TSG-RAN Meeting #26
Athen, Greece, 08-10 December 2004

RP-040526
agenda item 7.3.5

Source: **TSG-RAN WG2.**

Title: CRs to 25.304 and 25.331 Rel-5 (and Rel-6) on Cell selection and reselection parameters.

The following CRs are in RP-040526:

Spec	CR	Rev	Phase	Subject	Cat	Version-Current	Version-New	Doc-2nd-Level	Workitem
25.304	120	2	Rel-5	Cell selection and reselection parameters	B	5.6.0	5.7.0	R2-042636	TEI5
25.304	121	2	Rel-6	Cell selection and reselection parameters	B	6.3.0	6.4.0	R2-042637	TEI5
25.331	2456	2	Rel-5	Cell selection and reselection parameters	B	5.10.0	5.11.0	R2-042634	TEI5
25.331	2457	2	Rel-6	Cell selection and reselection parameters	B	6.3.0	6.4.0	R2-042635	TEI5

3GPP TSG-RAN WG2 Meeting #45 ***Tdoc ⌘R2-042636***
Shin-Yokohama, Japan, November 15th – 19th, 2004

CR-Form-v7.1

CHANGE REQUEST

⌘ **25.304** **CR** **120** ⌘ **rev** **2** ⌘ Current version: **5.6.0** ⌘

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

Proposed change affects: UICC apps⌘ [ ] ME [X] Radio Access Network [X] Core Network [ ]

Title:	⌘	Cell selection and reselection parameters
Source:	⌘	RAN WG2
Work item code:	⌘	TEI5
Date:	⌘	November 17th, 2004
Category:	⌘	**B**

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.

Release: ⌘ Rel-5

Use one of the following releases:

Ph2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*
Rel-7	*(Release 7)*

Reason for change:	⌘	As indicated in the liaison statement from RAN4 (R2-041175), it is recommended to align cell reselection parameters with behaviour of UE receiver (with or without DRX operation) in order to improve and optimize the cell reselection accuracy for UEs in CELL_PCH/URA_PCH and CELL_FACH separately. Expierence from commercial W-CDMA networks have shown that the cell reselection performance especially for UEs in CELL_FACH state needs to be improved while still optimising for reasonable long DRX cycles to safe UE battery consumption.
Summary of change:	⌘	State specific handling of Treselection and Qhyst for UE in CELL_PCH/URA_PCH and for UEs in Cell_FACH is introduced. Defintion and UE behaviour for newly introduced parameters $Qhyst_{s,PCH}$ / $Qhyst_{s,FACH}$ and $Treselection_{s,PCH}$ / $Treselection_{s,FACH}$ is introduced. Editorial update to align wording. Isolated Impacts: · CR implemented only by the UTRAN: No interoperability issues foreseen. · CR implemented only by the UE: No interoperability issues foreseen.
Consequences if not approved:	⌘	The timing of cell selection and reselection in connected mode is not optimized, resulting in failure of RACH transmission and FACH/PICH/PCH reception failure or unwanted ping-pong effect. Optimised parametrisation or cell reselection is not possible resulting in non optimised cell reselection performance or non-optimised UE standby times.

	Usage of newly added parameters for cell reselection is not described.

Clauses affected:	⌘	5.2.6.1.4, 5.2.6.1.5				
		Y	**N**			
Other specs Affected:	⌘	**X**		Other core specifications	⌘	25.331
		X		Test specifications		34.123 & 34.108
			X	O&M Specifications		
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.

5.2.6.1.4 Cell Reselection Criteria

The following cell re-selection criteria are used for intra-frequency cells, inter-frequency cells and inter-RAT cells:

The quality level threshold criterion H for hierarchical cell structures is used to determine whether prioritised ranking according to hierarchical cell re-selection rules shall apply, and is defined by:

$$H_s = Q_{meas,s} - Qhcs_s$$

$$H_n = Q_{meas,n} - Qhcs_n - TO_n * L_n$$

If it is indicated in system information that HCS is not used, the quality level threshold criterion H is not applied.

The cell-ranking criterion R is defined by:

$$R_s = Q_{meas,s} + Qhyst_s$$

$$R_n = Q_{meas,n} - Qoffset_{s,n} - TO_n * (1 - L_n)$$

where:

$$TO_n = TEMP\_OFFSET_n * W(PENALTY\_TIME_n - T_n)$$

$L_n = 0$ if $HCS\_PRIO_n = HCS\_PRIO_s$
$L_n = 1$ if $HCS\_PRIO_n <> HCS\_PRIO_s$

$W(x) = 0$ for $x < 0$
$W(x) = 1$ for $x >= 0$

$TEMP\_OFFSET_n$ applies an offset to the H and R criteria for the duration of $PENALTY\_TIME_n$ after a timer T_n has started for that neighbouring cell.

$TEMP\_OFFSET_n$ and $PENALTY\_TIME_n$ are only applicable if the usage of HCS is indicated in system information.

The timer T_n is implemented for each neighbouring cell. T_n shall be started from zero when one of the following conditions becomes true:

- if $HCS\_PRIO_n <> HCS\_PRIO_s$ and

$$Q_{meas,n} > Qhcs_n$$

Or

- if $HCS\_PRIO_n = HCS\_PRIO_s$ and
  - for serving FDD and neighbour FDD cells if the quality measure for cell selection and reselection is set to CPICH RSCP in the serving cell, and:

$$Q_{meas,n} > Q_{meas,s} + Qoffset1_{s,n}$$

- for serving FDD and neighbour FDD cells if the quality measure for cell selection and reselection is set to CPICH Ec/No in the serving cell, and:

$$Q_{meas,n} > Q_{meas,s} + Qoffset2_{s,n}$$

- for all other serving and neighbour cells:

$$Q_{meas,n} > Q_{meas,s} + Qoffset1_{s,n}$$

T_n for the associated neighbour cell shall be stopped as soon as any of the above conditions are no longer fulfilled. Any value calculated for TO_n is valid only if the associated timer T_n is still running else TO_n shall be set to zero.

At cell-reselection, a timer T_n is stopped only if the corresponding cell is not a neighbour cell of the new serving cell, or if the criteria given above for starting timer T_n for the corresponding cell is no longer fulfilled with the parameters of the new serving cell. On cell re-selection, timer T_n shall be continued to be run for the corresponding cells but the criteria given above shall be evaluated with parameters broadcast in the new serving cell if the corresponding cells are neighbours of the new serving cell.

S_n	Cell Selection value of the neighbouring cell, (dB)
Q_{meas}	Quality value. The quality value of the received signal derived from the averaged CPICH Ec/No or CPICH RSCP for FDD cells, from the averaged P-CCPCH RSCP for TDD cells and from the averaged received signal level for GSM cells. The averaging of these measurement quantities are performed as specified in [10] and [11]. For FDD cells, the measurement that is used to derive the quality value is set by the Cell_selection_and_reselection_quality_measure information element.

Cell reselection parameters broadcast in system information are listed in subclause 5.2.6.1.5.

