONAL,
        ul-ChannelRequirement              UL-ChannelRequirement                OPTIONAL,
        modeSpecificPhysChInfo             CHOICE {
            fdd                                SEQUENCE {
                dl-PDSCH-Information                DL-PDSCH-Information         OPTIONAL
            },
            tdd                                NULL
        },
        dl-CommonInformation               DL-CommonInformation                 OPTIONAL,
        dl-InformationPerRL-List           DL-InformationPerRL-List             OPTIONAL
}

-- **************************************************
--
-- CELL UPDATE CONFIRM for CCCH
--
-- **************************************************

CellUpdateConfirm-CCCH-r3 ::= CHOICE {
    r3                          SEQUENCE {
        -- User equipment IEs
        u-RNTI                          U-RNTI,
        -- The rest of the message is identical to the one sent on DCCH.

        cellUpdateConfirm-r3                CellUpdateConfirm-r3-IEs,
        nonCriticalExtensions           SEQUENCE {} OPTIONAL
    },
    criticalExtensions          SEQUENCE {}
}

-- **************************************************
--
-- COUNTER CHECK
--
-- **************************************************

CounterCheck-r3 ::= CHOICE {
    r3                          SEQUENCE {
        counterCheck-r3                 CounterCheck-r3-IEs,
        nonCriticalExtensions           SEQUENCE {} OPTIONAL
    },
    criticalExtensions          SEQUENCE {}
}

CounterCheck-r3-IEs ::= SEQUENCE {
    -- User equipment IEs
    rrc-TransactionIdentifier       RRC-TransactionIdentifier,
    -- Radio bearer IEs
    rb-COUNT-C-MSB-InformationList  RB-COUNT-C-MSB-InformationList
}

-- **************************************************
--
-- COUNTER CHECK RESPONSE
--
-- **************************************************

CounterCheckResponse ::= SEQUENCE {
    -- User equipment IEs
    rrc-TransactionIdentifier       RRC-TransactionIdentifier,
    -- Radio bearer IEs
    rb-COUNT-C-InformationList      RB-COUNT-C-InformationList           OPTIONAL,
    -- Extension mechanism for non- release99 information
    nonCriticalExtensions           SEQUENCE {} OPTIONAL
}

-- **************************************************
--
-- DOWNLINK DIRECT TRANSFER
--
```

```
-- **************************************************
DownlinkDirectTransfer-r3 ::= CHOICE {
    r3                                SEQUENCE {
        downlinkDirectTransfer-r3       DownlinkDirectTransfer-r3-IEs,
        nonCriticalExtensions           SEQUENCE {} OPTIONAL
    },
    criticalExtensions              SEQUENCE {}
}

DownlinkDirectTransfer-r3-IEs ::= SEQUENCE {
    -- User equipment IEs
        rrc-TransactionIdentifier       RRC-TransactionIdentifier,
    -- Core network IEs
        cn-DomainIdentity               CN-DomainIdentity,
        nas-Message                     NAS-Message
}

-- **************************************************
--
-- HANDOVER TO UTRAN COMMAND
--
-- **************************************************


HandoverToUTRANCommand-r3 ::= CHOICE {
    r3                                SEQUENCE {
        handoverToUTRANCommand-r3       HandoverToUTRANCommand-r3-IEs,
        nonCriticalExtensions           SEQUENCE {} OPTIONAL
    },
    criticalExtensions              SEQUENCE {}
}

HandoverToUTRANCommand-r3-IEs ::= SEQUENCE {
    -- User equipment IEs
        new-U-RNTI                      U-RNTI-Short,
        activationTime                  ActivationTime                          OPTIONAL,
        cipheringAlgorithm              CipheringAlgorithm                      OPTIONAL,
    -- Radio bearer IEs
        rab-Info                        RAB-Info-Post,
    -- Specification mode information
        specificationMode               CHOICE {
            complete                        SEQUENCE {
                srb-InformationSetupList        SRB-InformationSetupList,
                rab-InformationSetupList        RAB-InformationSetupList                OPTIONAL,
                ul-CommonTransChInfo            UL-CommonTransChInfo,
                ul-AddReconfTransChInfoList     UL-AddReconfTransChInfoList,
                dl-CommonTransChInfo            DL-CommonTransChInfo,
                dl-AddReconfTransChInfoList     DL-AddReconfTransChInfoList,
                ul-DPCH-Info                    UL-DPCH-Info,
                modeSpecificInfo                CHOICE {
                    fdd                             SEQUENCE {
                        dl-PDSCH-Information             DL-PDSCH-Information OPTIONAL,
                        cpch-SetInfo                    CPCH-SetInfo        OPTIONAL
                    },
                    tdd                             NULL
                },
                dl-CommonInformation            DL-CommonInformation,
                dl-InformationPerRL-List        DL-InformationPerRL-List,
                frequencyInfo                   FrequencyInfo
            },
            preconfiguration                SEQUENCE {
-- All IEs that include an FDD/TDD choice are split in two IEs for this message,
-- one for the FDD only elements and one for the TDD only elements, so that one
-- FDD/TDD choice in this level is sufficient.
                predefinedConfigIdentity        PredefinedConfigIdentity,
                rab-Info                        RAB-Info-Post       OPTIONAL,
                modeSpecificInfo                CHOICE {
                    fdd                             SEQUENCE {
                        ul-DPCH-Info                    UL-DPCH-InfoPostFDD,
                        dl-CommonInformationPost        DL-CommonInformationPost,
                        dl-InformationPerRL-List        DL-InformationPerRL-ListPostFDD,
                        frequencyInfo                   FrequencyInfoFDD
                    },
                    tdd                             SEQUENCE {
                        ul-DPCH-Info                    UL-DPCH-InfoPostTDD,
                        dl-InformationPerRL             DL-InformationPerRL-PostTDD,
                        frequencyInfo                   FrequencyInfoTDD,
                        primaryCCPCH-TX-Power           PrimaryCCPCH-TX-Power
                    }

                }
            }
```

```
    },
-- Physical channel IEs
    maxAllowedUL-TX-Power           MaxAllowedUL-TX-Power
}

HandoverToUTRANCommand-r4-IEs ::= SEQUENCE {
    -- User equipment IEs
        new-U-RNTI                      U-RNTI-Short,
        activationTime                  ActivationTime                      OPTIONAL,
        cipheringAlgorithm              CipheringAlgorithm                  OPTIONAL,
    -- Radio bearer IEs
        rab-Info                        RAB-Info-Post,
    -- Specification mode information
        specificationMode           CHOICE {
            complete                        SEQUENCE {
                srb-InformationSetupList        SRB-InformationSetupList,
                rab-InformationSetupList        RAB-InformationSetupList-r4         OPTIONAL,
                ul-CommonTransChInfo            UL-CommonTransChInfo,
                ul-AddReconfTransChInfoList     UL-AddReconfTransChInfoList,
                dl-CommonTransChInfo            DL-CommonTransChInfo,
                dl-AddReconfTransChInfoList     DL-AddReconfTransChInfoList,
                ul-DPCH-Info                    UL-DPCH-Info,
                modeSpecificInfo                CHOICE {
                    fdd                             SEQUENCE {
                        dl-PDSCH-Information             DL-PDSCH-Information OPTIONAL,
                        cpch-SetInfo                    CPCH-SetInfo        OPTIONAL
                    },
                    tdd                             NULL
                },
                dl-CommonInformation            DL-CommonInformation,
                dl-InformationPerRL-List        DL-InformationPerRL-List,
                frequencyInfo                   FrequencyInfo
            },
            preconfiguration               SEQUENCE {
-- All IEs that include an FDD/TDD choice are split in two IEs for this message,
-- one for the FDD only elements and one for the TDD only elements, so that one
-- FDD/TDD choice in this level is sufficient.
                predefinedConfigIdentity        PredefinedConfigIdentity,
                rab-Info                        RAB-Info-Post       OPTIONAL,
                modeSpecificInfo                CHOICE {
                    fdd                             SEQUENCE {
                        ul-DPCH-Info                    UL-DPCH-InfoPostFDD,
                        dl-CommonInformationPost        DL-CommonInformationPost,
                        dl-InformationPerRL-List        DL-InformationPerRL-ListPostFDD,
                        frequencyInfo                   FrequencyInfoFDD
                    },
                    tdd                             SEQUENCE {
                        ul-DPCH-Info                    UL-DPCH-InfoPostTDD,
                        dl-InformationPerRL             DL-InformationPerRL-PostTDD,
                        frequencyInfo                   FrequencyInfoTDD,
                        primaryCCPCH-TX-Power           PrimaryCCPCH-TX-Power
                    }
                }
            }
        },
    -- Physical channel IEs
        maxAllowedUL-TX-Power           MaxAllowedUL-TX-Power
}

-- **************************************************
--
-- HANDOVER TO UTRAN COMPLETE
--
-- **************************************************

HandoverToUTRANComplete ::= SEQUENCE {
    --TABULAR: Integrity protection shall not be performed on this message.
    -- User equipment IEs
    -- TABULAR: the IE below is conditional on history.
        startList                       STARTList                           OPTIONAL,
    -- Extension mechanism for non- release99 information
        nonCriticalExtensions           SEQUENCE {}     OPTIONAL
}

-- **************************************************
--
-- INITIAL DIRECT TRANSFER
--
-- **************************************************

InitialDirectTransfer ::= SEQUENCE {
    -- Core network IEs
```

```
                cn-DomainIdentity               CN-DomainIdentity,
                intraDomainNasNodeSelector      IntraDomainNasNodeSelector,
                nas-Message                     NAS-Message,
        -- Measurement IEs
                measuredResultsOnRACH           MeasuredResultsOnRACH                OPTIONAL,
        -- Extension mechanism for non- release99 information
                nonCriticalExtensions           SEQUENCE {}    OPTIONAL
}

-- **************************************************
--
-- HANDOVER FROM UTRAN COMMAND
--
-- **************************************************

HandoverFromUTRANCommand-GSM-r3 ::= CHOICE {
    r3                              SEQUENCE {
        handoverFromUTRANCommand-GSM-r3
                                    HandoverFromUTRANCommand-GSM-r3-IEs,
        nonCriticalExtensions       SEQUENCE {} OPTIONAL
    },
    criticalExtensions              SEQUENCE {}
}

HandoverFromUTRANCommand-GSM-r3-IEs ::= SEQUENCE {
    -- User equipment IEs
        rrc-TransactionIdentifier       RRC-TransactionIdentifier,
        activationTime                  ActivationTime                  OPTIONAL,
    -- Radio bearer IEs
        remainingRAB-Info               RAB-Info                        OPTIONAL,
    -- Other IEs
        message-and-extension           CHOICE {
            gsm-Message                     SEQUENCE {},
            -- In this case, what follows the basic production is a variable length bit string
            -- with no length field, containing the GSM message including GSM padding up to end
            -- of container, to be analysed according to GSM specifications
            with-extension                  SEQUENCE {
                messages                        GSM-MessageList
            }
        }
}

HandoverFromUTRANCommand-CDMA2000-r3 ::= CHOICE {
    r3                              SEQUENCE {
        handoverFromUTRANCommand-CDMA2000-r3
                                    HandoverFromUTRANCommand-CDMA2000-r3-IEs,
        nonCriticalExtensions       SEQUENCE {} OPTIONAL
    },
    criticalExtensions              SEQUENCE {}
}

HandoverFromUTRANCommand-CDMA2000-r3-IEs ::= SEQUENCE {
    -- User equipment IEs
        rrc-TransactionIdentifier       RRC-TransactionIdentifier,
        activationTime                  ActivationTime                  OPTIONAL,
    -- Radio bearer IEs
        remainingRAB-Info               RAB-Info                        OPTIONAL,
    -- Other IEs
        cdma2000-MessageList            CDMA2000-MessageList
}

-- **************************************************
--
-- HANDOVER FROM UTRAN FAILURE
--
-- **************************************************

HandoverFromUTRANFailure ::= SEQUENCE {
    -- User equipment IEs
        rrc-TransactionIdentifier       RRC-TransactionIdentifier,
    -- Other IEs
        interRAT-HO-Failure             InterRAT-HO-Failure             OPTIONAL,
    -- Extension mechanism for non- release99 information
        nonCriticalExtensions           SEQUENCE {}    OPTIONAL
}

-- **************************************************
--
-- MEASUREMENT CONTROL
--
-- **************************************************

MeasurementControl-r3 ::= CHOICE {
```

```
    r3                              SEQUENCE {
        measurementControl-r3           MeasurementControl-r3-IEs,
        nonCriticalExtensions           SEQUENCE {} OPTIONAL
    },
    criticalExtensions              SEQUENCE {}
}

MeasurementControl-r3-IEs ::= SEQUENCE {
    -- User equipment IEs
        rrc-TransactionIdentifier       RRC-TransactionIdentifier,
    -- Measurement IEs
        measurementIdentity     MeasurementIdentity,
        measurementCommand              MeasurementCommand,
        -- TABULAR: The measurement type is included in MeasurementCommand.
        measurementReportingMode        MeasurementReportingMode                OPTIONAL,
        additionalMeasurementList       AdditionalMeasurementID-List            OPTIONAL,
    -- Physical channel IEs
        dpch-CompressedModeStatusInfo   DPCH-CompressedModeStatusInfo           OPTIONAL
}


-- **************************************************
--
-- MEASUREMENT CONTROL FAILURE
--
-- **************************************************

MeasurementControlFailure ::= SEQUENCE {
    -- User equipment IEs
        rrc-TransactionIdentifier       RRC-TransactionIdentifier,
        failureCause                    FailureCauseWithProtErr,
    -- Extension mechanism for non- release99 information
        nonCriticalExtensions           SEQUENCE {}     OPTIONAL
}


-- **************************************************
--
-- MEASUREMENT REPORT
--
-- **************************************************

MeasurementReport ::= SEQUENCE {
    -- Measurement IEs
        measurementIdentity     MeasurementIdentity,
        measuredResults                 MeasuredResults                         OPTIONAL,
        measuredResultsOnRACH           MeasuredResultsOnRACH                   OPTIONAL,
        additionalMeasuredResults       MeasuredResultsList                     OPTIONAL,
        eventResults                    EventResults                            OPTIONAL,
    -- Extension mechanism for non- release99 information
        nonCriticalExtensions           SEQUENCE {}     OPTIONAL
}


-- **************************************************
--
-- PAGING TYPE 1
--
-- **************************************************

PagingType1 ::= SEQUENCE {
    -- User equipment IEs
        pagingRecordList                PagingRecordList                        OPTIONAL,
    -- Other IEs
        bcch-ModificationInfo           BCCH-ModificationInfo                   OPTIONAL,
    -- Extension mechanism for non- release99 information
        nonCriticalExtensions           SEQUENCE {}     OPTIONAL
}


-- **************************************************
--
-- PAGING TYPE 2
--
-- **************************************************

PagingType2 ::= SEQUENCE {
    -- User equipment IEs
        rrc-TransactionIdentifier       RRC-TransactionIdentifier,
        pagingCause                     PagingCause,
    -- Core network IEs
        cn-DomainIdentity               CN-DomainIdentity,
        pagingRecordTypeID              PagingRecordTypeID,
    -- Extension mechanism for non- release99 information
        nonCriticalExtensions           SEQUENCE {}     OPTIONAL
}
```

```
-- **************************************************
--
-- PHYSICAL CHANNEL RECONFIGURATION
--
-- **************************************************

