TSG-RAN Meeting #13 *RP-010545*
Beijing, China, 18 - 21 September 2001

Title: **Agreed CRs (Release '99 and Rel-4 category A) to TS 25.331 (2)**

Source: **TSG-RAN WG2**

Agenda item: **8.2.3**

Doc-1st-	Status-	Spec	CR	Rev	Phase	Subject	Cat	Version	Versio
R2-012179	agreed	25.331	0925	2	R99	Intra-frequency measurements	F	3.7.0	3.8.0
R2-012180	agreed	25.331	0926		Rel-4	Intra-frequency measurements	A	4.1.0	4.2.0
R2-012078	agreed	25.331	0927	1	R99	Multiplexing configuration corrections	F	3.7.0	3.8.0
R2-012079	agreed	25.331	0928		Rel-4	Multiplexing configuration corrections	A	4.1.0	4.2.0
R2-012076	agreed	25.331	0929	1	R99	Reception of non-dedicated control channels mapped on FACH in CELL_FACH state	F	3.7.0	3.8.0
R2-012077	agreed	25.331	0930		Rel-4	Reception of non-dedicated control channels mapped on FACH in CELL_FACH state	A	4.1.0	4.2.0
R2-011840	agreed	25.331	0931		R99	Removal of C-RNTI when entering CELL_DCH	F	3.7.0	3.8.0
R2-012075	agreed	25.331	0932		Rel-4	Removal of C-RNTI when entering CELL_DCH	A	4.1.0	4.2.0
R2-012154	agreed	25.331	0934	1	R99	TF and TFC set definition	F	3.7.0	3.8.0
R2-012190	agreed	25.331	0935		Rel-4	TF and TFC set definition	A	4.1.0	4.2.0
R2-012080	agreed	25.331	0936	1	R99	Correction of remaining ASN.1/Tabular inconsistencies	F	3.7.0	3.8.0
R2-012081	agreed	25.331	0937		Rel-4	Correction of remaining ASN.1/Tabular inconsistencies	A	4.1.0	4.2.0
R2-012082	agreed	25.331	0938	1	R99	CPICH Ec/N0 Range	F	3.7.0	3.8.0
R2-012083	agreed	25.331	0939		Rel-4	CPICH Ec/N0 Range	A	4.1.0	4.2.0
R2-012084	agreed	25.331	0940	1	R99	Priorities for IDNNS coding	F	3.7.0	3.8.0
R2-012085	agreed	25.331	0941		Rel-4	Priorities for IDNNS coding	A	4.1.0	4.2.0
R2-012086	agreed	25.331	0942	1	R99	Dedicated pilots and S-CPICH specification related to UE specific beamforming	F	3.7.0	3.8.0
R2-012087	agreed	25.331	0943		Rel-4	Dedicated pilots and S-CPICH specification related to UE specific beamforming	A	4.1.0	4.2.0
R2-012032	agreed	25.331	0944	1	R99	Security corrections	F	3.7.0	3.8.0
R2-012182	agreed	25.331	0945		Rel-4	Security corrections	A	4.1.0	4.2.0

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Tdoc R2-012179

CR-Form-v4

CHANGE REQUEST

⌘ **25.331 CR 925** ⌘ ev **r2** ⌘ Current version: **3.7.0** ⌘

*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:	⌘	Intra-frequency measurement corrections
Source:	⌘	TSG-RAN WG2
Work item code:	⌘	TEI
Date:	⌘	2001-08-21
Category:	⌘	**F**
Release:	⌘	R99

Use one of the following categories:
F *(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 one 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: ⌘ Some inconsistencies in the description of the events needed to be corrected. The use of the variables "TRIGGERED_1A_EVENT"… needed also to be clarified in case several 1a… events are configured.

Summary of change: ⌘
- Introduction of new IE "Periodical Reporting running" in TRIGGERED_1A_EVENT and TRIGGERED_1C_EVENT to describe that during periodical reporting phase no further reports are to be sent due to trigger
- Clarification on inclusion of elements in "intra-frequency measurement event results"
- 10.3.7.38: UTRA carrier RSSI cannot be used as measurement quantity in any of the 1x events. It is therefore proposed not to allow for it to be specified as measurement quantity when configuring an intra-frequency measurement.
- 13.4.27a-13.4.27b: it is clarified that there is one variable of type "TRIGGERED_1A_EVENT" per 1a event configured in the UE. The singular form was used instead of the plural in the names of the variables, since such a variable contains information related to one configured event.
- 14.1.1: Ec/Io is said to be a measurement quantity, while in the tabular, as well as in 25.215, 25.225, Ec/No is the measurement quantity that is considered. The text is changed, and a reference to those two specifications is added regarding the description of the measurement quantities.
- 14.1.2.1, 14.1.2.2, 14.1.2.3, 14.1.2.5, 14.1.2.6: in the leaving triggering conditions, the ≥ (resp. ≤) are changed to > (resp. <), in order for those conditions to be the exact complementary of the triggering conditions.
- 14.1.2.1 and 14.1.2.3: at two places, it reads "reporting interval" where it should read "amount of reporting". This is corrected. Moreover, the text "if the value of "Reporting deactivations threshold" for this event is greater than the current number of cells in the active set or equal to 0" is changed to "if the value of "Reporting deactivations threshold"

		for this event is greater or equal to the current number of cells in the active set or equal to 0" since otherwise the case where "Reporting deactivation threshold" is equal to 1 would not make sense. · 14.1.2.3: it reads "if the value of "Replacement activation threshold" for this event is lower than the current number of cells in the active set or equal to 0". This is in contradiction with the text below the figure in the same section: "It is activated if the number of active cells is equal to or greater than a **replacement activation threshold** parameter that UTRAN signals to the UE in the MEASUREMENT CONTROL message". A correction is proposed to make the text consistent. · 14.1.6: the section is updated to reflect what are the values that can be reported by the UE in an intra-frequency measurement. This CR has an isolated impact on intra-frequency measurement reporting. Correction to a function where the specification was not sufficiently explicit. Would not affect implementations behaving like indicated in the CR, would affect implementations supporting the corrected functionality otherwise.
Consequences if not approved:	⌘	Inconsistencies in the text describing the 1x events.

Clauses affected:	⌘	10.3.7.38, 10.3.7.39, 11.3, 13.4.27a, 13.4.27b, 13.4.27c, 13.4.27d, 13.4.27e, 13.4.27f, 14.1.1, 14.1.2, 14.1.2.1, 14.1.2.2, 14.1.2.3, 14.1.2.4, 14.1.2.5, 14.1.2.6, 14.1.4, 14.1.5, 14.1.5.3, 14.1.6		
Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ O&M Specifications	⌘	25.331 v4.1.0, CR 926
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://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 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.

10.3.7.38 Intra-frequency measurement quantity

The quantity the UE shall measure in case of intra-frequency measurement. It also includes the filtering of the measurements.

Information Element/Group name	Need	Multi	Type and reference	Semantics description
Filter coefficient	MP		Filter coefficient 10.3.7.9	
CHOICE *mode*	MP			
>FDD				
>>Measurement quantity	MP		Enumerated(CPICH Ec/N0, CPICH RSCP, Pathloss, UTRA Carrier RSSI)	~~If used in Inter system measurement quantity only Ec/N0 and RSCP is allowed. If used in inter-frequency m~~Measurement quantity ~~RSSI is not allowed~~ in this ~~release.~~
>TDD				
>>Measurement quantity list	MP	1 to 4		
>>>Measurement quantity	MP		Enumerated(Primary CCPCH RSCP, Pathloss, Timeslot ISCP, UTRA Carrier RSSI)	~~If used in inter-frequency measurement quantity RSSI is not allowed.~~

10.3.7.39 Intra-frequency measurement reporting criteria

The triggering of the event-triggered reporting for an intra-frequency measurement. All events concerning intra-frequency measurements are labelled 1x where x is a, b, c….
Event 1a: A Primary CPICH enters the Reporting Range (FDD only).
Event 1b: A Primary CPICH leaves the Reporting Range (FDD only).
Event 1c: A Non-active Primary CPICH becomes better than an active Primary CPICH (FDD only).
Event 1d: Change of best cell ~~[Note 1]~~ (FDD only).
Event 1e: A Primary CPICH becomes better than an absolute threshold (FDD only).
Event 1f: A Primary CPICH becomes worse than an absolute threshold (FDD only).
Event 1g: Change of best cell in TDD.
Event 1h: Timeslot ISCP below a certain threshold (TDD only).
Event 1i: Timeslot ISCP above a certain threshold (TDD only).

Information Element/Group name	Need	Multi	Type and reference	Semantics description
Parameters required for each event	OP	1 to <maxMeasEvent>		
>Intra-frequency event identity	MP		Intra-frequency event identity 10.3.7.34	
>Triggering condition 1	CV–*clause 0*		Enumerated(Active set cells, Monitored set cells, Active set cells and monitored set cells)	Indicates which cells can trigger the event
>Triggering condition 2	CV–*clause 6*		Enumerated(Active set cells, Monitored set cells, Active set cells and monitored set cells, Detected set cells, Detected set cells and monitored set cells)	Indicates which cells can trigger the event
>Reporting Range Constant	CV–*clause 2*		Real(0..14.5 by step of 0.5)	In dB. In event 1a,1b.
>Cells forbidden to affect Reporting range	CV–*clause 1*	1 to <maxCellMeas>		In event 1a,1b
>>CHOICE *mode*	MP			
>>>FDD				
>>>>Primary CPICH info	MP		Primary CPICH info 10.3.6.60	
>>>TDD				
>>>>Primary CCPCH info	MP		Primary CCPCH info 10.3.6.57	
>W	CV–*clause 2*		Real(0.0..2.0 by step of 0.1)	
>Hysteresis	MP		Real(0..7.5 by step of 0.5)	In dB.
>Threshold used frequency	CV-*clause 3*		Integer (-115..165)	Range used depend on measurement quantity. CPICH RSCP -115..-25 dBm CPICH Ec/No -24..0 dB Pathloss 30..165dB ISCP -115..-25 dBm

Information Element/Group name	Need	Multi	Type and reference	Semantics description
>Reporting deactivation threshold	CV–*clause 4*		Integer(0, 1, 2, 3, 4, 5, 6, 7)	In event 1a Indicates the maximum number of cells allowed in the active set in order for event 1a to occur. 0 means not applicable .
>Replacement activation threshold	CV-*clause 5*		Integer(0, 1, 2, 3, 4, 5, 6, 7)	In event 1c Indicates the minimum number of cells allowed in the active set in order for event 1c to occur. 0 means not applicable
>Time to trigger	MP		Time to trigger 10.3.7.64	Indicates the period of time between the timing of event detection and the timing of sending Measurement Report. Time in ms
>Amount of reporting	CV–*clause 7*		Integer(1, 2, 4, 8, 16, 32, 64, Infinity)	
>Reporting interval	CV–*clause 7*		Integer(0, 250, 500, 1000, 2000, 4000, 8000, 16000)	Indicates the interval of periodical reporting when such reporting is triggered by an event. Interval in milliseconds. 0 means no periodical reporting
>Reporting cell status	OP		Reporting cell status 10.3.7.61	

Condition	Explanation
Clause 0	The IE is mandatory if "Intra-frequency event identity" is set to "1b" or "1f", otherwise the IE is not needed
Clause 1	The IE is optional if "Intra-frequency event identity" is set to "1a" or "1b", otherwise the IE is not needed
Clause 2	The IE is mandatory if "Intra-frequency event identity" is set to "1a" or "1b", otherwise the IE is not needed
Clause 3	The IE is mandatory if "Intra-frequency event identity" is set to , "1e", "1f", "1h" or "1i", otherwise the IE is not needed
Clause 4	The IE is mandatory if "Intra-frequency event identity" is set to "1a", otherwise the IE is not needed
Clause 5	The IE is mandatory if "Intra-frequency event identity" is set to "1c", otherwise the IE is not needed
Clause 6	The IE is mandatory if "Intra-frequency event identity" is set to "1a" or "1e".
Clause 7	The IE is mandatory if "Intra-frequency event identity" is set to "1a" or "1c".

11.3 Information element definitions

```
IntraFreqMeasQuantity-FDD ::=       ENUMERATED {
                                        cpich-Ec-N0,
                                        cpich-RSCP,
                                        pathloss,
                                        utra-CarrierRSSI }

-- If used in InterRATMeasQuantity only cpich-Ec-N0 and cpich-RSCP is
-- allowed.
-- If used in InterFreqMeasQuantity utra-CarrierRSSI is not allowed.

IntraFreqMeasQuantity-TDD ::=       ENUMERATED {
                                        primaryCCPCH-RSCP,
                                        pathloss,
                                        timeslotISCP,
                                        utra-CarrierRSSI }
-- If used in InterFreqMeasQuantity utra-CarrierRSSI is not allowed.
```

13.4.27a TRIGGERED_1A_EVENTS

This variable contains information about a 1a events that hasve been triggered in the UE. There is one such variable per 1a event configured in the UE.

Information Element/Group name	Need	Multi	Type and reference	Semantics description
Cells triggered	OP	1 to < maxCellMeas>		
>primary CPICH	MP		Primary CPICH info 10.3.6.60	
>sent reports	MP		Integer(1..Infinity)	Number of reports sent to UTRAN in case of event triggered periodical reporting
Cells recently triggered	OP	1 to < maxCellMeas>		
>primary CPICH	MP		Primary CPICH info 10.3.6.60	
>sent reports	MP		Integer(1..Infinity)	Number of reports sent to UTRAN in case of event triggered periodical reporting
Periodical reporting running	MP		Boolean	

13.4.27b TRIGGERED_1B_EVENTS

This variable contains information about a 1b events that hasve been triggered in the UE. There is one such variable per 1b event configured in the UE.

Information Element/Group name	Need	Multi	Type and reference	Semantics description
Cells triggered	OP	1 to < maxCellMeas>		
>primary CPICH	MP		Primary CPICH info 10.3.6.60	
Cells recently triggered	OP	1 to < maxCellMeas>		
>primary CPICH	MP		Primary CPICH info 10.3.6.60	

13.4.27c TRIGGERED_1C_EVENTS

This variable contains information about a 1b events that hasve been triggered in the UE. There is one such variable per 1c event configured in the UE.

Information Element/Group name	Need	Multi	Type and reference	Semantics description
Cells triggered	OP	1 to < maxCellMeas>		
>primary CPICH	MP		Primary CPICH info 10.3.6.60	
>sent reports	MP		Integer(1..Infinity)	Number of reports sent to UTRAN in case of event triggered periodical reporting

13.4.27d BEST_CELL_1D_EVENT

This variable contains information about a 1d events that hasve been triggered in the UE. There is one such variable per 1d event configured in the UE.

Information Element/Group name	Need	Multi	Type and reference	Semantics description
Best cell	MP		Primary CPICH info 10.3.6.60	

13.4.27e TRIGGERED_1E_EVENTS

This variable contains information about a 1e events that hasve been triggered in the UE. There is one such variable per 1e event configured in the UE.

Information Element/Group name	Need	Multi	Type and reference	Semantics description
Cells triggered	OP	1 to < maxCellMeas>		
>primary CPICH	MP		Primary CPICH info 10.3.6.60	
Cells recently triggered	OP	1 to < maxCellMeas>		
>primary CPICH	MP		Primary CPICH info 10.3.6.60	

13.4.27f TRIGGERED_1F_EVENTS

This variable contains information about a 1f events that hasve been triggered in the UE. There is one such variable per 1f event configured in the UE.

Information Element/Group name	Need	Multi	Type and reference	Semantics description
Cells triggered	OP	1 to < maxCellMeas>		
>primary CPICH	MP		Primary CPICH info 10.3.6.60	
Cells recently triggered	OP	1 to < maxCellMeas>		
>primary CPICH	MP		Primary CPICH info 10.3.6.60	

14.1 Intra-frequency measurements

14.1.1 Intra-frequency measurement quantities

A measurement quantity is used to evaluate whether an intra-frequency event has occurred or not. It can be:

1 Downlink E_c/N_0 ~~E_c/I_0 (chip energy per total received channel power density)~~.

2 Downlink path loss.

For FDD:
Pathloss in dB = Primary CPICH Tx power - CPICH RSCP.

For Primary CPICH Tx power the IE "Primary CPICH Tx power" shall be used. The unit is dBm.

CPICH RSCP is the result of the CPICH RSCP measurement. The unit is dBm.

For TDD:
Pathloss in dB = Primary CCPCH TX power - Primary CCPCH RSCP.

For Primary CCPCH TX power the IE "Primary CCPCH TX Power" shall be used. The unit is dBm.

Primary CCPCH RSCP is the result of the Primary CCPCH RSCP measurement. The unit is dBm.

If necessary Pathloss shall be rounded up to the next higher integer.
Results higher than 158 shall be reported as 158.
Results lower than 46 shall be reported as 46.

3 Downlink received signal code power (RSCP) after despreading.

4 ISCP measured on Timeslot basis.

A description of those values can be found in [7] and [8].

14.1.2 Intra-frequency reporting events for FDD

Within the measurement reporting criteria field in the Measurement Control message the UTRAN notifies the UE which events should trigger a measurement report. The listed events are the toolbox from which the UTRAN can choose the reporting events that are needed for the implemented handover evaluation function, or other radio network functions.

All the ~~illustrated~~ specified events are measured with respect to any of the measurement quantities given in subclause 14.1.1. The measurement ~~objects~~quantities are measured on ~~are~~ the monitored primary common pilot channels (CPICH) of the cell defined in the measurement object.

Special mechanisms for the events are illustrated in section 14.1.4 and 14.1.5.

NOTE: The events below are numbered 1A, 1B, 1C,… since all intra-frequency reporting events would be labelled 1X, inter-frequency reporting events would be labelled 2X, and so on for the other measurement types.

14.1.2.1 Reporting event 1A: A Primary CPICH enters the reporting range

When event 1A is configured in the UE, the UE shall:

- if "Measurement quantity" is "pathloss" and Equation 1 below is fulfilled for ~~a~~one or more primary CPICH~~s~~, or if "Measurement quantity" is "CPICH Ec/N0" or "CPICH RSCP", and Equation 2 below is fulfilled for ~~a~~one or more primary CPICH~~s~~ do the following for each of these primary CPICHs:
  - if the equations have been fulfilled during the time "Time to trigger", and if that primary CPICH is part of cells allowed to trigger the event according to "Triggering condition 2", and if that primary CPICH is not included in the "cells triggered" in the variable TRIGGERED_1A_EVENT~~S~~:
    - include that primary CPICH in the "cells recently triggered" in the variable TRIGGERED_1A_EVENT~~S~~;

- if the value of "Reporting deactivations threshold" for this event is greater than or equal to~~than~~ the current number of cells in the active set or equal to 0 and any primary CPICHs are stored in the "cells recently triggered" in the variable TRIGGERED_1A_EVENT:
  - if "Reporting interval" for this event is not equal to 0:
    - if the IE "Periodical reporting running" in the variable TRIGGERED_1A_EVENT is set to FALSE
      - start a timer ~~for that primary CPICH~~ with the value of "Reporting interval" for this event;
    - set "sent reports" for ~~that~~ the primary CPICH~~s~~ in "cells recently triggered" in the variable TRIGGERED_1A_EVENT~~S~~ to 1;
    - send a measurement report with IEs set as below:
      - in "intra-frequency measurement event results": "Intrafrequency event identity" to "1a" and in "cell measurement event results"~~the first entry to the IE "Primary CPICH info" of the primary CPICH that triggered the report; and~~
        - ~~include this for each 1a event that is triggered without a report being sent;~~all entries of the "cells recently triggered" in the variable TRIGGERED_1A_EVENT that are not part of the active set in descending order according to the configured measurement quantity
      - the IE "measured results" and ~~possible~~ the IE "additional measured results" according to 8.4.2;
    - move all entries from "cells recently triggered" to "cells triggered" in the variable TRIGGERED_1A_EVENT

- if the timer for ~~that primary CPICH in the variable TRIGGERED_1A_EVENT~~the periodical reporting has expired:

  - if ~~that~~any primary CPICH is included in the "cells triggered" in the variable TRIGGERED_1A_EVENT~~S~~, and not included in the current active set:

    - if "Reporting interval" for this event is not equal to 0, and if ~~"Reporting interval~~ "Amount of reporting" is greater ~~larger~~ than "sent reports" stored for ~~that~~any of these primary CPICH~~s~~, in "cells triggered" in the variable TRIGGERED_1A_EVENT~~S~~; and

    ~~- and if the timer for that primary CPICH in the variable TRIGGERED_1A_EVENTS has expired:~~

      - increment the stored counter "sent reports" for ~~that~~all CPICH in "cell triggered" in variable TRIGGERED_1A_EVENT~~S~~;

      - start a timer ~~for that primary CPICH~~ with the value of "Reporting interval" for this event;

      - send a measurement report with IEs set as below:

        - in "intra-frequency measurement event results": "Intrafrequency event identity" to "1a" and in "cell measurement event results"~~ to the CPICH info of the primary CPICH that triggered the report; and~~:

          - include all entries of the variable TRIGGERED_1A_EVENT with value of IE "sent reports" smaller than value of "Amount of reporting" that are not part of the active set in descending order according to the configured measurement quantity ~~this for each 1a event that is triggered without a report being sent;~~

        - increment the value of the IE " sent reports" for all entries in the variable TRIGGERED_1A_events

        - the IE "measured results" and ~~possible~~the IE "additional measured results" according to 8.4.2;

        - if "sent reports" in variable TRIGGERED_1A_EVENT is greater than "Amount of reporting" for all entries

          - set the IE "Periodical Reporting running" in the variable TRIGGERED_1A_EVENT to FALSE and disable the timer for the periodical reporting

- if "Measurement quantity" is "pathloss" and Equation 3 below is fulfilled for a primary CPICH, or if "Measurement quantity" is "CPICH Ec/N0" or "CPICH RSCP", and Equation 4 below is fulfilled for a primary CPICH:

  - if that primary CPICH is included in the "cells triggered" in the variable TRIGGERED_1A_EVENT~~S~~:

    - remove the entry of that primary CPICH ~~and sent reports~~ from "cells triggered" in the variable TRIGGERED_1A_EVENT~~S~~;

    - if no entry in the variable TRIGGERED_1A_EVENT has a value of "sent reports" smaller than "Amount of reporting"

      - stop the reporting interval timer~~s related to that primary CPICH.~~

- set the IE “Periodical reporting running” in the variable TRIGGERED_1A_EVENT to FALSE

Upon transition to CELL_DCH the UE shall:

- Include the primary CPICH of all cells in the current active set into the "cells triggered" in the variable TRIGGERED_1A_EVENTS.

Equation 1 (Triggering condition for pathloss)

$$10 \cdot LogM_{New} \leq W \cdot 10 \cdot Log\left(1/\sum_{i=1}^{N_A}(1/M_i)\right) + (1-W) \cdot 10 \cdot LogM_{Best} + (R_{1a} - H_{1a}/2),$$

Equation 2 (Triggering condition for all the other measurement quantities)

$$10 \cdot LogM_{New} \geq W \cdot 10 \cdot Log\left(\sum_{i=1}^{N_A} M_i\right) + (1-W) \cdot 10 \cdot LogM_{Best} - (R_{1a} - H_{1a}/2),$$

Equation 3 (Leaving triggering condition for pathloss)

$$10 \cdot LogM_{New} > W \cdot 10 \cdot Log\left(1/\sum_{i=1}^{N_A}(1/M_i)\right) + (1-W) \cdot 10 \cdot LogM_{Best} + (R_{1a} + H_{1a}/2),$$ [≥ in the formula changed to >]

Equation 4 (Leaving triggering condition for all the other measurement quantities)

$$10 \cdot LogM_{New} < W \cdot 10 \cdot Log\left(\sum_{i=1}^{N_A} M_i\right) + (1-W) \cdot 10 \cdot LogM_{Best} - (R_{1a} + H_{1a}/2),$$ [≤ in the formula changed to <]

The variables in the formula are defined as follows:

$\boldsymbol{M_{New}}$ is the measurement result of the cell entering the reporting range.

$\boldsymbol{M_i}$ is a measurement result of a cell in the active set.

$\boldsymbol{N_A}$ is the number of cells in the current active set.

For pathloss

$\boldsymbol{M_{Best}}$ is the measurement result of the cell in the active set with the lowest measurement result.

for other measurements quantities.

$\boldsymbol{M_{Best}}$ is the measurement result of the cell in the active set with the highest measurement result.

$\boldsymbol{W}$ is a parameter sent from UTRAN to UE.

$\boldsymbol{R_{1a}}$ is the reporting range constant.

$\boldsymbol{H_{1a}}$ is the hysteresis parameter for the event 1a.

If the measurement results are pathloss or CPICH-Ec/No then $\boldsymbol{M_{New}}$, $\boldsymbol{M_i}$ and $\boldsymbol{M_{Best}}$ are expressed as ratios.

If the measurement result is CPICH-RSCP then $\boldsymbol{M_{New}}$, $\boldsymbol{M_i}$ and $\boldsymbol{M_{Best}}$ are expressed in [mW].

~~The addition window of cells in event 1A is configured with the **reporting range constant** parameter ($\boldsymbol{R_{1a}}$) with an additional **hysteresis** parameter ($\boldsymbol{H_{1a}}$).~~
~~The occurrence of event 1A is conditional on a **report deactivation threshold** parameter.~~
~~Event 1A may be enhanced with an addition timer, which is configured with the **time-to-trigger** parameter (see subclause 14.1.5.2). If a time-to-trigger value is used, a cell must continuously stay within the reporting range for the given time period, before the UE shall send a measurement report.~~
~~Event 1A may be used for triggering a measurement report, which includes cells, which the UE has detected without having received a neighbour cell list.~~

~~If more than one cell triggers event 1A within the UE internal event evaluation period (defined in [19]) and fulfils the reporting criteria after the addition timer has elapsed , the UE shall report all of the triggering cells in the event results. The triggering cells shall be sorted in descending order according to the measured quantity.~~

14.1.2.2 Reporting event 1B: A primary CPICH leaves the reporting range

When event 1B is configures in the UE, the UE shall:

- if "Measurement quantity" is "pathloss" and Equation 1 below is fulfilled for ~~a~~one or more primary CPICH, or if "Measurement quantity" is "CPICH Ec/N0" or "CPICH RSCP", and Equation 2 below is fulfilled for ~~a~~one or more primary CPICH~~s~~ do the following for each of these primary CPICHs:
  - if the equations have been fulfilled during the time "Time to trigger", and if that primary CPICH is part of cells allowed to trigger the event according to "Triggering condition 1", and if that primary CPICH is not included in the "cells triggered" in the variable TRIGGERED_1B_EVENT~~S~~:
    - include that primary CPICH in the "cells recently triggered" in the variable TRIGGERED_1B_EVENT~~S~~;

- if any primary CPICHs are stored in the "cells recently triggered" in the variable TRIGGERED_1B_EVENT
  - send a measurement report with IEs set as below:
    - in "intra-frequency measurement event results": "Intrafrequency event identity" to "1b" and "cell measurement event results" ~~to the CPICH info of the primary CPICH that triggered the report; and~~
    - ~~-~~ include all entries of “cells recently triggered” in the variable TRIGGERED_1B_EVENT that are part of the active set~~this for each 1b event that is triggered without a report being sent;~~
    - the IE "measured results" and ~~possible~~the IE "additional measured results" according to 8.4.2.
    - move all entries from IE “cells recently triggered” to “cells triggered” in the variable TRIGGERED_1B_EVENT

- if "Measurement quantity" is "pathloss" and Equation 3 below is fulfilled for a primary CPICH, or if "Measurement quantity" is "CPICH Ec/N0" or "CPICH RSCP", and Equation 4 below is fulfilled for a primary CPICH:
  - if that primary CPICH is included in the "cells triggered" in the variable TRIGGERED_1B_EVENT~~S~~:
    - remove the entry of that primary CPICH ~~and sent reports~~ from "cells triggered" in the variable TRIGGERED_1B_EVENT~~S~~;

Equation 1 (Triggering condition for pathloss)

$$10 \cdot LogM_{Old} \geq W \cdot 10 \cdot Log\left(1/\sum_{i=1}^{N_A}(1/M_i)\right) + (1-W) \cdot 10 \cdot LogM_{Best} + (R + H_{1b}/2),$$

Equation 2 (Triggering condition for all the other measurement quantities)

$$10 \cdot LogM_{Old} \leq W \cdot 10 \cdot Log\left(\sum_{i=1}^{N_A} M_i\right) + (1-W) \cdot 10 \cdot LogM_{Best} - (R + H_{1b}/2),$$

Equation 3 (Leaving triggering condition for pathloss)

$$10 \cdot LogM_{Old} < W \cdot 10 \cdot Log\left(1/\sum_{i=1}^{N_A} (1/M_i)\right) + (1-W) \cdot 10 \cdot LogM_{Best} + (R - H_{1b}/2),$$ [≤ in the formula changed to <]

Equation 4 (Leaving triggering condition for all the other measurement quantities)

$$10 \cdot LogM_{Old} > W \cdot 10 \cdot Log\left(\sum_{i=1}^{N_A} M_i\right) + (1-W) \cdot 10 \cdot LogM_{Best} - (R - H_{1b}/2),$$ [≥ in the formula changed to >]

The variables in the formula are defined as follows:

$\boldsymbol{M_{Old}}$ is the measurement result of the cell leaving the reporting range.

$\boldsymbol{M_i}$ is a measurement result of a cell in the active set.

$\boldsymbol{N_A}$ is the number of cells in the current active set.

For pathloss

$\boldsymbol{M_{Best}}$ is the measurement result of the cell in the active set with the lowest measurement result.

for other measurements quantities.

$\boldsymbol{M_{Best}}$ is the measurement result of the cell in the active set with the highest measurement result.

$\boldsymbol{W}$ is a parameter sent from UTRAN to UE.

$\boldsymbol{R_{1b}}$ ~~$\boldsymbol{a}$~~ is the reporting range constant.

$\boldsymbol{H_{1b}}$ is the hysteresis parameter for the event 1b.

If the measurement results are pathloss or CPICH-Ec/No then $\boldsymbol{M_{New}}$, $\boldsymbol{M_i}$ and $\boldsymbol{M_{Best}}$ are expressed as ratios.

If the measurement result is CPICH-RSCP then $\boldsymbol{M_{New}}$, $\boldsymbol{M_i}$ and $\boldsymbol{M_{Best}}$ are expressed in [mW].

~~The drop window of cells in event 1B is configured with the **reporting range constant** parameter ($\boldsymbol{R_{1b}}$) with an additional **hysteresis** parameter ($\boldsymbol{H_{1b}}$).~~
~~Event 1B may be enhanced with a drop timer, which is configured with the **time-to-trigger** parameter. If the timer is used, the weakening cell must continuously stay below the reporting range for the given time period before the UE may send a measurement report.~~
~~If more than one cell triggers event 1B within the UE internal event evaluation period (defined in [19]) and fulfils the reporting criteria after the drop timer has elapsed, the UE shall report all of the triggering cells in the event results. The triggering cells shall be sorted in descending order according to the measured quantity.~~

14.1.2.3 Reporting event 1C: A non-active primary CPICH becomes better than an active primary CPICH

When event 1C is configured in the UE, the UE shall:

- if "Measurement quantity" is "pathloss" and Equation 1 below is fulfilled for a primary CPICH, or if "Measurement quantity" is "CPICH Ec/N0" or "CPICH RSCP", and Equation 2 below is fulfilled for a primary CPICH:
  - if the equations have been fulfilled during the time "Time to trigger", and if the primary CPICH that is better is not included in the active set but the other primary CPICH is any of the primary

CPICHs included in the active set, and if that primary CPICH is not included in the "cells triggered" in the variable TRIGGERED_1C_EVENTS:

- include that primary CPICH in the "cells triggered" in the variable TRIGGERED_1C_EVENTS;
- if the value of "Replacement activation threshold" for this event is less ~~lower~~ than or equal to the current number of cells in the active set or equal to 0:
  - if "Reporting interval" for this event is not equal to 0:
    - start a timer for that primary CPICH with the value of "Reporting interval" for this event;
- set "sent reports" for that primary CPICH in the variable TRIGGERED_1C_EVENTS to 1;
- send a measurement report with IEs set as below:
  - in "intra-frequency measurement event results": "Intrafrequency event identity" to "1c" and in the first entry in "cell measurement event results" ~~to~~ the IE "Primary CPICH info" ~~of~~to the primary CPICH not in the active set that triggered the report; and
  - the second entry in "cell measurement event results" to the CPICH info of the primary CPICH in the active set that now is worse than the new primary CPICH and has the best measured value (lowest measured result for pathloss and highest measured result for other measurements); and
  - the rest of the entries to other primary CPICHs that are now worse than this new primary CPICH in the order of their measured value;
- the IE "measured results" and ~~possible~~ "additional measured results" according to 8.4.2;

- if that primary CPICH is included in the "cells triggered" in the variable TRIGGERED_1C_EVENTS, and not included in the current active set:
  - if "Reporting interval" for this event is not equal to 0, and if "~~Reporting interval~~ "Amount of reporting" is greater ~~larger~~ than "sent reports" stored for that primary CPICH, in "cells triggered" in the variable TRIGGERED_1C_EVENTS; and
    - if the timer for that primary CPICH in the variable TRIGGERED_1C_EVENTS has expired:
      - increment the stored counter "sent reports" for that CPICH in "cell triggered" in variable TRIGGERED_1C_EVENTS;
      - start a timer for that primary CPICH with the value of "Reporting interval" for this event;
      - send a measurement report with IEs set as below:
        - in "intra-frequency event results": "Intrafrequency event identity" to "1c" and the first entry in "cell measurement event results" to the CPICH info of the primary CPICH not in the active set that triggered the report; and
        - the second entry in "cell measurement event results" to the CPICH info of the primary CPICH in the active set that now is worse than the new primary CPICH and has the best measured value (lowest measured result for pathloss and highest measured result for other measurements); and

- the rest of the entries to other primary CPICHs that is now worse than this new primary CPICH in the order of their measured value;

- the IE "measured results" and ~~possible~~ "additional measured results" according to 8.4.2;

- if "Measurement quantity" is "pathloss" and Equation 3 below is fulfilled for a primary CPICH, or if "Measurement quantity" is "CPICH Ec/N0" or "CPICH RSCP", and Equation 4 below is fulfilled for a primary CPICH:

  - if that primary CPICH is included in the "cells triggered" in the variable TRIGGERED_1C_EVENT~~S~~:

    - remove that primary CPICH and sent reports from "cells triggered" in the variable TRIGGERED_1C_EVENT~~S~~;

    - stop the reporting interval timer~~s~~ related to that primary CPICH.

Equation 1 (Triggering condition for pathloss)

$$M_{New} \leq M_{InAS} - H_{1c}/2,$$

Equation 2 (Triggering condition for all the other measurement quantities)

$$M_{New} \geq M_{InAS} + H_{1c}/2,$$

Equation 3 (Leaving triggering condition for pathloss)

$$M_{New} > M_{InAS} + H_{1c}/2,$$ [≥ in the formula changed to >]

Equation 4 (Leaving triggering condition for all the other measurement quantities)

$$M_{New} < M_{InAS} - H_{1c}/2,$$ [≤ in the formula changed to <]

The variables in the formula are defined as follows:

$\boldsymbol{M_{New}}$ is the measurement result of the cell not included in the active set.

$\boldsymbol{M_{InAS}}$ is the measurement result of a cell in the active set.

$\boldsymbol{H_{1c}}$ is the hysteresis parameter for the event 1c.

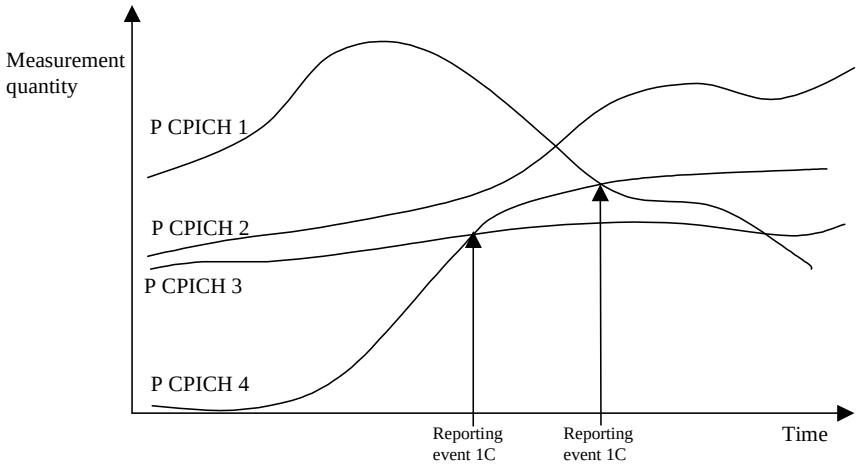

Figure 63: A primary CPICH that is not included in the active set becomes better than a primary CPICH that is in the active set

In this example the cells belonging to primary CPICH 1, 2 and 3 are supposed to be in the active set, but the cell transmitting primary CPICH 4 is not (yet) in the active set.

~~If a primary CPICH that is not included in the active set becomes better than a primary CPICH that is in the active set, and event 1C has been ordered by UTRAN, this event shall trigger a report to be sent from the UE.~~

~~This event may be used for replacing cells in the active set. It is activated if the number of active cells is equal to or greater than a **replacement activation threshold** parameter that UTRAN signals to the UE in the MEASUREMENT CONTROL message. This parameter indicates the minimum number of cells required in the active set for measurement reports triggered by event 1C to be transmitted.~~

14.1.2.4 Reporting event 1D: Change of best cell

When event 1D is configured in the UE, the UE shall:

- if "Measurement quantity" is "pathloss" and Equation 1 below is fulfilled for a primary CPICH that is not stored in "Best cell" in variable BEST_CELL_1D_EVENT, or if "Measurement quantity" is "CPICH Ec/N0" or "CPICH RSCP", and Equation 2 below is fulfilled for a primary CPICH that is not stored in "Best cell" in variable BEST_CELL_1D_EVENT:
  - if the equations have been fulfilled during the time "Time to trigger":
    - set "best cell" in the variable BEST_CELL_1D_EVENT to that primary CPICH that triggered the event;
    - send a measurement report with IEs set as below:
      - in "intra-frequency measurement event results"; "Intrafrequency event identity" to "1d" and "cell measurement event results" to the CPICH info of the primary CPICH that triggered the report.
      - the IE "measured results" and ~~possible~~the IE "additional measured results" according to 8.4.2;

Upon transition to CELL_DCH the UE shall:

- set "best cell" in the variable BEST_CELL_1D_EVENT to the best cell of the primary CPICHs included in the active set.

Equation 1 (Triggering condition for pathloss)

$$M_{NotBest} \leq M_{Best} - H_{1d}/2,$$

Equation 2 (Triggering condition for all the other measurement quantities)

$$M_{NotBest} \geq M_{Best} + H_{1d} / 2,$$

The variables in the formula are defined as follows:

$M_{NotBest}$ is the measurement result of a cell not stored in "best cell" in the variable BEST_CELL_1D_EVENT.

M_{Best} is the measurement result of the cell stored in "best cell" in variable BEST_CELL_1D_EVENT.

H_{1d} is the hysteresis parameter for the event 1d.

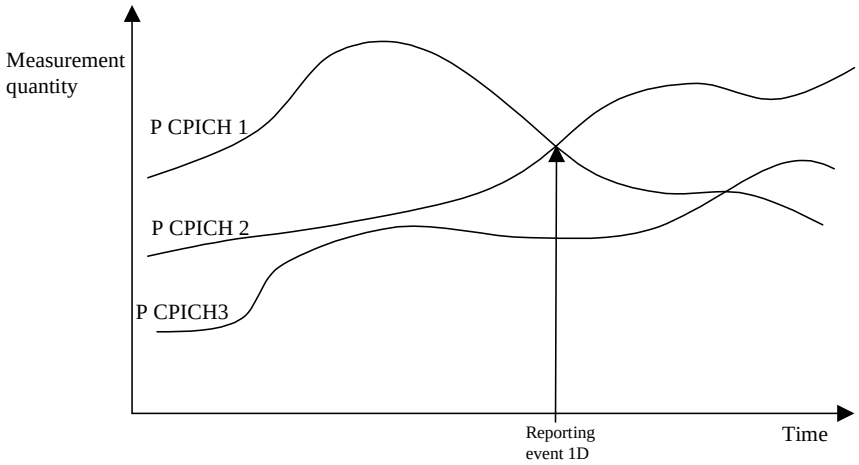

Figure 64: A primary CPICH becomes better than the previously best primary CPICH

14.1.2.5 Reporting event 1E: A Primary CPICH becomes better than an absolute threshold

When event 1E is configured in the UE, the UE shall:

- if "Measurement quantity" is "pathloss" and Equation 1 below is fulfilled for a primary CPICH, or if "Measurement quantity" is "CPICH Ec/N0" or "CPICH RSCP", and Equation 2 below is fulfilled for ~~a~~one or more primary CPICHs do the following for each of these primary CPICHs:
  - if the equations have been fulfilled during the time "Time to trigger", and if that primary CPICH is part of cells allowed to trigger the event according to "Triggering condition 2", and that primary CPICH is not included in the "cells triggered" in the variable TRIGGERED_1E_EVENT~~S~~:
    - include that primary CPICH in the "cells recently triggered" in the variable TRIGGERED_1E_EVENT~~S~~;
- if any primary CPICHs are stored in the "cells recently triggered" in the variable TRIGGERED_1E_EVENT
  - send a measurement report with IEs set as below:
    - in "intra-frequency measurement event results": "Intrafrequency event identity" to "1e" and in "cell measurement event results" ~~to the CPICH info of the primary CPICH that triggered the report; and~~

all entries of the "cells recently triggered" in the variable TRIGGERED_1E_EVENT that are not part of the active set in descending order according to the configured measurement quantity ~~- include this for each 1e event that is triggered without a report being sent;~~

- the IE "measured results" and ~~possible~~the IE "additional measured results" according to 8.4.2;

- move all entries from "cells recently triggered" to "cells triggered" in the variable TRIGGERED_1E_EVENT

- if "Measurement quantity" is "pathloss" and Equation 3 below is fulfilled for a primary CPICH, or if "Measurement quantity" is "CPICH Ec/N0" or "CPICH RSCP", and Equation 4 below is fulfilled for a primary CPICH:
  - if that primary CPICH is included in the "cells triggered" in the variable TRIGGERED_1E_EVENT~~S~~:
    - remove that primary CPICH and sent reports from "cells triggered" in the variable TRIGGERED_1E_EVENT~~S~~.

Upon transition to CELL_DCH the UE shall:
- include the primary CPICH of all cells in the current active set that fulfil the equations 1 or 2 according to the "Measurement quantity" of event 1e into the "cells triggered" in the variable TRIGGERED_1E_EVENT~~S~~.

Equation 1 (Triggering condition for pathloss)

$$M_{New} \leq T_{1e} - H_{1e}/2$$

Equation 2 (Triggering condition for all the other measurement quantities)

$$M_{New} \geq T_{1e} + H_{1e}/2$$

Equation 3 (Leaving triggering condition for pathloss)

$$M_{New} > T_{1e} + H_{1e}/2$$ [≥ in the formula changed to >]

Equation 4 (Leaving triggering condition for all the other measurement quantities)

$$M_{New} < T_{1e} - H_{1e}/2$$ [≤ in the formula changed to <]

The variables in the formula are defined as follows:

$\boldsymbol{M_{New}}$ is the measurement result of a cell that becomes better than an absolute threshold.

$\boldsymbol{T_{1e}}$ is an absolute threshold.

$\boldsymbol{H_{1e}}$ is the hysteresis parameter for the event 1e.

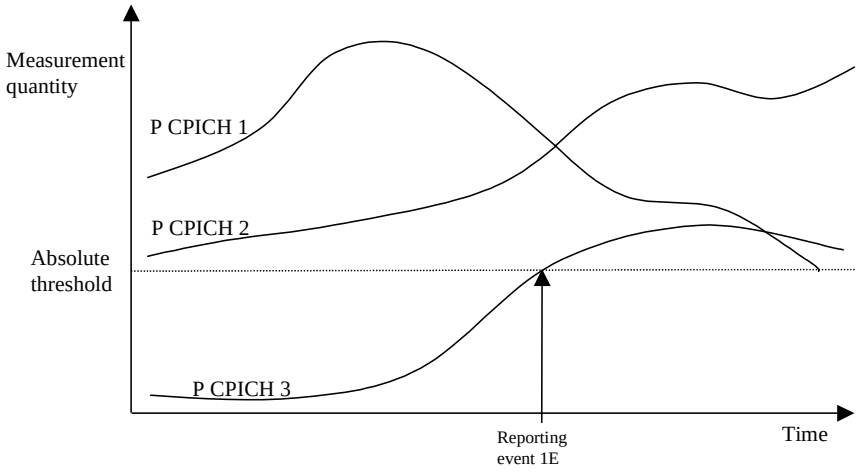

Figure 65: Event-triggered report when a Primary CPICH becomes better than an absolute threshold

~~Event 1E may be used for triggering a measurement report, which includes cells, which the UE has detected without having received a neighbour cell list.~~

14.1.2.6 Reporting event 1F: A Primary CPICH becomes worse than an absolute threshold

When event 1F is configured in the UE, the UE shall:

- if "Measurement quantity" is "pathloss" and Equation 1 below is fulfilled for ~~a~~one or more primary CPICH, or if "Measurement quantity" is "CPICH Ec/N0" or "CPICH RSCP", and Equation 2 below is fulfilled for ~~a~~one or more primary CPICH~~s~~ do the following for each of these primary CPICHs:
  - if the equations have been fulfilled during the time "Time to trigger", and if that primary CPICH is part of cells allowed to trigger the event according to "Triggering condition 1", and that primary CPICH is not included in the "cells triggered" in the variable TRIGGERED_1F_EVENT~~S~~:
    - include that primary CPICH in the "cells recently triggered" in the variable TRIGGERED_1F_EVENT~~S~~;

- if any primary CPICHs are stored in the "cells recently triggered" in the variable TRIGGERED_1F_EVENT
  - send a measurement report with IEs set as below:
    - in "intra-frequency measurement event results": "Intrafrequency event identity" to "1f" and in "cell measurement event results" ~~to~~ all entries of the "cells recently triggered" in the variable TRIGGERED_1F_EVENT that are part of the active set in descending order according to the configured measurement quantity~~the CPICH info of the primary CPICH that triggered the report; and~~

    - ~~include this for each 1f event that is triggered without a report being sent;~~

    - the IE "measured results" and ~~possible~~ "additional measured results" according to 8.4.2;

- move all entries from "cells recently triggered" to "cells triggered" in the variable TRIGGERED_1F_EVENT

- if "Measurement quantity" is "pathloss" and Equation 3 below is fulfilled for a primary CPICH, or if "Measurement quantity" is "CPICH Ec/N0" or "CPICH RSCP", and Equation 4 below is fulfilled for a primary CPICH:
  - if that primary CPICH is included in the "cells triggered" in the variable TRIGGERED_1F_EVENTS:
    - remove that primary CPICH ~~and sent reports~~ from "cells triggered" in the variable TRIGGERED_1F_EVENTS.

Upon transition to CELL_DCH the UE shall:
- include the primary CPICH of all cells that fulfil the equations 1 or 2 according to the "Measurement quantity" of event 1f into the "cells triggered" in the variable TRIGGERED_1F_EVENTS.

Equation 1 (Triggering condition for pathloss)

$$M_{New} \geq T_{1f} + H_{1f}/2,$$

Equation 2 (Triggering condition for all the other measurement quantities)

$$M_{New} \leq T_{1f} - H_{1f}/2,$$

Equation 3 (Leaving triggering condition for pathloss)

$$M_{New} < T_{1f} - H_{1f}/2,$$ [≤ in the formula changed to <]

Equation 4 (Leaving triggering condition for all the other measurement quantities)

$$M_{New} > T_{1f} + H_{1f}/2,$$ [≥ in the formula changed to >]

The variables in the formula are defined as follows:

$\boldsymbol{M_{New}}$ is the measurement result of a cell that becomes worse than an absolute threshold

$\boldsymbol{T_{1f}}$ is an absolute threshold

$\boldsymbol{H_{1f}}$ is the hysteresis parameter for the event 1f.

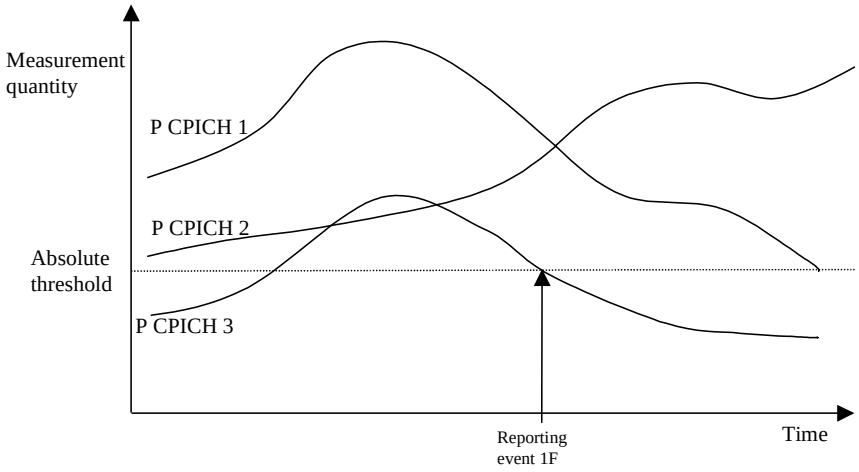

Figure 66: Event-triggered report when a Primary CPICH becomes worse than an absolute threshold

14.1.4 Event-triggered periodic intra-frequency measurement reports (informative)

14.1.4.1 Cell addition failure (FDD only)

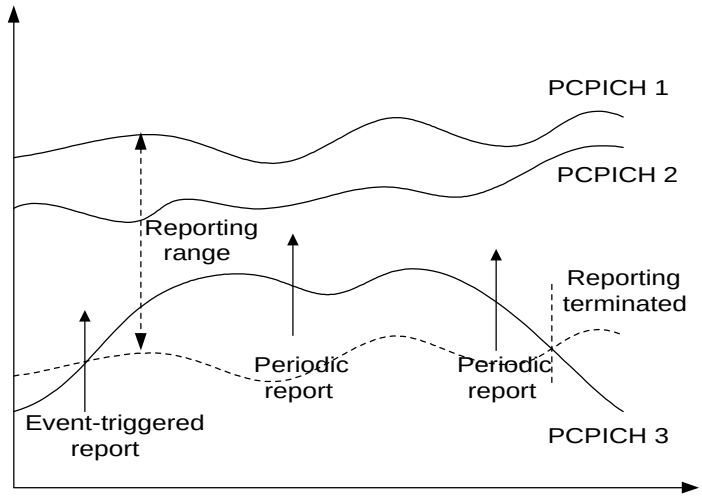

Figure 70: Periodic reporting triggered by event 1A

When a cell enters the reporting range and triggers event 1A, the UE shall transmit a MEASUREMENT REPORT to the UTRAN and typically this may result in an update of the active set. However, in some situations the UTRAN may be unable to add a strong cell to the active set typically due to capacity shortage for example.

The UE shall continue reporting after the initial report by reverting to periodical measurement reporting if the reported cell is not added to the active set. This is illustrated in Figure 70. During periodic reporting the UE shall transmit MEASUREMENT REPORT messages to the UTRAN at predefined intervals. The reports shall include reporting information of the cells in the current active set and of the monitored cell(s) in the reporting range.

Event-triggered periodic measurement reporting shall be terminated if:

- there are no longer any monitored cell(s) within the reporting range; or

- the UTRAN has added cells to the active set so that it includes the maximum number of cells (defined by the **reporting deactivation threshold** parameter), which are allowed for event 1A to be triggered; or

- the UE has sent the maximum number of MEASUREMENT REPORT messages (defined by the **amount of reporting** parameter).

The reporting period is assigned by the UTRAN (with the **Reporting interval** parameter). If the reporting interval is set to zero event-triggered measurement reporting shall not be applied.

14.1.4.2 Cell replacement failure (FDD only)

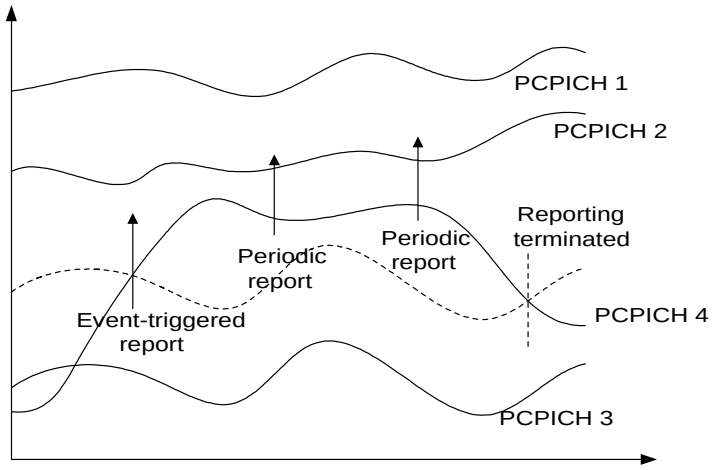

Figure 71: Periodic reporting triggered by event 1C

When a cell enters the replacement range and triggers event 1C, the UE shall transmit a MEASUREMENT REPORT to the UTRAN and typically this may result in the replacement of the weakest active cell. If the UTRAN is unable to replace the cell due to for example capacity shortage, it is beneficial to receive continuous reports in this case as well.
The UE shall revert to periodical measurement reporting if the UTRAN does not update the active set after the transmission of the measurement report. This is illustrated in Figure 71. During periodic reporting the UE shall transmit MEASUREMENT REPORT messages to the UTRAN at predefined intervals. The reports shall include reporting information of the cells in the current active set and of the monitored cell(s) in the replacement range.
Event-triggered periodic measurement reporting shall be terminated if:

- there are no longer any monitored cell(s) within the replacement range; or

- the UTRAN has removed cells from the active set so that there are no longer the minimum amount of active cells for event 1C to be triggered (as defined by the **replacement activation threshold** parameter); or

- the UE has sent the maximum number of MEASUREMENT REPORT messages (defined by the **amount of reporting** parameter).