The cell selection criterion S used for cell reselection is fulfilled when:

for FDD cells:	Srxlev > 0 AND Squal > 0
for TDD cells:	Srxlev > 0
for GSM cells:	Srxlev > 0

Where :

$$Squal = Q_{qualmeas} - Qqualmin$$

$$Srxlev = Q_{rxlevmeas} - Qrxlevmin - Pcompensation$$

Squal	Cell Selection quality value (dB) Applicable only for FDD cells.
Srxlev	Cell Selection RX level value (dB)
$Q_{qualmeas}$	Measured cell quality value. The quality of the received signal expressed in CPICH E_C/N_0 (dB) for FDD cells. CPICH Ec/N0 shall be averaged as specified in [10]. Applicable only for FDD cells.
$Q_{rxlevmeas}$	Measured cell RX level value. This is received signal, CPICH RSCP for FDD cells (dBm), P-CCPCH RSCP for TDD cells (dBm) and the averaged received signal level as specified in [10] for GSM cells (dBm). CPICH RSCP, P-CCPCH RSCP and the received signal level for GSM cells shall be averaged as specified in [10] and [11].
Qqualmin	Minimum required quality level in the cell (dB). Applicable only for FDD cells.
Qrxlevmin	Minimum required RX level in the cell (dBm)
Pcompensation	max(UE_TXPWR_MAX_RACH – P_MAX, 0) (dB)
UE_TXPWR_MAX_RACH	Maximum TX power level an UE may use when accessing the cell on RACH (read in system information) (dBm)
P_MAX	Maximum RF output power of the UE (dBm)

The UE shall perform ranking of all cells that fulfil the S criterion among

- all cells that have the highest HCS_PRIO among those cells that fulfil the criterion H >= 0**.** Note that this rule is not valid when UE high-mobility is detected (see subclause 5.2.6.1.2).
- all cells, not considering HCS priority levels, if no cell fulfil the criterion H >= 0. This case is also valid when it is indicated in system information that HCS is not used, that is when serving cell does not belong to a hierarchical cell structure.

The cells shall be ranked according to the R criteria specified above, deriving $Q_{meas,n}$ and $Q_{meas,s}$ and calculating the R values using CPICH RSCP, P-CCPCH RSCP and the averaged received signal level as specified in [10] and [11] for FDD, TDD and GSM cells, respectively.

The offset $Qoffset1_{s,n}$ is used for $Qoffset_{s,n}$ to calculate R_n, the hysteresis $Qhyst1_s$ is used for $Qhyst_s$ to calculate R_s. For UE in RRC connected mode states CELL_PCH or URA_PCH the hysteresis $Qhyst_s$ takes the value $Qhyst1_{s,PCH}$ to calculate R_s ~~(~~, if provided in SIB4 [see 4]~~)~~. For UE in RRC connected mode state CELL_FACH the hysteresis $Qhyst_s$ takes the value $Qhyst1_{s,FACH}$ to calculate R_s ~~(~~, if provided in SIB4 [see 4]~~)~~.

If the usage of HCS is indicated in system information, $TEMP\_OFFSET1_n$ is used for $TEMP\_OFFSET_n$ to calculate TO_n. If it is indicated in system information that HCS is not used, $TEMP\_OFFSET_n$ is not applied when calculating R_n. The best ranked cell is the cell with the highest R value.

If a TDD or GSM cell is ranked as the best cell, then the UE shall perform cell re-selection to that TDD or GSM cell.

If an FDD cell is ranked as the best cell and the quality measure for cell selection and re-selection is set to CPICH RSCP, the UE shall perform cell re-selection to that FDD cell.

If an FDD cell is ranked as the best cell and the quality measure for cell selection and re-selection is set to CPICH Ec/No, the UE shall perform a second ranking of the FDD cells according to the R criteria specified above, but using the measurement quantity CPICH Ec/No for deriving the $Q_{meas,n}$ and $Q_{meas,s}$ and calculating the R values of the FDD cells. The offset $Qoffset2_{s,n}$ is used for $Qoffset_{s,n}$ to calculate R_n, the hysteresis $Qhyst2_s$ is used for $Qhyst_s$ to calculate R_s. For UE in RRC connected mode states CELL_PCH or URA_PCH the hysteresis $Qhyst_s$ takes the value $Qhyst2_{s,PCH}$ ~~is used for $Qhyst_s$~~ to calculate R_s ~~(~~, if provided in SIB4 [see 4]~~)~~. For UE in RRC connected mode state CELL_FACH the hysteresis $Qhyst_s$ takes the value $Qhyst2_{s,FACH}$ ~~uis used for $Qhyst_s$~~ to calculate R_s ~~(~~, if provided in SIB4 [see 4]~~)~~. If the usage of HCS is indicated in system information, $TEMP\_OFFSET2_n$ is used to calculate TO_n. If it is indicated in system information that HCS is not used, $TEMP\_OFFSET_n$ is not applied when calculating R_n. Following this second ranking, the UE shall perform cell re-selection to the best ranked FDD cell.

In all cases, the UE shall reselect the new cell, only if the following conditions are met:

- the new cell is better ranked than the serving cell during a time interval Treselection. For UE in RRC connected mode states CELL_PCH or URA_PCH the interval $Treselection_{s,PCH}$ applies, ~~(~~if provided in SIB4 [see 4]~~)~~, while for UE in RRC connected mode state CELL_FACH the interval $Treselection_{s,FACH}$ applies, ~~(~~if provided in SIB4 [see 4]~~)~~. For hierarchical cell structures when high mobility state has not been detected, if according to the HCS rules the serving cell is not ranked then all the ranked cells are considered to be better ranked than the serving cell.

- more than 1 second has elapsed since the UE camped on the current serving cell.

5.2.6.1.5 Cell reselection parameters in system information broadcasts

The selection of values for network controlled parameters can be optimised by means of different methods. Examples of methods are described in [6]. Cell reselection parameters are broadcast in system information and are read in the serving cell as follows:

$Qoffset1_{s,n}$

This specifies the offset between the two cells. It is used for TDD and GSM cells and for FDD cells in case the quality measure for cell selection and re-selection is set to CPICH RSCP.

$Qoffset2_{s,n}$

This specifies the offset between the two cells. It is used for FDD cells in case the quality measure for cell selection and re-selection is set to CPICH Ec/No.

$Qhyst1_s$

This specifies the hysteresis value (Qhyst). It is used for TDD and GSM cells and for FDD cells in case the quality measure for cell selection and re-selection is set to CPICH RSCP.

$Qhyst1_{s,PCH}$

This specifies the hysteresis value (Qhyst) to be used in RRC connected mode states CELL_PCH and URA_PCH. It is used for TDD and GSM cells and for FDD cells in case the quality measure for cell selection and re-selection is set to CPICH RSCP. If this parameter is not provided in SIB4, $Qhyst1_s$ shall be used.

$Qhyst1_{s,FACH}$

This specifies the hysteresis value (Qhyst) to be used in RRC connected mode state CELL_FACH. It is used for TDD and GSM cells and for FDD cells in case the quality measure for cell selection and re-selection is set to CPICH RSCP. If this parameter is not provided in SIB4, $Qhyst1_s$ shall be used.

$Qhyst2_s$

This specifies the hysteresis value (Qhyst). It is used for FDD cells if the quality measure for cell selection and re-selection is set to CPICH Ec/No.

$Qhyst2_{s,PCH}$

This specifies the hysteresis value (Qhyst) to be used in RRC connected mode states CELL_PCH and URA_PCH. It is used for FDD cells if the quality measure for cell selection and re-selection is set to CPICH Ec/No. If this parameter is not provided in SIB4, $Qhyst2_s$ shall be used.