PhysicalChannelReconfiguration-r3 ::= CHOICE {
    r3                                  SEQUENCE {
        physicalChannelReconfiguration-r3
                                        PhysicalChannelReconfiguration-r3-IEs,
        nonCriticalExtensions           SEQUENCE {} OPTIONAL
    },
    criticalExtensions              SEQUENCE {}
}

PhysicalChannelReconfiguration-r3-IEs ::= SEQUENCE {
    -- User equipment IEs
        rrc-TransactionIdentifier       RRC-TransactionIdentifier,
        integrityProtectionModeInfo     IntegrityProtectionModeInfo         OPTIONAL,
        cipheringModeInfo               CipheringModeInfo                   OPTIONAL,
        activationTime                  ActivationTime                      OPTIONAL,
        new-U-RNTI                      U-RNTI                              OPTIONAL,
        new-C-RNTI                      C-RNTI                              OPTIONAL,
        rrc-StateIndicator              RRC-StateIndicator,
        utran-DRX-CycleLengthCoeff      UTRAN-DRX-CycleLengthCoefficient    OPTIONAL,
    -- Core network IEs
        cn-InformationInfo              CN-InformationInfo                  OPTIONAL,
    -- UTRAN mobility IEs
        ura-Identity                    URA-Identity                        OPTIONAL,
    -- Radio bearer IEs
        rb-WithPDCP-InfoList            RB-WithPDCP-InfoList                OPTIONAL,
    -- Physical channel IEs
        frequencyInfo                   FrequencyInfo                       OPTIONAL,
        maxAllowedUL-TX-Power           MaxAllowedUL-TX-Power               OPTIONAL,
        ul-ChannelRequirement           UL-ChannelRequirementWithCPCH-SetID OPTIONAL,
        -- TABULAR: UL-ChannelRequirementWithCPCH-SetID contains the choice
        -- between UL DPCH info, CPCH SET info and CPCH set ID.
        modeSpecificInfo                CHOICE {
            fdd                             SEQUENCE {
                dl-PDSCH-Information             DL-PDSCH-Information         OPTIONAL
            },
            tdd                             NULL
        },
        dl-CommonInformation            DL-CommonInformation                OPTIONAL,
        dl-InformationPerRL-List        DL-InformationPerRL-List            OPTIONAL
}

-- **************************************************
--
-- PHYSICAL CHANNEL RECONFIGURATION COMPLETE
--
-- **************************************************

PhysicalChannelReconfigurationComplete ::= SEQUENCE {
    -- User equipment IEs
        rrc-TransactionIdentifier       RRC-TransactionIdentifier,
        ul-IntegProtActivationInfo      IntegrityProtActivationInfo         OPTIONAL,
        -- TABULAR: UL-TimingAdvance is applicable for TDD mode only.
        ul-TimingAdvance                UL-TimingAdvance                    OPTIONAL,
    -- Radio bearer IEs
        count-C-ActivationTime          ActivationTime                      OPTIONAL,
        rb-UL-CiphActivationTimeInfo    RB-ActivationTimeInfoList           OPTIONAL,
        rb-WithPDCP-InfoList            RB-WithPDCP-InfoList                OPTIONAL,
    -- Extension mechanism for non- release99 information
        nonCriticalExtensions           SEQUENCE {}     OPTIONAL
}

-- **************************************************
--
-- PHYSICAL CHANNEL RECONFIGURATION FAILURE
--
-- **************************************************

PhysicalChannelReconfigurationFailure ::= SEQUENCE {
    -- User equipment IEs
        rrc-TransactionIdentifier       RRC-TransactionIdentifier           OPTIONAL,
        failureCause                    FailureCauseWithProtErr,
    -- Extension mechanism for non- release99 information
        nonCriticalExtensions           SEQUENCE {}     OPTIONAL
}

-- **************************************************
--
```

```
-- PHYSICAL SHARED CHANNEL ALLOCATION (TDD only)
--
-- **************************************************

PhysicalSharedChannelAllocation-r3 ::= CHOICE {
    r3                              SEQUENCE {
        physicalSharedChannelAllocation-r3
                                    PhysicalSharedChannelAllocation-r3-IEs,
        nonCriticalExtensions       SEQUENCE {} OPTIONAL
    },
    criticalExtensions              SEQUENCE {}
}

PhysicalSharedChannelAllocation-r3-IEs ::= SEQUENCE {
    -- TABULAR: Integrity protection shall not be performed on this message.
    -- User equipment IEs
        c-RNTI                          C-RNTI                          OPTIONAL,
        rrc-TransactionIdentifier       RRC-TransactionIdentifier,
    -- Physical channel IEs
        ul-TimingAdvance                UL-TimingAdvanceControl         OPTIONAL,
        pusch-CapacityAllocationInfo    PUSCH-CapacityAllocationInfo    OPTIONAL,
        pdsch-CapacityAllocationInfo    PDSCH-CapacityAllocationInfo    OPTIONAL,
        confirmRequest                  ENUMERATED {
                                            confirmPDSCH, confirmPUSCH }  OPTIONAL,
        -- TABULAR: If the above value is not present, the default value "No Confirm"
        -- shall be used as specified in 10.2.25.
        iscpTimeslotList                TimeslotList                    OPTIONAL
}

-- **************************************************
--
-- PUSCH CAPACITY REQUEST (TDD only)
--
-- **************************************************

PUSCHCapacityRequest ::= SEQUENCE {
    -- User equipment IEs
        c-RNTI                          C-RNTI                          OPTIONAL,
    -- Measurement IEs
        trafficVolumeMeasuredResultsList
                                        TrafficVolumeMeasuredResultsList,
        timeslotListWithISCP            TimeslotListWithISCP            OPTIONAL,
        primaryCCPCH-RSCP               PrimaryCCPCH-RSCP               OPTIONAL,
        allocationConfirmation          CHOICE {
            pdschConfirmation               PDSCH-Identity,
            puschConfirmation               PUSCH-Identity
        }                                                               OPTIONAL,
        protocolErrorIndicator          ProtocolErrorIndicatorWithMoreInfo,
    -- Extension mechanism for non- release99 information
        nonCriticalExtensions           SEQUENCE {} OPTIONAL
}

-- **************************************************
--
-- RADIO BEARER RECONFIGURATION
--
-- **************************************************

RadioBearerReconfiguration-r3 ::= CHOICE {
    r3                              SEQUENCE {
        radioBearerReconfiguration-r3   RadioBearerReconfiguration-r3-IEs,
        nonCriticalExtensions           SEQUENCE {} OPTIONAL
    },
    criticalExtensions              SEQUENCE {}
}

RadioBearerReconfiguration-r3-IEs ::= SEQUENCE {
    -- User equipment IEs
        rrc-TransactionIdentifier       RRC-TransactionIdentifier,
        integrityProtectionModeInfo     IntegrityProtectionModeInfo     OPTIONAL,
        cipheringModeInfo               CipheringModeInfo               OPTIONAL,
        activationTime                  ActivationTime                  OPTIONAL,
        new-U-RNTI                      U-RNTI                          OPTIONAL,
        new-C-RNTI                      C-RNTI                          OPTIONAL,
        rrc-StateIndicator              RRC-StateIndicator,
        utran-DRX-CycleLengthCoeff      UTRAN-DRX-CycleLengthCoefficient  OPTIONAL,
    -- Core network IEs
        cn-InformationInfo              CN-InformationInfo              OPTIONAL,
    -- UTRAN mobility IEs
        ura-Identity                    URA-Identity                    OPTIONAL,
    -- Radio bearer IEs
        rab-InformationReconfigList     RAB-InformationReconfigList     OPTIONAL,
        rb-InformationReconfigList      RB-InformationReconfigList,
```

```
        rb-InformationAffectedList       RB-InformationAffectedList          OPTIONAL,
    -- Transport channel IEs
        ul-CommonTransChInfo             UL-CommonTransChInfo                OPTIONAL,
        ul-deletedTransChInfoList        UL-DeletedTransChInfoList           OPTIONAL,
        ul-AddReconfTransChInfoList      UL-AddReconfTransChInfoList         OPTIONAL,
        modeSpecificTransChInfo          CHOICE {
            fdd                                  SEQUENCE {
                cpch-SetID                           CPCH-SetID             OPTIONAL,
                addReconfTransChDRAC-Info            DRAC-StaticInformationList  OPTIONAL
            },
            tdd                              NULL
        }                                                                    OPTIONAL,
        dl-CommonTransChInfo             DL-CommonTransChInfo                OPTIONAL,
        dl-DeletedTransChInfoList        DL-DeletedTransChInfoList           OPTIONAL,
        dl-AddReconfTransChInfoList      DL-AddReconfTransChInfo2List        OPTIONAL,
    -- Physical channel IEs
        frequencyInfo                    FrequencyInfo                       OPTIONAL,
        maxAllowedUL-TX-Power            MaxAllowedUL-TX-Power               OPTIONAL,
        ul-ChannelRequirement            UL-ChannelRequirement               OPTIONAL,
        modeSpecificPhysChInfo           CHOICE {
            fdd                                  SEQUENCE {
                dl-PDSCH-Information                  DL-PDSCH-Information   OPTIONAL
            },
            tdd                              NULL
        },
        dl-CommonInformation             DL-CommonInformation                OPTIONAL,
        dl-InformationPerRL-List         DL-InformationPerRL-List
}

RadioBearerReconfiguration-r4-IEs ::= SEQUENCE {
    -- User equipment IEs
        rrc-TransactionIdentifier        RRC-TransactionIdentifier,
        integrityProtectionModeInfo      IntegrityProtectionModeInfo         OPTIONAL,
        cipheringModeInfo                CipheringModeInfo                   OPTIONAL,
        activationTime                   ActivationTime                      OPTIONAL,
        new-U-RNTI                       U-RNTI                              OPTIONAL,
        new-C-RNTI                       C-RNTI                              OPTIONAL,
        rrc-StateIndicator               RRC-StateIndicator,
        utran-DRX-CycleLengthCoeff       UTRAN-DRX-CycleLengthCoefficient    OPTIONAL,
    -- Core network IEs
        cn-InformationInfo               CN-InformationInfo                  OPTIONAL,
    -- UTRAN mobility IEs
        ura-Identity                     URA-Identity                        OPTIONAL,
    -- Radio bearer IEs
        rab-InformationReconfigList      RAB-InformationReconfigList         OPTIONAL,
        rb-InformationReconfigList       RB-InformationReconfigList-r4,
        rb-InformationAffectedList       RB-InformationAffectedList          OPTIONAL,
    -- Transport channel IEs
        ul-CommonTransChInfo             UL-CommonTransChInfo                OPTIONAL,
        ul-deletedTransChInfoList        UL-DeletedTransChInfoList           OPTIONAL,
        ul-AddReconfTransChInfoList      UL-AddReconfTransChInfoList         OPTIONAL,
        modeSpecificTransChInfo          CHOICE {
            fdd                                  SEQUENCE {
                cpch-SetID                           CPCH-SetID             OPTIONAL,
                addReconfTransChDRAC-Info            DRAC-StaticInformationList  OPTIONAL
            },
            tdd                              NULL
        }                                                                    OPTIONAL,
        dl-CommonTransChInfo             DL-CommonTransChInfo                OPTIONAL,
        dl-DeletedTransChInfoList        DL-DeletedTransChInfoList           OPTIONAL,
        dl-AddReconfTransChInfoList      DL-AddReconfTransChInfo2List        OPTIONAL,
    -- Physical channel IEs
        frequencyInfo                    FrequencyInfo                       OPTIONAL,
        maxAllowedUL-TX-Power            MaxAllowedUL-TX-Power               OPTIONAL,
        ul-ChannelRequirement            UL-ChannelRequirement               OPTIONAL,
        modeSpecificPhysChInfo           CHOICE {
            fdd                                  SEQUENCE {
                dl-PDSCH-Information                  DL-PDSCH-Information   OPTIONAL
            },
            tdd                              NULL
        },
        dl-CommonInformation             DL-CommonInformation                OPTIONAL,
        dl-InformationPerRL-List         DL-InformationPerRL-List
}

-- **********************************************
--
-- RADIO BEARER RECONFIGURATION COMPLETE
--
-- **********************************************

RadioBearerReconfigurationComplete ::= SEQUENCE {
    -- User equipment IEs
```

```
            rrc-TransactionIdentifier       RRC-TransactionIdentifier,
            ul-IntegProtActivationInfo      IntegrityProtActivationInfo        OPTIONAL,
            -- TABULAR: UL-TimingAdvance is applicable for TDD mode only.
            ul-TimingAdvance                UL-TimingAdvance                   OPTIONAL,
        -- Radio bearer IEs
            rb-UL-CiphActivationTimeInfo    RB-ActivationTimeInfoList          OPTIONAL,
            rb-WithPDCP-InfoList            RB-WithPDCP-InfoList               OPTIONAL,
        -- Extension mechanism for non- release99 information
            nonCriticalExtensions           SEQUENCE {} OPTIONAL
}

-- **************************************************
--
-- RADIO BEARER RECONFIGURATION FAILURE
--
-- **************************************************

RadioBearerReconfigurationFailure ::= SEQUENCE {
        -- User equipment IEs
            rrc-TransactionIdentifier       RRC-TransactionIdentifier,
            failureCause                    FailureCauseWithProtErr,
        -- Radio bearer IEs
            potentiallySuccesfulBearerList  RB-IdentityList                    OPTIONAL,
        -- Extension mechanism for non- release99 information
            nonCriticalExtensions           SEQUENCE {} OPTIONAL
}

-- **************************************************
--
-- RADIO BEARER RELEASE
--
-- **************************************************

RadioBearerRelease-r3 ::= CHOICE {
        r3                              SEQUENCE {
            radioBearerRelease-r3           RadioBearerRelease-r3-IEs,
            nonCriticalExtensions           SEQUENCE {} OPTIONAL
        },
        criticalExtensions              SEQUENCE {}
}

RadioBearerRelease-r3-IEs ::= SEQUENCE {
        -- User equipment IEs
            rrc-TransactionIdentifier       RRC-TransactionIdentifier,
            integrityProtectionModeInfo     IntegrityProtectionModeInfo        OPTIONAL,
            cipheringModeInfo               CipheringModeInfo                  OPTIONAL,
            activationTime                  ActivationTime                     OPTIONAL,
            new-U-RNTI                      U-RNTI                             OPTIONAL,
            new-C-RNTI                      C-RNTI                             OPTIONAL,
            rrc-StateIndicator              RRC-StateIndicator,
            utran-DRX-CycleLengthCoeff      UTRAN-DRX-CycleLengthCoefficient   OPTIONAL,
        -- Core network IEs
            cn-InformationInfo              CN-InformationInfo                 OPTIONAL,
            signallingConnectionRelIndication  CN-DomainIdentity               OPTIONAL,
        -- UTRAN mobility IEs
            ura-Identity                    URA-Identity                       OPTIONAL,
        -- Radio bearer IEs
            rab-InformationReconfigList     RAB-InformationReconfigList        OPTIONAL,
            rb-InformationReleaseList       RB-InformationReleaseList,
            rb-InformationAffectedList      RB-InformationAffectedList         OPTIONAL,
            rb-WithPDCP-InfoList            RB-WithPDCP-InfoList               OPTIONAL,
        -- Transport channel IEs
            ul-CommonTransChInfo            UL-CommonTransChInfo               OPTIONAL,
            ul-deletedTransChInfoList       UL-DeletedTransChInfoList          OPTIONAL,
            ul-AddReconfTransChInfoList     UL-AddReconfTransChInfoList        OPTIONAL,
            modeSpecificTransChInfo         CHOICE {
                fdd                             SEQUENCE {
                    cpch-SetID                      CPCH-SetID                 OPTIONAL,
                    addReconfTransChDRAC-Info       DRAC-StaticInformationList OPTIONAL
                },
                tdd                             NULL
            }                                                                  OPTIONAL,
            dl-CommonTransChInfo            DL-CommonTransChInfo               OPTIONAL,
            dl-DeletedTransChInfoList       DL-DeletedTransChInfoList          OPTIONAL,
            dl-AddReconfTransChInfoList     DL-AddReconfTransChInfo2List       OPTIONAL,
        -- Physical channel IEs
            frequencyInfo                   FrequencyInfo                      OPTIONAL,
            maxAllowedUL-TX-Power           MaxAllowedUL-TX-Power              OPTIONAL,
            ul-ChannelRequirement           UL-ChannelRequirement             OPTIONAL,
            modeSpecificPhysChInfo          CHOICE {
                fdd                             SEQUENCE {
                    dl-PDSCH-Information             DL-PDSCH-Information       OPTIONAL
                },
```