The reporting period is assigned by the UTRAN (with the **Reporting interval** parameter). If the reporting interval is set to zero, event-triggered measurement reporting shall not be applied.

14.1.5 Mechanisms available for modifying intra-frequency measurement reporting behaviour (informative)

14.1.5.1 Hysteresis

To limit the amount of event-triggered reports, a hysteresis parameter may be connected with each reporting event given above. The value of the hysteresis is given to the UE in the Reporting criteria field of the Measurement Control message.
In the example in Figure 72, the hysteresis ensures that the event 1D (FDD) or IG(TDD) (primary CPICH(FDD)/CCPCH(TDD) 2 becomes the best cell) is not reported until the difference is equal to the hysteresis value. The fact that primary CPICH(FDD)/CCPCH(TDD) 1 becomes best afterwards is not reported at all in the example since the primary CPICH(FDD)/CCPCH(TDD) 1 does not become sufficiently better than the primary CPICH(FDD)/CCPCH(TDD) 2.

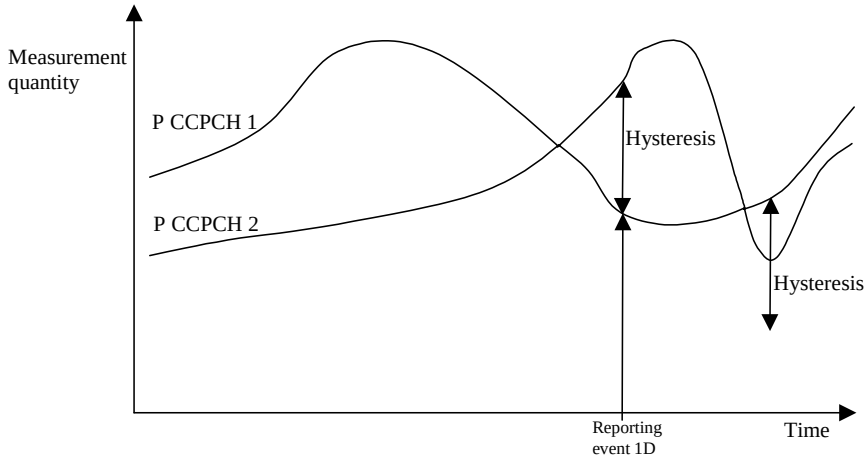

Figure 72: Hysteresis limits the amount of measurement reports

14.1.5.2 Time-to-trigger

To limit the measurement signalling load, a time-to-trigger parameter could be connected with each reporting event given above. The value of the time-to-trigger is given to the UE in the Reporting criteria field of the Measurement Control message.
The effect of the time-to-trigger is that the report is triggered only after the conditions for the event have existed for the specified time-to-trigger. In the following FDD example in Figure 73, the use of time-to-trigger means that the event (primary CPICH 3 enters the reporting range) is not reported until is has been within the range for the time given by the time-to-trigger parameter.

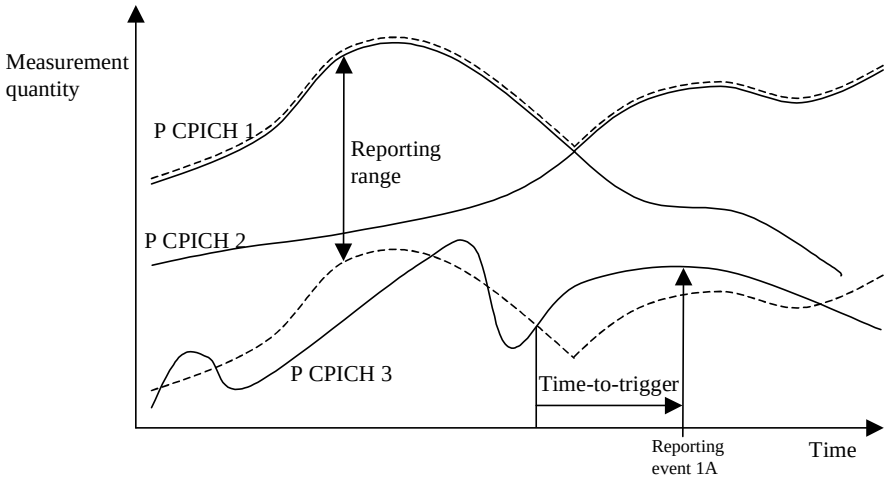

Figure 73: Time-to-trigger limits the amount of measurement reports

In the following TDD example in Figure 74, the use of time-to-trigger means that the event (Timeslot ISCP upon certain threshold) is not reported until it has been upon the threshold for the time given by the time-to trigger parameter.

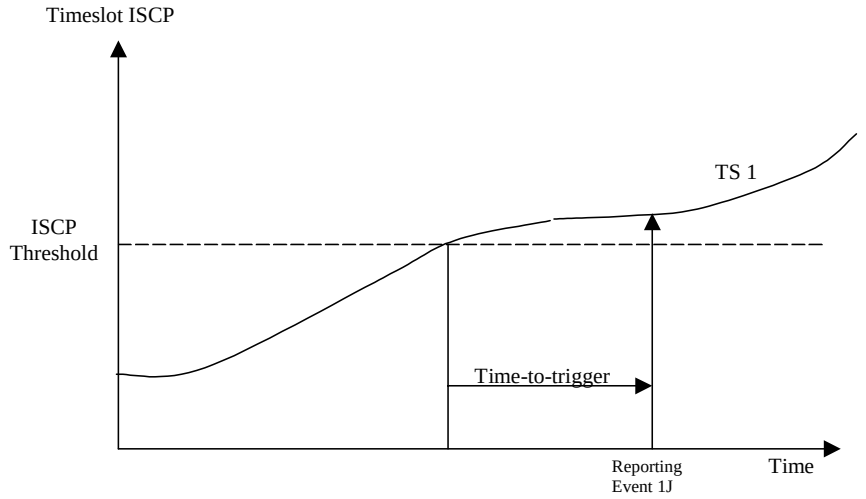

Figure 74: Time-to-trigger limits the amount of measurement reports

NOTE: The time-to-trigger could be combined with hysteresis, i.e. a hysteresis value is added to the measurement quantity before evaluating if the time-to-trigger timer should be started.

14.1.5.3 Cell individual offsets

For each cell that is monitored, an offset can be assigned with inband signalling. The offset can be either positive or negative. The offset is added to the measurement quantity before the UE evaluates if an event has occurred. The UE receives the cell individual offsets for each primary CPICH(FDD)/CCPCH(TDD) in the IE "Cell individual offset" included in the IE "Cell info" associated with each measurement object ~~field of~~ included in the MEASUREMENT CONTROL message.

For the FDD example, in Figure 75, since an offset is added to primary CPICH 3, it is the dotted curve that is used to evaluate if an event occurs. Hence, this means that measurement reports from UE to UTRAN are triggered when primary CPICH plus the corresponding offset, i.e. the dotted curve, leaves and enters the

reporting range and when it gets better than primary CPICH 1 (if these events have been ordered by UTRAN). This offset mechanism provides the network with an efficient tool to change the reporting of an individual primary CPICH.
By applying a positive offset, as in Figure 75, the UE will send measurement reports as if the primary CPICH is offset *x* dB better than what it really is. This could be useful if the operator knows that a specific cell is interesting to monitor more carefully, even though it is not so good for the moment. In the example in Figure 75, the operator might know by experience that in this area primary CPICH 3 can become good very quickly (e.g. due to street corners) and therefore that it is worth reporting more intensively. Depending on the implemented handover evaluation algorithm, this may result in the cell with primary CPICH 3 being included in the active set earlier than would have been the case without the positive offset.

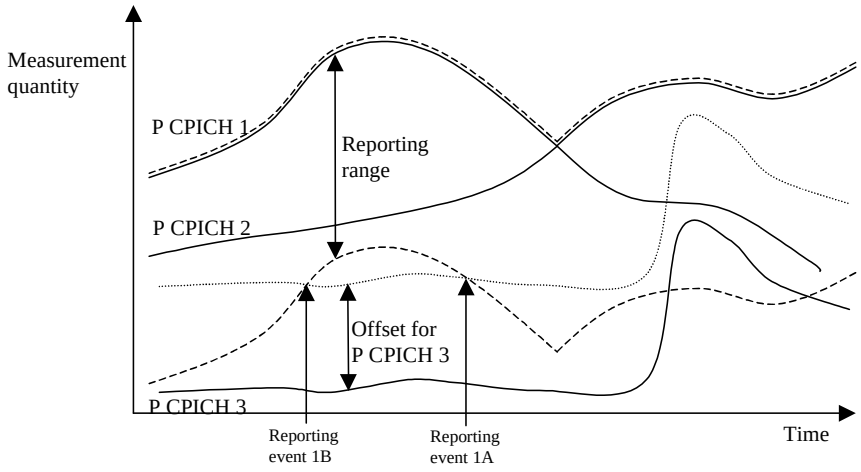

Figure 75: A positive offset is applied to primary CPICH 3 before event evaluation in the UE

For the TDD example, in Figure 76, an offset is added to primary CCPCH2, it is the dotted curve that is used to evaluate if the primary CCPCH2 becomes better than primary CCPCH1 (ordered by the UTRAN).

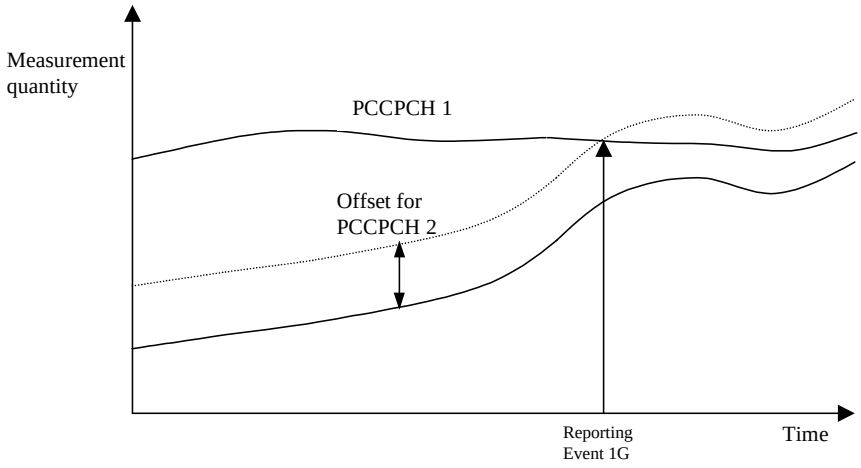

Figure 76: A positive offset is applied to primary CCPCH 2

Correspondingly, the operator can choose to apply a negative offset to a primary CCPCH. Then the reporting on that primary CCPCH is limited and the corresponding cell may be, at least temporarily excluded from the active set or as a target cell for handover.
The cell individual offset can be seen as a tool to move the cell border. It is important to note that the offset is added before triggering events, i.e. the offset is added by the UE before evaluating if a measurement

report should be sent as opposed to offsets that are applied in the network and used for the actual handover evaluation.

14.1.5.4 Forbid a Primary CPICH to affect the reporting range (FDD only)

The reporting range affects the reporting events 1A and 1B presented above. The reporting range is defined as a function of all the Primary CPICHs in the active set (see 14.1.2.1 and 14.1.2.2). If the parameter W is set to 0, the reporting range is defined relative to the best Primary CPICH. However, there could be cases where it is good to forbid a specific Primary CPICH to affect the reporting range. For example in Figure 77 the network has requested the UE to not let Primary CPICH 3 affect the reporting range. This mechanism could be effective if the operator knows by experience that the quality of Primary CPICH 3 is very unstable in a specific area and therefore should not affect the reporting of the other Primary CPICHs.
The UE shall ignore that a Primary CPICH is forbidden to affect the reporting range if all of the following conditions are fulfilled:

- the Primary CPICH is included in active set; and
- all cells in active set are defined as Primary CPICHs forbidden to affect the reporting range.

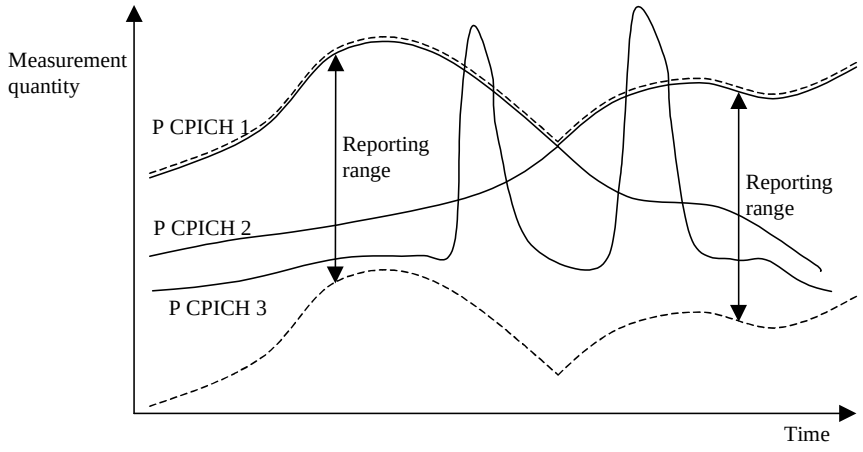

Figure 77: Primary CPICH 3 is forbidden to affect the reporting range

14.1.6 Report quantities in intra-frequency measurements

The quantities that the UE shall report to UTRAN when the event is triggered for an intra-frequency measurement are given by the "Intra-frequency reporting quantity" IE stored for this measurement and can be the following:

1 SFN-SFN observed time difference

2 Cell synchronisation information

3 Cell Identity

4 Downlink E_c/N_0 (FDD).

5 Downlink path loss.

For FDD:
Pathloss in dB = Primary CPICH Tx power - CPICH RSCP.

For Primary CPICH Tx power the IE "Primary CPICH Tx power" shall be used. The unit is dBm.

CPICH RSCP is the result of the CPICH RSCP measurement. The unit is dBm.

For TDD:
Pathloss in dB = Primary CCPCH TX power - Primary CCPCH RSCP.

For Primary CCPCH TX power the IE "Primary CCPCH TX Power" shall be used. The unit is dBm.

Primary CCPCH RSCP is the result of the Primary CCPCH RSCP measurement. The unit is dBm.

If necessary Pathloss shall be rounded up to the next higher integer.
Results higher than 158 shall be reported as 158.
Results lower than 46 shall be reported as 46.

5 Downlink received signal code power (RSCP) after despreading (of a primary CPICH for FDD, and of a primary CCPCH for TDD).

6 ISCP measured on Timeslot basis. (TDD)

7 Proposed TGSN (TDD)

A description of those values can be found in [7] and [8].

~~In the event-triggered measurement reports, mandatory information connected to the events is always reported. For instance, at the event "a primary CPICH(FDD)/CCPCH(TDD) enters the reporting range" the corresponding report identifies the primary CPICH(FDD)/CCPCH(TDD) that entered the range. However, besides this mandatory information, UTRAN should be able to optionally require additional measurement information in the report to support the radio network functions in UTRAN. Furthermore, it will allow the UTRAN to use the UE as a general tool for radio network optimisation if necessary. Examples of report quantities that may be appended to the measurement reports are:~~

- ~~Downlink transport channel block error rate.~~
- ~~Downlink E_c/I_0 on primary CPICH(FDD)/CCPCH(TDD) (e.g. used for initial DL power setting on new radio links).~~
- ~~Time difference between the received primary CPICH(FDD)/CCPCH(TDD) frame-timing from the target cell and the earliest received existing DPCH path. [Note: This measurement is identified in [26] (denoted T_m in clause 7)].~~
- ~~UE transmit power.~~
- ~~UE position.~~

3GPP TSG-RAN WG2 Meeting #23
Helsinki, Finland, August 27th-31th, 2001

Tdoc R2-012180

CR-Form-v4

CHANGE REQUEST

⌘ **25.331 CR 926** ⌘ ev **-** ⌘ Current version: **4.1.0** ⌘

*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:	⌘	Intra-frequency measurement corrections
Source:	⌘	TSG-RAN WG2
Work item code:	⌘	TEI
Date:	⌘	2001-08-21
Category:	⌘	**A**
Release:	⌘	REL-4

Use one of the following categories:
F *(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 one 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: ⌘ Some inconsistencies in the description of the events needed to be corrected. The use of the variables "TRIGGERED_1A_EVENT"… needed also to be clarified in case several 1a… events are configured.

Summary of change: ⌘
- Introduction of new IE "Periodical Reporting running" in TRIGGERED_1A_EVENT and TRIGGERED_1C_EVENT to describe that during periodical reporting phase no further reports are to be sent due to trigger
- Clarification on inclusion of elements in "intra-frequency measurement event results"
- 10.3.7.38: UTRA carrier RSSI cannot be used as measurement quantity in any of the 1x events. It is therefore proposed not to allow for it to be specified as measurement quantity when configuring an intra-frequency measurement.
- 13.4.27a-13.4.27b: it is clarified that there is one variable of type "TRIGGERED_1A_EVENT" per 1a event configured in the UE. The singular form was used instead of the plural in the names of the variables, since such a variable contains information related to one configured event.
- 14.1.1: Ec/Io is said to be a measurement quantity, while in the tabular, as well as in 25.215, 25.225, Ec/No is the measurement quantity that is considered. The text is changed, and a reference to those two specifications is added regarding the description of the measurement quantities.
- 14.1.2.1, 14.1.2.2, 14.1.2.3, 14.1.2.5, 14.1.2.6: in the leaving triggering conditions, the ≥ (resp. ≤) are changed to > (resp. <), in order for those conditions to be the exact complementary of the triggering conditions.
- 14.1.2.1 and 14.1.2.3: at two places, it reads "reporting interval" where it should read "amount of reporting". This is corrected. Moreover, the text "if the value of "Reporting deactivations threshold" for this event is greater than the current number of cells in the active set or equal to 0" is changed to "if the value of "Reporting deactivations threshold"

		for this event is greater or equal to the current number of cells in the active set or equal to 0" since otherwise the case where "Reporting deactivation threshold" is equal to 1 would not make sense. · 14.1.2.3: it reads "if the value of "Replacement activation threshold" for this event is lower than the current number of cells in the active set or equal to 0". This is in contradiction with the text below the figure in the same section: "It is activated if the number of active cells is equal to or greater than a **replacement activation threshold** parameter that UTRAN signals to the UE in the MEASUREMENT CONTROL message". A correction is proposed to make the text consistent. · 14.1.6: the section is updated to reflect what are the values that can be reported by the UE in an intra-frequency measurement. This CR has an isolated impact on intra-frequency measurement reporting. Correction to a function where the specification was not sufficiently explicit. Would not affect implementations behaving like indicated in the CR, would affect implementations supporting the corrected functionality otherwise.
Consequences if not approved:	⌘	Inconsistencies in the text describing the 1x events.

Clauses affected:	⌘	10.3.7.38, 10.3.7.39, 11.3, 13.4.27a, 13.4.27b, 13.4.27c, 13.4.27d, 13.4.27e, 13.4.27f, 14.1.1, 14.1.2, 14.1.2.1, 14.1.2.2, 14.1.2.3, 14.1.2.4, 14.1.2.5, 14.1.2.6, 14.1.4, 14.1.5, 14.1.5.3, 14.1.6		
Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ O&M Specifications	⌘	25.331 v3.7.0, CR 0925r2
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://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 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.

10.3.7.38 Intra-frequency measurement quantity

The quantity the UE shall measure in case of intra-frequency measurement. It also includes the filtering of the measurements.

Information Element/Group name	Need	Multi	Type and reference	Semantics description
Filter coefficient	MP		Filter coefficient 10.3.7.9	
CHOICE *mode*	MP			
>FDD				
>>Measurement quantity	MP		Enumerated(CPICH Ec/N0, CPICH RSCP, Pathloss, UTRA Carrier RSSI)	~~If used in Inter system measurement quantity only Ec/N0 and RSCP is allowed. If used in inter-frequency m~~Measurement quantity ~~RSSI is not allowed~~ in this ~~release.~~
>TDD				
>>Measurement quantity list	MP	1 to 4		
>>>Measurement quantity	MP		Enumerated(Primary CCPCH RSCP, Pathloss, Timeslot ISCP, UTRA Carrier RSSI)	~~If used in inter-frequency measurement quantity RSSI is not allowed.~~

10.3.7.39 Intra-frequency measurement reporting criteria

The triggering of the event-triggered reporting for an intra-frequency measurement. All events concerning intra-frequency measurements are labelled 1x where x is a, b, c….
Event 1a: A Primary CPICH enters the Reporting Range (FDD only).
Event 1b: A Primary CPICH leaves the Reporting Range (FDD only).
Event 1c: A Non-active Primary CPICH becomes better than an active Primary CPICH (FDD only).
Event 1d: Change of best cell ~~[Note 1]~~ (FDD only).
Event 1e: A Primary CPICH becomes better than an absolute threshold (FDD only).
Event 1f: A Primary CPICH becomes worse than an absolute threshold (FDD only).
Event 1g: Change of best cell in TDD.
Event 1h: Timeslot ISCP below a certain threshold (TDD only).
Event 1i: Timeslot ISCP above a certain threshold (TDD only).

Information Element/Group name	Need	Multi	Type and reference	Semantics description
Parameters required for each event	OP	1 to <maxMeasEvent>		
>Intra-frequency event identity	MP		Intra-frequency event identity 10.3.7.34	
>Triggering condition 1	CV–*clause 0*		Enumerated(Active set cells, Monitored set cells, Active set cells and monitored set cells)	Indicates which cells can trigger the event
>Triggering condition 2	CV–*clause 6*		Enumerated(Active set cells, Monitored set cells, Active set cells and monitored set cells, Detected set cells, Detected set cells and monitored set cells)	Indicates which cells can trigger the event
>Reporting Range Constant	CV–*clause 2*		Real(0..14.5 by step of 0.5)	In dB. In event 1a,1b.
>Cells forbidden to affect Reporting range	CV–*clause 1*	1 to <maxCellMeas>		In event 1a,1b
>>CHOICE *mode*	MP			
>>>FDD				
>>>>Primary CPICH info	MP		Primary CPICH info 10.3.6.60	
>>>TDD				
>>>>Primary CCPCH info	MP		Primary CCPCH info 10.3.6.57	
>W	CV–*clause 2*		Real(0.0..2.0 by step of 0.1)	
>Hysteresis	MP		Real(0..7.5 by step of 0.5)	In dB.
>Threshold used frequency	CV-*clause 3*		Integer (-115..165)	Range used depend on measurement quantity. CPICH RSCP -115..-25 dBm CPICH Ec/No -24..0 dB Pathloss 30..165dB ISCP -115..-25 dBm

Information Element/Group name	Need	Multi	Type and reference	Semantics description
>Reporting deactivation threshold	CV–*clause 4*		Integer(0, 1, 2, 3, 4, 5, 6, 7)	In event 1a Indicates the maximum number of cells allowed in the active set in order for event 1a to occur. 0 means not applicable .
>Replacement activation threshold	CV-*clause 5*		Integer(0, 1, 2, 3, 4, 5, 6, 7)	In event 1c Indicates the minimum number of cells allowed in the active set in order for event 1c to occur. 0 means not applicable
>Time to trigger	MP		Time to trigger 10.3.7.64	Indicates the period of time between the timing of event detection and the timing of sending Measurement Report. Time in ms
>Amount of reporting	CV–*clause 7*		Integer(1, 2, 4, 8, 16, 32, 64, Infinity)	
>Reporting interval	CV–*clause 7*		Integer(0, 250, 500, 1000, 2000, 4000, 8000, 16000)	Indicates the interval of periodical reporting when such reporting is triggered by an event. Interval in milliseconds. 0 means no periodical reporting
>Reporting cell status	OP		Reporting cell status 10.3.7.61	

Condition	Explanation
Clause 0	The IE is mandatory if "Intra-frequency event identity" is set to "1b" or "1f", otherwise the IE is not needed
Clause 1	The IE is optional if "Intra-frequency event identity" is set to "1a" or "1b", otherwise the IE is not needed
Clause 2	The IE is mandatory if "Intra-frequency event identity" is set to "1a" or "1b", otherwise the IE is not needed
Clause 3	The IE is mandatory if "Intra-frequency event identity" is set to , "1e", "1f", "1h" or "1i", otherwise the IE is not needed
Clause 4	The IE is mandatory if "Intra-frequency event identity" is set to "1a", otherwise the IE is not needed
Clause 5	The IE is mandatory if "Intra-frequency event identity" is set to "1c", otherwise the IE is not needed
Clause 6	The IE is mandatory if "Intra-frequency event identity" is set to "1a" or "1e".
Clause 7	The IE is mandatory if "Intra-frequency event identity" is set to "1a" or "1c".

11.3 Information element definitions

```
IntraFreqMeasQuantity-FDD ::=       ENUMERATED {
                                        cpich-Ec-N0,
                                        cpich-RSCP,
                                        pathloss,
                                        utra-CarrierRSSI }

-- If used in InterRATMeasQuantity only cpich-Ec-N0 and cpich-RSCP is
-- allowed.
-- If used in InterFreqMeasQuantity utra-CarrierRSSI is not allowed.

IntraFreqMeasQuantity-TDD ::=       ENUMERATED {
                                        primaryCCPCH-RSCP,
                                        pathloss,
                                        timeslotISCP,
                                        utra-CarrierRSSI }
-- If used in InterFreqMeasQuantity utra-CarrierRSSI is not allowed.
```

13.4.27a TRIGGERED_1A_EVENTS

This variable contains information about a 1a events that hasve been triggered in the UE. There is one such variable per 1a event configured in the UE.

Information Element/Group name	Need	Multi	Type and reference	Semantics description
Cells triggered	OP	1 to < maxCellMeas>		
>primary CPICH	MP		Primary CPICH info 10.3.6.60	
>sent reports	MP		Integer(1..Infinity)	Number of reports sent to UTRAN in case of event triggered periodical reporting
Cells recently triggered	OP	1 to < maxCellMeas>		
>primary CPICH	MP		Primary CPICH info 10.3.6.60	
>sent reports	MP		Integer(1..Infinity)	Number of reports sent to UTRAN in case of event triggered periodical reporting
Periodical reporting running	MP		Boolean	

13.4.27b TRIGGERED_1B_EVENTS

This variable contains information about a 1b events that hasve been triggered in the UE. There is one such variable per 1b event configured in the UE.

Information Element/Group name	Need	Multi	Type and reference	Semantics description
Cells triggered	OP	1 to < maxCellMeas>		
>primary CPICH	MP		Primary CPICH info 10.3.6.60	
Cells recently triggered	OP	1 to < maxCellMeas>		
>primary CPICH	MP		Primary CPICH info 10.3.6.60	

13.4.27c TRIGGERED_1C_EVENTS

This variable contains information about a 1b events that hasve been triggered in the UE. There is one such variable per 1c event configured in the UE.

Information Element/Group name	Need	Multi	Type and reference	Semantics description
Cells triggered	OP	1 to < maxCellMeas>		
>primary CPICH	MP		Primary CPICH info 10.3.6.60	
>sent reports	MP		Integer(1..Infinity)	Number of reports sent to UTRAN in case of event triggered periodical reporting

13.4.27d BEST_CELL_1D_EVENT

This variable contains information about a 1d events that hasve been triggered in the UE. There is one such variable per 1d event configured in the UE.

Information Element/Group name	Need	Multi	Type and reference	Semantics description
Best cell	MP		Primary CPICH info 10.3.6.60	

13.4.27e TRIGGERED_1E_EVENTS

This variable contains information about a 1e events that hasve been triggered in the UE. There is one such variable per 1e event configured in the UE.

Information Element/Group name	Need	Multi	Type and reference	Semantics description
Cells triggered	OP	1 to < maxCellMeas>		
>primary CPICH	MP		Primary CPICH info 10.3.6.60	
Cells recently triggered	OP	1 to < maxCellMeas>		
>primary CPICH	MP		Primary CPICH info 10.3.6.60	

13.4.27f TRIGGERED_1F_EVENTS

This variable contains information about a 1f events that hasve been triggered in the UE. There is one such variable per 1f event configured in the UE.

Information Element/Group name	Need	Multi	Type and reference	Semantics description
Cells triggered	OP	1 to < maxCellMeas>		
>primary CPICH	MP		Primary CPICH info 10.3.6.60	
Cells recently triggered	OP	1 to < maxCellMeas>		
>primary CPICH	MP		Primary CPICH info 10.3.6.60	

14.1 Intra-frequency measurements

14.1.1 Intra-frequency measurement quantities

A measurement quantity is used to evaluate whether an intra-frequency event has occurred or not. It can be:

1 Downlink E_c/N_0 ~~E_c/I_0 (chip energy per total received channel power density)~~.

2 Downlink path loss.

For FDD:
Pathloss in dB = Primary CPICH Tx power - CPICH RSCP.

For Primary CPICH Tx power the IE "Primary CPICH Tx power" shall be used. The unit is dBm.

CPICH RSCP is the result of the CPICH RSCP measurement. The unit is dBm.

For TDD:
Pathloss in dB = Primary CCPCH TX power - Primary CCPCH RSCP.

For Primary CCPCH TX power the IE "Primary CCPCH TX Power" shall be used. The unit is dBm.

Primary CCPCH RSCP is the result of the Primary CCPCH RSCP measurement. The unit is dBm.

If necessary Pathloss shall be rounded up to the next higher integer.
Results higher than 158 shall be reported as 158.
Results lower than 46 shall be reported as 46.

3 Downlink received signal code power (RSCP) after despreading.

4 ISCP measured on Timeslot basis.

A description of those values can be found in [7] and [8].

14.1.2 Intra-frequency reporting events for FDD

Within the measurement reporting criteria field in the Measurement Control message the UTRAN notifies the UE which events should trigger a measurement report. The listed events are the toolbox from which the UTRAN can choose the reporting events that are needed for the implemented handover evaluation function, or other radio network functions.

All the ~~illustrated~~ specified events are measured with respect to any of the measurement quantities given in subclause 14.1.1. The measurement ~~objects~~quantities are measured on ~~are~~ the monitored primary common pilot channels (CPICH) of the cell defined in the measurement object.

Special mechanisms for the events are illustrated in section 14.1.4 and 14.1.5.

NOTE: The events below are numbered 1A, 1B, 1C,… since all intra-frequency reporting events would be labelled 1X, inter-frequency reporting events would be labelled 2X, and so on for the other measurement types.

14.1.2.1 Reporting event 1A: A Primary CPICH enters the reporting range

When event 1A is configured in the UE, the UE shall:

- if "Measurement quantity" is "pathloss" and Equation 1 below is fulfilled for a~~a~~one or more primary CPICHs, or if "Measurement quantity" is "CPICH Ec/N0" or "CPICH RSCP", and Equation 2 below is fulfilled for a~~a~~one or more primary CPICHs do the following for each of these primary CPICHs:
  - if the equations have been fulfilled during the time "Time to trigger", and if that primary CPICH is part of cells allowed to trigger the event according to "Triggering condition 2", and if that primary CPICH is not included in the "cells triggered" in the variable TRIGGERED_1A_EVENT~~S~~:
    - include that primary CPICH in the "cells recently triggered" in the variable TRIGGERED_1A_EVENT~~S~~;

- if the value of "Reporting deactivations threshold" for this event is greater than or equal to~~than~~ the current number of cells in the active set or equal to 0 and any primary CPICHs are stored in the "cells recently triggered" in the variable TRIGGERED_1A_EVENT:
  - if "Reporting interval" for this event is not equal to 0:
    - if the IE "Periodical reporting running" in the variable TRIGGERED_1A_EVENT is set to FALSE
      - start a timer ~~for that primary CPICH~~ with the value of "Reporting interval" for this event;
      - set "sent reports" for ~~that~~ the primary CPICHs in "cells recently triggered" in the variable TRIGGERED_1A_EVENT~~S~~ to 1;
      - send a measurement report with IEs set as below:
        - in "intra-frequency measurement event results": "Intrafrequency event identity" to "1a" and in "cell measurement event results"~~the first entry to the IE "Primary CPICH info" of the primary CPICH that triggered the report; and~~
          - ~~include this for each 1a event that is triggered without a report being sent;~~all entries of the "cells recently triggered" in the variable TRIGGERED_1A_EVENT that are not part of the active set in descending order according to the configured measurement quantity
        - the IE "measured results" and ~~possible~~ the IE "additional measured results" according to 8.4.2;
      - move all entries from "cells recently triggered" to "cells triggered" in the variable TRIGGERED_1A_EVENT

- if the timer for ~~that primary CPICH in the variable TRIGGERED_1A_EVENT~~the periodical reporting has expired:

  - if ~~that~~any primary CPICH is included in the "cells triggered" in the variable TRIGGERED_1A_EVENT~~S~~, and not included in the current active set:

    - if "Reporting interval" for this event is not equal to 0, and if ~~"Reporting interval~~ "Amount of reporting" is greater ~~larger~~ than "sent reports" stored for ~~that~~any of these primary CPICH~~s~~, in "cells triggered" in the variable TRIGGERED_1A_EVENT~~S~~; and

    ~~- and if the timer for that primary CPICH in the variable TRIGGERED_1A_EVENTS has expired:~~

      - increment the stored counter "sent reports" for ~~that~~all CPICH in "cell triggered" in variable TRIGGERED_1A_EVENT~~S~~;

      - start a timer ~~for that primary CPICH~~ with the value of "Reporting interval" for this event;

      - send a measurement report with IEs set as below:

        - in "intra-frequency measurement event results": "Intrafrequency event identity" to "1a" and in "cell measurement event results" ~~to the CPICH info of the primary CPICH that triggered the report; and~~:

          - include all entries of the variable TRIGGERED_1A_EVENT with value of IE "sent reports" smaller than value of "Amount of reporting" that are not part of the active set in descending order according to the configured measurement quantity ~~this for each 1a event that is triggered without a report being sent;~~

        - increment the value of the IE " sent reports" for all entries in the variable TRIGGERED_1A_events

        - the IE "measured results" and ~~possible~~the IE "additional measured results" according to 8.4.2;

        - if "sent reports" in variable TRIGGERED_1A_EVENT is greater than "Amount of reporting" for all entries

          - set the IE "Periodical Reporting running" in the variable TRIGGERED_1A_EVENT to FALSE and disable the timer for the periodical reporting

- if "Measurement quantity" is "pathloss" and Equation 3 below is fulfilled for a primary CPICH, or if "Measurement quantity" is "CPICH Ec/N0" or "CPICH RSCP", and Equation 4 below is fulfilled for a primary CPICH:

  - if that primary CPICH is included in the "cells triggered" in the variable TRIGGERED_1A_EVENT~~S~~:

    - remove the entry of that primary CPICH ~~and sent reports~~ from "cells triggered" in the variable TRIGGERED_1A_EVENT~~S~~;

    - if no entry in the variable TRIGGERED_1A_EVENT has a value of "sent reports" smaller than "Amount of reporting"

      - stop the reporting interval timer~~s related to that primary CPICH.~~

- set the IE “Periodical reporting running” in the variable TRIGGERED_1A_EVENT to FALSE

Upon transition to CELL_DCH the UE shall:

- Include the primary CPICH of all cells in the current active set into the "cells triggered" in the variable TRIGGERED_1A_EVENT~~S~~.

Equation 1 (Triggering condition for pathloss)

$$10 \cdot LogM_{New} \le W \cdot 10 \cdot Log\left(1/\sum_{i=1}^{N_A}(1/M_i)\right) + (1-W) \cdot 10 \cdot LogM_{Best} + (R_{1a} - H_{1a}/2),$$

Equation 2 (Triggering condition for all the other measurement quantities)

$$10 \cdot LogM_{New} \ge W \cdot 10 \cdot Log\left(\sum_{i=1}^{N_A} M_i\right) + (1-W) \cdot 10 \cdot LogM_{Best} - (R_{1a} - H_{1a}/2),$$

Equation 3 (Leaving triggering condition for pathloss)

$$10 \cdot LogM_{New} > W \cdot 10 \cdot Log\left(1/\sum_{i=1}^{N_A}(1/M_i)\right) + (1-W) \cdot 10 \cdot LogM_{Best} + (R_{1a} + H_{1a}/2),$$ [≥ in the formula changed to >]

Equation 4 (Leaving triggering condition for all the other measurement quantities)

$$10 \cdot LogM_{New} < W \cdot 10 \cdot Log\left(\sum_{i=1}^{N_A} M_i\right) + (1-W) \cdot 10 \cdot LogM_{Best} - (R_{1a} + H_{1a}/2),$$ [≤ in the formula changed to <]

The variables in the formula are defined as follows:

$\boldsymbol{M_{New}}$ is the measurement result of the cell entering the reporting range.

$\boldsymbol{M_i}$ is a measurement result of a cell in the active set.

$\boldsymbol{N_A}$ is the number of cells in the current active set.

For pathloss

$\boldsymbol{M_{Best}}$ is the measurement result of the cell in the active set with the lowest measurement result.

for other measurements quantities.

$\boldsymbol{M_{Best}}$ is the measurement result of the cell in the active set with the highest measurement result.

$\boldsymbol{W}$ is a parameter sent from UTRAN to UE.

$\boldsymbol{R_{1a}}$ is the reporting range constant.

$\boldsymbol{H_{1a}}$ is the hysteresis parameter for the event 1a.

If the measurement results are pathloss or CPICH-Ec/No then $\boldsymbol{M_{New}}$, $\boldsymbol{M_i}$ and $\boldsymbol{M_{Best}}$ are expressed as ratios.

If the measurement result is CPICH-RSCP then $\boldsymbol{M_{New}}$, $\boldsymbol{M_i}$ and $\boldsymbol{M_{Best}}$ are expressed in [mW].

~~The addition window of cells in event 1A is configured with the **reporting range constant** parameter ($\boldsymbol{R_{1a}}$) with an additional **hysteresis** parameter ($\boldsymbol{H_{1a}}$).~~
~~The occurrence of event 1A is conditional on a **report deactivation threshold** parameter.~~
~~Event 1A may be enhanced with an addition timer, which is configured with the **time-to-trigger** parameter (see subclause 14.1.5.2). If a time-to-trigger value is used, a cell must continuously stay within the reporting range for the given time period, before the UE shall send a measurement report.~~
~~Event 1A may be used for triggering a measurement report, which includes cells, which the UE has detected without having received a neighbour cell list.~~

~~If more than one cell triggers event 1A within the UE internal event evaluation period (defined in [19]) and fulfils the reporting criteria after the addition timer has elapsed , the UE shall report all of the triggering cells in the event results. The triggering cells shall be sorted in descending order according to the measured quantity.~~

14.1.2.2 Reporting event 1B: A primary CPICH leaves the reporting range

When event 1B is configures in the UE, the UE shall:

- if "Measurement quantity" is "pathloss" and Equation 1 below is fulfilled for ~~a~~one or more primary CPICH, or if "Measurement quantity" is "CPICH Ec/N0" or "CPICH RSCP", and Equation 2 below is fulfilled for ~~a~~one or more primary CPICH~~s~~ do the following for each of these primary CPICHs:
  - if the equations have been fulfilled during the time "Time to trigger", and if that primary CPICH is part of cells allowed to trigger the event according to "Triggering condition 1", and if that primary CPICH is not included in the "cells triggered" in the variable TRIGGERED_1B_EVENT~~S~~:
    - include that primary CPICH in the "cells recently triggered" in the variable TRIGGERED_1B_EVENT~~S~~;

- if any primary CPICHs are stored in the "cells recently triggered" in the variable TRIGGERED_1B_EVENT
  - send a measurement report with IEs set as below:
    - in "intra-frequency measurement event results": "Intrafrequency event identity" to "1b" and "cell measurement event results" ~~to the CPICH info of the primary CPICH that triggered the report; and~~
    - ~~-~~ include all entries of “cells recently triggered” in the variable TRIGGERED_1B_EVENT that are part of the active set~~this for each 1b event that is triggered without a report being sent;~~
    - the IE "measured results" and ~~possible~~the IE "additional measured results" according to 8.4.2.
    - move all entries from IE “cells recently triggered” to “cells triggered” in the variable TRIGGERED_1B_EVENT

- if "Measurement quantity" is "pathloss" and Equation 3 below is fulfilled for a primary CPICH, or if "Measurement quantity" is "CPICH Ec/N0" or "CPICH RSCP", and Equation 4 below is fulfilled for a primary CPICH:
  - if that primary CPICH is included in the "cells triggered" in the variable TRIGGERED_1B_EVENT~~S~~:
    - remove the entry of that primary CPICH ~~and sent reports~~ from "cells triggered" in the variable TRIGGERED_1B_EVENT~~S~~;

Equation 1 (Triggering condition for pathloss)

$$10 \cdot LogM_{Old} \geq W \cdot 10 \cdot Log\left(1/\sum_{i=1}^{N_A}(1/M_i)\right) + (1-W) \cdot 10 \cdot LogM_{Best} + (R + H_{1b}/2),$$

Equation 2 (Triggering condition for all the other measurement quantities)

$$10 \cdot LogM_{Old} \leq W \cdot 10 \cdot Log\left(\sum_{i=1}^{N_A} M_i\right) + (1-W) \cdot 10 \cdot LogM_{Best} - (R + H_{1b}/2),$$

Equation 3 (Leaving triggering condition for pathloss)

$$10 \cdot LogM_{Old} < W \cdot 10 \cdot Log\left(1/\sum_{i=1}^{N_A} (1/M_i)\right) + (1-W) \cdot 10 \cdot LogM_{Best} + (R - H_{1b}/2),$$ [≤ in the formula changed to <]

Equation 4 (Leaving triggering condition for all the other measurement quantities)

$$10 \cdot LogM_{Old} > W \cdot 10 \cdot Log\left(\sum_{i=1}^{N_A} M_i\right) + (1-W) \cdot 10 \cdot LogM_{Best} - (R - H_{1b}/2),$$ [≥ in the formula changed to >]

The variables in the formula are defined as follows:

$\boldsymbol{M_{Old}}$ is the measurement result of the cell leaving the reporting range.

$\boldsymbol{M_i}$ is a measurement result of a cell in the active set.

$\boldsymbol{N_A}$ is the number of cells in the current active set.

For pathloss

$\boldsymbol{M_{Best}}$ is the measurement result of the cell in the active set with the lowest measurement result.

for other measurements quantities.

$\boldsymbol{M_{Best}}$ is the measurement result of the cell in the active set with the highest measurement result.

$\boldsymbol{W}$ is a parameter sent from UTRAN to UE.

$\boldsymbol{R_{1b}}$ ~~$\boldsymbol{a}$~~ is the reporting range constant.

$\boldsymbol{H_{1b}}$ is the hysteresis parameter for the event 1b.

If the measurement results are pathloss or CPICH-Ec/No then $\boldsymbol{M_{New}}$, $\boldsymbol{M_i}$ and $\boldsymbol{M_{Best}}$ are expressed as ratios.

If the measurement result is CPICH-RSCP then $\boldsymbol{M_{New}}$, $\boldsymbol{M_i}$ and $\boldsymbol{M_{Best}}$ are expressed in [mW].

~~The drop window of cells in event 1B is configured with the **reporting range constant** parameter ($\boldsymbol{R_{1b}}$) with an additional **hysteresis** parameter ($\boldsymbol{H_{1b}}$).~~
~~Event 1B may be enhanced with a drop timer, which is configured with the **time-to-trigger** parameter. If the timer is used, the weakening cell must continuously stay below the reporting range for the given time period before the UE may send a measurement report.~~
~~If more than one cell triggers event 1B within the UE internal event evaluation period (defined in [19]) and fulfils the reporting criteria after the drop timer has elapsed, the UE shall report all of the triggering cells in the event results. The triggering cells shall be sorted in descending order according to the measured quantity.~~

14.1.2.3 Reporting event 1C: A non-active primary CPICH becomes better than an active primary CPICH

When event 1C is configured in the UE, the UE shall:

- if "Measurement quantity" is "pathloss" and Equation 1 below is fulfilled for a primary CPICH, or if "Measurement quantity" is "CPICH Ec/N0" or "CPICH RSCP", and Equation 2 below is fulfilled for a primary CPICH:
  - if the equations have been fulfilled during the time "Time to trigger", and if the primary CPICH that is better is not included in the active set but the other primary CPICH is any of the primary

CPICHs included in the active set, and if that primary CPICH is not included in the "cells triggered" in the variable TRIGGERED_1C_EVENT~~S~~:

- include that primary CPICH in the "cells triggered" in the variable TRIGGERED_1C_EVENT~~S~~;
- if the value of "Replacement activation threshold" for this event is less ~~lower~~ than or equal to the current number of cells in the active set or equal to 0:
  - if "Reporting interval" for this event is not equal to 0:
    - start a timer for that primary CPICH with the value of "Reporting interval" for this event;
- set "sent reports" for that primary CPICH in the variable TRIGGERED_1C_EVENT~~S~~ to 1;
- send a measurement report with IEs set as below:
  - in "intra-frequency measurement event results": "Intrafrequency event identity" to "1c" and in the first entry in "cell measurement event results" ~~to~~ the IE "Primary CPICH info" ~~of~~to the primary CPICH not in the active set that triggered the report; and
  - the second entry in "cell measurement event results" to the CPICH info of the primary CPICH in the active set that now is worse than the new primary CPICH and has the best measured value (lowest measured result for pathloss and highest measured result for other measurements); and
  - the rest of the entries to other primary CPICHs that are now worse than this new primary CPICH in the order of their measured value;
- the IE "measured results" and ~~possible~~ "additional measured results" according to 8.4.2;

- if that primary CPICH is included in the "cells triggered" in the variable TRIGGERED_1C_EVENT~~S~~, and not included in the current active set:
  - if "Reporting interval" for this event is not equal to 0, and if ~~"Reporting interval~~ "Amount of reporting" is greater ~~larger~~ than "sent reports" stored for that primary CPICH, in "cells triggered" in the variable TRIGGERED_1C_EVENT~~S~~; and
    - if the timer for that primary CPICH in the variable TRIGGERED_1C_EVENT~~S~~ has expired:
      - increment the stored counter "sent reports" for that CPICH in "cell triggered" in variable TRIGGERED_1C_EVENT~~S~~;
      - start a timer for that primary CPICH with the value of "Reporting interval" for this event;
      - send a measurement report with IEs set as below:
        - in "intra-frequency event results": "Intrafrequency event identity" to "1c" and the first entry in "cell measurement event results" to the CPICH info of the primary CPICH not in the active set that triggered the report; and
        - the second entry in "cell measurement event results" to the CPICH info of the primary CPICH in the active set that now is worse than the new primary CPICH and has the best measured value (lowest measured result for pathloss and highest measured result for other measurements); and

- the rest of the entries to other primary CPICHs that is now worse than this new primary CPICH in the order of their measured value;

- the IE "measured results" and ~~possible~~ "additional measured results" according to 8.4.2;

- if "Measurement quantity" is "pathloss" and Equation 3 below is fulfilled for a primary CPICH, or if "Measurement quantity" is "CPICH Ec/N0" or "CPICH RSCP", and Equation 4 below is fulfilled for a primary CPICH:

  - if that primary CPICH is included in the "cells triggered" in the variable TRIGGERED_1C_EVENT~~S~~:

    - remove that primary CPICH and sent reports from "cells triggered" in the variable TRIGGERED_1C_EVENT~~S~~;

    - stop the reporting interval timer~~s~~ related to that primary CPICH.

Equation 1 (Triggering condition for pathloss)

$$M_{New} \leq M_{InAS} - H_{1c}/2,$$

Equation 2 (Triggering condition for all the other measurement quantities)

$$M_{New} \geq M_{InAS} + H_{1c}/2,$$

Equation 3 (Leaving triggering condition for pathloss)

$$M_{New} > M_{InAS} + H_{1c}/2,$$ [≥ in the formula changed to >]

Equation 4 (Leaving triggering condition for all the other measurement quantities)

$$M_{New} < M_{InAS} - H_{1c}/2,$$ [≤ in the formula changed to <]

The variables in the formula are defined as follows:

$\boldsymbol{M_{New}}$ is the measurement result of the cell not included in the active set.

$\boldsymbol{M_{InAS}}$ is the measurement result of a cell in the active set.

$\boldsymbol{H_{1c}}$ is the hysteresis parameter for the event 1c.

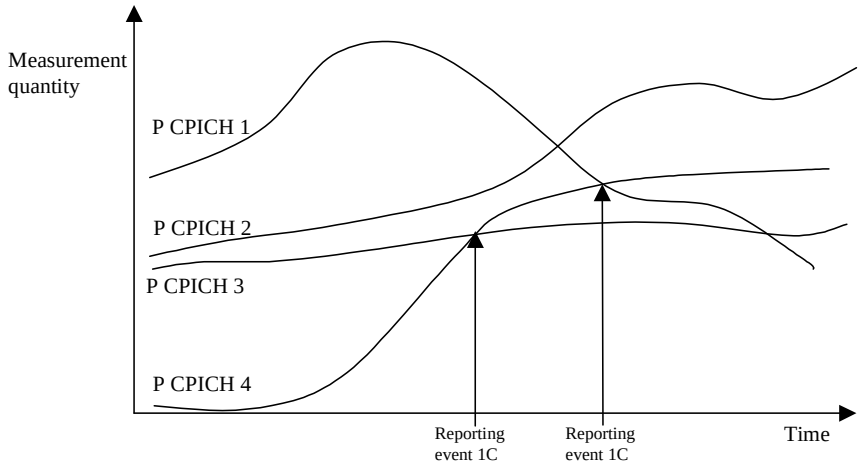

Figure 63: A primary CPICH that is not included in the active set becomes better than a primary CPICH that is in the active set

In this example the cells belonging to primary CPICH 1, 2 and 3 are supposed to be in the active set, but the cell transmitting primary CPICH 4 is not (yet) in the active set.

~~If a primary CPICH that is not included in the active set becomes better than a primary CPICH that is in the active set, and event 1C has been ordered by UTRAN, this event shall trigger a report to be sent from the UE.~~

~~This event may be used for replacing cells in the active set. It is activated if the number of active cells is equal to or greater than a **replacement activation threshold** parameter that UTRAN signals to the UE in the MEASUREMENT CONTROL message. This parameter indicates the minimum number of cells required in the active set for measurement reports triggered by event 1C to be transmitted.~~

14.1.2.4 Reporting event 1D: Change of best cell

When event 1D is configured in the UE, the UE shall:

- if "Measurement quantity" is "pathloss" and Equation 1 below is fulfilled for a primary CPICH that is not stored in "Best cell" in variable BEST_CELL_1D_EVENT, or if "Measurement quantity" is "CPICH Ec/N0" or "CPICH RSCP", and Equation 2 below is fulfilled for a primary CPICH that is not stored in "Best cell" in variable BEST_CELL_1D_EVENT:
  - if the equations have been fulfilled during the time "Time to trigger":
    - set "best cell" in the variable BEST_CELL_1D_EVENT to that primary CPICH that triggered the event;
    - send a measurement report with IEs set as below:
      - in "intra-frequency measurement event results"; "Intrafrequency event identity" to "1d" and "cell measurement event results" to the CPICH info of the primary CPICH that triggered the report.
      - the IE "measured results" and ~~possible~~the IE "additional measured results" according to 8.4.2;

Upon transition to CELL_DCH the UE shall:

- set "best cell" in the variable BEST_CELL_1D_EVENT to the best cell of the primary CPICHs included in the active set.

Equation 1 (Triggering condition for pathloss)

$$M_{NotBest} \leq M_{Best} - H_{1d}/2,$$

Equation 2 (Triggering condition for all the other measurement quantities)

$$M_{NotBest} \geq M_{Best} + H_{1d} / 2,$$

The variables in the formula are defined as follows:

$M_{NotBest}$ is the measurement result of a cell not stored in "best cell" in the variable BEST_CELL_1D_EVENT.

M_{Best} is the measurement result of the cell stored in "best cell" in variable BEST_CELL_1D_EVENT.

H_{1d} is the hysteresis parameter for the event 1d.

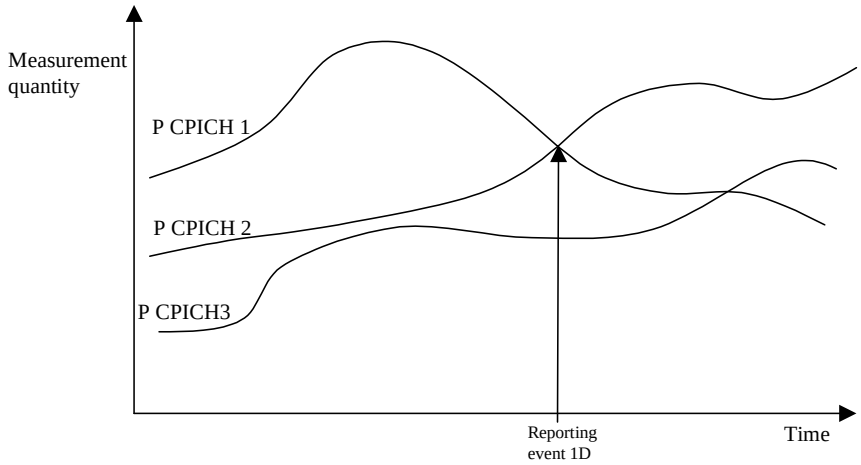

Figure 64: A primary CPICH becomes better than the previously best primary CPICH

14.1.2.5 Reporting event 1E: A Primary CPICH becomes better than an absolute threshold

When event 1E is configured in the UE, the UE shall:

- if "Measurement quantity" is "pathloss" and Equation 1 below is fulfilled for a primary CPICH, or if "Measurement quantity" is "CPICH Ec/N0" or "CPICH RSCP", and Equation 2 below is fulfilled for ~~a~~one or more primary CPICHs do the following for each of these primary CPICHs:
  - if the equations have been fulfilled during the time "Time to trigger", and if that primary CPICH is part of cells allowed to trigger the event according to "Triggering condition 2", and that primary CPICH is not included in the "cells triggered" in the variable TRIGGERED_1E_EVENT~~S~~:
    - include that primary CPICH in the "cells recently triggered" in the variable TRIGGERED_1E_EVENT~~S~~;
- if any primary CPICHs are stored in the "cells recently triggered" in the variable TRIGGERED_1E_EVENT
  - send a measurement report with IEs set as below:
    - in "intra-frequency measurement event results": "Intrafrequency event identity" to "1e" and in "cell measurement event results" ~~to the CPICH info of the primary CPICH that triggered the report; and~~

all entries of the "cells recently triggered" in the variable TRIGGERED_1E_EVENT that are not part of the active set in descending order according to the configured measurement quantity ~~- include this for each 1e event that is triggered without a report being sent;~~

- the IE "measured results" and ~~possible~~the IE "additional measured results" according to 8.4.2;

- move all entries from "cells recently triggered" to "cells triggered" in the variable TRIGGERED_1E_EVENT

- if "Measurement quantity" is "pathloss" and Equation 3 below is fulfilled for a primary CPICH, or if "Measurement quantity" is "CPICH Ec/N0" or "CPICH RSCP", and Equation 4 below is fulfilled for a primary CPICH:
  - if that primary CPICH is included in the "cells triggered" in the variable TRIGGERED_1E_EVENT~~S~~:
    - remove that primary CPICH and sent reports from "cells triggered" in the variable TRIGGERED_1E_EVENT~~S~~.