$Qhyst2_{s,FACH}$

This specifies the hysteresis value (Qhyst) to be used in RRC connected mode state CELL_FACH. It is used for FDD cells if the quality measure for cell selection and re-selection is set to CPICH Ec/No. If this parameter is not provided in SIB4, $Qhyst2_s$ shall be used.

HCS_PRIO_s, HCS_PRIO_n

This specifies the HCS priority level (0-7) for serving cell and neighbouring cells.

HCS priority level 0 means lowest priority and HCS priority level 7 means highest priority.

$Qhcs_s$, $Qhcs_n$

This specifies the quality threshold levels for applying prioritised hierarchical cell re-selection.

Qqualmin

This specifies the minimum required quality level in the cell in dB. It is not applicable for TDD cells or GSM cells.

Qrxlevmin

This specifies the minimum required RX level in the cell in dBm.

$PENALTY\_TIME_n$

This specifies the time duration for which the $TEMPORARY\_OFFSET_n$ is applied for a neighbouring cell.

$TEMPORARY\_OFFSET1_n$

This specifies the offset applied to the H and R criteria for a neighbouring cell for the duration of $PENALTY\_TIME_n$. It is used for TDD and GSM cells and for FDD cells in case the quality measure for cell selection and re-selection is set to CPICH RSCP.

$TEMPORARY\_OFFSET2_n$

This specifies the offset applied to the H and R criteria for a neighbouring cell for the duration of $PENALTY\_TIME_n$. It is used for FDD cells in case the quality measure for cell selection and re-selection is set to CPICH Ec/No.

T_{CRmax}

This specifies the duration for evaluating allowed amount of cell reselection(s).

N_{CR}

This specifies the maximum number of cell reselections.

$T_{CRmaxHyst}$

This specifies the additional time period before the UE can revert to low-mobility measurements.

$Treselection_s$

This specifies the cell reselection timer value.

$Treselection_{s,PCH}$

This specifies the cell reselection timer value the UE shall use in RRC connected mode states CELL_PCH and URA_PCH if provided in SIB4, otherwise $Treselection_s$ shall be used.

$Treselection_{s,FACH}$

This specifies the cell reselection timer value the UE shall use in RRC connected mode state CELL_FACH if provided in SIB4, otherwise $Treselection_s$ shall be used.

$Ssearch_{HCS}$

This threshold is used in the measurement rules for cell re-selection when HCS is used. It specifies the limit for Srxlev in the serving cell below which the UE shall initiate measurements of all neighbouring cells of the serving cell.

$Ssearch_{RAT\ 1}$ - $Ssearch_{RAT\ k}$

This specifies the RAT specific threshold in the serving cell used in the inter-RAT measurement rules.

$S_{HCS,RATm}$

This threshold is used in the measurement rules for cell re-selection when HCS is used. It specifies the RAT specific threshold in the serving cell used in the inter-RAT measurement rules.

$S_{intrasearch}$

This specifies the threshold (in dB) for intra frequency measurements and for the HCS measurement rules.

$S_{intersearch}$

This specifies the threshold (in dB) for inter-frequency measurements and for the HCS measurement rules.

$S_{limit,SearchRATm}$

This threshold is used in the measurement rules for cell re-selection when HCS is used. It specifies the RAT specific threshold (in dB) in the serving UTRA cell above which the UE may choose to not perform any inter-RAT measurements in RAT "m".

5.2.6.2 GSM case

The cell reselection procedure in GSM, including reselection from GSM to UTRA, is specified in [1].

3GPP TSG-RAN WG2 Meeting #45 **Tdoc ⌘R2-042637**
Shin-Yokohama, Japan, November 15th – 19th, 2004

CR-Form-v7.1

CHANGE REQUEST

⌘ **25.304** **CR** **121** ⌘**rev** **2** ⌘ Current version: **6.3.0** ⌘

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Proposed change affects: UICC apps⌘ ☐ ME ☒ Radio Access Network ☒ Core Network ☐

Title:	⌘	Cell selection and reselection parameters
Source:	⌘	RAN WG2
Work item code:	⌘	TEI5
Date:	⌘	November 17th, 2004
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Release: ⌘ Rel-6

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Reason for change:	⌘	As indicated in the liaison statement from RAN4 (R2-041175), it is recommended to align cell reselection parameters with behaviour of UE receiver (with or without DRX operation) in order to improve and optimize the cell reselection accuracy for UEs in CELL_PCH/URA_PCH and CELL_FACH separately. Expierence from commercial W-CDMA networks have shown that the cell reselection performance especially for UEs in CELL_FACH state needs to be improved while still optimising for reasonable long DRX cycles to safe UE battery consumption.
Summary of change:	⌘	State specific handling of Treselection and Qhyst for UE in CELL_PCH/URA_PCH and for UEs in Cell_FACH is introduced. Defintion and UE behaviour for newly introduced parameters $Qhyst_{s,PCH}$ / $Qhyst_{s,FACH}$ and $Treselection_{s,PCH}$ / $Treselection_{s,FACH}$ is introduced. Isolated Impacts: · CR implemented only by the UTRAN: No interoperability issues foreseen. · CR implemented only by the UE: No interoperability issues foreseen.
Consequences if not approved:	⌘	The timing of cell selection and reselection in connected mode is not optimized, resulting in failure of RACH transmission and FACH/PICH/PCH reception failure or unwanted ping-pong effect. Optimised parametrisation or cell reselection is not possible resulting in non optimised cell reselection performance or non-optimised UE standby times.

	Usage of newly added parameters for cell reselection is not described.

Clauses affected:	⌘	5.2.6.1.4, 5.2.6.1.5				
		Y	**N**			
Other specs Affected:	⌘	**X**		Other core specifications	⌘	25.331
		X		Test specifications		34.123 & 34.108
			X	O&M Specifications		
Other comments:	⌘					

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5.2.6.1.4 Cell Reselection Criteria

The following cell re-selection criteria are used for intra-frequency cells, inter-frequency cells and inter-RAT cells:

The quality level threshold criterion H for hierarchical cell structures is used to determine whether prioritised ranking according to hierarchical cell re-selection rules shall apply, and is defined by:

$$H_s = Q_{meas,s} - Qhcs_s$$

$$H_n = Q_{meas,n} - Qhcs_n - TO_n * L_n$$

If it is indicated in system information that HCS is not used, the quality level threshold criterion H is not applied.

The cell-ranking criterion R is defined by:

$$R_s = Q_{meas,s} + Qhyst_s$$

$$R_n = Q_{meas,n} - Qoffset_{s,n} - TO_n * (1 - L_n)$$

where:

$$TO_n = TEMP\_OFFSET_n * W(PENALTY\_TIME_n - T_n)$$

$L_n = 0$ if $HCS\_PRIO_n = HCS\_PRIO_s$
$L_n = 1$ if $HCS\_PRIO_n <> HCS\_PRIO_s$

$W(x) = 0$ for $x < 0$
$W(x) = 1$ for $x >= 0$

$TEMP\_OFFSET_n$ applies an offset to the H and R criteria for the duration of $PENALTY\_TIME_n$ after a timer T_n has started for that neighbouring cell.