```
            tdd                         NULL
        },
        dl-CommonInformation          DL-CommonInformation              OPTIONAL,
        dl-InformationPerRL-List      DL-InformationPerRL-List          OPTIONAL
}

-- **************************************************
--
-- RADIO BEARER RELEASE COMPLETE
--
-- **************************************************

RadioBearerReleaseComplete ::= SEQUENCE {
    -- User equipment IEs
        rrc-TransactionIdentifier     RRC-TransactionIdentifier,
        ul-IntegProtActivationInfo    IntegrityProtActivationInfo       OPTIONAL,
        -- TABULAR: UL-TimingAdvance is applicable for TDD mode only.
        ul-TimingAdvance              UL-TimingAdvance                  OPTIONAL,
    -- Radio bearer IEs
        rb-UL-CiphActivationTimeInfo  RB-ActivationTimeInfoList         OPTIONAL,
    -- Extension mechanism for non- release99 information
        nonCriticalExtensions         SEQUENCE {}   OPTIONAL
}

-- **************************************************
--
-- RADIO BEARER RELEASE FAILURE
--
-- **************************************************

RadioBearerReleaseFailure ::= SEQUENCE {
    -- User equipment IEs
        rrc-TransactionIdentifier     RRC-TransactionIdentifier,
        failureCause                  FailureCauseWithProtErr,
    -- Radio bearer IEs
        potentiallySuccesfulBearerList RB-IdentityList                  OPTIONAL,
    -- Extension mechanism for non- release99 information
        nonCriticalExtensions         SEQUENCE {}   OPTIONAL
}

-- **************************************************
--
-- RADIO BEARER SETUP
--
-- **************************************************

RadioBearerSetup-r3 ::= CHOICE {
    r3                            SEQUENCE {
        radioBearerSetup-r3           RadioBearerSetup-r3-IEs,
        nonCriticalExtensions         SEQUENCE {} OPTIONAL
    },
    criticalExtensions            SEQUENCE {}
}

RadioBearerSetup-r3-IEs ::= SEQUENCE {
    -- User equipment IEs
        rrc-TransactionIdentifier     RRC-TransactionIdentifier,
        integrityProtectionModeInfo   IntegrityProtectionModeInfo       OPTIONAL,
        cipheringModeInfo             CipheringModeInfo                 OPTIONAL,
        activationTime                ActivationTime                    OPTIONAL,
        new-U-RNTI                    U-RNTI                            OPTIONAL,
        new-C-RNTI                    C-RNTI                            OPTIONAL,
        rrc-StateIndicator            RRC-StateIndicator,
        utran-DRX-CycleLengthCoeff    UTRAN-DRX-CycleLengthCoefficient  OPTIONAL,
    -- UTRAN mobility IEs
        ura-Identity                  URA-Identity                      OPTIONAL,
    -- Core network IEs
        cn-InformationInfo            CN-InformationInfo                OPTIONAL,
    -- Radio bearer IEs
        srb-InformationSetupList      SRB-InformationSetupList          OPTIONAL,
        rab-InformationSetupList      RAB-InformationSetupList          OPTIONAL,
        rb-InformationAffectedList    RB-InformationAffectedList        OPTIONAL,
    -- Transport channel IEs
        ul-CommonTransChInfo          UL-CommonTransChInfo              OPTIONAL,
        ul-deletedTransChInfoList     UL-DeletedTransChInfoList         OPTIONAL,
        ul-AddReconfTransChInfoList   UL-AddReconfTransChInfoList       OPTIONAL,
        modeSpecificTransChInfo       CHOICE {
            fdd                           SEQUENCE {
                cpch-SetID                    CPCH-SetID                OPTIONAL,
                addReconfTransChDRAC-Info     DRAC-StaticInformationList OPTIONAL
            },
            tdd                           NULL
        }                                                               OPTIONAL,
```

```
    dl-CommonTransChInfo            DL-CommonTransChInfo                    OPTIONAL,
    dl-DeletedTransChInfoList       DL-DeletedTransChInfoList               OPTIONAL,
    dl-AddReconfTransChInfoList     DL-AddReconfTransChInfoList             OPTIONAL,
    -- Physical channel IEs
    frequencyInfo                   FrequencyInfo                          OPTIONAL,
    maxAllowedUL-TX-Power           MaxAllowedUL-TX-Power                  OPTIONAL,
    ul-ChannelRequirement           UL-ChannelRequirement                  OPTIONAL,
    modeSpecificPhysChInfo          CHOICE {
        fdd                             SEQUENCE {
            dl-PDSCH-Information             DL-PDSCH-Information            OPTIONAL
        },
        tdd                             NULL
    },
    dl-CommonInformation            DL-CommonInformation                   OPTIONAL,
    dl-InformationPerRL-List        DL-InformationPerRL-List               OPTIONAL
}


RadioBearerSetup-r4-IEs ::= SEQUENCE {
    -- User equipment IEs
    rrc-TransactionIdentifier       RRC-TransactionIdentifier,
    integrityProtectionModeInfo     IntegrityProtectionModeInfo            OPTIONAL,
    cipheringModeInfo               CipheringModeInfo                      OPTIONAL,
    activationTime                  ActivationTime                         OPTIONAL,
    new-U-RNTI                      U-RNTI                                 OPTIONAL,
    new-C-RNTI                      C-RNTI                                 OPTIONAL,
    rrc-StateIndicator              RRC-StateIndicator,
    utran-DRX-CycleLengthCoeff      UTRAN-DRX-CycleLengthCoefficient       OPTIONAL,
    -- UTRAN mobility IEs
    ura-Identity                    URA-Identity                           OPTIONAL,
    -- Core network IEs
    cn-InformationInfo              CN-InformationInfo                     OPTIONAL,
    -- Radio bearer IEs
    srb-InformationSetupList        SRB-InformationSetupList               OPTIONAL,
    rab-InformationSetupList        RAB-InformationSetupList-r4            OPTIONAL,
    rb-InformationAffectedList      RB-InformationAffectedList             OPTIONAL,
    -- Transport channel IEs
    ul-CommonTransChInfo            UL-CommonTransChInfo                   OPTIONAL,
    ul-deletedTransChInfoList       UL-DeletedTransChInfoList              OPTIONAL,
    ul-AddReconfTransChInfoList     UL-AddReconfTransChInfoList            OPTIONAL,
    modeSpecificTransChInfo         CHOICE {
        fdd                             SEQUENCE {
            cpch-SetID                      CPCH-SetID                     OPTIONAL,
            addReconfTransChDRAC-Info       DRAC-StaticInformationList     OPTIONAL
        },
        tdd                             NULL
    }                                                                      OPTIONAL,
    dl-CommonTransChInfo            DL-CommonTransChInfo                   OPTIONAL,
    dl-DeletedTransChInfoList       DL-DeletedTransChInfoList              OPTIONAL,
    dl-AddReconfTransChInfoList     DL-AddReconfTransChInfoList            OPTIONAL,
    -- Physical channel IEs
    frequencyInfo                   FrequencyInfo                          OPTIONAL,
    maxAllowedUL-TX-Power           MaxAllowedUL-TX-Power                  OPTIONAL,
    ul-ChannelRequirement           UL-ChannelRequirement                  OPTIONAL,
    modeSpecificPhysChInfo          CHOICE {
        fdd                             SEQUENCE {
            dl-PDSCH-Information             DL-PDSCH-Information            OPTIONAL
        },
        tdd                             NULL
    },
    dl-CommonInformation            DL-CommonInformation                   OPTIONAL,
    dl-InformationPerRL-List        DL-InformationPerRL-List               OPTIONAL
}


-- **************************************************
--
-- RADIO BEARER SETUP COMPLETE
--
-- **************************************************

RadioBearerSetupComplete ::= SEQUENCE {
    -- User equipment IEs
    rrc-TransactionIdentifier       RRC-TransactionIdentifier,
    ul-IntegProtActivationInfo      IntegrityProtActivationInfo            OPTIONAL,
    -- TABULAR: UL-TimingAdvance is applicable for TDD mode only.
    ul-TimingAdvance                UL-TimingAdvance                       OPTIONAL,
    start-Value             START-Value                                    OPTIONAL,
    -- Radio bearer IEs
    count-C-ActivationTime          ActivationTime                         OPTIONAL,
    rb-UL-CiphActivationTimeInfo    RB-ActivationTimeInfoList              OPTIONAL,
    rb-WithPDCP-InfoList            RB-WithPDCP-InfoList                   OPTIONAL,
    -- Extension mechanism for non- release99 information
    nonCriticalExtensions           SEQUENCE {}      OPTIONAL
}
```

```
-- **************************************************
--
-- RADIO BEARER SETUP FAILURE
--
-- **************************************************

RadioBearerSetupFailure ::= SEQUENCE {
    -- User equipment IEs
        rrc-TransactionIdentifier         RRC-TransactionIdentifier,
        failureCause                      FailureCauseWithProtErr,
    -- Radio bearer IEs
        potentiallySuccesfulBearerList  RB-IdentityList                      OPTIONAL,
    -- Extension mechanism for non- release99 information
        nonCriticalExtensions             SEQUENCE {}    OPTIONAL
}

-- **************************************************
--
-- RRC CONNECTION REJECT
--
-- **************************************************

RRCConnectionReject-r3 ::= CHOICE {
    r3                               SEQUENCE {
        rrcConnectionReject-r3          RRCConnectionReject-r3-IEs,
        nonCriticalExtensions           SEQUENCE {} OPTIONAL
    },
    criticalExtensions              SEQUENCE {}
}

RRCConnectionReject-r3-IEs ::= SEQUENCE {
    -- TABULAR: Integrity protection shall not be performed on this message.
    -- User equipment IEs
        initialUE-Identity                InitialUE-Identity,
        rrc-TransactionIdentifier         RRC-TransactionIdentifier,
        rejectionCause                    RejectionCause,
        waitTime                          WaitTime,
        redirectionInfo                   RedirectionInfo                 OPTIONAL
}

-- **************************************************
--
-- RRC CONNECTION RELEASE
--
-- **************************************************

RRCConnectionRelease-r3 ::= CHOICE {
    r3                               SEQUENCE {
        rrcConnectionRelease-r3         RRCConnectionRelease-r3-IEs,
        nonCriticalExtensions           SEQUENCE {} OPTIONAL
    },
    criticalExtensions              SEQUENCE {}
}

RRCConnectionRelease-r3-IEs ::= SEQUENCE {
    -- User equipment IEs
        rrc-TransactionIdentifier         RRC-TransactionIdentifier,
        n-308                             N-308                           OPTIONAL,
        -- The IE above is conditional on the UE state.
        releaseCause                      ReleaseCause,
        rplmn-information                 Rplmn-Information               OPTIONAL
}

-- **************************************************
--
-- RRC CONNECTION RELEASE for CCCH
--
-- **************************************************

RRCConnectionRelease-CCCH-r3 ::= CHOICE {
    r3                               SEQUENCE {
        rrcConnectionRelease-CCCH-r3    RRCConnectionRelease-CCCH-r3-IEs,
        nonCriticalExtensions           SEQUENCE {} OPTIONAL
    },
    criticalExtensions              SEQUENCE {}
}

RRCConnectionRelease-CCCH-r3-IEs ::= SEQUENCE {
    -- User equipment IEs
        u-RNTI                            U-RNTI,
    -- The rest of the message is identical to the one sent on DCCH.
        rrcConnectionRelease              RRCConnectionRelease-r3-IEs
```

```
}

-- **************************************************
--
-- RRC CONNECTION RELEASE COMPLETE
--
-- **************************************************

RRCConnectionReleaseComplete ::= SEQUENCE {
    -- User equipment IEs
        rrc-TransactionIdentifier        RRC-TransactionIdentifier,
        errorIndication                  FailureCauseWithProtErr           OPTIONAL,
    -- Extension mechanism for non- release99 information
        nonCriticalExtensions            SEQUENCE {}     OPTIONAL
}

-- **************************************************
--
-- RRC CONNECTION REQUEST
--
-- **************************************************

RRCConnectionRequest ::= SEQUENCE {
    -- TABULAR: Integrity protection shall not be performed on this message.
    -- User equipment IEs
        initialUE-Identity               InitialUE-Identity,
        establishmentCause               EstablishmentCause,
        protocolErrorIndicator           ProtocolErrorIndicator,
        -- The IE above is MD, but for compactness reasons no default value
        -- has been assigned to it.
    -- Measurement IEs
        measuredResultsOnRACH            MeasuredResultsOnRACH             OPTIONAL,
    -- Extension mechanism for non- release99 information
        nonCriticalExtensions            SEQUENCE {}     OPTIONAL
}

-- **************************************************
--
-- RRC CONNECTION SETUP
--
-- **************************************************

RRCConnectionSetup-r3 ::= CHOICE {
    r3                               SEQUENCE {
        rrcConnectionSetup-r3            RRCConnectionSetup-r3-IEs,
        nonCriticalExtensions            SEQUENCE {} OPTIONAL
    },
    criticalExtensions               SEQUENCE {}
}

RRCConnectionSetup-r3-IEs ::= SEQUENCE {
    -- TABULAR: Integrity protection shall not be performed on this message.
    -- User equipment IEs
        initialUE-Identity               InitialUE-Identity,
        rrc-TransactionIdentifier        RRC-TransactionIdentifier,
        activationTime                   ActivationTime                   OPTIONAL,
        new-U-RNTI                       U-RNTI,
        new-c-RNTI                       C-RNTI                           OPTIONAL,
        rrc-StateIndicator               RRC-StateIndicator,
        utran-DRX-CycleLengthCoeff       UTRAN-DRX-CycleLengthCoefficient,
        capabilityUpdateRequirement      CapabilityUpdateRequirement      OPTIONAL,
        -- TABULAR: If the IE is not present, the default value defined in 10.3.3.2 shall
        -- be used.
    -- Radio bearer IEs
        srb-InformationSetupList         SRB-InformationSetupList2,
    -- Transport channel IEs
        ul-CommonTransChInfo             UL-CommonTransChInfo             OPTIONAL,
        ul-AddReconfTransChInfoList      UL-AddReconfTransChInfoList,
        dl-CommonTransChInfo             DL-CommonTransChInfo             OPTIONAL,
        dl-AddReconfTransChInfoList      DL-AddReconfTransChInfoList,
    -- Physical channel IEs
        frequencyInfo                    FrequencyInfo                    OPTIONAL,
        maxAllowedUL-TX-Power            MaxAllowedUL-TX-Power            OPTIONAL,
        ul-ChannelRequirement            UL-ChannelRequirement            OPTIONAL,
        dl-CommonInformation             DL-CommonInformation             OPTIONAL,
        dl-InformationPerRL-List         DL-InformationPerRL-List         OPTIONAL
}