Upon transition to CELL_DCH the UE shall:
- include the primary CPICH of all cells in the current active set that fulfil the equations 1 or 2 according to the "Measurement quantity" of event 1e into the "cells triggered" in the variable TRIGGERED_1E_EVENT~~S~~.

Equation 1 (Triggering condition for pathloss)

$$M_{New} \leq T_{1e} - H_{1e}/2$$

Equation 2 (Triggering condition for all the other measurement quantities)

$$M_{New} \geq T_{1e} + H_{1e}/2$$

Equation 3 (Leaving triggering condition for pathloss)

$$M_{New} > T_{1e} + H_{1e}/2$$ [≥ in the formula changed to >]

Equation 4 (Leaving triggering condition for all the other measurement quantities)

$$M_{New} < T_{1e} - H_{1e}/2$$ [≤ in the formula changed to <]

The variables in the formula are defined as follows:

$\boldsymbol{M_{New}}$ is the measurement result of a cell that becomes better than an absolute threshold.

$\boldsymbol{T_{1e}}$ is an absolute threshold.

$\boldsymbol{H_{1e}}$ is the hysteresis parameter for the event 1e.

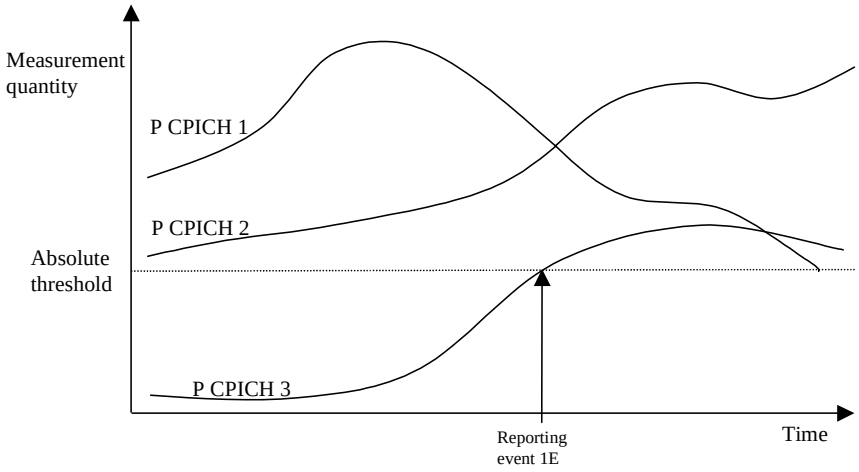

Figure 65: Event-triggered report when a Primary CPICH becomes better than an absolute threshold

~~Event 1E may be used for triggering a measurement report, which includes cells, which the UE has detected without having received a neighbour cell list.~~

14.1.2.6 Reporting event 1F: A Primary CPICH becomes worse than an absolute threshold

When event 1F is configured in the UE, the UE shall:

- if "Measurement quantity" is "pathloss" and Equation 1 below is fulfilled for ~~a~~one or more primary CPICH, or if "Measurement quantity" is "CPICH Ec/N0" or "CPICH RSCP", and Equation 2 below is fulfilled for ~~a~~one or more primary CPICH~~s~~ do the following for each of these primary CPICHs:
  - if the equations have been fulfilled during the time "Time to trigger", and if that primary CPICH is part of cells allowed to trigger the event according to "Triggering condition 1", and that primary CPICH is not included in the "cells triggered" in the variable TRIGGERED_1F_EVENT~~S~~:
    - include that primary CPICH in the "cells recently triggered" in the variable TRIGGERED_1F_EVENT~~S~~;

- if any primary CPICHs are stored in the "cells recently triggered" in the variable TRIGGERED_1F_EVENT
  - send a measurement report with IEs set as below:
    - in "intra-frequency measurement event results": "Intrafrequency event identity" to "1f" and in "cell measurement event results" ~~to~~ all entries of the "cells recently triggered" in the variable TRIGGERED_1F_EVENT that are part of the active set in descending order according to the configured measurement quantity~~the CPICH info of the primary CPICH that triggered the report; and~~

    - ~~include this for each 1f event that is triggered without a report being sent;~~

    - the IE "measured results" and ~~possible~~ "additional measured results" according to 8.4.2;

- move all entries from "cells recently triggered" to "cells triggered" in the variable TRIGGERED_1F_EVENT

- if "Measurement quantity" is "pathloss" and Equation 3 below is fulfilled for a primary CPICH, or if "Measurement quantity" is "CPICH Ec/N0" or "CPICH RSCP", and Equation 4 below is fulfilled for a primary CPICH:
  - if that primary CPICH is included in the "cells triggered" in the variable TRIGGERED_1F_EVENTS:
    - remove that primary CPICH ~~and sent reports~~ from "cells triggered" in the variable TRIGGERED_1F_EVENTS.

Upon transition to CELL_DCH the UE shall:
- include the primary CPICH of all cells that fulfil the equations 1 or 2 according to the "Measurement quantity" of event 1f into the "cells triggered" in the variable TRIGGERED_1F_EVENTS.

Equation 1 (Triggering condition for pathloss)

$$M_{New} \geq T_{1f} + H_{1f}/2,$$

Equation 2 (Triggering condition for all the other measurement quantities)

$$M_{New} \leq T_{1f} - H_{1f}/2,$$

Equation 3 (Leaving triggering condition for pathloss)

$$M_{New} < T_{1f} - H_{1f}/2,$$ [≤ in the formula changed to <]

Equation 4 (Leaving triggering condition for all the other measurement quantities)

$$M_{New} > T_{1f} + H_{1f}/2,$$ [≥ in the formula changed to >]

The variables in the formula are defined as follows:

$\boldsymbol{M_{New}}$ is the measurement result of a cell that becomes worse than an absolute threshold

$\boldsymbol{T_{1f}}$ is an absolute threshold

$\boldsymbol{H_{1f}}$ is the hysteresis parameter for the event 1f.

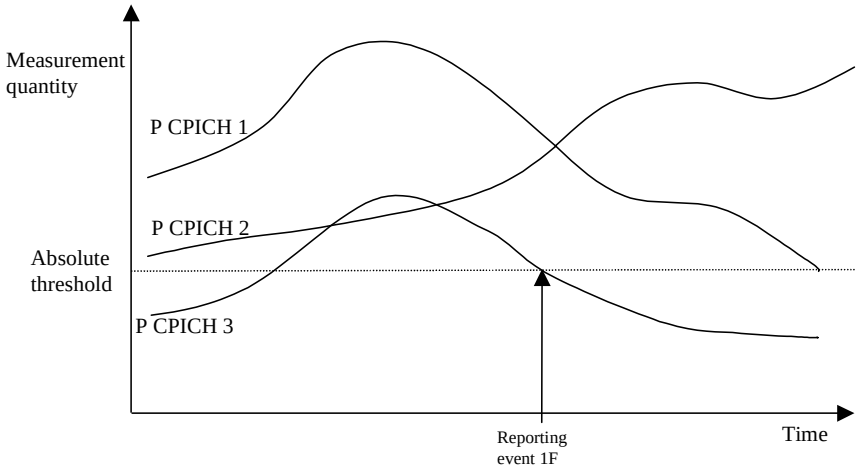

Figure 66: Event-triggered report when a Primary CPICH becomes worse than an absolute threshold

14.1.4 Event-triggered periodic intra-frequency measurement reports (informative)

14.1.4.1 Cell addition failure (FDD only)

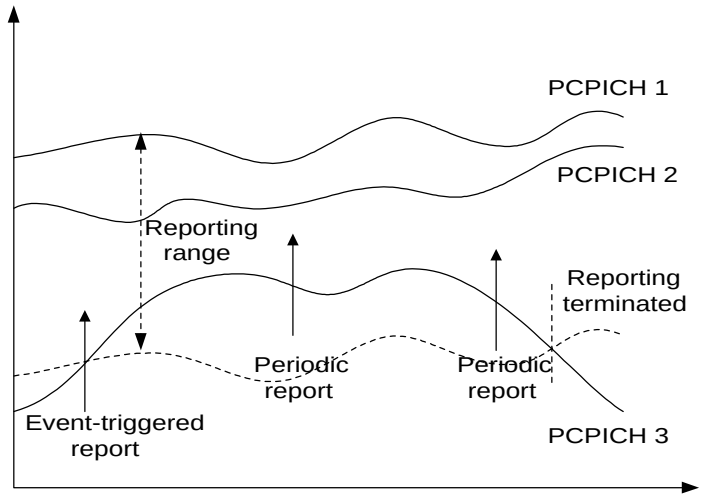

Figure 70: Periodic reporting triggered by event 1A

When a cell enters the reporting range and triggers event 1A, the UE shall transmit a MEASUREMENT REPORT to the UTRAN and typically this may result in an update of the active set. However, in some situations the UTRAN may be unable to add a strong cell to the active set typically due to capacity shortage for example.

The UE shall continue reporting after the initial report by reverting to periodical measurement reporting if the reported cell is not added to the active set. This is illustrated in Figure 70. During periodic reporting the UE shall transmit MEASUREMENT REPORT messages to the UTRAN at predefined intervals. The reports shall include reporting information of the cells in the current active set and of the monitored cell(s) in the reporting range.

Event-triggered periodic measurement reporting shall be terminated if:

- there are no longer any monitored cell(s) within the reporting range; or

- the UTRAN has added cells to the active set so that it includes the maximum number of cells (defined by the **reporting deactivation threshold** parameter), which are allowed for event 1A to be triggered; or

- the UE has sent the maximum number of MEASUREMENT REPORT messages (defined by the **amount of reporting** parameter).

The reporting period is assigned by the UTRAN (with the **Reporting interval** parameter). If the reporting interval is set to zero event-triggered measurement reporting shall not be applied.

14.1.4.2 Cell replacement failure (FDD only)

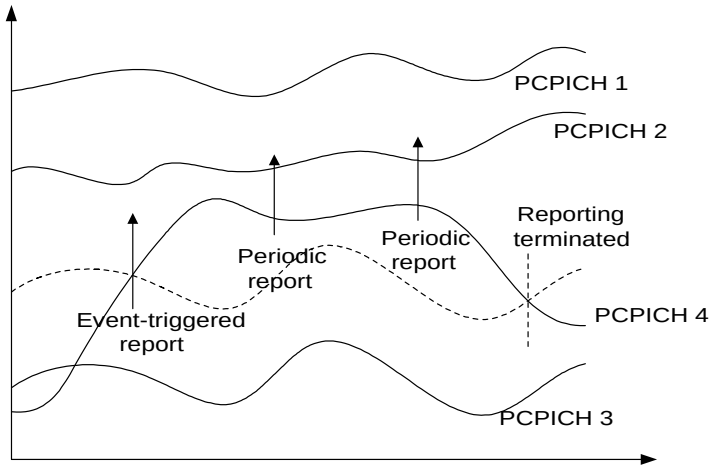

Figure 71: Periodic reporting triggered by event 1C

When a cell enters the replacement range and triggers event 1C, the UE shall transmit a MEASUREMENT REPORT to the UTRAN and typically this may result in the replacement of the weakest active cell. If the UTRAN is unable to replace the cell due to for example capacity shortage, it is beneficial to receive continuous reports in this case as well.
The UE shall revert to periodical measurement reporting if the UTRAN does not update the active set after the transmission of the measurement report. This is illustrated in Figure 71. During periodic reporting the UE shall transmit MEASUREMENT REPORT messages to the UTRAN at predefined intervals. The reports shall include reporting information of the cells in the current active set and of the monitored cell(s) in the replacement range.
Event-triggered periodic measurement reporting shall be terminated if:

- there are no longer any monitored cell(s) within the replacement range; or

- the UTRAN has removed cells from the active set so that there are no longer the minimum amount of active cells for event 1C to be triggered (as defined by the **replacement activation threshold** parameter); or

- the UE has sent the maximum number of MEASUREMENT REPORT messages (defined by the **amount of reporting** parameter).

The reporting period is assigned by the UTRAN (with the **Reporting interval** parameter). If the reporting interval is set to zero, event-triggered measurement reporting shall not be applied.

14.1.5 Mechanisms available for modifying intra-frequency measurement reporting behaviour (informative)

14.1.5.1 Hysteresis

To limit the amount of event-triggered reports, a hysteresis parameter may be connected with each reporting event given above. The value of the hysteresis is given to the UE in the Reporting criteria field of the Measurement Control message.
In the example in Figure 72, the hysteresis ensures that the event 1D (FDD) or IG(TDD) (primary CPICH(FDD)/CCPCH(TDD) 2 becomes the best cell) is not reported until the difference is equal to the hysteresis value. The fact that primary CPICH(FDD)/CCPCH(TDD) 1 becomes best afterwards is not reported at all in the example since the primary CPICH(FDD)/CCPCH(TDD) 1 does not become sufficiently better than the primary CPICH(FDD)/CCPCH(TDD) 2.

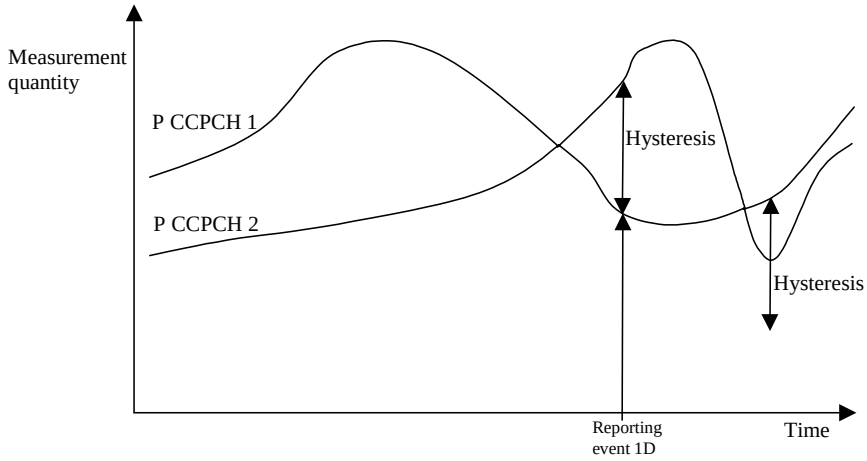

Figure 72: Hysteresis limits the amount of measurement reports

14.1.5.2 Time-to-trigger

To limit the measurement signalling load, a time-to-trigger parameter could be connected with each reporting event given above. The value of the time-to-trigger is given to the UE in the Reporting criteria field of the Measurement Control message.
The effect of the time-to-trigger is that the report is triggered only after the conditions for the event have existed for the specified time-to-trigger. In the following FDD example in Figure 73, the use of time-to-trigger means that the event (primary CPICH 3 enters the reporting range) is not reported until is has been within the range for the time given by the time-to-trigger parameter.

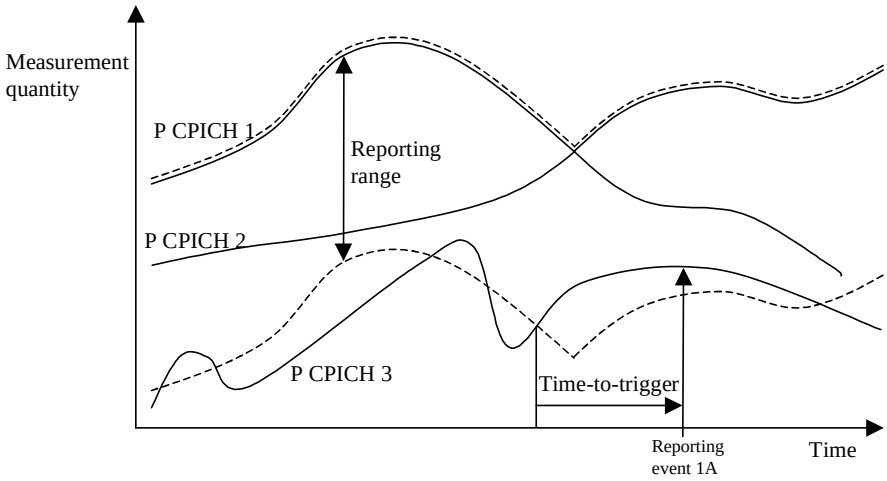

Figure 73: Time-to-trigger limits the amount of measurement reports

In the following TDD example in Figure 74, the use of time-to-trigger means that the event (Timeslot ISCP upon certain threshold) is not reported until it has been upon the threshold for the time given by the time-to trigger parameter.

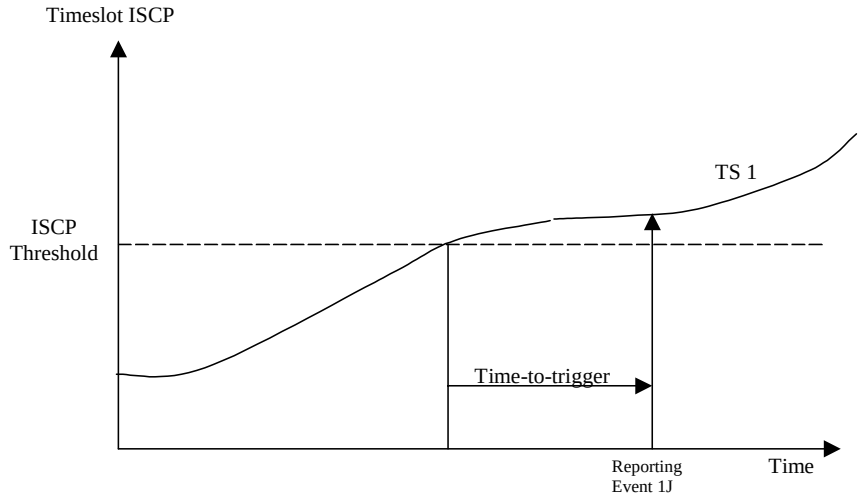

Figure 74: Time-to-trigger limits the amount of measurement reports

NOTE: The time-to-trigger could be combined with hysteresis, i.e. a hysteresis value is added to the measurement quantity before evaluating if the time-to-trigger timer should be started.

14.1.5.3 Cell individual offsets

For each cell that is monitored, an offset can be assigned with inband signalling. The offset can be either positive or negative. The offset is added to the measurement quantity before the UE evaluates if an event has occurred. The UE receives the cell individual offsets for each primary CPICH(FDD)/CCPCH(TDD) in the IE "Cell individual offset" included in the IE "Cell info" associated with each measurement object ~~field of~~ included in the MEASUREMENT CONTROL message.

For the FDD example, in Figure 75, since an offset is added to primary CPICH 3, it is the dotted curve that is used to evaluate if an event occurs. Hence, this means that measurement reports from UE to UTRAN are triggered when primary CPICH plus the corresponding offset, i.e. the dotted curve, leaves and enters the

reporting range and when it gets better than primary CPICH 1 (if these events have been ordered by UTRAN). This offset mechanism provides the network with an efficient tool to change the reporting of an individual primary CPICH.
By applying a positive offset, as in Figure 75, the UE will send measurement reports as if the primary CPICH is offset *x* dB better than what it really is. This could be useful if the operator knows that a specific cell is interesting to monitor more carefully, even though it is not so good for the moment. In the example in Figure 75, the operator might know by experience that in this area primary CPICH 3 can become good very quickly (e.g. due to street corners) and therefore that it is worth reporting more intensively. Depending on the implemented handover evaluation algorithm, this may result in the cell with primary CPICH 3 being included in the active set earlier than would have been the case without the positive offset.

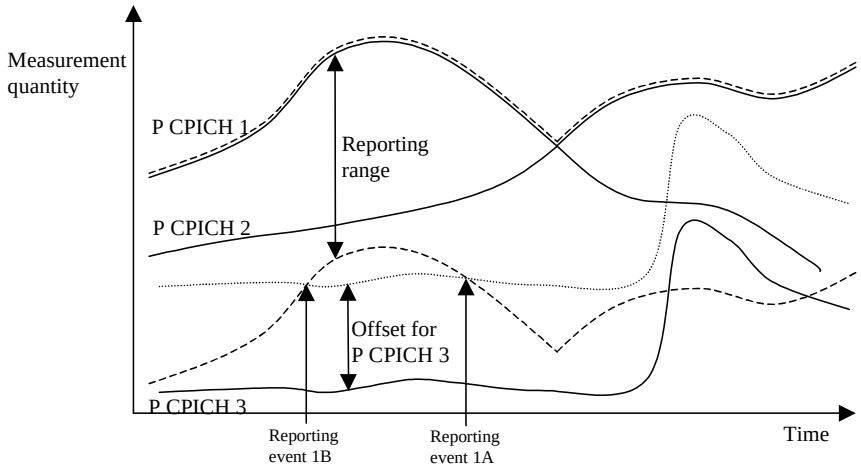

Figure 75: A positive offset is applied to primary CPICH 3 before event evaluation in the UE

For the TDD example, in Figure 76, an offset is added to primary CCPCH2, it is the dotted curve that is used to evaluate if the primary CCPCH2 becomes better than primary CCPCH1 (ordered by the UTRAN).

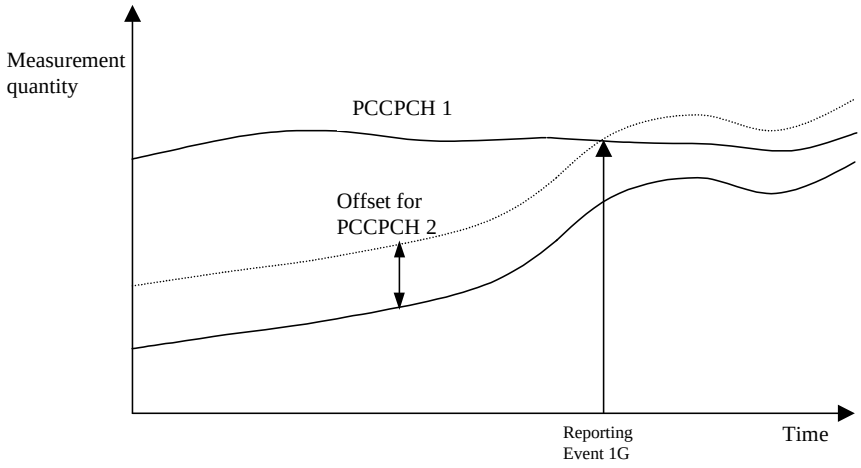

Figure 76: A positive offset is applied to primary CCPCH 2

Correspondingly, the operator can choose to apply a negative offset to a primary CCPCH. Then the reporting on that primary CCPCH is limited and the corresponding cell may be, at least temporarily excluded from the active set or as a target cell for handover.
The cell individual offset can be seen as a tool to move the cell border. It is important to note that the offset is added before triggering events, i.e. the offset is added by the UE before evaluating if a measurement

report should be sent as opposed to offsets that are applied in the network and used for the actual handover evaluation.

14.1.5.4 Forbid a Primary CPICH to affect the reporting range (FDD only)

The reporting range affects the reporting events 1A and 1B presented above. The reporting range is defined as a function of all the Primary CPICHs in the active set (see 14.1.2.1 and 14.1.2.2). If the parameter W is set to 0, the reporting range is defined relative to the best Primary CPICH. However, there could be cases where it is good to forbid a specific Primary CPICH to affect the reporting range. For example in Figure 77 the network has requested the UE to not let Primary CPICH 3 affect the reporting range. This mechanism could be effective if the operator knows by experience that the quality of Primary CPICH 3 is very unstable in a specific area and therefore should not affect the reporting of the other Primary CPICHs.
The UE shall ignore that a Primary CPICH is forbidden to affect the reporting range if all of the following conditions are fulfilled:

- the Primary CPICH is included in active set; and
- all cells in active set are defined as Primary CPICHs forbidden to affect the reporting range.

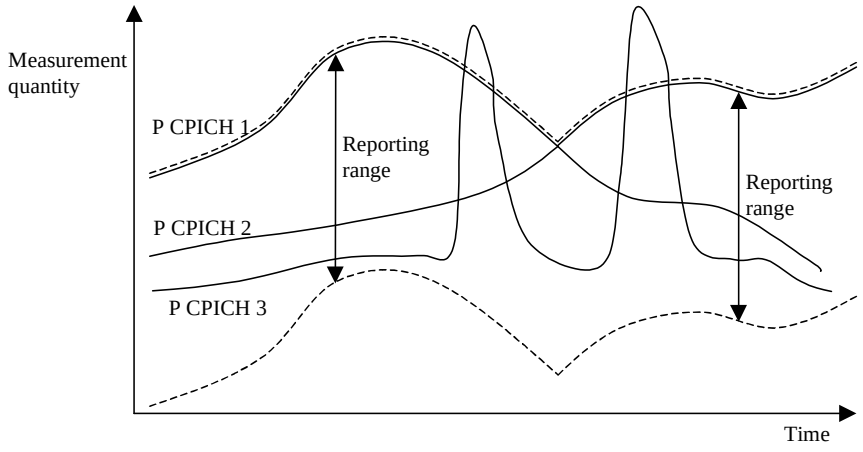

Figure 77: Primary CPICH 3 is forbidden to affect the reporting range

14.1.6 Report quantities in intra-frequency measurements

The quantities that the UE shall report to UTRAN when the event is triggered for an intra-frequency measurement are given by the "Intra-frequency reporting quantity" IE stored for this measurement and can be the following:

1 SFN-SFN observed time difference

2 Cell synchronisation information

3 Cell Identity

4 Downlink E_c/N_0 (FDD).

5 Downlink path loss.

For FDD:
Pathloss in dB = Primary CPICH Tx power - CPICH RSCP.

For Primary CPICH Tx power the IE "Primary CPICH Tx power" shall be used. The unit is dBm.

CPICH RSCP is the result of the CPICH RSCP measurement. The unit is dBm.

For TDD:
Pathloss in dB = Primary CCPCH TX power - Primary CCPCH RSCP.

For Primary CCPCH TX power the IE "Primary CCPCH TX Power" shall be used. The unit is dBm.

Primary CCPCH RSCP is the result of the Primary CCPCH RSCP measurement. The unit is dBm.

If necessary Pathloss shall be rounded up to the next higher integer.
Results higher than 158 shall be reported as 158.
Results lower than 46 shall be reported as 46.

5 Downlink received signal code power (RSCP) after despreading (of a primary CPICH for FDD, and of a primary CCPCH for TDD).

6 ISCP measured on Timeslot basis. (TDD)

7 Proposed TGSN (TDD)

A description of those values can be found in [7] and [8].

~~In the event-triggered measurement reports, mandatory information connected to the events is always reported. For instance, at the event "a primary CPICH(FDD)/CCPCH(TDD) enters the reporting range" the corresponding report identifies the primary CPICH(FDD)/CCPCH(TDD) that entered the range. However, besides this mandatory information, UTRAN should be able to optionally require additional measurement information in the report to support the radio network functions in UTRAN. Furthermore, it will allow the UTRAN to use the UE as a general tool for radio network optimisation if necessary. Examples of report quantities that may be appended to the measurement reports are:~~

- ~~Downlink transport channel block error rate.~~
- ~~Downlink E_c/I_0 on primary CPICH(FDD)/CCPCH(TDD) (e.g. used for initial DL power setting on new radio links).~~
- ~~Time difference between the received primary CPICH(FDD)/CCPCH(TDD) frame-timing from the target cell and the earliest received existing DPCH path. [Note: This measurement is identified in [26] (denoted T_m in clause 7)].~~
- ~~UE transmit power.~~
- ~~UE position.~~

3GPP TSG-RAN WG2 Meeting #23
Helsinki, Finland, August 27th-31th 2001

Tdoc R2-012078

CR-Form-v3

CHANGE REQUEST

⌘ **25.331 CR 927** ⌘ rev **r1** ⌘ Current version: **3.7.0** ⌘

*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:	⌘	Multiplexing configuration corrections
Source:	⌘	TSG-RAN WG2
Work item code:	⌘	TEI
Date:	⌘	2001-08-30
Category:	⌘	**F**
Release:	⌘	R99

Use one 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 one 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: ⌘ Some corrections are needed to resolve ambiguities in the existing text, and to cover error cases that are not yet covered:

8.6.4.6:

The sentence “release the lower layer entities dedicated for that radio bearer” is ambiguous since it could be understood that the transport channel and physical channel that the released radio bearer was mapped on shall be released.

In 8.6.5.10 and 10.3.5.6:

The SCCPCH TFCS should not be included in 10.3.5.6 DL Transport channel information common for all transport channels.

All necessary configuration information is already available in System information.

And in case the UE is in CELL_DCH, the IE 10.3.6.27 contains 10.3.6.70 that contains the SCCPCH configuration.

In 10.3.4.21:

The two conditions "UL-RLC info" and "DL-RLC info" do not cover the case the IE “RLC info” is not received for the RB, because the choice “Same as RB” was made as “CHOICE RLC info type” in the IE RB information to set up.

In 8.6.4.8:

- Confusion between RB and logical channel.
- Some error cases were not covered yet:
  - the case where a RB using TM-RLC or UM-RLC is realised in a multiplexing option using two logical channels
  - the case where the same logical channel identity was allocated to two

logical channels belonging to two different RBs mapped onto the same transport channel.

- Some clarification was needed regarding the sentence: “no RLC size is applicable for that RB”.
- There is some confusion in the existing text regarding whether the IE “Transport Format Set” is included in the same message or not.
- The sentence “configure MAC multiplexing according to the selected multiplexing option” is quite ambiguous. Indeed, in the case only one logical channel is mapped onto a transport channel, but the IE “Logical channel id” was included in the multiplexing option for that logical channel on that transport channel, it is not clear whether the MAC header shall be included or not.
- The sentence “if a transport channel that would not exist as a result of the message is referred to” can be misunderstood. Its original meaning was to prohibit for a transport channel removed in the same message, in one of the IEs “Deleted DL TrCH information” or “Deleted UL TrCH information” to be used in any multiplexing option. But it could be interpreted that this shall also apply to the case of the transition from CELL_FACH to CELL_DCH, where RACH and FACH are removed “implicitely”.

In 8.6.5.1:

- The situations where Transport Channels are reconfigured without the RBs mapped onto it being reconfigured is not covered in the existing text.

Case of the RACH:

If the UE is in CELL_FACH state and is changing cell, the transport formats that can be used for the RACH in the new cell can be different from the ones that existed in the old cell. When receiving the IE “PRACH system information list”, the UE could thus be in a situation where it has RLC size indexes stored within the “RB mapping info” for its radio bearers that point at non existing RLC sizes. Besides, in such a situation, UTRAN may then according to the current text reconfigure all the RBs that have multiplexing options on the RACH within the “Cell update confirm” message. This means need for extra-signalling for each UE entering the cell, also UTRAN need to keep track of cell configuration in relation to UE configuration. To avoid that problem, it is proposed to allow for the RLC size indexes to point at non existing RLC sizes and to have several RLC sizes pointed at in the AM case when defining the multiplexing option for a RB on RACH. If RACH is the transport channel to be used, the RLC size indexes that do not point at any actual RLC size shall then be ignored by the UE.

Summary of change: ⌘ *In the text of the CR, the yellow parts correspond to text that has been moved, and the green parts to comments related to the nature of the changes.*

8.6.4.6:

It is clarified that what is meant by “release the lower layer entities dedicated for that radio bearer” is actually to release the RLC and PDCP entities that were dedicated to that radio bearer.

In 8.6.5.10 and 10.3.5.6:

Change explanation in tabular 10.3.5.6 for the IE SCCPCH TFCS to “This IE should not be included in this version of the protocol”

In the RB mapping info IE:

The text was reshuffled to resolve the confusion between RB and logical channel, and two bullets were added to clarify that INVALID_CONFIGURATION shall be

set to TRUE in case one of the two situations described above occurred.

It was clarified that the “transport channels that would not exist as a result of the message” means the ones removed in IE “Deleted DL TrCH information” or “Deleted UL TrCH information”.

It was clarified that MAC multiplexing shall only be used for a logical channel in case there is another logical channel mapped on the same transport channel. This shall not depend on whether the “Logical Channel id” was included for the logical channel or not.

For the RACH issue, it was clarified that for a multiplexing option on RACH, the RLC size indexes could point at non existing RLC sizes, and that those shall be ignored when determining the set of RLC sizes applicable to the logical channels used by the RB. If the RB uses AM and if RACH is the transport channel to be used, the largest RLC size shall be used.

In the Transport Format Set IE:

The following situations shall trigger INVALID_CONFIGURATION to be set to TRUE:

- If the “Logical Channel List” is set to “All” or “Explicit List”, and for any logical channel that is indicated, the “RLC size list” (either stored or included in the same message) was not set to “Configured”.
- If a logical channel is indicated to be mapped onto a transport channel for which the “Logical Channels lists” are given as “Explicit Lists” for all the RLC sizes, but is not included in any of those.
- If there is a mix of Logical Channel List defined as “Configured” and “All”/”Explicit List”.
- In the case where the “Logical Channel Lists” are set to “Configured” for a transport channel, and for any logical channel that could be mapped onto it, the “RLC size list” is also set to “Configured”.
- In the case the “RLC size list” for any logical channel points to an RLC size that does not exist in the Transport Format Set.

The changes introduced for RACH in the IE RB mapping info were also reflected in that section.

10.3.4.21:

In the case the choice “Same as RB” was made as “CHOICE RLC info type” in the IE RB information to set up, the “RLC info” received or stored for the RB pointed at in the IE “Same as RB” shall be checked. The current conditions are rephrased to reflect that.

Impact analysis:

Correction to functionality (the multiplexing of RB to transport channels) where the specification was ambiguous or not sufficiently explicit. Would not affect implementations behaving like indicated in the CR, would affect implementations supporting the corrected functionality otherwise.

Consequences if not approved:	⌘	Ambiguity in the text that could lead to unexpected UE behaviour.

Clauses affected:	⌘	8.6.4.6, 8.6.4.8, 8.6.5.1, 8.6.5.10, 10.3.4.21, 10.3.5.6		
Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ O&M Specifications	⌘	25.331 v4.1.0, CR 928
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.

8.6.4.6 RB information to release

If the IE "RB information to release" is included, the UE shall apply the following actions on the radio bearer identified with the value of the IE "RB identity". The UE shall:

- release the ~~entities in lower layers~~ PDCP and RLC entities dedicated for that radio bearer;
- if the information about the radio bearer is stored in the variable ESTABLISHED_RABS:
  - indicate release of the RAB subflow associated with the radio bearer to upper layers;
  - delete the information about the radio bearer from the variable ESTABLISHED_RABS;
  - when all radio bearers belonging to the same radio access bearer have been released:
    - indicate release of the radio access bearer to upper layers providing the "CN domain identity" together with the "RAB identity" stored in the variable ESTABLISHED_RABS;
    - delete all information about the radio access bearer from the variable ESTABLISHED_RABS.

8.6.4.8 RB mapping info

If the IE "RB mapping info" is included, the UE shall, ~~for each multiplexing option of that RB~~:

- for each multiplexing option of the RB:
  - if a transport channel that would not exist as a result of the message (i.e. removed in the same message in IE "Deleted DL TrCH information" and IE "Deleted UL TrCH information") is referred to:
    - set the variable INVALID_CONFIGURATION to TRUE;
  - if a multiplexing option that maps a logical channel corresponding to a TM-RLC entity onto RACH, CPCH, FACH or DSCH is included:
    - set the variable INVALID_CONFIGURATION to TRUE;
  - if the multiplexing option realises the radio bearer on the uplink (resp. on the downlink) using two logical channels with different values of the IE "Uplink transport channel type" (resp. of the IE "Downlink transport channel type"): [text slightly changed to fit here: it read:"if a multiplexing option that realises the radio bearer…]
    - set the variable INVALID_CONFIGURATION to TRUE;
  - if that RB is using TM and the IE "Segmentation indication" is set to TRUE and, based on the multiplexing configuration resulting from this message, the logical channel corresponding to it is mapped onto the same transport channel as another logical channel:[text slightly changed to resolve the confusion between RB and logical channel: it read: "…it is mapped onto the same transport channel as another RB]
    - set the variable INVALID_CONFIGURATION to TRUE;
  - if the transport channel considered in that multiplexing option is different from RACH and if that RB is using AM and the set of RLC sizes applicable to the logical channel transferring data PDUs has more than one element:
    - set the variable INVALID_CONFIGURATION to TRUE;
  - if that RB is using UM or TM and the multiplexing option realises it using two logical channels:

- set the variable INVALID_CONFIGURATION to TRUE;

- for each logical channel in that multiplexing option:

  - if the value of the IE "RLC size list" is set to "Explicit list": [indent increased two levels]

    - if a "Transport format set" for ~~that~~ the transport channel this logical channel is mapped on in this multiplexing option is included in the same message, and the value (index) of any IE "RLC size index" in the IE "RLC size index list" does not correspond to an "RLC size" in the IE transport format set of that transport channel given in the message; or[indent increased two levels]

    - if the transport channel this logical channel is mapped on in this multiplexing option is different from RACH, and if a "Transport format set" for that transport channel is not included in the same message, and the value (index) of any IE "RLC size index" in the IE "RLC size index list" does not correspond to an "RLC size" in the stored transport format set of that transport channel or [indent increased two levels]

  - if a "Transport format set" for ~~that~~ the transport channel this logical channel is mapped on in this multiplexing option is included in the same message, and the value of any IE "Logical channel list" in the transport format set is not set to "Configured"; or [indent increased two levels]

  - if a "Transport format set" for ~~that~~ the transport channel this logical channel is mapped on in this multiplexing option is not included in the same message, and the value of any IE "Logical channel list" in the stored transport format set of that transport channel is not set to "Configured"; [indent increased two levels]

    - set the variable INVALID_CONFIGURATION to TRUE; [indent increased two levels]

  - if the value of the IE "RLC size list" is set to "All": [indent increased two levels]

    - if a "Transport format set" for ~~that~~ the transport channel this logical channel is mapped on in this multiplexing option is included in the same message, and the value of any IE "Logical channel list" in the transport format set is not set to "Configured"; or [indent increased two levels]

    - if a "Transport format set" for ~~that~~ the transport channel this logical channel is mapped on in this multiplexing option is not included in the same message, and the value of any IE "Logical channel list" in the stored transport format set of that transport channel is not set to "Configured"; [indent increased two levels]

      - set the variable INVALID_CONFIGURATION to TRUE; [indent increased two levels]

  - if the value of the IE "RLC size list" is set to "Configured": [indent increased two levels]

    - if a "Transport format set" for ~~that~~ the transport channel this logical channel is mapped on in this multiplexing option is included in the same message, and ~~the IE "Logical channel list" in the transport format set indicates that no "RLC size" is applicable for that RB~~ for none of the RLC sizes defined for that transport channel in the “Transport format set”, the “Logical Channel List” is set to “All” or given as an “Explicit List” which contains this logical channel; or [indent increased two levels]

    - if a "Transport format set" for ~~that~~ the transport channel this logical channel is mapped on in this multiplexing option is not included in the same message, and ~~the IE "Logical channel list" in the stored transport format set of that transport channel indicates that no "RLC size" is applicable for that RB;~~ for none of the RLC sizes defined in the transport format set stored for that transport channel, the “Logical Channel List” is set to “All” or given as an “Explicit List” which contains this logical channel; [indent increased two levels]

- set the variable INVALID_CONFIGURATION to TRUE; [indent increased two levels]

- ~~if that RB is using TM and the IE "Segmentation indication" is set to TRUE and, based on the multiplexing configuration resulting from this message, it is mapped onto the same transport channel as another RB:~~

  - ~~set the variable INVALID_CONFIGURATION to true;~~ [moved up]

- ~~else:~~

- if, as a result of the message this IE is included in, several radio bearers can be mapped onto the same transport channel, and the IE "Logical Channel Identity" was not included in the RB mapping info of any of those radio bearers for a multiplexing option on that transport channel or the same "Logical Channel Identity" was used more than once in the RB mapping info of those radio bearers for the multiplexing options on that transport channel:

  - set the variable INVALID_CONFIGURATION to TRUE;

- delete all previously stored multiplexing options for that radio bearer; [indent decreased one level]

- store each new multiplexing option for that radio bearer; [indent decreased one level]

- select and configure the multiplexing options applicable for the transport channels to be used; [indent decreased one level]

- if the IE "Uplink transport channel type" is set to the value "RACH": [indent decreased one level]

  - refer the IE "RLC size index" to the RACH Transport Format Set of the first PRACH received in the IE "PRACH system information list" received in SIB5 or SIB6; [indent decreased one level]

- determine the sets of RLC sizes that apply to the logical channels used by that RB, based on the "RLC size list" IEs and/or the "Logical Channel List" IEs included in the applicable "Transport format set" (either the ones received in the same message or the ones stored if none was ~~were~~ received); in case the selected multiplexing option is a multiplexing option on RACH, the UE shall ignore the RLC size indexes that do not correspond to any RLC size within the Transport Format Set stored for RACH. [indent decreased one level]

  - ~~if that RB is using AM and the set of RLC sizes applicable to the logical channel transferring data PDUs has more than one element:~~

    - ~~set the variable INVALID_CONFIGURATION to true.~~ [moved up]

- if RACH is the transport channel to be used on the uplink, if that RB has a multiplexing option on RACH and if it is using AM, the RLC size (or RLC sizes in case the RB is realised using two logical channels) that shall apply for the corresponding RLC entity is the largest one amongst the ones derived according to the previous bullet.

- if that RB is using AM and the RLC size applicable to the logical channel transporting data PDUs is different from the one derived from the previously stored configuration: [indent decreased one level]

  - re-establish the corresponding RLC entity; [indent decreased one level]

  - configure the corresponding RLC entity with the new RLC size; [indent decreased one level]

  - if the variable CIPHERING_STATUS is set to "Started":[indent decreased one level]

    - if this IE was included in system information: [indent decreased one level]

- set the HFN values for the corresponding RLC entity equal to the value of the IE "START" for the CN domain stored in the variable LATEST_CONFIGURED_CN_DOMAIN that will be included in the CELL UPDATE message that will be sent before the next transmission; [indent decreased one level]

- if this IE was included in CELL UPDATE CONFIRM: [indent decreased one level]

- set the HFN values for the corresponding RLC entity equal to the value of the IE "START" included in the latest transmitted CELL UPDATE message for the CN domain stored in the variable LATEST_CONFIGURED_CN_DOMAIN; [indent decreased one level]

- if this IE was included in a reconfiguration message: [indent decreased one level]

- set the HFN values for the corresponding RLC entity equal to the value of the IE "START" that will be included in the reconfiguration complete message for the CN domain stored in the variable LATEST_CONFIGURED_CN_DOMAIN; [indent decreased one level]

- if that RB is using UM, indicate the largest applicable RLC size to the corresponding RLC entity [indent decreased one level]

- configure MAC multiplexing according to the selected multiplexing option; MAC multiplexing shall only be configured for a logical channel if the transport channel it is mapped on according to the selected multiplexing option is the same as the transport channel another logical channel is mapped on according to the multiplexing option selected for it. [indent decreased one level]

- configure the MAC with the logical channel priorities according to selected multiplexing option; [indent decreased one level]

- configure the MAC with the set of applicable RLC Sizes for each of the logical channels used for that RB; [indent decreased one level]

~~- if a transport channel that would not exist as a result of the message is referred to:~~

~~- set the variable INVALID_CONFIGURATION to TRUE;~~ [moved up]

~~- if a multiplexing option that maps a logical channel corresponding to a TM-RLC entity onto RACH, CPCH, FACH or DSCH is included:~~

~~- set the variable INVALID_CONFIGURATION to TRUE;~~ [moved up]

~~- if a multiplexing option is included that realises the radio bearer on the uplink (resp. on the downlink) using two logical channels with different values of the IE "Uplink transport channel type" (resp. of the IE "Downlink transport channel type"):~~

~~- set the variable INVALID_CONFIGURATION to TRUE;~~ [moved up]

- if there is no multiplexing option applicable for the transport channels to be used: [indent decreased one level]

- set the variable INVALID_CONFIGURATION to TRUE; [indent decreased one level]

- if there is more than one multiplexing option applicable for the transport channels to be used: [indent decreased one level]

- set the variable INVALID_CONFIGURATION to TRUE. [indent decreased one level]

In case IE "RB mapping info" includes IE "Downlink RLC logical channel info" but IE "Number of downlink RLC logical channels" is absent, the parameter values are exactly the same as for the corresponding UL logical channels. In case two multiplexing options are specified for the UL, the first options shall be used as default for the DL. As regards the IE "Channel type", the following rule should be applied to derive the DL channel type from the UL channel included in the IE:

Channel used in UL	DL channel type implied by "same as"
DCH	DCH
RACH	FACH
CPCH	FACH
USCH	DSCH

8.6.5.1 Transport Format Set

If the IE "Transport format set" is included, the UE shall:

- if the transport format set is a RACH TFS received in System Information Block type 5 or 6, and CHOICE "Logical Channel List" has the value "Explicit List":
  - ignore that System Information Block;
- if the transport format set for a downlink transport channel is received in a System Information Block, and CHOICE "Logical Channel List" has a value different from 'ALL':
  - ignore that System Information Block;
- if the transport format set for a downlink transport channel is received in a message on a DCCH, and CHOICE "Logical Channel List" has a value different from 'ALL':
  - keep the transport format set if this exists for that transport channel;
  - set the variable INVALID_CONFIGURATION to TRUE;
- if the value of any IE "RB identity" (and "Logical Channel" for RBs using two UL logical channels) in the IE "Logical channel list" does not correspond to a logical channel indicated to be mapped onto this transport channel in any RB multiplexing option (either included in the same message or previously stored and not changed by this message) or:
- if the "Logical Channel List" for any of the RLC sizes defined for that transport channel is set to "Configured" while it is set to "All" or given as an "Explicit List" for any other RLC size, or:
- if the "Logical Channel List" for any of the RLC sizes defined for that transport channel is set to "All" and for any logical channel mapped to this transport channel, the value of the "RLC size list" (either provided in the "RB mapping info" IE if included in the same message, or stored) is not set to "Configured" or:
- if the "Logical Channel List" for any of the RLC sizes defined for that transport channel is given as an "Explicit List" that contains a logical channel for which the value of the "RLC size list" (either provided in the "RB mapping info" IE if included in the same message, or stored) is not set to "Configured" or:
- if the "Logical Channel List" for all the RLC sizes defined for that transport channel are given as "Explicit List" and if one of the logical channels mapped onto this transport channel is not included in any of those lists, or:
- if the "Logical Channel List" for the RLC sizes defined for that transport channel is set to "Configured" and for any logical channel mapped onto that transport channel, the value of the "RLC size list" (either provided in the "RB mapping info" IE if included in the same message, or stored) is also set to "Configured" or:
- if the IE "Transport Format Set" was not received within the IE "PRACH system information list" and if the "Logical Channel List" for the RLC sizes defined for that transport channel is set to "Configured" and for any logical channel mapped onto that transport channel, the "RLC size list" (either provided in the "RB mapping info" IE if included in the same message, or stored) is given as an "Explicit List" that includes an "RLC size index" that does not correspond to any RLC size in this "Transport Format Set":
  - keep the transport format set if this exists for that transport channel;
  - set the variable INVALID_CONFIGURATION to TRUE;
- if the total number of configured transport formats for the transport channel exceeds maxTF:
  - keep the transport format set if this exists for that transport channel;
  - set the variable INVALID_CONFIGURATION to TRUE;

- if the IE "Transport format set" is considered as valid according to the rules above:
  - remove a previously stored transport format set if this exists for that transport channel;
  - store the transport format set for that transport channel;
  - consider the first instance of the parameter *Number of TBs and TTI List* within the *Dynamic transport format information* to correspond to transport format 0 for this transport channel, the second to transport format 1 and so on;
  - if the IE "Transport format Set" has the choice "Transport channel type" set to "Dedicated transport channel":
    - calculate the transport block size for all transport formats in the TFS using the following

      TB size = RLC size + MAC header size,

      where:
      - MAC header size is calculated according to [15] if MAC multiplexing is used. Otherwise it is 0 bits;
      - 'RLC size' reflects the RLC PDU size.
  - if the IE "Transport format Set" has the choice "Transport channel type" set to "Common transport channel":
    - calculate the transport block size for all transport formats in the TFS using the following:

      TB size = RLC size
  - if the IE "Number of Transport blocks" <> 0 and IE "RLC size" = 0, no RLC PDU data exists but only parity bits exist for that transport format;
  - if the IE "Number of Transport blocks" = 0, neither RLC PDU neither data nor parity bits exist for that transport format;
  - configure the MAC with the new transport format set (with computed transport block sizes) for that transport channel;
  - if the RB multiplexing option for a RB mapped onto that transport channel (based on the stored RB multiplexing option) is not modified by this message:
    - determine the sets of RLC sizes that apply to the logical channels used by that RB, based on the IE "Logical Channel List" and/or the IE "RLC Size List" from the previously stored RB multiplexing option; if the IE "Transport Format Set" was received within the IE "PRACH system information list", the UE shall ignore the RLC size indexes in the stored RB multiplexing option that do not correspond to any RLC size in the received Transport Format Set.
    - if the IE "Transport Format Set" was received within the IE "PRACH system information list", if that RB is using AM and if RACH is the transport channel to be used on the uplink, the RLC size (or RLC sizes in case the RB is realised using two logical channels) that shall apply for the corresponding RLC entity is the largest one amongst the ones derived according to the previous bullet.
    - if the IE "Transport Format Set" was not received within the IE "PRACH system information list", and if that RB is using AM and the set of RLC sizes applicable to the logical channel transferring data PDUs has more than one element:
      - set the variable INVALID_CONFIGURATION to true;
    - if that RB is using AM and the RLC size applicable to the logical channel transporting data PDUs is different from the one derived from the previously stored configuration:

- re-establish the corresponding RLC entity;
- configure the corresponding RLC entity with the new RLC size;
- if this IE was included in system information and if the variable CIPHERING_STATUS is set to "Started":
  - set the HFN values for the corresponding RLC entity equal to the value of the IE "START" for the CN domain stored in the variable LATEST_CONFIGURED_CN_DOMAIN that will be included in the CELL UPDATE message that will be sent before the next transmission;
- if this IE was included in CELL UPDATE CONFIRM and if the variable CIPHERING_STATUS is set to "Started":
  - set the HFN values for the corresponding RLC entity equal to the value of the IE "START" included in the latest transmitted CELL UPDATE message for the CN domain stored in the variable LATEST_CONFIGURED_CN_DOMAIN;
- if this IE was included in a reconfiguration message and if the variable CIPHERING_STATUS is set to "Started":
  - set the HFN values for the corresponding RLC entity equal to the value of the IE "START" that will be included in the reconfiguration complete message for the CN domain stored in the variable LATEST_CONFIGURED_CN_DOMAIN;
- if this IE was included in ACTIVE SET UPDATE and if the variable CIPHERING_STATUS is set to "Started":
  - set the HFN values for the corresponding RLC entity equal to the value of the IE "START" that will be included in the ACTIVE SET UPDATE COMPLETE message for the CN domain stored in the variable LATEST_CONFIGURED_CN_DOMAIN;

- if that RB is using UM:
  - indicate the largest applicable RLC size to the corresponding RLC entity;
- configure MAC with the set of applicable RLC Sizes for each of the logical channels used for that RB.

For configuration restrictions on Blind Transport Format Detection, see [27].

8.6.5.10 DL Transport channel information common for all transport channels

If the IE "DL Transport channel information common for all transport channels" is included the UE shall:

- if the IE "SCCPCH TFCS" is included:
  - ~~perform actions for the TFCS of the selected SCCPCH as specified in subclause 8.6.5.2;~~
  - set the variable INVALID_CONFIGURATION to TRUE;
- if the IE choice "mode" is set to FDD:
  - if the choice "DL parameters" is set to 'Independent':
    - if the IE "DL DCH TFCS" is included:
      - if the IE "SCCPCH TFCS" is included and the state the UE enters after handling the received information is other than CELL_DCH:
        - ignore the received IE "DL DCH TFCS";

NOTE: the IE "DL Transport channel information common for all transport channels" always includes a DL DCH TFCS configuration, either by including the IE "DL DCH TFCS " or by specifying that the TFCS is the same as in UL. If UTRAN does not require the reconfiguration of the concerned parameters, UTRAN may replace one TFC with the value that is already assigned for this IE.

- else:
  - perform actions as specified in subclause 8.6.5.2;

- if the IE choice "mode" is set to TDD:
  - if the IE "Individual DL CCTRCH information" is included:
    - for each DL TFCS identified by the IE "DL TFCS identity":
      - if the IE choice "DL parameters" is set to 'independent':
        - perform actions for the IE "DL TFCS" as specified in subclause 8.6.5.2;
      - if the IE choice "DL parameters" is set to 'same as UL':
        - if the IE "UL DCH TFCS identity" indicates an existing or a new UL TFCS:
          - store for that DL TFCS the TFCS identified by the IE "UL DCH TFCS identity";
        - else:
          - set the variable INVALID_CONFIGURATION to TRUE.