$TEMP\_OFFSET_n$ and $PENALTY\_TIME_n$ are only applicable if the usage of HCS is indicated in system information.

The timer T_n is implemented for each neighbouring cell. T_n shall be started from zero when one of the following conditions becomes true:

- if $HCS\_PRIO_n <> HCS\_PRIO_s$ and

$$Q_{meas,n} > Qhcs_n$$

Or

- if $HCS\_PRIO_n = HCS\_PRIO_s$ and
  - for serving FDD and neighbour FDD cells if the quality measure for cell selection and reselection is set to CPICH RSCP in the serving cell, and:

$$Q_{meas,n} > Q_{meas,s} + Qoffset1_{s,n}$$

  - for serving FDD and neighbour FDD cells if the quality measure for cell selection and reselection is set to CPICH Ec/No in the serving cell, and:

$$Q_{meas,n} > Q_{meas,s} + Qoffset2_{s,n}$$

- for all other serving and neighbour cells:

$$Q_{meas,n} > Q_{meas,s} + Qoffset1_{s,n}$$

T_n for the associated neighbour cell shall be stopped as soon as any of the above conditions are no longer fulfilled. Any value calculated for TO_n is valid only if the associated timer T_n is still running else TO_n shall be set to zero.

At cell-reselection, a timer T_n is stopped only if the corresponding cell is not a neighbour cell of the new serving cell, or if the criteria given above for starting timer T_n for the corresponding cell is no longer fulfilled with the parameters of the new serving cell. On cell re-selection, timer T_n shall be continued to be run for the corresponding cells but the criteria given above shall be evaluated with parameters broadcast in the new serving cell if the corresponding cells are neighbours of the new serving cell.

S_n	Cell Selection value of the neighbouring cell, (dB)
Q_{meas}	Quality value. The quality value of the received signal derived from the averaged CPICH Ec/No or CPICH RSCP for FDD cells, from the averaged P-CCPCH RSCP for TDD cells and from the averaged received signal level for GSM cells. The averaging of these measurement quantities are performed as specified in [10] and [11]. For FDD cells, the measurement that is used to derive the quality value is set by the Cell_selection_and_reselection_quality_measure information element.

Cell reselection parameters broadcast in system information are listed in subclause 5.2.6.1.5.

The cell selection criterion S used for cell reselection is fulfilled when:

for FDD cells: Srxlev > 0 AND Squal > 0

for TDD cells: Srxlev > 0

for GSM cells: Srxlev > 0

Where :

$$Squal = Q_{qualmeas} - Qqualmin$$

$$Srxlev = Q_{rxlevmeas} - Qrxlevmin - Pcompensation$$

Squal	Cell Selection quality value (dB) Applicable only for FDD cells.
Srxlev	Cell Selection RX level value (dB)
$Q_{qualmeas}$	Measured cell quality value. The quality of the received signal expressed in CPICH E_C/N_0 (dB) for FDD cells. CPICH Ec/N0 shall be averaged as specified in [10]. Applicable only for FDD cells.
$Q_{rxlevmeas}$	Measured cell RX level value. This is received signal, CPICH RSCP for FDD cells (dBm), P-CCPCH RSCP for TDD cells (dBm) and the averaged received signal level as specified in [10] for GSM cells (dBm). CPICH RSCP, P-CCPCH RSCP and the received signal level for GSM cells shall be averaged as specified in [10] and [11].
Qqualmin	Minimum required quality level in the cell (dB). Applicable only for FDD cells.
Qrxlevmin	Minimum required RX level in the cell (dBm)
Pcompensation	max(UE_TXPWR_MAX_RACH – P_MAX, 0) (dB)
UE_TXPWR_MAX_RACH	Maximum TX power level an UE may use when accessing the cell on RACH (read in system information) (dBm)
P_MAX	Maximum RF output power of the UE (dBm)

The UE shall perform ranking of all cells that fulfil the S criterion among

- all cells that have the highest HCS_PRIO among those cells that fulfil the criterion H >= 0**.** Note that this rule is not valid when UE high-mobility is detected (see subclause 5.2.6.1.2).

- all cells, not considering HCS priority levels, if no cell fulfil the criterion H >= 0. This case is also valid when it is indicated in system information that HCS is not used, that is when serving cell does not belong to a hierarchical cell structure.

The cells shall be ranked according to the R criteria specified above, deriving $Q_{meas,n}$ and $Q_{meas,s}$ and calculating the R values using CPICH RSCP, P-CCPCH RSCP and the averaged received signal level as specified in [10] and [11] for FDD, TDD and GSM cells, respectively.

The offset $Qoffset1_{s,n}$ is used for $Qoffset_{s,n}$ to calculate R_n, the hysteresis $Qhyst1_s$ is used for $Qhyst_s$ to calculate R_s. For UE in RRC connected mode states CELL_PCH or URA_PCH the hysteresis $Qhyst_s$ takes the value $Qhyst1_{s,PCH}$ to calculate R_s, if provided in SIB4 [see 4]. For UE in RRC connected mode state CELL_FACH the hysteresis $Qhyst_s$ takes the value $Qhyst1_{s,FACH}$ to calculate R_s, if provided in SIB4 [see 4].

If the usage of HCS is indicated in system information, $TEMP\_OFFSET1_n$ is used for $TEMP\_OFFSET_n$ to calculate TO_n. If it is indicated in system information that HCS is not used, $TEMP\_OFFSET_n$ is not applied when calculating R_n. The best ranked cell is the cell with the highest R value.

If a TDD or GSM cell is ranked as the best cell, then the UE shall perform cell re-selection to that TDD or GSM cell.

If an FDD cell is ranked as the best cell and the quality measure for cell selection and re-selection is set to CPICH RSCP, the UE shall perform cell re-selection to that FDD cell.

If an FDD cell is ranked as the best cell and the quality measure for cell selection and re-selection is set to CPICH Ec/No, the UE shall perform a second ranking of the FDD cells according to the R criteria specified above, but using the measurement quantity CPICH Ec/No for deriving the $Q_{meas,n}$ and $Q_{meas,s}$ and calculating the R values of the FDD cells. The offset $Qoffset2_{s,n}$ is used for $Qoffset_{s,n}$ to calculate R_n, the hysteresis $Qhyst2_s$ is used for $Qhyst_s$ to calculate R_s. For UE in RRC connected mode states CELL_PCH or URA_PCH the hysteresis $Qhyst_s$ takes the value $Qhyst2_{s,PCH}$ to calculate R_s, if provided in SIB4 [see 4]. For UE in RRC connected mode state CELL_FACH the hysteresis $Qhyst_s$ takes the value $Qhyst2_{s,FACH}$ to calculate R_s, if provided in SIB4 [see 4]. If the usage of HCS is indicated in system information, $TEMP\_OFFSET2_n$ is used to calculate TO_n. If it is indicated in system information that HCS is not used, $TEMP\_OFFSET_n$ is not applied when calculating R_n. Following this second ranking, the UE shall perform cell re-selection to the best ranked FDD cell.

In all cases, the UE shall reselect the new cell, only if the following conditions are met:

- the new cell is better ranked than the serving cell during a time interval Treselection. For UE in RRC connected mode states CELL_PCH or URA_PCH the interval $Treselection_{s,PCH}$ applies, if provided in SIB4 [see 4], while for UE in RRC connected mode state CELL_FACH the interval $Treselection_{s,FACH}$ applies, if provided in SIB4 [see 4]. For hierarchical cell structures when high mobility state has not been detected, if according to the HCS rules the serving cell is not ranked then all the ranked cells are considered to be better ranked than the serving cell.