-- **************************************************
--
-- RRC CONNECTION SETUP COMPLETE
--
-- **************************************************
```

```
RRCConnectionSetupComplete ::= SEQUENCE {
    -- TABULAR: Integrity protection shall not be performed on this message.
    -- User equipment IEs
        rrc-TransactionIdentifier       RRC-TransactionIdentifier,
        startList                       STARTList,
        ue-RadioAccessCapability        UE-RadioAccessCapability            OPTIONAL,
    -- Other IEs
        ue-RATSpecificCapability        InterRAT-UE-RadioAccessCapabilityList  OPTIONAL,
    -- Extension mechanism for non- release99 information
        nonCriticalExtensions           SEQUENCE {}        OPTIONAL
        nonCriticalExtensions-r3        SEQUENCE {
            rrcConectionSetupComplete-r4ext RRCConectionSetupComplete-r4ext,
            nonCriticalExtensions-r4        SEQUENCE {}      OPTIONAL
        }        OPTIONAL
}

RRCConnectionSetupComplete-r4ext ::= SEQUENCE {
    -- User equipment IEs
        ue-RadioAccessCapability-r4ext      UE-RadioAccessCapability-r4ext     OPTIONAL
}

-- **************************************************
--
-- RRC STATUS
--
-- **************************************************

RRCStatus ::= SEQUENCE {
    -- Other IEs
        protocolErrorInformation        ProtocolErrorMoreInformation,
    -- TABULAR:  Identification of received message is nested in
    -- ProtocolErrorMoreInformation
    -- Extension mechanism for non- release99 information
        nonCriticalExtensions           SEQUENCE {}     OPTIONAL
}

SecurityModeCommand-r3 ::= CHOICE {
    r3                              SEQUENCE {
        securityModeCommand-r3          SecurityModeCommand-r3-IEs,
        nonCriticalExtensions           SEQUENCE {}     OPTIONAL
    },
    criticalExtensions              SEQUENCE {}
}

-- **************************************************
--
-- SECURITY MODE COMMAND
--
-- **************************************************

SecurityModeCommand-r3-IEs ::= SEQUENCE {
-- TABULAR: Integrity protection shall always be performed on this message.
    -- User equipment IEs
        rrc-TransactionIdentifier       RRC-TransactionIdentifier,
        securityCapability              SecurityCapability,
        cipheringModeInfo               CipheringModeInfo                   OPTIONAL,
        integrityProtectionModeInfo     IntegrityProtectionModeInfo         OPTIONAL,
    -- Core network IEs
        cn-DomainIdentity               CN-DomainIdentity
}

-- **************************************************
--
-- SECURITY MODE COMPLETE
--
-- **************************************************

SecurityModeComplete ::= SEQUENCE {
-- TABULAR: Integrity protection shall always be performed on this message.

    -- User equipment IEs
        rrc-TransactionIdentifier       RRC-TransactionIdentifier,
        ul-IntegProtActivationInfo      IntegrityProtActivationInfo         OPTIONAL,
    -- Radio bearer IEs
        rb-UL-CiphActivationTimeInfo    RB-ActivationTimeInfoList           OPTIONAL,
    -- Extension mechanism for non- release99 information
        nonCriticalExtensions           SEQUENCE {}     OPTIONAL
}

-- **************************************************
--
-- SECURITY MODE FAILURE
```

```
--
-- **************************************************

SecurityModeFailure ::= SEQUENCE {
    -- User equipment IEs
        rrc-TransactionIdentifier       RRC-TransactionIdentifier,
        failureCause                    FailureCauseWithProtErr,
    -- Extension mechanism for non- release99 information
        nonCriticalExtensions           SEQUENCE {}     OPTIONAL
}

-- **************************************************
--
-- SIGNALLING CONNECTION RELEASE
--
-- **************************************************

SignallingConnectionRelease-r3 ::= CHOICE {
    r3                              SEQUENCE {
        signallingConnectionRelease-r3  SignallingConnectionRelease-r3-IEs,
        nonCriticalExtensions           SEQUENCE {}     OPTIONAL
    },
    criticalExtensions              SEQUENCE {}
}

SignallingConnectionRelease-r3-IEs ::= SEQUENCE {
    -- User equipment IEs
        rrc-TransactionIdentifier       RRC-TransactionIdentifier,
    -- Core network IEs
        cn-DomainIdentity               CN-DomainIdentity
}

-- **************************************************
--
-- SIGNALLING CONNECTION RELEASE REQUEST
--
-- **************************************************

SignallingConnectionReleaseRequest ::= SEQUENCE {
    -- Core network IEs
        cn-DomainIdentity               CN-DomainIdentity,
    -- Extension mechanism for non- release99 information
        nonCriticalExtensions           SEQUENCE {}     OPTIONAL
}

-- **************************************************
--
-- SYSTEM INFORMATION for BCH
--
-- **************************************************

SystemInformation-BCH ::= SEQUENCE {
    -- Other information elements
        sfn-Prime                   SFN-Prime,
        payload                     CHOICE {
            noSegment                       NULL,
            firstSegment                    FirstSegment,
            subsequentSegment               SubsequentSegment,
            lastSegmentShort                    LastSegmentShort,
            lastAndFirst                    SEQUENCE {
                lastSegmentShort                LastSegmentShort,
                firstSegment                    FirstSegmentShort
            },
            lastAndComplete                 SEQUENCE {
                lastSegmentShort                LastSegmentShort,
                completeSIB-List                CompleteSIB-List
            },
            lastAndCompleteAndFirst         SEQUENCE {
                lastSegmentShort                LastSegmentShort,
                completeSIB-List                CompleteSIB-List,
                firstSegment                    FirstSegmentShort
            },
            completeSIB-List                CompleteSIB-List,
            completeAndFirst                SEQUENCE {
                completeSIB-List                CompleteSIB-List,
                firstSegment                    FirstSegmentShort
            },
            completeSIB                     CompleteSIB,
            lastSegment                     LastSegment
        }
}

-- **************************************************
```

```
--
-- SYSTEM INFORMATION for FACH
--
-- **************************************************

SystemInformation-FACH ::= SEQUENCE {
    -- Other information elements
        payload                         CHOICE {
            noSegment                       NULL,
            firstSegment                    FirstSegment,
            subsequentSegment               SubsequentSegment,
            lastSegmentShort                LastSegmentShort,
            lastAndFirst                    SEQUENCE {
                lastSegmentShort                LastSegmentShort,
                firstSegment                    FirstSegmentShort
            },
            lastAndComplete                 SEQUENCE {
                lastSegmentShort                LastSegmentShort,
                completeSIB-List                CompleteSIB-List
            },
            lastAndCompleteAndFirst         SEQUENCE {
                lastSegmentShort                LastSegmentShort,
                completeSIB-List                CompleteSIB-List,
                firstSegment                    FirstSegmentShort
            },
            completeSIB-List                CompleteSIB-List,
            completeAndFirst                SEQUENCE {
                completeSIB-List                CompleteSIB-List,
                firstSegment                    FirstSegmentShort
            },
            completeSIB                     CompleteSIB,
            lastSegment                     LastSegment
        }
}

-- **************************************************
--
-- First segment
--
-- **************************************************

FirstSegment ::=                SEQUENCE {
    -- Other information elements
        sib-Type                        SIB-Type,
        seg-Count                       SegCount,
        sib-Data-fixed                  SIB-Data-fixed
}

-- **************************************************
--
-- First segment (short)
--
-- **************************************************

FirstSegmentShort ::=           SEQUENCE {
    -- Other information elements
        sib-Type                        SIB-Type,
        seg-Count                       SegCount,
        sib-Data-variable               SIB-Data-variable
}

-- **************************************************
--
-- Subsequent segment
--
-- **************************************************

SubsequentSegment ::=           SEQUENCE {
    -- Other information elements
        sib-Type                        SIB-Type,
        segmentIndex                    SegmentIndex,
        sib-Data-fixed                  SIB-Data-fixed
}

-- **************************************************
--
-- Last segment
--
-- **************************************************

LastSegment ::=                 SEQUENCE {
    -- Other information elements
        sib-Type                        SIB-Type,
```

```
        segmentIndex                        SegmentIndex,
        sib-Data-fixed                      SIB-Data-fixed
    -- In case the SIB data is less than 222 bits, padding shall be used
    -- The same padding bits shall be used as defined in clause 12.1
}

LastSegmentShort ::=                        SEQUENCE {
    -- Other information elements
        sib-Type                            SIB-Type,
        segmentIndex                        SegmentIndex,
        sib-Data-variable                   SIB-Data-variable
}

-- **************************************************
--
-- Complete SIB
--
-- **************************************************

CompleteSIB-List ::=                        SEQUENCE (SIZE (1..maxSIBperMsg)) OF
                                            CompleteSIBshort

CompleteSIB ::=                             SEQUENCE {
    -- Other information elements
        sib-Type                            SIB-Type,
        sib-Data-fixed                      BIT STRING (SIZE (226))
    -- In case the SIB data is less than 226 bits, padding shall be used
    -- The same padding bits shall be used as defined in clause 12.1
}

CompleteSIBshort ::=                        SEQUENCE {
    -- Other information elements
        sib-Type                            SIB-Type,
        sib-Data-variable                   SIB-Data-variable
}

-- **************************************************
--
-- SYSTEM INFORMATION CHANGE INDICATION
--
-- **************************************************

SystemInformationChangeIndication ::=   SEQUENCE {
    -- Other IEs
        bcch-ModificationInfo               BCCH-ModificationInfo,
    -- Extension mechanism for non- release99 information
        nonCriticalExtensions               SEQUENCE {}     OPTIONAL
}

-- **************************************************
--
-- TRANSPORT CHANNEL RECONFIGURATION
--
-- **************************************************

TransportChannelReconfiguration-r3 ::= CHOICE {
    r3                                      SEQUENCE {
        transportChannelReconfiguration-r3
                                            TransportChannelReconfiguration-r3-IEs,
        nonCriticalExtensions               SEQUENCE {}     OPTIONAL
    },
    criticalExtensions                      SEQUENCE {}
}

TransportChannelReconfiguration-r3-IEs ::= SEQUENCE {
    -- User equipment IEs
        rrc-TransactionIdentifier           RRC-TransactionIdentifier,
        integrityProtectionModeInfo         IntegrityProtectionModeInfo          OPTIONAL,
        cipheringModeInfo                   CipheringModeInfo                    OPTIONAL,
        activationTime                      ActivationTime                       OPTIONAL,
        new-U-RNTI                          U-RNTI                               OPTIONAL,
        new-C-RNTI                          C-RNTI                               OPTIONAL,
        rrc-StateIndicator                  RRC-StateIndicator,
        utran-DRX-CycleLengthCoeff          UTRAN-DRX-CycleLengthCoefficient     OPTIONAL,
    -- Core network IEs
        cn-InformationInfo                  CN-InformationInfo                   OPTIONAL,
    -- UTRAN mobility IEs
        ura-Identity                        URA-Identity                         OPTIONAL,
    -- Radio bearer IEs
        rb-WithPDCP-InfoList                RB-WithPDCP-InfoList                 OPTIONAL,
    -- Transport channel IEs
        ul-CommonTransChInfo                UL-CommonTransChInfo                 OPTIONAL,
        ul-AddReconfTransChInfoList         UL-AddReconfTransChInfoList          OPTIONAL,
```

```
                modeSpecificTransChInfo           CHOICE {
                    fdd                              SEQUENCE {
                        cpch-SetID                       CPCH-SetID               OPTIONAL,
                        addReconfTransChDRAC-Info        DRAC-StaticInformationList  OPTIONAL
                    },
                    tdd                              NULL
                }                                                                  OPTIONAL,
                dl-CommonTransChInfo            DL-CommonTransChInfo               OPTIONAL,
                dl-AddReconfTransChInfoList     DL-AddReconfTransChInfoList        OPTIONAL,
        -- Physical channel IEs
                frequencyInfo                   FrequencyInfo                      OPTIONAL,
                maxAllowedUL-TX-Power           MaxAllowedUL-TX-Power              OPTIONAL,
                ul-ChannelRequirement           UL-ChannelRequirement              OPTIONAL,
                modeSpecificPhysChInfo          CHOICE {
                    fdd                              SEQUENCE {
                        dl-PDSCH-Information              DL-PDSCH-Information      OPTIONAL
                    },
                    tdd                              NULL
                },
                dl-CommonInformation            DL-CommonInformation               OPTIONAL,
                dl-InformationPerRL-List        DL-InformationPerRL-List           OPTIONAL
}

-- **************************************************
--
-- TRANSPORT CHANNEL RECONFIGURATION COMPLETE
--
-- **************************************************

TransportChannelReconfigurationComplete ::= SEQUENCE {
    -- User equipment IEs
        rrc-TransactionIdentifier       RRC-TransactionIdentifier,
        ul-IntegProtActivationInfo      IntegrityProtActivationInfo        OPTIONAL,
        -- TABULAR: UL-TimingAdvance is applicable for TDD mode only.
        ul-TimingAdvance                UL-TimingAdvance                   OPTIONAL,
    -- Radio bearer IEs
        count-C-ActivationTime          ActivationTime                     OPTIONAL,
        rb-UL-CiphActivationTimeInfo    RB-ActivationTimeInfoList          OPTIONAL,
        rb-WithPDCP-InfoList            RB-WithPDCP-InfoList               OPTIONAL,
    -- Extension mechanism for non- release99 information
        nonCriticalExtensions           SEQUENCE {}     OPTIONAL
}

-- **************************************************
--
-- TRANSPORT CHANNEL RECONFIGURATION FAILURE
--
-- **************************************************

TransportChannelReconfigurationFailure ::= SEQUENCE {
    -- User equipment IEs
        rrc-TransactionIdentifier       RRC-TransactionIdentifier,
        failureCause                    FailureCauseWithProtErr,
    -- Extension mechanism for non- release99 information
        nonCriticalExtensions           SEQUENCE {}     OPTIONAL
}

-- **************************************************
--
-- TRANSPORT FORMAT COMBINATION CONTROL
--
-- **************************************************

TransportFormatCombinationControl ::= SEQUENCE {
    -- TABULAR: Integrity protection shall not be performed on this message when transmitting this
message
    -- on the transparent mode signalling DCCH.
        rrc-TransactionIdentifier       RRC-TransactionIdentifier          OPTIONAL,
    -- The information element is not included when transmitting the message
    -- on the transparent mode signalling DCCH
    modeSpecificInfo                    CHOICE {
        fdd                              NULL,
        tdd                              SEQUENCE {
            tfcs-ID                          TFCS-Identity   OPTIONAL
        }
    },
    dpch-TFCS-InUplink                  TFC-Subset,
    tfc-ControlDuration                 TFC-ControlDuration                OPTIONAL,
    -- The information element is not included when transmitting the message
    -- on the transparent mode signalling DCCH and is optional otherwise
    -- Extension mechanism for non- release99 information
        nonCriticalExtensions           SEQUENCE {}     OPTIONAL
}
```