10.3.4.21 RB mapping info

A multiplexing option for each possible transport channel this RB can be multiplexed on.

Information Element/Group name	Need	Multi	Type and reference	Semantics description
Information for each multiplexing option	MP	1 to <maxRBMuxOptions>		
>RLC logical channel mapping indicator	CV-*UL-RLCLogicalChannels*		Boolean	TRUE indicates that the first logical channel shall be used for data PDUs and the second logical channel shall be used for control PDUs. FALSE indicates that control and data PDUs can be sent on either of the two logical channels. This parameter is not used in this release and shall be set to TRUE.
>Number of uplink RLC logical channels	CV-*UL-RLC info*	1 to MaxLoCHperRLC		1 or 2 logical channels per RLC entity or radio bearer RLC [16]
>>Uplink transport channel type	MP		Enumerated(DCH,RACH, CPCH,USCH)	CPCH is FDD only USCH is TDD only
>>ULTransport channel identity	CV-*UL-DCH/USCH*		Transport channel identity 10.3.5.18	This is the ID of a DCH or USCH (TDD only) that this RB could be mapped onto.
>>Logical channel identity	OP		Integer(1..15)	This parameter is used to distinguish logical channels multiplexed by MAC on a transport channel.
>>CHOICE *RLC size list*	MP			The RLC sizes that are allowed for this logical channel For radio bearers mapped to RACH, "Explicit list" is the only valid choice. The UE shall regard all other choices as undefined IE values and handle these as specified in clause 9.
>>>All			Null	All RLC sizes listed in the *Transport Format Set*. 10.3.5.23
>>>Configured			Null	The RLC sizes configured for this logical channel in the *Transport Format Set*. 10.3.5.23 if present in this message or in the previously stored configuration otherwise
>>>Explicit List		1 to <maxTF>		Lists the RLC sizes that are valid for the logical channel.
>>>>RLC size index	MP		Integer(1..maxTF)	The integer number is a reference to the *RLC size* which arrived at that position in the *Transport Format Set* 10.3.5.23
>>MAC logical channel priority	MP		Integer(1..8)	This is priority between a user's different RBs (or logical channels). [15]
>Downlink RLC logical channel info	CV-*DL-RLC info*			
>>Number of downlink RLC logical channels	*MD*	1 to MaxLoCHperRLC		1 or 2 logical channels per RLC entity or radio bearer RLC [16] Default value is that parameter

				values for DL are exactly the same as for corresponding UL logical channel. In case two multiplexing options are specified for the UL, the first options shall be used as default for the DL. As regards to the IE "Channel type", rule is specified in 8.6.4.8.
>>>Downlink transport channel type	MP		Enumerated(DCH,FACH, DSCH,DCH+ DSCH)	
>>>DL DCH Transport channel identity	CV-*DL-DCH*		Transport channel identity 10.3.5.18	
>>>DL DSCH Transport channel identity	CV-*DL-DSCH*		Transport channel identity 10.3.5.18	
>>>Logical channel identity	OP		Integer(1..15)	16 is reserved

Condition	Explanation
UL-RLC info	If "CHOICE *Uplink RLC mode*" in the IE "RLC info" that applies for that RB (i.e. either the one stored or received in in the same message for the RB for which the "RB mapping info" was received, or the one stored or received in the same message for the RB pointed at in the IE "Same as RB" in the IE "RB information to setup" stored or received in the same message) is present, this IE is MP. Otherwise the IE is not needed.
DL-RLC info	If "CHOICE *Downlink RLC mode*" in the IE "RLC info" that applies for that RB (i.e. either the one stored or received in in the same message for the RB for which the "RB mapping info" was received, or the one stored or received in the same message for the RB pointed at in the IE "Same as RB" in the IE "RB information to setup" stored or received in the same message) is present this IE is MP. Otherwise the IE is not needed.
UL-RLCLogicalChannels	If "Number of uplink RLC logical channels" in IE "RB mapping info" is 2, then this is present. Otherwise this IE is not needed.
UL-DCH/USCH	If IE "Uplink transport channel type" is equal to "DCH" or "USCH" (TDD only) this IE is MP. Otherwise the IE is not needed.
DL-DCH	If IE "Downlink transport channel type" is equal to "DCH" or "DCH+DSCH" this IE is MP. Otherwise the IE is not needed.
DL-DSCH	If IE "Downlink transport channel type" is equal to "DSCH" or "DCH+DSCH" this IE is MP. Otherwise the IE is not needed.

10.3.5.6 DL Transport channel information common for all transport channels

Information Element/Group name	Need	Multi	Type and reference	Semantics description
SCCPCH TFCS	OP		Transport Format Combination Set 10.3.5.20	~~This IE should be absent within IE "Predefined RB configuration"~~ This IE should not be included in this version of the protocol
CHOICE *mode*	MP			Although this IE is not always required, need is MP to align with ASN.1
>FDD				
>>CHOICE *DL parameters*	OP			
>>>Explicit				
>>>>DL DCH TFCS	MP		Transport Format Combination Set 10.3.5.20	Although this IE is not always required, need is MP to align with ASN.1
>>>SameAsUL				(no data)
>TDD				
>>Individual DL CCTrCH information	OP	1 to <maxCCTrCH>		
>>>DL TFCS Identity	MP		Transport format combination set identity 10.3.5.21	Identifies a special CCTrCH for shared or dedicated channels.
>>>CHOICE *DL parameters*	MP			
>>>>Independent				
>>>>>DL TFCS	MP		Transport format combination set 10.3.5.20	
>>>>SameAsUL				
>>>>>UL DCH TFCS Identity	MP		Transport format combination set identity 10.3.5.21	Same TFCS applies as specified for the indicated UL DCH TFCS identity except for information applicable for UL only

NOTE This information element is included within IE "Predefined TrCh configuration"

3GPP TSG-RAN WG2 Meeting #23
Helsinki, Finland, August 27th-31th 2001

Tdoc R2-012079

CR-Form-v3

CHANGE REQUEST

⌘ **25.331 CR 928** ⌘ rev - ⌘ Current version: **4.1.0** ⌘

*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:	⌘	Multiplexing configuration corrections
Source:	⌘	TSG-RAN WG2
Work item code:	⌘	TEI
Date:	⌘	2001-08-30
Category:	⌘	**A**
Release:	⌘	REL-4

Use one 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 one 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: ⌘ Some corrections are needed to resolve ambiguities in the existing text, and to cover error cases that are not yet covered:

8.6.4.6:

The sentence “release the lower layer entities dedicated for that radio bearer” is ambiguous since it could be understood that the transport channel and physical channel that the released radio bearer was mapped on shall be released.

In 8.6.5.10 and 10.3.5.6:

The SCCPCH TFCS should not be included in 10.3.5.6 DL Transport channel information common for all transport channels.

All necessary configuration information is already available in System information.

And in case the UE is in CELL_DCH, the IE 10.3.6.27 contains 10.3.6.70 that contains the SCCPCH configuration.

In 10.3.4.21:

The two conditions "UL-RLC info" and "DL-RLC info" do not cover the case the IE “RLC info” is not received for the RB, because the choice “Same as RB” was made as “CHOICE RLC info type” in the IE RB information to set up.

In 8.6.4.8:

- Confusion between RB and logical channel.
- Some error cases were not covered yet:
  - the case where a RB using TM-RLC or UM-RLC is realised in a multiplexing option using two logical channels
  - the case where the same logical channel identity was allocated to two

logical channels belonging to two different RBs mapped onto the same transport channel.

- Some clarification was needed regarding the sentence: “no RLC size is applicable for that RB”.
- There is some confusion in the existing text regarding whether the IE “Transport Format Set” is included in the same message or not.
- The sentence “configure MAC multiplexing according to the selected multiplexing option” is quite ambiguous. Indeed, in the case only one logical channel is mapped onto a transport channel, but the IE “Logical channel id” was included in the multiplexing option for that logical channel on that transport channel, it is not clear whether the MAC header shall be included or not.
- The sentence “if a transport channel that would not exist as a result of the message is referred to” can be misunderstood. Its original meaning was to prohibit for a transport channel removed in the same message, in one of the IEs “Deleted DL TrCH information” or “Deleted UL TrCH information” to be used in any multiplexing option. But it could be interpreted that this shall also apply to the case of the transition from CELL_FACH to CELL_DCH, where RACH and FACH are removed “implicitely”.

In 8.6.5.1:

- The situations where Transport Channels are reconfigured without the RBs mapped onto it being reconfigured is not covered in the existing text.

Case of the RACH:

If the UE is in CELL_FACH state and is changing cell, the transport formats that can be used for the RACH in the new cell can be different from the ones that existed in the old cell. When receiving the IE “PRACH system information list”, the UE could thus be in a situation where it has RLC size indexes stored within the “RB mapping info” for its radio bearers that point at non existing RLC sizes. Besides, in such a situation, UTRAN may then according to the current text reconfigure all the RBs that have multiplexing options on the RACH within the “Cell update confirm” message. This means need for extra-signalling for each UE entering the cell, also UTRAN need to keep track of cell configuration in relation to UE configuration. To avoid that problem, it is proposed to allow for the RLC size indexes to point at non existing RLC sizes and to have several RLC sizes pointed at in the AM case when defining the multiplexing option for a RB on RACH. If RACH is the transport channel to be used, the RLC size indexes that do not point at any actual RLC size shall then be ignored by the UE.

Summary of change: ⌘ *In the text of the CR, the yellow parts correspond to text that has been moved, and the green parts to comments related to the nature of the changes.*

8.6.4.6:

It is clarified that what is meant by “release the lower layer entities dedicated for that radio bearer” is actually to release the RLC and PDCP entities that were dedicated to that radio bearer.

In 8.6.5.10 and 10.3.5.6:

Change explanation in tabular 10.3.5.6 for the IE SCCPCH TFCS to “This IE should not be included in this version of the protocol”

In the RB mapping info IE:

The text was reshuffled to resolve the confusion between RB and logical channel, and two bullets were added to clarify that INVALID_CONFIGURATION shall be

set to TRUE in case one of the two situations described above occurred.

It was clarified that the “transport channels that would not exist as a result of the message” means the ones removed in IE “Deleted DL TrCH information” or “Deleted UL TrCH information”.

It was clarified that MAC multiplexing shall only be used for a logical channel in case there is another logical channel mapped on the same transport channel. This shall not depend on whether the “Logical Channel id” was included for the logical channel or not.

For the RACH issue, it was clarified that for a multiplexing option on RACH, the RLC size indexes could point at non existing RLC sizes, and that those shall be ignored when determining the set of RLC sizes applicable to the logical channels used by the RB. If the RB uses AM and if RACH is the transport channel to be used, the largest RLC size shall be used.

In the Transport Format Set IE:

The following situations shall trigger INVALID_CONFIGURATION to be set to TRUE:

- If the “Logical Channel List” is set to “All” or “Explicit List”, and for any logical channel that is indicated, the “RLC size list” (either stored or included in the same message) was not set to “Configured”.
- If a logical channel is indicated to be mapped onto a transport channel for which the “Logical Channels lists” are given as “Explicit Lists” for all the RLC sizes, but is not included in any of those.
- If there is a mix of Logical Channel List defined as “Configured” and “All”/”Explicit List”.
- In the case where the “Logical Channel Lists” are set to “Configured” for a transport channel, and for any logical channel that could be mapped onto it, the “RLC size list” is also set to “Configured”.
- In the case the “RLC size list” for any logical channel points to an RLC size that does not exist in the Transport Format Set.

The changes introduced for RACH in the IE RB mapping info were also reflected in that section.

10.3.4.21:

In the case the choice “Same as RB” was made as “CHOICE RLC info type” in the IE RB information to set up, the “RLC info” received or stored for the RB pointed at in the IE “Same as RB” shall be checked. The current conditions are rephrased to reflect that.

Impact analysis:

Correction to functionality (the multiplexing of RB to transport channels) where the specification was ambiguous or not sufficiently explicit. Would not affect implementations behaving like indicated in the CR, would affect implementations supporting the corrected functionality otherwise.

Consequences if not approved:	⌘	Ambiguity in the text that could lead to unexpected UE behaviour.

Clauses affected:	⌘	8.6.4.6, 8.6.4.8, 8.6.5.1, 8.6.5.10, 10.3.4.21, 10.3.5.6		
Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ O&M Specifications	⌘	25.331 v3.7.0, CR 927r1
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.

8.6.4.6 RB information to release

If the IE "RB information to release" is included, the UE shall apply the following actions on the radio bearer identified with the value of the IE "RB identity". The UE shall:

- release the ~~entities in lower layers~~ PDCP and RLC entities dedicated for that radio bearer;
- if the information about the radio bearer is stored in the variable ESTABLISHED_RABS:
  - indicate release of the RAB subflow associated with the radio bearer to upper layers;
  - delete the information about the radio bearer from the variable ESTABLISHED_RABS;
  - when all radio bearers belonging to the same radio access bearer have been released:
    - indicate release of the radio access bearer to upper layers providing the "CN domain identity" together with the "RAB identity" stored in the variable ESTABLISHED_RABS;
    - delete all information about the radio access bearer from the variable ESTABLISHED_RABS.

8.6.4.8 RB mapping info

If the IE "RB mapping info" is included, the UE shall, ~~for each multiplexing option of that RB~~:

- for each multiplexing option of the RB:
  - if a transport channel that would not exist as a result of the message (i.e. removed in the same message in IE "Deleted DL TrCH information" and IE "Deleted UL TrCH information") is referred to:
    - set the variable INVALID_CONFIGURATION to TRUE;
  - if a multiplexing option that maps a logical channel corresponding to a TM-RLC entity onto RACH, CPCH, FACH or DSCH is included:
    - set the variable INVALID_CONFIGURATION to TRUE;
  - if the multiplexing option realises the radio bearer on the uplink (resp. on the downlink) using two logical channels with different values of the IE "Uplink transport channel type" (resp. of the IE "Downlink transport channel type"): [text slightly changed to fit here: it read:"if a multiplexing option that realises the radio bearer…]
    - set the variable INVALID_CONFIGURATION to TRUE;
  - if that RB is using TM and the IE "Segmentation indication" is set to TRUE and, based on the multiplexing configuration resulting from this message, the logical channel corresponding to it is mapped onto the same transport channel as another logical channel:[text slightly changed to resolve the confusion between RB and logical channel: it read: "…it is mapped onto the same transport channel as another RB]
    - set the variable INVALID_CONFIGURATION to TRUE;
  - if the transport channel considered in that multiplexing option is different from RACH and if that RB is using AM and the set of RLC sizes applicable to the logical channel transferring data PDUs has more than one element:
    - set the variable INVALID_CONFIGURATION to TRUE;
  - if that RB is using UM or TM and the multiplexing option realises it using two logical channels:

- set the variable INVALID_CONFIGURATION to TRUE;

- for each logical channel in that multiplexing option:

  - if the value of the IE "RLC size list" is set to "Explicit list": [indent increased two levels]

    - if a "Transport format set" for ~~that~~ the transport channel this logical channel is mapped on in this multiplexing option is included in the same message, and the value (index) of any IE "RLC size index" in the IE "RLC size index list" does not correspond to an "RLC size" in the IE transport format set of that transport channel given in the message; or[indent increased two levels]

    - if the transport channel this logical channel is mapped on in this multiplexing option is different from RACH, and if a "Transport format set" for that transport channel is not included in the same message, and the value (index) of any IE "RLC size index" in the IE "RLC size index list" does not correspond to an "RLC size" in the stored transport format set of that transport channel or [indent increased two levels]

  - if a "Transport format set" for ~~that~~ the transport channel this logical channel is mapped on in this multiplexing option is included in the same message, and the value of any IE "Logical channel list" in the transport format set is not set to "Configured"; or [indent increased two levels]

  - if a "Transport format set" for ~~that~~ the transport channel this logical channel is mapped on in this multiplexing option is not included in the same message, and the value of any IE "Logical channel list" in the stored transport format set of that transport channel is not set to "Configured"; [indent increased two levels]

    - set the variable INVALID_CONFIGURATION to TRUE; [indent increased two levels]

  - if the value of the IE "RLC size list" is set to "All": [indent increased two levels]

    - if a "Transport format set" for ~~that~~ the transport channel this logical channel is mapped on in this multiplexing option is included in the same message, and the value of any IE "Logical channel list" in the transport format set is not set to "Configured"; or [indent increased two levels]

    - if a "Transport format set" for ~~that~~ the transport channel this logical channel is mapped on in this multiplexing option is not included in the same message, and the value of any IE "Logical channel list" in the stored transport format set of that transport channel is not set to "Configured"; [indent increased two levels]

      - set the variable INVALID_CONFIGURATION to TRUE; [indent increased two levels]

  - if the value of the IE "RLC size list" is set to "Configured": [indent increased two levels]

    - if a "Transport format set" for ~~that~~ the transport channel this logical channel is mapped on in this multiplexing option is included in the same message, and ~~the IE "Logical channel list" in the transport format set indicates that no "RLC size" is applicable for that RB~~ for none of the RLC sizes defined for that transport channel in the “Transport format set”, the “Logical Channel List” is set to “All” or given as an “Explicit List” which contains this logical channel; or [indent increased two levels]

    - if a "Transport format set" for ~~that~~ the transport channel this logical channel is mapped on in this multiplexing option is not included in the same message, and ~~the IE "Logical channel list" in the stored transport format set of that transport channel indicates that no "RLC size" is applicable for that RB;~~ for none of the RLC sizes defined in the transport format set stored for that transport channel, the “Logical Channel List” is set to “All” or given as an “Explicit List” which contains this logical channel; [indent increased two levels]

- set the variable INVALID_CONFIGURATION to TRUE; [indent increased two levels]

- ~~if that RB is using TM and the IE "Segmentation indication" is set to TRUE and, based on the multiplexing configuration resulting from this message, it is mapped onto the same transport channel as another RB:~~

  - ~~set the variable INVALID_CONFIGURATION to true;~~ [moved up]

- ~~else:~~

- if, as a result of the message this IE is included in, several radio bearers can be mapped onto the same transport channel, and the IE "Logical Channel Identity" was not included in the RB mapping info of any of those radio bearers for a multiplexing option on that transport channel or the same "Logical Channel Identity" was used more than once in the RB mapping info of those radio bearers for the multiplexing options on that transport channel:

  - set the variable INVALID_CONFIGURATION to TRUE;

- delete all previously stored multiplexing options for that radio bearer; [indent decreased one level]

- store each new multiplexing option for that radio bearer; [indent decreased one level]

- select and configure the multiplexing options applicable for the transport channels to be used; [indent decreased one level]

- if the IE "Uplink transport channel type" is set to the value "RACH": [indent decreased one level]

  - refer the IE "RLC size index" to the RACH Transport Format Set of the first PRACH received in the IE "PRACH system information list" received in SIB5 or SIB6; [indent decreased one level]

- determine the sets of RLC sizes that apply to the logical channels used by that RB, based on the "RLC size list" IEs and/or the "Logical Channel List" IEs included in the applicable "Transport format set" (either the ones received in the same message or the ones stored if none was ~~were~~ received); in case the selected multiplexing option is a multiplexing option on RACH, the UE shall ignore the RLC size indexes that do not correspond to any RLC size within the Transport Format Set stored for RACH. [indent decreased one level]

  - ~~if that RB is using AM and the set of RLC sizes applicable to the logical channel transferring data PDUs has more than one element:~~

    - ~~set the variable INVALID_CONFIGURATION to true.~~ [moved up]

- if RACH is the transport channel to be used on the uplink, if that RB has a multiplexing option on RACH and if it is using AM, the RLC size (or RLC sizes in case the RB is realised using two logical channels) that shall apply for the corresponding RLC entity is the largest one amongst the ones derived according to the previous bullet.

- if that RB is using AM and the RLC size applicable to the logical channel transporting data PDUs is different from the one derived from the previously stored configuration: [indent decreased one level]

  - re-establish the corresponding RLC entity; [indent decreased one level]

  - configure the corresponding RLC entity with the new RLC size; [indent decreased one level]

  - if the variable CIPHERING_STATUS is set to "Started":[indent decreased one level]

    - if this IE was included in system information: [indent decreased one level]

- set the HFN values for the corresponding RLC entity equal to the value of the IE "START" for the CN domain stored in the variable LATEST_CONFIGURED_CN_DOMAIN that will be included in the CELL UPDATE message that will be sent before the next transmission; [indent decreased one level]

- if this IE was included in CELL UPDATE CONFIRM: [indent decreased one level]

- set the HFN values for the corresponding RLC entity equal to the value of the IE "START" included in the latest transmitted CELL UPDATE message for the CN domain stored in the variable LATEST_CONFIGURED_CN_DOMAIN; [indent decreased one level]

- if this IE was included in a reconfiguration message: [indent decreased one level]

- set the HFN values for the corresponding RLC entity equal to the value of the IE "START" that will be included in the reconfiguration complete message for the CN domain stored in the variable LATEST_CONFIGURED_CN_DOMAIN; [indent decreased one level]

- if that RB is using UM, indicate the largest applicable RLC size to the corresponding RLC entity [indent decreased one level]

- configure MAC multiplexing according to the selected multiplexing option; MAC multiplexing shall only be configured for a logical channel if the transport channel it is mapped on according to the selected multiplexing option is the same as the transport channel another logical channel is mapped on according to the multiplexing option selected for it. [indent decreased one level]

- configure the MAC with the logical channel priorities according to selected multiplexing option; [indent decreased one level]

- configure the MAC with the set of applicable RLC Sizes for each of the logical channels used for that RB; [indent decreased one level]

~~- if a transport channel that would not exist as a result of the message is referred to:~~

~~- set the variable INVALID_CONFIGURATION to TRUE;~~ [moved up]

~~- if a multiplexing option that maps a logical channel corresponding to a TM-RLC entity onto RACH, CPCH, FACH or DSCH is included:~~

~~- set the variable INVALID_CONFIGURATION to TRUE;~~ [moved up]

~~- if a multiplexing option is included that realises the radio bearer on the uplink (resp. on the downlink) using two logical channels with different values of the IE "Uplink transport channel type" (resp. of the IE "Downlink transport channel type"):~~

~~- set the variable INVALID_CONFIGURATION to TRUE;~~ [moved up]

- if there is no multiplexing option applicable for the transport channels to be used: [indent decreased one level]

- set the variable INVALID_CONFIGURATION to TRUE; [indent decreased one level]

- if there is more than one multiplexing option applicable for the transport channels to be used: [indent decreased one level]

- set the variable INVALID_CONFIGURATION to TRUE. [indent decreased one level]

In case IE "RB mapping info" includes IE "Downlink RLC logical channel info" but IE "Number of downlink RLC logical channels" is absent, the parameter values are exactly the same as for the corresponding UL logical channels. In case two multiplexing options are specified for the UL, the first options shall be used as default for the DL. As regards the IE "Channel type", the following rule should be applied to derive the DL channel type from the UL channel included in the IE:

Channel used in UL	DL channel type implied by "same as"
DCH	DCH
RACH	FACH
CPCH	FACH
USCH	DSCH

8.6.5.1 Transport Format Set

If the IE "Transport format set" is included, the UE shall:

- if the transport format set is a RACH TFS received in System Information Block type 5 or 6, and CHOICE "Logical Channel List" has the value "Explicit List":
  - ignore that System Information Block;
- if the transport format set for a downlink transport channel is received in a System Information Block, and CHOICE "Logical Channel List" has a value different from 'ALL':
  - ignore that System Information Block;
- if the transport format set for a downlink transport channel is received in a message on a DCCH, and CHOICE "Logical Channel List" has a value different from 'ALL':
  - keep the transport format set if this exists for that transport channel;
  - set the variable INVALID_CONFIGURATION to TRUE;
- if the value of any IE "RB identity" (and "Logical Channel" for RBs using two UL logical channels) in the IE "Logical channel list" does not correspond to a logical channel indicated to be mapped onto this transport channel in any RB multiplexing option (either included in the same message or previously stored and not changed by this message) or:
- if the "Logical Channel List" for any of the RLC sizes defined for that transport channel is set to "Configured" while it is set to "All" or given as an "Explicit List" for any other RLC size, or:
- if the "Logical Channel List" for any of the RLC sizes defined for that transport channel is set to "All" and for any logical channel mapped to this transport channel, the value of the "RLC size list" (either provided in the "RB mapping info" IE if included in the same message, or stored) is not set to "Configured" or:
- if the "Logical Channel List" for any of the RLC sizes defined for that transport channel is given as an "Explicit List" that contains a logical channel for which the value of the "RLC size list" (either provided in the "RB mapping info" IE if included in the same message, or stored) is not set to "Configured" or:
- if the "Logical Channel List" for all the RLC sizes defined for that transport channel are given as "Explicit List" and if one of the logical channels mapped onto this transport channel is not included in any of those lists, or:
- if the "Logical Channel List" for the RLC sizes defined for that transport channel is set to "Configured" and for any logical channel mapped onto that transport channel, the value of the "RLC size list" (either provided in the "RB mapping info" IE if included in the same message, or stored) is also set to "Configured" or:
- if the IE "Transport Format Set" was not received within the IE "PRACH system information list" and if the "Logical Channel List" for the RLC sizes defined for that transport channel is set to "Configured" and for any logical channel mapped onto that transport channel, the "RLC size list" (either provided in the "RB mapping info" IE if included in the same message, or stored) is given as an "Explicit List" that includes an "RLC size index" that does not correspond to any RLC size in this "Transport Format Set":
  - keep the transport format set if this exists for that transport channel;
  - set the variable INVALID_CONFIGURATION to TRUE;
- if the total number of configured transport formats for the transport channel exceeds maxTF:
  - keep the transport format set if this exists for that transport channel;
  - set the variable INVALID_CONFIGURATION to TRUE;

- if the IE "Transport format set" is considered as valid according to the rules above:
  - remove a previously stored transport format set if this exists for that transport channel;
  - store the transport format set for that transport channel;
  - consider the first instance of the parameter *Number of TBs and TTI List* within the *Dynamic transport format information* to correspond to transport format 0 for this transport channel, the second to transport format 1 and so on;
  - if the IE "Transport format Set" has the choice "Transport channel type" set to "Dedicated transport channel":
    - calculate the transport block size for all transport formats in the TFS using the following

      TB size = RLC size + MAC header size,

      where:
      - MAC header size is calculated according to [15] if MAC multiplexing is used. Otherwise it is 0 bits;
      - 'RLC size' reflects the RLC PDU size.
  - if the IE "Transport format Set" has the choice "Transport channel type" set to "Common transport channel":
    - calculate the transport block size for all transport formats in the TFS using the following:

      TB size = RLC size
  - if the IE "Number of Transport blocks" <> 0 and IE "RLC size" = 0, no RLC PDU data exists but only parity bits exist for that transport format;
  - if the IE "Number of Transport blocks" = 0, neither RLC PDU neither data nor parity bits exist for that transport format;
  - configure the MAC with the new transport format set (with computed transport block sizes) for that transport channel;
  - if the RB multiplexing option for a RB mapped onto that transport channel (based on the stored RB multiplexing option) is not modified by this message:
    - determine the sets of RLC sizes that apply to the logical channels used by that RB, based on the IE "Logical Channel List" and/or the IE "RLC Size List" from the previously stored RB multiplexing option; if the IE "Transport Format Set" was received within the IE "PRACH system information list", the UE shall ignore the RLC size indexes in the stored RB multiplexing option that do not correspond to any RLC size in the received Transport Format Set.
    - if the IE "Transport Format Set" was received within the IE "PRACH system information list", if that RB is using AM and if RACH is the transport channel to be used on the uplink, the RLC size (or RLC sizes in case the RB is realised using two logical channels) that shall apply for the corresponding RLC entity is the largest one amongst the ones derived according to the previous bullet.
    - if the IE "Transport Format Set" was not received within the IE "PRACH system information list", and if that RB is using AM and the set of RLC sizes applicable to the logical channel transferring data PDUs has more than one element:
      - set the variable INVALID_CONFIGURATION to true;
    - if that RB is using AM and the RLC size applicable to the logical channel transporting data PDUs is different from the one derived from the previously stored configuration:

- re-establish the corresponding RLC entity;
- configure the corresponding RLC entity with the new RLC size;
- if this IE was included in system information and if the variable CIPHERING_STATUS is set to "Started":
  - set the HFN values for the corresponding RLC entity equal to the value of the IE "START" for the CN domain stored in the variable LATEST_CONFIGURED_CN_DOMAIN that will be included in the CELL UPDATE message that will be sent before the next transmission;
- if this IE was included in CELL UPDATE CONFIRM and if the variable CIPHERING_STATUS is set to "Started":
  - set the HFN values for the corresponding RLC entity equal to the value of the IE "START" included in the latest transmitted CELL UPDATE message for the CN domain stored in the variable LATEST_CONFIGURED_CN_DOMAIN;
- if this IE was included in a reconfiguration message and if the variable CIPHERING_STATUS is set to "Started":
  - set the HFN values for the corresponding RLC entity equal to the value of the IE "START" that will be included in the reconfiguration complete message for the CN domain stored in the variable LATEST_CONFIGURED_CN_DOMAIN;
- if this IE was included in ACTIVE SET UPDATE and if the variable CIPHERING_STATUS is set to "Started":
  - set the HFN values for the corresponding RLC entity equal to the value of the IE "START" that will be included in the ACTIVE SET UPDATE COMPLETE message for the CN domain stored in the variable LATEST_CONFIGURED_CN_DOMAIN;

- if that RB is using UM:
  - indicate the largest applicable RLC size to the corresponding RLC entity;
- configure MAC with the set of applicable RLC Sizes for each of the logical channels used for that RB.

For configuration restrictions on Blind Transport Format Detection, see [27].

8.6.5.10 DL Transport channel information common for all transport channels

If the IE "DL Transport channel information common for all transport channels" is included the UE shall:

- if the IE "SCCPCH TFCS" is included:
  - ~~perform actions for the TFCS of the selected SCCPCH as specified in subclause 8.6.5.2;~~
  - set the variable INVALID_CONFIGURATION to TRUE;
- if the IE choice "mode" is set to FDD:
  - if the choice "DL parameters" is set to 'Independent':
    - if the IE "DL DCH TFCS" is included:
      - if the IE "SCCPCH TFCS" is included and the state the UE enters after handling the received information is other than CELL_DCH:
        - ignore the received IE "DL DCH TFCS";

NOTE: the IE "DL Transport channel information common for all transport channels" always includes a DL DCH TFCS configuration, either by including the IE "DL DCH TFCS " or by specifying that the TFCS is the same as in UL. If UTRAN does not require the reconfiguration of the concerned parameters, UTRAN may replace one TFC with the value that is already assigned for this IE.

- else:
  - perform actions as specified in subclause 8.6.5.2;

- if the IE choice "mode" is set to TDD:
  - if the IE "Individual DL CCTRCH information" is included:
    - for each DL TFCS identified by the IE "DL TFCS identity":
      - if the IE choice "DL parameters" is set to 'independent':
        - perform actions for the IE "DL TFCS" as specified in subclause 8.6.5.2;
      - if the IE choice "DL parameters" is set to 'same as UL':
        - if the IE "UL DCH TFCS identity" indicates an existing or a new UL TFCS:
          - store for that DL TFCS the TFCS identified by the IE "UL DCH TFCS identity";
        - else:
          - set the variable INVALID_CONFIGURATION to TRUE.

10.3.4.21 RB mapping info

A multiplexing option for each possible transport channel this RB can be multiplexed on.

Information Element/Group name	Need	Multi	Type and reference	Semantics description
Information for each multiplexing option	MP	1 to <maxRBMuxOptions>		
>RLC logical channel mapping indicator	CV-*UL-RLCLogicalChannels*		Boolean	TRUE indicates that the first logical channel shall be used for data PDUs and the second logical channel shall be used for control PDUs. FALSE indicates that control and data PDUs can be sent on either of the two logical channels. This parameter is not used in this release and shall be set to TRUE.
>Number of uplink RLC logical channels	CV-*UL-RLC info*	1 to MaxLoCHperRLC		1 or 2 logical channels per RLC entity or radio bearer RLC [16]
>>Uplink transport channel type	MP		Enumerated(DCH,RACH, CPCH,USCH)	CPCH is FDD only USCH is TDD only
>>ULTransport channel identity	CV-*UL-DCH/USCH*		Transport channel identity 10.3.5.18	This is the ID of a DCH or USCH (TDD only) that this RB could be mapped onto.
>>Logical channel identity	OP		Integer(1..15)	This parameter is used to distinguish logical channels multiplexed by MAC on a transport channel.
>>CHOICE *RLC size list*	MP			The RLC sizes that are allowed for this logical channel For radio bearers mapped to RACH, "Explicit list" is the only valid choice. The UE shall regard all other choices as undefined IE values and handle these as specified in clause 9.
>>>All			Null	All RLC sizes listed in the *Transport Format Set*. 10.3.5.23
>>>Configured			Null	The RLC sizes configured for this logical channel in the *Transport Format Set*. 10.3.5.23 if present in this message or in the previously stored configuration otherwise
>>>Explicit List		1 to <maxTF>		Lists the RLC sizes that are valid for the logical channel.
>>>>RLC size index	MP		Integer(1..maxTF)	The integer number is a reference to the *RLC size* which arrived at that position in the *Transport Format Set* 10.3.5.23
>>MAC logical channel priority	MP		Integer(1..8)	This is priority between a user's different RBs (or logical channels). [15]
>Downlink RLC logical channel info	CV-*DL-RLC info*			
>>Number of downlink RLC logical channels	*MD*	1 to MaxLoCHperRLC		1 or 2 logical channels per RLC entity or radio bearer RLC [16] Default value is that parameter

				values for DL are exactly the same as for corresponding UL logical channel. In case two multiplexing options are specified for the UL, the first options shall be used as default for the DL. As regards to the IE "Channel type", rule is specified in 8.6.4.8.
>>>Downlink transport channel type	MP		Enumerated(DCH,FACH, DSCH,DCH+ DSCH)	
>>>DL DCH Transport channel identity	CV-*DL-DCH*		Transport channel identity 10.3.5.18	
>>>DL DSCH Transport channel identity	CV-*DL-DSCH*		Transport channel identity 10.3.5.18	
>>>Logical channel identity	OP		Integer(1..15)	16 is reserved

Condition	Explanation
UL-RLC info	If "CHOICE *Uplink RLC mode*" in the IE "RLC info" that applies for that RB (i.e. either the one stored or received in in the same message for the RB for which the "RB mapping info" was received, or the one stored or received in the same message for the RB pointed at in the IE "Same as RB" in the IE "RB information to setup" stored or received in the same message) is present, this IE is MP. Otherwise the IE is not needed.
DL-RLC info	If "CHOICE *Downlink RLC mode*" in the IE "RLC info" that applies for that RB (i.e. either the one stored or received in in the same message for the RB for which the "RB mapping info" was received, or the one stored or received in the same message for the RB pointed at in the IE "Same as RB" in the IE "RB information to setup" stored or received in the same message) is present this IE is MP. Otherwise the IE is not needed.
UL-RLCLogicalChannels	If "Number of uplink RLC logical channels" in IE "RB mapping info" is 2, then this is present. Otherwise this IE is not needed.
UL-DCH/USCH	If IE "Uplink transport channel type" is equal to "DCH" or "USCH" (TDD only) this IE is MP. Otherwise the IE is not needed.
DL-DCH	If IE "Downlink transport channel type" is equal to "DCH" or "DCH+DSCH" this IE is MP. Otherwise the IE is not needed.
DL-DSCH	If IE "Downlink transport channel type" is equal to "DSCH" or "DCH+DSCH" this IE is MP. Otherwise the IE is not needed.

10.3.5.6 DL Transport channel information common for all transport channels

Information Element/Group name	Need	Multi	Type and reference	Semantics description
SCCPCH TFCS	OP		Transport Format Combination Set 10.3.5.20	~~This IE should be absent within IE "Predefined RB configuration"~~ This IE should not be included in this version of the protocol
CHOICE *mode*	MP			Although this IE is not always required, need is MP to align with ASN.1
>FDD				
>>CHOICE *DL parameters*	OP			
>>>Explicit				
>>>>DL DCH TFCS	MP		Transport Format Combination Set 10.3.5.20	Although this IE is not always required, need is MP to align with ASN.1
>>>SameAsUL				(no data)
>TDD				
>>Individual DL CCTrCH information	OP	1 to <maxCCTrCH>		
>>>DL TFCS Identity	MP		Transport format combination set identity 10.3.5.21	Identifies a special CCTrCH for shared or dedicated channels.
>>>CHOICE *DL parameters*	MP			
>>>>Independent				
>>>>>DL TFCS	MP		Transport format combination set 10.3.5.20	
>>>>SameAsUL				
>>>>>UL DCH TFCS Identity	MP		Transport format combination set identity 10.3.5.21	Same TFCS applies as specified for the indicated UL DCH TFCS identity except for information applicable for UL only

NOTE This information element is included within IE "Predefined TrCh configuration"

3GPP TSG-RAN WG2 Meeting #23
Helsinki, Finland, August 27th-31st 2001

Tdoc R2-012076

CR-Form-v4

CHANGE REQUEST

⌘ **25.331 CR 929** ⌘ ev **r1** ⌘ Current version: **3.7.0** ⌘

*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:	⌘	Reception of non-dedicated control channels mapped on FACH in CELL_FACH state
Source:	⌘	TSG-RAN WG2
Work item code:	⌘	TEI
Date:	⌘	2001-08-29
Category:	⌘	**F**
Release:	⌘	R99

Use one of the following categories:
F *(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 one 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: ⌘ The UE requirements for reception of RRC messages on non-dedicated logical control channels (such as CCCH, SHCCH and BCCH) mapped on FACH are not explicitely stated.
For instance, whether the UE shall be capable of receiving RRC CONNECTION RELEASE on CCCH at any time in CELL_FACH state needs clarification.

Summary of change: ⌘

1. In clause 7, requirements on reception of logical channels are added for each state. For CELL_FACH, it is stated that the UE shall receive RRC messages on DCCH, CCCH, BCCH and SHCCH (TDD only).

2. In the RRC connection release procedure, it is clarified that UTRAN should use DCCH to transmit the RRC CONNECTION RELEASE message when the UE is in CELL_FACH state, if the DCCH is available.

Isolated impact analysis:

Corrected functionality: RRC procedures (such as RRC connection release) that may use non-dedicated logical control channels (such as CCCH) in CELL_FACH state.

Corrections to a function where the specification was ambiguous or not sufficiently explicit. They would not affect implementations behaving like indicated in the CR, would affect implementations supporting the corrected functionality otherwise.

Consequences if not approved: ⌘ Unclear UE behaviour and risk of interoperability problems.

Clauses affected: ⌘ 7.2.2.1, 7.2.2.2, 7.2.2.3, 8.1.4.2

Other specs affected: ⌘ ☐ Other core specifications ⌘ 25.331 v4.1.0, CR 930
☐ 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://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 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.

7.2.2.1 URA_PCH or CELL_PCH state

In the URA_PCH or CELL_PCH state the UE shall perform the following actions:

NOTE: Neither DCCH nor DTCH are available in these states.

- if the UE is "in service area":
  - maintain up-to-date system information as broadcast by the serving cell as specified in the sub-clause 8.1.1;
  - perform cell reselection process as specified in [4];
  - perform a periodic search for higher priority PLMNs as specified in [25];
  - monitor the paging occasions and PICH monitoring occasions determined according to subclause 8.6.3.1a and 8.6.3.2 and receive paging information on the PCH mapped on the S-CCPCH selected by the UE according to the procedure in subclause 8.5.19;
  - act on RRC messages received on PCCH and BCCH;
  - perform measurements process according to measurement control information as specified in subclause 8.4 and in subclause 14.4;
  - maintain up-to-date BMC data if it supports Cell Broadcast Service (CBS) as specified in [37];
  - run timer T305 for periodical URA update if the UE is in URA_PCH or for periodical cell update if the UE is in CELL_PCH;
- if the UE is "out of service area":
  - perform cell reselection process as specified in [4];
  - run timer T316;
  - run timer T305

7.2.2.2 CELL_FACH state

In the CELL_FACH state the UE shall perform the following actions:

- if the UE is "in service area":

NOTE:~~-~~ DCCH and, if configured, DTCH are available in this state~~;~~ [Note to Hans: Paragraph type changed to "NO"]

  - maintain up-to-date system information as broadcast by the serving cell as specified in the sub-clause 8.1.1;
  - perform cell reselection process as specified in [4];
  - perform measurements process according to measurement control information as specified in subclause 8.4 and in subclause 14.4;
  - run timer T305 (periodical cell update);
  - listen to all FACH transport channels mapped on the S-CCPCH selected by the UE according to the procedure in subclause 8.5.19;
  - act on RRC messages received on BCCH, CCCH and DCCH;
  - act on RRC messages received on, if available, SHCCH (TDD only);
- if the UE is "out of service area":
  - perform cell reselection process as specified in [4];

- run timers T305 (periodical cell update), and T317 (cell update when re-entering "in service") or T307 (transition to Idle mode)

7.2.2.3 CELL_DCH state

In the CELL_DCH state the UE shall perform the following actions:

NOTE:~~-~~ ~~if~~ DCCH and, if configured, DTCH are available in this state [Note to Hans: Paragraph type changed to "NO"]~~:~~

- read system information broadcast on FACH as specified in subclause 8.1.1.3 (applicable only to UEs with certain capabilities and in FDD mode); [Note to Hans: Indentation changed to B1]

- read the system information as specified in subclause 8.1.1 (for UEs in TDD mode); [Note to Hans: Indentation changed to B1]

- perform measurements process according to measurement control information as specified in subclause 8.4 and in clause 14; [Note to Hans: Indentation changed to B1]

- act on RRC messages received on DCCH;

- act on RRC messages received on BCCH (applicable only to UEs with certain capabilities and in FDD mode);

- act on RRC messages received on BCCH (TDD only) and, if available, SHCCH (TDD only);

8.1.4.2 Initiation

When the UE is in state CELL_DCH or CELL_FACH, the UTRAN may at anytime initiate an RRC connection release by transmitting an RRC CONNECTION RELEASE message using UM RLC.

When UTRAN transmits an RRC CONNECTION RELEASE message ~~in response to a CELL UPDATE (subclause 8.3.1) or URA UPDATE (subclause 8.3.2) message from the UE, UTRAN should use the downlink CCCH to transmit the message. In all other cases~~ the downlink DCCH should be used, if available. If the downlink DCCH is not available in UTRAN and the UE is in CELL_FACH state, the downlink CCCH may be used.

UTRAN may transmit several RRC CONNECTION RELEASE messages to increase the probability of proper reception of the message by the UE. In such a case, the RRC SN for these repeated messages shall be the same. This shall also apply to the RRC CONNECTION RELEASE COMPLETE message. The number of repeated messages and the interval between the messages is a network option.

3GPP TSG-RAN WG2 Meeting #23
Helsinki, Finland, August 27th-31st 2001

Tdoc R2-012077

CR-Form-v4

CHANGE REQUEST

⌘ **25.331 CR 930** ⌘ ev **-** ⌘ Current version: **4.1.0** ⌘

*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:	⌘	Reception of non-dedicated control channels mapped on FACH in CELL_FACH state
Source:	⌘	TSG-RAN WG2
Work item code:	⌘	TEI
Date:	⌘	2001-08-29
Category:	⌘	**A**
Release:	⌘	REL-4

Use one of the following categories:
F *(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 one 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:	⌘	The UE requirements for reception of RRC messages on non-dedicated logical control channels (such as CCCH, SHCCH and BCCH) mapped on FACH are not explicitely stated. For instance, whether the UE shall be capable of receiving RRC CONNECTION RELEASE on CCCH at any time in CELL_FACH state needs clarification.
Summary of change:	⌘	1. In clause 7, requirements on reception of logical channels are added for each state. For CELL_FACH, it is stated that the UE shall receive RRC messages on DCCH, CCCH, BCCH and SHCCH (TDD only). 2. In the RRC connection release procedure, it is clarified that UTRAN should use DCCH to transmit the RRC CONNECTION RELEASE message when the UE is in CELL_FACH state, if the DCCH is available. **Isolated impact analysis:** Corrected functionality: RRC procedures (such as RRC connection release) that may use non-dedicated logical control channels (such as CCCH) in CELL_FACH state. Corrections to a function where the specification was ambiguous or not sufficiently explicit. They would not affect implementations behaving like indicated in the CR, would affect implementations supporting the corrected functionality otherwise.
Consequences if not approved:	⌘	Unclear UE behaviour and risk of interoperability problems.

Clauses affected:	⌘	7.2.2.1, 7.2.2.2, 7.2.2.3, 8.1.4.2		
Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications	⌘	25.331 v3.7.0, CR 0929r1

	☐ 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://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 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.

7.2.2.1 URA_PCH or CELL_PCH state

In the URA_PCH or CELL_PCH state the UE shall perform the following actions:

NOTE: Neither DCCH nor DTCH are available in these states.

- if the UE is "in service area":
  - maintain up-to-date system information as broadcast by the serving cell as specified in the sub-clause 8.1.1;
  - perform cell reselection process as specified in [4];
  - perform a periodic search for higher priority PLMNs as specified in [25];
  - monitor the paging occasions and PICH monitoring occasions determined according to subclause 8.6.3.1a and 8.6.3.2 and receive paging information on the PCH mapped on the S-CCPCH selected by the UE according to the procedure in subclause 8.5.19;
  - act on RRC messages received on PCCH and BCCH;
  - perform measurements process according to measurement control information as specified in subclause 8.4 and in subclause 14.4;
  - maintain up-to-date BMC data if it supports Cell Broadcast Service (CBS) as specified in [37];
  - run timer T305 for periodical URA update if the UE is in URA_PCH or for periodical cell update if the UE is in CELL_PCH;
- if the UE is "out of service area":
  - perform cell reselection process as specified in [4];
  - run timer T316;
  - run timer T305

7.2.2.2 CELL_FACH state

In the CELL_FACH state the UE shall perform the following actions:

- if the UE is "in service area":

NOTE:~~-~~ DCCH and, if configured, DTCH are available in this state~~;~~ [Note to Hans: Paragraph type changed to "NO"]

  - maintain up-to-date system information as broadcast by the serving cell as specified in the sub-clause 8.1.1;
  - perform cell reselection process as specified in [4];
  - perform measurements process according to measurement control information as specified in subclause 8.4 and in subclause 14.4;
  - run timer T305 (periodical cell update);
  - listen to all FACH transport channels mapped on the S-CCPCH selected by the UE according to the procedure in subclause 8.5.19;
  - act on RRC messages received on BCCH, CCCH and DCCH;
  - act on RRC messages received on, if available, SHCCH (TDD only);
- if the UE is "out of service area":
  - perform cell reselection process as specified in [4];

- run timers T305 (periodical cell update), and T317 (cell update when re-entering "in service") or T307 (transition to Idle mode)

7.2.2.3 CELL_DCH state

In the CELL_DCH state the UE shall perform the following actions:

NOTE:~~-~~ ~~if~~ DCCH and, if configured, DTCH are available in this state [Note to Hans: Paragraph type changed to "NO"]~~:~~

- read system information broadcast on FACH as specified in subclause 8.1.1.3 (applicable only to UEs with certain capabilities and in FDD mode); [Note to Hans: Indentation changed to B1]

- read the system information as specified in subclause 8.1.1 (for UEs in TDD mode); [Note to Hans: Indentation changed to B1]

- perform measurements process according to measurement control information as specified in subclause 8.4 and in clause 14; [Note to Hans: Indentation changed to B1]

- act on RRC messages received on DCCH;

- act on RRC messages received on BCCH (applicable only to UEs with certain capabilities and in FDD mode);

- act on RRC messages received on BCCH (TDD only) and, if available, SHCCH (TDD only);

8.1.4.2 Initiation

When the UE is in state CELL_DCH or CELL_FACH, the UTRAN may at anytime initiate an RRC connection release by transmitting an RRC CONNECTION RELEASE message using UM RLC.

When UTRAN transmits an RRC CONNECTION RELEASE message ~~in response to a CELL UPDATE (subclause 8.3.1) or URA UPDATE (subclause 8.3.2) message from the UE, UTRAN should use the downlink CCCH to transmit the message. In all other cases~~ the downlink DCCH should be used, if available. If the downlink DCCH is not available in UTRAN and the UE is in CELL_FACH state, the downlink CCCH may be used.

UTRAN may transmit several RRC CONNECTION RELEASE messages to increase the probability of proper reception of the message by the UE. In such a case, the RRC SN for these repeated messages shall be the same. This shall also apply to the RRC CONNECTION RELEASE COMPLETE message. The number of repeated messages and the interval between the messages is a network option.

3GPP TSG-RAN WG2 Meeting #23
Helsinki, Finland, August 27th- 31st 2001

Tdoc R2-011840

CR-Form-v3

CHANGE REQUEST

⌘ **25.331** **CR** **931** ⌘ rev **-** ⌘ Current version: **3.7.0** ⌘

*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:	⌘	Remove C-RNTI when entering CELL_DCH.
Source:	⌘	TSG-RAN WG2
Work item code:	⌘	TEI
Date:	⌘	2001-08-20
Category:	⌘	**F**
Release:	⌘	R99

Use one 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 one 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:	⌘	Clarification that the UE shold remove C-RNTI when entering CELL_DCH from CELL_FACH, because otherwise the UE and network might end up with different C-RNTI if the UE re-enters CELL_FACH state, and uses the stored C-RNTI. **Isolated impact:**. The change has isolated impact and is a correction where the specification was ambiguous or not sufficiently explicit. The change would not affect implementations behaving like indicated in the CR, would affect implementations supporting the corrected functionality otherwise.
Summary of change:	⌘	It is added that the UE shall delete C-RNTI after state transition to CELL_DCH.
Consequences if not approved:	⌘	The UE might use an old and not valid C-RNTI when entering CELL_FACH. The UTRANmay use that C-RNTI to another UE, then the first UE will think that UTRAN is talking to him while infact talking to another UE.

Clauses affected:	⌘	8.2.2.3		
Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ O&M Specifications	⌘	25.331 v4.1.0, CR 932
Other comments:	⌘			

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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.

8.2.2.3 Reception of RADIO BEARER SETUP or RADIO BEARER RECONFIGURATION or RADIO BEARER RELEASE or TRANSPORT CHANNEL RECONFIGURATION or PHYSICAL CHANNEL RECONFIGURATION message by the UE

The UE shall be able to receive any of the following messages:

- RADIO BEARER SETUP message; or
- RADIO BEARER RECONFIGURATION message; or
- RADIO BEARER RELEASE message; or
- TRANSPORT CHANNEL RECONFIGURATION message; or
- PHYSICAL CHANNEL RECONFIGURATION message

and perform a hard handover, even if no prior UE measurements have been performed on the target cell and/or frequency.

If the UE receives:

- a RADIO BEARER SETUP message; or
- a RADIO BEARER RECONFIGURATION message; or
- a RADIO BEARER RELEASE message; or
- a TRANSPORT CHANNEL RECONFIGURATION message; or
- a PHYSICAL CHANNEL RECONFIGURATION message

it shall:

- set the variable ORDERED_RECONFIGURATION to TRUE;
- perform the physical layer synchronisation procedure as specified in [29];
- act upon all received information elements as specified in subclause 8.6, unless specified in the following and perform the actions below.

The UE may first release the physical channel configuration used at reception of the reconfiguration message. The UE shall then:

- in FDD, if the IE "PDSCH code mapping" is included but the IE "PDSCH with SHO DCH Info" is not included and if the DCH has only one link in its active set:
  - act upon the IE "PDSCH code mapping" as specified in subclause 8.6 and:
  - infer that the PDSCH will be transmitted from the cell from which the downlink DPCH is transmitted;
- enter a state according to subclause 8.6.3.3.

In case the UE receives a RADIO BEARER RECONFIGURATION message including the IE "RB information to reconfigure" that only includes the IE "RB identity", the UE shall:

- handle the message as if IE "RB information to reconfigure" was absent.

NOTE: The RADIO BEARER RECONFIGURATION message always includes the IE "RB information to reconfigure". UTRAN has to include it even if it does not require the reconfiguration of any RB.

If after state transition the UE enters CELL_DCH state, the UE shall, after the state transistion:

- remove any C-RNTI from MAC;

- clear the variable C_RNTI;

If the UE was in CELL_DCH state upon reception of the reconfiguration message and remains in CELL_DCH state, the UE shall:

- if the IE "UL DPCH Info" is absent, not change its current UL Physical channel configuration;
- if the IE "DL DPCH Info for each RL" is absent, not change its current DL Physical channel configuration.