- more than 1 second has elapsed since the UE camped on the current serving cell.

5.2.6.1.5 Cell reselection parameters in system information broadcasts

The selection of values for network controlled parameters can be optimised by means of different methods. Examples of methods are described in [6]. Cell reselection parameters are broadcast in system information and are read in the serving cell as follows:

$Qoffset1_{s,n}$

This specifies the offset between the two cells. It is used for TDD and GSM cells and for FDD cells in case the quality measure for cell selection and re-selection is set to CPICH RSCP.

$Qoffset2_{s,n}$

This specifies the offset between the two cells. It is used for FDD cells in case the quality measure for cell selection and re-selection is set to CPICH Ec/No.

$Qhyst1_s$

This specifies the hysteresis value (Qhyst). It is used for TDD and GSM cells and for FDD cells in case the quality measure for cell selection and re-selection is set to CPICH RSCP.

$Qhyst1_{s,PCH}$

This specifies the hysteresis value (Qhyst) to be used in RRC connected mode states CELL_PCH and URA_PCH. It is used for TDD and GSM cells and for FDD cells in case the quality measure for cell selection and re-selection is set to CPICH RSCP. If this parameter is not provided in SIB4, $Qhyst1_s$ shall be used.

$Qhyst1_{s,FACH}$

This specifies the hysteresis value (Qhyst) to be used in RRC connected mode state CELL_FACH. It is used for TDD and GSM cells and for FDD cells in case the quality measure for cell selection and re-selection is set to CPICH RSCP. If this parameter is not provided in SIB4, $Qhyst1_s$ shall be used.

$Qhyst2_s$

This specifies the hysteresis value (Qhyst). It is used for FDD cells if the quality measure for cell selection and re-selection is set to CPICH Ec/No.

$Qhyst2_{s,PCH}$

This specifies the hysteresis value (Qhyst) to be used in RRC connected mode states CELL_PCH and URA_PCH. It is used for FDD cells if the quality measure for cell selection and re-selection is set to CPICH Ec/No. If this parameter is not provided in SIB4, $Qhyst2_s$ shall be used.

$Qhyst2_{s,FACH}$

This specifies the hysteresis value (Qhyst) to be used in RRC connected mode state CELL_FACH. It is used for FDD cells if the quality measure for cell selection and re-selection is set to CPICH Ec/No. If this parameter is not provided in SIB4, $Qhyst2_s$ shall be used.

HCS_PRIO_s, HCS_PRIO_n

This specifies the HCS priority level (0-7) for serving cell and neighbouring cells.

HCS priority level 0 means lowest priority and HCS priority level 7 means highest priority.

$Qhcs_s$, $Qhcs_n$

This specifies the quality threshold levels for applying prioritised hierarchical cell re-selection.

Qqualmin

This specifies the minimum required quality level in the cell in dB. It is not applicable for TDD cells or GSM cells.

Qrxlevmin

This specifies the minimum required RX level in the cell in dBm.

$PENALTY\_TIME_n$

This specifies the time duration for which the $TEMPORARY\_OFFSET_n$ is applied for a neighbouring cell.

$TEMPORARY\_OFFSET1_n$

This specifies the offset applied to the H and R criteria for a neighbouring cell for the duration of $PENALTY\_TIME_n$. It is used for TDD and GSM cells and for FDD cells in case the quality measure for cell selection and re-selection is set to CPICH RSCP.

$TEMPORARY\_OFFSET2_n$

This specifies the offset applied to the H and R criteria for a neighbouring cell for the duration of $PENALTY\_TIME_n$. It is used for FDD cells in case the quality measure for cell selection and re-selection is set to CPICH Ec/No.

T_{CRmax}

This specifies the duration for evaluating allowed amount of cell reselection(s).

N_{CR}

This specifies the maximum number of cell reselections.

$T_{CRmaxHyst}$

This specifies the additional time period before the UE can revert to low-mobility measurements.

$Treselection_s$

This specifies the cell reselection timer value.

$Treselection_{s,PCH}$

This specifies the cell reselection timer value the UE shall use in RRC connected mode states CELL_PCH and URA_PCH if provided in SIB4, otherwise $Treselection_s$ shall be used.

$Treselection_{s,FACH}$

This specifies the cell reselection timer value the UE shall use in RRC connected mode state CELL_FACH if provided in SIB4, otherwise $Treselection_s$ shall be used.

$Ssearch_{HCS}$

This threshold is used in the measurement rules for cell re-selection when HCS is used. It specifies the limit for Srxlev in the serving cell below which the UE shall initiate measurements of all neighbouring cells of the serving cell.

$Ssearch_{RAT\ 1}$ - $Ssearch_{RAT\ k}$

This specifies the RAT specific threshold in the serving cell used in the inter-RAT measurement rules.

$S_{HCS,RATm}$

This threshold is used in the measurement rules for cell re-selection when HCS is used. It specifies the RAT specific threshold in the serving cell used in the inter-RAT measurement rules.

$S_{intrasearch}$

This specifies the threshold (in dB) for intra frequency measurements and for the HCS measurement rules.

$S_{intersearch}$

This specifies the threshold (in dB) for inter-frequency measurements and for the HCS measurement rules.

$S_{limit,SearchRATm}$

This threshold is used in the measurement rules for cell re-selection when HCS is used. It specifies the RAT specific threshold (in dB) in the serving UTRA cell above which the UE may choose to not perform any inter-RAT measurements in RAT "m".

5.2.6.2 GSM case

The cell reselection procedure in GSM, including reselection from GSM to UTRA, is specified in [1].

3GPP TSG-RAN WG2 Meeting #45 ***Tdoc ⌘R2-042634***
Shin-Yokohama, Japan, November 15th – 19th, 2004

CR-Form-v7.1

CHANGE REQUEST

⌘ **25.331** **CR** **2456** ⌘ **rev** **2** ⌘ Current version: **5.10.0** ⌘

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

Proposed change affects: UICC apps⌘ [ ] ME [X] Radio Access Network [X] Core Network [ ]

Title:	⌘	Cell selection and reselection parameters
Source:	⌘	RAN WG2
Work item code:	⌘	TEI5
Date:	⌘	17th November, 2004
Category:	⌘	**B**
Release:	⌘	Rel-5

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:
Ph2 *(GSM Phase 2)*
R96 *(Release 1996)*
R97 *(Release 1997)*
R98 *(Release 1998)*
R99 *(Release 1999)*
Rel-4 *(Release 4)*
Rel-5 *(Release 5)*
Rel-6 *(Release 6)*
Rel-7 *(Release 7)*

Reason for change: ⌘ Expierence from commercial W-CDMA networks have shown that CELL_FACH performance needs to be improved while still optimising for reasonable long DRX cycles to safe UE battery consumption. See R2-042361 for detail.

Summary of change: ⌘ It is proposed to add information elements in SIB4 in the following manner.

1) Treselection for CELL_FACH with its step size of 200 ms and its range (0..6.2).
2) Treselection for CELL/URA_PCH with its step size of 1 second (existing value)
3) Qhyst for CELL_FACH and CELL_PCH/URA_PCH, resepectively with their step size of ~~0.5~~ 1 dB.