```
-- **************************************************
--
-- TRANSPORT FORMAT COMBINATION CONTROL FAILURE
--
-- **************************************************

TransportFormatCombinationControlFailure ::= SEQUENCE {
    -- User equipment IEs
        rrc-TransactionIdentifier       RRC-TransactionIdentifier,
        failureCause                    FailureCauseWithProtErr,
    -- Extension mechanism for non- release99 information
        nonCriticalExtensions           SEQUENCE {}    OPTIONAL
}

-- **************************************************
--
-- UE CAPABILITY ENQUIRY
--
-- **************************************************

UECapabilityEnquiry-r3 ::= CHOICE {
    r3                              SEQUENCE {
        ueCapabilityEnquiry-r3          UECapabilityEnquiry-r3-IEs,
        nonCriticalExtensions           SEQUENCE {}    OPTIONAL
    },
    criticalExtensions              SEQUENCE {}
}

UECapabilityEnquiry-r3-IEs ::= SEQUENCE {
    -- User equipment IEs
        rrc-TransactionIdentifier       RRC-TransactionIdentifier,
        capabilityUpdateRequirement     CapabilityUpdateRequirement
}

-- **************************************************
--
-- UE CAPABILITY INFORMATION
--
-- **************************************************

UECapabilityInformation ::= SEQUENCE {
    -- User equipment IEs
        rrc-TransactionIdentifier       RRC-TransactionIdentifier           OPTIONAL,
        ue-RadioAccessCapability        UE-RadioAccessCapability            OPTIONAL,
    -- Other IEs
        ue-RATSpecificCapability        InterRAT-UE-RadioAccessCapabilityList
    OPTIONAL,
    -- Extension mechanism for non- release99 information
        nonCriticalExtensions           SEQUENCE {}    OPTIONAL
        nonCriticalExtensions-r3        SEQUENCE {
            ueCapabilityInformation-r4ext   UECapabilityInformation-r4ext,
            nonCriticalExtensions-r4        SEQUENCE {}    OPTIONAL
        }        OPTIONAL
}

UECapabilityInformation-r4ext ::= SEQUENCE {
    -- User equipment IEs
        ue-RadioAccessCapability-r4ext      UE-RadioAccessCapability-r4ext      OPTIONAL
}

-- **************************************************
--
-- UE CAPABILITY INFORMATION CONFIRM
--
-- **************************************************

UECapabilityInformationConfirm-r3 ::= CHOICE {
    r3                              SEQUENCE {
        ueCapabilityInformationConfirm-r3
                                        UECapabilityInformationConfirm-r3-IEs,
        nonCriticalExtensions           SEQUENCE {}    OPTIONAL
    },
    criticalExtensions              SEQUENCE {}
}

UECapabilityInformationConfirm-r3-IEs ::= SEQUENCE {
    -- User equipment IEs
        rrc-TransactionIdentifier       RRC-TransactionIdentifier
}

-- **************************************************
--
```

```
-- UPLINK DIRECT TRANSFER
--
-- **************************************************

UplinkDirectTransfer ::= SEQUENCE {
    -- Core network IEs
        cn-DomainIdentity               CN-DomainIdentity,
        nas-Message                     NAS-Message,
    -- Measurement IEs
        measuredResultsOnRACH           MeasuredResultsOnRACH               OPTIONAL,
    -- Extension mechanism for non- release99 information
        nonCriticalExtensions           SEQUENCE {}     OPTIONAL
}

-- **************************************************
--
-- UPLINK PHYSICAL CHANNEL CONTROL
--
-- **************************************************

UplinkPhysicalChannelControl-r3 ::= CHOICE {
    r3                              SEQUENCE {
        uplinkPhysicalChannelControl-r3 UplinkPhysicalChannelControl-r3-IEs,
        nonCriticalExtensions           SEQUENCE {}     OPTIONAL
    },
    criticalExtensions              SEQUENCE {}
}


UplinkPhysicalChannelControl-r3-IEs ::= SEQUENCE {
    -- User equipment IEs
        rrc-TransactionIdentifier       RRC-TransactionIdentifier,
    -- Physical channel IEs
        ccTrCH-PowerControlInfo         CCTrCH-PowerControlInfo            OPTIONAL,
        timingAdvance                   UL-TimingAdvanceControl           OPTIONAL,
        alpha                           Alpha                             OPTIONAL,
        prach-ConstantValue             ConstantValue                     OPTIONAL,
        pusch-ConstantValue             ConstantValue                     OPTIONAL
}

-- **************************************************
--
-- URA UPDATE
--
-- **************************************************

URAUpdate ::= SEQUENCE {
    -- User equipment IEs
        u-RNTI                          U-RNTI,
        ura-UpdateCause                 URA-UpdateCause,
        protocolErrorIndicator          ProtocolErrorIndicatorWithMoreInfo,
    -- Extension mechanism for non- release99 information
        nonCriticalExtensions           SEQUENCE {}     OPTIONAL
}

-- **************************************************
--
-- URA UPDATE CONFIRM
--
-- **************************************************

URAUpdateConfirm-r3 ::= CHOICE {
    r3                              SEQUENCE {
        uraUpdateConfirm-r3             URAUpdateConfirm-r3-IEs,
        nonCriticalExtensions           SEQUENCE {}     OPTIONAL
    },
    criticalExtensions              SEQUENCE {}
}

URAUpdateConfirm-r3-IEs ::= SEQUENCE {
    -- User equipment IEs
        rrc-TransactionIdentifier       RRC-TransactionIdentifier,
        integrityProtectionModeInfo     IntegrityProtectionModeInfo        OPTIONAL,
        cipheringModeInfo               CipheringModeInfo                  OPTIONAL,
        new-U-RNTI                      U-RNTI                             OPTIONAL,
        new-C-RNTI                      C-RNTI                             OPTIONAL,
        rrc-StateIndicator              RRC-StateIndicator,
        utran-DRX-CycleLengthCoeff      UTRAN-DRX-CycleLengthCoefficient   OPTIONAL,
    -- CN information elements
        cn-InformationInfo              CN-InformationInfo                 OPTIONAL,
    -- UTRAN mobility IEs
        ura-Identity                    URA-Identity                       OPTIONAL,
    -- Radio bearer IEs
```

```
            rb-WithPDCP-InfoList              RB-WithPDCP-InfoList              OPTIONAL
}

-- **************************************************
--
-- URA UPDATE CONFIRM for CCCH
--
-- **************************************************

URAUpdateConfirm-CCCH-r3 ::= CHOICE {
    r3                            SEQUENCE {
        uraUpdateConfirm-CCCH-r3      URAUpdateConfirm-CCCH-r3-IEs,
        nonCriticalExtensions         SEQUENCE {}    OPTIONAL
    },
    criticalExtensions            SEQUENCE {}
}

URAUpdateConfirm-CCCH-r3-IEs ::= SEQUENCE {
    -- User equipment IEs
        u-RNTI                        U-RNTI,
    -- The rest of the message is identical to the one sent on DCCH.
        uraUpdateConfirm              URAUpdateConfirm-r3-IEs
}

-- **************************************************
--
-- UTRAN MOBILITY INFORMATION
--
-- **************************************************

UTRANMobilityInformation ::= SEQUENCE {
    -- User equipment IEs
        rrc-TransactionIdentifier     RRC-TransactionIdentifier,
        integrityProtectionModeInfo   IntegrityProtectionModeInfo        OPTIONAL,
        cipheringModeInfo             CipheringModeInfo                  OPTIONAL,
        new-U-RNTI                    U-RNTI                             OPTIONAL,
        new-C-RNTI                    C-RNTI                             OPTIONAL,
        ue-ConnTimersAndConstants     UE-ConnTimersAndConstants          OPTIONAL,
    -- CN information elements
        cn-InformationInfo            CN-InformationInfo                 OPTIONAL,
    -- UTRAN mobility IEs
        ura-Identity                  URA-Identity                       OPTIONAL,
    -- Radio bearer IEs
        count-C-ActivationTime        ActivationTime                     OPTIONAL,
        rb-WithPDCP-InfoList          RB-WithPDCP-InfoList               OPTIONAL,
    -- Extension mechanism for non- release99 information
        nonCriticalExtensions         SEQUENCE {}    OPTIONAL
}

-- **************************************************
--
-- UTRAN MOBILITY INFORMATION CONFIRM
--
-- **************************************************

UTRANMobilityInformationConfirm ::= SEQUENCE {
    -- User equipment IEs
        rrc-TransactionIdentifier     RRC-TransactionIdentifier,
        ul-IntegProtActivationInfo    IntegrityProtActivationInfo        OPTIONAL,
    -- Radio bearer IEs
        rb-UL-CiphActivationTimeInfo  RB-ActivationTimeInfoList          OPTIONAL,
        rb-WithPDCP-InfoList          RB-WithPDCP-InfoList               OPTIONAL,
    -- Extension mechanism for non- release99 information
        nonCriticalExtensions         SEQUENCE {}    OPTIONAL
}

-- **************************************************
--
-- UTRAN MOBILITY INFORMATION FAILURE
--
-- **************************************************

UTRANMobilityInformationFailure ::= SEQUENCE {
    -- UE information elements
        rrc-TransactionIdentifier     RRC-TransactionIdentifier,
        failureCause                  FailureCauseWithProtErr,
    -- Extension mechanism for non- release99 information
        nonCriticalExtensions         SEQUENCE {}    OPTIONAL
}

END
```

11.3 Information element definitions

<Cut until the next changed section>

```
-- **************************************************
--
--     USER EQUIPMENT INFORMATION ELEMENTS (10.3.3)
--
-- **************************************************

ActivationTime ::=              INTEGER (0..255)
-- TABULAR : value 'now' always appear as default, and is encoded by absence of the field

BackoffControlParams ::=        SEQUENCE {
    n-AP-RetransMax                 N-AP-RetransMax,
    n-AccessFails                   N-AccessFails,
    nf-BO-NoAICH                    NF-BO-NoAICH,
    ns-BO-Busy                      NS-BO-Busy,
    nf-BO-AllBusy                   NF-BO-AllBusy,
    nf-BO-Mismatch                  NF-BO-Mismatch,
    t-CPCH                          T-CPCH
}

C-RNTI ::=                      BIT STRING (SIZE (16))

CapabilityUpdateRequirement ::=    SEQUENCE {
    ue-RadioCapabilityUpdateRequirement BOOLEAN,
    systemSpecificCapUpdateReqList    SystemSpecificCapUpdateReqList      OPTIONAL
}

CellUpdateCause ::=             ENUMERATED {
                                    cellReselection,
                                    periodicalCellUpdate,
                                    uplinkDataTransmission,
                                    utran-pagingResponse,
                                    re-enteredServiceArea,
                                    radiolinkFailure,
                                    rlc-unrecoverableError,
                                    spare1 }

ChipRateCapability ::=          ENUMERATED {
                                    mcps3-84, mcps1-28 }

CipheringAlgorithm ::=          ENUMERATED {
                                    uea0, uea1 }

CipheringModeCommand ::=        CHOICE {
    startRestart                    CipheringAlgorithm,
    stopCiphering                   NULL
}

CipheringModeInfo ::=           SEQUENCE {
    cipheringModeCommand            CipheringModeCommand,
    -- TABULAR: The ciphering algorithm is included in
    -- the CipheringModeCommand.
    activationTimeForDPCH           ActivationTime                      OPTIONAL,
    rb-DL-CiphActivationTimeInfo    RB-ActivationTimeInfoList           OPTIONAL
}

CN-DRX-CycleLengthCoefficient ::=  INTEGER (6..9)

CN-PagedUE-Identity ::=         CHOICE {
    imsi-GSM-MAP                    IMSI-GSM-MAP,
    tmsi-GSM-MAP                    TMSI-GSM-MAP,
    p-TMSI-GSM-MAP                  P-TMSI-GSM-MAP,
    imsi-DS-41                      IMSI-DS-41,
    tmsi-DS-41                      TMSI-DS-41
}

CompressedModeMeasCapability ::=   SEQUENCE {
    fdd-Measurements                BOOLEAN,
    -- TABULAR: The IEs below are made optional since they are conditional based
    -- on another information element. Their absence corresponds to the case where
    -- the condition is not true.
    tdd-Measurements                BOOLEAN                             OPTIONAL,
    gsm-Measurements                GSM-Measurements                    OPTIONAL,
    multiCarrierMeasurements        BOOLEAN                             OPTIONAL
}


CPCH-Parameters ::=             SEQUENCE {
    initialPriorityDelayList        InitialPriorityDelayList            OPTIONAL,
```

```
    backoffControlParams                 BackoffControlParams,
    powerControlAlgorithm                PowerControlAlgorithm,
    -- TABULAR: TPC step size nested inside PowerControlAlgorithm
    dl-DPCCH-BER                         DL-DPCCH-BER
}

DL-DPCCH-BER ::=                 INTEGER (0..63)

DL-PhysChCapabilityFDD ::=       SEQUENCE {
    maxNoDPCH-PDSCH-Codes            INTEGER (1..8),
    maxNoPhysChBitsReceived          MaxNoPhysChBitsReceived,
    supportForSF-512                 BOOLEAN,
    supportOfPDSCH                   BOOLEAN,
    simultaneousSCCPCH-DPCH-Reception  SimultaneousSCCPCH-DPCH-Reception
}

DL-PhysChCapabilityTDD ::=       SEQUENCE {
    maxTS-PerFrame                   MaxTS-PerFrame,
    maxPhysChPerFrame                MaxPhysChPerFrame,
    minimumSF                        MinimumSF-DL,
    supportOfPDSCH                   BOOLEAN,
    maxPhysChPerTS                   MaxPhysChPerTS
}

DL-TransChCapability ::=         SEQUENCE {
    maxNoBitsReceived                MaxNoBits,
    maxConvCodeBitsReceived          MaxNoBits,
    turboDecodingSupport             TurboSupport,
    maxSimultaneousTransChs          MaxSimultaneousTransChsDL,
    maxSimultaneousCCTrCH-Count      MaxSimultaneousCCTrCH-Count,
    maxReceivedTransportBlocks       MaxTransportBlocksDL,
    maxNumberOfTFC-InTFCS            MaxNumberOfTFC-InTFCS-DL,
    maxNumberOfTF                    MaxNumberOfTF
}

DRAC-SysInfo ::=                 SEQUENCE {
    transmissionProbability          TransmissionProbability,
    maximumBitRate                   MaximumBitRate
}

DRAC-SysInfoList ::=             SEQUENCE (SIZE (1..maxDRACclasses)) OF
                                     DRAC-SysInfo

ESN-DS-41 ::=                    BIT STRING (SIZE (32))

EstablishmentCause ::=           ENUMERATED {
                                     originatingConversationalCall,
                                     originatingStreamingCall,
                                     originatingInteractiveCall,
                                     originatingBackgroundCall,
                                     originatingSubscribedTrafficCall,
                                     terminatingConversationalCall,
                                     terminatingStreamingCall,
                                     terminatingInteractiveCall,
                                     terminatingBackgroundCall,
                                     emergencyCall,
                                     interRAT-CellReselection,
                                     interRAT-CellChangeOrder,
                                     registration,
                                     detach,
                                     highPrioritySignalling,
                                     lowPrioritySignalling,
                                     callRe-establishment,
                                     spare1 }