If after state transition the UE enters CELL_FACH state, the UE shall, after the state transition:

- if the IE "Frequency info" is included in the received reconfiguration message:
  - select a suitable UTRA cell according to [4] on that frequency;
- if the IE "Frequency info" is not included in the received reconfiguration message:
  - select a suitable UTRA cell according to [4];
- if the received reconfiguration message included the IE "Primary CPICH info" (for FDD) or "Primary CCPCH info" (for TDD), and the UE selects another cell than indicated by this IE or the received reconfiguration message did not include the IE "Primary CPICH info" (for FDD) or "Primary CCPCH info" (for TDD):
  - initiate a cell update procedure according to subclause 8.3.1 using the cause "Cell reselection";
  - when the cell update procedure completed successfully:
    - if the UE is in CELL_PCH or URA_PCH state:
      - initiate a cell update procedure according to subclause 8.3.1 using the cause "Uplink data transmission";
      - proceed as below;
- start timer T305 using its initial value if timer T305 is not running and if periodical update has been configured by T305 in the IE "UE Timers and constants in connected mode" set to any other value than "infinity" in system information block type 1;
- select PRACH according to subclause 8.5.17;
- select Secondary CCPCH according to subclause 8.5.19;
- use the transport format set given in system information;
- if the IE "UTRAN DRX cycle length coefficient" is included in the same message:
  - ignore that IE and stop using DRX;
- if the contents of the variable C_RNTI is empty:
  - perform a cell update procedure according to subclause 8.3.1 using the cause "Cell reselection";
  - when the cell update procedure completed successfully:
    - if the UE is in CELL_PCH or URA_PCH state:
      - initiate a cell update procedure according to subclause 8.3.1 using the cause "Uplink data transmission";
      - proceed as below;

The UE shall transmit a response message as specified in subclause 8.2.2.4, setting the information elements as specified below. The UE shall:

- if the received reconfiguration message included the IE "Downlink counter synchronisation info":

- calculate the START value according to subclause 8.5.9;
- include the calculated START values for each CN domain in the IE "START list" in the IE "Uplink counter synchronisation info";

- if the received reconfiguration message did not include the IE "Downlink counter synchronisation info":
  - if the variable START_VALUE_TO_TRANSMIT is set:
    - include and set the IE "START" to the value of that variable;
  - if the variable START_VALUE_TO_TRANSMIT is not set and the IE "New U-RNTI" is included:
    - calculate the START value according to subclause 8.5.9;
    - include the calculated START values for each CN domain in the IE "START list" in the IE "Uplink counter synchronisation info";
- if the received reconfiguration message contained the IE "Ciphering mode info":
  - include and set the IE "Radio bearer uplink ciphering activation time info" to the value of the variable RB_UPLINK_CIPHERING_ACTIVATION_TIME_INFO;
- if the received reconfiguration message contained the IE "Integrity protection mode info" with the IE "Integrity protection mode command" set to "Modify":
  - include and set the IE "Integrity protection activation info" to the value of the variable INTEGRITY_PROTECTION_ACTIVATION_INFO;
- if the received reconfiguration message did not contain the IE "Ciphering activation time for DPCH" in IE "Ciphering mode info":
  - if prior to this procedure there exist no transparent mode RLC radio bearers:
    - if, at the conclusion of this procedure, the UE will be in CELL_DCH state; and
    - if, at the conclusion of this procedure, at least one transparent mode RLC radio bearer exists:
      - include the IE "COUNT-C activation time" and specify a CFN value other than the default, "Now", for this IE;
  - if prior to this procedure there exists at least one transparent mode RLC radio bearer:
    - if, at the conclusion of this procedure, no transparent mode RLC radio bearers exist:
      - include the IE "COUNT-C activation time" in the response message and specify a CFN value other than the default, "Now", for this IE;
- set the IE "RRC transaction identifier" to the value of "RRC transaction identifier" in the entry for the received message in the table "Accepted transactions" in the variable TRANSACTIONS; and
- clear that entry;
- if the variable PDCP_SN_INFO is not empty:
  - include the IE "RB with PDCP information list" and set it to the value of the variable PDCP_SN_INFO;
- in TDD, if the procedure is used to perform a handover to a cell where timing advance is enabled, and the UE can calculate the timing advance value in the new cell (i.e. in a synchronous TDD network):
  - set the IE "Uplink Timing Advance" to the calculated value;
- if the IE "Integrity protection mode info" was present in the received reconfiguration message:
  - start applying the new integrity protection configuration in the uplink for signalling radio bearer RB 2 from and including the transmitted response message;

If after state transition the UE enters CELL_PCH or URA_PCH state, the UE shall, after the state transition and transmission of the response message:

- if the IE "Frequency info" is included in the received reconfiguration message:
  - select a suitable UTRA cell according to [4] on that frequency;
- if the IE "Frequency info" is not included in the received reconfiguration message:
  - select a suitable UTRA cell according to [4];
- prohibit periodical status transmission in RLC;
- remove any C-RNTI from MAC;
- clear the variable C_RNTI;
- start timer T305 using its initial value if timer T305 is not running and if periodical update has been configured by T305 in the IE "UE Timers and constants in connected mode" set to any other value than "infinity" in system information block type 1;
- select Secondary CCPCH according to subclause 8.5.19;
- if the IE "UTRAN DRX cycle length coefficient" is included in the same message:
  - use the value in the IE "UTRAN DRX Cycle length coefficient" for calculating Paging occasion and PICH Monitoring Occasion as specified in subclause 8.6.3.2;
- if the UE enters CELL_PCH state from CELL_DCH state, and the received reconfiguration message included the IE "Primary CPICH info" (for FDD) or "Primary CCPCH info" (for TDD), and the UE selected another cell than indicated by this IE or the received reconfiguration message did not include the IE "Primary CPICH info" (for FDD) or "Primary CCPCH info" (for TDD):
  - initiate a cell update procedure according to subclause 8.3.1 using the cause "cell reselection";
  - when the cell update procedure completed successfully:
    - the procedure ends;
- if the UE enters CELL_PCH state from CELL_FACH state, and the received reconfiguration message included the IE "Primary CPICH info" (for FDD) or "Primary CCPCH info" (for TDD), and the UE selected another cell than indicated by this IE:
  - initiate a cell update procedure according to subclause 8.3.1 using the cause "cell reselection";
  - when the cell update procedure completed successfully:
    - the procedure ends;
- if the UE enters URA_PCH state, and after cell selection the criteria for URA update caused by "URA reselection" according to subclause 8.3.1 is fulfilled:
  - initiate a URA update procedure according to subclause 8.3.1 using the cause "URA reselection";
  - when the URA update procedure completed:
    - the procedure ends.

3GPP TSG-RAN WG2 Meeting #23
Helsinki, Finland, August 27th- 31st 2001

Tdoc R2-012075

CR-Form-v3

CHANGE REQUEST

⌘ **25.331 CR 932** ⌘ rev **-** ⌘ Current version: **4.1.0** ⌘

*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:	⌘	Remove C-RNTI when entering CELL_DCH.
Source:	⌘	TSG-RAN WG2
Work item code:	⌘	TEI
Date:	⌘	2001-08-29
Category:	⌘	**A**
Release:	⌘	REL-4

Use one 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 one 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:	⌘	Clarification that the UE shold remove C-RNTI when entering CELL_DCH from CELL_FACH, because otherwise the UE and network might end up with different C-RNTI if the UE re-enters CELL_FACH state, and uses the stored C-RNTI. **Isolated impact:**. The change has isolated impact and is a correction where the specification was ambiguous or not sufficiently explicit. The change would not affect implementations behaving like indicated in the CR, would affect implementations supporting the corrected functionality otherwise.
Summary of change:	⌘	It is added that the UE shall delete C-RNTI after state transition to CELL_DCH.
Consequences if not approved:	⌘	The UE might use an old and not valid C-RNTI when entering CELL_FACH. The UTRANmay use that C-RNTI to another UE, then the first UE will think that UTRAN is talking to him while infact talking to another UE.

Clauses affected:	⌘	8.2.2.3		
Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ O&M Specifications	⌘	25.331 v3.7.0, CR 931
Other comments:	⌘			

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8.2.2.3 Reception of RADIO BEARER SETUP or RADIO BEARER RECONFIGURATION or RADIO BEARER RELEASE or TRANSPORT CHANNEL RECONFIGURATION or PHYSICAL CHANNEL RECONFIGURATION message by the UE

The UE shall be able to receive any of the following messages:

- RADIO BEARER SETUP message; or
- RADIO BEARER RECONFIGURATION message; or
- RADIO BEARER RELEASE message; or
- TRANSPORT CHANNEL RECONFIGURATION message; or
- PHYSICAL CHANNEL RECONFIGURATION message

and perform a hard handover, even if no prior UE measurements have been performed on the target cell and/or frequency.

If the UE receives:

- a RADIO BEARER SETUP message; or
- a RADIO BEARER RECONFIGURATION message; or
- a RADIO BEARER RELEASE message; or
- a TRANSPORT CHANNEL RECONFIGURATION message; or
- a PHYSICAL CHANNEL RECONFIGURATION message

it shall:

- set the variable ORDERED_RECONFIGURATION to TRUE;
- perform the physical layer synchronisation procedure as specified in [29];
- act upon all received information elements as specified in subclause 8.6, unless specified in the following and perform the actions below.

The UE may first release the physical channel configuration used at reception of the reconfiguration message. The UE shall then:

- in FDD, if the IE "PDSCH code mapping" is included but the IE "PDSCH with SHO DCH Info" is not included and if the DCH has only one link in its active set:
  - act upon the IE "PDSCH code mapping" as specified in subclause 8.6 and:
  - infer that the PDSCH will be transmitted from the cell from which the downlink DPCH is transmitted;
- enter a state according to subclause 8.6.3.3.

In case the UE receives a RADIO BEARER RECONFIGURATION message including the IE "RB information to reconfigure" that only includes the IE "RB identity", the UE shall:

- handle the message as if IE "RB information to reconfigure" was absent.

NOTE: The RADIO BEARER RECONFIGURATION message always includes the IE "RB information to reconfigure". UTRAN has to include it even if it does not require the reconfiguration of any RB.

If after state transition the UE enters CELL_DCH state, the UE shall, after the state transistion:

- remove any C-RNTI from MAC;

- clear the variable C_RNTI;

If the UE was in CELL_DCH state upon reception of the reconfiguration message and remains in CELL_DCH state, the UE shall:

- if the IE "UL DPCH Info" is absent, not change its current UL Physical channel configuration;
- if the IE "DL DPCH Info for each RL" is absent, not change its current DL Physical channel configuration.

If after state transition the UE enters CELL_FACH state, the UE shall, after the state transition:

- if the IE "Frequency info" is included in the received reconfiguration message:
  - select a suitable UTRA cell according to [4] on that frequency;
- if the IE "Frequency info" is not included in the received reconfiguration message:
  - select a suitable UTRA cell according to [4];
- if the received reconfiguration message included the IE "Primary CPICH info" (for FDD) or "Primary CCPCH info" (for TDD), and the UE selects another cell than indicated by this IE or the received reconfiguration message did not include the IE "Primary CPICH info" (for FDD) or "Primary CCPCH info" (for TDD):
  - initiate a cell update procedure according to subclause 8.3.1 using the cause "Cell reselection";
  - when the cell update procedure completed successfully:
    - if the UE is in CELL_PCH or URA_PCH state:
      - initiate a cell update procedure according to subclause 8.3.1 using the cause "Uplink data transmission";
      - proceed as below;
- start timer T305 using its initial value if timer T305 is not running and if periodical update has been configured by T305 in the IE "UE Timers and constants in connected mode" set to any other value than "infinity" in system information block type 1;
- select PRACH according to subclause 8.5.17;
- select Secondary CCPCH according to subclause 8.5.19;
- use the transport format set given in system information;
- if the IE "UTRAN DRX cycle length coefficient" is included in the same message:
  - ignore that IE and stop using DRX;
- if the contents of the variable C_RNTI is empty:
  - perform a cell update procedure according to subclause 8.3.1 using the cause "Cell reselection";
  - when the cell update procedure completed successfully:
    - if the UE is in CELL_PCH or URA_PCH state:
      - initiate a cell update procedure according to subclause 8.3.1 using the cause "Uplink data transmission";
      - proceed as below;

The UE shall transmit a response message as specified in subclause 8.2.2.4, setting the information elements as specified below. The UE shall:

- if the received reconfiguration message included the IE "Downlink counter synchronisation info":

- calculate the START value according to subclause 8.5.9;
- include the calculated START values for each CN domain in the IE "START list" in the IE "Uplink counter synchronisation info";

- if the received reconfiguration message did not include the IE "Downlink counter synchronisation info":
  - if the variable START_VALUE_TO_TRANSMIT is set:
    - include and set the IE "START" to the value of that variable;
  - if the variable START_VALUE_TO_TRANSMIT is not set and the IE "New U-RNTI" is included:
    - calculate the START value according to subclause 8.5.9;
    - include the calculated START values for each CN domain in the IE "START list" in the IE "Uplink counter synchronisation info";
- if the received reconfiguration message contained the IE "Ciphering mode info":
  - include and set the IE "Radio bearer uplink ciphering activation time info" to the value of the variable RB_UPLINK_CIPHERING_ACTIVATION_TIME_INFO;
- if the received reconfiguration message contained the IE "Integrity protection mode info" with the IE "Integrity protection mode command" set to "Modify":
  - include and set the IE "Integrity protection activation info" to the value of the variable INTEGRITY_PROTECTION_ACTIVATION_INFO;
- if the received reconfiguration message did not contain the IE "Ciphering activation time for DPCH" in IE "Ciphering mode info":
  - if prior to this procedure there exist no transparent mode RLC radio bearers:
    - if, at the conclusion of this procedure, the UE will be in CELL_DCH state; and
    - if, at the conclusion of this procedure, at least one transparent mode RLC radio bearer exists:
      - include the IE "COUNT-C activation time" and specify a CFN value other than the default, "Now", for this IE;
  - if prior to this procedure there exists at least one transparent mode RLC radio bearer:
    - if, at the conclusion of this procedure, no transparent mode RLC radio bearers exist:
      - include the IE "COUNT-C activation time" in the response message and specify a CFN value other than the default, "Now", for this IE;
- set the IE "RRC transaction identifier" to the value of "RRC transaction identifier" in the entry for the received message in the table "Accepted transactions" in the variable TRANSACTIONS; and
- clear that entry;
- if the variable PDCP_SN_INFO is not empty:
  - include the IE "RB with PDCP information list" and set it to the value of the variable PDCP_SN_INFO;
- in TDD, if the procedure is used to perform a handover to a cell where timing advance is enabled, and the UE can calculate the timing advance value in the new cell (i.e. in a synchronous TDD network):
  - set the IE "Uplink Timing Advance" to the calculated value;
- if the IE "Integrity protection mode info" was present in the received reconfiguration message:
  - start applying the new integrity protection configuration in the uplink for signalling radio bearer RB 2 from and including the transmitted response message;

If after state transition the UE enters CELL_PCH or URA_PCH state, the UE shall, after the state transition and transmission of the response message:

- if the IE "Frequency info" is included in the received reconfiguration message:
  - select a suitable UTRA cell according to [4] on that frequency;
- if the IE "Frequency info" is not included in the received reconfiguration message:
  - select a suitable UTRA cell according to [4];
- prohibit periodical status transmission in RLC;
- remove any C-RNTI from MAC;
- clear the variable C_RNTI;
- start timer T305 using its initial value if timer T305 is not running and if periodical update has been configured by T305 in the IE "UE Timers and constants in connected mode" set to any other value than "infinity" in system information block type 1;
- select Secondary CCPCH according to subclause 8.5.19;
- if the IE "UTRAN DRX cycle length coefficient" is included in the same message:
  - use the value in the IE "UTRAN DRX Cycle length coefficient" for calculating Paging occasion and PICH Monitoring Occasion as specified in subclause 8.6.3.2;
- if the UE enters CELL_PCH state from CELL_DCH state, and the received reconfiguration message included the IE "Primary CPICH info" (for FDD) or "Primary CCPCH info" (for TDD), and the UE selected another cell than indicated by this IE or the received reconfiguration message did not include the IE "Primary CPICH info" (for FDD) or "Primary CCPCH info" (for TDD):
  - initiate a cell update procedure according to subclause 8.3.1 using the cause "cell reselection";
  - when the cell update procedure completed successfully:
    - the procedure ends;
- if the UE enters CELL_PCH state from CELL_FACH state, and the received reconfiguration message included the IE "Primary CPICH info" (for FDD) or "Primary CCPCH info" (for TDD), and the UE selected another cell than indicated by this IE:
  - initiate a cell update procedure according to subclause 8.3.1 using the cause "cell reselection";
  - when the cell update procedure completed successfully:
    - the procedure ends;
- if the UE enters URA_PCH state, and after cell selection the criteria for URA update caused by "URA reselection" according to subclause 8.3.1 is fulfilled:
  - initiate a URA update procedure according to subclause 8.3.1 using the cause "URA reselection";
  - when the URA update procedure completed:
    - the procedure ends.

3GPP TSG-RAN WG2 Meeting #23
Helsinki, Finland, 27-31.07.2001

Tdoc 012154

CR-Form-v4

CHANGE REQUEST

⌘ **25.331** **CR** **934** ⌘ ev **r1** ⌘ Current version: **3.7.0** ⌘

*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 ☐ Radio Access Network **X** Core Network ☐

Title:	⌘	TF and TFC set definition
Source:	⌘	TSG-RAN WG2
Work item code:	⌘	TEI
Date:	⌘	31 Aug 01
Category:	⌘	**F**
Release:	⌘	R99

Use one of the following categories:
F *(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 one 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:	⌘	1A) For certain services the general TFCs defined are not correct. For example, in the case of AMR codec where class A, B and C are mapped to separate subflows there is no case where B or C should be sent without A. Currently UTRAN should define TFCs that would give combinations that are not correct to use. 1B) For certain services the general TFs defined are not correct. For example, a circuit switched 64kbps service may require all or none it's data to be transmitted in a particular TTI, where if the data cannot be transmitted it will be discarded. Currently UTRAN should include a TF that it would not be meaningful to use. 2) Correction detailed in (2) moved to 25.321 in CR092r2, associated text removed from this CR.
Summary of change:	⌘	1A & 1B) Sentence added to allow exception to general rules for a specific service. Paragraph bulletised to make understanding clearer. Impact Analysis: This is an isolated impact correction to TF and TFC definition. 2) Removed, see above.
Consequences if not approved:	⌘	1) Incorrect TFs and TFCs defined for certain services.

	2) Removed, see above.

Clauses affected:	⌘	8.6.5.2			
Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ O&M Specifications	⌘	25.331 v4.1.0, CR 935	
Other comments:	⌘				

How to create CRs using this form:
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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://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 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.

8.6.5.2 Transport format combination set

If the IE "Transport format combination set" is included, the UE shall for that direction (uplink or downlink):

- store the new transport format combination set, or (if this exists) modify a previously stored transport format combination set according to IEs included in IE "Transport format combination set";
- start to respect those transport format combinations;
- if IE "Transport format combination subset" is received in this message:
  - perform the actions as specified in subsection 8.6.5.3;
- if IE "Transport format combination subset" is not received in this message:
  - clear the IE "Duration" in the variable TFC_SUBSET;
  - set both the IE "Current TFC subset" and the IE "Default TFC subset" in the variable TFC_SUBSET to the value indicating "full transport format combination set".

If the IE "Transport format combination set" is not included and if there is no addition, removal or reconfiguration of transport channels, the UE shall for that direction (uplink or downlink):

- use a previously stored transport format combination set if this exists.

If the IE "Transport format combination set" is not included; and

- if no transport format combination set is stored in the UE; or
- if transport channels are added or removed in the message; or
- if any transport channel is reconfigured in the message such that the size of the transport format set is changed:

the UE shall:

- set the variable INVALID_CONFIGURATION to TRUE.

In the uplink TFCS the UTRAN should include the following minimum set of TFCs:

- for each transport channel, a TFC with one transport block for this transport channel and empty TFs (see [34]) for all the others;
- for each AM logical channel, a TFC with a minimum size compatible TF for the corresponding transport channel and empty TFs for all other transport channels;
- for each TM logical channel and for each SDU size associated with it, a TFC with a minimum size compatible TF for the corresponding transport channel and empty TFs for all other transport channels;
- an "empty" TFC (see [34]).

For TDD, the TFCS of a CCTrCH should include those of the above combinations, which include a TF with one transport block for a transport channel used in that CCTrCH, and the “empty” TFC should be included in the TFCS of every CCTrCH.

The UTRAN may decide not to include TFs and or TFCs as specified above where they are not usable by a specific service.

~~The UTRAN should include in the TFCS, for each transport channel, a TFC with one transport block for this transport channel and empty TFs (see [34]) for all the others. Similarly, the UTRAN should include, for each AM logical channel, a TFC with a minimum size compatible TF for the corresponding transport channel and empty TFs for all other transport channels. Finally, the UTRAN should include, for each TM logical channel and for each SDU size associated with it, a TFC with a minimum size compatible TF for the corresponding transport channel and empty TFs for all other transport channels. For TDD, the TFCS of a CCTrCH should include those of the above combinations, which include a TF with one transport block for a transport channel used in that CCTrCH.~~

For AM-RLC logical channels, the minimum size compatible TF includes one transport block with "Configured RLC Size" equal to the RLC PDU size. For non-segmented mode TM-RLC logical channels, the minimum size compatible TF includes one transport block with "Configured RLC Size" equal to the RLC SDU size considered. For segmented mode TM-RLC, the minimum size compatible TF is any TF such that the number of transport blocks multiplied by the "Configured RLC Size" is equal to the RLC SDU size considered.

NOTE: The "Configured RLC Size" is defined as the transport block size minus the MAC header size.

~~Finally, UTRAN should include in the TFCS an "empty" TFC (see [34]). For TDD, the "empty" TFC should be included in the TFCS of every CCTrCH.~~

3GPP TSG-RAN WG2 Meeting #23
Helsinki, Finland, 27-31.07.2001

Tdoc 012190

CR-Form-v4

CHANGE REQUEST

⌘ **25.331 CR 935** ⌘ ev **-** ⌘ Current version: **4.1.0** ⌘

*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 ☐ Radio Access Network **X** Core Network ☐

Title:	⌘	TF and TFC set definition
Source:	⌘	TSG-RAN WG2
Work item code:	⌘	TEI
Date:	⌘	31 Aug 01
Category:	⌘	**A**
Release:	⌘	REL-4

Use one of the following categories:
F *(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 one 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:	⌘	1A) For certain services the general TFCs defined are not correct. For example, in the case of AMR codec where class A, B and C are mapped to separate subflows there is no case where B or C should be sent without A. Currently UTRAN should define TFCs that would give combinations that are not correct to use. 1B) For certain services the general TFs defined are not correct. For example, a circuit switched 64kbps service may require all or none it's data to be transmitted in a particular TTI, where if the data cannot be transmitted it will be discarded. Currently UTRAN should include a TF that it would not be meaningful to use.
Summary of change:	⌘	1A & 1B) Sentence added to allow exception to general rules for a specific service. Paragraph bulletised to make understanding clearer. Impact Analysis: This is an isolated impact correction to TF and TFC definition.
Consequences if not approved:	⌘	1) Incorrect TFs and TFCs defined for certain services.

Clauses affected:	⌘	8.6.5.2
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.

8.6.5.2 Transport format combination set

If the IE "Transport format combination set" is included, the UE shall for that direction (uplink or downlink):

- store the new transport format combination set, or (if this exists) modify a previously stored transport format combination set according to IEs included in IE "Transport format combination set";
- start to respect those transport format combinations;
- if IE "Transport format combination subset" is received in this message:
  - perform the actions as specified in subsection 8.6.5.3;
- if IE "Transport format combination subset" is not received in this message:
  - clear the IE "Duration" in the variable TFC_SUBSET;
  - set both the IE "Current TFC subset" and the IE "Default TFC subset" in the variable TFC_SUBSET to the value indicating "full transport format combination set".

If the IE "Transport format combination set" is not included and if there is no addition, removal or reconfiguration of transport channels, the UE shall for that direction (uplink or downlink):

- use a previously stored transport format combination set if this exists.

If the IE "Transport format combination set" is not included; and

- if no transport format combination set is stored in the UE; or
- if transport channels are added or removed in the message; or
- if any transport channel is reconfigured in the message such that the size of the transport format set is changed:

the UE shall:

- set the variable INVALID_CONFIGURATION to TRUE.

In the uplink TFCS the UTRAN should include the following minimum set of TFCs:

- for each transport channel, a TFC with one transport block for this transport channel and empty TFs (see [34]) for all the others;
- for each AM logical channel, a TFC with a minimum size compatible TF for the corresponding transport channel and empty TFs for all other transport channels;
- for each TM logical channel and for each SDU size associated with it, a TFC with a minimum size compatible TF for the corresponding transport channel and empty TFs for all other transport channels;
- an "empty" TFC (see [34]).

For TDD, the TFCS of a CCTrCH should include those of the above combinations, which include a TF with one transport block for a transport channel used in that CCTrCH, and the “empty” TFC should be included in the TFCS of every CCTrCH.

The UTRAN may decide not to include TFs and or TFCs as specified above where they are not usable by a specific service.

~~The UTRAN should include in the TFCS, for each transport channel, a TFC with one transport block for this transport channel and empty TFs (see [34]) for all the others. Similarly, the UTRAN should include, for each AM logical channel, a TFC with a minimum size compatible TF for the corresponding transport channel and empty TFs for all other transport channels. Finally, the UTRAN should include, for each TM logical channel and for each SDU size associated with it, a TFC with a minimum size compatible TF for the corresponding transport channel and empty TFs for all other transport channels. For TDD, the TFCS of a CCTrCH should include those of the above combinations, which include a TF with one transport block for a transport channel used in that CCTrCH.~~

For AM-RLC logical channels, the minimum size compatible TF includes one transport block with "Configured RLC Size" equal to the RLC PDU size. For non-segmented mode TM-RLC logical channels, the minimum size compatible TF includes one transport block with "Configured RLC Size" equal to the RLC SDU size considered. For segmented mode TM-RLC, the minimum size compatible TF is any TF such that the number of transport blocks multiplied by the "Configured RLC Size" is equal to the RLC SDU size considered.

NOTE: The "Configured RLC Size" is defined as the transport block size minus the MAC header size.

~~Finally, UTRAN should include in the TFCS an "empty" TFC (see [34]). For TDD, the "empty" TFC should be included in the TFCS of every CCTrCH.~~

3GPP TSG-RAN WG2 Meeting #22
Helsinki, Finland, 27-31.07.2001

Tdoc 012080

CR-Form-v4

CHANGE REQUEST

⌘ **25.331 CR 936** ⌘ ev **r1** ⌘ Current version: **3.7.0** ⌘

*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:	⌘	Correction of remaining ASN.1/Tabular inconsistencies
Source:	⌘	TSG-RAN WG2
Work item code:	⌘	TEI
Date:	⌘	29 Aug 01
Category:	⌘	**F**
Release:	⌘	R99

Use one of the following categories:
F *(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 one 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: ⌘ A small number of inconsistencies identified during RAN WG2 #21 are still present in the new version of the specification. This CR resolves those using the solutions already discussed and agreed by RAN WG2.

Summary of change: ⌘

Tabular Changes

10.3.2.3 Cell selection and re-selection info for SIB3/4

FDD->SlimitSearchRAT changed from OP to MP in table to align with ASN.1.

Impact Analysis: This is purely editorial and has no functional impact.

10.2.26 PUSCH CAPACITY REQUEST

10.3.6.42 PDSCH Capacity Allocation info

10.3.6.46 PDSCH system information

10.3.6.64 PUSCH Capacity Allocation info

10.3.6.66 PUSCH system information

Capitalisation not correct for constant HiPUSCHIdentities and HiPDSCHIdentities (also corrected in 10.3.10).

Impact Analysis: This is purely editorial and has no functional impact.

10.3.7.33 Intra-frequency cell info list

Comments added to table and corresponding ASN.1 definitions to explain that OP choice Intra-Frequency Cell Removal should be considered MD.

Comment changed to indicate that absence is equivalent to “Remove no intra-frequency cells” option. Corresponding ASN.1 changes removed as no longer

required.

Impact Analysis: This is purely editorial and has no functional impact assuming implementations have the same understanding as presented in this CR.

10.3.7.45 Measured results on RACH

CPICH Ec/N0 and CPICH RSCP ranges for “monitored cells” made consistent with “current cell” and ASN.1 implementation.

Impact Analysis: This is purely editorial and has no functional impact assuming implementations have the same understanding as presented in this CR.

Change to CPICH Ec/N0 range removed to avoid conflict with CR938r1

10.3.7.61 Reporting Cell Status

Definitions that were changed to enumerated types return to Integer for consistency with rest of specification.

Impact Analysis: This is purely editorial and has no functional impact.

10.3.7.88 UE positioning GPS acquisition assistance

Doppler (0^{th} order term) and Doppler (1^{st} order term) ranges corrected.

Impact Analysis: This is purely editorial and has no functional impact.

ASN.1 Changes

In ASN.1 the comment announcing that the SECURITY MODE COMMAND has been moved to the correct place (table 10.2.43).

Impact Analysis: This is purely editorial and has no functional impact.

Ranges shown in the table with limit maxTrCHpreconf have been updated to use the type with the correct name and comments have been added to explain the differences between Tabular and ASN.1 definitions.. (table 10.3.5.9).

Impact Analysis: This is purely editorial and has no functional impact.

Missing parameter additionalAssistanceDataRequest has been added to type UE-Positioning-ReportingQuantity (table 10.3.7.111).

Impact Analysis: This is an essential correction and does not impact any functionality other than that being corrected.

Consequences if not approved:	⌘	Inconsistencies between Tabular and ASN.1 definitions possibly resulting in confusion and incorrect implementations.

Clauses affected:	⌘	10.2.26, 10.3.2.3, 10.3.6.42, 10.3.6.46, 10.3.6.64, 10.3.6.66, 10.3.7.33, 10.3.7.45, 10.3.7.61, 10.3.7.88, 10.3.10, 11.2, 11.3, 11.4		
Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ O&M Specifications	⌘	25.331 v4.1.0, CR 937
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.

10 Message and information element functional definition and content

10.2.26 PUSCH CAPACITY REQUEST

NOTE: Only for TDD.

This message is used by the UE for request of PUSCH resources to the UTRAN.

RLC-SAP: TM

Logical channel: SHCCH

Direction: UE → UTRAN

Information Element/Group name	Need	Multi	Type and reference	Semantics description
Message Type	MP		Message Type	
C-RNTI	OP		C-RNTI 10.3.3.8	
RRC transaction identifier	CV-*ProtErr*		RRC transaction identifier 10.3.3.36	
Traffic Volume	OP		Traffic Volume, measured results list 10.3.7.67	
Timeslot list	OP	1 to maxTS		
>Timeslot number	MP		Timeslot number 10.3.6.84	
>Timeslot ISCP	MP		Timeslot ISCP info 10.3.7.65	
Primary CCPCH RSCP	OP		Primary CCPCH RSCP info 10.3.7.54	
CHOICE *Allocation confirmation*	OP			
>PDSCH Confirmation			Integer(1..~~H~~h iPDSCH~~I~~identities)	
>PUSCH Confirmation			Integer(1..~~H~~h iPUSCH~~I~~identities)	
Protocol error indicator	MD		Protocol error indicator 10.3.3.27	Default value is FALSE
Protocol error information	CV-*ProtErr*		Protocol error information 10.3.8.12	

Condition	Explanation
ProtErr	This IE is mandatory if the IE "Protocol error indicator" has the value "TRUE". Otherwise it is not needed.

10.3.2.3 Cell selection and re-selection info for SIB3/4

Information Element/Group name	Need	Multi	Type and reference	Semantics description
Mapping Info	OP		Mapping info 10.3.2.5	
Cell_selection_and_reselection_quality_measure	MP		Enumerated (CPICH Ec/N0, CPICH RSCP)	Choice of measurement (CPICH Ec/N0 or CPICH RSCP) to use as quality measure Q for FDD cells.
CHOICE *mode*	MP			
>FDD				
>>$S_{intrasearch}$	OP		Integer (-32..20 by step of 2)	[4] [dB]
>>$S_{intersearch}$	OP		Integer (-32..20 by step of 2)	[4] [dB]
>>$S_{searchHCS}$	OP		Integer (-105..91 by step of 2)	[4] [dB]
>>RAT List	OP	1 to <maxOtherRAT>		
>>>RAT identifier	MP		Enumerated (GSM, cdma2000)	
>>>$S_{search,RAT}$	MP		Integer (-32..20 by step of 2)	In case the value 20 is received the UE shall consider this IE as if it was absent according to [4] [dB]
>>>$S_{HCS,RAT}$	OP		Integer (-105..91 by step of 2)	[4] [dB]
>>>$S_{limit,SearchRAT}$	~~OP~~MP		Integer (-32..20 by step of 2)	[4] [dB]
>>Qqualmin	MP		Integer (-24..0)	Ec/N0, [dB]
>>Qrxlevmin	MP		Integer (-115..-25 by step of 2)	RSCP, [dBm]
>TDD				
>>$S_{intrasearch}$	OP		Integer (-105..91 by step of 2)	[4] [dB]
>>$S_{intersearch}$	OP		Integer (-105..91 by step of 2)	[4] [dB]
>>$S_{searchHCS}$	OP		Integer (-105..91 by step of 2)	[4] [dB]
>>RAT List	OP	1 to <maxOtherRAT>		
>>>RAT identifier	MP		Enumerated (GSM, cdma2000)	
>>>$S_{search,RAT}$	MP		Integer (-105..91 by step of 2)	In case the value 91 is received the UE shall consider this IE as if it was absent according to [4] [dB]
>>>$S_{HCS,RAT}$	OP		Integer (-	[4]

			105..91 by step of 2)	[dB]
>>>$S_{limit,SearchRAT}$	MP		Integer (-105..91 by step of 2)	[4] [dB]
>>Qrxlevmin	MP		Integer (-115..-25 by step of 2)	RSCP, [dBm]
$Qhyst1_s$	MP		Integer (0..40 by step of 2)	[4] [dB]
$Qhyst2_s$	CV-*FDD-Quality-Measure*		Integer (0..40 by step of 2)	Default value is $Qhyst1_s$ [4] [dB]
$Treselection_s$	MP		Integer (0..31)	[s]
HCS Serving cell Information	OP		HCS Serving cell information 10.3.7.12	
Maximum allowed UL TX power	MP		Maximum allowed UL TX power 10.3.6.39	[dBm] UE_TXPWR_MAX_RACH in [4].

Condition	Explanation
FDD-Quality-Measure	Presence is not allowed if the IE "Cell_selection_and_reselection_quality_measure" has the value CPICH RSCP, otherwise the IE is mandatory and has a default value.

UE	This information element is only sent when the value of the "Midamble Allocation Mode" IE is "UE-specific midamble".

10.3.6.42 PDSCH Capacity Allocation info

NOTE: Only for TDD.

Information Element/Group name	Need	Multi	Type and reference	Semantics description
PDSCH allocation period info	MP		Allocation Period Info 10.3.6.4	
TFCS ID	MD		Integer(1..8)	Default is 1.
CHOICE *Configuration*	MP			
>Old configuration				
>>PDSCH Identity	MP		Integer(1..~~H~~hiPDSCH~~I~~identities)	
>New configuration				
>>PDSCH Info	MP		PDSCH Info 10.3.6.44	
>>PDSCH Identity	OP		Integer(1..~~H~~hiPDSCH~~I~~identities)	
>>PDSCH power control info	OP		PDSCH power control info 10.3.6.45	

10.3.6.46 PDSCH system information

NOTE: Only for TDD.

Information Element/Group name	Need	Multi	Type and reference	Semantics description
PDSCH information	MP	1 to <maxPDSCH>		
>PDSCH Identity	MP		Integer(1..~~H~~hiPDSCH~~I~~identities)	
>PDSCH info	MP		PDSCH info 10.3.6.44	
>SFN Time Info	CH-*Block17*		SFN Time Info 10.3.6.75	
>DSCH TFS	OP		Transport format set 10.3.5.23	
>DSCH TFCS	OP		Transport Format Combination Set 10.3.5.20	

Condition	Explanation
Block17	This IE is absent in System Information Block 17. Otherwise it is optional.

10.3.6.64 PUSCH Capacity Allocation info

NOTE: Only for TDD.

Information Element/Group name	Need	Multi	Type and reference	Semantics description
CHOICE *PUSCH allocation*	MP			
>PUSCH allocation pending				(no data)
>PUSCH allocation assignment				
>>PUSCH allocation period info	MP		Allocation Period Info 10.3.6.4	
>>PUSCH power control info	OP		PUSCH power control info 10.3.6.65	
>>TFCS ID	MD		Integer(1..8)	Default is 1.
>>CHOICE *Configuration*	MP			
>>>Old configuration				
>>>>PUSCH Identity	MP		Integer(1..~~H~~hiPUSCH~~I~~identities)	
>>>New configuration				
>>>>PUSCH info	MP		PUSCH info 10.3.6.63	
>>>>PUSCH Identity	OP		Integer(1..~~H~~hiPUSCH~~I~~identities)	

10.3.6.66 PUSCH system information

NOTE: Only for TDD.

Information Element/Group name	Need	Multi	Type and reference	Semantics description
PUSCH information	MP	1 to <maxPUSCH>		
>PUSCH Identity	MP		Integer(1..~~H~~hiPUSCH~~l~~identities)	
>PUSCH info	MP		PUSCH info 10.3.6.63	
>SFN Time Info	CH-*Block17*		SFN Time Info 10.3.6.75	
>USCH TFS	OP		Transport format set 10.3.5.23	
>USCH TFCS	MP		Transport Format Combination Set 10.3.5.20	

Condition	Explanation
Block17	This IE is absent in System Information Block 17. Otherwise it is optional.

10.3.7.33 Intra-frequency cell info list

Contains the measurement object information for an intra-frequency measurement.

Information Element/Group name	Need	Multi	Type and reference	Semantics description
CHOICE *Intra-frequency cell removal*	OP			Absence of this IE is equivalent to choice "Remove no intra-frequency cells"
>Remove all intra-frequency cells				No data
>Remove some intra-frequency cells				
>>Removed intra-frequency cells	MP	1 to <maxCellMeas>		
>>>Intra-frequency cell id	MP		Integer(0 .. <maxCellMeas> - 1)	
>Remove no intra-frequency cells				
New intra-frequency cell	OP	1 to <maxCellMeas>		This information element must be present when "Intra-frequency cell info list" is included in the system information
>Intra-frequency cell id	MD		Integer(0 .. <maxCellMeas> - 1)	
>Cell info	MP		Cell info 10.3.7.2	
Cell for measurement	CV-*BCHopt*	1 to <maxCellMeas>		
>Intra-frequency cell id	MP		Integer(0 .. <maxCellMeas>-1)	

Condition	Explanation
BCHopt	This IE is not needed when sent in SYSTEM INFORMATION. Otherwise, the IE is Optional

10.3.7.45 Measured results on RACH

Contains the measured results on RACH of the quantity indicated optionally by Reporting Quantity in the system information broadcast on BCH. The list should be in the order of the value of the measurement quality (the first cell should be the best cell). The "best" FDD cell has the largest value when the measurement quantity is "Ec/No" or "RSCP". On the other hand, the "best" cell has the smallest value when the measurement quantity is "Pathloss". The "best" TDD cell has the largest value when measurement quantity is "Primary CCPCH RSCP".

Information Element/group name	Need	Multi	Type and reference	Semantics description
Measurement result for current cell				
CHOICE *mode*	MP			
>FDD				
>>CHOICE *measurement quantity*	MP			
>>>CPICH Ec/N0			Integer(0..50)	In dB. According to CPICH_Ec/No in [19]
>>>CPICH RSCP			Integer(0..91)	In dBm. According to CPICH_RSCP_LEV in [19]
>>>Pathloss			Integer(46..158)	In dB
>TDD				
>>Timeslot List	OP	1 to 14		
>>>Timeslot ISCP	MP		Timeslot ISCP info 10.3.7.65	The UE shall report the Timeslot ISCP in the same order as indicated in the cell info
>>Primary CCPCH RSCP	OP		Primary CCPCH RSCP info 10.3.7.54	
Measurement results for monitored cells	OP	1 to 7		
>SFN-SFN observed time difference	OP		SFN-SFN observed time difference 10.3.7.63	It is absent for current cell
>CHOICE *mode*	MP			
>>FDD				
>>>Primary CPICH info	MP		Primary CPICH info 10.3.6.60	
>>>CHOICE *measurement quantity*	OP			It is absent for current cell
>>>>CPICH Ec/N0			Integer(-20..0)	In dB. According to CPICH_Ec/No in [19].
>>>>CPICH RSCP			Integer(~~-115..-40~~)(0..91)	In dBm. According to CPICH_RSCP_LEV in [19].
>>>>Pathloss			Integer(46..158)	In dB
>>TDD				
>>>Cell parameters Id	MP		Cell parameters Id 10.3.6.9	
>>>Primary CCPCH RSCP	MP		Primary CCPCH RSCP info 10.3.7.54	

NOTE 1: Monitored cells consist of current cell and neighbouring cells.

10.3.7.61 Reporting Cell Status

Indicates maximum allowed number of cells to report and whether active set cells and/or virtual active set cells and/or monitored set cells on and/or detected set cells used frequency and/or monitored set cells on non used frequency should/should not be included in the IE "Measured results".

Information Element/Group name	Need	Multi	Type and reference	Semantics description
CHOICE *reported cell*	MP			
>Report cells within active set				
>>Maximum number of reported cells	MP		~~Enumerated(e1..e6)~~ Integer(1..6)	
>Report cells within monitored set cells on used frequency				
>>Maximum number of reported cells	MP		~~Enumerated(e1..e6)~~ Integer(1..6)	
>Report cells within active set and/or monitored set cells on used frequency				
>>Maximum number of reported cells	MP		~~Enumerated(e1..e6)~~ Integer(1..6)	
>Report cells within detected set on used frequency				
>>Maximum number of reported cells	MP		~~Enumerated(e1..e6)~~ Integer(1..6)	
>Report cells within monitored set and/or detected set on used frequency				
>>Maximum number of reported cells	MP		~~Enumerated(e1..e6)~~ Integer(1..6)	
>Report all active set cells + cells within monitored set on used frequency				
>>Maximum number of reported cells	MP		Enumerated (virtual/active set cells+1, virtual/active set cells+2, …., virtual/active set cells+6)	
>Report all active set cells + cells within detected set on used frequency				
>>Maximum number of reported cells	MP		Enumerated (virtual/active set cells+1, virtual/active set cells+2, …., virtual/active set cells+6)	
>Report all active set cells + cells within monitored set and/or detected set on used frequency				
>>Maximum number of reported cells	MP		Enumerated (virtual/active set cells+1, virtual/active set cells+2, …., virtual/active set cells+6)	

>Report cells within virtual active set				
>>Maximum number of reported cells	MP		Integer(1..6)	
>Report cells within monitored set on non-used frequency				
>>Maximum number of reported cells	MP		Integer(1..6)	
>Report cells within monitored and/or active set on non-used frequency				
>>Maximum number of reported cells	MP		Integer(1..6)	
>Report all virtual active set cells + cells within monitored set on non-used frequency				
>>Maximum number of reported cells	MP		Enumerated (virtual/active set cells+1, virtual/active set cells+2, …., virtual/active set cells+6)	
>Report cells within active set or within virtual active set				
>>Maximum number of reported cells	MP		Integer (1..12)	
>Report cells within active and/or monitored set on used frequency or within active and/or monitored set on non-used frequency				
>>Maximum number of reported cells	MP		Integer(1..12)	

10.3.7.88 UE positioning GPS acquisition assistance

This IE contains parameters that enable fast acquisition of the GPS signals in UE-assisted GPS positioning.

Information Element/Group name	Need	Multi	Type and Reference	Semantics description
CHOICE *Reference Time*	MP			
>UTRAN reference time				GPS Time of Week counted in microseconds, given as GPS TOW in milliseconds and GPS TOW remainder in microseconds, UTRAN reference time = 1000 * GPS TOW msec + GPS TOW rem usec
>>GPS TOW msec	MP		Integer(0..6.048*10^8-1)	GPS Time of Week in milliseconds (rounded down to the nearest millisecond unit)
>>GPS TOW rem usec	MP		Integer(0..999)	GPS Time of Week in microseconds MOD 1000.
>>CHOICE *mode*				
>>>FDD				
>>>>Primary CPICH Info	OP		Primary CPICH Info 10.3.6.60	Identifies the reference cell for the GPS TOW-SFN relationship
>>>TDD				
>>>>cell parameters id	OP		Cell parameters id 10.3.6.9	Identifies the reference cell for the GPS TOW-SFN relationship
>>SFN	MP		Integer(0..4095)	
>GPS reference time only				
>>GPS TOW msec	MP		Integer(0..6.048*10^8-1)	GPS Time of Week in milliseconds (rounded down to the nearest millisecond unit).
Satellite information	MP	1 to <maxSat>		
>SatID	MP		Integer (0..63)	
>Doppler (0th order term)	MP		Real(-5120..5117,5 by step of 2.5)	Hz
>Extra Doppler	OP			
>>Doppler (1st order term)	MP		Real (-0.966..0.483 by step of 0.023)	Scaling factor 1/42
>>Doppler Uncertainty	MP		Enumerated (12.5,25,50,100,200)	Hz
>Code Phase	MP		Integer(0..1022)	Chips, specifies the centre of the search window
>Integer Code Phase	MP		Integer(0..19)	1023 chip segments
>GPS Bit number	MP		Integer(0..3)	Specifies GPS bit number (20 1023 chip segments)
>Code Phase Search Window	MP		Integer(1023,1,2,3,4,6,8,12,16,24,32,48,64,96,128,192)	Specifies the width of the search window.
>Azimuth and Elevation	OP			
>>Azimuth	MP		Real(0..348.75 by step of 11.25)	Degrees
>>Elevation	MP		Real(0..78.75 by step of 11.25)	Degrees

CHOICE *Reference time*	Condition under which the given *reference time* is chosen
UTRAN reference time	The reference time is relating GPS time to UTRAN time (SFN)
GPS reference time only	The time gives the time for which the location estimate is valid

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
maxFreqBandsFDD	Maximum number of frequency bands supported by the UE as defined in [21]	8
maxFreqBandsTDD	Maximum number of frequency bands supported by the UE as defined in [22]	4
maxFreqBandsGSM	Maximum number of frequency bands supported by the UE as defined in [45]	16
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
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
~~H~~hiPUSCH~~l~~identities	Maximum number of PDSCH Identities	64
~~H~~hiPDSCH~~l~~identities	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 Message and Information element abstract syntax (with ASN.1)

< *** Uneccessary Definitions Removed *** >

11.2 PDU definitions

< *** Uneccessary Definitions Removed *** >

```
-- **************************************************
--
-- 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
}

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

SecurityModeCommand ::= CHOICE {
    r3                              SEQUENCE {
        securityModeCommand-r3          SecurityModeCommand-r3-IEs,
        nonCriticalExtensions           SEQUENCE {}     OPTIONAL
    },
    later-than-r3                   SEQUENCE {
        rrc-TransactionIdentifier       RRC-TransactionIdentifier,
        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,
    --  Other IEs
        ue-SystemSpecificSecurityCap    InterRAT-UE-SecurityCapList         OPTIONAL
}

-- **************************************************
--
-- 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
}
```

< *** Uneccessary Definitions Removed *** >

11.3 Information element definitions

< *** Uneccessary Definitions Removed *** >

```
-- **************************************************
--
--     TRANSPORT CHANNEL INFORMATION ELEMENTS (10.3.5)
--
-- **************************************************
```

< *** Uneccessary Definitions Removed *** >

```
-- The maximum allowed size of this sequence is 16
DL-AddReconfTransChInfo2List ::=    SEQUENCE (SIZE (1..maxTrCHpreconf)) OF
                                        DL-AddReconfTransChInformation2

-- The maximum allowed size of this sequence is 16
DL-AddReconfTransChInfoList ::=     SEQUENCE (SIZE (1..maxTrCHpreconf)) OF
                                        DL-AddReconfTransChInformation
```

< *** Uneccessary Definitions Removed *** >

```
-- The maximum allowed size of this sequence is 16
UL-AddReconfTransChInfoList ::=     SEQUENCE (SIZE (1..maxTrCHpreconf)) OF
                                        UL-AddReconfTransChInformation
```

< *** Uneccessary Definitions Removed *** >

```
-- **************************************************
--
--     MEASUREMENT INFORMATION ELEMENTS (10.3.7)
--
-- **************************************************
```

< *** Uneccessary Definitions Removed *** >

```
UE-Positioning-ReportingQuantity ::=            SEQUENCE {
    methodType                          UE-Positioning-MethodType,
    positioningMethod                   PositioningMethod,
    responseTime                        UE-Positioning-ResponseTime,
    accuracy                            UE-Positioning-Accuracy                 OPTIONAL,
    gps-TimingOfCellWanted              BOOLEAN,
    multipleSets                        BOOLEAN,
    additionalAssistanceDataRequest     BOOLEAN,
    environmentCharacterisation         EnvironmentCharacterisation         OPTIONAL
}
```

< *** Uneccessary Definitions Removed *** >

11.4 Constant definitions

```
Constant-definitions DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

hiPDSCHidentities           INTEGER ::= 64
hiPUSCHidentities           INTEGER ::= 64
hiRM                        INTEGER ::= 256
maxAC                       INTEGER ::= 16
maxAdditionalMeas           INTEGER ::= 4
maxASC                      INTEGER ::= 8
maxASCmap                   INTEGER ::= 7
maxASCpersist               INTEGER ::= 6
maxCCTrCH                   INTEGER ::= 8
maxCellMeas                 INTEGER ::= 32
maxCellMeas-1               INTEGER ::= 31
maxCNdomains                INTEGER ::= 4
maxCPCHsets                 INTEGER ::= 16
maxDPCH-DLchan              INTEGER ::= 8
maxDPCHcodesPerTS           INTEGER ::= 16
-- **TODO**
maxDPDCH-UL                 INTEGER ::= 6
maxDRACclasses              INTEGER ::= 8
-- **TODO**
maxFACHPCH                  INTEGER ::= 8
maxFreq                     INTEGER ::= 8
maxFreqBandsFDD             INTEGER ::= 8
maxFreqBandsTDD             INTEGER ::= 4
maxFreqBandsGSM             INTEGER ::= 16
maxInterSysMessages         INTEGER ::= 4
maxLoCHperRLC               INTEGER ::= 2
maxMeasEvent                INTEGER ::= 8
maxMeasIntervals            INTEGER ::= 3
maxMeasParEvent             INTEGER ::= 2
maxNumCDMA2000Freqs         INTEGER ::=  8
maxNumGSMFreqRanges         INTEGER ::= 32
maxNumFDDFreqs              INTEGER ::=  8
maxNumTDDFreqs              INTEGER ::=  8
maxNoOfMeas                 INTEGER ::= 16
maxOtherRAT                 INTEGER ::= 15
maxPage1                    INTEGER ::= 8
maxPCPCH-APsig              INTEGER ::= 16
maxPCPCH-APsubCh            INTEGER ::= 12
maxPCPCH-CDsig              INTEGER ::= 16
maxPCPCH-CDsubCh            INTEGER ::= 12
maxPCPCH-SF                 INTEGER ::= 7
maxPCPCHs                   INTEGER ::= 64
maxPDCPAlgoType             INTEGER ::= 8
maxPDSCH                    INTEGER ::= 8
maxPDSCH-TFCIgroups         INTEGER ::= 256
maxPRACH                    INTEGER ::= 16
maxPredefConfig             INTEGER ::= 16
maxPUSCH                    INTEGER ::= 8
maxRABsetup                 INTEGER ::= 16
maxRAT                      INTEGER ::= 16
maxRB                       INTEGER ::= 32
maxRBallRABs                INTEGER ::= 27
maxRBMuxOptions             INTEGER ::= 8
maxRBperRAB                 INTEGER ::= 8
maxReportedGSMCells         INTEGER ::= 6
maxRL                       INTEGER ::= 8
maxRL-1                     INTEGER ::= 7
maxSat                      INTEGER ::= 16
maxSCCPCH                   INTEGER ::= 16
maxSIB                      INTEGER ::= 32
-- **TODO**
maxSIB-FACH                 INTEGER ::= 8
maxSIBperMsg                INTEGER ::= 16
maxSig                      INTEGER ::= 16
maxSRBsetup                 INTEGER ::= 8
maxSubCh                    INTEGER ::= 12
maxSystemCapability         INTEGER ::= 16
maxTF                       INTEGER ::= 32
```

```
maxTF-CPCH                  INTEGER ::= 16
maxTFC                      INTEGER ::= 1024
maxTFCI-2-Combs             INTEGER ::= 512
maxTGPS                     INTEGER ::= 6
maxTrCH                     INTEGER ::= 32
-- maxTrCHpreconf should be 16 but has been set to 32 for compatibility
maxTrCHpreconf              INTEGER ::= 1632
maxTS                       INTEGER ::= 14
maxTS-1                     INTEGER ::= 13
maxURA                      INTEGER ::= 8

END
```

3GPP TSG-RAN WG2 Meeting #22
Helsinki, Finland, 27-31.07.2001

Tdoc 012081

CR-Form-v4

CHANGE REQUEST

⌘ **25.331 CR 937** ⌘ ev **-** ⌘ Current version: **4.1.0** ⌘

*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:	⌘	Correction of remaining ASN.1/Tabular inconsistencies
Source:	⌘	TSG-RAN WG2
Work item code:	⌘	TEI
Date:	⌘	29 Aug 2001
Category:	⌘	**A**
Release:	⌘	REL-4

Use one of the following categories:
F *(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 one 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: ⌘ A small number of inconsistencies identified during RAN WG2 #21 are still present in the new version of the specification. This CR resolves those using the solutions already discussed and agreed by RAN WG2.

Summary of change: ⌘

Tabular Changes

10.3.2.3 Cell selection and re-selection info for SIB3/4

FDD->SlimitSearchRAT changed from OP to MP in table to align with ASN.1.

10.2.26 PUSCH CAPACITY REQUEST

10.3.6.42 PDSCH Capacity Allocation info

10.3.6.46 PDSCH system information

10.3.6.64 PUSCH Capacity Allocation info

10.3.6.66 PUSCH system information

Capitalisation not correct for constant HiPUSCHIdentities and HiPDSCHIdentities (also corrected in 10.3.10).

10.3.7.33 Intra-frequency cell info list

Comment added to indicate that absence of IE “Intra-Frequency Cell Removal” is equivalent to “Remove no intra-frequency cells” option.

10.3.7.61 Reporting Cell Status

Definitions that were changed to enumerated types return to Integer for

		consistency with rest of specification. 10.3.7.88 UE positioning GPS acquisition assistance Doppler (0^{th} order term) and Doppler (1^{st} order term) ranges corrected. **ASN.1 Changes** In ASN.1 the comment announcing that the SECURITY MODE COMMAND has been moved to the correct place (table 10.2.43). Ranges shown in the table with limit maxTrCHpreconf have been updated to use the type with the correct name and comments have been added to explain the differences between Tabular and ASN.1 definitions.. (table 10.3.5.9).
Consequences if not approved:	⌘	Inconsistencies between Tabular and ASN.1 definitions possibly resulting in confusion and incorrect implementations.