If Treselection for CELL_FACH is broadcast in SIB4, the UE in CELL_FACH uses the value as Treselection. If not, it uses the exisiting Treselection. If Treselection for CELL/URA_PCH is broadcase in SIB4, the UE in CELL_PCH or URA_PCH uses the value as Treselection. If not, it uses the exisiting Treselection.

If Qhyst for CELL_FACH is broadcast in SIB4, the UE in CELL_FACH uses the value as Qhyst. If not, it uses the exisiting Qhyst. If Qhyst for CELL/URA_PCH is broadcast in SIB4, the UE in CELL_PCH or URA_PCH uses the value as Qhyst. If not, it uses the exisiting Qhyst.

Isolated Impacts:
· CR implemented only by the UTRAN: No interoperability issues foreseen.
· CR implemented only by the UE: No interoperability issues foreseen.

Changes made to rev1 are highlighted in water colour

Consequences if not approved:	⌘	The timing of cell selection and reselection in connected mode is not optimized, resulting in failure of RACH transmission and FACH/PCH reception failure or unwanted ping-pong effect. Optimised parametrisation or cell reselection is not possible resulting in non optimised cell reselection performance or non-optimised UE standby times.

Clauses affected:	⌘	Section 10.3.2.3			
		Y	**N**		
Other specs Affected:	⌘	**X**		Other core specifications	⌘ 25.304
		X		Test specifications	34.123 & 34.108
			X	O&M Specifications	
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.

1.1.1.1. 10.3.2.3 Cell selection and re-selection info for SIB3/4

Information Element/Group name	Need	Multi	Type and reference	Semantics description	Version
Mapping Info	OP		Mapping info 10.3.2.5	This IE should not be sent.	
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. This IE is also sent to the UE in SIB11/12. Both occurrences of the IE should be set to the same value.	
CHOICE *mode*	MP				
>FDD					
>>$S_{intrasearch}$	OP		Integer (-32..20 by step of 2)	If a negative value is received the UE shall consider the value to be 0. [4] [dB]	
>>$S_{intersearch}$	OP		Integer (-32..20 by step of 2)	If a negative value is received the UE shall consider the value to be 0. [4] [dB]	
>>$S_{searchHCS}$	OP		Integer (-105..91 by step of 2)	If a negative value is received the UE shall consider the value to be 0. [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] If a negative value is received the UE shall consider the value to be 0. [dB]	
>>>$S_{HCS,RAT}$	OP		Integer (-105..91 by step of 2)	If a negative value is received the UE shall consider the value to be 0. [4] [dB]	
>>>$S_{limit,SearchRAT}$	MP		Integer (-32..20 by step of 2)	If a negative value is received the UE shall consider the value to be 0. [4] [dB]	
>>Qqualmin	MP		Integer (-	Ec/N0, [dB]	

Information Element/Group name	Need	Multi	Type and reference	Semantics description	Version
			24..0)		
>>Qrxlevmin	MP		Integer (-115..-25 by step of 2)	RSCP, [dBm]	
>> $Delta_{Qrxlevmin}$	CV-*Delta*		Integer(-4..-2 by step of 2)	If present, the actual value of Qrxlevmin = Qrxlevmin + $Delta_{Qrxlevmin}$	REL-5
>TDD					
>>$S_{intrasearch}$	OP		Integer (-105..91 by step of 2)	If a negative value is received the UE shall consider the value to be 0. [4] [dB]	
>>$S_{intersearch}$	OP		Integer (-105..91 by step of 2)	If a negative value is received the UE shall consider the value to be 0. [4] [dB]	
>>$S_{searchHCS}$	OP		Integer (-105..91 by step of 2)	If a negative value is received the UE shall consider the value to be 0. [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] If a negative value is received the UE shall consider the value to be 0. [dB]	
>>>$S_{HCS,RAT}$	OP		Integer (-105..91 by step of 2)	If a negative value is received the UE shall consider the value to be 0. [4] [dB]	
>>>$S_{limit,SearchRAT}$	MP		Integer (-105..91 by step of 2)	If a negative value is received the UE shall consider the value to be 0. [4] [dB]	
>>Qrxlevmin	MP		Integer (-115..-25 by step of 2)	RSCP, [dBm]	

Information Element/Group name	Need	Multi	Type and reference	Semantics description	Version
>>Delta$_{Qrxlevmin}$	CV-*Delta*		Integer(-4..-2 by step of 2)	If present, the actual value of Qrxlevmin = Qrxlevmin + Delta$_{Qrxlevmin}$	REL-5
Qhyst1$_S$	MP		Integer (0..40 by step of 2)	[4] [dB]	
Qhyst1$_{S,PCH}$	CV-*SIB4*		Integer (0..40 ~~by step of 0.5~~)	If present, it is used as Qhyst1$_S$ for UE in CELL_PCH or URA_PCH state [4] [dB]	REL-5
Qhyst1$_{S,FACH}$	CV-*SIB4*		Integer (0..40 ~~by step of 0.5~~)	If present, it is used as Qhyst1$_S$ for UE in CELL_FACH state [4] [dB]	REL-5
Qhyst2$_S$	CV-*FDD-Quality-Measure*		Integer (0..40 by step of 2)	Default value is Qhyst1$_S$ [4] [dB]	
Qhyst2$_{S,PCH}$	CV-*SIB4-FDD-Qualtiy-Measure*		Integer (0..40 ~~by step of 0.5~~)	If present, it is used as Qhyst2$_S$ for UE using CPICH Ec/No quality measure in CELL_PCH or URA_PCH state. Default value is Qhyst1$_{S,PCH}$ [4] [dB]	REL-5
Qhyst2$_{S,FACH}$	CV-*SIB4-FDD-Qualtiy-Measure*		Integer (0..40 ~~by step of 0.5~~)	If present, it is used as Qhyst2$_S$ for UE using CPICH Ec/No quality measure in CELL_FACH state. Default value is Qhyst1$_{S,FACH}$ [4] [dB]	REL-5
Treselection$_S$	MP		Integer (0..31)	[s]	
Treselection$_{S,PCH}$	CV-*SIB4*		Integer (0..31)	If present, it is used as Treselection$_S$ for UE in CELL_PCH or URA_PCH state [4] [s]	REL-5
Treselection$_{S,FACH}$	CV-*SIB4*		Integer (0..6.2 by step of 0.2)	If present, it is used as Treselection$_S$ for UE in CELL_FACH state [4] [s]	REL-5
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	The IE is not needed if the IE "Cell selection and reselection quality measure" has the value CPICH RSCP, otherwise the IE is mandatory and has a default value.
Delta	This IE is optional if the value of Qrxlevmin is below –115dBm. It is not needed otherwise.
SIB4	This IE is optional if the IE “Cell selection and re-selection info for SIB3/4” is included in SIB type 4. It is not needed otherwise.
SIB4-FDD-Qualtiy-Measure	This IE is optional if the IE “Cell selection and re-selection info for SIB3/4” is included in SIB type 4, and the IE "Cell selection and reselection quality measure" has the value CPICH Ec/N0. It is not needed otherwise.