FailureCauseWithProtErr ::=      CHOICE {
    configurationUnsupported         NULL,
    physicalChannelFailure           NULL,
    incompatibleSimultaneousReconfiguration
                                     NULL,
    compressedModeRuntimeError       TGPSI,
    protocolError                    ProtocolErrorInformation,
    cellReselection                  NULL,
    invalidConfiguration             NULL,
    configurationIncomplete          NULL,
    unsupportedMeasurement           NULL,
    spare1                           NULL,
    spare2                           NULL,
    spare3                           NULL,
    spare4                           NULL,
    spare5                           NULL,
    spare6                           NULL,
    spare7                           NULL
```

```
}

FailureCauseWithProtErrTrId ::=    SEQUENCE {
        rrc-TransactionIdentifier       RRC-TransactionIdentifier,
        failureCause                    FailureCauseWithProtErr
}

GSM-Measurements ::=               SEQUENCE {
    gsm900                            BOOLEAN,
    dcs1800                           BOOLEAN,
    gsm1900                           BOOLEAN
}


ICS-Version ::=                    ENUMERATED {
                                      r99 }

IMSI-and-ESN-DS-41 ::=             SEQUENCE {
    imsi-DS-41                        IMSI-DS-41,
    esn-DS-41                         ESN-DS-41
}

IMSI-DS-41 ::=                     OCTET STRING (SIZE (5..7))

InitialPriorityDelayList ::=       SEQUENCE (SIZE (maxASC)) OF
                                      NS-IP

InitialUE-Identity ::=             CHOICE {
    imsi                              IMSI-GSM-MAP,
    tmsi-and-LAI                      TMSI-and-LAI-GSM-MAP,
    p-TMSI-and-RAI                    P-TMSI-and-RAI-GSM-MAP,
    imei                              IMEI,
    esn-DS-41                         ESN-DS-41,
    imsi-DS-41                        IMSI-DS-41,
    imsi-and-ESN-DS-41                IMSI-and-ESN-DS-41,
    tmsi-DS-41                        TMSI-DS-41
}

IntegrityCheckInfo ::=             SEQUENCE {
    messageAuthenticationCode         MessageAuthenticationCode,
    rrc-MessageSequenceNumber         RRC-MessageSequenceNumber
}

IntegrityProtActivationInfo ::=    SEQUENCE {
    rrc-MessageSequenceNumberList     RRC-MessageSequenceNumberList
}

IntegrityProtectionAlgorithm ::=   ENUMERATED {
                                      uia1 }


IntegrityProtectionModeCommand ::= CHOICE {
    startIntegrityProtection          SEQUENCE {
        integrityProtInitNumber           IntegrityProtInitNumber
    },
    modify                            SEQUENCE {
        dl-IntegrityProtActivationInfo    IntegrityProtActivationInfo
    }
}

IntegrityProtectionModeInfo ::=    SEQUENCE {
    integrityProtectionModeCommand    IntegrityProtectionModeCommand,
    -- TABULAR: DL integrity protection activation info and Integrity
    -- protection intialisation number have been nested inside
    -- IntegrityProtectionModeCommand.
    integrityProtectionAlgorithm      IntegrityProtectionAlgorithm       OPTIONAL
}

IntegrityProtInitNumber ::=        BIT STRING (SIZE (32))

MaxHcContextSpace ::=              ENUMERATED  {
                                      by512, by1024, by2048, by4096,
                                      by8192 }


MaxROHC-ContextSessions ::=        ENUMERATED  {
                                      s2, s4, s8, s12, s16, s24, s32, s48,
                                      s64, s128, s256, s512, s1024, s16384 }

MaximumAM-EntityNumberRLC-Cap ::=  ENUMERATED {
                                      am3, am4, am5, am6,
                                      am8, am16, am32 }
```

```
-- Actual value = IE value * 16
MaximumBitRate ::=                INTEGER (0..32)

MaximumRLC-WindowSize ::=         ENUMERATED { mws2047, mws4095 }

MaxNoDPDCH-BitsTransmitted ::=    ENUMERATED {
                                      b600, b1200, b2400, b4800,
                                      b9600, b19200, b28800, b38400,
                                      b48000, b57600 }

MaxNoBits ::=                     ENUMERATED {
                                      b640, b1280, b2560, b3840, b5120,
                                      b6400, b7680, b8960, b10240,
                                      b20480, b40960, b81920, b163840 }

MaxNoPhysChBitsReceived ::=       ENUMERATED {
                                      b600, b1200, b2400, b3600,
                                      b4800, b7200, b9600, b14400,
                                      b19200, b28800, b38400, b48000,
                                      b57600, b67200, b76800 }

MaxNoSCCPCH-RL ::=                ENUMERATED {
                                      rl1 }

MaxNumberOfTF ::=                 ENUMERATED {
                                      tf32, tf64, tf128, tf256,
                                      tf512, tf1024 }

MaxNumberOfTFC-InTFCS-DL ::=      ENUMERATED {
                                      tfc16, tfc32, tfc48, tfc64, tfc96,
                                      tfc128, tfc256, tfc512, tfc1024 }

MaxNumberOfTFC-InTFCS-UL ::=      ENUMERATED {
                                      tfc4, tfc8, tfc16, tfc32, tfc48, tfc64,
                                      tfc96, tfc128, tfc256, tfc512, tfc1024 }

MaxPhysChPerFrame ::=             INTEGER (1..224)

MaxPhysChPerTimeslot ::=          ENUMERATED {
                                      ts1, ts2 }

MaxPhysChPerTS ::=                INTEGER (1..16)

MaxSimultaneousCCTrCH-Count ::=   INTEGER (1..8)

MaxSimultaneousTransChsDL ::=     ENUMERATED {
                                      e4, e8, e16, e32 }

MaxSimultaneousTransChsUL ::=     ENUMERATED {
                                      e2, e4, e8, e16, e32 }

MaxTransportBlocksDL ::=          ENUMERATED {
                                      tb4, tb8, tb16, tb32, tb48,
                                      tb64, tb96, tb128, tb256, tb512 }

MaxTransportBlocksUL ::=          ENUMERATED {
                                      tb2, tb4, tb8, tb16, tb32, tb48,
                                      tb64, tb96, tb128, tb256, tb512 }

MaxTS-PerFrame ::=                INTEGER (1..14)

-- TABULAR: This IE contains dependencies to UE-MultiModeRAT-Capability,
-- the conditional fields have been left mandatory for now.
MeasurementCapability ::=         SEQUENCE {
    downlinkCompressedMode            CompressedModeMeasCapability,
    uplinkCompressedMode              CompressedModeMeasCapability
}

MessageAuthenticationCode ::=     BIT STRING (SIZE (32))

MinimumSF-DL ::=                  ENUMERATED {
                                      sf1, sf16 }

MinimumSF-UL ::=                  ENUMERATED {
                                      sf1, sf2, sf4, sf8, sf16 }

MultiModeCapability ::=           ENUMERATED {
                                      tdd, fdd, fdd-tdd }

MultiRAT-Capability ::=           SEQUENCE {
    supportOfGSM                      BOOLEAN,
    supportOfMulticarrier             BOOLEAN
}
```

```
N-300 ::=                        INTEGER (0..7)

N-301 ::=                        INTEGER (0..7)

N-302 ::=                        INTEGER (0..7)

N-304 ::=                        INTEGER (0..7)

N-308 ::=                        INTEGER (1..8)

N-310 ::=                        INTEGER (0..7)

N-312 ::=                        ENUMERATED {
                                     s1, s50, s100, s200, s400,
                                     s600, s800, s1000 }

N-313 ::=                        ENUMERATED {
                                     s1, s2, s4, s10, s20,
                                      s50, s100, s200 }

N-315 ::=                        ENUMERATED {
                                     s1, s50, s100, s200, s400,
                                     s600, s800, s1000 }

N-AccessFails ::=                INTEGER (1..64)

N-AP-RetransMax ::=              INTEGER (1..64)

NetworkAssistedGPS-Supported ::= ENUMERATED {
                                     networkBased,
                                     ue-Based,
                                     bothNetworkAndUE-Based,
                                     noNetworkAssistedGPS }

NF-BO-AllBusy ::=                INTEGER (0..31)

NF-BO-NoAICH ::=                 INTEGER (0..31)

NF-BO-Mismatch ::=               INTEGER (0..127)

NS-BO-Busy ::=                   INTEGER (0..63)

NS-IP ::=                        INTEGER (0..28)

P-TMSI-and-RAI-GSM-MAP ::=       SEQUENCE {
    p-TMSI                           P-TMSI-GSM-MAP,
    rai                              RAI
}

PagingCause ::=                  ENUMERATED {
                                     terminatingConversationalCall,
                                     terminatingStreamingCall,
                                     terminatingInteractiveCall,
                                     terminatingBackgroundCall,
                                     highPrioritySignalling,
                                     lowPrioritySignalling
 }

PagingRecord ::=                 CHOICE {
    cn-Identity                      SEQUENCE {
        pagingCause                      PagingCause,
        cn-DomainIdentity                CN-DomainIdentity,
        cn-pagedUE-Identity              CN-PagedUE-Identity
    },
    utran-Identity                   SEQUENCE {
        u-RNTI                           U-RNTI,
        cn-OriginatedPage-connectedMode-UE  SEQUENCE {
            pagingCause                      PagingCause,
            cn-DomainIdentity                CN-DomainIdentity,
            pagingRecordTypeID               PagingRecordTypeID
        }                                                          OPTIONAL
    }
}

PagingRecordList ::=             SEQUENCE (SIZE (1..maxPage1)) OF
                                     PagingRecord

PDCP-Capability ::=              SEQUENCE {
    losslessSRNS-RelocationSupport   BOOLEAN,
    supportForRfc2507                CHOICE {
        notSupported                     NULL,
        supported                        MaxHcContextSpace
```

```
    }
}

PDCP-Capability-r4ext ::=          SEQUENCE {
    SupportForRfc3095ROHC                    CHOICE {
        notSupported                         NULL,
        supported                            SEQUENCE {
            maxROHC-ContextSessions          MaxROHC-ContextSessions    DEFAULT s16,
            reverseCompressionDepth          INTEGER (0..65535)         DEFAULT 0
        }
    }
}

PhysicalChannelCapability ::=      SEQUENCE {
    fddPhysChCapability                      SEQUENCE {
        downlinkPhysChCapability             DL-PhysChCapabilityFDD,
        uplinkPhysChCapability               UL-PhysChCapabilityFDD
    }                                        OPTIONAL,
    tddPhysChCapability                      SEQUENCE {
        downlinkPhysChCapability             DL-PhysChCapabilityTDD,
        uplinkPhysChCapability               UL-PhysChCapabilityTDD
    }                                        OPTIONAL
}

ProtocolErrorCause ::=             ENUMERATED {
                                       asn1-ViolationOrEncodingError,
                                       messageTypeNonexistent,
                                       messageNotCompatibleWithReceiverState,
                                       ie-ValueNotComprehended,
                                       conditionalInformationElementError,
                                       messageExtensionNotComprehended,
                                       spare1, spare2 }

ProtocolErrorIndicator ::=         ENUMERATED {
                                       noError, errorOccurred }

ProtocolErrorIndicatorWithMoreInfo ::=
                                   CHOICE {
    noError                            NULL,
    errorOccurred                      SEQUENCE {
        rrc-TransactionIdentifier          RRC-TransactionIdentifier,
        protocolErrorInformation           ProtocolErrorInformation
    }
}

ProtocolErrorMoreInformation ::=   SEQUENCE {
    diagnosticsType                    CHOICE {
        type1                              CHOICE {
            asn1-ViolationOrEncodingError      NULL,
            messageTypeNonexistent             NULL,
            messageNotCompatibleWithReceiverState
                                               IdentificationOfReveivedMessage,
            ie-ValueNotComprehended            IdentificationOfReveivedMessage,
            conditionalInformationElementError IdentificationOfReveivedMessage,
            messageExtensionNotComprehended    IdentificationOfReveivedMessage,
            spare1                             NULL,
            spare2                             NULL
        },
        spare                              NULL
    }
}

RadioFrequencyBand ::=             ENUMERATED {
                                       a, b, c, ab, ac, bc, abc }

Rb-timer-indicator ::=             SEQUENCE {
    t314-expired                       BOOLEAN,
    t315-expired                       BOOLEAN }

Re-EstablishmentTimer ::=          ENUMERATED {
                                       useT314, useT315
}

RedirectionInfo ::=                CHOICE {
    frequencyInfo                      FrequencyInfo,
    interRATInfo                       InterRATInfo
}

RejectionCause ::=                 ENUMERATED {
                                       congestion,
                                       unspecified }

ReleaseCause ::=                   ENUMERATED {
```

```
                                        normalEvent,
                                        unspecified,
                                        pre-emptiveRelease,
                                        congestion,
                                        re-establishmentReject,
                               directedsignallingconnectionre-establishment,
                                        userInactivity }

RF-Capability ::=                   SEQUENCE {
        fddRF-Capability                    SEQUENCE {
            ue-PowerClass                       UE-PowerClass,
            txRxFrequencySeparation             TxRxFrequencySeparation
        }                                       OPTIONAL,
        tddRF-Capability                        SEQUENCE {
            ue-PowerClass                   UE-PowerClass,
            radioFrequencyBandList          RadioFrequencyBand,
            chipRateCapability              ChipRateCapability
        }                                   OPTIONAL

}

RLC-Capability ::=                  SEQUENCE {
    totalRLC-AM-BufferSize              TotalRLC-AM-BufferSize,
    maximumRLC-WindowSize               MaximumRLC-WindowSize,
    maximumAM-EntityNumber              MaximumAM-EntityNumberRLC-Cap
}

RRC-MessageSequenceNumber ::=       INTEGER (0..15)


RRC-MessageSequenceNumberList ::=   SEQUENCE (SIZE (4..5)) OF
                                    RRC-MessageSequenceNumber

RRC-StateIndicator ::=              ENUMERATED {
                                    cell-DCH, cell-FACH, cell-PCH, ura-PCH }

RRC-TransactionIdentifier ::=       INTEGER (0..3)

S-RNTI ::=                          BIT STRING (SIZE (20))

S-RNTI-2 ::=                        BIT STRING (SIZE (10))

SecurityCapability ::=              SEQUENCE {
    cipheringAlgorithmCap                   BIT STRING (SIZE (16)),
    integrityProtectionAlgorithmCap     BIT STRING (SIZE (16))
}

SimultaneousSCCPCH-DPCH-Reception ::= CHOICE {
    notSupported                        NULL,
    supported                           SEQUENCE {
        maxNoSCCPCH-RL                      MaxNoSCCPCH-RL,
        simultaneousSCCPCH-DPCH-DPDCH-Reception
                                           BOOLEAN
        -- The IE above is applicable only if IE Support of PDSCH = TRUE
    }
}

SRNC-Identity ::=                   BIT STRING (SIZE (12))


START-Value ::=                     BIT STRING (SIZE (20))

STARTList ::=                       SEQUENCE (SIZE (1..maxCNdomains)) OF
                                    STARTSingle

STARTSingle ::=                     SEQUENCE {
    cn-DomainIdentity                   CN-DomainIdentity,
    start-Value                         START-Value
}

SystemSpecificCapUpdateReq ::=      ENUMERATED {
                                    gsm }

SystemSpecificCapUpdateReqList ::= SEQUENCE (SIZE (1..maxSystemCapability)) OF
                                    SystemSpecificCapUpdateReq


T-300 ::=                           ENUMERATED {
                                    ms100, ms200, ms400, ms600, ms800,
                                    ms1000, ms1200, ms1400, ms1600,
                                    ms1800, ms2000, ms3000, ms4000,
                                    ms6000, ms8000 }
```