Clauses affected:	⌘	10.2.26, 10.3.2.3, 10.3.6.42, 10.3.6.46, 10.3.6.64, 10.3.6.66, 10.3.7.33, 10.3.7.45, 10.3.7.61, 10.3.7.88, 10.3.10, 11.2, 11.3, 11.4		
Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ O&M Specifications	⌘	25.331 v3.7.0, CR 936r1
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://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 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.

10 Message and information element functional definition and content

10.2.26 PUSCH CAPACITY REQUEST

NOTE: Only for TDD.

This message is used by the UE for request of PUSCH resources to the UTRAN.

RLC-SAP: TM

Logical channel: SHCCH

Direction: UE → UTRAN

Information Element/Group name	Need	Multi	Type and reference	Semantics description
Message Type	MP		Message Type	
C-RNTI	OP		C-RNTI 10.3.3.8	
RRC transaction identifier	CV-*ProtErr*		RRC transaction identifier 10.3.3.36	
Traffic Volume	OP		Traffic Volume, measured results list 10.3.7.67	
Timeslot list	OP	1 to maxTS		
>Timeslot number	MP		Timeslot number 10.3.6.84	
>Timeslot ISCP	MP		Timeslot ISCP info 10.3.7.65	
Primary CCPCH RSCP	OP		Primary CCPCH RSCP info 10.3.7.54	
CHOICE *Allocation confirmation*	OP			
>PDSCH Confirmation			Integer(1..~~H~~h iPDSCH~~I~~identities)	
>PUSCH Confirmation			Integer(1..~~H~~h iPUSCH~~I~~identities)	
Protocol error indicator	MD		Protocol error indicator 10.3.3.27	Default value is FALSE
Protocol error information	CV-*ProtErr*		Protocol error information 10.3.8.12	

Condition	Explanation
ProtErr	This IE is mandatory if the IE "Protocol error indicator" has the value "TRUE". Otherwise it is not needed.

10.3.2.3 Cell selection and re-selection info for SIB3/4

Information Element/Group name	Need	Multi	Type and reference	Semantics description
Mapping Info	OP		Mapping info 10.3.2.5	
Cell_selection_and_reselection_quality_measure	MP		Enumerated (CPICH Ec/N0, CPICH RSCP)	Choice of measurement (CPICH Ec/N0 or CPICH RSCP) to use as quality measure Q for FDD cells.
CHOICE *mode*	MP			
>FDD				
>>$S_{intrasearch}$	OP		Integer (-32..20 by step of 2)	[4] [dB]
>>$S_{intersearch}$	OP		Integer (-32..20 by step of 2)	[4] [dB]
>>$S_{searchHCS}$	OP		Integer (-105..91 by step of 2)	[4] [dB]
>>RAT List	OP	1 to <maxOtherRAT>		
>>>RAT identifier	MP		Enumerated (GSM, cdma2000)	
>>>$S_{search,RAT}$	MP		Integer (-32..20 by step of 2)	In case the value 20 is received the UE shall consider this IE as if it was absent according to [4] [dB]
>>>$S_{HCS,RAT}$	OP		Integer (-105..91 by step of 2)	[4] [dB]
>>>$S_{limit,SearchRAT}$	~~OP~~MP		Integer (-32..20 by step of 2)	[4] [dB]
>>Qqualmin	MP		Integer (-24..0)	Ec/N0, [dB]
>>Qrxlevmin	MP		Integer (-115..-25 by step of 2)	RSCP, [dBm]
>TDD				
>>$S_{intrasearch}$	OP		Integer (-105..91 by step of 2)	[4] [dB]
>>$S_{intersearch}$	OP		Integer (-105..91 by step of 2)	[4] [dB]
>>$S_{searchHCS}$	OP		Integer (-105..91 by step of 2)	[4] [dB]
>>RAT List	OP	1 to <maxOtherRAT>		
>>>RAT identifier	MP		Enumerated (GSM, cdma2000)	
>>>$S_{search,RAT}$	MP		Integer (-105..91 by step of 2)	In case the value 91 is received the UE shall consider this IE as if it was absent according to [4] [dB]
>>>$S_{HCS,RAT}$	OP		Integer (-	[4]

			105..91 by step of 2)	[dB]
>>>$S_{limit,SearchRAT}$	MP		Integer (-105..91 by step of 2)	[4] [dB]
>>Qrxlevmin	MP		Integer (-115..-25 by step of 2)	RSCP, [dBm]
$Qhyst1_s$	MP		Integer (0..40 by step of 2)	[4] [dB]
$Qhyst2_s$	CV-*FDD-Quality-Measure*		Integer (0..40 by step of 2)	Default value is $Qhyst1_s$ [4] [dB]
$Treselection_s$	MP		Integer (0..31)	[s]
HCS Serving cell Information	OP		HCS Serving cell information 10.3.7.12	
Maximum allowed UL TX power	MP		Maximum allowed UL TX power 10.3.6.39	[dBm] UE_TXPWR_MAX_RACH in [4].

Condition	Explanation
FDD-Quality-Measure	Presence is not allowed if the IE "Cell_selection_and_reselection_quality_measure" has the value CPICH RSCP, otherwise the IE is mandatory and has a default value.

10.3.6.42 PDSCH Capacity Allocation info

NOTE: Only for TDD.

Information Element/Group name	Need	Multi	Type and reference	Semantics description
PDSCH allocation period info	MP		Allocation Period Info 10.3.6.4	
TFCS ID	MD		Integer(1..8)	Default is 1.
CHOICE *Configuration*	MP			
>Old configuration				
>>PDSCH Identity	MP		Integer(1..~~H~~hiPDSCH~~I~~identities)	
>New configuration				
>>PDSCH Info	MP		PDSCH Info 10.3.6.44	
>>PDSCH Identity	OP		Integer(1..~~H~~hiPDSCH~~I~~identities)	
>>PDSCH power control info	OP		PDSCH power control info 10.3.6.45	

10.3.6.46 PDSCH system information

NOTE: Only for TDD.

Information Element/Group name	Need	Multi	Type and reference	Semantics description
PDSCH information	MP	1 to <maxPDSCH>		
>PDSCH Identity	MP		Integer(1..~~H~~hiPDSCH~~I~~identities)	
>PDSCH info	MP		PDSCH info 10.3.6.44	
>SFN Time Info	CH-*Block17*		SFN Time Info 10.3.6.75	
>DSCH TFS	OP		Transport format set 10.3.5.23	
>DSCH TFCS	OP		Transport Format Combination Set 10.3.5.20	

Condition	Explanation
Block17	This IE is absent in System Information Block 17. Otherwise it is optional.

10.3.6.64 PUSCH Capacity Allocation info

NOTE: Only for TDD.

Information Element/Group name	Need	Multi	Type and reference	Semantics description
CHOICE *PUSCH allocation*	MP			
>PUSCH allocation pending				(no data)
>PUSCH allocation assignment				
>>PUSCH allocation period info	MP		Allocation Period Info 10.3.6.4	
>>PUSCH power control info	OP		PUSCH power control info 10.3.6.65	
>>TFCS ID	MD		Integer(1..8)	Default is 1.
>>CHOICE *Configuration*	MP			
>>>Old configuration				
>>>>PUSCH Identity	MP		Integer(1..~~H~~hiPUSCH~~I~~identities)	
>>>New configuration				
>>>>PUSCH info	MP		PUSCH info 10.3.6.63	
>>>>PUSCH Identity	OP		Integer(1..~~H~~hiPUSCH~~I~~identities)	

10.3.6.66 PUSCH system information

NOTE: Only for TDD.

Information Element/Group name	Need	Multi	Type and reference	Semantics description
PUSCH information	MP	1 to <maxPUSCH>		
>PUSCH Identity	MP		Integer(1..~~H~~h iPUSCH~~l~~identities)	
>PUSCH info	MP		PUSCH info 10.3.6.63	
>SFN Time Info	CH-*Block17*		SFN Time Info 10.3.6.75	
>USCH TFS	OP		Transport format set 10.3.5.23	
>USCH TFCS	MP		Transport Format Combination Set 10.3.5.20	

Condition	Explanation
Block17	This IE is absent in System Information Block 17. Otherwise it is optional.

10.3.7.33 Intra-frequency cell info list

Contains the measurement object information for an intra-frequency measurement.

Information Element/Group name	Need	Multi	Type and reference	Semantics description
CHOICE *Intra-frequency cell removal*	OP			Absence of this IE is equivalent to choice “Remove no intra-frequency cells”
>Remove all intra-frequency cells				No data
>Remove some intra-frequency cells				
>>Removed intra-frequency cells	MP	1 to <maxCell Meas>		
>>>Intra-frequency cell id	MP		Integer(0 .. <maxCellMeas> - 1)	
>Remove no intra-frequency cells				
New intra-frequency cell	OP	1 to <maxCell Meas>		This information element must be present when "Intra-frequency cell info list" is included in the system information
>Intra-frequency cell id	MD		Integer(0 .. <maxCellMeas> - 1)	
>Cell info	MP		Cell info 10.3.7.2	
Cell for measurement	CV-*BCHopt*	1 to <maxCell Meas>		
>Intra-frequency cell id	MP		Integer(0 .. <maxCellMeas>-1)	

Condition	Explanation
BCHopt	This IE is not needed when sent in SYSTEM INFORMATION. Otherwise, the IE is Optional

10.3.7.61 Reporting Cell Status

Indicates maximum allowed number of cells to report and whether active set cells and/or virtual active set cells and/or monitored set cells on and/or detected set cells used frequency and/or monitored set cells on non used frequency should/should not be included in the IE "Measured results".

Information Element/Group name	Need	Multi	Type and reference	Semantics description
CHOICE *reported cell*	MP			
>Report cells within active set				
>>Maximum number of reported cells	MP		~~Enumerated(e1..e6)~~ Integer(1..6)	
>Report cells within monitored set cells on used frequency				
>>Maximum number of reported cells	MP		~~Enumerated(e1..e6)~~ Integer(1..6)	
>Report cells within active set and/or monitored set cells on used frequency				
>>Maximum number of reported cells	MP		~~Enumerated(e1..e6)~~ Integer(1..6)	
>Report cells within detected set on used frequency				
>>Maximum number of reported	MP		~~Enumerated(e1..e6)~~	

cells			Integer(1..6)	
>Report cells within monitored set and/or detected set on used frequency				
>>Maximum number of reported cells	MP		~~Enumerated(e1..e6)~~ Integer(1..6)	
>Report all active set cells + cells within monitored set on used frequency				
>>Maximum number of reported cells	MP		Enumerated (virtual/active set cells+1, virtual/active set cells+2, …., virtual/active set cells+6)	
>Report all active set cells + cells within detected set on used frequency				
>>Maximum number of reported cells	MP		Enumerated (virtual/active set cells+1, virtual/active set cells+2, …., virtual/active set cells+6)	
>Report all active set cells + cells within monitored set and/or detected set on used frequency				
>>Maximum number of reported cells	MP		Enumerated (virtual/active set cells+1, virtual/active set cells+2, …., virtual/active set cells+6)	

>Report cells within virtual active set				
>>Maximum number of reported cells	MP		Integer(1..6)	
>Report cells within monitored set on non-used frequency				
>>Maximum number of reported cells	MP		Integer(1..6)	
>Report cells within monitored and/or active set on non-used frequency				
>>Maximum number of reported cells	MP		Integer(1..6)	
>Report all virtual active set cells + cells within monitored set on non-used frequency				
>>Maximum number of reported cells	MP		Enumerated (virtual/active set cells+1, virtual/active set cells+2, …., virtual/active set cells+6)	
>Report cells within active set or within virtual active set				
>>Maximum number of reported cells	MP		Integer (1..12)	
>Report cells within active and/or monitored set on used frequency or within active and/or monitored set on non-used frequency				
>>Maximum number of reported cells	MP		Integer(1..12)	

10.3.7.88 UE positioning GPS acquisition assistance

This IE contains parameters that enable fast acquisition of the GPS signals in UE-assisted GPS positioning.

Information Element/Group name	Need	Multi	Type and Reference	Semantics description
CHOICE *Reference Time*	MP			
>UTRAN reference time				GPS Time of Week counted in microseconds, given as GPS TOW in milliseconds and GPS TOW remainder in microseconds, UTRAN reference time = 1000 * GPS TOW msec + GPS TOW rem usec
>>GPS TOW msec	MP		Integer(0..6.048*10^8-1)	GPS Time of Week in milliseconds (rounded down to the nearest millisecond unit)
>>GPS TOW rem usec	MP		Integer(0..999)	GPS Time of Week in microseconds MOD 1000.
>>CHOICE *mode*				
>>>FDD				
>>>>Primary CPICH Info	OP		Primary CPICH Info 10.3.6.60	Identifies the reference cell for the GPS TOW-SFN relationship
>>>TDD				
>>>>cell parameters id	OP		Cell parameters id 10.3.6.9	Identifies the reference cell for the GPS TOW-SFN relationship
>>SFN	MP		Integer(0..4095)	
>GPS reference time only				
>>GPS TOW msec	MP		Integer(0..6.048*10^8-1)	GPS Time of Week in milliseconds (rounded down to the nearest millisecond unit).
Satellite information	MP	1 to <maxSat>		
>SatID	MP		Integer (0..63)	
>Doppler (0th order term)	MP		Real(-5120..5117,5 by step of 2.5)	Hz
>Extra Doppler	OP			
>>Doppler (1st order term)	MP		Real (-0.966..0.483 by step of 0.023)	Scaling factor 1/42
>>Doppler Uncertainty	MP		Enumerated (12.5,25,50,100,200)	Hz
>Code Phase	MP		Integer(0..1022)	Chips, specifies the centre of the search window
>Integer Code Phase	MP		Integer(0..19)	1023 chip segments
>GPS Bit number	MP		Integer(0..3)	Specifies GPS bit number (20 1023 chip segments)
>Code Phase Search Window	MP		Integer(1023,1,2,3,4,6,8,12,16,24,32,48,64,96,128,192)	Specifies the width of the search window.
>Azimuth and Elevation	OP			
>>Azimuth	MP		Real(0..348.75 by step of 11.25)	Degrees
>>Elevation	MP		Real(0..78.75 by step of 11.25)	Degrees

CHOICE *Reference time*	Condition under which the given *reference time* is chosen
UTRAN reference time	The reference time is relating GPS time to UTRAN time (SFN)
GPS reference time only	The time gives the time for which the location estimate is valid

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
maxFreqBandsFDD	Maximum number of frequency bands supported by the UE as defined in [21]	8
maxFreqBandsTDD	Maximum number of frequency bands supported by the UE as defined in [22]	4
maxFreqBandsGSM	Maximum number of frequency bands supported by the UE as defined in [45]	16
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
MaxPRACH_FPACH	Maximum number of PRACH / FPACH pairs in a cell (1.28 Mcps TDD)	8
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)	6 (1.28 Mcps TDD) 14 (3.84 Mcps TDD)
~~H~~hiPUSCH~~l~~identities	Maximum number of PDSCH Identities	64
~~H~~hiPDSCH~~l~~identities	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 Message and Information element abstract syntax (with ASN.1)

< *** Uneccessary Definitions Removed *** >

11.2 PDU definitions

< *** Uneccessary Definitions Removed *** >

```
-- **************************************************
--
-- 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
}

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

SecurityModeCommand ::= CHOICE {
    r3                              SEQUENCE {
        securityModeCommand-r3          SecurityModeCommand-r3-IEs,
        nonCriticalExtensions           SEQUENCE {}     OPTIONAL
    },
    later-than-r3                   SEQUENCE {
        rrc-TransactionIdentifier       RRC-TransactionIdentifier,
        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,
    --  Other IEs
        ue-SystemSpecificSecurityCap    InterRAT-UE-SecurityCapList         OPTIONAL
}
```

< *** Uneccessary Definitions Removed *** >

11.3 Information element definitions

< *** Uneccessary Definitions Removed *** >

```
-- **************************************************
--
--     TRANSPORT CHANNEL INFORMATION ELEMENTS (10.3.5)
--
-- **************************************************
```

< *** Uneccessary Definitions Removed *** >

```
-- The maximum allowed size of this sequence is 16
DL-AddReconfTransChInfo2List ::=    SEQUENCE (SIZE (1..maxTrCHpreconf)) OF
                                        DL-AddReconfTransChInformation2

-- The maximum allowed size of this sequence is 16
DL-AddReconfTransChInfoList ::=     SEQUENCE (SIZE (1..maxTrCHpreconf)) OF
                                        DL-AddReconfTransChInformation
```

< *** Uneccessary Definitions Removed *** >

```
-- The maximum allowed size of this sequence is 16
UL-AddReconfTransChInfoList ::=     SEQUENCE (SIZE (1..maxTrCHpreconf)) OF
                                        UL-AddReconfTransChInformation
```

< *** Uneccessary Definitions Removed *** >

11.4 Constant definitions

```
Constant-definitions DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

hiPDSCHidentities           INTEGER ::= 64
hiPUSCHidentities           INTEGER ::= 64
hiRM                        INTEGER ::= 256
maxAC                       INTEGER ::= 16
maxAdditionalMeas           INTEGER ::= 4
maxASC                      INTEGER ::= 8
maxASCmap                   INTEGER ::= 7
maxASCpersist               INTEGER ::= 6
maxCCTrCH                   INTEGER ::= 8
maxCellMeas                 INTEGER ::= 32
maxCellMeas-1               INTEGER ::= 31
maxCNdomains                INTEGER ::= 4
maxCPCHsets                 INTEGER ::= 16
maxDPCH-DLchan              INTEGER ::= 8
maxDPCHcodesPerTS           INTEGER ::= 16
-- **TODO**
maxDPDCH-UL                 INTEGER ::= 6
maxDRACclasses              INTEGER ::= 8
-- **TODO**
maxFACHPCH                  INTEGER ::= 8
maxFreq                     INTEGER ::= 8
maxFreqBandsFDD             INTEGER ::= 8
maxFreqBandsTDD             INTEGER ::= 4
maxFreqBandsGSM             INTEGER ::= 16
maxInterSysMessages         INTEGER ::= 4
maxLoCHperRLC               INTEGER ::= 2
maxMeasEvent                INTEGER ::= 8
maxMeasIntervals            INTEGER ::= 3
maxMeasParEvent             INTEGER ::= 2
maxNumCDMA2000Freqs         INTEGER ::=  8
maxNumGSMFreqRanges         INTEGER ::= 32
maxNumFDDFreqs              INTEGER ::=  8
maxNumTDDFreqs              INTEGER ::=  8
maxNoOfMeas                 INTEGER ::= 16
maxOtherRAT                 INTEGER ::= 15
```

```
maxPage1                    INTEGER ::= 8
maxPCPCH-APsig              INTEGER ::= 16
maxPCPCH-APsubCh            INTEGER ::= 12
maxPCPCH-CDsig              INTEGER ::= 16
maxPCPCH-CDsubCh            INTEGER ::= 12
maxPCPCH-SF                 INTEGER ::= 7
maxPCPCHs                   INTEGER ::= 64
maxPDCPAlgoType             INTEGER ::= 8
maxPDSCH                    INTEGER ::= 8
maxPDSCH-TFCIgroups         INTEGER ::= 256
maxPRACH                    INTEGER ::= 16
maxPRACH-FPACH              INTEGER ::= 8
maxPredefConfig             INTEGER ::= 16
maxPUSCH                    INTEGER ::= 8
maxRABsetup                 INTEGER ::= 16
maxRAT                      INTEGER ::= 16
maxRB                       INTEGER ::= 32
maxRBallRABs                INTEGER ::= 27
maxRBMuxOptions             INTEGER ::= 8
maxRBperRAB                 INTEGER ::= 8
maxReportedGSMCells         INTEGER ::= 6
maxRL                       INTEGER ::= 8
maxRL-1                     INTEGER ::= 7
maxROHC-PacketSizes-r4      INTEGER ::= 16
maxROHC-Profile-r4          INTEGER ::= 8
maxSat                      INTEGER ::= 16
maxSCCPCH                   INTEGER ::= 16
maxSIB                      INTEGER ::= 32
-- **TODO**
maxSIB-FACH                 INTEGER ::= 8
maxSIBperMsg                INTEGER ::= 16
maxSig                      INTEGER ::= 16
maxSRBsetup                 INTEGER ::= 8
maxSubCh                    INTEGER ::= 12
maxSystemCapability         INTEGER ::= 16
maxTF                       INTEGER ::= 32
maxTF-CPCH                  INTEGER ::= 16
maxTFC                      INTEGER ::= 1024
maxTFCI-2-Combs             INTEGER ::= 512
maxTGPS                     INTEGER ::= 6
maxTrCH                     INTEGER ::= 32
-- maxTrCHpreconf should be 16 but has been set to 32 for compatibility
maxTrCHpreconf              INTEGER ::= 1632
maxTS                       INTEGER ::= 14
maxTS-1                     INTEGER ::= 13
maxTS-LCR                   INTEGER ::= 6
maxTS-LCR-1                 INTEGER ::= 5
maxURA                      INTEGER ::= 8

END
```

3GPP TSG-RAN WG2 Meeting #23
Helsinki, Finland, 27-31.07.2001

Tdoc 012082

CR-Form-v4

CHANGE REQUEST

⌘ **25.331** **CR** **938** ⌘ ev **r1** ⌘ Current version: **3.7.0** ⌘

*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:	⌘	CPICH Ec/N0 Range
Source:	⌘	TSG-RAN WG2
Work item code:	⌘	TEI
Date:	⌘	29 Aug 01
Category:	⌘	**F**
Release:	⌘	R99

Use one of the following categories:
F *(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 one 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:	⌘	In 25.133 v3.5.0 the indicated range for CPICH Ec/N0 measurments was corrected to be 0 to 49 but this has not been updated in 25.331.
Summary of change:	⌘	**10.3.7.3 Cell measured results** **10.3.7.45 Measured results on RACH** Both tables are updated to show the correct range and comment added to show how to interpret the incorrect value. Comment also added to ASN.1 definition. r1 – Comment in tabular removed Impact Analysis: This change has isolated impact and - the calculation of the range already refers to 25.133, which has the correct range, so existing implementations should not be sending the erroneous value. There is no impact on ASN.1 encoding.
Consequences if not approved:	⌘	Inconsistency between the two specifications leading to incorrect implementations.

Clauses affected:	⌘	10.3.7.3, 10.3.7.45, 11.3		
Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ O&M Specifications	⌘	25.331 v4.1.0, CR 939
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://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 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.

10.3.7.3 Cell measured results

Includes non-frequency related measured results for a cell.

Information Element/Group name	Need	Multi	Type and reference	Semantics description
Cell Identity	OP		Cell Identity 10.3.2.2	
SFN-SFN observed time difference	OP		SFN-SFN observed time difference 10.3.7.63	
Cell synchronisation information	OP		Cell synchronisation information 10.3.7.6	
CHOICE *mode*	MP			
>FDD				
>>Primary CPICH info	MP		Primary CPICH info 10.3.6.60	
>>CPICH Ec/N0	OP		Integer(0..~~50~~49)	According to CPICH_Ec/No in [19] and [20]
>>CPICH RSCP	OP		Integer(0..91)	According to CPICH_RSCP in [19] and [20]
>>Pathloss	OP		Integer(46..158)	In dB
>TDD				
>>Cell parameters Id	MP		Cell parameters Id 10.3.6.9	
>>Proposed TGSN	OP		Integer (0..14)	Proposal for the next TGSN
>>Primary CCPCH RSCP	OP		Primary CCPCH RSCP info 10.3.7.54	
>>Pathloss	OP		Integer(46..158)	In dB
>>Timeslot list	OP	1 to < maxTS>		
>>>Timeslot ISCP	MP		Timeslot ISCP Info 10.3.7.65	The UE shall report the Timeslot ISCP in the same order as indicated in the cell info

10.3.7.45 Measured results on RACH

Contains the measured results on RACH of the quantity indicated optionally by Reporting Quantity in the system information broadcast on BCH. The list should be in the order of the value of the measurement quality (the first cell should be the best cell). The "best" FDD cell has the largest value when the measurement quantity is "Ec/No" or "RSCP". On the other hand, the "best" cell has the smallest value when the measurement quantity is "Pathloss". The "best" TDD cell has the largest value when measurement quantity is "Primary CCPCH RSCP".

Information Element/group name	Need	Multi	Type and reference	Semantics description
Measurement result for current cell				
CHOICE *mode*	MP			
>FDD				
>>CHOICE *measurement quantity*	MP			
>>>CPICH Ec/N0			Integer(0..~~50~~ 49)	In dB. According to CPICH_Ec/No in [19]
>>>CPICH RSCP			Integer(0..91)	In dBm. According to CPICH_RSCP_LEV in [19]
>>>Pathloss			Integer(46..1 58)	In dB
>TDD				
>>Timeslot List	OP	1 to 14		
>>>Timeslot ISCP	MP		Timeslot ISCP info 10.3.7.65	The UE shall report the Timeslot ISCP in the same order as indicated in the cell info
>>Primary CCPCH RSCP	OP		Primary CCPCH RSCP info 10.3.7.54	
Measurement results for monitored cells	OP	1 to 7		
>SFN-SFN observed time difference	OP		SFN-SFN observed time difference 10.3.7.63	It is absent for current cell
>CHOICE *mode*	MP			
>>FDD				
>>>Primary CPICH info	MP		Primary CPICH info 10.3.6.60	
>>>CHOICE *measurement quantity*	OP			It is absent for current cell
>>>>CPICH Ec/N0			Integer(~~-20..~~0..49)	In dB. According to CPICH_Ec/No in [19].
>>>>CPICH RSCP			Integer(-115..-40)	In dBm. According to CPICH_RSCP_LEV in [19].
>>>>Pathloss			Integer(46..1 58)	In dB
>>TDD				
>>>Cell parameters Id	MP		Cell parameters Id 10.3.6.9	
>>>Primary CCPCH RSCP	MP		Primary CCPCH RSCP info 10.3.7.54	

NOTE 1: Monitored cells consist of current cell and neighbouring cells.

11.3 Information element definitions

```
-- **************************************************
--
--     MEASUREMENT INFORMATION ELEMENTS (10.3.7)
--
-- **************************************************
```

```
CellMeasuredResults ::=             SEQUENCE {
    cellIdentity                        CellIdentity                        OPTIONAL,
    sfn-SFN-ObsTimeDifference           SFN-SFN-ObsTimeDifference           OPTIONAL,
    cellSynchronisationInfo         CellSynchronisationInfo         OPTIONAL,
    modeSpecificInfo                    CHOICE {
        fdd                                 SEQUENCE {
            primaryCPICH-Info                   PrimaryCPICH-Info,
            cpich-Ec-N0                         CPICH-Ec-N0                 OPTIONAL,
            cpich-RSCP                          CPICH-RSCP                  OPTIONAL,
            pathloss                            Pathloss                    OPTIONAL
        },
        tdd                                 SEQUENCE {
            cellParametersID                    CellParametersID,
            proposedTGSN                        TGSN                        OPTIONAL,
            primaryCCPCH-RSCP                   PrimaryCCPCH-RSCP           OPTIONAL,
            pathloss                            Pathloss                    OPTIONAL,
            timeslotISCP-List                   TimeslotISCP-List           OPTIONAL
        }
    }
}

-- It is not allowed to send value 50 in this version of the specification
CPICH-Ec-N0 ::=                     INTEGER (0..50)


MeasuredResultsOnRACH ::=           SEQUENCE {
    currentCell                         SEQUENCE {
        modeSpecificInfo                    CHOICE {
            fdd                                 SEQUENCE {
                measurementQuantity                 CHOICE {
                    cpich-Ec-N0                         CPICH-Ec-N0,
                    cpich-RSCP                          CPICH-RSCP,
                    pathloss                            Pathloss
                }
            },
            tdd                                 SEQUENCE {
                timeslotISCP                        TimeslotISCP-List       OPTIONAL,
                primaryCCPCH-RSCP                   PrimaryCCPCH-RSCP       OPTIONAL
            }
        }
    },
    monitoredCells                      MonitoredCellRACH-List              OPTIONAL
}


MonitoredCellRACH-List ::=          SEQUENCE (SIZE (1..7)) OF
                                        MonitoredCellRACH-Result

MonitoredCellRACH-Result ::=        SEQUENCE {
    sfn-SFN-ObsTimeDifference           SFN-SFN-ObsTimeDifference           OPTIONAL,
    modeSpecificInfo                    CHOICE {
        fdd                                 SEQUENCE {
            primaryCPICH-Info                   PrimaryCPICH-Info,
            measurementQuantity                 CHOICE {
                cpich-Ec-N0                         CPICH-Ec-N0,
                cpich-RSCP                          CPICH-RSCP,
                pathloss                            Pathloss
            }                                                               OPTIONAL
        },
        tdd                                 SEQUENCE {
            cellParametersID                    CellParametersID,
            primaryCCPCH-RSCP                   PrimaryCCPCH-RSCP
        }
    }
}
```

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Helsinki, Finland, 27-31.07.2001

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CR-Form-v4

CHANGE REQUEST

⌘ **25.331** **CR** **939** ⌘ ev **-** ⌘ Current version: **4.1.0** ⌘

*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:	⌘	CPICH Ec/N0 Range
Source:	⌘	TSG-RAN WG2
Work item code:	⌘	TEI
Date:	⌘	29 Aug 01
Category:	⌘	**A**
Release:	⌘	REL-4

Use one of the following categories:
F *(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 one 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:	⌘	In 25.133 v4.1.0 the indicated range for CPICH Ec/N0 measurments is stated to be 0 to 49 but tables in 25.331 have the range as 0 to 50.
Summary of change:	⌘	**10.3.7.3 Cell measured results** **10.3.7.45 Measured results on RACH** Both tables are updated to show the correct range and comment added to ASN.1 definition.
Consequences if not approved:	⌘	Inconsistency between the two specifications leading to incorrect implementations.

Clauses affected:	⌘	10.3.7.3, 10.3.7.45, 11.3		
Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ O&M Specifications	⌘	25.331 v3.7.0, CR 938r1
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://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 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.

10.3.7.3 Cell measured results

Includes non-frequency related measured results for a cell.

Information Element/Group name	Need	Multi	Type and reference	Semantics description
Cell Identity	OP		Cell Identity 10.3.2.2	
SFN-SFN observed time difference	OP		SFN-SFN observed time difference 10.3.7.63	
Cell synchronisation information	OP		Cell synchronisation information 10.3.7.6	
CHOICE *mode*	MP			
>FDD				
>>Primary CPICH info	MP		Primary CPICH info 10.3.6.60	
>>CPICH Ec/N0	OP		Integer(0..~~50~~49)	According to CPICH_Ec/No in [19] and [20]
>>CPICH RSCP	OP		Integer(0..91)	According to CPICH_RSCP in [19] and [20]
>>Pathloss	OP		Integer(46..158)	In dB
>TDD				
>>Cell parameters Id	MP		Cell parameters Id 10.3.6.9	
>>Proposed TGSN	OP		Integer (0..14)	Proposal for the next TGSN
>>Primary CCPCH RSCP	OP		Primary CCPCH RSCP info 10.3.7.54	
>>Pathloss	OP		Integer(46..158)	In dB
>>Timeslot list	OP	1 to < maxTS>		
>>>Timeslot ISCP	MP		Timeslot ISCP Info 10.3.7.65	The UE shall report the Timeslot ISCP in the same order as indicated in the cell info

10.3.7.45 Measured results on RACH

Contains the measured results on RACH of the quantity indicated optionally by Reporting Quantity in the system information broadcast on BCH. The list should be in the order of the value of the measurement quality (the first cell should be the best cell). The "best" FDD cell has the largest value when the measurement quantity is "Ec/No" or "RSCP". On the other hand, the "best" cell has the smallest value when the measurement quantity is "Pathloss". The "best" TDD cell has the largest value when measurement quantity is "Primary CCPCH RSCP".

Information Element/group name	Need	Multi	Type and reference	Semantics description	Version
Measurement result for current cell					
CHOICE *mode*	MP				
>FDD					
>>CHOICE *measurement quantity*	MP				
>>>CPICH Ec/N0			Integer(0..~~50~~ 49)	In dB. According to CPICH_Ec/No in [19]	
>>>CPICH RSCP			Integer(0..91)	In dBm. According to CPICH_RSCP_LEV in [19]	
>>>Pathloss			Integer(46..158)	In dB	
>TDD					
>>CHOICE *TDD option*	MP				REL-4
>>>3.84 Mcps TDD					REL-4
>>>>Timeslot List	OP	1 to 14			
>>>>>Timeslot ISCP	MP		Timeslot ISCP info 10.3.7.65	The UE shall report the Timeslot ISCP in the same order as indicated in the cell info	
>>>1.28 Mcps TDD					REL-4
>>>>Timeslot List	OP	1 to 6			REL-4
>>>>>Timeslot ISCP	MP		Timeslot ISCP info 10.3.7.65	The UE shall report the Timeslot ISCP in the same order as indicated in the cell info	REL-4
>>Primary CCPCH RSCP	OP		Primary CCPCH RSCP info 10.3.7.54		
Measurement results for monitored cells	OP	1 to 7			
>SFN-SFN observed time difference	OP		SFN-SFN observed time difference 10.3.7.63	It is absent for current cell	
>CHOICE *mode*	MP				
>>FDD					
>>>Primary CPICH info	MP		Primary CPICH info 10.3.6.60		
>>>CHOICE *measurement quantity*	OP			It is absent for current cell	
>>>>CPICH Ec/N0			Integer(0..~~50~~ 49)	In dB. According to CPICH_Ec/No in [19].	
>>>>CPICH RSCP			Integer(0..91)	In dBm. According to CPICH_RSCP_LEV in [19].	
>>>>Pathloss			Integer(46..158)	In dB	
>>TDD					
>>>Cell parameters Id	MP		Cell parameters Id 10.3.6.9		
>>>Primary CCPCH RSCP	MP		Primary		

			CCPCH RSCP info 10.3.7.54		

NOTE 1: Monitored cells consist of current cell and neighbouring cells.

11.3 Information element definitions

```
-- **************************************************
--
--     MEASUREMENT INFORMATION ELEMENTS (10.3.7)
--
-- **************************************************


CellMeasuredResults ::=             SEQUENCE {
    cellIdentity                        CellIdentity                        OPTIONAL,
    sfn-SFN-ObsTimeDifference           SFN-SFN-ObsTimeDifference           OPTIONAL,
    cellSynchronisationInfo         CellSynchronisationInfo         OPTIONAL,
    modeSpecificInfo                    CHOICE {
        fdd                                 SEQUENCE {
            primaryCPICH-Info                   PrimaryCPICH-Info,
            cpich-Ec-N0                         CPICH-Ec-N0                 OPTIONAL,
            cpich-RSCP                          CPICH-RSCP                  OPTIONAL,
            pathloss                            Pathloss                    OPTIONAL
        },
        tdd                                 SEQUENCE {
            cellParametersID                    CellParametersID,
            proposedTGSN                        TGSN                        OPTIONAL,
            primaryCCPCH-RSCP                   PrimaryCCPCH-RSCP           OPTIONAL,
            pathloss                            Pathloss                    OPTIONAL,
            timeslotISCP-List                   TimeslotISCP-List           OPTIONAL
        }
    }
}


-- It is not allowed to send value 50 in this version of the specification
CPICH-Ec-N0 ::=                     INTEGER (0..50)


MeasuredResultsOnRACH ::=           SEQUENCE {
    currentCell                         SEQUENCE {
        modeSpecificInfo                    CHOICE {
            fdd                                 SEQUENCE {
                measurementQuantity                 CHOICE {
                    cpich-Ec-N0                         CPICH-Ec-N0,
                    cpich-RSCP                          CPICH-RSCP,
                    pathloss                            Pathloss
                }
            },
            tdd                                 SEQUENCE {
                timeslotISCP                        TimeslotISCP-List       OPTIONAL,
                primaryCCPCH-RSCP                   PrimaryCCPCH-RSCP       OPTIONAL
            }
        }
    },
    monitoredCells                      MonitoredCellRACH-List              OPTIONAL
}


MonitoredCellRACH-List ::=          SEQUENCE (SIZE (1..7)) OF
                                        MonitoredCellRACH-Result

MonitoredCellRACH-Result ::=        SEQUENCE {
    sfn-SFN-ObsTimeDifference           SFN-SFN-ObsTimeDifference           OPTIONAL,
    modeSpecificInfo                    CHOICE {
        fdd                                 SEQUENCE {
            primaryCPICH-Info                   PrimaryCPICH-Info,
            measurementQuantity                 CHOICE {
                cpich-Ec-N0                         CPICH-Ec-N0,
```

```
                cpich-RSCP                      CPICH-RSCP,
                pathloss                        Pathloss
            }                                                       OPTIONAL
        },
        tdd                             SEQUENCE {
            cellParametersID                CellParametersID,
            primaryCCPCH-RSCP               PrimaryCCPCH-RSCP
        }
    }
}
```

3GPP TSG-RAN WG2 Meeting #23
Helsinki, Finland, 27.08. – 31.08.2001

Tdoc R2-012084

CR-Form-v4

CHANGE REQUEST

⌘ **25.331** **CR** **940** ⌘ ev **r1** ⌘ Current version: **3.7.0** ⌘

*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:	⌘	Priorities for IDNNS coding
Source:	⌘	TSG-RAN WG2
Work item code:	⌘	TEI
Date:	⌘	29.08.2001
Category:	⌘	**F**
Release:	⌘	R99

Use one of the following categories:
F *(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 one 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:	⌘	25.331 describes that IDNNS may be derived from TMSI/PTMSI, IMSI or IMEI. It does not, however, describe what are the priorities of TMSI/PTMSI, IMSI and IMEI. This CR proposes to derive IDNNS according to the following priorities: 1) TMSI/PTMSI, 2) IMSI, 3) IMEI. Isolated impact analysis: The corrected functionality is IDNNS. Would not affect implementations behaving like indicated in the CR, would affect implementations supporting the corrected functionality otherwise. Revision 1: Named the corrected functionality in the isolated impact analysis.
Summary of change:	⌘	The required clarifications was added in 3.2 and 8.1.8.2.
Consequences if not approved:	⌘	If this CR is not approved, it is not clear for the UE how to derive IDNNS. The UE may, e.g., use IMSI to derive IDNNS even if valid TMSI/PTMSI exists.

Clauses affected:	⌘	3.2, 8.1.8.2		
Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ O&M Specifications	⌘	25.331 v4.1.0, CR 941
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://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 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.

3.2 Abbreviations

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

ACK	Acknowledgement
AICH	Acquisition Indicator CHannel
AM	Acknowledged Mode
AS	Access Stratum
ASC	Access Service Class
ASN.1	Abstract Syntax Notation.1
BCCH	Broadcast Control Channel
BCFE	Broadcast Control Functional Entity
BER	Bit Error Rate
BLER	BLock Error Rate
BSS	Base Station Sub-system
CH	Conditional on history
CV	Conditional on value
CCPCH	Common Control Physical CHannel
CCCH	Common Control Channel
CN	Core Network
CM	Connection Management
CPCH	Common Packet CHannel
C-RNTI	Cell RNTI
CTCH	Common Traffic CHannel
CTFC	Calculated Transport Format Combination
DCA	Dynamic Channel Allocation
DCCH	Dedicated Control Channel
DCFE	Dedicated Control Functional Entity
DCH	Dedicated Channel
DC-SAP	Dedicated Control SAP
DGPS	Differential Global Positioning System
DL	Downlink
DRAC	Dynamic Resource Allocation Control
DSCH	Downlink Shared Channel
DTCH	Dedicated Traffic Channel
FACH	Forward Access Channel
FDD	Frequency Division Duplex
FFS	For Further Study
GC-SAP	General Control SAP
HCS	Hierarchical Cell Structure
HFN	Hyper Frame Number
ID	Identifier
IDNNS	Intra Domain NAS Node Selector
IETF	Internet Engineering Task Force
IMEI	International Mobile Equipment Identity
IMSI	International Mobile Subscriber Identity
IE	Information element
IP	Internet Protocol
ISCP	Interference on Signal Code Power
LAI	Location Area Identity
L1	Layer 1
L2	Layer 2
L3	Layer 3
MD	Mandatory default
MP	Mandatory present
MAC	Media Access Control
MCC	Mobile Country Code
MM	Mobility Management
MNC	Mobile Network Code

NAS	Non Access Stratum
Nt-SAP	Notification SAP
NW	Network
OP	Optional
PCCH	Paging Control Channel
PCH	Paging Channel
PDCP	Packet Data Convergence Protocol
PDSCH	Physical Downlink Shared Channel
PDU	Protocol Data Unit
PLMN	Public Land Mobile Network
PNFE	Paging and Notification Control Functional Entity
PRACH	Physical Random Access CHannel
P-TMSI	Packet Temporary Mobile Subscriber Identity
PUSCH	Physical Uplink Shared Channel
QoS	Quality of Service
RAB	Radio access bearer
RAT	Radio Access Technology
RAI	Routing Area Identity
RACH	Random Access CHannel
RB	Radio Bearer
RFE	Routing Functional Entity
RL	Radio Link
RLC	Radio Link Control
RNTI	Radio Network Temporary Identifier
RNC	Radio Network Controller
RRC	Radio Resource Control
RSCP	Received Signal Code Power
RSSI	Received Signal Strength Indicator
SAP	Service Access Point
SCFE	Shared Control Function Entity
SF	Spreading Factor
SHCCH	Shared Control Channel
SIR	Signal to Interference Ratio
SSDT	Site Selection Diversity Transmission
S-RNTI	SRNC - RNTI
TDD	Time Division Duplex
TF	Transport Format
TFCS	Transport Format Combination Set
TFS	Transport Format Set
TM	Transparent Mode
TME	Transfer Mode Entity
TMSI	Temporary Mobile Subscriber Identity
Tr	Transparent
Tx	Transmission
UE	User Equipment
UL	Uplink
UM	Unacknowledged Mode
URA	UTRAN Registration Area
U-RNTI	UTRAN-RNTI
USCH	Uplink Shared Channel
UTRAN	Universal Terrestrial Radio Access Network

8.1.8 Initial Direct transfer

Figure 14: Initial Direct transfer in the uplink, normal flow

8.1.8.1 General

The initial direct transfer procedure is used in the uplink to establish a signalling connection. It is also used to carry an initial upper layer (NAS) message over the radio interface.

8.1.8.2 Initiation of Initial direct transfer procedure in the UE

In the UE, the initial direct transfer procedure shall be initiated, when the upper layers request establishment of a signalling connection. This request also includes a request for the transfer of a NAS message.

Upon initiation of the initial direct transfer procedure when the UE is in idle mode, the UE shall

- set the variable ESTABLISHMENT_CAUSE to the cause for establishment indicated by upper layers;
- perform an RRC connection establishment procedure, according to subclause 8.1.3;
- if the RRC connection establishment procedure was not successful:
  - indicate failure to establish the signalling connection to upper layers and end the procedure;
- when the RRC connection establishment procedure is completed successfully:
  - continue with the initial direct transfer procedure as below;

Upon initiation of the initial direct transfer procedure when the UE is in CELL_PCH or URA_PCH state, the UE shall:

- perform a cell update procedure, according to subclause 8.3.1, using the cause "uplink data transmission";
- when the cell update procedure completed successfully:
  - continue with the initial direct transfer procedure as below.

The UE shall, in the INITIAL DIRECT TRANSFER message:

- set the IE "NAS message" as received from upper layers; and
- set the IE "CN domain identity" as indicated by the upper layers; and
- set the IE "Intra Domain NAS Node Selector". The UE shall derive the IE "Intra Domain NAS Node Selector" from TMSI/PMTSI, IMSI, or IMEI. The UE shall provide the coding of the IE "Intra Domain NAS Node Selector" according to the following priorities:

  1. The routing parameter for IDNNS is derived from TMSI (CS domain) or PTMSI (PS domain) whenever a valid TMSI/PTMSI is available.

  2. The routing parameter for IDNNS is based on IMSI when no valid TMSI/PTMSI is available.

3. The routing parameter for IDNNS is based on IMEI only if no (U)SIM is inserted in the UE.

~~as indicated by the upper layers.~~

In CELL_FACH state, the UE shall:

- if RACH measurement reporting has been requested in the IE "Intra-frequency reporting quantity for RACH reporting" and the IE "Maximum number of reported cells on RACH" in "System Information Block type 12" (or "System Information Block type 11" if "System Information Block type 12" is not being broadcast):
  - include IE "Measured results on RACH" in the INITIAL DIRECT TRANSFER message.

The UE shall:

- transmit the INITIAL DIRECT TRANSFER message on the uplink DCCH using AM RLC on signalling radio bearer RB3;
- when the INITIAL DIRECT TRANSFER message has been submitted to lower layers for transmission:
  - confirm the establishment of a signalling connection to upper layers; and
  - add the signalling connection with the identity indicated by the IE "CN domain identity" in the variable ESTABLISHED_SIGNALLING_CONNECTIONS; and
  - the procedure ends.

When not stated otherwise elsewhere, the UE may also initiate the initial direct transfer procedure when another procedure is ongoing, and in that case the state of the latter procedure shall not be affected.

A new signalling connection request may be received from upper layers subsequent to the indication of the release of a previously established signalling connection to upper layers. From the time of the indication of release to upper layers until the UE has entered idle mode, any such upper layer request to establish a new signalling connection shall be queued. This request shall be processed after the UE has entered idle mode.

8.1.8.3 Reception of INITIAL DIRECT TRANSFER message by the UTRAN

On reception of the INITIAL DIRECT TRANSFER message the NAS message should be routed using the IE "CN Domain Identity". UTRAN may also use the IE "Intra Domain NAS Node Selector" for routing among the CN nodes for the addressed CN domain.

If no signalling connection exists towards the chosen node, then a signalling connection is established.

If the IE "Measured results on RACH" is present in the message, the UTRAN should extract the contents to be used for radio resource control.

When the UTRAN receives an INITIAL DIRECT TRANSFER message, it shall not affect the state of any other ongoing RRC procedures, when not stated otherwise elsewhere.

3GPP TSG-RAN WG2 Meeting #23
Helsinki, Finland, 27.08. – 31.08.2001

Tdoc R2-012085

CR-Form-v4

CHANGE REQUEST

⌘ **25.331** **CR** **941** ⌘ ev **-** ⌘ Current version: **4.1.0** ⌘

*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:	⌘	Priorities for IDNNS coding
Source:	⌘	TSG-RAN WG2
Work item code:	⌘	TEI
Date:	⌘	29.08.2001
Category:	⌘	**A**
Release:	⌘	REL-4

Use one of the following categories:
F *(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 one 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:	⌘	25.331 describes that IDNNS may be derived from TMSI/PTMSI, IMSI or IMEI. It does not, however, describe what are the priorities of TMSI/PTMSI, IMSI and IMEI. This CR proposes to derive IDNNS according to the following priorities: 1) TMSI/PTMSI, 2) IMSI, 3) IMEI.
Summary of change:	⌘	The required clarifications was added in 3.2 and 8.1.8.2.
Consequences if not approved:	⌘	If this CR is not approved, it is not clear for the UE how to derive IDNNS. The UE may, e.g., use IMSI to derive IDNNS even if valid TMSI/PTMSI exists.

Clauses affected:	⌘	3.2, 8.1.8.2		
Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ O&M Specifications	⌘	25.331 v3.7.0, CR 940r1
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://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 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.

3.2 Abbreviations

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

ACK	Acknowledgement
AICH	Acquisition Indicator CHannel
AM	Acknowledged Mode
AS	Access Stratum
ASC	Access Service Class
ASN.1	Abstract Syntax Notation.1
BCCH	Broadcast Control Channel
BCFE	Broadcast Control Functional Entity
BER	Bit Error Rate
BLER	BLock Error Rate
BSS	Base Station Sub-system
CH	Conditional on history
CV	Conditional on value
CCPCH	Common Control Physical CHannel
CCCH	Common Control Channel
CN	Core Network
CM	Connection Management
CPCH	Common Packet CHannel
C-RNTI	Cell RNTI
CTCH	Common Traffic CHannel
CTFC	Calculated Transport Format Combination
DCA	Dynamic Channel Allocation
DCCH	Dedicated Control Channel
DCFE	Dedicated Control Functional Entity
DCH	Dedicated Channel
DC-SAP	Dedicated Control SAP
DGPS	Differential Global Positioning System
DL	Downlink
DRAC	Dynamic Resource Allocation Control
DSCH	Downlink Shared Channel
DTCH	Dedicated Traffic Channel
FACH	Forward Access Channel
FDD	Frequency Division Duplex
FFS	For Further Study
GC-SAP	General Control SAP
HCS	Hierarchical Cell Structure
HFN	Hyper Frame Number
ID	Identifier
IDNNS	Intra Domain NAS Node Selector
IETF	Internet Engineering Task Force
IMEI	International Mobile Equipment Identity
IMSI	International Mobile Subscriber Identity
IE	Information element
IP	Internet Protocol
ISCP	Interference on Signal Code Power
LAI	Location Area Identity
L1	Layer 1
L2	Layer 2
L3	Layer 3
MD	Mandatory default
MP	Mandatory present
MAC	Media Access Control
MCC	Mobile Country Code
MM	Mobility Management
MNC	Mobile Network Code

NAS	Non Access Stratum
Nt-SAP	Notification SAP
NW	Network
OP	Optional
PCCH	Paging Control Channel
PCH	Paging Channel
PDCP	Packet Data Convergence Protocol
PDSCH	Physical Downlink Shared Channel
PDU	Protocol Data Unit
PLMN	Public Land Mobile Network
PNFE	Paging and Notification Control Functional Entity
PRACH	Physical Random Access CHannel
P-TMSI	Packet Temporary Mobile Subscriber Identity
PUSCH	Physical Uplink Shared Channel
QoS	Quality of Service
RAB	Radio access bearer
RAT	Radio Access Technology
RAI	Routing Area Identity
RACH	Random Access CHannel
RB	Radio Bearer
RFE	Routing Functional Entity
RL	Radio Link
RLC	Radio Link Control
RNTI	Radio Network Temporary Identifier
RNC	Radio Network Controller
RRC	Radio Resource Control
RSCP	Received Signal Code Power
RSSI	Received Signal Strength Indicator
SAP	Service Access Point
SCFE	Shared Control Function Entity
SF	Spreading Factor
SHCCH	Shared Control Channel
SIR	Signal to Interference Ratio
SSDT	Site Selection Diversity Transmission
S-RNTI	SRNC - RNTI
TDD	Time Division Duplex
TF	Transport Format
TFCS	Transport Format Combination Set
TFS	Transport Format Set
TM	Transparent Mode
TME	Transfer Mode Entity
TMSI	Temporary Mobile Subscriber Identity
Tr	Transparent
Tx	Transmission
UE	User Equipment
UL	Uplink
UM	Unacknowledged Mode
URA	UTRAN Registration Area
U-RNTI	UTRAN-RNTI
USCH	Uplink Shared Channel
UTRAN	Universal Terrestrial Radio Access Network

8.1.8 Initial Direct transfer

Figure 14: Initial Direct transfer in the uplink, normal flow

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In the UE, the initial direct transfer procedure shall be initiated, when the upper layers request establishment of a signalling connection. This request also includes a request for the transfer of a NAS message.

Upon initiation of the initial direct transfer procedure when the UE is in idle mode, the UE shall

- set the variable ESTABLISHMENT_CAUSE to the cause for establishment indicated by upper layers;
- perform an RRC connection establishment procedure, according to subclause 8.1.3;
- if the RRC connection establishment procedure was not successful:
  - indicate failure to establish the signalling connection to upper layers and end the procedure;
- when the RRC connection establishment procedure is completed successfully:
  - continue with the initial direct transfer procedure as below;

Upon initiation of the initial direct transfer procedure when the UE is in CELL_PCH or URA_PCH state, the UE shall:

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  2. The routing parameter for IDNNS is based on IMSI when no valid TMSI/PTMSI is available.

  3. The routing parameter for IDNNS is based on IMEI only if no (U)SIM is inserted in the UE.

~~as indicated by the upper layers.~~

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- if RACH measurement reporting has been requested in the IE "Intra-frequency reporting quantity for RACH reporting" and the IE "Maximum number of reported cells on RACH" in "System Information Block type 12" (or "System Information Block type 11" if "System Information Block type 12" is not being broadcast):
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  - confirm the establishment of a signalling connection to upper layers; and
  - add the signalling connection with the identity indicated by the IE "CN domain identity" in the variable ESTABLISHED_SIGNALLING_CONNECTIONS; and
  - the procedure ends.

When not stated otherwise elsewhere, the UE may also initiate the initial direct transfer procedure when another procedure is ongoing, and in that case the state of the latter procedure shall not be affected.

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8.1.8.3 Reception of INITIAL DIRECT TRANSFER message by the UTRAN

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If no signalling connection exists towards the chosen node, then a signalling connection is established.

If the IE "Measured results on RACH" is present in the message, the UTRAN should extract the contents to be used for radio resource control.

When the UTRAN receives an INITIAL DIRECT TRANSFER message, it shall not affect the state of any other ongoing RRC procedures, when not stated otherwise elsewhere.

3GPP TSG-RAN WG2 Meeting #23
Helsinki, Finland, 27.08. – 31.08.2001

Tdoc R2-012086

CR-Form-v4

CHANGE REQUEST

⌘ **25.331** **CR** **942** ⌘ ev **r1** ⌘ Current version: **3.7.0** ⌘

*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:	⌘	Dedicated pilots and S-CPICH specification related to UE specific beamforming
Source:	⌘	TSG-RAN WG2
Work item code:	⌘	TEI
Date:	⌘	29.08.2001
Category:	⌘	**F**
Release:	⌘	R99

Use one of the following categories:
F *(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 one 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:	⌘	In TSG-RAN #11 meeting a CR [1] for removing S-CPICH as a phase reference for S-CCPCH was approved. Since S-CCPCH is thus effectively not beamformed, references to this feature is removed in 25.331. Isolated impact analysis: The corrected functionality is channel estimation. Would not affect implementations behaving like indicated in the CR, would affect implementations supporting the corrected functionality otherwise. Revision 1: Named the corrected functionality in the isolated impact analysis.
Summary of change:	⌘	IEs “Primary CPICH usage for channel estimation” and “Secondary CPICH info” in “Secondary CCPCH info” were deleted.
Consequences if not approved:	⌘	Inconsistency in S-CCPCH descriptions.