1.2. 11.3 Information element definitions

```
InformationElements DEFINITIONS AUTOMATIC TAGS ::=

BEGIN
-- **************************************************
--
--     MEASUREMENT INFORMATION ELEMENTS (10.3.7)
--
-- **************************************************

[...]

SysInfoType4 ::=                    SEQUENCE {
    -- UTRAN mobility IEs
        cellIdentity                    CellIdentity,
        cellSelectReselectInfo          CellSelectReselectInfoSIB-3-4,
        cellAccessRestriction           CellAccessRestriction,
    -- Extension mechanism for non- release99 information
        v4b0NonCriticalExtensions       SEQUENCE {
            sysInfoType4-v4b0ext            SysInfoType4-v4b0ext-IEs,
            v590NonCriticalExtension        SEQUENCE {
                sysInfoType4-v590ext            SysInfoType4-v590ext,
                v5b0NonCriticalExtension        SEQUENCE {
                    sysInfoType4-v5b0ext            SysInfoType4-v5b0ext,
                    nonCriticalExtensions           SEQUENCE {}                     OPTIONAL
                } OPTIONAL
            }   OPTIONAL
        }   OPTIONAL
}

[...]

SysInfoType4-v590ext ::= SEQUENCE {
    cellSelectReselectInfo-v590ext      CellSelectReselectInfo-v590ext      OPTIONAL
}

SysInfoType4-v5b0ext ::= SEQUENCE {
    cellSelectReselectInfoPCHFACH-v5b0ext   CellSelectReselectInfoPCHFACH-v5b0ext       OPTIONAL
}

[...]


CellSelectReselectInfo-v590ext ::= SEQUENCE {
    deltaQrxlevmin                  DeltaQrxlevmin                  OPTIONAL,
    deltaQhcs                       DeltaRSCP                       OPTIONAL
}

CellSelectReselectInfoPCHFACH-v5b0ext ::= SEQUENCE {
    q-Hyst-l-S-PCH              Q-Hyst-S-Fine                       OPTIONAL,
    q-Hyst-l-S-FACH             Q-Hyst-S-Fine                       OPTIONAL,
    q-Hyst-2-S-PCH              Q-Hyst-S-Fine                       OPTIONAL,
    q-Hyst-2-S-FACH             Q-Hyst-S-Fine                       OPTIONAL,
    t-Reselection-S-PCH         T-Reselection-S                     OPTIONAL,
    t-Reselection-S-FACH        T-Reselection-S-Fine                OPTIONAL
}

[...]
```

```
-- Actual value Q-Hyst-S = IE value * 2
Q-Hyst-S ::=      INTEGER (0..20)

-- Actual value Q-Hyst-S-Fine = IE value * 0.5
Q-Hyst-S-Fine ::= INTEGER (0..4080)

[...]


T-Reselection-S ::=     INTEGER (0..31)

-- Actual value T-Reselection-S-Fine = IE value * 0.2
T-Reselection-S-Fine ::=INTEGER (0..31)
```

3GPP TSG-RAN WG2 Meeting #45 ***Tdoc ⌘R2-042635***
Shin-Yokohama, Japan, November 15th – 19th, 2004

CR-Form-v7.1

CHANGE REQUEST

⌘ **25.331** **CR** **2457** ⌘ **rev** **2** ⌘ Current version: **6.3.0** ⌘

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

Proposed change affects: UICC apps⌘ [ ] ME [X] Radio Access Network [X] Core Network [ ]

Title:	⌘	Cell selection and reselection parameters
Source:	⌘	RAN WG2
Work item code:	⌘	TEI5
Date:	⌘	17th November, 2004
Category:	⌘	**B**
Release:	⌘	Rel-6

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:
Ph2 *(GSM Phase 2)*
R96 *(Release 1996)*
R97 *(Release 1997)*
R98 *(Release 1998)*
R99 *(Release 1999)*
Rel-4 *(Release 4)*
Rel-5 *(Release 5)*
Rel-6 *(Release 6)*
Rel-7 *(Release 7)*

Reason for change: ⌘ Expierence from commercial W-CDMA networks have shown that CELL_FACH performance needs to be improved while still optimising for reasonable long DRX cycles to safe UE battery consumption. See R2-042361 for detail.

Summary of change: ⌘ It is proposed to add information elements in SIB4 in the following manner.

1) Treselection for CELL_FACH with its step size of 200 ms and its range (0..6.2).
2) Treselection for CELL/URA_PCH with its step size of 1 second (existing value)
3) Qhyst for CELL_FACH and CELL_PCH/URA_PCH, resepectively with their step size of ~~0.5~~ 1 dB.

If Treselection for CELL_FACH is broadcast in SIB4, the UE in CELL_FACH uses the value as Treselection. If not, it uses the exisiting Treselection. If Treselection for CELL/URA_PCH is broadcase in SIB4, the UE in CELL_PCH or URA_PCH uses the value as Treselection. If not, it uses the exisiting Treselection.

If Qhyst for CELL_FACH is broadcast in SIB4, the UE in CELL_FACH uses the value as Qhyst. If not, it uses the exisiting Qhyst. If Qhyst for CELL/URA_PCH is broadcast in SIB4, the UE in CELL_PCH or URA_PCH uses the value as Qhyst. If not, it uses the exisiting Qhyst.

Isolated Impacts:
· CR implemented only by the UTRAN: No interoperability issues foreseen.
· CR implemented only by the UE: No interoperability issues foreseen.

Changes made to rev1 are highlighted in water colour

Consequences if ⌘ The timing of cell selection and reselection in connected mode is not optimized,

not approved:	resulting in failure of RACH transmission and FACH/PCH reception failure or unwanted ping-pong effect. Optimised parametrisation or cell reselection is not possible resulting in non optimised cell reselection performance or non-optimised UE standby times.

Clauses affected:	⌘	Section 10.3.2.3			
		Y	**N**		
Other specs Affected:	⌘	**X**		Other core specifications	⌘ 25.304
		X		Test specifications	34.123 & 34.108
			X	O&M Specifications	
Other comments:	⌘				

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1.1.1.1. 10.3.2.3 Cell selection and re-selection info for SIB3/4

Information Element/Group name	Need	Multi	Type and reference	Semantics description	Version
Mapping Info	OP		Mapping info 10.3.2.5	This IE should not be sent.	
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. This IE is also sent to the UE in SIB11/12. Both occurrences of the IE should be set to the same value.	
CHOICE *mode*	MP				
>FDD					
>>$S_{intrasearch}$	OP		Integer (-32..20 by step of 2)	If a negative value is received the UE shall consider the value to be 0. [4] [dB]	
>>$S_{intersearch}$	OP		Integer (-32..20 by step of 2)	If a negative value is received the UE shall consider the value to be 0. [4] [dB]	
>>$S_{searchHCS}$	OP		Integer (-105..91 by step of 2)	If a negative value is received the UE shall consider the value to be 0. [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] If a negative value is received the UE shall consider the value to be 0. [dB]	
>>>$S_{HCS,RAT}$	OP		Integer (-105..91 by step of 2)	If a negative value is received the UE shall consider the value to be 0. [4] [dB]	
>>>$S_{limit,SearchRAT}$	MP		Integer (-32..20 by step of 2)	If a negative value is received the UE shall consider the value to be 0. [4] [dB]	
>>Qqualmin	MP		Integer (-	Ec/N0, [dB]	