```
T-301 ::=                         ENUMERATED {
                                      ms100, ms200, ms400, ms600, ms800,
                                      ms1000, ms1200, ms1400, ms1600,
                                      ms1800, ms2000, ms3000, ms4000,
                                      ms6000, ms8000 }

T-302 ::=                         ENUMERATED {
                                      ms100, ms200, ms400, ms600, ms800,
                                      ms1000, ms1200, ms1400, ms1600,
                                      ms1800, ms2000, ms3000, ms4000,
                                      ms6000, ms8000 }

T-304 ::=                         ENUMERATED {
                                      ms100, ms200, ms400,
                                      ms1000, ms2000 }

T-305 ::=                         ENUMERATED {
                                      noUpdate, m5, m10, m30,
                                      m60, m120, m360, m720 }

T-307 ::=                         ENUMERATED {
                                      s5, s10, s15, s20,
                                      s30, s40, s50 }

T-308 ::=                         ENUMERATED {
                                      ms40, ms80, ms160, ms320 }

T-309 ::=                         INTEGER (1..8)

T-310 ::=                         ENUMERATED {
                                      ms40, ms80, ms120, ms160,
                                      ms200, ms240, ms280, ms320 }

T-311 ::=                         ENUMERATED {
                                      ms250, ms500, ms750, ms1000,
                                      ms1250, ms1500, ms1750, ms2000 }

T-312 ::=                         INTEGER (0..15)

T-313 ::=                         INTEGER (0..15)

T-314 ::=                         ENUMERATED {
                                      s0, s2, s4, s6, s8,
                                      s12, s16, s20 }

T-315 ::=                         ENUMERATED {
                                      s0, s10, s30, s60, s180,
                                      s600, s1200, s1800 }

T-316 ::=                         ENUMERATED {
                                      s0, s10, s20, s30, s40,
                                      s50, s-inf }

T-317 ::=                         ENUMERATED {
                                      s0, s10, s30, s60, s180,
                                      s600, s1200, s1800 }

T-CPCH ::=                        ENUMERATED {
                                      ct0, ct1 }

TMSI-and-LAI-GSM-MAP ::=          SEQUENCE {
    tmsi                              TMSI-GSM-MAP,
    lai                               LAI
}

TMSI-DS-41 ::=                    OCTET STRING (SIZE (2..12))

TotalRLC-AM-BufferSize ::=        ENUMERATED {
                                      kb2, kb10, kb50, kb100,
                                      kb150, kb500, kb1000 }

-- Actual value = IE value * 0.125
TransmissionProbability ::=       INTEGER (1..8)

TransportChannelCapability ::=    SEQUENCE {
    dl-TransChCapability              DL-TransChCapability,
    ul-TransChCapability              UL-TransChCapability
}

TurboSupport ::=                  CHOICE {
    notSupported                      NULL,
    supported                         MaxNoBits
}
```

```
TxRxFrequencySeparation ::=         ENUMERATED {
                                      mhz190, mhz174-8-205-2,
                                      mhz134-8-245-2 }

U-RNTI ::=                          SEQUENCE {
    srnc-Identity                       SRNC-Identity,
    s-RNTI                              S-RNTI
}

U-RNTI-Short ::=                    SEQUENCE {
    srnc-Identity                       SRNC-Identity,
    s-RNTI-2                            S-RNTI-2
}

UE-ConnTimersAndConstants ::=       SEQUENCE {
-- Optional is used also for parameters for which the default value is the last one read in SIB1
    t-301                               T-301                       DEFAULT ms2000,
    n-301                               N-301                       DEFAULT 2,
    t-302                               T-302                       DEFAULT ms4000,
    n-302                               N-302                       DEFAULT 3,
    t-304                               T-304                       OPTIONAL,
    n-304                               N-304                       OPTIONAL,
    t-305                               T-305                       DEFAULT m30,
    t-307                               T-307                       DEFAULT s30,
    t-308                               T-308                       OPTIONAL,
    t-309                               T-309                       OPTIONAL,
    t-310                               T-310                       DEFAULT ms160,
    n-310                               N-310                       DEFAULT 4,
    t-311                               T-311                       DEFAULT ms2000,
    t-312                               T-312                       DEFAULT 1,
    n-312                               N-312                       DEFAULT s1,
    t-313                               T-313                       OPTIONAL,
    n-313                               N-313                       OPTIONAL,
    t-314                               T-314                       OPTIONAL,
    t-315                               T-315                       OPTIONAL,
    n-315                               N-315                       OPTIONAL,
    t-316                               T-316                       OPTIONAL,
    t-317                               T-317                       OPTIONAL
}

UE-IdleTimersAndConstants ::=       SEQUENCE {
    t-300                               T-300,
    n-300                               N-300,
    t-312                               T-312,
    n-312                               N-312
}

UE-MultiModeRAT-Capability ::=      SEQUENCE {
    multiRAT-CapabilityList             MultiRAT-Capability,
    multiModeCapability                 MultiModeCapability
}

UE-PowerClass ::=                   INTEGER (1..4)

UE-RadioAccessCapability ::=        SEQUENCE {
    ics-Version                         ICS-Version,
    pdcp-Capability                     PDCP-Capability,
    rlc-Capability                      RLC-Capability,
    transportChannelCapability          TransportChannelCapability,
    rf-Capability                       RF-Capability,
    physicalChannelCapability           PhysicalChannelCapability,
    ue-MultiModeRAT-Capability          UE-MultiModeRAT-Capability,
    securityCapability                  SecurityCapability,
    up-Capability                       UP-Capability,
    measurementCapability               MeasurementCapability       OPTIONAL
}

UE-RadioAccessCapability-r4ext ::=      SEQUENCE {
    pdcp-Capability-r4ext                   PDCP-Capability-r4ext,
}

UL-PhysChCapabilityFDD ::=          SEQUENCE {
    maxNoDPDCH-BitsTransmitted          MaxNoDPDCH-BitsTransmitted,
    supportOfPCPCH                      BOOLEAN
}

UL-PhysChCapabilityTDD ::=          SEQUENCE {
    maxTS-PerFrame                      MaxTS-PerFrame,
    maxPhysChPerTimeslot                MaxPhysChPerTimeslot,
    minimumSF                           MinimumSF-UL,
    supportOfPUSCH                      BOOLEAN
}
```

```
UL-TransChCapability ::=            SEQUENCE {
    maxNoBitsTransmitted                MaxNoBits,
    maxConvCodeBitsTransmitted          MaxNoBits,
    turboDecodingSupport                TurboSupport,
    maxSimultaneousTransChs             MaxSimultaneousTransChsUL,
    modeSpecificInfo                    CHOICE {
        fdd                                 NULL,
        tdd                                 SEQUENCE {
            maxSimultaneousCCTrCH-Count         MaxSimultaneousCCTrCH-Count
        }
    },
    maxTransmittedBlocks                MaxTransportBlocksUL,
    maxNumberOfTFC-InTFCS               MaxNumberOfTFC-InTFCS-UL,
    maxNumberOfTF                       MaxNumberOfTF
}

UP-Capability ::=                   SEQUENCE {
    standaloneLocMethodsSupported       BOOLEAN,
    ue-BasedOTDOA-Supported             BOOLEAN,
    networkAssistedGPS-Supported        NetworkAssistedGPS-Supported,
    gps-ReferenceTimeCapable            BOOLEAN,
    supportForIDL                       BOOLEAN
}

URA-UpdateCause ::=                 ENUMERATED {
                                        changeOfURA,
                                        periodicURAUpdate,
                                        re-enteredServiceArea,
                                        spare1 }

UTRAN-DRX-CycleLengthCoefficient ::= INTEGER (3..9)

WaitTime ::=                        INTEGER (0..15)

-- **************************************************
--
--      RADIO BEARER INFORMATION ELEMENTS (10.3.4)
--
-- **************************************************

AlgorithmSpecificInfo ::=           CHOICE {
    rfc2507-Info                        RFC2507-Info
}

AlgorithmSpecificInfo-r4 ::=        CHOICE {
    rfc2507-Info                        RFC2507-Info,
    rfc3095ROHC-Info                    RFC3095-ROHC-Info
}

-- Upper limit is 2^32 - 1
COUNT-C ::=                         INTEGER (0..4294967295)

-- Upper limit is 2^25 - 1
COUNT-C-MSB ::=                     INTEGER (0..33554431)

DL-AM-RLC-Mode ::=                  SEQUENCE {
    inSequenceDelivery                  BOOLEAN,
    receivingWindowSize                 ReceivingWindowSize,
    dl-RLC-StatusInfo                   DL-RLC-StatusInfo
}

DL-LogicalChannelMapping ::=        SEQUENCE {
    -- TABULAR: DL-TransportChannelType contains TransportChannelIdentity as well.
    dl-TransportChannelType             DL-TransportChannelType,
    logicalChannelIdentity              LogicalChannelIdentity          OPTIONAL
}

DL-LogicalChannelMappingList ::=    SEQUENCE (SIZE (1..maxLoCHperRLC)) OF
                                        DL-LogicalChannelMapping

DL-RLC-Mode ::=                     CHOICE {
    dl-AM-RLC-Mode                      DL-AM-RLC-Mode,
    dl-UM-RLC-Mode                      NULL,
    dl-TM-RLC-Mode                      DL-TM-RLC-Mode
}

DL-RLC-StatusInfo ::=               SEQUENCE {
    timerStatusProhibit                 TimerStatusProhibit             OPTIONAL,
    timerEPC                            TimerEPC                        OPTIONAL,
    missingPU-Indicator                 BOOLEAN,
    timerStatusPeriodic                 TimerStatusPeriodic             OPTIONAL
}
```

```
DL-TM-RLC-Mode ::=               SEQUENCE {
    segmentationIndication           BOOLEAN
}

DL-TransportChannelType ::=      CHOICE {
    dch                              TransportChannelIdentity,
    fach                             NULL,
    dsch                             TransportChannelIdentity
}

ExpectReordering ::=             ENUMERATED {
                                     reorderingNotExpected,
                                     reorderingExpected }

ExplicitDiscard ::=              SEQUENCE {
    timerMRW                         TimerMRW,
    timerDiscard                     TimerDiscard,
    maxMRW                           MaxMRW
}

HeaderCompressionInfo ::=        SEQUENCE {
    algorithmSpecificInfo            AlgorithmSpecificInfo
}

HeaderCompressionInfoList ::=    SEQUENCE (SIZE (1..maxPDCPAlgoType)) OF
                                     HeaderCompressionInfo

HeaderCompressionInfo-r4 ::=     SEQUENCE {
    algorithmSpecificInfo            AlgorithmSpecificInfo-r4
}

HeaderCompressionInfoList-r4 ::= SEQUENCE (SIZE (1..maxPDCPAlgoType)) OF
                                     HeaderCompressionInfo-r4

LogicalChannelIdentity ::=       INTEGER (1..15)

LosslessSRNS-RelocSupport ::=    CHOICE {
    supported                        MaxPDCP-SN-WindowSize,
    notSupported                     NULL
}

MAC-LogicalChannelPriority ::=   INTEGER (1..8)

MaxDAT ::=                       ENUMERATED {
                                     dat1, dat2, dat3, dat4, dat5, dat6,
                                     dat7, dat8, dat9, dat10, dat15, dat20,
                                     dat25, dat30, dat35, dat40 }

MaxDAT-Retransmissions ::=       SEQUENCE {
    maxDAT                           MaxDAT,
    timerMRW                         TimerMRW,
    maxMRW                           MaxMRW
}

MaxMRW ::=                       ENUMERATED {
                                     mm1, mm4, mm6, mm8, mm12, mm16,
                                     mm24, mm32 }

MaxPDCP-SN-WindowSize ::=        ENUMERATED {
                                     sn255, sn65535 }

MaxRST ::=                       ENUMERATED {
                                     rst1, rst4, rst6, rst8, rst12,
                                     rst16, rst24, rst32 }

NoExplicitDiscard ::=            ENUMERATED {
                                     dt10, dt20, dt30, dt40, dt50,
                                     dt60, dt70, dt80, dt90, dt100 }

PDCP-Info ::=                    SEQUENCE {
    losslessSRNS-RelocSupport        LosslessSRNS-RelocSupport         OPTIONAL,
    pdcp-PDU-Header                  PDCP-PDU-Header,
    -- TABULAR: The IE above is MD in the tabular format and it can be encoded
    -- in one bit, so the OPTIONAL is removed for compactness.
    headerCompressionInfoList        HeaderCompressionInfoList         OPTIONAL
}

PDCP-Info-r4 ::=                 SEQUENCE {
    losslessSRNS-RelocSupport        LosslessSRNS-RelocSupport         OPTIONAL,
    pdcp-PDU-Header                  PDCP-PDU-Header,
    -- TABULAR: The IE above is MD in the tabular format and it can be encoded
    -- in one bit, so the OPTIONAL is removed for compactness.
```

```
    headerCompressionInfoList        HeaderCompressionInfoList-r4      OPTIONAL
}

PDCP-InfoReconfig ::=              SEQUENCE {
    pdcp-Info                         PDCP-Info,
    pdcp-SN-Info                      PDCP-SN-Info
}

PDCP-InfoReconfig-r4 ::=          SEQUENCE {
    pdcp-Info                         PDCP-Info-r4,
    pdcp-SN-Info                      PDCP-SN-Info
}

PDCP-PDU-Header ::=               ENUMERATED {
                                     present, absent }

PDCP-SN-Info ::=                  INTEGER (0..65535)

Poll-PU ::=                       ENUMERATED {
                                     pu1, pu2, pu4, pu8, pu16,
                                     pu32, pu64, pu128 }

Poll-SDU ::=                      ENUMERATED {
                                     sdu1, sdu4, sdu16, sdu64 }

PollingInfo ::=                   SEQUENCE {
    timerPollProhibit                 TimerPollProhibit             OPTIONAL,
    timerPoll                         TimerPoll                     OPTIONAL,
    poll-PU                           Poll-PU                       OPTIONAL,
    poll-SDU                          Poll-SDU                      OPTIONAL,
    lastTransmissionPU-Poll           BOOLEAN,
    lastRetransmissionPU-Poll         BOOLEAN,
    pollWindow                        PollWindow                    OPTIONAL,
    timerPollPeriodic                 TimerPollPeriodic             OPTIONAL
}

PollWindow ::=                    ENUMERATED {
                                     pw50, pw60, pw70, pw80, pw85,
                                     pw90, pw95, pw99 }

PredefinedConfigIdentity ::=      INTEGER (0..15)

PredefinedConfigValueTag ::=      INTEGER (0..15)

PredefinedRB-Configuration ::=    SEQUENCE {
    srb-InformationList               SRB-InformationSetupList,
    rb-InformationList                RB-InformationSetupList
}

PreDefRadioConfiguration ::=      SEQUENCE {
    -- User equipment IEs
    re-EstablishmentTimer             Re-EstablishmentTimer,
    -- Radio bearer IEs
    predefinedRB-Configuration        PredefinedRB-Configuration,
    -- Transport channel IEs
    preDefTransChConfiguration        PreDefTransChConfiguration,
    -- Physical channel IEs
    preDefPhyChConfiguration          PreDefPhyChConfiguration
}