Clauses affected:	⌘	10.3.6.71, 11.3		
Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ O&M Specifications	⌘	25.331 v4.1.0, CR 943
Other comments:	⌘	[1] RP-01-0255, "Phase reference for secondary CCPCH carrying FACH"		

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://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 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.

10.3.6.71 Secondary CCPCH info

Information Element/Group name	Need	Multi	Type and reference	Semantics description
CHOICE *mode*	MP			
>FDD				
~~>>Primary CPICH usage for channel estimation~~	~~MP~~		~~Primary CPICH usage for channel estimation 10.3.6.62~~	
~~>>Secondary CPICH info~~	~~OP~~		~~Secondary CPICH info 10.3.6.73~~	~~May only be sent for SCCPCH channels not carrying the PCH.~~
>>Secondary scrambling code	OP		Secondary scrambling code 10.3.6.74	May only be sent for SCCPCH channels not carrying the PCH.
>>STTD indicator	MD		STTD Indicator 10.3.6.78	Default value is "TRUE"
>>Spreading factor	MP		Integer(4, 8, 16, 32, 64, 128, 256)	
>>Code number	MP		Integer(0..Spreading factor - 1)	
>>Pilot symbol existence	MD		Boolean	TRUE means the existence. Default value is "TRUE"
>>TFCI existence	MD		Boolean	TRUE means the existence. Default value is "TRUE"
>>Fixed or Flexible Position	MD		Enumerated (Fixed, Flexible)	Default value is "Flexible"
>>Timing Offset	MD		Integer(0..38144 by step of 256)	Chip Delay of the Secondary CCPCH relative to the Primary CCPCH. Default value is 0.
>TDD				
>>Offset	MP		Integer (0...Repetition Period -1)	SFN modulo Repetition period = offset. Repetition period is the one indicated in the accompanying Common timeslot info IE
>>Common timeslot info	MP		Common timeslot info 10.3.6.10	
>>Individual timeslot info	MP		Individual timeslot info 10.3.6.37	
>>Code List	MP	1 to 16		
>>>Channelisation Code	MP		Enumerated((16/1)..(16/16))	

```
SecondaryCCPCH-Info ::=             SEQUENCE {
    modeSpecificInfo                CHOICE {
        fdd                             SEQUENCE {
            -- This IE is not used in this version of the specification and should be ignored.
            pCPICH-UsageForChannelEstdummy      PCPICH-UsageForChannelEst,
            -- This IE is not used in this version of the specification.  It should not
            -- be sent and if received it should be ignored.
            secondaryCPICH-Infodummy            SecondaryCPICH-Info             OPTIONAL,
            secondaryScramblingCode         SecondaryScramblingCode         OPTIONAL,
            sttd-Indicator                  BOOLEAN,
            sf-AndCodeNumber                SF256-AndCodeNumber,
            pilotSymbolExistence            BOOLEAN,
            tfci-Existence                  BOOLEAN,
            positionFixedOrFlexible         PositionFixedOrFlexible,
            timingOffset                    TimingOffset                    DEFAULT 0
        },
        tdd                             SEQUENCE {
            -- TABULAR: the offset is included in CommonTimeslotInfoSCCPCH
            commonTimeslotInfo              CommonTimeslotInfoSCCPCH,
            individualTimeslotInfo          IndividualTimeslotInfo,
            channelisationCode              SCCPCH-ChannelisationCodeList
        }
    }
}
```

3GPP TSG-RAN WG2 Meeting #23
Helsinki, Finland, 27.08. – 31.08.2001

Tdoc R2-012086

CR-Form-v4

CHANGE REQUEST

⌘ **25.331** **CR** **943** ⌘ ev **-** ⌘ Current version: **4.1.0** ⌘

*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:	⌘	Dedicated pilots and S-CPICH specification related to UE specific beamforming
Source:	⌘	TSG-RAN WG2
Work item code:	⌘	TEI
Date:	⌘	29.08.2001
Category:	⌘	**A**
Release:	⌘	REL-4

Use one of the following categories:
F *(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 one 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:	⌘	In TSG-RAN #11 meeting a CR [1] for removing S-CPICH as a phase reference for S-CCPCH was approved. Since S-CCPCH is thus effectively not beamformed, references to this feature is removed in 25.331.
Summary of change:	⌘	IEs “Primary CPICH usage for channel estimation” and “Secondary CPICH info” in “Secondary CCPCH info” were deleted.
Consequences if not approved:	⌘	Inconsistency in S-CCPCH descriptions.

Clauses affected:	⌘	10.3.6.71, 11.3		
Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ O&M Specifications	⌘	25.331 v3.7.0, CR 942r1
Other comments:	⌘	[1] RP-01-0255, "Phase reference for secondary CCPCH carrying FACH"		

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10.3.6.71 Secondary CCPCH info

Information Element/Group name	Need	Multi	Type and reference	Semantics description
CHOICE *mode*	MP			
>FDD				
~~>>Primary CPICH usage for channel estimation~~	~~MP~~		~~Primary CPICH usage for channel estimation 10.3.6.62~~	
~~>>Secondary CPICH info~~	~~OP~~		~~Secondary CPICH info 10.3.6.73~~	~~May only be sent for SCCPCH channels not carrying the PCH.~~
>>Secondary scrambling code	OP		Secondary scrambling code 10.3.6.74	May only be sent for SCCPCH channels not carrying the PCH.
>>STTD indicator	MD		STTD Indicator 10.3.6.78	Default value is "TRUE"
>>Spreading factor	MP		Integer(4, 8, 16, 32, 64, 128, 256)	
>>Code number	MP		Integer(0..Spreading factor - 1)	
>>Pilot symbol existence	MD		Boolean	TRUE means the existence. Default value is "TRUE"
>>TFCI existence	MD		Boolean	TRUE means the existence. Default value is "TRUE"
>>Fixed or Flexible Position	MD		Enumerated (Fixed, Flexible)	Default value is "Flexible"
>>Timing Offset	MD		Integer(0..38144 by step of 256)	Chip Delay of the Secondary CCPCH relative to the Primary CCPCH. Default value is 0.
>TDD				
>>Offset	MP		Integer (0...Repetition Period -1)	SFN modulo Repetition period = offset. Repetition period is the one indicated in the accompanying Common timeslot info IE
>>Common timeslot info	MP		Common timeslot info 10.3.6.10	
>>Individual timeslot info	MP		Individual timeslot info 10.3.6.37	
>>Code List	MP	1 to 16		
>>>Channelisation Code	MP		Enumerated((16/1)..(16/16))	

```
SecondaryCCPCH-Info ::=             SEQUENCE {
```

```
    modeSpecificInfo                CHOICE {
        fdd                             SEQUENCE {
            -- This IE is not used in this version of the specification and should be ignored.
            ~~pCPICH-UsageForChannelEst~~dummy      PCPICH-UsageForChannelEst,
            -- This IE is not used in this version of the specification.  It should not
            -- be sent and if received it should be ignored.
            ~~secondaryCPICH-Info~~dummy            SecondaryCPICH-Info             OPTIONAL,
            secondaryScramblingCode         SecondaryScramblingCode         OPTIONAL,
            sttd-Indicator                  BOOLEAN,
            sf-AndCodeNumber                SF256-AndCodeNumber,
            pilotSymbolExistence            BOOLEAN,
            tfci-Existence                  BOOLEAN,
            positionFixedOrFlexible         PositionFixedOrFlexible,
            timingOffset                    TimingOffset                    DEFAULT 0
        },
        tdd                             SEQUENCE {
            -- TABULAR: the offset is included in CommonTimeslotInfoSCCPCH
            commonTimeslotInfo              CommonTimeslotInfoSCCPCH,
            individualTimeslotInfo          IndividualTimeslotInfo,
            channelisationCode              SCCPCH-ChannelisationCodeList
        }
    }
}
```

3GPP TSG-RAN WG2 Meeting #23
Helsinki, Finland, 27-31 August 2001

Tdoc R2-012032

CR-Form-v4

CHANGE REQUEST

⌘ **25.331 CR 944** ⌘ ev **r1** ⌘ Current version: **3.7.0** ⌘

*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:	⌘	Security corrections
Source:	⌘	TSG-RAN WG2
Work item code:	⌘	TEI
Date:	⌘	21 Aug 2001
Category:	⌘	**F**
Release:	⌘	R99

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
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Use one 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: ⌘

Upon reception of a Security Mode Command (section 8.1.12.3), the UE needs to perform the actions specified in 8.6.3.5 (Integrity protection mode info). In 8.6.3.5, the variable LATEST_CONFIGURED_CN_DOMAIN is read but the initialization of this variable has not yet taken place (the initialization happens later in 8.1.12.3).

Security key set deletion described in subclause 8.1.4.3 “Reception of an RRC CONNECTION RELEASE message by the UE” is redundant, since it has been specified in subclause 8.5.2 “Actions when entering idle mode from connected mode”, which will be performed at the end of RRC Connection Release procedure.

When the UE performs downlink message authentication code (MAC) calculation, the IE “RRC message sequence number” included in the IE “Integrity check info” of the received message should be used as the LSB of COUNT-I, rather than using the IE “Downlink RRC message sequence number” in the variable INTEGRITY_PROTECTION_INFO. Because it is the former that is used by the UTRAN for MAC calculation, not the latter.

According to the current specification, when initiating the first SECURITY MODE COMMAND, the UTRAN should use the value "START" in the most recently received IE "START list" that belongs to the CN domain as indicated in the IE "CN domain identity" to initialize all HFNs for all the signaling radio bearers.

However, when the integrity protection mode is started, the UE initialises the HFNs of COUNT-I for the signalling radio bearers with the calculated START value as specified in subclause 8.5.9.

So, the HFNs of COUNT-I between UTRAN and UE are not synchronized.

Summary of change:	⌘	This revision is a merge of R2-011848, R2-011936, R2-011937 and R2-011939. Add a statement in the subclause 8.1.12.3 “Reception of SECURITY MODE COMMAND message by the UE” to set the START value associated with the new key set to 0. The IE “Downlink RRC message sequence number” in the variable INTEGRITY_PROTECTION_INFO for downlink MAC calculation in subclause 8.5.10.3 is replaced by the IE “RRC message sequence number” included in the IE “Integrity check info” of the received message. The HFNs of COUNT-I for the signalling radio bearers in subclause 8.6.3.5 are initialised with the START value included in the most recently transmitted IE “START list” instead of using the calculated START value as specified in subclause 8.5.9. In 8.6.3.5 a clarification has been added that the LATEST_CONFIGURED_CN_DOMAIN is used only if it is initialised, else the IE “CN domain identity” in the message is used. Editorial corrections in subclauses 8.1.3.6, 8.1.4, 8.5.8, 8.5.9 and 8.6.3.5. Impact analysis: Correction to security functionality where the specification was ambiguous or not sufficiently explicit.This CR would not affect implementations behaving like indicated in the CR, would affect implementations supporting the corrected functionality otherwise.
Consequences if not approved:	⌘	The UE behaviour is ambiguous in security procedures.

Clauses affected:	⌘	8.1.3.6, 8.1.4.1, 8.1.4.3, 8.1.12.2.2, 8.1.12.3, 8.5.8, 8.5.9, 8.5.10.3, 8.6.3.5		
Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ O&M Specifications	⌘	25.331 v4.1.0, CR0945
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://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 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.

8.1.3.6 Reception of an RRC CONNECTION SETUP message by the UE

The UE shall compare the value of the IE "Initial UE identity" in the received RRC CONNECTION SETUP message with the value of the variable INITIAL_UE_IDENTITY.

If the values are different, the UE shall:

- ignore the rest of the message;

If the values are identical, the UE shall:

- stop timer T300, and act upon all received information elements as specified in subclause 8.6, unless specified otherwise in the following;
  - if the UE will be in the CELL_FACH state at the conclusion of this procedure:
    - if the IE "Frequency info" is included:
      - select a suitable UTRA cell according to [4] on that frequency;
    - select PRACH according to subclause 8.5.17;
    - select Secondary CCPCH according to subclause 8.5.19;
- perform the physical layer synchronization procedure as specified in [29];
- enter a state according to subclause 8.6.3.3;
- submit an RRC CONNECTION SETUP COMPLETE message to the lower layers on the uplink DCCH after successful state transition per subclause 8.6.3.3, with the contents set as specified below:
  - set the IE "RRC transaction identifier" to
    - the value of "RRC transaction identifier" in the entry for the RRC CONNECTION SETUP message in the table "Accepted transactions" in the variable TRANSACTIONS; and
    - clear that entry.
  - if the USIM is present:
    - set the "START" for each CN domain in the IE "START list" in the RRC CONNECTION SETUP COMPLETE message with the corresponding START value that is stored in the USIM [50]; and then
    - set the START value stored in the USIM [50] for any CN domain to the value "THRESHOLD" of the variable START_THRESHOLD;
  - if the USIM is not present:
    - set the "START" for each CN domain in the IE "START list" in the RRC CONNECTION SETUP COMPLETE message to zero;
  - retrieve its UTRA UE radio access capability information elements from variable UE_CAPABILITY_REQUESTED; and then
  - include this in IE "UE radio access capability" and IE "UE radio access capability extension", provided this IE is included in variable UE_CAPABILITY_REQUESTED;
  - retrieve its inter-RAT-specific UE radio access capability information elements from variable UE_CAPABILITY_REQUESTED; and then
  - include this in IE "UE system specific capability".

When the RRC CONNECTION SETUP COMPLETE message has been submitted to lower layers for transmission the UE shall:

- if the UE has entered CELL_FACH state:

  - start timer T305 using its initial value if periodical update has been configured by T305 in the IE "UE Timers and constants in connected mode" set to any other value than "infinity" in system information block type 1;

- store the contents of the variable UE_CAPABILITY_REQUESTED in the variable UE_CAPABILITY_TRANSFERRED;
- clear the variable UE_CAPABILITY_REQUESTED;
- if the IE "Transport format combination subset" was not included in the RRC CONNECTION SETUP message:
  - set the IE "Current TFC subset" in the variable TFS_SUBSET to "Full transport format combination set";
- set the "Status" in the variable CIPHERING_STATUS to "Not started";
- set the "Reconfiguration" in the variable CIPHERING_STATUS to FALSE;
- set the "Status" in the variable INTEGRITY_PROTECTION_INFO to "Not started";
- set the "Historical status" in the variable INTEGRITY_PROTECTION_INFO to "Never been active";
- set the "Reconfiguration" in the variable INTEGRITY_PROTECTION_INFO to FALSE;
- set the variable CELL_UPDATE_STARTED to FALSE;
- set the variable CONFIGURATION_INCOMPLETE to FALSE;
- set the variable ORDERED_RECONFIGURATION to FALSE;
- set the variable FAILURE_INDICATOR to FALSE;
- set the variable INCOMPATIBLE_SECURITY_RECONFIGURATION to FALSE;
- set the variable INVALID_CONFIGURATION to FALSE;
- set the variable PROTOCOL_ERROR_INDICATOR to FALSE;
- set the variable PROTOCOL_ERROR_REJECT to FALSE;
- set the variable TGSN_REPORTED to FALSE;
- set the variable UNSUPPORTED_CONFIGURATION to FALSE;
- clear all optional IEs in all variables, except those optional IEs that are set in this procedure;
- consider the procedure to be successful;

And the procedure ends.

8.1.4 RRC connection release

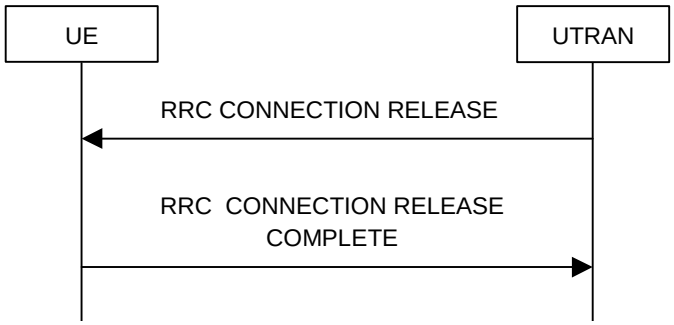

Figure 10: RRC Connection Release procedure on the DCCH

Figure 11: RRC Connection Release procedure on the CCCH

8.1.4.1 General

The purpose of this procedure is to release the RRC connection including ~~and~~ all radio bearers and all signalling radio bearers between the UE and the UTRAN. By doing so, all established signalling connections will be released.

8.1.4.2 Initiation

When the UE is in state CELL_DCH or CELL_FACH, the UTRAN may at anytime initiate an RRC connection release by transmitting an RRC CONNECTION RELEASE message using UM RLC.

When UTRAN transmits an RRC CONNECTION RELEASE message in response to a CELL UPDATE (subclause 8.3.1) or URA UPDATE (subclause 8.3.2) message from the UE, UTRAN should use the downlink CCCH to transmit the message. In all other cases the downlink DCCH should be used.

UTRAN may transmit several RRC CONNECTION RELEASE messages to increase the probability of proper reception of the message by the UE. In such a case, the RRC SN for these repeated messages shall be the same. This shall also apply to the RRC CONNECTION RELEASE COMPLETE message. The number of repeated messages and the interval between the messages is a network option.

8.1.4.3 Reception of an RRC CONNECTION RELEASE message by the UE

The UE shall receive and act on an RRC CONNECTION RELEASE message in states CELL_DCH and CELL_FACH. Furthermore this procedure can interrupt any ongoing procedures with the UE in the above listed states.

When the UE receives the first RRC CONNECTION RELEASE message, it shall:

~~- if the USIM is present; and~~

~~- if the "START" stored in the USIM [50] for a CN domain is greater than the value "THRESHOLD" of the variable START_THRESHOLD:~~

~~- delete the ciphering and integrity keys that are stored in the USIM for that CN domain;~~

~~- inform the deletion of these keys to upper layers;~~

- in state CELL_DCH:

- initialise the counter V308 to zero;
- set the IE "RRC transaction identifier" in the RRC CONNECTION RELEASE COMPLETE message to the value of "RRC transaction identifier" in the entry for the RRC CONNECTION RELEASE message in the table "Accepted transactions" in the variable TRANSACTIONS; and
- clear that entry.
- submit an RRC CONNECTION RELEASE COMPLETE message to the lower layers for transmission using UM RLC on the DCCH to the UTRAN;
- if the IE "Rplmn information" is present:
  - the UE may:
    - store the IE on the ME together with the PLMN id for which it applies;
  - the UE may then:
    - utilise this information, typically indicating where a number of BCCH frequency ranges of a RAT may be expected to be found, during subsequent Rplmn selections of the indicated PLMN;
- start timer T308 when the RRC CONNECTION RELEASE COMPLETE message is sent on the radio interface.

- in state CELL_FACH:
  - if the RRC CONNECTION RELEASE message was received on the DCCH:
    - set the IE "RRC transaction identifier" in the RRC CONNECTION RELEASE COMPLETE message to the value of "RRC transaction identifier" in the entry for the RRC CONNECTION RELEASE message in the table "Accepted transactions" in the variable TRANSACTIONS; and
    - clear that entry;
    - submit an RRC CONNECTION RELEASE COMPLETE message to the lower layers for transmission using AM RLC on the DCCH to the UTRAN.
    - when the successful transmission of the RRC CONNECTION RELEASE COMPLETE message has been confirmed by the lower layers:
      - release all its radio resources; and
      - indicate the release of the established signalling connections (as stored in the variable ESTABLISHED_SIGNALLING_CONNECTIONS) and established radio access bearers (as stored in the variable ESTABLISHED_RABS) to upper layers; and
      - clear the variable ESTABLISHED_SIGNALLING_CONNECTIONS;
      - clear the variable ESTABLISHED_RABS;
      - pass the value of the IE "Release cause" received in the RRC CONNECTION RELEASE message to upper layers;
      - enter idle mode;
      - perform the actions specified in subclause 8.5.2 when entering idle mode;
    - and the procedure ends.
  - if the RRC CONNECTION RELEASE message was received on the CCCH:
    - release all its radio resources;
    - indicate the release of the established signalling connections (as stored in the variable ESTABLISHED_SIGNALLING_CONNECTIONS) and established radio access bearers (as stored in the variable ESTABLISHED_RABS) to the upper layers;

- clear the variable ESTABLISHED_SIGNALLING_CONNECTIONS;
- clear the variable ESTABLISHED_RABS;
- pass the value of the IE "Release cause" received in the RRC CONNECTION RELEASE message to upper layers;
- enter idle mode;
- perform the actions specified in subclause 8.5.2 when entering idle mode;
- and the procedure ends.

8.1.4.4 Invalid RRC CONNECTION RELEASE message

If the RRC CONNECTION RELEASE message contains a protocol error causing the variable PROTOCOL_ERROR_REJECT to be set to TRUE according to clause 9, and if the "protocol error cause" in PROTOCOL_ERROR_INFORMATION is set to any cause value except "ASN.1 violation or encoding error", the UE shall perform procedure specific error handling as follows:

The UE shall:

- ignore any IE(s) causing the error but treat the rest of the RRC CONNECTION RELEASE message as normal according to subclause 8.1.4.3, with an addition of the following actions;
  - if the RRC CONNECTION RELEASE message was received on the DCCH:
    - set the IE "RRC transaction identifier" in the RRC CONNECTION RELEASE COMPLETE message to the value of "RRC transaction identifier" in the entry for the RRC CONNECTION RELEASE message in the table "Rejected transactions" in the variable TRANSACTIONS; and
    - clear that entry.
    - include the IE "Error indication" in the RRC CONNECTION RELEASE COMPLETE message with:
      - the IE "Failure cause" set to the cause value "Protocol error" and
      - the IE "Protocol error information" set to the value of the variable PROTOCOL_ERROR_INFORMATION;

8.1.4.5 Cell re-selection or radio link failure

If the UE performs cell re-selection or the radio link failure criteria in subclause 8.5.6 is met at any time during the RRC connection release procedure and the UE has not yet entered idle mode, the UE shall:

- if cell re-selection occurred (CELL_FACH state):
  - perform a cell update procedure according to subclause 8.3.1 using the cause "Cell reselection";
- if radio link failure occurred (CELL_DCH state):
  - select a suitable UTRA cell according to [4];
  - perform a cell update procedure according to subclause 8.3.1 using the cause "radio link failure".

8.1.4.6 Expiry of timer T308, unacknowledged mode transmission

When in state CELL_DCH and the timer T308 expires, the UE shall:

- increment V308 by one;
- if V308 is equal to or smaller than N308:

- retransmit the RRC CONNECTION RELEASE COMPLETE message, without incrementing "Uplink RRC Message sequence number" for signalling radio bearer RB1 in the variable INTEGRITY_PROTECTION_INFO;

- if V308 is greater than N308:

  - release all its radio resources;

  - indicate the release of the established signalling connections (as stored in the variable ESTABLISHED_SIGNALLING_CONNECTIONS) and established radio access bearers (as stored in the variable ESTABLISHED_RABS) to upper layers;

  - clear the variable ESTABLISHED_SIGNALLING_CONNECTIONS;

  - clear the variable ESTABLISHED_RABS;

  - enter idle mode;

  - perform the actions specified in subclause 8.5.2 when entering idle mode;

  - and the procedure ends.

8.1.4.7 Void

8.1.4.8 Reception of an RRC CONNECTION RELEASE COMPLETE message by UTRAN

When UTRAN receives an RRC CONNECTION RELEASE COMPLETE message from the UE, it should:

- release all UE dedicated resources and the procedure ends on the UTRAN side.

8.1.4.9 Unsuccessful transmission of the RRC CONNECTION RELEASE COMPLETE message, acknowledged mode transmission

When acknowledged mode was used and RLC does not succeed in transmitting the RRC CONNECTION RELEASE COMPLETE message, the UE shall:

- release all its radio resources;

- indicate the release of the established signalling connections (as stored in the variable ESTABLISHED_SIGNALLING_CONNECTIONS) and established radio access bearers (as stored in the variable ESTABLISHED_RABS) to upper layers;

- clear the variable ESTABLISHED_SIGNALLING_CONNECTIONS;

- clear the variable ESTABLISHED_RABS;

- enter idle mode;

- perform the actions specified in subclause 8.5.2 when entering idle mode;

- and the procedure ends.

8.1.4.10 Detection of loss of dedicated physical channel by UTRAN in CELL_DCH state

If the release is performed from the state CELL_DCH, and UTRAN detects loss of the dedicated physical channel according to subclause 8.5.6, UTRAN may release all UE dedicated resources, even if no RRC CONNECTION RELEASE COMPLETE message has been received.

8.1.4.11 Failure to receive RRC CONNECTION RELEASE COMPLETE message by UTRAN

If UTRAN does not receive any RRC CONNECTION RELEASE COMPLETE message, it should release all UE dedicated resources.

8.1.12 Security mode control

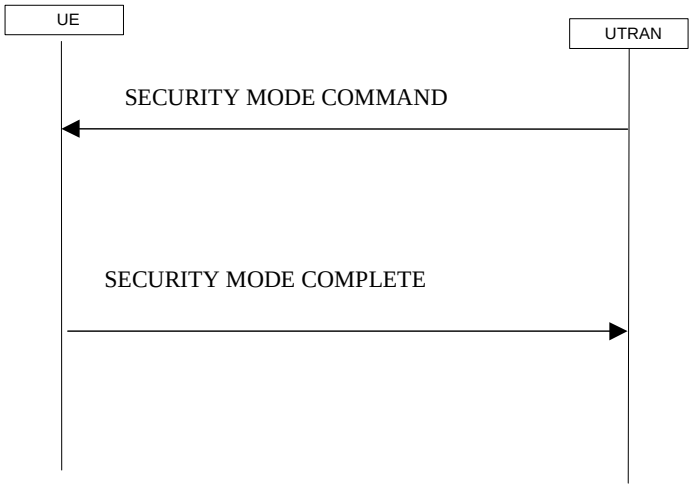

Figure 18: Security mode control procedure

8.1.12.1 General

The purpose of this procedure is to trigger the stop or start of ciphering or to command the restart of the ciphering with a new ciphering configuration, for all radio bearers and for all signalling radio bearers.

It is also used to start integrity protection or to modify the integrity protection configuration for all signalling radio bearers.

8.1.12.2 Initiation

8.1.12.2.1 Ciphering configuration change

To stop or start/restart ciphering, UTRAN sends a SECURITY MODE COMMAND message on the downlink DCCH in AM RLC using the most recent ciphering configuration. If no such ciphering configuration exists then the SECURITY MODE COMMAND is not ciphered.

Prior to sending the SECURITY MODE COMMAND, for the CN domain indicated in the IE "CN domain identity" in the SECURITY MODE COMMAND, UTRAN should:

- if this is the first SECURITY MODE COMMAND sent for this RRC connection:
  - use the value "START" in the most recently received IE "START list" that belongs to the CN domain as indicated in the IE "CN domain identity" to initialise all hyper frame numbers for all the signalling radio bearers; while
    - setting the 20 most significant bits of the hyper frame numbers for all signalling radio bearers to the START for that CN domain;
    - setting the remaining bits of the hyper frame numbers equal to zero;
- suspend all radio bearers using RLC-AM and RLC-UM;
- suspend all signalling radio bearers using RLC-AM and RLC-UM, except the signalling radio bearer used to send the SECURITY MODE COMMAND message on the downlink DCCH in RLC-AM;
- set, for the signalling radio bearer used to send the SECURITY MODE COMMAND, the "RLC send sequence number" in IE "Radio bearer downlink ciphering activation time info" in the IE "Ciphering mode info", at which time the new ciphering configuration shall be applied;

- include "Ciphering activation time for DPCH" in IE "Ciphering mode info" when a DPCH exists and is used for radio bearers using transparent mode RLC, at which time the new ciphering configuration shall be applied;

- set, for each suspended radio bearer and signalling radio bearer that has no pending ciphering activation time set by a previous security mode control procedure, an "RLC send sequence number" in IE "Radio bearer downlink ciphering activation time info" in the IE "Ciphering mode info", at which time the new ciphering configuration shall be applied;

- set, for each suspended radio bearer and signalling radio bearer that has a pending ciphering activation time set by a previous security mode control procedure, the "RLC send sequence number" in IE "Radio bearer downlink ciphering activation time info" in the IE "Ciphering mode info" to the value used in the previous security mode control procedure, at which time the latest ciphering configuration shall be applied.

While suspended, radio bearers and signalling radio bearers shall not deliver RLC PDUs with sequence number greater than or equal to the number in IE "Radio bearer downlink ciphering activation time info".

When the successful delivery of the SECURITY MODE COMMAND has been confirmed by RLC, UTRAN shall:

- resume all the suspended radio bearers and signalling radio bearers. The old ciphering configuration shall be applied for the transmission of RLC PDUs with RLC sequence number less than the number indicated in the IE "Radio bearer downlink ciphering activation time info", as sent to the UE. The new ciphering configuration shall be applied for the transmission of RLC PDUs with RLC sequence number greater than or equal to the number indicated in IE "Radio bearer downlink ciphering activation time info", sent to the UE.

8.1.12.2.2 Integrity protection configuration change

To start or modify integrity protection, UTRAN sends a SECURITY MODE COMMAND message on the downlink DCCH in AM RLC using the new integrity protection configuration.

When the successful delivery of the SECURITY MODE COMMAND has been confirmed by RLC, UTRAN should:

- for the ~~radio bearers and~~ signalling radio bearers:

    - send an indication to upper layers that the new integrity protection configuration has been activated when the activation time has elapsed.

8.1.12.3 Reception of SECURITY MODE COMMAND message by the UE

Upon reception of the SECURITY MODE COMMAND message, the UE shall perform the actions for the received information elements according to subclause 8.6.

If the IE "Ciphering mode info" and the IE "Integrity protection mode info" are both not included in the SECURITY MODE COMMAND, the UE shall:

- set the variable INVALID_CONFIGURATION to TRUE.

If the IE "Security capability" is the same as indicated by variable UE_CAPABILITY_TRANSFERRED, and the IE "GSM security capability" (if included in the SECURITY MODE COMMAND) is the same as indicated by the variable UE_CAPABILITY_TRANSFERRED, the UE shall:

- set the variable LATEST_CONFIGURED_CN_DOMAIN equal to the IE "CN domain identity";

- if prior to the reception of SECURITY MODE COMMAND, the value of the IE "Status" in the variable "CIPHERING_STATUS" is "Not started" and the value of the IE "Historical status" in the variable "INTEGRITY_PROTECTION_INFO" is "Never been active":

    - use the value "START" in the most recently sent IE "START list" that belongs to the CN domain as indicated in the IE "CN domain identity" to initialise all hyper frame numbers for all the signalling radio bearers; while

        - setting the 20 most significant bits of the hyper frame numbers for all signalling radio bearers to the START for that CN domain;

        - setting the remaining bits of the hyper frame numbers equal to zero;

- suspend all radio bearers and signalling radio bearers (except the signalling radio bearer used to transmit the SECURITY MODE COMPLETE message on the uplink DCCH in RLC-AM) using RLC-AM or RLC-UM that belong to the CN domain indicated in the IE "CN domain identity"; and

- set the "RLC send sequence number" in IE "Radio bearer uplink ciphering activation time info", at which time the new ciphering configuration shall be applied;

- set the IE "RRC transaction identifier" in the SECURITY MODE COMPLETE message to the value of "RRC transaction identifier" in the entry for the SECURITY MODE COMMAND message in the table "Accepted transactions" in the variable TRANSACTIONS; and

- clear that entry;

- if the SECURITY MODE COMMAND message contained the IE "Ciphering mode info":

  - include and set the IE "Radio bearer uplink ciphering activation time info" to the value of the variable RB_UPLINK_CIPHERING_ACTIVATION_TIME_INFO, for the respective radio bearer and signalling radio bearer;

- if the SECURITY MODE COMMAND message contained the IE "Integrity protection mode info" with the IE "Integrity protection mode command" set to "Modify":

  - include and set the IE "Integrity protection activation info" to the value of the variable INTEGRITY_PROTECTION_ACTIVATION_INFO;

- for radio bearers using RLC-TM:

  - apply the old ciphering configuration for the receiving and transmission of RLC TrD PDUs with CFN less than the number indicated in the IE "Ciphering activation time for DPCH", as sent by the UTRAN;

  - apply the new ciphering configuration for the receiving and transmission of RLC TrD PDUs with CFN greater than or equal to the number indicated in IE "Ciphering activation time for DPCH", as sent by the UTRAN;

- when the radio bearers and signalling radio bearers using RLC-AM or RLC-UM have been suspended:

  - send a SECURITY MODE COMPLETE message on the uplink DCCH in AM RLC, using the old ciphering configurations;

  - if the IE "Integrity protection mode info" was present in the SECURITY MODE COMMAND message:

    - start applying the new integrity protection configuration in the uplink for signalling radio bearer RB2 from and including the transmitted SECURITY MODE COMPLETE message;

- when the successful delivery of the SECURITY MODE COMPLETE message has been confirmed by RLC:

  - resume data transmission on any suspended radio bearer and signalling radio bearer mapped on RLC-AM or RLC-UM;

  - if the SECURITY MODE COMMAND message contained the IE "Ciphering mode info":

    - set the IE "Reconfiguration" in the variable CIPHERING_STATUS to FALSE; and

    - clear the variable RB_UPLINK_CIPHERING_ACTIVATION_TIME_INFO;

  - if the SECURITY MODE COMMAND message contained the IE "Integrity protection mode info":

    - set the IE "Reconfiguration" in the variable INTEGRITY_PROTECTION_INFO to FALSE; and

    - clear the variable INTEGRITY_PROTECTION_ACTIVATION_INFO;

  - the procedure ends. If a RLC reset or re-establishment occurs after the SECURITY MODE COMPLETE message has been confirmed by RLC, but before the activation time for the new ciphering configuration has been reached, then the activation time shall be ignored and the new ciphering configuration shall be applied immediately after the RLC reset or RLC re-establishment;

  - notify upper layers upon change of the security configuration;~~.~~

- if a new security key set has been received for the CN domain as indicated in the variable LATEST_CONFIGURED_CN_DOMAIN, the UE shall set the START value for this CN domain to 0.

For radio bearers and signalling radio bearers used by the CN indicated in the IE "CN domain identity", the UE shall:

- if a new integrity protection key has been received:
  - in the downlink:
    - use the new key;
    - set the IE "Downlink RRC HFN" for all signalling radio bearers in the variable INTEGRITY_PROTECTION_INFO of the downlink COUNT-I to zero when the RRC sequence number in a received RRC message on the particular signalling radio bearer reaches the value for that signalling radio bearer indicated in IE "Downlink integrity protection activation info" included in the IE "Integrity protection mode info";

    in the uplink:
    - use the new key;
    - set the IE "Uplink RRC HFN" for all signalling radio bearers in the variable INTEGRITY_PROTECTION_INFO of the uplink COUNT-I to zero when the RRC sequence number in a transmitted RRC message on the particular signalling radio bearer reaches the value for that signalling radio bearer indicated in IE "Uplink integrity protection activation info";
- if a new ciphering key is available:
  - for radio bearers using RLC-TM:
    - use the new key in uplink and downlink;
    - set the HFN component of the COUNT-C to zero at the CFN as indicated in the IE "Ciphering activation time for DPCH" in the IE "Ciphering mode info";
  - for radio bearers using RLC-AM and RLC-UM:
    - in the downlink, at and after the RLC sequence number indicated in IE "Radio bearer downlink ciphering activation time info" in the IE "Ciphering mode info":
      - use the new key;
      - set the HFN component of the downlink COUNT-C to zero;
    - in the uplink, at and after the RLC sequence number indicated in IE "Radio bearer uplink ciphering activation time info":
      - use the new key;
      - set the HFN component of the uplink COUNT-C to zero.

If the IE "Security capability" is not the same as indicated by the variable UE_CAPABILITY_TRANSFERRED, or the IE "GSM security capability" (if included in the SECURITY MODE COMMAND) is not the same as indicated by the variable UE_CAPABILITY_TRANSFERRED, or if the IE "GSM security capability" is not included in the SECURITY MODE COMMAND and is included in the variable UE_CAPABILITY_TRANSFERRED, the UE shall:

- release all its radio resources;
- indicate the release of the established signalling connections (as stored in the variable ESTABLISHED_SIGNALLING_CONNECTIONS) and established radio access bearers (as stored in the variable ESTABLISHED_RABS) to upper layers;
- clear the variable ESTABLISHED_SIGNALLING_CONNECTIONS;
- clear the variable ESTABLISHED_RABS;
- enter idle mode;

- perform actions when entering idle mode as specified in subclause 8.5.2;
- and the procedure ends.

8.1.12.4 Void

8.1.12.4a Incompatible simultaneous security reconfiguration

If the variable INCOMPATIBLE_SECURITY_RECONFIGURATION becomes set to TRUE of the received SECURITY MODE COMMAND message, the UE shall:

- transmit a SECURITY MODE FAILURE message on the uplink DCCH using AM RLC, using the ciphering and integrity protection configurations prior to the reception of this SECURITY MODE COMMAND;
- set the IE "RRC transaction identifier" in the SECURITY MODE FAILURE message to the value of "RRC transaction identifier" in the entry for the SECURITY MODE COMMAND message in the table "Accepted transactions" in the variable TRANSACTIONS; and
- clear that entry;
- set the IE "failure cause" to the cause value "incompatible simultaneous reconfiguration";
- when the successful delivery of the SECURITY MODE FAILURE message has been confirmed by RLC:
  - set the variable INCOMPATIBLE_SECURITY_RECONFIGURATION to FALSE;
  - continue with any ongoing processes and procedures as if the invalid SECURITY MODE COMMAND message has not been received;
  - and the procedure ends.

8.1.12.4b Cell update procedure during security reconfiguration

If:

- a cell update procedure according to subclause 8.3.1 is initiated; and
- the received SECURITY MODE COMMAND message causes either,
  - the IE "Reconfiguration" in the variable CIPHERING_STATUS to be set to TRUE; and/or
  - the IE "Reconfiguration" in the variable INTEGRITY_PROTECTION_INFO to be set to TRUE:

the UE shall:

- abort the ongoing integrity and/or ciphering reconfiguration;
- resume data transmission on any suspended radio bearer and signalling radio bearer mapped on RLC-AM or RLC-UM;
- transmit a SECURITY MODE FAILURE message on the uplink DCCH using AM RLC, using the ciphering and integrity protection configurations prior to the reception of this SECURITY MODE COMMAND;
- set the IE "RRC transaction identifier" in the SECURITY MODE FAILURE message to the value of "RRC transaction identifier" in the entry for the SECURITY MODE COMMAND message in the table "Accepted transactions" in the variable TRANSACTIONS; and
- clear that entry;
- set the IE "failure cause" to the cause value "cell update occurred";
- when the successful delivery of the SECURITY MODE FAILURE message has been confirmed by RLC:
  - if the SECURITY MODE COMMAND message contained the IE "Ciphering mode info":

- set the IE "Reconfiguration" in the variable CIPHERING_STATUS to FALSE; and
- clear the variable RB_UPLINK_CIPHERING_ACTIVATION_TIME_INFO;

- if the SECURITY MODE COMMAND message contained the IE "Integrity protection mode info":
  - set the IE "Reconfiguration" in the variable INTEGRITY_PROTECTION_INFO to FALSE; and
  - clear the variable INTEGRITY_PROTECTION_ACTIVATION_INFO;
- continue with any ongoing processes and procedures as if the invalid SECURITY MODE COMMAND message has not been received; and
- the procedure ends.

8.1.12.4c Invalid configuration

If the variable INVALID_CONFIGURATION is set to TRUE due to the received SECURITY MODE COMMAND message, the UE shall:

- transmit a SECURITY MODE FAILURE message on the DCCH using AM RLC after setting the IEs as specified below;
  - set the IE "RRC transaction identifier" in the SECURITY MODE FAILURE message to the value of "RRC transaction identifier" in the entry for the SECURITY MODE COMMAND message in the table "Accepted transactions" in the variable TRANSACTIONS; and
  - clear that entry;
  - set the IE "failure cause" to the cause value "invalid configuration";
- when the successful delivery of the SECURITY MODE FAILURE message has been confirmed by RLC:
  - set the variable INVALID_CONFIGURATION to FALSE;
  - continue with any ongoing processes and procedures as if the invalid SECURITY MODE COMMAND message has not been received;
  - and the procedure ends.

8.1.12.5 Reception of SECURITY MODE COMPLETE message by the UTRAN

UTRAN should apply integrity protection on the received SECURITY MODE COMPLETE message and all subsequent messages with the new integrity protection configuration, if changed. When UTRAN has received a SECURITY MODE COMPLETE message and the integrity protection has successfully been applied, UTRAN shall:

- for radio bearers using RLC-AM or RLC-UM:
  - use the old ciphering configuration for received RLC PDUs with RLC sequence number less than the RLC sequence number indicated in the IE "Radio bearer uplink ciphering activation time info" sent by the UE;
  - use the new ciphering configuration for received RLC PDUs with RLC sequence number greater than or equal to the RLC sequence number indicated in the IE "Radio bearer uplink ciphering activation time info" sent by the UE;
  - if an RLC reset or re-establishment occurs after the SECURITY MODE COMPLETE message has been received by UTRAN before the activation time for the new ciphering configuration has been reached, ignore the activation time and apply the new ciphering configuration immediately after the RLC reset or RLC re-establishment;
- for radio bearers using RLC-TM:
  - use the old ciphering configuration for the received RLC PDUs before the CFN as indicated in the IE "Ciphering activation time for DPCH" in the IE "Ciphering mode info" as included in the SECURITY MODE COMMAND;

- use the new ciphering configuration for the received RLC PDUs at the CFN as indicated in the IE "Ciphering activation time for DPCH" in the IE "Ciphering mode info" as included in the SECURITY MODE COMMAND;

- and the procedure ends.

8.1.12.6 Invalid SECURITY MODE COMMAND message

If the SECURITY MODE COMMAND message contains a protocol error causing the variable PROTOCOL_ERROR_REJECT to be set to TRUE according to clause 9, the UE shall perform procedure specific error handling as follows:

- transmit a SECURITY MODE FAILURE message on the uplink DCCH using AM RLC;

- set the IE "RRC transaction identifier" in the SECURITY MODE FAILURE message to the value of "RRC transaction identifier" in the entry for the SECURITY MODE COMMAND message in the table "Rejected transactions" in the variable TRANSACTIONS; and

- clear that entry;

- set the IE "failure cause" to the cause value "protocol error";

- include the IE "Protocol error information" with contents set to the value of the variable PROTOCOL_ERROR_INFORMATION.

- when the successful delivery of the SECURITY MODE FAILURE message has been confirmed by RLC:

  - continue with any ongoing processes and procedures as if the invalid SECURITY MODE COMMAND message has not been received;

  - and the procedure ends.

8.5.8 Maintenance of Hyper Frame Numbers

The MSBs of both the ciphering sequence numbers (COUNT-C) and integrity sequence numbers (COUNT-I), for the ciphering and integrity protection algorithms, respectively [40], are called the Hyper Frame Numbers (HFN).

For integrity protection, the UE shall:

- maintain COUNT-I as specified in subclause 8.5.10.

The following hyper frame numbers types are defined:

MAC-d HFN:
24 MSB of COUNT-C for data sent over RLC TM

RLC UM HFN:
25 MSB of COUNT-C for data sent over RLC UM

RLC AM HFN:
20 MSB of COUNT-C for data sent over RLC AM

RRC HFN:
28 MSB of COUNT-I

For non-transparent mode RLC signalling radio bearers and radio bearers, the UE shall:

- maintain one uplink and one downlink COUNT-C per signalling radio bearer and per radio bearer and one uplink and one downlink COUNT-I per signalling radio bearer.

For all transparent mode RLC signalling radio bearers and radio bearers of ~~the same~~each CN domain, the UE shall:

- maintain one COUNT-C, common for all signalling radio bearers and radio bearers in uplink and downlink;
- maintain one uplink and one downlink COUNT-I per signalling radio bearer.

NOTE: In this release of the specification there is only an uplink transparent mode COUNT-I, which is used for signalling radio bearer RB0.

COUNT-C and COUNT-I are defined in [40], with the following supplement for COUNT-C: for transparent mode RLC radio bearers with a transmission time interval of x radio frames (x = 2, 4, 8), the MAC PDU is carried by L1 in x consecutive radio frames due to radio frame segmentation. In this case, the CFN of the first segment of the MAC PDU is used as the CFN component of COUNT-C.

8.5.9 START value calculation

In connected mode, the START value for CN domain 'X' is calculated as

Let $START_X$ = the START value for CN domain 'X' prior to the calculation below:

$START_X' = MSB_{20}$ (MAX {COUNT-C, COUNT-I | radio bearers and signalling radio bearers with the most recently configured CK_X and IK_X}) + 1.

- if $START_X'$ = the maximum value = 1048575 then $START_X = START_X'$;
- if the current $START_X < START_X'$ then $START_X = START_X'$, otherwise $START_X$ is unchanged.

8.5.10 Integrity protection

If the "Status" in the variable INTEGRITY_ PROTECTION_INFO has the value "Started" then the UE and UTRAN shall:

- perform integrity protection (and integrity checking) on all RRC messages, with the following exceptions:

  HANDOVER TO UTRAN COMPLETE

  PAGING TYPE 1

  PUSCH CAPACITY REQUEST

  PHYSICAL SHARED CHANNEL ALLOCATION

  RRC CONNECTION REQUEST

  RRC CONNECTION SETUP

  RRC CONNECTION SETUP COMPLETE

  RRC CONNECTION REJECT

  RRC CONNECTION RELEASE (CCCH only)

  SYSTEM INFORMATION

  SYSTEM INFORMATION CHANGE INDICATION

  TRANSPORT FORMAT COMBINATION CONTROL (TM DCCH only)

If the "Status" in the variable INTEGRITY_ PROTECTION_INFO has the value "Not started" then integrity protection (and integrity checking) shall not be performed on any RRC message.

For each signalling radio bearer, the UE shall use two RRC hyper frame numbers:

- "Uplink RRC HFN";
- "Downlink RRC HFN".

and two message sequence numbers:

- "Uplink RRC Message sequence number";
- "Downlink RRC Message sequence number".

The above information is stored in the variable INTEGRITY_PROTECTION_INFO per signalling radio bearer (RB0-RB4).

Upon the first activation of integrity protection for an RRC connection, UE and UTRAN initialise the "Uplink RRC Message sequence number" and "Downlink RRC Message sequence number" for all signalling radio bearers as specified in subclauses 8.6.3.5 and 8.5.10.1.

As a general rule, the RRC message sequence number (RRC SN) is incremented for every integrity protected RRC message. In cases when there are exceptions, these are stated for those procedures.

8.5.10.1 Integrity protection in downlink

If the UE receives an RRC message on signalling radio bearer with RB identity n, the "Status" in the variable INTEGRITY_ PROTECTION_INFO has the value "Started" and the IE "Integrity check info" is present the UE shall:

- perform the actions in subclause 8.6.3.5; and
- apply the new integrity protection configuration;
- check the value of the IE "RRC message sequence number" included in the IE "Integrity check info";

- if the "Downlink RRC Message sequence number" is not present in the variable INTEGRITY_PROTECTION_INFO:
    - initialise the "Downlink RRC Message sequence number" in the variable INTEGRITY_PROTECTION_INFO with the value of the IE "RRC message sequence number" included in the IE "Integrity check info" of the received message;
- if the "Downlink RRC Message sequence number" is present in the variable INTEGRITY_PROTECTION_INFO:
    - if the RRC message sequence number is lower than the "Downlink RRC Message sequence number" for signalling radio bearer RBn in the variable INTEGRITY_PROTECTION_INFO:
        - increment "Downlink RRC HFN" for signalling radio bearer RBn in the variable INTEGRITY_PROTECTION_INFO with one;
    - if the RRC message sequence number is equal to the "Downlink RRC Message sequence number" for signalling radio bearer RBn in the variable INTEGRITY_PROTECTION_INFO:
        - discard the message;
- calculate an expected message authentication code in accordance with subclause 8.5.10.3;
- compare the expected message authentication code with the value of the received IE "message authentication code" contained in the IE "Integrity check info";
    - if the expected message authentication code and the received message authentication code are the same, the integrity check is successful:
        - update the "Downlink RRC Message sequence number" for signalling radio bearer RBn in the variable INTEGRITY_PROTECTION_INFO with the value of the IE "RRC message sequence number" included in the IE "Integrity check info" of the received RRC message;
    - if the calculated expected message authentication code and the received message authentication code differ:
        - if the IE "RRC message sequence number" included in the IE "Integrity check info" is lower than the "Downlink RRC Message sequence number" for signalling radio bearer RBn in the variable INTEGRITY_PROTECTION_INFO (in this case the "Downlink RRC HFN" for signalling radio bearer RBn in the variable INTEGRITY_PROTECTION_INFO was incremented by one, as stated above):
            - decrement "Downlink RRC HFN" for signalling radio bearer RBn in the variable INTEGRITY_PROTECTION_INFO by one;
        - discard the message.

If the UE receives an RRC message on signalling radio bearer with identity n, the "Status" in the variable INTEGRITY_ PROTECTION_INFO has the value "Started" and the IE "Integrity check info" is not present the UE shall:

- discard the message.

8.5.10.2 Integrity protection in uplink

Upon transmitting an RRC message using the signalling radio bearer with radio bearer identity n, and the "Status" in the variable INTEGRITY_ PROTECTION_INFO has the value "Started" the UE shall:

- increment "Uplink RRC Message sequence number" for signalling radio bearer RBn in the variable INTEGRITY_PROTECTION_INFO with 1. When "Uplink RRC Message sequence number" for signalling radio bearer RBn in the variable INTEGRITY_PROTECTION_INFO becomes 0, the UE shall increment "Uplink RRC HFN" for signalling radio bearer RBn in the variable INTEGRITY_PROTECTION_INFO with 1
- calculate the message authentication code in accordance with subclause 8.5.10.3
- replace the "Message authentication code" in the IE "Integrity check info" in the message with the calculated message authentication code.

- replace the "RRC Message sequence number" in the IE "Integrity check info" in the message with contents set to the new value of the "Uplink RRC Message sequence number" for signalling radio bearer RBn in the variable INTEGRITY_PROTECTION_INFO

During an ongoing reconfiguration of the integrity protection, UTRAN should, for all signalling radio bearers, apply the old configuration (that is, the configuration that was applied before the reconfiguration) for the integrity protection. In the response message for the procedure ordering the reconfiguration, the UE indicates the activation time, for each signalling radio bearer except RB2, when the new configuration is to be applied in uplink. UTRAN should then start to apply the new configuration according to the activation time for each signalling radio bearer (for signalling radio bearer RB2 the new configuration is applied starting from reception of the response message).

8.5.10.3 Calculation of message authentication code

The UE shall calculate the message authentication code in accordance with [40]. The input parameter MESSAGE [40] for the integrity algorithm shall be constructed by:

- setting the "Message authentication code" in the IE "Integrity check info" in the message to the radio bearer identity for the signalling radio bearer;
- setting the "RRC Message sequence number" in the IE "Integrity check info" in the message to zero;
- encoding the message;
- appending RRC padding (if any) as a bitstring to the encoded bitstring as the least significant bits.

For usage on an RRC message transmitted or received on the radio bearer with identity n, the UE shall:

- construct the input parameter COUNT-I [40] by appending the following IEs from the IE "Signalling radio bearer specific integrity protection information" for radio bearer n in the variable INTEGRITY_PROTECTION_INFO:
  - for uplink:
    - "Uplink RRC HFN", as the MSB, and "Uplink RRC Message sequence number", as LSB;
  - for downlink:
    - "Downlink RRC HFN", as the MSB, and the IE "RRC message sequence number" included in the IE "Integrity check info""~~Downlink RRC Message sequence number"~~, as LSB.