Information Element/Group name	Need	Multi	Type and reference	Semantics description	Version
			24..0)		
>>Qrxlevmin	MP		Integer (-115..-25 by step of 2)	RSCP, [dBm]	
>> $Delta_{Qrxlevmin}$	CV-*Delta*		Integer(-4..-2 by step of 2)	If present, the actual value of Qrxlevmin = Qrxlevmin + $Delta_{Qrxlevmin}$	REL-5
>TDD					
>>$S_{intrasearch}$	OP		Integer (-105..91 by step of 2)	If a negative value is received the UE shall consider the value to be 0. [4] [dB]	
>>$S_{intersearch}$	OP		Integer (-105..91 by step of 2)	If a negative value is received the UE shall consider the value to be 0. [4] [dB]	
>>$S_{searchHCS}$	OP		Integer (-105..91 by step of 2)	If a negative value is received the UE shall consider the value to be 0. [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] If a negative value is received the UE shall consider the value to be 0. [dB]	
>>>$S_{HCS,RAT}$	OP		Integer (-105..91 by step of 2)	If a negative value is received the UE shall consider the value to be 0. [4] [dB]	
>>>$S_{limit,SearchRAT}$	MP		Integer (-105..91 by step of 2)	If a negative value is received the UE shall consider the value to be 0. [4] [dB]	
>>Qrxlevmin	MP		Integer (-115..-25 by step of 2)	RSCP, [dBm]	

Information Element/Group name	Need	Multi	Type and reference	Semantics description	Version
>>Delta$_{Qrxlevmin}$	CV-*Delta*		Integer(-4..-2 by step of 2)	If present, the actual value of Qrxlevmin = Qrxlevmin + Delta$_{Qrxlevmin}$	REL-5
Qhyst1$_S$	MP		Integer (0..40 by step of 2)	[4] [dB]	
Qhyst1$_{S,PCH}$	CV-*SIB4*		Integer (0..40 ~~by step of 0.5~~)	If present, it is used as Qhyst1$_S$ for UE in CELL_PCH or URA_PCH state [4] [dB]	REL-5
Qhyst1$_{S,FACH}$	CV-*SIB4*		Integer (0..40 ~~by step of 0.5~~)	If present, it is used as Qhyst1$_S$ for UE in CELL_FACH state [4] [dB]	REL-5
Qhyst2$_S$	CV-*FDD-Quality-Measure*		Integer (0..40 by step of 2)	Default value is Qhyst1$_S$ [4] [dB]	
Qhyst2$_{S,PCH}$	CV-*SIB4-FDD-Qualtiy-Measure*		Integer (0..40 ~~by step of 0.5~~)	If present, it is used as Qhyst2$_S$ for UE using CPICH Ec/No quality measure in CELL_PCH or URA_PCH state. Default value is Qhyst1$_{S,PCH}$ [4] [dB]	REL-5
Qhyst2$_{S,FACH}$	CV-*SIB4-FDD-Qualtiy-Measure*		Integer (0..40 ~~by step of 0.5~~)	If present, it is used as Qhyst2$_S$ for UE using CPICH Ec/No quality measure in CELL_FACH state. Default value is Qhyst1$_{S,FACH}$ [4] [dB]	REL-5
Treselection$_S$	MP		Integer (0..31)	[s]	
Treselection$_{S,PCH}$	CV-*SIB4*		Integer (0..31)	If present, it is used as Treselection$_S$ for UE in CELL_PCH or URA_PCH state [4] [s]	REL-5
Treselection$_{S,FACH}$	CV-*SIB4*		Integer (0..6.2 by step of 0.2)	If present, it is used as Treselection$_S$ for UE in CELL_FACH state [4] [s]	REL-5
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	The IE is not needed if the IE "Cell selection and reselection quality measure" has the value CPICH RSCP, otherwise the IE is mandatory and has a default value.
Delta	This IE is optional if the value of Qrxlevmin is below –115dBm. It is not needed otherwise.
SIB4	This IE is optional if the IE “Cell selection and re-selection info for SIB3/4” is included in SIB type 4. It is not needed otherwise.
SIB4-FDD-Qualtiy-Measure	This IE is optional if the IE “Cell selection and re-selection info for SIB3/4” is included in SIB type 4, and the IE "Cell selection and reselection quality measure" has the value CPICH Ec/N0. It is not needed otherwise.

1.2. 11.3 Information element definitions

```
InformationElements DEFINITIONS AUTOMATIC TAGS ::=

BEGIN
-- **************************************************
--
--     MEASUREMENT INFORMATION ELEMENTS (10.3.7)
--
-- **************************************************

[...]

SysInfoType4 ::=                    SEQUENCE {
    -- UTRAN mobility IEs
        cellIdentity                    CellIdentity,
        cellSelectReselectInfo          CellSelectReselectInfoSIB-3-4,
        cellAccessRestriction           CellAccessRestriction,
    -- Extension mechanism for non- release99 information
        v4b0NonCriticalExtensions       SEQUENCE {
            sysInfoType4-v4b0ext            SysInfoType4-v4b0ext-IEs,
            v590NonCriticalExtension        SEQUENCE {
                sysInfoType4-v590ext            SysInfoType4-v590ext,
                v5b0NonCriticalExtension        SEQUENCE {
                    sysInfoType4-v5b0ext            SysInfoType4-v5b0ext,
                    nonCriticalExtensions           SEQUENCE {}                     OPTIONAL
                } OPTIONAL
            }   OPTIONAL
        }   OPTIONAL
}

[...]

SysInfoType4-v590ext ::= SEQUENCE {
    cellSelectReselectInfo-v590ext      CellSelectReselectInfo-v590ext      OPTIONAL
}

SysInfoType4-v5b0ext ::= SEQUENCE {
    cellSelectReselectInfoPCHFACH-v5b0ext   CellSelectReselectInfoPCHFACH-v5b0ext       OPTIONAL
}

[...]


CellSelectReselectInfo-v590ext ::= SEQUENCE {
    deltaQrxlevmin                  DeltaQrxlevmin                  OPTIONAL,
    deltaQhcs                       DeltaRSCP                       OPTIONAL
}

CellSelectReselectInfoPCHFACH-v5b0ext ::= SEQUENCE {
    q-Hyst-l-S-PCH              Q-Hyst-S-Fine                       OPTIONAL,
    q-Hyst-l-S-FACH             Q-Hyst-S-Fine                       OPTIONAL,
    q-Hyst-2-S-PCH              Q-Hyst-S-Fine                       OPTIONAL,
    q-Hyst-2-S-FACH             Q-Hyst-S-Fine                       OPTIONAL,
    t-Reselection-S-PCH         T-Reselection-S                     OPTIONAL,
    t-Reselection-S-FACH        T-Reselection-S-Fine                OPTIONAL
}

[...]
```

```
-- Actual value Q-Hyst-S = IE value * 2
Q-Hyst-S ::=      INTEGER (0..20)

-- Actual value Q-Hyst-S-Fine = IE value * 0.5
Q-Hyst-S-Fine ::= INTEGER (0..4080)

[...]


T-Reselection-S ::=     INTEGER (0..31)

-- Actual value T-Reselection-S-Fine = IE value * 0.2
T-Reselection-S-Fine ::=INTEGER (0..31)
```