RAB-Info ::=                      SEQUENCE {
    rab-Identity                      RAB-Identity,
    cn-DomainIdentity                 CN-DomainIdentity,
    nas-Synchronisation-Indicator     NAS-Synchronisation-Indicator    OPTIONAL,
    re-EstablishmentTimer             Re-EstablishmentTimer
}
RAB-InformationList       ::=     SEQUENCE (SIZE (1..maxRABsetup)) OF
                                     RAB-Info

RAB-InformationReconfigList ::=   SEQUENCE (SIZE (1.. maxRABsetup)) OF
                                     RAB-InformationReconfig

RAB-InformationReconfig ::=       SEQUENCE {
    rab-Identity                      RAB-Identity,
    cn-DomainIdentity                 CN-DomainIdentity,
    nas-Synchronisation-Indicator     NAS-Synchronisation-Indicator
}

RAB-Info-Post ::=                     SEQUENCE {
    rab-Identity                      RAB-Identity,
    cn-DomainIdentity                 CN-DomainIdentity,
    nas-Synchronisation-Indicator     NAS-Synchronisation-Indicator    OPTIONAL
}
```

```
RAB-InformationSetup ::=            SEQUENCE {
    rab-Info                            RAB-Info,
    rb-InformationSetupList             RB-InformationSetupList
}

RAB-InformationSetup-r4 ::=         SEQUENCE {
    rab-Info                            RAB-Info,
    rb-InformationSetupList             RB-InformationSetupList-r4
}

RAB-InformationSetupList ::=        SEQUENCE (SIZE (1..maxRABsetup)) OF
                                        RAB-InformationSetup

RAB-InformationSetupList-r4 ::=     SEQUENCE (SIZE (1..maxRABsetup)) OF
                                        RAB-InformationSetup-r4

RB-ActivationTimeInfo ::=           SEQUENCE {
    rb-Identity                         RB-Identity,
    rlc-SequenceNumber                  RLC-SequenceNumber
}

RB-ActivationTimeInfoList ::=       SEQUENCE (SIZE (1..maxRB)) OF
                                        RB-ActivationTimeInfo

RB-COUNT-C-Information ::=          SEQUENCE {
    rb-Identity                         RB-Identity,
    count-C-UL                          COUNT-C,
    count-C-DL                          COUNT-C
}

RB-COUNT-C-InformationList ::=      SEQUENCE (SIZE (1..maxRBallRABs)) OF
                                        RB-COUNT-C-Information

RB-COUNT-C-MSB-Information ::=      SEQUENCE {
    rb-Identity                         RB-Identity,
    count-C-MSB-UL                      COUNT-C-MSB,
    count-C-MSB-DL                      COUNT-C-MSB
}

RB-COUNT-C-MSB-InformationList ::=  SEQUENCE (SIZE (1..maxRBallRABs)) OF
                                        RB-COUNT-C-MSB-Information

RB-Identity ::=                     INTEGER (1..32)

RB-IdentityList ::=                 SEQUENCE (SIZE (1..maxRB)) OF
                                        RB-Identity

RB-InformationAffected ::=          SEQUENCE {
    rb-Identity                         RB-Identity,
    rb-MappingInfo                      RB-MappingInfo
}

RB-InformationAffectedList ::=      SEQUENCE (SIZE (1..maxRB)) OF
                                        RB-InformationAffected

RB-InformationReconfig ::=          SEQUENCE {
    rb-Identity                         RB-Identity,
    pdcp-Info                           PDCP-InfoReconfig            OPTIONAL,
    rlc-Info                            RLC-Info                     OPTIONAL,
    rb-MappingInfo                      RB-MappingInfo               OPTIONAL,
    rb-StopContinue                     RB-StopContinue            OPTIONAL
}

RB-InformationReconfig-r4 ::=       SEQUENCE {
    rb-Identity                         RB-Identity,
    pdcp-Info                           PDCP-InfoReconfig-r4         OPTIONAL,
    rlc-Info                            RLC-Info                     OPTIONAL,
    rb-MappingInfo                      RB-MappingInfo               OPTIONAL,
    rb-StopContinue                     RB-StopContinue              OPTIONAL
}

RB-InformationReconfigList ::=      SEQUENCE (SIZE (1..maxRB)) OF
                                        RB-InformationReconfig

RB-InformationReconfigList-r4 ::=   SEQUENCE (SIZE (1..maxRB)) OF
                                        RB-InformationReconfig-r4

RB-InformationReleaseList ::=       SEQUENCE (SIZE (1..maxRB)) OF
                                        RB-Identity

RB-InformationSetup ::=             SEQUENCE {
    rb-Identity                         RB-Identity,
```

```
    pdcp-Info                       PDCP-Info                       OPTIONAL,
    rlc-Info                        RLC-Info,
    rb-MappingInfo                  RB-MappingInfo
}

RB-InformationSetup-r4 ::=          SEQUENCE {
    rb-Identity                     RB-Identity,
    pdcp-Info                       PDCP-Info-r4                    OPTIONAL,
    rlc-Info                        RLC-Info,
    rb-MappingInfo                  RB-MappingInfo
}

RB-InformationSetupList ::=         SEQUENCE (SIZE (1..maxRBperRAB)) OF
                                    RB-InformationSetup

RB-InformationSetupList-r4 ::=      SEQUENCE (SIZE (1..maxRBperRAB)) OF
                                    RB-InformationSetup-r4

RB-MappingInfo ::=                  SEQUENCE (SIZE (1..maxRBMuxOptions)) OF
                                    RB-MappingOption

RB-MappingOption ::=                SEQUENCE {
    ul-LogicalChannelMappings       UL-LogicalChannelMappings       OPTIONAL,
    dl-LogicalChannelMappingList    DL-LogicalChannelMappingList    OPTIONAL
}

RB-StopContinue ::=                 ENUMERATED {
                                    stopRB, continueRB }

RB-WithPDCP-Info ::=                SEQUENCE {
    rb-Identity                     RB-Identity,
    pdcp-SN-Info                    PDCP-SN-Info
}

RB-WithPDCP-InfoList ::=            SEQUENCE (SIZE (1..maxRBallRABs)) OF
                                    RB-WithPDCP-Info

ReceivingWindowSize ::=             ENUMERATED {
                                    rw1, rw8, rw16, rw32, rw64, rw128, rw256,
                                    rw512, rw768, rw1024, rw1536, rw2047,
                                    rw2560, rw3072, rw3584, rw4095 }

RFC2507-Info ::=                    SEQUENCE {
    f-MAX-PERIOD                    INTEGER (1..65535)              DEFAULT 256,
    f-MAX-TIME                      INTEGER (1..255)                DEFAULT 5,
    max-HEADER                      INTEGER (60..65535)             DEFAULT 168,
    tcp-SPACE                       INTEGER (3..255)                DEFAULT 15,
    non-TCP-SPACE                   INTEGER (3..65535)              DEFAULT 15,
    expectReordering                ExpectReordering
    -- TABULAR: The IE above has only two possible values, so using Optional or Default
    -- would be wasteful
}

RFC3095-ROHC-Info ::=               SEQUENCE {
    max-CID                         INTEGER (1..16383)              DEFAULT 15,
    rohcProfileList                 ROHC-ProfileList,
    mrru                            INTEGER (1..65535)              DEFAULT 0,
    rohcPacketSizeList              ROHC-PacketSizeList,
    reverseDecompressionDepth       INTEGER (0..65535)              DEFAULT 0
}

RLC-Info ::=                        SEQUENCE {
    ul-RLC-Mode                     UL-RLC-Mode                     OPTIONAL,
    dl-RLC-Mode                     DL-RLC-Mode                     OPTIONAL
}

RLC-SequenceNumber ::=              INTEGER (0..4095)

RLC-SizeInfo    ::=                 SEQUENCE {
    rlc-SizeIndex                   INTEGER (1..maxTF)
}

RLC-SizeExplicitList    ::=         SEQUENCE (SIZE (1..maxTF)) OF
                                    RLC-SizeInfo

ROHC-ProfileList ::=                SEQUENCE (SIZE (1..maxROHC-Profile)) OF
                                    ROHC-Profile

ROHC-PacketSize                     INTEGER (2..1500)

ROHC-PacketSizeList::=              SEQUENCE (SIZE (1..maxROHC-Profile)) OF
                                    ROHC-PacketSizeList
```

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```
SRB-InformationSetup ::=         SEQUENCE {
    rb-Identity                      RB-Identity                       OPTIONAL,
    -- The default value for the IE above is the smallest value not used yet.
    rlc-Info                         RLC-Info,
    rb-MappingInfo                   RB-MappingInfo
}

SRB-InformationSetupList ::=     SEQUENCE (SIZE (1..maxSRBsetup)) OF
                                     SRB-InformationSetup

SRB-InformationSetupList2 ::=    SEQUENCE (SIZE (3..4)) OF
                                     SRB-InformationSetup

TimerDiscard ::=                 ENUMERATED {
                                     td0-1, td0-25, td0-5, td0-75,
                                     td1, td1-25, td1-5, td1-75,
                                     td2, td2-5, td3, td3-5, td4,
                                     td4-5, td5, td7-5 }

TimerEPC ::=                     ENUMERATED {
                                     te50, te60, te70, te80, te90,
                                     te100, te120, te140, te160, te180,
                                     te200, te300, te400, te500, te700,
                                     te900 }

TimerMRW ::=                     ENUMERATED {
                                     te50, te60, te70, te80, te90, te100,
                                     te120, te140, te160, te180, te200,
                                     te300, te400, te500, te700, te900 }

TimerPoll ::=                    ENUMERATED {
                                     tp10, tp20, tp30, tp40, tp50,
                                     tp60, tp70, tp80, tp90, tp100,
                                     tp110, tp120, tp130, tp140, tp150,
                                     tp160, tp170, tp180, tp190, tp200,
                                     tp210, tp220, tp230, tp240, tp250,
                                     tp260, tp270, tp280, tp290, tp300,
                                     tp310, tp320, tp330, tp340, tp350,
                                     tp360, tp370, tp380, tp390, tp400,
                                     tp410, tp420, tp430, tp440, tp450,
                                     tp460, tp470, tp480, tp490, tp500,
                                     tp510, tp520, tp530, tp540, tp550,
                                     tp600, tp650, tp700, tp750, tp800,
                                     tp850, tp900, tp950, tp1000 }

TimerPollPeriodic ::=            ENUMERATED {
                                     tper100, tper200, tper300, tper400,
                                     tper500, tper750, tper1000, tper2000 }

TimerPollProhibit ::=            ENUMERATED {
                                     tpp10, tpp20, tpp30, tpp40, tpp50,
                                     tpp60, tpp70, tpp80, tpp90, tpp100,
                                     tpp110, tpp120, tpp130, tpp140, tpp150,
                                     tpp160, tpp170, tpp180, tpp190, tpp200,
                                     tpp210, tpp220, tpp230, tpp240, tpp250,
                                     tpp260, tpp270, tpp280, tpp290, tpp300,
                                     tpp310, tpp320, tpp330, tpp340, tpp350,
                                     tpp360, tpp370, tpp380, tpp390, tpp400,
                                     tpp410, tpp420, tpp430, tpp440, tpp450,
                                     tpp460, tpp470, tpp480, tpp490, tpp500,
                                     tpp510, tpp520, tpp530, tpp540, tpp550,
                                     tpp600, tpp650, tpp700, tpp750, tpp800,
                                     tpp850, tpp900, tpp950, tpp1000 }

TimerRST ::=                     ENUMERATED {
                                     tr50, tr100, tr150, tr200, tr250, tr300,
                                     tr350, tr400, tr450, tr500, tr550,
                                     tr600, tr700, tr800, tr900, tr1000 }

TimerStatusPeriodic ::=          ENUMERATED {
                                     tsp100, tsp200, tsp300, tsp400, tsp500,
                                     tsp750, tsp1000, tsp2000 }

TimerStatusProhibit ::=          ENUMERATED {
                                     tsp10,tsp20,tsp30,tsp40,tsp50,
                                     tsp60,tsp70,tsp80,tsp90,tsp100,
                                     tsp110,tsp120,tsp130,tsp140,tsp150,
                                     tsp160,tsp170,tsp180,tsp190,tsp200,
                                     tsp210,tsp220,tsp230,tsp240,tsp250,
                                     tsp260,tsp270,tsp280,tsp290,tsp300,
                                     tsp310,tsp320,tsp330,tsp340,tsp350,
                                     tsp360,tsp370,tsp380,tsp390,tsp400,
                                     tsp410,tsp420,tsp430,tsp440,tsp450,
```

```
SRB-InformationSetupList2 ::=    SEQUENCE
```

```
                                        tsp460,tsp470,tsp480,tsp490,tsp500,
                                        tsp510,tsp520,tsp530,tsp540,tsp550,
                                        tsp600,tsp650,tsp700,tsp750,tsp800,
                                        tsp850,tsp900,tsp950,tsp1000 }

TransmissionRLC-Discard ::=        CHOICE {
    timerBasedExplicit                 ExplicitDiscard,
    timerBasedNoExplicit               NoExplicitDiscard,
    maxDAT-Retransmissions             MaxDAT-Retransmissions,
    noDiscard                          MaxDAT
}

TransmissionWindowSize ::=         ENUMERATED {
                                        tw1, tw8, tw16, tw32, tw64, tw128, tw256,
                                        tw512, tw768, tw1024, tw1536, tw2047,
                                        tw2560, tw3072, tw3584, tw4095 }

UL-AM-RLC-Mode ::=                 SEQUENCE {
    transmissionRLC-Discard            TransmissionRLC-Discard,
    transmissionWindowSize             TransmissionWindowSize,
    timerRST                           TimerRST,
    max-RST                            MaxRST,
    pollingInfo                        PollingInfo
}

UL-LogicalChannelMapping ::=       SEQUENCE {
    -- TABULAR: UL-TransportChannelType contains TransportChannelIdentity as well.
    ul-TransportChannelType            UL-TransportChannelType,
    logicalChannelIdentity             LogicalChannelIdentity          OPTIONAL,
    rlc-SizeList                       CHOICE {
        allSizes                           NULL,
        configured                         NULL,
        explicitList                       RLC-SizeExplicitList
    },
    mac-LogicalChannelPriority         MAC-LogicalChannelPriority
}

UL-LogicalChannelMappingList ::=   SEQUENCE {
    rlc-LogicalChannelMappingIndicator BOOLEAN,
    ul-LogicalChannelMapping           SEQUENCE (SIZE (maxLoCHperRLC)) OF
                                       UL-LogicalChannelMapping
}

UL-LogicalChannelMappings ::=      CHOICE {
    oneLogicalChannel                  UL-LogicalChannelMapping,
    twoLogicalChannels                 UL-LogicalChannelMappingList
}

UL-RLC-Mode ::=                    CHOICE {
    ul-AM-RLC-Mode                     UL-AM-RLC-Mode,
    ul-UM-RLC-Mode                     UL-UM-RLC-Mode,
    ul-TM-RLC-Mode                     UL-TM-RLC-Mode,
    spare                              NULL
}

UL-TM-RLC-Mode ::=                 SEQUENCE {
    transmissionRLC-Discard            TransmissionRLC-Discard          OPTIONAL,
    segmentationIndication             BOOLEAN
}

UL-UM-RLC-Mode ::=                 SEQUENCE {
    transmissionRLC-Discard            TransmissionRLC-Discard          OPTIONAL

}

UL-TransportChannelType ::=        CHOICE {
    dch                                TransportChannelIdentity,
    rach                               NULL,
    cpch                               NULL,
    usch                               NULL
}
```