8.6.3.5 Integrity protection mode info

The IE "Integrity protection mode info" defines the new integrity protection configuration. If the IE "Integrity protection mode info" is present and if the IE "Reconfiguration" in the variable INTEGRITY_PROTECTION_STATUS is set to FALSE, the UE shall check the IE "Integrity protection mode command" as part of the IE "Integrity protection mode info", and perform the following. The UE shall:

- if the IE "Integrity protection mode command" has the value "Modify" and the IE "Status" in the variable INTEGRITY_PROTECTION_INFO has the value "Not Started":
  - ignore this attempt to change the integrity protection configuration; and
  - set the variable INVALID_CONFIGURATION to TRUE;
- else:
  - set the IE "Reconfiguration" in the variable INTEGRITY_PROTECTION_STATUS to TRUE;
  - if IE "Integrity protection mode command" has the value "start" and the IE "Status" in the variable INTEGRITY_PROTECTION_INFO has the value "Not started":
    - if the IE "Historical status" in the variable INTEGRITY_PROTECTION_INFO has the value "Never been active":
      - initialise the information for all signalling radio bearers in the variable INTEGRITY_PROTECTION_INFO according to the following:

        - initialise the 20 MSB of the "Uplink RRC HFN" and "Downlink RRC HFN" of COUNT-I for this signalling radio bearer with the START value included in the most recently transmitted IE "START list" for the CN domain: ~~calculate the START value as specified in subclauses 8.5.9 for the CN domain~~

        - ~~as~~ as indicated in the variable LATEST_CONFIGURED_CN_DOMAIN, if the variable LATEST_CONFIGURED_CN_DOMAIN has been initialised or,~~;~~

        - as indicated in the IE "CN domain identity", if the variable LATEST_CONFIGURED_CN_DOMAIN is not initialised;

        ~~- set the 20 MSB of the "Uplink RRC HFN" and "Downlink RRC HFN" with the START value as calculated above;~~

        - set the remaining LSB of the "Uplink RRC HFN" and "Downlink RRC HFN" to zero;
        - set the IE "Uplink RRC Message sequence number" to zero;
        - do not include the IE "Downlink RRC Message sequence number";
      - set the IE "Historical status" in the variable INTEGRITY_PROTECTION_INFO to the value "Has been active";
    - set the IE "Status" in the variable INTEGRITY_PROTECTION_INFO to the value "Started";
    - perform integrity protection on the received message as described in subclause 8.5.10.1;
    - use the algorithm (UIA [40]) indicated by the IE "Integrity protection algorithm" contained in the IE "Integrity protection mode info";
    - use the IE "Integrity protection initialisation number", contained in the IE "Integrity protection mode info" as the value of FRESH [40];
  - if IE "Integrity protection mode command" has the value "start" and the IE "Status" in the variable INTEGRITY_PROTECTION_INFO has the value "Started":

NOTE: This case is used in SRNS relocation

- perform integrity protection on the received message as described in subclause 8.5.10.1;
- use the algorithm (UIA [40]) indicated by the IE "Integrity protection algorithm" contained in the IE "Integrity protection mode info";
- use the IE "Integrity protection initialisation number", contained in the IE "Integrity protection mode info" as the value of FRESH [40];

- if IE "Integrity protection mode command" has the value "modify" and the IE "Status" in the variable INTEGRITY_PROTECTION_INFO has the value "Started":
  - store the (oldest currently used) integrity protection configuration until activation times have elapsed for the new integrity protection configuration to be applied on all signalling radio bearers;
  - if there are pending activation times set for integrity protection by a previous procedure changing the integrity protection configuration:
    - apply the integrity protection configuration at this pending activation time as indicated in this procedure;
    - only need to store at most two different integrity protection configurations at any given time for all signalling radio bearers, the old and newest integrity protection configurations, per CN domain;
  - start applying the new integrity protection configuration in the downlink at the RRC sequence number, for each signalling radio bearer n, indicated by the entry for signalling radio bearer n in the "RRC message sequence number list" in the IE "Downlink integrity protection activation info", included in the IE "Integrity protection mode info";
  - perform integrity protection on the received message as described in subclause 8.5.10.1;
  - if present, use the algorithm indicated by the IE "Integrity protection algorithm" (UIA [40]);
  - set the content of the variable INTEGRITY_PROTECTION_ACTIVATION_INFO according to the following:
    - for each established signalling radio bearer, stored in the variable ESTABLISHED_RABS:
    - select a value of the RRC sequence number at which (activation) time the new integrity protection configuration shall be applied in uplink for that signalling radio bearer according to the following:
      - for each signalling radio bearer that has no pending activation time as set for integrity protection by a previous procedure changing the integrity protection configuration:
        - set a suitable value that would ensure a minimised delay in the change to the latest integrity protection configuration;
      - for signalling radio bearer that has a pending activation time as set for integrity protection by a previous procedure changing the integrity protection configuration:
        - set the same value as the pending activation time for integrity protection;
      - consider this activation time to be elapsed when the selected activation time (as above) is equal to the next RRC sequence number to be used;
    - for signalling radio bearer RB0:
      - set the value of the included RRC sequence number to greater than or equal to the current value of the RRC sequence number for signalling radio bearer RB0 in the variable INTEGRITY_PROTECTION_INFO, plus the value of the constant N302 plus one;
  - let RBm be the signalling radio bearer on which the message containing the IE "integrity protection mode info" was received;
  - start applying the new integrity protection configuration in the uplink at the RRC sequence number, for each RBn, except for signalling radio bearer RBm, indicated by the entry for signalling radio bearer n in

the "RRC message sequence number list" in the IE "Uplink integrity protection activation info", included in the variable INTEGRITY_PROTECTION_ACTIVATION_INFO;

- start applying the new integrity protection configuration in the uplink at the RRC sequence number for signalling radio bearer RBm, as specified for the procedure initiating the integrity protection reconfiguration;

If the IE "Integrity protection mode info" is present and if the IE "Reconfiguration" in the variable INTEGRITY_PROTECTION_STATUS is set to TRUE, the UE shall:

- ignore this second attempt to change the integrity protection configuration; and
- set the variable INCOMPATIBLE_SECURITY_RECONFIGURATION to TRUE.

If the IE "Integrity protection mode info" is not present, the UE shall not change the integrity protection configuration.

3GPP TSG-RAN WG2 Meeting #23
Helsinki, Finland, 27-31 August 2001

Tdoc R2-012182

CR-Form-v4

CHANGE REQUEST

⌘ **25.331** **CR** **945** ⌘ ev **-** ⌘ Current version: **4.1.0** ⌘

*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:	⌘	Security corrections
Source:	⌘	TSG-RAN WG2
Work item code:	⌘	TEI
Date:	⌘	31 Aug 2001
Category:	⌘	**A**
Release:	⌘	REL-4

Use one of the following categories:
F *(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 one 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: ⌘

Upon reception of a Security Mode Command (section 8.1.12.3), the UE needs to perform the actions specified in 8.6.3.5 (Integrity protection mode info). In 8.6.3.5, the variable LATEST_CONFIGURED_CN_DOMAIN is read but the initialization of this variable has not yet taken place (the initialization happens later in 8.1.12.3).

Security key set deletion described in subclause 8.1.4.3 “Reception of an RRC CONNECTION RELEASE message by the UE” is redundant, since it has been specified in subclause 8.5.2 “Actions when entering idle mode from connected mode”, which will be performed at the end of RRC Connection Release procedure.

When the UE performs downlink message authentication code (MAC) calculation, the IE “RRC message sequence number” included in the IE “Integrity check info” of the received message should be used as the LSB of COUNT-I, rather than using the IE “Downlink RRC message sequence number” in the variable INTEGRITY_PROTECTION_INFO. Because it is the former that is used by the UTRAN for MAC calculation, not the latter.

According to the current specification, when initiating the first SECURITY MODE COMMAND, the UTRAN should use the value "START" in the most recently received IE "START list" that belongs to the CN domain as indicated in the IE "CN domain identity" to initialize all HFNs for all the signaling radio bearers.

However, when the integrity protection mode is started, the UE initialises the HFNs of COUNT-I for the signalling radio bearers with the calculated START value as specified in subclause 8.5.9.

So, the HFNs of COUNT-I between UTRAN and UE are not synchronized.

Summary of change:	⌘	This revision is a merge of R2-011848, R2-011936, R2-011937 and R2-011939. Add a statement in the subclause 8.1.12.3 “Reception of SECURITY MODE COMMAND message by the UE” to set the START value associated with the new key set to 0. The IE “Downlink RRC message sequence number” in the variable INTEGRITY_PROTECTION_INFO for downlink MAC calculation in subclause 8.5.10.3 is replaced by the IE “RRC message sequence number” included in the IE “Integrity check info” of the received message. The HFNs of COUNT-I for the signalling radio bearers in subclause 8.6.3.5 are initialised with the START value included in the most recently transmitted IE “START list” instead of using the calculated START value as specified in subclause 8.5.9. In 8.6.3.5 a clarification has been added that the LATEST_CONFIGURED_CN_DOMAIN is used only if it is initialised, else the IE “CN domain identity” in the message is used. Editorial corrections in subclauses 8.1.3.6, 8.1.4, 8.5.8, 8.5.9 and 8.6.3.5.
Consequences if not approved:	⌘	The UE behaviour is ambiguous in security procedures.

Clauses affected:	⌘	8.1.3.6, 8.1.4.1, 8.1.4.3, 8.1.12.2.2, 8.1.12.3, 8.5.8, 8.5.9, 8.5.10.3, 8.6.3.5		
Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ O&M Specifications	⌘	25.331 v3.7.0, CR 944r1
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://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 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.

8.1.3.6 Reception of an RRC CONNECTION SETUP message by the UE

The UE shall compare the value of the IE "Initial UE identity" in the received RRC CONNECTION SETUP message with the value of the variable INITIAL_UE_IDENTITY.

If the values are different, the UE shall:

- ignore the rest of the message;

If the values are identical, the UE shall:

- stop timer T300, and act upon all received information elements as specified in subclause 8.6, unless specified otherwise in the following;
  - if the UE will be in the CELL_FACH state at the conclusion of this procedure:
    - if the IE "Frequency info" is included:
      - select a suitable UTRA cell according to [4] on that frequency;
    - select PRACH according to subclause 8.5.17;
    - select Secondary CCPCH according to subclause 8.5.19;
- perform the physical layer synchronization procedure as specified in [29];
- enter a state according to subclause 8.6.3.3;
- submit an RRC CONNECTION SETUP COMPLETE message to the lower layers on the uplink DCCH after successful state transition per subclause 8.6.3.3, with the contents set as specified below:
  - set the IE "RRC transaction identifier" to
    - the value of "RRC transaction identifier" in the entry for the RRC CONNECTION SETUP message in the table "Accepted transactions" in the variable TRANSACTIONS; and
    - clear that entry.
  - if the USIM is present:
    - set the "START" for each CN domain in the IE "START list" in the RRC CONNECTION SETUP COMPLETE message with the corresponding START value that is stored in the USIM [50]; and then
    - set the START value stored in the USIM [50] for any CN domain to the value "THRESHOLD" of the variable START_THRESHOLD;
  - if the USIM is not present:
    - set the "START" for each CN domain in the IE "START list" in the RRC CONNECTION SETUP COMPLETE message to zero;
  - retrieve its UTRA UE radio access capability information elements from variable UE_CAPABILITY_REQUESTED; and then
  - include this in IE "UE radio access capability" and IE "UE radio access capability extension", provided this IE is included in variable UE_CAPABILITY_REQUESTED;
  - retrieve its inter-RAT-specific UE radio access capability information elements from variable UE_CAPABILITY_REQUESTED; and then
  - include this in IE "UE system specific capability".

When the RRC CONNECTION SETUP COMPLETE message has been submitted to lower layers for transmission the UE shall:

- if the UE has entered CELL_FACH state:

  - start timer T305 using its initial value if periodical update has been configured by T305 in the IE "UE Timers and constants in connected mode" set to any other value than "infinity" in system information block type 1;

- store the contents of the variable UE_CAPABILITY_REQUESTED in the variable UE_CAPABILITY_TRANSFERRED;
- clear the variable UE_CAPABILITY_REQUESTED;
- if the IE "Transport format combination subset" was not included in the RRC CONNECTION SETUP message:
  - set the IE "Current TFC subset" in the variable TFS_SUBSET to "Full transport format combination set";
- set the "Status" in the variable CIPHERING_STATUS to "Not started";
- set the "Reconfiguration" in the variable CIPHERING_STATUS to FALSE;
- set the "Status" in the variable INTEGRITY_PROTECTION_INFO to "Not started";
- set the "Historical status" in the variable INTEGRITY_PROTECTION_INFO to "Never been active";
- set the "Reconfiguration" in the variable INTEGRITY_PROTECTION_INFO to FALSE;
- set the variable CELL_UPDATE_STARTED to FALSE;
- set the variable CONFIGURATION_INCOMPLETE to FALSE;
- set the variable ORDERED_RECONFIGURATION to FALSE;
- set the variable FAILURE_INDICATOR to FALSE;
- set the variable INCOMPATIBLE_SECURITY_RECONFIGURATION to FALSE;
- set the variable INVALID_CONFIGURATION to FALSE;
- set the variable PROTOCOL_ERROR_INDICATOR to FALSE;
- set the variable PROTOCOL_ERROR_REJECT to FALSE;
- set the variable TGSN_REPORTED to FALSE;
- set the variable UNSUPPORTED_CONFIGURATION to FALSE;
- clear all optional IEs in all variables, except those optional IEs that are set in this procedure;
- consider the procedure to be successful;

And the procedure ends.

8.1.4 RRC connection release

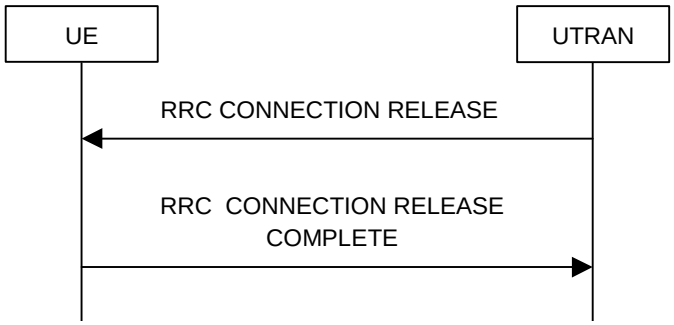

Figure 10: RRC Connection Release procedure on the DCCH

Figure 11: RRC Connection Release procedure on the CCCH

8.1.4.1 General

The purpose of this procedure is to release the RRC connection including ~~and~~ all radio bearers and all signalling radio bearers between the UE and the UTRAN. By doing so, all established signalling connections will be released.

8.1.4.2 Initiation

When the UE is in state CELL_DCH or CELL_FACH, the UTRAN may at anytime initiate an RRC connection release by transmitting an RRC CONNECTION RELEASE message using UM RLC.

When UTRAN transmits an RRC CONNECTION RELEASE message in response to a CELL UPDATE (subclause 8.3.1) or URA UPDATE (subclause 8.3.2) message from the UE, UTRAN should use the downlink CCCH to transmit the message. In all other cases the downlink DCCH should be used.

UTRAN may transmit several RRC CONNECTION RELEASE messages to increase the probability of proper reception of the message by the UE. In such a case, the RRC SN for these repeated messages shall be the same. This shall also apply to the RRC CONNECTION RELEASE COMPLETE message. The number of repeated messages and the interval between the messages is a network option.

8.1.4.3 Reception of an RRC CONNECTION RELEASE message by the UE

The UE shall receive and act on an RRC CONNECTION RELEASE message in states CELL_DCH and CELL_FACH. Furthermore this procedure can interrupt any ongoing procedures with the UE in the above listed states.

When the UE receives the first RRC CONNECTION RELEASE message, it shall:

~~- if the USIM is present; and~~

~~- if the "START" stored in the USIM [50] for a CN domain is greater than the value "THRESHOLD" of the variable START_THRESHOLD:~~

~~- delete the ciphering and integrity keys that are stored in the USIM for that CN domain;~~

~~- inform the deletion of these keys to upper layers;~~

- in state CELL_DCH:

- initialise the counter V308 to zero;
- set the IE "RRC transaction identifier" in the RRC CONNECTION RELEASE COMPLETE message to the value of "RRC transaction identifier" in the entry for the RRC CONNECTION RELEASE message in the table "Accepted transactions" in the variable TRANSACTIONS; and
- clear that entry.
- submit an RRC CONNECTION RELEASE COMPLETE message to the lower layers for transmission using UM RLC on the DCCH to the UTRAN;
- if the IE "Rplmn information" is present:
  - the UE may:
    - store the IE on the ME together with the PLMN id for which it applies;
  - the UE may then:
    - utilise this information, typically indicating where a number of BCCH frequency ranges of a RAT may be expected to be found, during subsequent Rplmn selections of the indicated PLMN;
- start timer T308 when the RRC CONNECTION RELEASE COMPLETE message is sent on the radio interface.

- in state CELL_FACH:
  - if the RRC CONNECTION RELEASE message was received on the DCCH:
    - set the IE "RRC transaction identifier" in the RRC CONNECTION RELEASE COMPLETE message to the value of "RRC transaction identifier" in the entry for the RRC CONNECTION RELEASE message in the table "Accepted transactions" in the variable TRANSACTIONS; and
    - clear that entry;
    - submit an RRC CONNECTION RELEASE COMPLETE message to the lower layers for transmission using AM RLC on the DCCH to the UTRAN.
    - when the successful transmission of the RRC CONNECTION RELEASE COMPLETE message has been confirmed by the lower layers:
      - release all its radio resources; and
      - indicate the release of the established signalling connections (as stored in the variable ESTABLISHED_SIGNALLING_CONNECTIONS) and established radio access bearers (as stored in the variable ESTABLISHED_RABS) to upper layers; and
      - clear the variable ESTABLISHED_SIGNALLING_CONNECTIONS;
      - clear the variable ESTABLISHED_RABS;
      - pass the value of the IE "Release cause" received in the RRC CONNECTION RELEASE message to upper layers;
      - enter idle mode;
      - perform the actions specified in subclause 8.5.2 when entering idle mode;
    - and the procedure ends.
  - if the RRC CONNECTION RELEASE message was received on the CCCH:
    - release all its radio resources;
    - indicate the release of the established signalling connections (as stored in the variable ESTABLISHED_SIGNALLING_CONNECTIONS) and established radio access bearers (as stored in the variable ESTABLISHED_RABS) to the upper layers;

- clear the variable ESTABLISHED_SIGNALLING_CONNECTIONS;
- clear the variable ESTABLISHED_RABS;
- pass the value of the IE "Release cause" received in the RRC CONNECTION RELEASE message to upper layers;
- enter idle mode;
- perform the actions specified in subclause 8.5.2 when entering idle mode;
- and the procedure ends.

8.1.4.4 Invalid RRC CONNECTION RELEASE message

If the RRC CONNECTION RELEASE message contains a protocol error causing the variable PROTOCOL_ERROR_REJECT to be set to TRUE according to clause 9, and if the "protocol error cause" in PROTOCOL_ERROR_INFORMATION is set to any cause value except "ASN.1 violation or encoding error", the UE shall perform procedure specific error handling as follows:

The UE shall:

- ignore any IE(s) causing the error but treat the rest of the RRC CONNECTION RELEASE message as normal according to subclause 8.1.4.3, with an addition of the following actions;
  - if the RRC CONNECTION RELEASE message was received on the DCCH:
    - set the IE "RRC transaction identifier" in the RRC CONNECTION RELEASE COMPLETE message to the value of "RRC transaction identifier" in the entry for the RRC CONNECTION RELEASE message in the table "Rejected transactions" in the variable TRANSACTIONS; and
    - clear that entry.
    - include the IE "Error indication" in the RRC CONNECTION RELEASE COMPLETE message with:
      - the IE "Failure cause" set to the cause value "Protocol error" and
      - the IE "Protocol error information" set to the value of the variable PROTOCOL_ERROR_INFORMATION;

8.1.4.5 Cell re-selection or radio link failure

If the UE performs cell re-selection or the radio link failure criteria in subclause 8.5.6 is met at any time during the RRC connection release procedure and the UE has not yet entered idle mode, the UE shall:

- if cell re-selection occurred (CELL_FACH state):
  - perform a cell update procedure according to subclause 8.3.1 using the cause "Cell reselection";
- if radio link failure occurred (CELL_DCH state):
  - select a suitable UTRA cell according to [4];
  - perform a cell update procedure according to subclause 8.3.1 using the cause "radio link failure".

8.1.4.6 Expiry of timer T308, unacknowledged mode transmission

When in state CELL_DCH and the timer T308 expires, the UE shall:

- increment V308 by one;
- if V308 is equal to or smaller than N308:

- retransmit the RRC CONNECTION RELEASE COMPLETE message, without incrementing "Uplink RRC Message sequence number" for signalling radio bearer RB1 in the variable INTEGRITY_PROTECTION_INFO;

- if V308 is greater than N308:

  - release all its radio resources;

  - indicate the release of the established signalling connections (as stored in the variable ESTABLISHED_SIGNALLING_CONNECTIONS) and established radio access bearers (as stored in the variable ESTABLISHED_RABS) to upper layers;

  - clear the variable ESTABLISHED_SIGNALLING_CONNECTIONS;

  - clear the variable ESTABLISHED_RABS;

  - enter idle mode;

  - perform the actions specified in subclause 8.5.2 when entering idle mode;

  - and the procedure ends.

8.1.4.7 Void

8.1.4.8 Reception of an RRC CONNECTION RELEASE COMPLETE message by UTRAN

When UTRAN receives an RRC CONNECTION RELEASE COMPLETE message from the UE, it should:

- release all UE dedicated resources and the procedure ends on the UTRAN side.

8.1.4.9 Unsuccessful transmission of the RRC CONNECTION RELEASE COMPLETE message, acknowledged mode transmission

When acknowledged mode was used and RLC does not succeed in transmitting the RRC CONNECTION RELEASE COMPLETE message, the UE shall:

- release all its radio resources;

- indicate the release of the established signalling connections (as stored in the variable ESTABLISHED_SIGNALLING_CONNECTIONS) and established radio access bearers (as stored in the variable ESTABLISHED_RABS) to upper layers;

- clear the variable ESTABLISHED_SIGNALLING_CONNECTIONS;

- clear the variable ESTABLISHED_RABS;

- enter idle mode;

- perform the actions specified in subclause 8.5.2 when entering idle mode;

- and the procedure ends.

8.1.4.10 Detection of loss of dedicated physical channel by UTRAN in CELL_DCH state

If the release is performed from the state CELL_DCH, and UTRAN detects loss of the dedicated physical channel according to subclause 8.5.6, UTRAN may release all UE dedicated resources, even if no RRC CONNECTION RELEASE COMPLETE message has been received.

8.1.4.11 Failure to receive RRC CONNECTION RELEASE COMPLETE message by UTRAN

If UTRAN does not receive any RRC CONNECTION RELEASE COMPLETE message, it should release all UE dedicated resources.

8.1.12 Security mode control

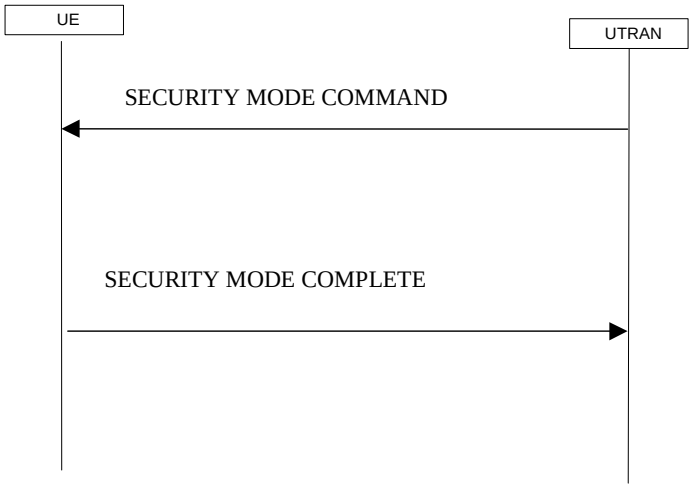

Figure 18: Security mode control procedure

8.1.12.1 General

The purpose of this procedure is to trigger the stop or start of ciphering or to command the restart of the ciphering with a new ciphering configuration, for all radio bearers and for all signalling radio bearers.

It is also used to start integrity protection or to modify the integrity protection configuration for all signalling radio bearers.

8.1.12.2 Initiation

8.1.12.2.1 Ciphering configuration change

To stop or start/restart ciphering, UTRAN sends a SECURITY MODE COMMAND message on the downlink DCCH in AM RLC using the most recent ciphering configuration. If no such ciphering configuration exists then the SECURITY MODE COMMAND is not ciphered.

Prior to sending the SECURITY MODE COMMAND, for the CN domain indicated in the IE "CN domain identity" in the SECURITY MODE COMMAND, UTRAN should:

- if this is the first SECURITY MODE COMMAND sent for this RRC connection:
  - use the value "START" in the most recently received IE "START list" that belongs to the CN domain as indicated in the IE "CN domain identity" to initialise all hyper frame numbers for all the signalling radio bearers; while
    - setting the 20 most significant bits of the hyper frame numbers for all signalling radio bearers to the START for that CN domain;
    - setting the remaining bits of the hyper frame numbers equal to zero;
- suspend all radio bearers using RLC-AM and RLC-UM;
- suspend all signalling radio bearers using RLC-AM and RLC-UM, except the signalling radio bearer used to send the SECURITY MODE COMMAND message on the downlink DCCH in RLC-AM;
- set, for the signalling radio bearer used to send the SECURITY MODE COMMAND, the "RLC send sequence number" in IE "Radio bearer downlink ciphering activation time info" in the IE "Ciphering mode info", at which time the new ciphering configuration shall be applied;

- include "Ciphering activation time for DPCH" in IE "Ciphering mode info" when a DPCH exists and is used for radio bearers using transparent mode RLC, at which time the new ciphering configuration shall be applied;

- set, for each suspended radio bearer and signalling radio bearer that has no pending ciphering activation time set by a previous security mode control procedure, an "RLC send sequence number" in IE "Radio bearer downlink ciphering activation time info" in the IE "Ciphering mode info", at which time the new ciphering configuration shall be applied;

- set, for each suspended radio bearer and signalling radio bearer that has a pending ciphering activation time set by a previous security mode control procedure, the "RLC send sequence number" in IE "Radio bearer downlink ciphering activation time info" in the IE "Ciphering mode info" to the value used in the previous security mode control procedure, at which time the latest ciphering configuration shall be applied.

While suspended, radio bearers and signalling radio bearers shall not deliver RLC PDUs with sequence number greater than or equal to the number in IE "Radio bearer downlink ciphering activation time info".

When the successful delivery of the SECURITY MODE COMMAND has been confirmed by RLC, UTRAN shall:

- resume all the suspended radio bearers and signalling radio bearers. The old ciphering configuration shall be applied for the transmission of RLC PDUs with RLC sequence number less than the number indicated in the IE "Radio bearer downlink ciphering activation time info", as sent to the UE. The new ciphering configuration shall be applied for the transmission of RLC PDUs with RLC sequence number greater than or equal to the number indicated in IE "Radio bearer downlink ciphering activation time info", sent to the UE.

8.1.12.2.2 Integrity protection configuration change

To start or modify integrity protection, UTRAN sends a SECURITY MODE COMMAND message on the downlink DCCH in AM RLC using the new integrity protection configuration.

When the successful delivery of the SECURITY MODE COMMAND has been confirmed by RLC, UTRAN should:

- for the ~~radio bearers and~~ signalling radio bearers:

    - send an indication to upper layers that the new integrity protection configuration has been activated when the activation time has elapsed.

8.1.12.3 Reception of SECURITY MODE COMMAND message by the UE

Upon reception of the SECURITY MODE COMMAND message, the UE shall perform the actions for the received information elements according to subclause 8.6.

If the IE "Ciphering mode info" and the IE "Integrity protection mode info" are both not included in the SECURITY MODE COMMAND, the UE shall:

- set the variable INVALID_CONFIGURATION to TRUE.

If the IE "Security capability" is the same as indicated by variable UE_CAPABILITY_TRANSFERRED, and the IE "GSM security capability" (if included in the SECURITY MODE COMMAND) is the same as indicated by the variable UE_CAPABILITY_TRANSFERRED, the UE shall:

- set the variable LATEST_CONFIGURED_CN_DOMAIN equal to the IE "CN domain identity";

- if prior to the reception of SECURITY MODE COMMAND, the value of the IE "Status" in the variable "CIPHERING_STATUS" is "Not started" and the value of the IE "Historical status" in the variable "INTEGRITY_PROTECTION_INFO" is "Never been active":

    - use the value "START" in the most recently sent IE "START list" that belongs to the CN domain as indicated in the IE "CN domain identity" to initialise all hyper frame numbers for all the signalling radio bearers; while

        - setting the 20 most significant bits of the hyper frame numbers for all signalling radio bearers to the START for that CN domain;

        - setting the remaining bits of the hyper frame numbers equal to zero;

- suspend all radio bearers and signalling radio bearers (except the signalling radio bearer used to transmit the SECURITY MODE COMPLETE message on the uplink DCCH in RLC-AM) using RLC-AM or RLC-UM that belong to the CN domain indicated in the IE "CN domain identity"; and

- set the "RLC send sequence number" in IE "Radio bearer uplink ciphering activation time info", at which time the new ciphering configuration shall be applied;

- set the IE "RRC transaction identifier" in the SECURITY MODE COMPLETE message to the value of "RRC transaction identifier" in the entry for the SECURITY MODE COMMAND message in the table "Accepted transactions" in the variable TRANSACTIONS; and

- clear that entry;

- if the SECURITY MODE COMMAND message contained the IE "Ciphering mode info":

  - include and set the IE "Radio bearer uplink ciphering activation time info" to the value of the variable RB_UPLINK_CIPHERING_ACTIVATION_TIME_INFO, for the respective radio bearer and signalling radio bearer;

- if the SECURITY MODE COMMAND message contained the IE "Integrity protection mode info" with the IE "Integrity protection mode command" set to "Modify":

  - include and set the IE "Integrity protection activation info" to the value of the variable INTEGRITY_PROTECTION_ACTIVATION_INFO;

- for radio bearers using RLC-TM:

  - apply the old ciphering configuration for the receiving and transmission of RLC TrD PDUs with CFN less than the number indicated in the IE "Ciphering activation time for DPCH", as sent by the UTRAN;

  - apply the new ciphering configuration for the receiving and transmission of RLC TrD PDUs with CFN greater than or equal to the number indicated in IE "Ciphering activation time for DPCH", as sent by the UTRAN;

- when the radio bearers and signalling radio bearers using RLC-AM or RLC-UM have been suspended:

  - send a SECURITY MODE COMPLETE message on the uplink DCCH in AM RLC, using the old ciphering configurations;

  - if the IE "Integrity protection mode info" was present in the SECURITY MODE COMMAND message:

    - start applying the new integrity protection configuration in the uplink for signalling radio bearer RB2 from and including the transmitted SECURITY MODE COMPLETE message;

- when the successful delivery of the SECURITY MODE COMPLETE message has been confirmed by RLC:

  - resume data transmission on any suspended radio bearer and signalling radio bearer mapped on RLC-AM or RLC-UM;

  - if the SECURITY MODE COMMAND message contained the IE "Ciphering mode info":

    - set the IE "Reconfiguration" in the variable CIPHERING_STATUS to FALSE; and

    - clear the variable RB_UPLINK_CIPHERING_ACTIVATION_TIME_INFO;

  - if the SECURITY MODE COMMAND message contained the IE "Integrity protection mode info":

    - set the IE "Reconfiguration" in the variable INTEGRITY_PROTECTION_INFO to FALSE; and

    - clear the variable INTEGRITY_PROTECTION_ACTIVATION_INFO;

  - the procedure ends. If a RLC reset or re-establishment occurs after the SECURITY MODE COMPLETE message has been confirmed by RLC, but before the activation time for the new ciphering configuration has been reached, then the activation time shall be ignored and the new ciphering configuration shall be applied immediately after the RLC reset or RLC re-establishment;

  - notify upper layers upon change of the security configuration;~~.~~

- if a new security key set has been received for the CN domain as indicated in the variable LATEST_CONFIGURED_CN_DOMAIN, the UE shall set the START value for this CN domain to 0.

For radio bearers and signalling radio bearers used by the CN indicated in the IE "CN domain identity", the UE shall:

- if a new integrity protection key has been received:
  - in the downlink:
    - use the new key;
    - set the IE "Downlink RRC HFN" for all signalling radio bearers in the variable INTEGRITY_PROTECTION_INFO of the downlink COUNT-I to zero when the RRC sequence number in a received RRC message on the particular signalling radio bearer reaches the value for that signalling radio bearer indicated in IE "Downlink integrity protection activation info" included in the IE "Integrity protection mode info";

    in the uplink:
    - use the new key;
    - set the IE "Uplink RRC HFN" for all signalling radio bearers in the variable INTEGRITY_PROTECTION_INFO of the uplink COUNT-I to zero when the RRC sequence number in a transmitted RRC message on the particular signalling radio bearer reaches the value for that signalling radio bearer indicated in IE "Uplink integrity protection activation info";
- if a new ciphering key is available:
  - for radio bearers using RLC-TM:
    - use the new key in uplink and downlink;
    - set the HFN component of the COUNT-C to zero at the CFN as indicated in the IE "Ciphering activation time for DPCH" in the IE "Ciphering mode info";
  - for radio bearers using RLC-AM and RLC-UM:
    - in the downlink, at and after the RLC sequence number indicated in IE "Radio bearer downlink ciphering activation time info" in the IE "Ciphering mode info":
      - use the new key;
      - set the HFN component of the downlink COUNT-C to zero;
    - in the uplink, at and after the RLC sequence number indicated in IE "Radio bearer uplink ciphering activation time info":
      - use the new key;
      - set the HFN component of the uplink COUNT-C to zero.

If the IE "Security capability" is not the same as indicated by the variable UE_CAPABILITY_TRANSFERRED, or the IE "GSM security capability" (if included in the SECURITY MODE COMMAND) is not the same as indicated by the variable UE_CAPABILITY_TRANSFERRED, or if the IE "GSM security capability" is not included in the SECURITY MODE COMMAND and is included in the variable UE_CAPABILITY_TRANSFERRED, the UE shall:

- release all its radio resources;
- indicate the release of the established signalling connections (as stored in the variable ESTABLISHED_SIGNALLING_CONNECTIONS) and established radio access bearers (as stored in the variable ESTABLISHED_RABS) to upper layers;
- clear the variable ESTABLISHED_SIGNALLING_CONNECTIONS;
- clear the variable ESTABLISHED_RABS;
- enter idle mode;

- perform actions when entering idle mode as specified in subclause 8.5.2;
- and the procedure ends.

8.1.12.4 Void

8.1.12.4a Incompatible simultaneous security reconfiguration

If the variable INCOMPATIBLE_SECURITY_RECONFIGURATION becomes set to TRUE of the received SECURITY MODE COMMAND message, the UE shall:

- transmit a SECURITY MODE FAILURE message on the uplink DCCH using AM RLC, using the ciphering and integrity protection configurations prior to the reception of this SECURITY MODE COMMAND;
- set the IE "RRC transaction identifier" in the SECURITY MODE FAILURE message to the value of "RRC transaction identifier" in the entry for the SECURITY MODE COMMAND message in the table "Accepted transactions" in the variable TRANSACTIONS; and
- clear that entry;
- set the IE "failure cause" to the cause value "incompatible simultaneous reconfiguration";
- when the successful delivery of the SECURITY MODE FAILURE message has been confirmed by RLC:
  - set the variable INCOMPATIBLE_SECURITY_RECONFIGURATION to FALSE;
  - continue with any ongoing processes and procedures as if the invalid SECURITY MODE COMMAND message has not been received;
  - and the procedure ends.

8.1.12.4b Cell update procedure during security reconfiguration

If:

- a cell update procedure according to subclause 8.3.1 is initiated; and
- the received SECURITY MODE COMMAND message causes either,
  - the IE "Reconfiguration" in the variable CIPHERING_STATUS to be set to TRUE; and/or
  - the IE "Reconfiguration" in the variable INTEGRITY_PROTECTION_INFO to be set to TRUE:

the UE shall:

- abort the ongoing integrity and/or ciphering reconfiguration;
- resume data transmission on any suspended radio bearer and signalling radio bearer mapped on RLC-AM or RLC-UM;
- transmit a SECURITY MODE FAILURE message on the uplink DCCH using AM RLC, using the ciphering and integrity protection configurations prior to the reception of this SECURITY MODE COMMAND;
- set the IE "RRC transaction identifier" in the SECURITY MODE FAILURE message to the value of "RRC transaction identifier" in the entry for the SECURITY MODE COMMAND message in the table "Accepted transactions" in the variable TRANSACTIONS; and
- clear that entry;
- set the IE "failure cause" to the cause value "cell update occurred";
- when the successful delivery of the SECURITY MODE FAILURE message has been confirmed by RLC:
  - if the SECURITY MODE COMMAND message contained the IE "Ciphering mode info":

- set the IE "Reconfiguration" in the variable CIPHERING_STATUS to FALSE; and
- clear the variable RB_UPLINK_CIPHERING_ACTIVATION_TIME_INFO;

- if the SECURITY MODE COMMAND message contained the IE "Integrity protection mode info":
  - set the IE "Reconfiguration" in the variable INTEGRITY_PROTECTION_INFO to FALSE; and
  - clear the variable INTEGRITY_PROTECTION_ACTIVATION_INFO;
- continue with any ongoing processes and procedures as if the invalid SECURITY MODE COMMAND message has not been received; and
- the procedure ends.

8.1.12.4c Invalid configuration

If the variable INVALID_CONFIGURATION is set to TRUE due to the received SECURITY MODE COMMAND message, the UE shall:

- transmit a SECURITY MODE FAILURE message on the DCCH using AM RLC after setting the IEs as specified below;
  - set the IE "RRC transaction identifier" in the SECURITY MODE FAILURE message to the value of "RRC transaction identifier" in the entry for the SECURITY MODE COMMAND message in the table "Accepted transactions" in the variable TRANSACTIONS; and
  - clear that entry;
  - set the IE "failure cause" to the cause value "invalid configuration";
- when the successful delivery of the SECURITY MODE FAILURE message has been confirmed by RLC:
  - set the variable INVALID_CONFIGURATION to FALSE;
  - continue with any ongoing processes and procedures as if the invalid SECURITY MODE COMMAND message has not been received;
  - and the procedure ends.

8.1.12.5 Reception of SECURITY MODE COMPLETE message by the UTRAN

UTRAN should apply integrity protection on the received SECURITY MODE COMPLETE message and all subsequent messages with the new integrity protection configuration, if changed. When UTRAN has received a SECURITY MODE COMPLETE message and the integrity protection has successfully been applied, UTRAN shall:

- for radio bearers using RLC-AM or RLC-UM:
  - use the old ciphering configuration for received RLC PDUs with RLC sequence number less than the RLC sequence number indicated in the IE "Radio bearer uplink ciphering activation time info" sent by the UE;
  - use the new ciphering configuration for received RLC PDUs with RLC sequence number greater than or equal to the RLC sequence number indicated in the IE "Radio bearer uplink ciphering activation time info" sent by the UE;
  - if an RLC reset or re-establishment occurs after the SECURITY MODE COMPLETE message has been received by UTRAN before the activation time for the new ciphering configuration has been reached, ignore the activation time and apply the new ciphering configuration immediately after the RLC reset or RLC re-establishment;
- for radio bearers using RLC-TM:
  - use the old ciphering configuration for the received RLC PDUs before the CFN as indicated in the IE "Ciphering activation time for DPCH" in the IE "Ciphering mode info" as included in the SECURITY MODE COMMAND;

- use the new ciphering configuration for the received RLC PDUs at the CFN as indicated in the IE "Ciphering activation time for DPCH" in the IE "Ciphering mode info" as included in the SECURITY MODE COMMAND;

- and the procedure ends.

8.1.12.6 Invalid SECURITY MODE COMMAND message

If the SECURITY MODE COMMAND message contains a protocol error causing the variable PROTOCOL_ERROR_REJECT to be set to TRUE according to clause 9, the UE shall perform procedure specific error handling as follows:

- transmit a SECURITY MODE FAILURE message on the uplink DCCH using AM RLC;

- set the IE "RRC transaction identifier" in the SECURITY MODE FAILURE message to the value of "RRC transaction identifier" in the entry for the SECURITY MODE COMMAND message in the table "Rejected transactions" in the variable TRANSACTIONS; and

- clear that entry;

- set the IE "failure cause" to the cause value "protocol error";

- include the IE "Protocol error information" with contents set to the value of the variable PROTOCOL_ERROR_INFORMATION.

- when the successful delivery of the SECURITY MODE FAILURE message has been confirmed by RLC:

  - continue with any ongoing processes and procedures as if the invalid SECURITY MODE COMMAND message has not been received;

  - and the procedure ends.

8.5.8 Maintenance of Hyper Frame Numbers

The MSBs of both the ciphering sequence numbers (COUNT-C) and integrity sequence numbers (COUNT-I), for the ciphering and integrity protection algorithms, respectively [40], are called the Hyper Frame Numbers (HFN).

For integrity protection, the UE shall:

- maintain COUNT-I as specified in subclause 8.5.10.

The following hyper frame numbers types are defined:

MAC-d HFN:
24 MSB of COUNT-C for data sent over RLC TM

RLC UM HFN:
25 MSB of COUNT-C for data sent over RLC UM

RLC AM HFN:
20 MSB of COUNT-C for data sent over RLC AM

RRC HFN:
28 MSB of COUNT-I

For non-transparent mode RLC signalling radio bearers and radio bearers, the UE shall:

- maintain one uplink and one downlink COUNT-C per signalling radio bearer and per radio bearer and one uplink and one downlink COUNT-I per signalling radio bearer.

For all transparent mode RLC signalling radio bearers and radio bearers of ~~the same~~each CN domain, the UE shall:

- maintain one COUNT-C, common for all signalling radio bearers and radio bearers in uplink and downlink;
- maintain one uplink and one downlink COUNT-I per signalling radio bearer.

NOTE: In this release of the specification there is only an uplink transparent mode COUNT-I, which is used for signalling radio bearer RB0.

COUNT-C and COUNT-I are defined in [40], with the following supplement for COUNT-C: for transparent mode RLC radio bearers with a transmission time interval of x radio frames (x = 2, 4, 8), the MAC PDU is carried by L1 in x consecutive radio frames due to radio frame segmentation. In this case, the CFN of the first segment of the MAC PDU is used as the CFN component of COUNT-C.

8.5.9 START value calculation

In connected mode, the START value for CN domain 'X' is calculated as

Let $START_X$ = the START value for CN domain 'X' prior to the calculation below:

$START_X' = MSB_{20}$ (MAX {COUNT-C, COUNT-I | radio bearers and signalling radio bearers with the most recently configured CK_X and IK_X}) + 1.

- if $START_X'$ = the maximum value = 1048575 then $START_X = START_X'$;
- if the current $START_X < START_X'$ then $START_X = START_X'$, otherwise $START_X$ is unchanged.

8.5.10 Integrity protection

If the "Status" in the variable INTEGRITY_ PROTECTION_INFO has the value "Started" then the UE and UTRAN shall:

- perform integrity protection (and integrity checking) on all RRC messages, with the following exceptions:

  HANDOVER TO UTRAN COMPLETE

  PAGING TYPE 1

  PUSCH CAPACITY REQUEST

  PHYSICAL SHARED CHANNEL ALLOCATION

  RRC CONNECTION REQUEST

  RRC CONNECTION SETUP

  RRC CONNECTION SETUP COMPLETE

  RRC CONNECTION REJECT

  RRC CONNECTION RELEASE (CCCH only)

  SYSTEM INFORMATION

  SYSTEM INFORMATION CHANGE INDICATION

  TRANSPORT FORMAT COMBINATION CONTROL (TM DCCH only)

If the "Status" in the variable INTEGRITY_ PROTECTION_INFO has the value "Not started" then integrity protection (and integrity checking) shall not be performed on any RRC message.

For each signalling radio bearer, the UE shall use two RRC hyper frame numbers:

- "Uplink RRC HFN";
- "Downlink RRC HFN".

and two message sequence numbers:

- "Uplink RRC Message sequence number";
- "Downlink RRC Message sequence number".

The above information is stored in the variable INTEGRITY_PROTECTION_INFO per signalling radio bearer (RB0-RB4).

Upon the first activation of integrity protection for an RRC connection, UE and UTRAN initialise the "Uplink RRC Message sequence number" and "Downlink RRC Message sequence number" for all signalling radio bearers as specified in subclauses 8.6.3.5 and 8.5.10.1.

As a general rule, the RRC message sequence number (RRC SN) is incremented for every integrity protected RRC message. In cases when there are exceptions, these are stated for those procedures.

8.5.10.1 Integrity protection in downlink

If the UE receives an RRC message on signalling radio bearer with RB identity n, the "Status" in the variable INTEGRITY_ PROTECTION_INFO has the value "Started" and the IE "Integrity check info" is present the UE shall:

- perform the actions in subclause 8.6.3.5; and
- apply the new integrity protection configuration;
- check the value of the IE "RRC message sequence number" included in the IE "Integrity check info";

- if the "Downlink RRC Message sequence number" is not present in the variable INTEGRITY_PROTECTION_INFO:
    - initialise the "Downlink RRC Message sequence number" in the variable INTEGRITY_PROTECTION_INFO with the value of the IE "RRC message sequence number" included in the IE "Integrity check info" of the received message;
- if the "Downlink RRC Message sequence number" is present in the variable INTEGRITY_PROTECTION_INFO:
    - if the RRC message sequence number is lower than the "Downlink RRC Message sequence number" for signalling radio bearer RBn in the variable INTEGRITY_PROTECTION_INFO:
        - increment "Downlink RRC HFN" for signalling radio bearer RBn in the variable INTEGRITY_PROTECTION_INFO with one;
    - if the RRC message sequence number is equal to the "Downlink RRC Message sequence number" for signalling radio bearer RBn in the variable INTEGRITY_PROTECTION_INFO:
        - discard the message;
- calculate an expected message authentication code in accordance with subclause 8.5.10.3;
- compare the expected message authentication code with the value of the received IE "message authentication code" contained in the IE "Integrity check info";
    - if the expected message authentication code and the received message authentication code are the same, the integrity check is successful:
        - update the "Downlink RRC Message sequence number" for signalling radio bearer RBn in the variable INTEGRITY_PROTECTION_INFO with the value of the IE "RRC message sequence number" included in the IE "Integrity check info" of the received RRC message;
    - if the calculated expected message authentication code and the received message authentication code differ:
        - if the IE "RRC message sequence number" included in the IE "Integrity check info" is lower than the "Downlink RRC Message sequence number" for signalling radio bearer RBn in the variable INTEGRITY_PROTECTION_INFO (in this case the "Downlink RRC HFN" for signalling radio bearer RBn in the variable INTEGRITY_PROTECTION_INFO was incremented by one, as stated above):
            - decrement "Downlink RRC HFN" for signalling radio bearer RBn in the variable INTEGRITY_PROTECTION_INFO by one;
        - discard the message.

If the UE receives an RRC message on signalling radio bearer with identity n, the "Status" in the variable INTEGRITY_ PROTECTION_INFO has the value "Started" and the IE "Integrity check info" is not present the UE shall:

- discard the message.

8.5.10.2 Integrity protection in uplink

Upon transmitting an RRC message using the signalling radio bearer with radio bearer identity n, and the "Status" in the variable INTEGRITY_ PROTECTION_INFO has the value "Started" the UE shall:

- increment "Uplink RRC Message sequence number" for signalling radio bearer RBn in the variable INTEGRITY_PROTECTION_INFO with 1. When "Uplink RRC Message sequence number" for signalling radio bearer RBn in the variable INTEGRITY_PROTECTION_INFO becomes 0, the UE shall increment "Uplink RRC HFN" for signalling radio bearer RBn in the variable INTEGRITY_PROTECTION_INFO with 1
- calculate the message authentication code in accordance with subclause 8.5.10.3
- replace the "Message authentication code" in the IE "Integrity check info" in the message with the calculated message authentication code.

- replace the "RRC Message sequence number" in the IE "Integrity check info" in the message with contents set to the new value of the "Uplink RRC Message sequence number" for signalling radio bearer RBn in the variable INTEGRITY_PROTECTION_INFO

During an ongoing reconfiguration of the integrity protection, UTRAN should, for all signalling radio bearers, apply the old configuration (that is, the configuration that was applied before the reconfiguration) for the integrity protection. In the response message for the procedure ordering the reconfiguration, the UE indicates the activation time, for each signalling radio bearer except RB2, when the new configuration is to be applied in uplink. UTRAN should then start to apply the new configuration according to the activation time for each signalling radio bearer (for signalling radio bearer RB2 the new configuration is applied starting from reception of the response message).

8.5.10.3 Calculation of message authentication code

The UE shall calculate the message authentication code in accordance with [40]. The input parameter MESSAGE [40] for the integrity algorithm shall be constructed by:

- setting the "Message authentication code" in the IE "Integrity check info" in the message to the radio bearer identity for the signalling radio bearer;
- setting the "RRC Message sequence number" in the IE "Integrity check info" in the message to zero;
- encoding the message;
- appending RRC padding (if any) as a bitstring to the encoded bitstring as the least significant bits.

For usage on an RRC message transmitted or received on the radio bearer with identity n, the UE shall:

- construct the input parameter COUNT-I [40] by appending the following IEs from the IE "Signalling radio bearer specific integrity protection information" for radio bearer n in the variable INTEGRITY_PROTECTION_INFO:
  - for uplink:
    - "Uplink RRC HFN", as the MSB, and "Uplink RRC Message sequence number", as LSB;
  - for downlink:
    - "Downlink RRC HFN", as the MSB, and the IE "RRC message sequence number" included in the IE "Integrity check info""~~Downlink RRC Message sequence number"~~, as LSB.

8.6.3.5 Integrity protection mode info

The IE "Integrity protection mode info" defines the new integrity protection configuration. If the IE "Integrity protection mode info" is present and if the IE "Reconfiguration" in the variable INTEGRITY_PROTECTION_STATUS is set to FALSE, the UE shall check the IE "Integrity protection mode command" as part of the IE "Integrity protection mode info", and perform the following. The UE shall:

- if the IE "Integrity protection mode command" has the value "Modify" and the IE "Status" in the variable INTEGRITY_PROTECTION_INFO has the value "Not Started":
  - ignore this attempt to change the integrity protection configuration; and
  - set the variable INVALID_CONFIGURATION to TRUE;
- else:
  - set the IE "Reconfiguration" in the variable INTEGRITY_PROTECTION_STATUS to TRUE;
  - if IE "Integrity protection mode command" has the value "start" and the IE "Status" in the variable INTEGRITY_PROTECTION_INFO has the value "Not started":
    - if the IE "Historical status" in the variable INTEGRITY_PROTECTION_INFO has the value "Never been active":
      - initialise the information for all signalling radio bearers in the variable INTEGRITY_PROTECTION_INFO according to the following:

        - initialise the 20 MSB of the "Uplink RRC HFN" and "Downlink RRC HFN" of COUNT-I for this signalling radio bearer with the START value included in the most recently transmitted IE "START list" for the CN domain: ~~calculate the START value as specified in subclauses 8.5.9 for the CN domain~~

        - ~~as~~ as indicated in the variable LATEST_CONFIGURED_CN_DOMAIN, if the variable LATEST_CONFIGURED_CN_DOMAIN has been initialised or,~~;~~

        - as indicated in the IE "CN domain identity", if the variable LATEST_CONFIGURED_CN_DOMAIN is not initialised;

        ~~- set the 20 MSB of the "Uplink RRC HFN" and "Downlink RRC HFN" with the START value as calculated above;~~

        - set the remaining LSB of the "Uplink RRC HFN" and "Downlink RRC HFN" to zero;
        - set the IE "Uplink RRC Message sequence number" to zero;
        - do not include the IE "Downlink RRC Message sequence number";
      - set the IE "Historical status" in the variable INTEGRITY_PROTECTION_INFO to the value "Has been active";
    - set the IE "Status" in the variable INTEGRITY_PROTECTION_INFO to the value "Started";
    - perform integrity protection on the received message as described in subclause 8.5.10.1;
    - use the algorithm (UIA [40]) indicated by the IE "Integrity protection algorithm" contained in the IE "Integrity protection mode info";
    - use the IE "Integrity protection initialisation number", contained in the IE "Integrity protection mode info" as the value of FRESH [40];
  - if IE "Integrity protection mode command" has the value "start" and the IE "Status" in the variable INTEGRITY_PROTECTION_INFO has the value "Started":

NOTE: This case is used in SRNS relocation

- perform integrity protection on the received message as described in subclause 8.5.10.1;
- use the algorithm (UIA [40]) indicated by the IE "Integrity protection algorithm" contained in the IE "Integrity protection mode info";
- use the IE "Integrity protection initialisation number", contained in the IE "Integrity protection mode info" as the value of FRESH [40];

- if IE "Integrity protection mode command" has the value "modify" and the IE "Status" in the variable INTEGRITY_PROTECTION_INFO has the value "Started":
  - store the (oldest currently used) integrity protection configuration until activation times have elapsed for the new integrity protection configuration to be applied on all signalling radio bearers;
  - if there are pending activation times set for integrity protection by a previous procedure changing the integrity protection configuration:
    - apply the integrity protection configuration at this pending activation time as indicated in this procedure;
    - only need to store at most two different integrity protection configurations at any given time for all signalling radio bearers, the old and newest integrity protection configurations, per CN domain;
  - start applying the new integrity protection configuration in the downlink at the RRC sequence number, for each signalling radio bearer n, indicated by the entry for signalling radio bearer n in the "RRC message sequence number list" in the IE "Downlink integrity protection activation info", included in the IE "Integrity protection mode info";
  - perform integrity protection on the received message as described in subclause 8.5.10.1;
  - if present, use the algorithm indicated by the IE "Integrity protection algorithm" (UIA [40]);
  - set the content of the variable INTEGRITY_PROTECTION_ACTIVATION_INFO according to the following:
    - for each established signalling radio bearer, stored in the variable ESTABLISHED_RABS:
    - select a value of the RRC sequence number at which (activation) time the new integrity protection configuration shall be applied in uplink for that signalling radio bearer according to the following:
      - for each signalling radio bearer that has no pending activation time as set for integrity protection by a previous procedure changing the integrity protection configuration:
        - set a suitable value that would ensure a minimised delay in the change to the latest integrity protection configuration;
      - for signalling radio bearer that has a pending activation time as set for integrity protection by a previous procedure changing the integrity protection configuration:
        - set the same value as the pending activation time for integrity protection;
      - consider this activation time to be elapsed when the selected activation time (as above) is equal to the next RRC sequence number to be used;
    - for signalling radio bearer RB0:
      - set the value of the included RRC sequence number to greater than or equal to the current value of the RRC sequence number for signalling radio bearer RB0 in the variable INTEGRITY_PROTECTION_INFO, plus the value of the constant N302 plus one;
  - let RBm be the signalling radio bearer on which the message containing the IE "integrity protection mode info" was received;
  - start applying the new integrity protection configuration in the uplink at the RRC sequence number, for each RBn, except for signalling radio bearer RBm, indicated by the entry for signalling radio bearer n in

the "RRC message sequence number list" in the IE "Uplink integrity protection activation info", included in the variable INTEGRITY_PROTECTION_ACTIVATION_INFO;

- start applying the new integrity protection configuration in the uplink at the RRC sequence number for signalling radio bearer RBm, as specified for the procedure initiating the integrity protection reconfiguration;

If the IE "Integrity protection mode info" is present and if the IE "Reconfiguration" in the variable INTEGRITY_PROTECTION_STATUS is set to TRUE, the UE shall:

- ignore this second attempt to change the integrity protection configuration; and
- set the variable INCOMPATIBLE_SECURITY_RECONFIGURATION to TRUE.

If the IE "Integrity protection mode info" is not present, the UE shall not change the integrity protection configuration.